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Application integration at electric utilities – System interfaces for distribution management –

Part 9: Interfaces for meter reading and control

Intégration d'applications pour les services électriques – Interfaces système pour la gestion de distribution –

Partie 9: Interfaces pour le relevé et la commande des compteurs



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3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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**APPLICATION INTEGRATION AT ELECTRIC UTILITIES –
SYSTEM INTERFACES FOR DISTRIBUTION MANAGEMENT –****Part 9: Interfaces for meter reading and control**

FOREWORD

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International Standard IEC 61968-9 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This second edition cancels and replaces the first edition published in 2009. This edition constitutes a technical revision and includes the following significant technical changes with respect to the previous edition:

- a) changes to and addition of new profiles to support PAN and UsagePoints;
- b) extensions to support PAN devices generically as EndDevices;
- c) extensions to the MeterReading model and profiles to support richer descriptions of metered quantities and to accommodate coincident readings;
- d) addition of CIM Name class and corresponding revisions to profiles to allow reference by name instead of by mRID. Where the document may identify the use of mRID values as references, Name.name values may be alternatively used. This is described in more detail in Annex G;

- e) reference of ReadingTypes, EndDeviceEventTypes and EndDeviceControlTypes using name references;
- f) definition of normative enumerations for ReadingTypes, EndDeviceEventTypes and EndDeviceControlTypes in annexes;
- g) various corrections to example sequence diagrams;
- h) Removal of MeterAssetReading profile, where functionality is supported using the MeterReading profile;
- i) MeterAsset class is now named Meter;
- j) MeterAssetConfig profile now named MeterConfig;
- k) EndDeviceAssets profile now named EndDeviceConfig;
- l) removal of EndDeviceFirmware profile, where functionality is supported using the EndDeviceConfig profile;
- m) use of new namespaces to reflect the new edition, where the namespaces is reflective of the year in which a profile is defined;
- n) adoption of UsagePoint as a replacement for and a generalization of ServiceDeliveryPoint;
- o) SDPLocationConfig has been deprecated in favor of UsagePointLocationConfig;
- p) some profiles previously defined have been moved into the new subclause 5.10 which is focused on data linkages;
- q) elimination of the MeterSystemEvents profile, as it provided no functionality that could not be achieved with the EndDeviceEvents profile;
- r) there were several profiles originally defined in support of prepayment use cases that were identified to be more general in nature, and were consequentially moved to 5.10. Subclause 5.8 now consists of only those profiles that are specific to prepayment. In all cases there has been some refactoring of these profiles to reflect other necessary changes that have been described;
- s) supplierConfig has been renamed ServiceSupplierConfig;
- t) messages using the SUBSCRIBE verb have been removed as these are related to the underlying communication transport and do not reflect actual IEC 61968 messages.

The text of this standard is based on the following documents:

FDIS	Report on voting
57/1377/FDIS	57/1394/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

A list of all parts in the IEC 61968 series, published under the general title *Application integration at electric utilities – System interfaces for distribution management*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
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INTRODUCTION

The purpose of this document is to define a standard for the integration of Metering Systems (MS), which would include traditional (one or two-way) Automated Meter Reading (AMR) Systems, with other systems and business functions within the scope of IEC 61968. The scope of this standard is the exchange of meter reading, transactions, event and control information between systems within the utility enterprise and between enterprises. The specific details of communication protocols those systems employ are outside the scope of this standard. Instead, this standard will recognize and model the general capabilities that can be potentially provided by advanced and/or legacy meter infrastructures, including two-way communication capabilities such as load control, dynamic pricing, outage detection, distributed energy resource (DER) control signals and on-request read. In this way, this standard will not be impacted by the specification, development and/or deployment of next generation meter infrastructures, either through the use of standards or proprietary means.

The IEC 61968 series of standards is intended to facilitate inter-application integration as opposed to intra-application integration. Intra-application integration is aimed at programs in the same application system, usually communicating with each other using middleware that is embedded in their underlying runtime environment, and tends to be optimised for close, real-time, synchronous connections and interactive request/reply or conversation communication models. IEC 61968, by contrast, is intended to support the inter-application integration of a utility enterprise that needs to connect disparate applications that are already built or new (legacy or purchased applications), each supported by dissimilar runtime environments. Therefore, these interface standards are relevant to loosely coupled applications with more heterogeneity in languages, operating systems, protocols and management tools. This series of standards is intended to support applications that need to exchange data every few seconds, minutes, or hours rather than waiting for a nightly batch run. This series of standards, which are intended to be implemented with middleware services that exchange messages among applications, will complement, not replace utility data warehouses, database gateways, and operational stores.

As used in IEC 61968, a Distribution Management System (DMS) consists of various distributed application components for the utility to manage electrical distribution networks. These capabilities include monitoring and control of equipment for power delivery, management processes to ensure system reliability, voltage management, demand-side management, outage management, work management, automated mapping and facilities management. Standard interfaces are defined for each class of applications identified in the Interface Reference Model (IRM), which is described in IEC 61968-1, *Interface architecture and general requirements*.

This part of IEC 61968 contains the clauses listed in Table 1 below.

Table 1 – Document overview for IEC 61968-9

Clause	Title	Purpose
1	Scope	The scope and purpose of the document are described.
2	Normative References	Documents that contain provisions which, through reference in this text, constitute provisions of this International Standard.
3	Terms, Definitions and Abbreviations	
4	Reference and Information Models	Description of general approach to metering system, reference model, use cases, interface reference model, meter reading and control functions and components, message type terms and static information model.
5	Meter Reading and Control Message Types	Message types related to the exchange of information for documents related to meter reading and control.
6	Document Conventions	
Annex A	Message Type Verbs	Description of the Verbs that are used for the message types
Annex B	CIM Extensions	CIM extensions to support the recommended message structure for meter reading and control
Annex C	Procedure for the generation of a ReadingTypeIcd	Technique for constructing, and offers recommended enumerations for the ReadingTypeIcd textual name and mRID.
Annex D	QualityCode enumerations	Technique for constructing, and offers recommended enumerations for reading quality codes
Annex E	EndDeviceEvent Code enumerations	Defines EndDevice alarm and event codes
Annex F	EndDeviceControl code enumerations	Defines EndDevice control codes.
Annex G	Maintaining Relationships Between Objects	Describes the use of the master resource identifier (mRID) and Names.
Annex H	XML Schemas for message payloads	To provide xsd information for use by developers to create IEC 61968-9 messages.
Annex I	Mappings	To provide mappings between IEC 61968-9 MeterReadings and other standards.
Annex J	Request Parameters	Describes the qualification of GET requests using Request parameters.
Annex K	Master Data Management Transaction Processing	Describes how complex Master data Management / Data Synchronization transactions are conveyed and the associated processing rules.
Annex L	Master Data Management Use Cases and Sample XML	Describes many of the common Master Data Management use cases and provides sample XML to illustrate intended usage of the various Master Data Management related profiles.

Future editions of IEC 61968-9 will strive to have changes be 'non-breaking', where the namespace of the previous version may be preserved, but the Revision attribute in the XSD is incremented.

APPLICATION INTEGRATION AT ELECTRIC UTILITIES – SYSTEM INTERFACES FOR DISTRIBUTION MANAGEMENT –

Part 9: Interfaces for meter reading and control

1 Scope

This part of IEC 61968 specifies the information content of a set of message types that can be used to support many of the business functions related to meter reading and control. Typical uses of the message types include meter reading, controls, events, customer data synchronization and customer switching. Although intended primarily for electrical distribution networks, IEC 61968-9 can be used for other metering applications, including non-electrical metered quantities necessary to support gas and water networks.

The purpose of this part of IEC 61968 is to define a standard for the integration of metering systems (MS), which includes traditional manual systems, and (one or two-way) automated meter reading (AMR) systems, and meter data management (MDM) systems with other enterprise systems and business functions within the scope of IEC 61968. The scope of this part of IEC 61968 is the exchange of information between metering systems, MDM systems and other systems within the utility enterprise. The specific details of communication protocols those systems employ are outside the scope of this International Standard. Instead, this International Standard will recognize and model the general capabilities that can be potentially provided by advanced and/or legacy meter infrastructures, including two-way communication capabilities such as load control, dynamic pricing, outage detection, distributed energy resource (DER) control signals and on-request read. In this way, this standard will not be impacted by the specification, development and/or deployment of next generation meter infrastructures either through the use of standards or proprietary means.

The diagram in Figure 1 describes the scope of this part of IEC 61968 from the perspective of direct and causal or indirect impacts of IEC 61968-9 messages. Where the focus of IEC 61968-9 is to define standard messages for the integration of enterprise applications, these messages may be directly or indirectly related to information flows within a broader scope. Examples would include messaging between head end systems and meters or PAN devices. The various components described later in this document will typically fall into either the category of a metering system (MS) head end, an MDM or other enterprise application (e.g. OMS, DRMS, CIS).

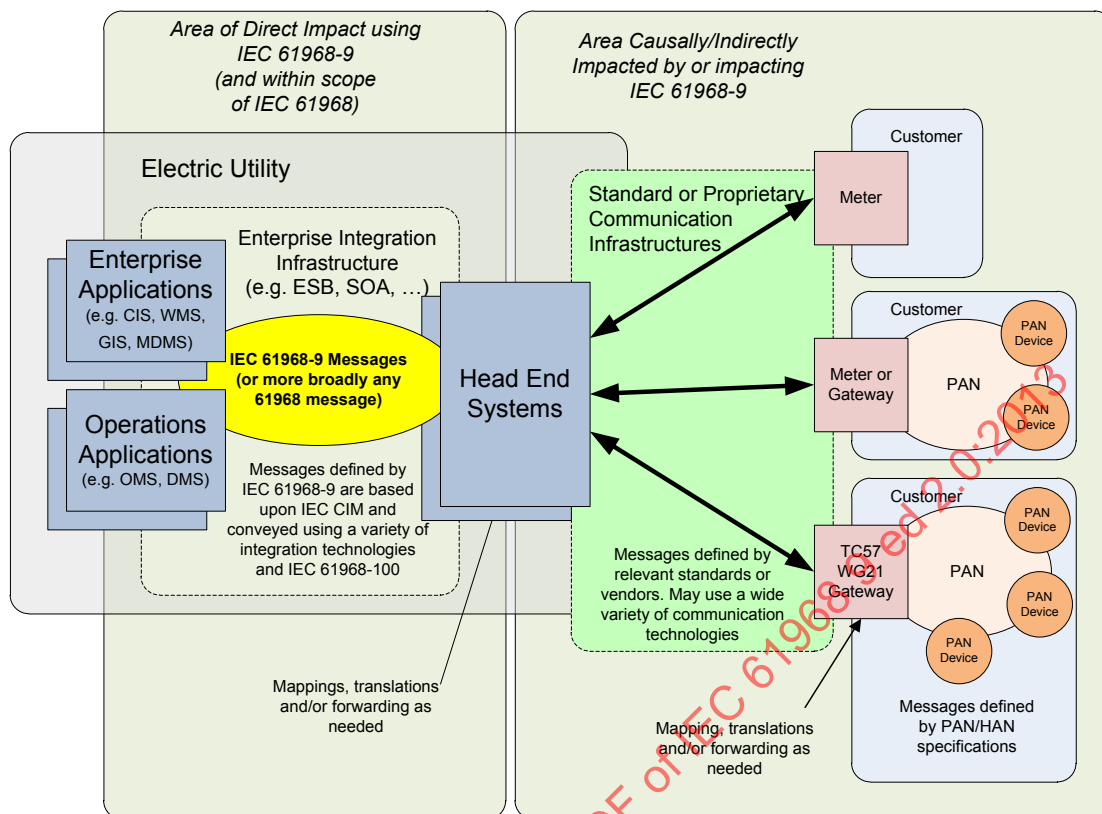


Figure 1 – IEC 61968-9 scope

The capabilities and information provided by a meter reading and meter data management systems are important for a variety of purposes, including (but not limited to) interval data, time-based demand data, time-based energy data (usage and production), outage management, service interruption, service restoration, quality of service monitoring, distribution network analysis, distribution planning, demand response, customer billing and work management. This standard also extends the CIM (Common Information Model) to support the exchange of meter data.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-300, *International Electrotechnical Vocabulary (IEV) – Electrical and electronic measurements and measuring instruments – Part 311: General terms relating to measurements – Part 312: General terms relating to electrical measurements – Part 313: Types of electrical measuring instruments – Part 314: Specific terms according to the type of instrument*

IEC 61968-1, *Application integration at electric utilities – System interfaces for distribution management – Part 1: Interface architecture and general recommendations*

IEC/TS 61968-2, *Application integration at electric utilities – System interfaces for distribution management – Part 2: Glossary*

IEC 61968-11, *Application integration at electric utilities – System interfaces for distribution management – Part 11: Common information model (CIM) extensions for distribution*

IEC 61968-100:2013, *Application integration at electric utilities – System interfaces for distribution management – Part 100: Implementation profiles*

IEC 61970-301, *Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base*

IEC/TR 62051-1, *Electricity metering – Data exchange for meter reading, tariff and load control – Glossary of terms – Part 1: Terms related to data exchange with metering equipment using DLMS/COSEM*

ISO 8601:2004, *Data Elements and Interchange Formats – Information Interchange – Representation of Dates and Times*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this standard, the terms and definitions given in IEC 60050-300, IEC/TS 61968-2, IEC/TR 62051-1, IEC 62055-31 and the following terms apply.

NOTE Where there is a difference between the definitions in this standard and those contained in other referenced IEC standards, then those defined in IEC/TS 61968-2 shall take precedence over the others listed, and those defined in IEC 61968-9 shall take precedence over those defined in IEC/TS 61968-2.

3.1.1

customer program

classification scheme for the sale of energy to consumers according to a particular tariff

Note 1 to entry: The program may specify the purpose, conditions on the time of use, the service voltage(s), the volumes consumed, and/or other terms as a condition of the sale.

Note 2 to entry: Utilities may promote particular programs to their industrial, commercial, agricultural, and residential customers in an effort to encourage a particular behaviour, or to make them aware of their options.

3.1.2

demand response

set of processes and programs that are used to reduce consumption

Note 1 to entry: This may be done on an economic, mandatory or emergency basis.

3.1.3

end device

equipment located at the end of the communication system, usually on the customer premises

Note 1 to entry: An end device may perform functions such as metrology, connect/disconnect, load control, demand response, or other functions, and may have power relay and/or local communications capability. This is represented within the CIM using the EndDevice class. Meters and PAN devices are examples of end devices.

3.1.4

head end

component of a metering system that collects data from and issues controls to end devices

Note 1 to entry: A head end may also manage the communication system used to communicate with the end devices. From the perspective of enterprise integration, the head end acts as a proxy for end devices.

3.1.5

gateway

device that may be used to manage devices on a PAN and participate in internet-based interactions

Note 1 to entry: A gateway may apply a transformation from one protocol to another.

3.1.6**load control device**

type of EndDevice which can receive signals causing it to shed load for the purposes of maintaining network reliability and/or commercial agreements

3.1.7**meter**

type of end device which performs metrology and supports the tariffing of the distribution and/or transmission network

Note 1 to entry: This is represented using the CIM Meter class, which is a subclass of EndDevice.

Note 2 to entry: As an end device, a meter will typically, but not always, have a communication link with a head end system.

3.1.8**meter changeout**

meter exchange

process of replacing an existing meter with a new meter

Note 1 to entry: The installer will customarily follow a work order which specifies a given location, and usually requires that he or she capture readings from the old and new meters, and record the time and day in which the work was performed.

3.1.9**meter data manager**

system that manages meter data, and typically provides a variety of value added functionalities such as VEE

3.1.10**premise area network**

fully inclusive of the scope of a home area network (HAN) as it also covers commercial premises

3.1.11**PAN device**

type of end device that is located on a customer premise and communicates using a PAN

Note 1 to entry: A PAN device can typically accept controls and/or report events.

Note 2 to entry: PAN devices commonly use meters as communication gateways.

3.1.12**payment meter**

electricity meter with additional functionalities that can be operated and controlled to allow the flow of energy according to agreed payment modes

Note 1 to entry: Typically this involves prepayment for electricity.

3.1.13**prepayment mode**

payment mode in which automatic interruption occurs when available credit is exhausted

3.2 Abbreviations

AM	asset management
AMR	automated meter reading
AMI	advanced metering infrastructure
CIM	common information model
CIS	customer information system

COSEM	companion specification for energy metering
DLMS UA	device language message specification user association
DMS	distribution management system
DR	demand response
DRMS	demand response management system
HAN	home area network
IDR	interval data recorder
IEC	International Electrotechnical Commission
LC	load control
LDC	load control system
LMS	load management system
MAM	meter asset management
MDM	meter data management
MDM	master data management
MM	meter maintenance
MR	meter reading
MS	metering system
NO	network operations
OMS	outage management system
POS	point of sale
PAN	premise area network (includes scope of HAN)
RF	radio frequency
SM	smart meter
UML	unified modeling language
VEE	validating, editing, and estimating
WM	work management
XSD	XML schema

4 Reference and information models

4.1 General approach to metering systems

The spinning disk in an electromechanical meter generally serves as a pulse initiator to the meter recorder module. In a similar fashion, solid-state meters may also employ a metrology unit that generates pulses which represent a fraction of a kWh, and if more sophisticated, the solid-state meter may have a meter recorder which is able to accumulate many different kinds of information and store it for presentation to the meter communications module using a message and table-driven protocol such as ANSI C12.19 or IEC 62056.

The most common metered data element is kWh, but many electricity meters can also capture kW, kVar, kVarh, and other similar billing quantities. Some meters can also capture pure engineering quantities such as voltage, current, power factor, etc.

Some AMR systems attempt to add value to meters by adding functionality that the meter may lack. For simple meters (e.g. energy only) it is common for an AMR meter module to add the capability to perform demand metering, Interval Data Recording (IDR), maintain an energisation count, or even provide estimates of certain engineering quantities such as voltage.

Commercial and Industrial meters often employ current transformers and voltage transformers to meter the actual service. Primary voltages and currents are scaled down using potential transformers (PTs) and current transformers (CTs) so that the meter does not have to be constructed to withstand the high voltages and currents actually delivered to the load. Secondary voltage or current values are those that are often measured directly by the meter. Secondary values are small percentage of the primary values that may actually delivered to or connected to the load. If secondary voltages and currents are measured by the meter, these can be converted back to primary values using the PT and CT ratios, which are just the ratio of primary to secondary values.

The metering system will convey meter data and other value-added data through the metering system network to the destination. Depending on the system, the journey may involve multiple steps through public or private networks, licensed or unlicensed RF spectrums, standardized or proprietary systems, in a one-way or two-way fashion.

Some general operations or services can be defined for a metering system. These general operations will translate to specific actions in the context of a given metering solution.

General operations can be scheduled or called on-demand. Each operation returns an answer with an optional status. A message encapsulates a general operation.

Readers of IEC 61968-9 interested in additional information may refer to other standards including IEC 62056, DLMS UA (Device Language Message Specification User Association) and the COSEM model: COmpanion Specification for Energy Metering.

4.2 Reference Model

4.2.1 General

The following diagrams serve as reference models and provide examples of the logical components and data flows related to this International Standard. Subclause 4.5.2 provides references to terms that are defined by the CIM.

The “meter” is a specialization of an “end device”. The end device may contain a metrology capability, it may contain a communications capability, it may be a load control unit, and it may contain a mixture of many different types of functionality. Figure 2 attempts to describe the concept of essentially a shopping-list of functionality which may be available in the (logical or physical) end device.

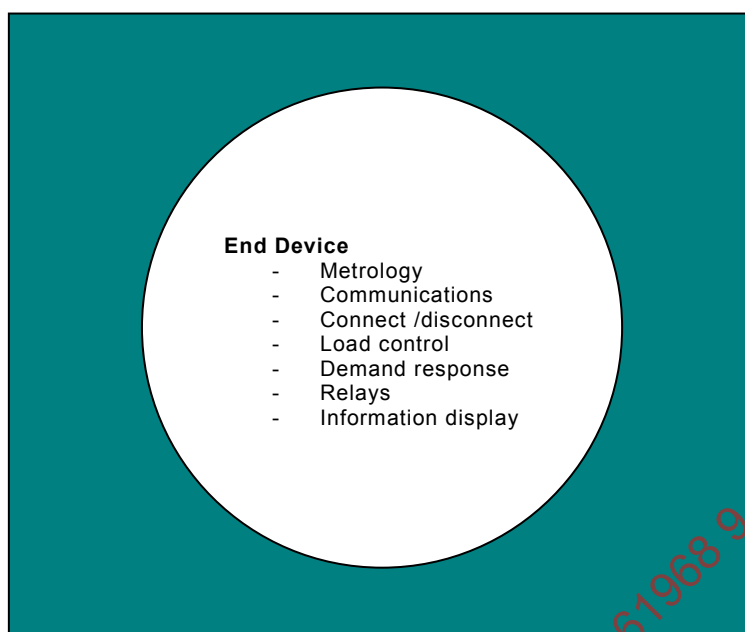


Figure 2 – Example of an end device with functions

The end device itself, while presenting a myriad of functionality, is not the subject of this standard. There are many interactions which ultimately affect the end device but occur as a result of a communication between systems at a much higher level in the control architecture. The interaction between systems is within the scope of this standard, and Figure 3 is an informative view of the systems involved and provides an overview to the stakeholder community.

From the perspective of this standard, an end device:

- has a unique identity (mRID and/or one or more instances of the Names class)
- is managed as a physical asset
- may issue events
- may receive control requests
- may collect and report measured values
- may participate in utility business processes

The following diagrams of Figures 3 and 4 describe the flows between the components in the reference model. Two diagrams are used in order to reduce the complexity that would be experienced by a single diagram. The numbers in brackets provide linkages to the flow definitions.

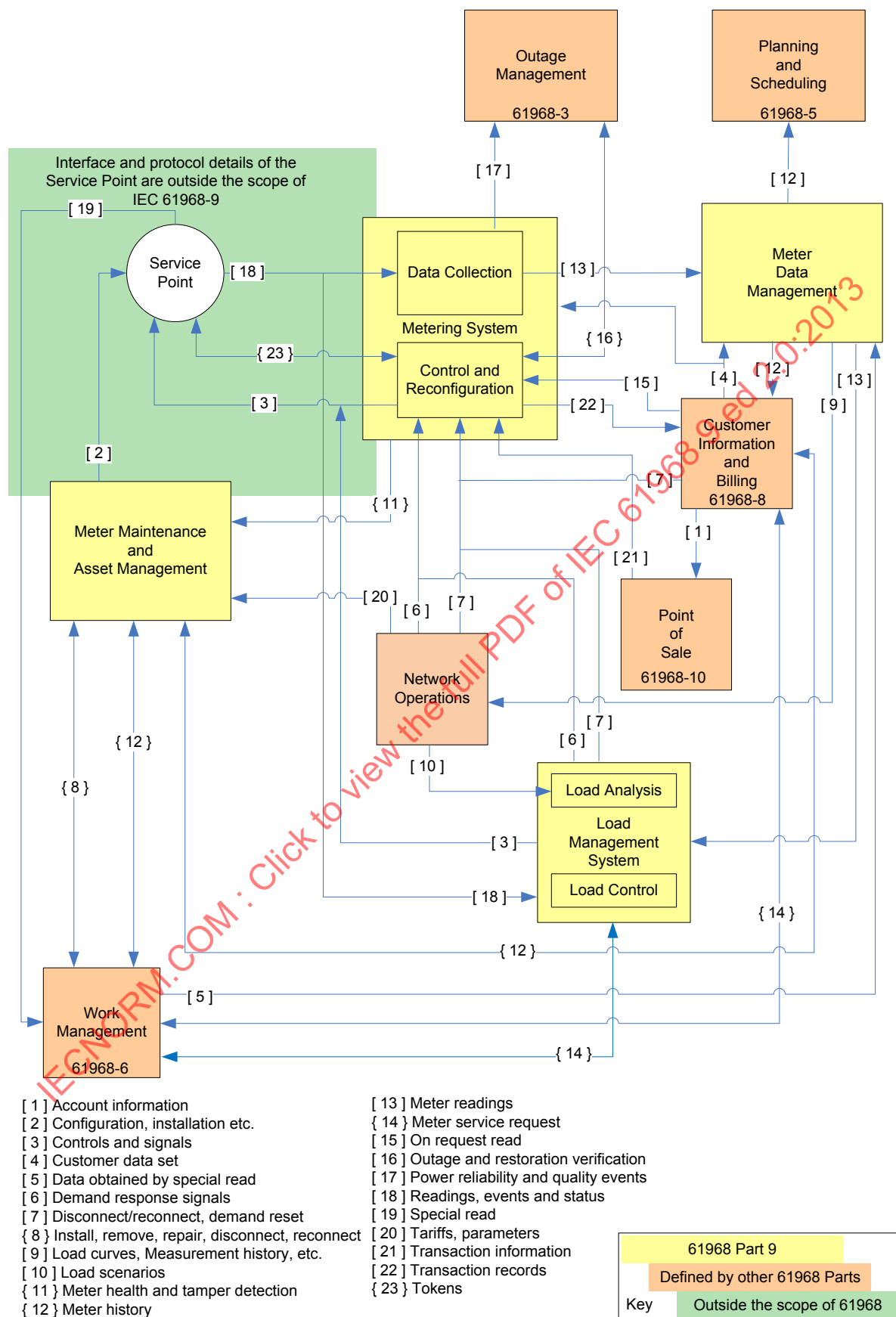


Figure 3 – IEC 61968-9 reference model

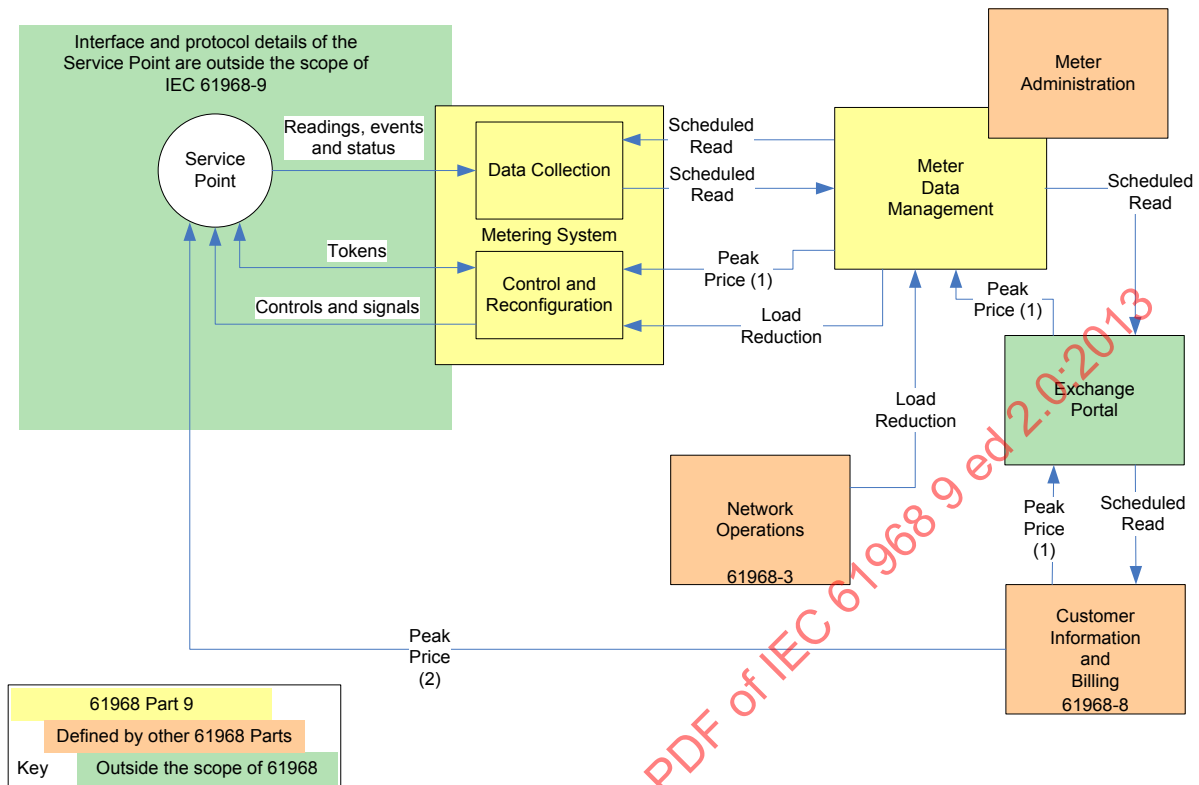


Figure 4 – IEC 61968-9 Reference model with customer information and billing system

The reference architecture reflects five main logical components (potentially realized as systems or subsystems) related to metering:

- metering system, potentially including data collection and control and reconfiguration functionality
- meter data management, which may include meter administration functions
- meter maintenance
- load management, potentially including load control and load analysis functionality
- meter asset management.

The metering system and meter maintenance system components may be bound to a specific meter and associated communication technology or they may support multiple meters (and more generically end devices) types and associated communication technology. The meter data management system component may support and consolidate meter data from more than one metering system. The metering system may also support consolidation of various measurement and data collection implementations, providing a consistent interface to the meter data management system component.

4.2.2 Metering system (MS) – Data collection

The tasks of the data collection sub-component within the metering system may include:

- readings and status collection. Readings and status may be obtained through either manual or automated means, on a scheduled or on-request basis
- transmission of meter readings and status to a meter data management system

- transmission of power reliability and quality event data to outage management, network operations, and capacity planning systems
- transmission of communication network health information to those responsible for maintaining the communications network.

It is important to note that metering systems are significantly diverse with respect to technologies used, protocols used, capabilities and frequency of data collection. The details of the internals of meters, communication transports and protocols are outside the scope of this international standard.

A handheld device used by a human meter reader could be regarded as a metering system. In a typical meter reading by human, a reader inputs meter data into a handheld device in a field. The handheld device is not connected to a communication network in a field. At the end of day work, the handheld device is connected to a communication network at reader's home (not in an office), and meter data is uploaded to a meter data management system. In this case, this communication network should be part of a metering system. Data collection is described in IEC 61968-1 as "MR-RMR."

4.2.3 Metering system (MS) – Control and reconfiguration

The tasks of the control and reconfiguration subcomponent within the metering system are:

- primary interface in executing meter control commands
- communicating payment system information
- act as a communication gateway for load control devices
- service connect / disconnect
- configuration of tariff units of measure and calendar
- configuration of power quality measurement
- configuration of meter event recording
- relay of load control signals
- configuration of meter identity and security credentials
- fraud detection.

This subcomponent is identified separately within the metering system in order to recognize the existence of metering systems that do not have the ability to send messages to meters. IEC 61968-1 describes this subcomponent as "MR-MOP-Meter Configuration." Metering systems with these capabilities are often referred to as "AMI".

4.2.4 Load control

The Metering System Infrastructure may often be used as a communication gateway to load control units. Load control units are end devices with load control (LC) capability. These are wired to control individual, target devices. End devices with LC functionality can take on different forms. Quite often a dedicated LC unit can be located at (or near) the device to be controlled. Another approach is to use meters that have relays which are configured to serve as LC devices. Still another approach is to interface with a customer energy management system (which would be another type of end device).

4.2.5 Load management system (LMS)

A load management system is used to manage and control load by the utility in order to promote system reliability. A load management system may perform load forecasting, contingency analysis, and other simulations prior to issuing a load control command.

4.2.6 Meter asset management (MAM) system

Utilities will employ some form of asset management software in an effort to maintain detailed records regarding their physical assets. Asset management is treated categorically in IEC 61968-4. However, metering has such special requirements that it is common for a utility to use specialized Meter Asset Management software. The software inventories the asset – providing a record of its physical attributes as well as its location. For sake of discussion, the IEC 61968-9 document will talk about a MAM system which is closely coupled to the MS and MDM, though some implementations will successfully generalize the asset management application sufficiently so that it can live within a more generic AM system.

4.2.7 Meter data management (MDM) system

From a historical perspective, it was common for a utility to have more than one automated meter reading system. Alternatively, a utility might outsource meter reading services to one or more third-party service providers who operate an AMR system and/or read the meters manually. The meter data management (MDM) system is used to provide a common repository, and point of management and access of meter data that is collected from disparate metering systems. In addition to data aggregation, quite often the MDM will also make an effort to scrutinize the data collected from the various metering systems, and provide a validating, editing, and estimating (VEE) capability. MDM systems will frequently also provide functionality involving issue, control, and tracking of EndDeviceControls and endDeviceEvents.

4.2.8 Customer information system (CIS)

A CIS will typically encompass functionality related to customer care and billing. This is a subject which is external to the IEC 61968-9 standard. The billing function is driven by readings, typically demand or time-of-use, obtained from the meter. The CIS is also often involved with processes related to billing inquiries, meter disconnect and meter reconnect, rate program changes.

The CIS is frequently the “source of record” in utility enterprises for master data defining key entities such as meters, other end devices, usage points, service suppliers, customers, pricing structures, etc. and the relationships between these entities. See 5.10 and Annexes K and L for additional information related to master data management / data synchronization.

4.2.9 Outage management system (OMS)

An outage management system (OMS) is used by distribution operators to detect and track outages, and to assist in the process of verification and/or restoration of service. An OMS typically combines (or has ties to) functionality such as network operations fault management; operational planning and optimisation, network operation simulation; maintenance and construction; maintenance and inspection; and work scheduling and dispatching.

The metering system can be an important source of information for identifying the existence and extent of outages, and can be used to verify the restoration of outages. The MS might have the ability to publish outage and restoration data to the OMS as it finds it. This type of information typically joins customer call-ins in the OMS to allow it to better predict the location of the outage. However, due to the time-sensitive nature of outage detection, there is also the potential need for a request/reply interface with the MS, where the OMS can ask for specific equipment on the distribution network to be tested by the MS, and an energisation status returned for analysis. The request/reply interface can be used by the OMS to supply critical data needed to make an outage prediction, or by a dispatcher who would like to verify that power has been restored to all of the metered endpoints downstream of a particular switch prior to sending the lineman to the next location.

It is also relatively common for MDM systems to act as an intelligent agent in the brokering of outage related messages between Metering Systems and Outage Management Systems.

4.2.10 Network operations (NO)

Network Operations (IEC 61968-3) may occasionally need to issue load control and pricing signals to meters. This can be done for both economic and emergency reasons.

4.2.11 Meter maintenance (MM)

Meter Maintenance is responsible for functionality related to the configuration and installation of meters. This type of functionality generally falls under Meter Asset Management, or Asset Management in general. Performing meter maintenance may require exchanges with Work Management.

4.2.12 Planning

The planning function is described as operational planning and optimisation, network operation simulation.

4.2.13 Work management (WM)

A Work Management system is responsible for work that is performed by field resources. This subject is covered in maintenance and construction maintenance and inspection (IEC 61968-6).

With respect to metering, WM includes the installation, maintenance and replacement of meters. This may also involve the process of special reads.

4.2.14 Point of sale (POS)

A Point of Sale (POS) system is used for the management of payment meters, where a customer either purchases a token or makes a payment for service.

4.2.15 Meter

The meter records the data used for tariffing public networks, and data used for network balancing mechanisms. Meters are a subtype of EndDevice.

Readings captured by the metering system are collected by a system such as the MDM before being presented for billing purposes. Billing entities may correct the data, or, in some regions, the energy supplier may perform validating, editing, and estimating (VEE) according to rules established by the appropriate supervising regulatory agency. In any case, those corrections are made available to the user who requests them.

Where this international standard refers to a "Meter", it should be realized that a "Meter" is an end device that has metrology capability, it may or may not have communications capability, it may or may not have connect/disconnect capability, or a host of other capabilities. Given that a meter will have metrology capability, electricity meters will in all likelihood meter kWh, but possibly also demand, reactive energy and demand, time of use quantities, interval data, engineering quantities and more. In like manner, meters for other commodities such as gas and water may monitor analogous quantities.

4.2.16 Load control devices

Load control devices are used to control loads at a UsagePoint. The metering system may often have a communication network which can be used for transmitting load control signals (EndDeviceControls) in order to control the load presented by the EndDevice(s). Alternatively, the communication network could be used to communicate demand response (price) signals to devices in order to affect the load presented by the EndDevice(s). PAN devices can also provide load control functions.

4.2.17 PAN devices

PAN devices are used for a variety of purposes within a customer premise. The meter is often used as a gateway for communication between the head end system and the PAN device. PAN devices may react to control messages or generate EndDeviceEvents. Some PAN devices, such as in-home displays, may also present information to consumers. PAN devices may be configured to react to pricing or other demand response related signals that are issued as EndDeviceControls. PAN devices are modelled as EndDevices in the CIM.

4.2.18 Demand response management system (DRMS)

Demand Response Management Systems are used to manage registration in DR programs, send events to program participants and collect related performance information as needed for settlements.

4.3 Interface reference model

It is not the intention of this standard to define the applications and systems that vendors should produce. It is expected that a concrete (physical) application will provide the functionality of one or more abstract (logical) components as listed in this standard. These abstract components are grouped by the business functions of the Interface Reference Model.

In this standard, the term abstract component is used to refer to that portion of a software system that supports one or more of the interfaces defined in Parts 3 to 9. It does not necessarily mean that compliant software is delivered either as separate modules nor as a single system.

IEC 61968-1 describes infrastructure services common to all abstract components while IEC 61968-3 to -9 define the details of the information exchanged for specific types of abstract component.

IEC 61968 defines that:

- a) An inter-application infrastructure is compliant if it supplies services defined in IEC 61968-1 to support at least two applications with interfaces compliant to sections of IEC 61968-3 to -9.
- b) An application interface is compliant if it supports the interface standards defined in IEC 61968-3 to -9 for the relevant abstract components defined in the Interface Reference Model.
- c) An application is only required to support interface standards of the applicable components listed under abstract components. An application is not required to support interfaces required by other abstract components of the same business sub-function or within the same business function. While this standard primarily defines information exchanged among components in different business functions, it will occasionally also define information exchanged among components within a single business function when a strong market need for this capability has been realised.

4.4 Meter reading and control functions and components

It should be noted that the message types defined in this "standard may be sent or received by any type of component within a distribution management system (DMS) system.

Table 2 shows these functions and typical abstract components that are expected to be producers of information for these message types. Typical consumers of the information include, but are not restricted to, the other components as listed in IEC 61968-1.

Table 2 – Business functions and abstract components

Business functions	Business sub-functions	Abstract components
Meter reading and control (MR)	Metering system (MS)	Data collection
		End point controls
		End point reconfiguration
		Disconnect/reconnect
		Demand reset
		On request read
		Point of sale
		Outage detection and restoration verification
		Power reliability and quality events
		Metering system events
	Meter maintenance and asset management	End point install, configure, remove, repair, disconnect, reconnect
		End point asset history
		End point reconfiguration
		Special read
		Meter service request
		Tariffs
	Meter data management (MDM)	Meter data repository
		Usage history
		Validation, estimation and editing
		Customer billing data
		End device controls and events
	Demand response (DR)	Real-time pricing
		Emergency reductions
		Economic reductions
		Program registration
	Load management (LM)	Load analysis
		Load control
		Demand response
		Performance measurements
		Risk management

4.5 Static information model

4.5.1 General

The information model relevant to meter reading and control consists of classes that provide a template for the attributes for each message.

The classes are defined in detail in IEC 61968-11, *Common Information Model (CIM) extensions for distribution* or in IEC 61970-301, *Energy management system application program interfaces – Common Information Model core*.

4.5.2 Classes for meter reading and control

Table 3 lists classes used within message types. Usually all the attributes of these classes are contained within a message type. The descriptions provided describe usage within this part.

Classes described as type "Asset" are defined in the 61968/Assets package of the CIM.

Classes described as type "Customer" are defined in the 61968/Customers package of the CIM.

Classes described as type "Metering" are defined in the 61968/Metering package of the CIM.

Classes described as type "PaymentMetering" are described in the 61968/PaymentMetering" package of the CIM.

Classes described as type "Profile" are contextual profiles defined for 61968-9 that describe message definitions defined using CIM objects.

Table 3 – Classes for meter reading and control

Class/Noun	Type	Description
AuxiliaryAccount	PaymentMetering	Variable and dynamic part of AuxiliaryAgreement, generally representing the current state of the account related to the outstanding balance defined in AuxiliaryAgreement.
AuxiliaryAgreement	PaymentMetering	An ad-hoc auxiliary account agreement associated with a customer agreement, not part of the customer's account, but typically subject to formal agreement between customer and supplier (utility). Typically this is used to collect revenue owing by the customer for other services or arrears accrued with the utility for other services. It is typically linked to a prepaid token purchase transaction, thus forcing the customer to make a payment towards settlement of the auxiliary account balance whenever he needs to purchase a prepaid token for electricity. The present status of AuxiliaryAgreement can be defined in the context of the utility's business rules, for example: enabled, disabled, pending, over recovered, under recovered, written off, etc.
AuxiliaryAgreementConfig	Profile	Message profile for AuxiliaryAgreements.
Card	PaymentMetering	Documentation of the tender when it is a type of card (credit, debit, etc).
Cashier	PaymentMetering	The operator of the point of sale for the duration of CashierShift. Cashier is under the exclusive management control of Vendor.
CashierShift	PaymentMetering	The operating shift for a cashier, during which he may transact against the CashierShift, subject to VendorShift being open.
Channel	Metering	A single path for the collection or reporting of register values over a period of time. For example, a register which measures forward energy can have two channels, one providing bulk quantity readings and the other providing interval readings of a fixed interval size.
Charge	PaymentMetering	A charge element associated with other entities such as tariff structures, auxiliary agreements or other charge elements. The total charge amount applicable to this instance of Charge is the sum of fixedPortion plus percentagePortion.
Cheque	PaymentMetering	The actual tender when it is a type of cheque. Cheque reference number (as printed on the cheque) is specified in 'name.'
ComFunction	Metering	Communication function of communication equipment or a device such as a meter.
ComModuleConfig	Profile	Profile for configuring communications modules.

Class/Noun	Type	Description
ConfigurationEvent	Metering	Used to report details on creation, change or deletion of an entity or its configuration.
ConsumptionTariffInterval	PaymentMetering	One of a sequence of intervals defined in terms of consumption quantity of a service such as electricity, water, gas, etc. It is typically used in association with TariffProfile to define the steps or blocks in a step tariff structure, where startValue simultaneously defines the entry value of this step and the closing value of the previous step. Where consumption is $\geq$ startValue it falls within this interval and where consumption is $<$ startValue it falls within the previous interval.
Customer	Customers	Organisation receiving services from ServiceSupplier.
CustomerAccount	Customers	Assignment of a group of products and services purchased by the Customer through a CustomerAgreement, used as a mechanism for customer billing and payment. It contains common information from the various types of CustomerAgreements to create billings (invoices) for a Customer and receive payment.
CustomerAccountConfig	Profile	Message profile for CustomerAccounts.
CustomerAgreement	Customers	Agreement between the Customer and the ServiceSupplier to pay for service at a specific ServiceLocation. It records certain billing information about the type of service provided at the ServiceLocation and is used during charge creation to determine the type of service.
CustomerAgreementConfig	Profile	Message profile for CustomerAgreements.
CustomerMeterDataSet	Profile	The CustomerMeterDataSet includes one or more CustomerAccounts for one or more ServiceLocations for one or more UsagePoints. TheCustomerMeterDataSet may include one or more EndDeviceGroups.
DemandResponseProgram	Metering	Demand response program.
DeviceFunction	Metering	Function performed by a device such as a meter, communication equipment, controllers, etc.
EndDevice	Metering	The EndDevice is equipment that performs the role of an end device. It may contain functionality such as metrology, communications, load control, connect/disconnect, or other capabilities. It is known as "the meter", "a smart meter", an "advanced meter", "air conditioner", "refrigerator", "pool pump", etc. that a CommModule and/or Meter may monitor and/or control. The asset may be owned by a consumer, a service provider, utility or other party.
EndDeviceConfig	Profile	Message used to convey descriptions of one or more EndDevices.
EndDeviceControl	Metering	Used to issue commands to EndDevices such as meters. May be addressed by EndDevice or by EndDeviceGroup. EndDeviceControls may have control types and parameters.
EndDeviceControls	Profile	Message used to convey one or more EndDeviceControls
EndDeviceControlType	Metering	Defines types of EndDeviceControls
EndDeviceEvent	Metering	Used to report events detected by end devices such as meters. Each EndDeviceEvent has an event type and a timestamp.
EndDeviceEvents	Profile	Message used to convey one or more EndDeviceEvents.
EndDeviceEventType	Metering	Defines types of EndDeviceEvents
EndDeviceFirmware	Profile	Profile for EndDevice firmware configuration messages.
EndDeviceGroup	Metering	An EndDeviceGroup is used for grouping end devices for a variety of purposes including, but not limited to, load control and other types of demand response. An EndDeviceGroup may belong to another EndDeviceGroup, and an end device may belong to zero or more EndDeviceGroups. In some cases the group ID is maintained within the end device, but in other cases it can be managed by a metering system.
EndDeviceGroups	Profile	Use to convey changes in group membership
GetCustomerMeterDataSet	Profile	Profile for GET requests. See annex J.

Class/Noun	Type	Description
GetEndDeviceConfig	Profile	Profile for GET requests. See annex J.
GetMeterReadings	Profile	Profile for GET requests. See annex J.
GetMeterServiceRequests	Profile	Profile for GET requests. See annex J.
Get<ProfileName>	Profile	Each profile will have a corresponding ""Get" profile that is used to convey parameters on GET requests.
IntervalBlock	Metering	Time sequence of Readings of the same ReadingType. Contained IntervalReadings may need conversion through the application of an offset and a scalar defined in associated Pending.
IntervalReading	Metering	Data captured at regular intervals of time. Interval data could be captured as incremental data, absolute data, or relative data. The source for the data is usually a tariff quantity or an engineering quantity. Data is typically captured in time-tagged, uniform, fixed-length intervals of 5, 10, 15, 30, or 60 minutes. Note: Interval Data is sometimes also called "Interval Data Readings" (IDR).
MasterDataLinkageConfig	Profile	A message profile used to establish or modify relationships between objects.
MerchantAccount	PaymentMetering	The operating account controlled by MerchantAgreement, against which Vendor may vend tokens or receipt payments. Transactions via VendorShift debit the account and bank deposits via BankStatement credit the account.
MerchantAgreement	PaymentMetering	A formal controlling contractual agreement between Supplier and Merchant, in terms of which Merchant is authorised to vend tokens and receipt payments on behalf of Supplier. Merchant is accountable to Supplier for revenue collected at PointOfSale.
Meter	Metering	The Meter class is used to describe meters. A Meter is a type of EndDevice typically used to measure and potentially monitor a customer load. The EndDevice class definition should be used as the basis for Meter class.
MeterConfig	Profile	Message profile for Meter configuration messages.
MeterReading	Metering	A set of values obtained from the meter. Each MeterReading may have multiple ReadingTypes, and each ReadingType may contain multiple values.
MeterReadings	Profile	Profile for conveying MeterReadings.
MeterReadSchedule	Profile	A MeterReadSchedule message is used to schedule meter readings.
MeterServiceRequests	Profile	A meter service request is a type of work that can be used for a variety of meter service related activities. These activities would include meter installation, meter change out, customer disconnect/reconnect, , etc.
MeterServiceWork	Metering	Work involving meters.
ObjectNamesConfig	Profile	Used to add, change, or delete Names class identifiers of CIM objects.
Pending	Metering	When present, a scalar conversion that is associated with IntervalBlock and which needs to be applied to every contained IntervalReading value. This conversion results in a new associated ReadingType, reflecting the true dimensions of interval reading values after the conversion.
PointOfSale	PaymentMetering	Logical point where transactions take place with operational interaction between Cashier and the payment system; in certain cases PointOfSale interacts directly with the end customer, in which case Cashier might not be a real person: for example a self-service kiosk or over the internet.
PricingStructure	Customer	Grouping of pricing components and prices used in the creation of customer charges and the eligibility criteria under which these terms may be offered to a customer. The reasons for grouping include state, customer classification, site characteristics, classification (i.e. fee price structure, deposit price structure, electric service price structure, etc.) and accounting requirements.

Class/Noun	Type	Description
PricingStructureConfig	Profile	Profile for configuring pricing structures.
Reading	Metering	Specific value measured by a meter or other asset. Each Reading is associated with a specific ReadingType.
ReadingQuality	Metering	Quality of a specific reading value or interval reading value. Note that more than one Quality may be applicable to a given Reading. Typically not used unless problems or unusual conditions occur (i.e., quality for each Reading is assumed to be 'Good' unless stated otherwise in associated ReadingQuality).
ReadingQualityType	Metering	Defines types for qualities that can be associated with a reading value.
ReadingType	Metering	Type of data conveyed by a specific Reading.
Receipt	PaymentMetering	Record of total receipted payment from customer.
ReceiptRecord	Profile	Profile for receipt messages.
ReceiptSummary	PaymentMetering	Record of detail of receipts pertaining to one shift of operation (one record per 'tenderKind').
Register	Metering	Display for quantity that is metered on an end device such as a meter.
ServiceCategory	Customers	Category of service provided to the customer.
ServiceCategoryConfig	Profile	Profile for ServiceCategory configuration messages.
ServiceLocationConfig	Profile	Profile for ServiceLocation configuration messages.
ServiceSupplier	PaymentMetering	Organisation that provides services to Customers.
ServiceSupplierConfig	Profile	Profile for service supplier configuration messages.
Shift	PaymentMetering	Generally referring to a period of operation or work performed. Whether shift is open/closed can be derived from attributes 'activityInterval.start' and 'activityInterval.end'. The grand total for receipts (i.e., cumulative total of all actual receipted amounts during this shift; bankable + non-bankable; excludes rounding error totals) can be derived from Receipt attributes: =sum(Receipt.receiptAmount); includes bankable and non-bankable receipts.
SimpleEndDeviceFunction	Metering	Simple end device function distinguished by 'kind'; use this class for instances that cannot be represented by another end device function subtype.
Tariff	PaymentMetering	Document, approved by the responsible regulatory agency, listing the terms and conditions, including a schedule of prices, under which utility services will be provided. It has a unique number within the state or province. For Rate Schedules it is frequently allocated by the affiliated Public Utilities Commission.
Tender	PaymentMetering	Tender is what is "offered" by the customer towards making a payment and is often more than the required payment (hence the need for 'change'). The payment is thus that part of the Tender that goes towards settlement of a particular transaction. Tender is modelled as an aggregation of Cheque and Card. Both these tender types can exist in a single tender bid thus 'accountHolderName' shall exist separately in each of Cheque and Card as each could have a different account holder name.
TimeTariffInterval	PaymentMetering	One of a sequence of time intervals defined in terms of real time. It is typically used in association with TariffProfile to define the intervals in a time of use tariff structure, where startDateTime simultaneously determines the starting point of this interval and the ending point of the previous interval.
Transaction	PaymentMetering	The record of details of payment for service or token sale.
TransactionRecord	Profile	Profile for Transactions messages.
TransactionSummary	PaymentMetering	The record of detail of payment transactions pertaining to one shift of operation (one record per 'transactionKind').

Class/Noun	Type	Description
Transactor	PaymentMetering	The entity that ultimately executes the transaction and who is in control of the process; typically this is embodied in secure software running on a server that may employ secure hardware encryption devices for secure transaction processing.
UsagePointLocation	Metering	Location of an individual usage point. For residential or most businesses, it is typically the location of a meter on the customer's premises. For transmission, it is the point(s) of interconnection on the transmission provider's transmission system where capacity and/or energy transmitted by the transmission provider is made available to the receiving party. The point(s) of delivery is specified in the service agreement.
UsagePointLocationConfig	Profile	Message used to establish associations to UsagePointLocations.
UsagePoint	Metering	Logical point on a Distribution Network to which Meter Readings and/or End Device Events can be attributed. Used at the place where a physical or virtual meter may be located; however, it is not required that a Meter be present.
UsagePointConfig	Profile	Message used to establish associations to UsagePoints.
UsagePointGroup	Metering	Abstraction for management of group communications within a two-way AMR system or the data for a group of related usage points. Commands can be issued to all of the usage points that belong to a usage point group using a defined group address and the underlying AMR communication infrastructure.
UsagePointGroups	Profile	Message used to establish UsagePointGroups.
Vendor	PaymentMetering	The entity that owns PointOfSale and contracts with Cashier to receipt payments and vend tokens using the payment system. Vendor has a private contract with and is managed by Merchant who is a type of Organisation. Vendor is accountable to Merchant for revenue collected, who is in turn accountable to Supplier.
VendorShift	PaymentMetering	The operating shift for a vendor during which he may transact against the merchant's account. It aggregates transactions and receipts during the shift and periodically debits a merchant account. The totals in VendorShift should always = sum of totals aggregated in all cashier shifts that were open under the particular vendor shift.
NOTE The class definitions provided here are for convenience purposes only. The normative definitions are provided by the CIM.		

4.5.3 Classes related to meter reading and control

Table 4 lists those classes that are associated with meter reading and control classes but only the name of an instance is given within messages defined in this standard. The detailed attributes of these classes are used in message types defined in other parts of IEC 61968.

Table 4 – Classes related to meter reading and control

Related Class	Reference	Description
Organisation	Common	This class is used to identify companies or divisions within companies. Organisations might have roles as utilities, contractors, suppliers, manufacturers, etc.
PowerSystemResource	Core (IEC 61970-301)	An entity that describes the logical view of a component part of the utility business. PowerSystemResources are further classified as EquipmentContainers e.g. Substations, ConductingEquipment, ProtectionEquipment etc. Instances of type PowerSystemResource may be related to instances of type Asset.
PowerTransformer	Wires (IEC 61970-301)	An electrical device consisting of two or more coupled windings, with or without a magnetic core, for introducing mutual coupling between electric circuits. Transformers can be used to control voltage and phase shift (MW flow).

Related Class	Reference	Description
ServiceLocation	Customers	A customer ServiceLocation has one or more UsagePoint(s). Meters are related to a UsagePoint. The location may be a point or a polygon depending on the specific circumstances For distribution, the ServiceLocation is typically the location of the utility customer's premise. Because a customer's premise may have one or more meters, the UsagePoint is used to define the actual conducting equipment that the EndDevice attaches to at the utility customer's ServiceLocation. For transmission, it is the point(s) of interconnection on the transmission provider's transmission system where capacity and/or energy transmitted by the transmission provider is made available to the receiving party.
TransformerTank	Wires (IEC 61970-301)	A transformer winding.
NOTE The class definitions provided here are for convenience purposes only. The normative definitions are provided by IEC 61968-11, which describes the distribution extensions to the IEC CIM.		

5 Meter reading and control message types

5.1 General

The purpose of this Clause 5 is to describe the message types related to IEC 61968-9. It is important to note that some of these message types may also be used by other parts of IEC 61968. The general approach to the realization of message structures and XML schemas for IEC 61968 messages is described in IEC 61968-1 and IEC 61968-100.

Although they may be represented in sequence diagrams for context and completeness, this document does not describe message formats that are defined by other parts of IEC 61968. The message payload structures defined by this part of IEC 61968 are described in Clause 5.

The normative XML schemas for messages defined by this part are provided in Annex H, providing more detailed, annotated descriptions of the message structures. Annex I provides XML schemas that are currently informative. Message structures are diagrammed within Clause 5. The notation convention shows required elements with a solid outline, and optional elements with dashed outlines.

It is also important to note that the use cases and sequence diagrams provided in this standard are informative in nature, and are intended to provide examples of usage for the normative messages definitions. There is no intent by this standard to standardize specific business processes.

5.2 End device event messages

5.2.1 General

An event is a report of a change of state that may be of potential interest. End device event messages are designed as a means to convey changes in the state of an end device, either by the end device itself or by a proxy on behalf of an end device. End device events are viewed as a potential data stream which is not necessarily synchronized to the collection of meter reading for billing purposes. However, it may still be relevant to the billing process. A meter health alarm might be so severe that all readings from the meter have to be considered invalid. The data consumer (e.g. the MDM System) may receive the available relevant event data, and consider such during the validation, editing, and estimation process. It may also report event data to other enterprise systems and use the data to initiate actions such as creation of a MeterServiceRequest to repair or exchange a faulty meter.

5.2.2 Applications

5.2.2.1 General

This standard views “events” as being different than “statuses.” Most MR systems don’t guarantee a timely delivery of an EndDeviceEvent. A “status” on the other hand is only useful if it is fresh. The status of an EndDevice is generally obtained using an “OnRequest” GetMeterReadings. The report of an EndDeviceEvent will eventually arrive to the utility back office and will be processed in turn. This implies that different applications will naturally fall into different types of message exchanges depending on both the underlying communication technology used by the MR system, as well as the need for having timely data. Some systems may have the ability to report an outage as an event. Other systems may treat it as a status. Most MR systems will report a change to meter health as an event, some may require it to be read as a status. Similarly most MR systems will report power quality as an event although some may treat it as a status.

5.2.2.2 Outage detection

When an outage is not due to a SCADA trip, electric utilities typically depend on the calls from the customers to identify the location of the fault. However, the use of a MS can provide another means to identify the location of trouble. It is often possible for a MS to determine that it has lost contact with a meter, in which case this can be reported as an EndDeviceEvent for potential use by an outage management system. It is important to note that loss of communications with a meter may not be sufficient to identify the existence of an outage, as it is common for some MS technologies to occasionally lose contact with meters for brief periods of time.

Some MS systems may be prone to false alarms as a result of the particular technology used to communicate with the meters. Many vendors are working to improve their technology and the accuracy of the data. The MDM, much like the role it sometimes plays in cleaning up metered data for billing applications, in many instances, can also play a role in cleaning up outage data supplied by the MS before it is relayed to the OMS. Such a decision, to route outage data through the MDM, depends on the capability of the MS to supply accurate data, the ability of the MDM to clean up data without introducing excessive delays, and the ability of the OMS to tolerate false alarms and delays. To support outage analysis and filtering of bad data, the MS may supply audit-trail data and quality of measurement data for the outage event, much like it supplies audit-trail data for billing reads. Figure 5 describes a deployment in which the MDM is employed to broker outage information.

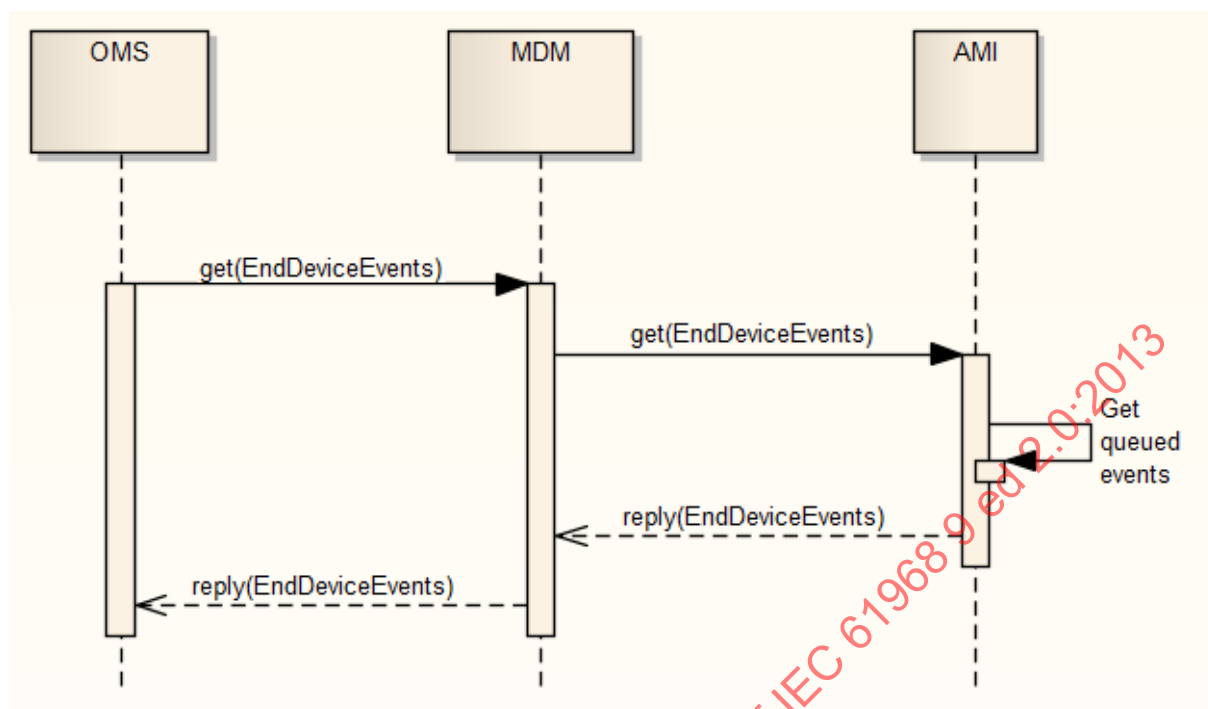


Figure 5 – Outage Detection, request/reply message exchange, example 1

Outage management systems analyze the circuit in terms of network topology. The `EndDeviceEventType` can indicate an event as detected by an end device for consideration in the analysis, as well as other information such as trouble tickets. Where an `EndDeviceEvent` can indicate a condition of interest that may in fact be an outage, an outage is usually the consequence of outage analysis within an OMS that will group potentially many events together within a single outage.

The use of an MDM to broker outage data is at the discretion of the utility. In some deployments, the outage detection request from the OMS may be issued directly to the MS as in the example of Figure 6.

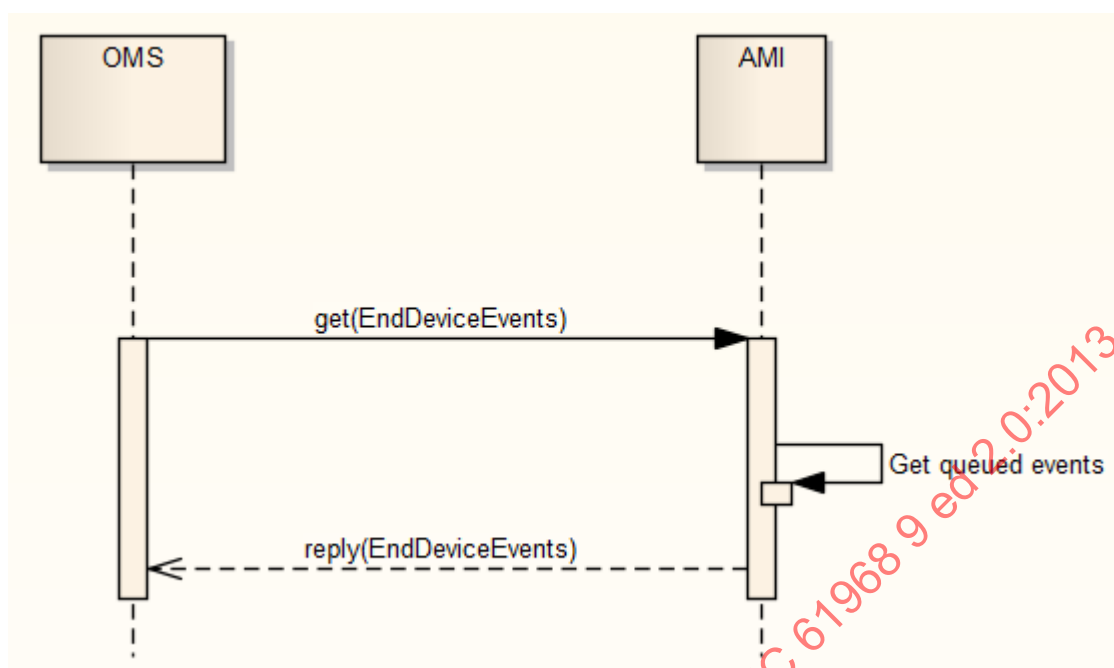


Figure 6 – Outage Detection, request / reply message exchange, Example 2

A reply (synchronous or asynchronous) from the MS will likely be in the form of zero or more EndDeviceEvents. The mRID or names structure will identify the end devices (e.g. meters) affected by the outage or restoration. Some data consumers that interact with the MS might only know how to deal with meter ID"s. Depending on the deployment, it may be required to limit the scope of exchanged mRID"s to that of meters ID"s using the Name class and not to that of power system resources in general. EndDeviceEvent.status can indicate "live" or "dead". Some metering systems may supplement the status information with collaborative evidence using the EndDeviceEventDetails class. EndDeviceEventType can be used to indicate that the status applies to a meter or power transformer. The reason for the event can be described (e.g. EndDeviceEvent.reason = "consecutiveFailCounter") and quantified (e.g. EndDeviceEvent.severity = "3").

While the request/reply exchange is useful whenever the OMS needs supplementary information, some MS are able to self-detect outages. A pub/sub exchange is ideal in these situations. Figure 7 shows such an exchange at a deployment where the MDM serves as an information broker. Figure 8 shows a deployment with information going directly from the MS to the OMS.

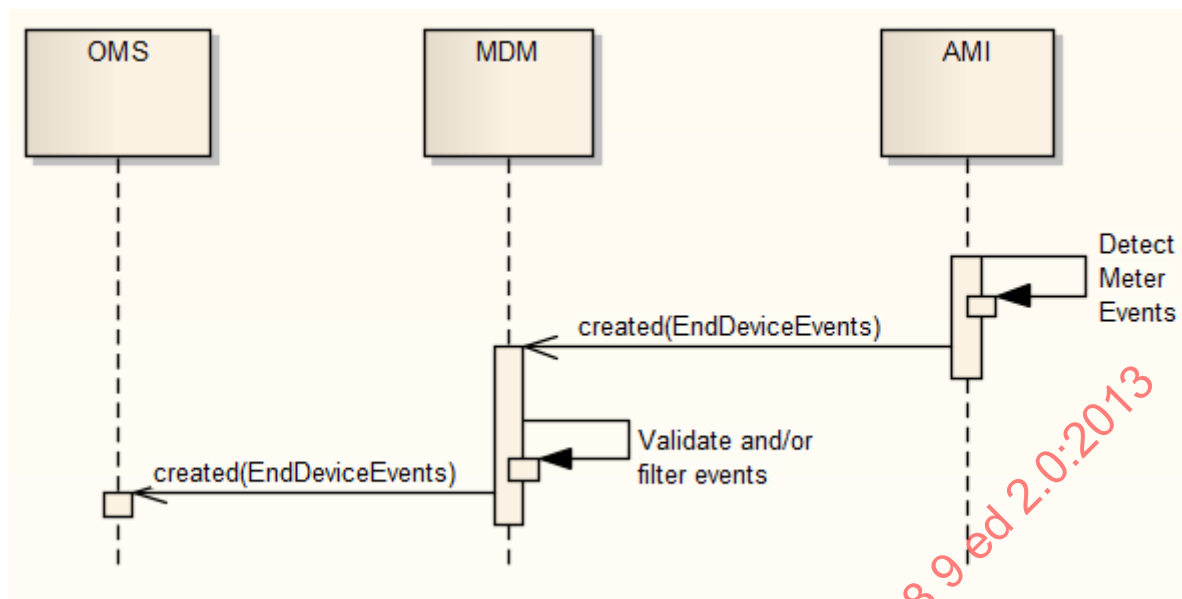


Figure 7 – Outage Detection, publish/subscribe exchange, Example 1

The following sequence diagram shows an example of event propagation without the use of an MDM.

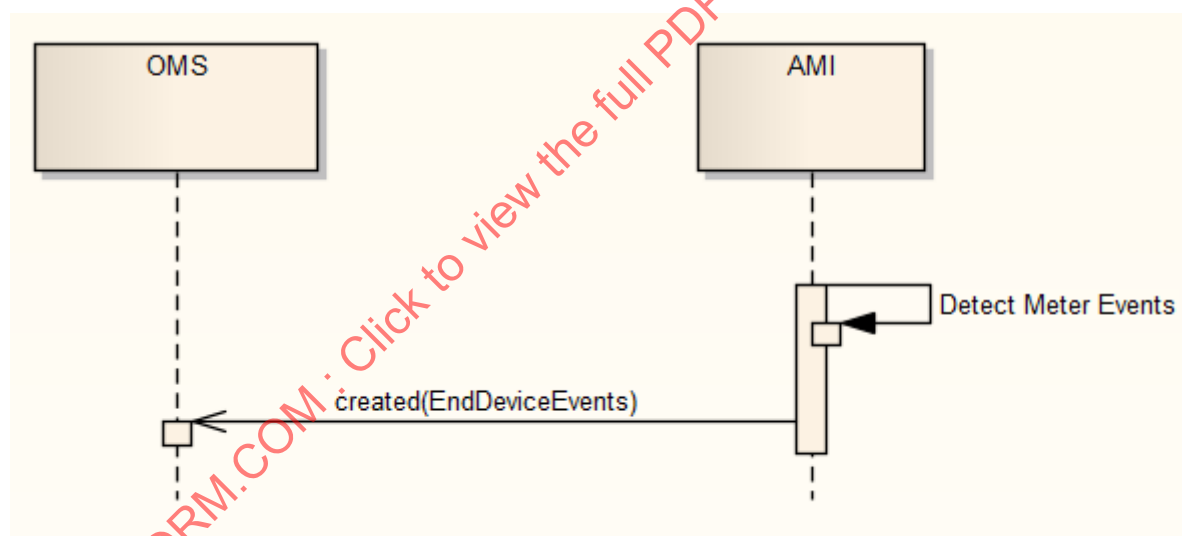


Figure 8 – Outage Detection, publish/subscribe exchange, Example 2

Some deployments may wish to limit the number of interfaces supported. The MeterReadings message structure also provides the means to convey EndDeviceEvents.

The preceding examples reflect the exchange of end device event messages to support outage management functions. As discussed previously, it is also frequently desirable to have an Outage Management System or MDM System make an on-demand read request to the Metering System to obtain the current energization status of a device. This is accomplished using a get(MeterReadings) exchange as described in 5.3. In such cases, the ReadingType (see Annex C) requested will indicate that it is the energization state that is being requested.

5.2.2.3 Meter Health Events

Some types of meters can sometimes generate meter health events, which can be used to identify issues with meter hardware, configuration or connection that should be resolved. The

alarms include such things as diagnostic alarms, tamper alarms, or other unusual conditions. The severity of the alarm might range from a simple notification to “fatal”. Often times, resolution of meter health events require a site visit, so typically they result in the creation of a MeterServiceRequest. Meter Health Events events are communicated using EndDeviceEvent messages.

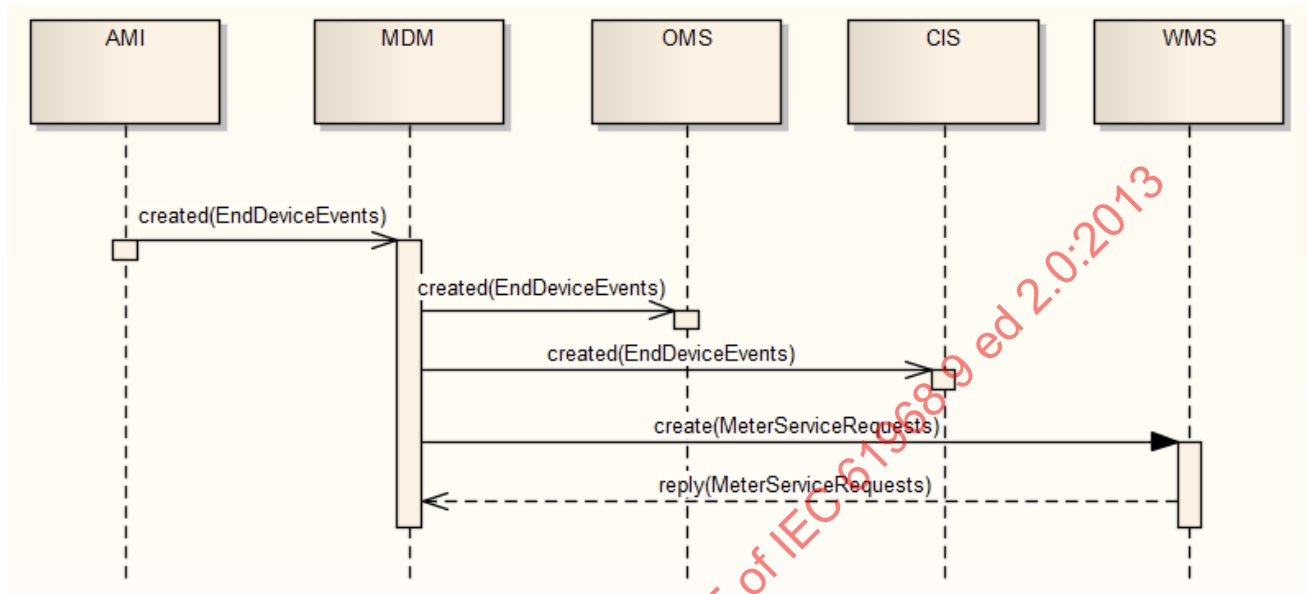


Figure 9 – Meter Health Event exchange, Example 1

In some deployments, the MDM will be present to broker meter health data for other stakeholders and potentially take action to initiate corrective actions as described in the scenario of Figure 9. Other installations however might not have an MDM or use it in this way. It is possible for the MS to publish data directly to the stakeholders that are equipped to receive it. Such an exchange is depicted in Figure 10.

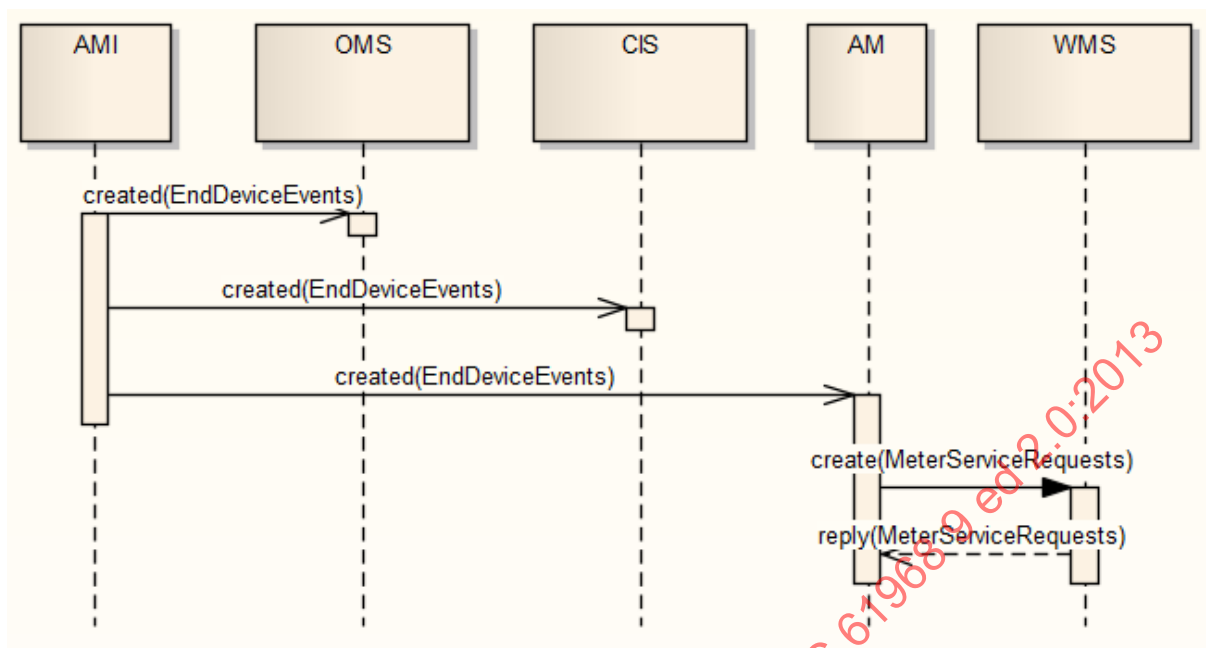


Figure 10 – Meter Health Event exchange, Example 2

5.2.2.4 Power Quality Event

Meters may collect information related to power quality, including but not limited to, momentary outage events, sustained outage events, low or high voltage events, and high distortion events. This information could be used for outage analysis, maintenance scheduling or capacity planning. Power quality events are a subtype of EndDeviceEvent.

Power quality events may be brokered (i.e. publications managed) by an MDM (as described in Figure 11), or sent directly to the various stakeholders (as described in Figure 12).

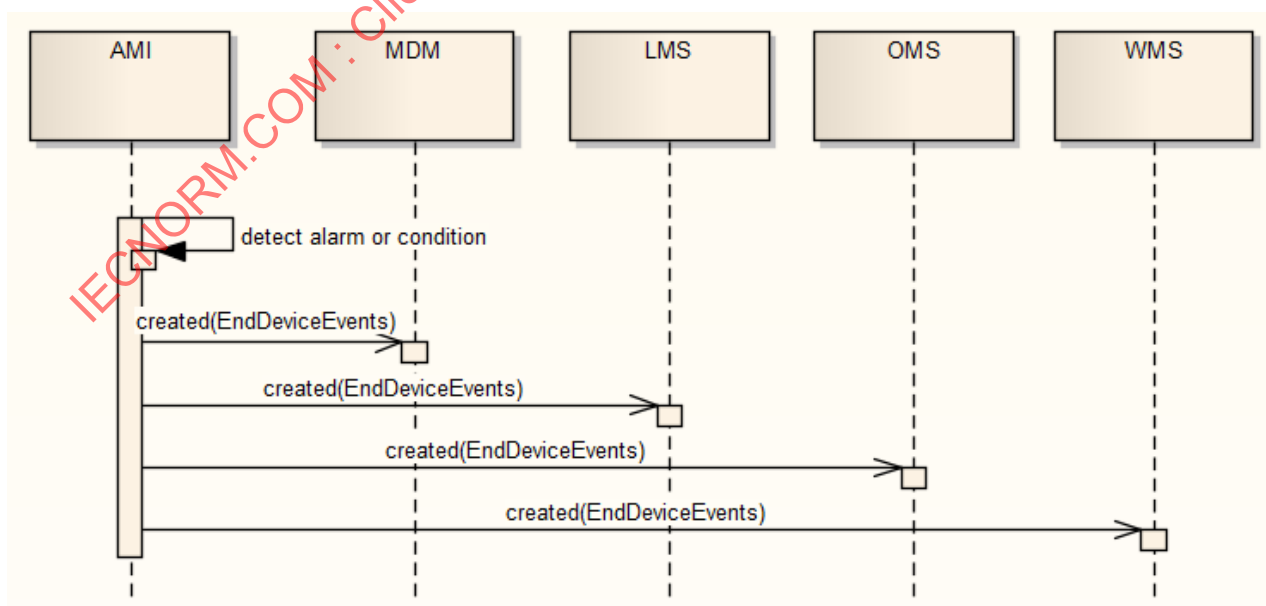


Figure 11 – Power quality event exchange, Example 1

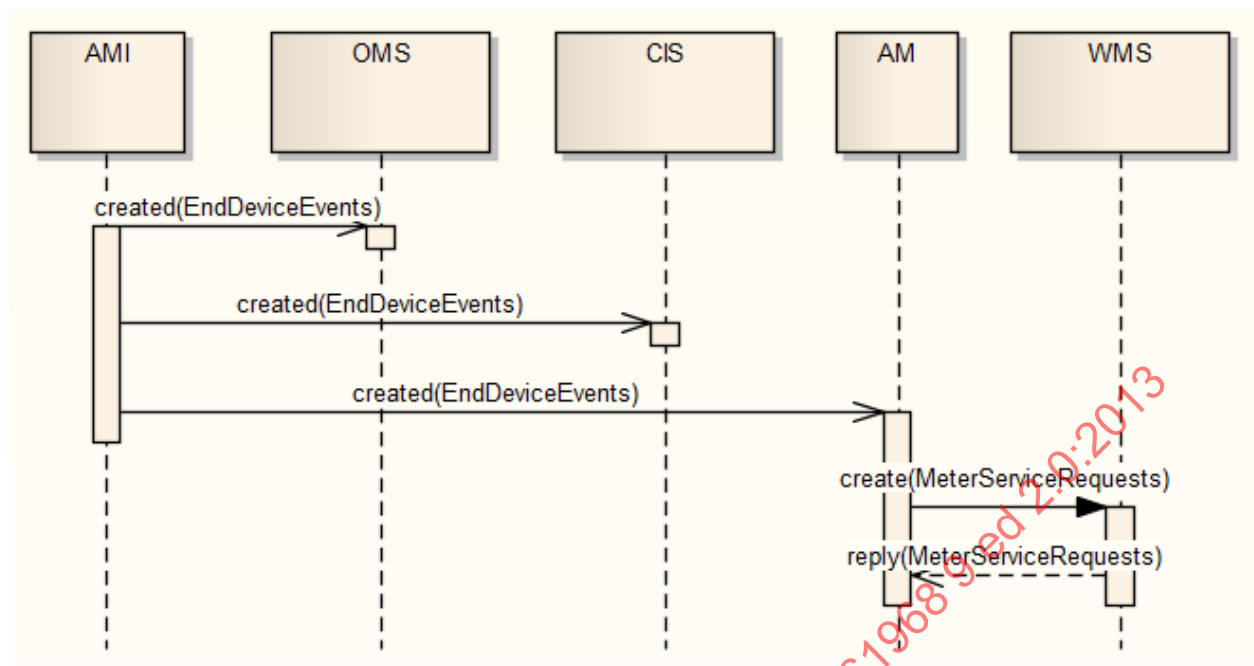


Figure 12 – Power quality event exchange, Example 2

5.2.3 Message format

Meter event messages are implemented using EndDeviceEvent structures in order to support a wider variety of event sources than just meters. The EndDeviceEvent.EndDeviceEventType (see Annex E) is a reference to an enumeration which indicates the type of event, such as outage detection, meter health, or power quality. The timestamp and mRID or a unique name of the end device are also required. The message format is described in Figure 13.

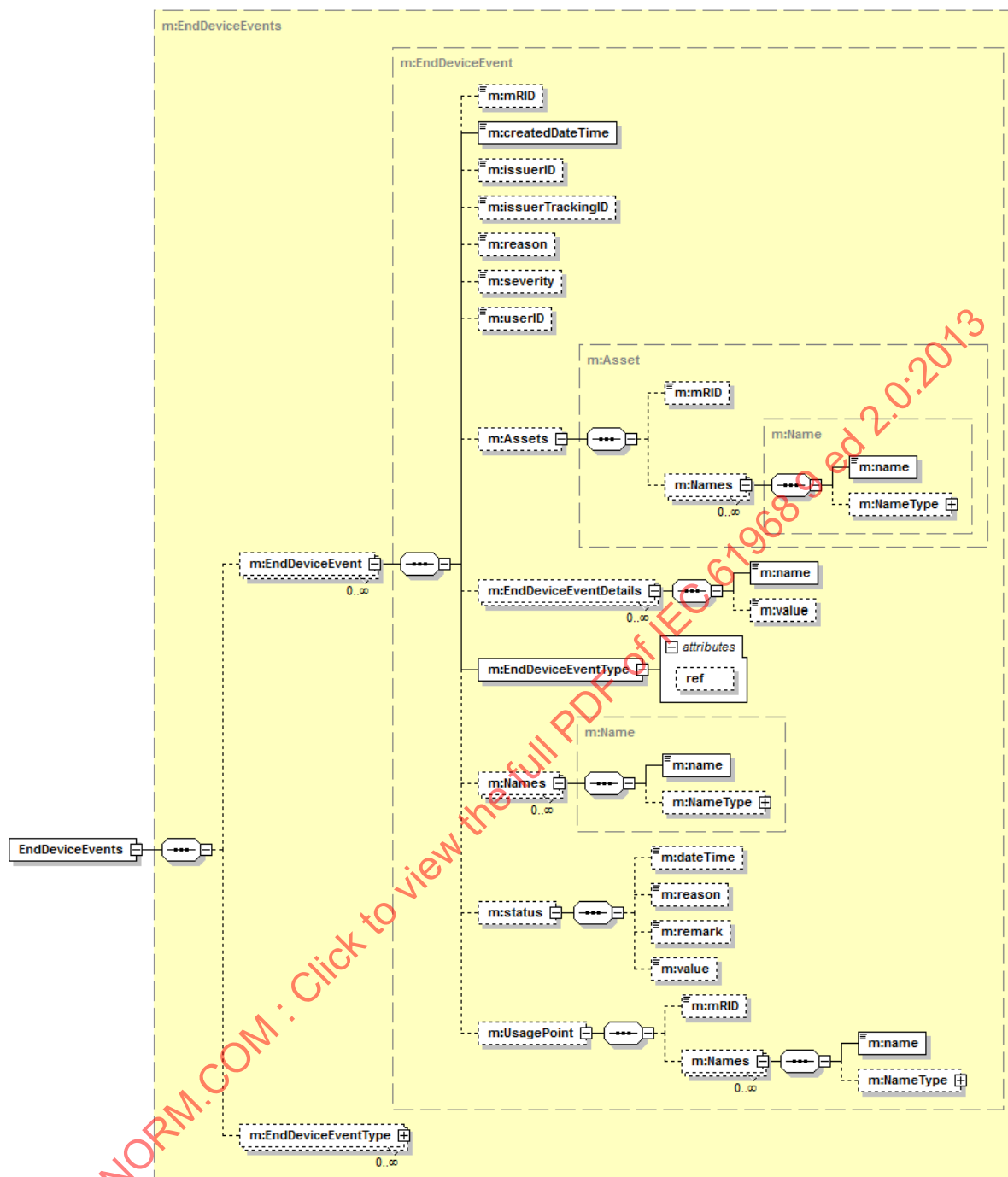


Figure 13 – End device event message format

As noted by Figure 13, only the timestamp and EndDeviceEventType elements are required, along with either an mRID or a unique name of the end device. The EndDeviceEventType element will allow different event types (e.g. meter health, outage detection, etc.) to be differentiated. Different event types would allow for an EndDeviceEvent message to convey events related (including but not limited) to:

- Sustained outage detection
- Momentary outage detection
- Low voltage threshold detection
- High voltage threshold detection

Distortion
 Meter health
 Tamper detection
 Revenue event

The detailed XML schema is provided in Annex H. The following is an XML example for an EndDeviceEvent.

```
<?xml version="1.0" encoding="UTF-8"?> <end:EndDeviceEvents
xmlns:end="http://iec.ch/TC57/2011/EndDeviceEvents#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <end:EndDeviceEvent>
    <end:createdDateTime>2011-11-10T21:54:53.404+01:00</end:createdDateTime>
    <end:issuerID>External System 1</end:issuerID>
    <end:issuerTrackingID>123</end:issuerTrackingID>
    <end:severity>5</end:severity>
    <end:Assets>
      <end:mRID>01f8b2e5-a677-4f2c-a6c0-1e79b409c55e</end:mRID>
      <end:Names>
        <end:name>Meter 123</end:name>
        <end:NameType>
          <end:name>Meter Name</end:name>
          <end:NameTypeAuthority>
            <end:name>Utility ABC</end:name>
          </end:NameTypeAuthority>
        </end:NameType>
      </end:Names>
    </end:Assets>
    <end:EndDeviceEventType ref="3.12.0.257"/>
  </end:EndDeviceEvent>
</end:EndDeviceEvents>
```

The EndDeviceEvent is logically generated by an EndDevice and/or a UsagePoint, either of which can be identified by mRID and/or Name. As in IEC 61968-9:2009, an EndDeviceEvent is associated with an Asset, where typically this will be an EndDevice.

5.3 Meter reading messages

5.3.1 General

Meter readings messages are designed to allow data collected by or calculated on behalf of a meter to be conveyed. This may include measured quantities, calculated quantities, state information or collected history. Whenever a “measurement” is required from an end device, a MeterReading exchange is quite likely the appropriate tool for the job. The end device may have metrology capability, and if so, is most likely called a “meter.” But there are other potential applications for MeterReading. If a data consumer wishes to measure the position of the switch on a connect/disconnect switch, this can be done as a MeterReading exchange. If a data consumer wishes to measure the “energisation” status of the end device, this can be done with a MeterReading exchange or alternatively, with an EndDeviceEvent exchange as described in 5.2.

5.3.2 Applications

5.3.2.1 Periodic meter reads

It is necessary to periodically gather meter readings from a MS for billing through the customer billing system. The request for meter reading should specify a meter or group of meters, a type of reading to collect, and a frequency and duration of interest. The scheduled frequency may consist of regular or irregular periods.

The MeterReadSchedule request may be initiated to the MS from any of the following:

- the CIS (in an effort to collect billing determinants);

- a planning and scheduling application (in an effort to acquire engineering data about the distribution network);
- an OMS (to establish a stream of status information);
- a meter data management system (in an effort to broker data for any or all of the above applications);
- the MS itself may also self-initiate a MeterReadSchedule.

An example for one such exchange (this one using an MDM) is shown in Figure 14.

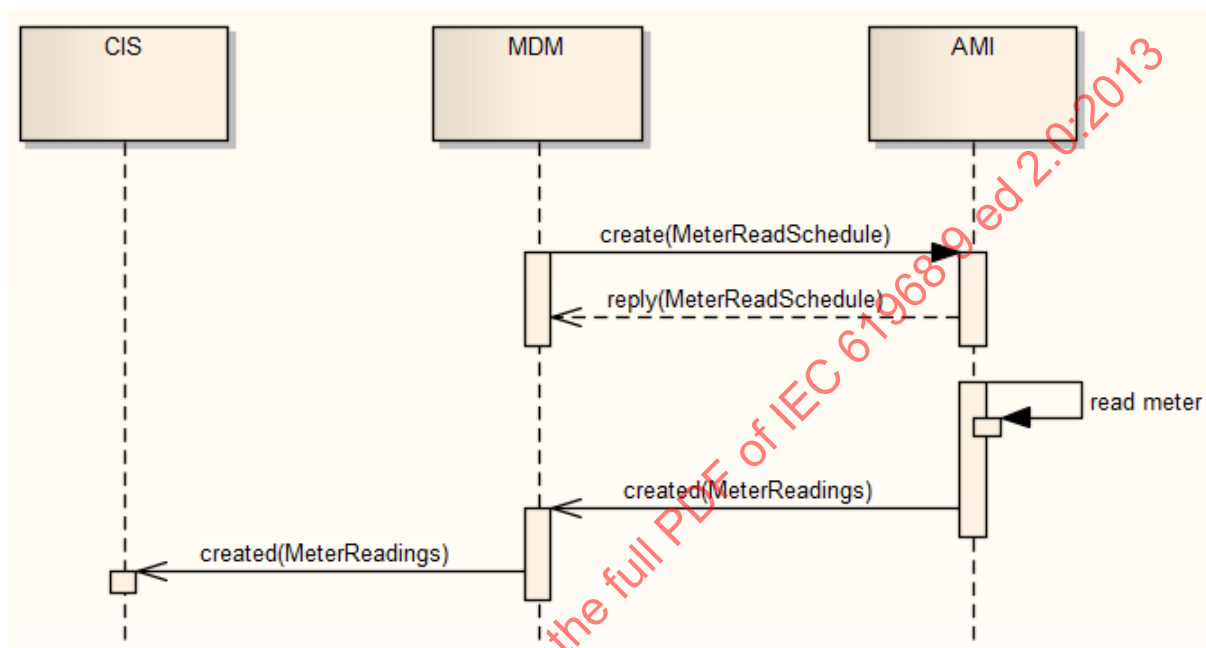


Figure 14 – Example use of meter read schedule to create subscription

Some metering systems may have the ability to decouple MeterReading collection from MeterReading reporting. For Metering Systems without this capability, readings may be reported immediately upon collection. In the MeterReadSchedule request, MeterReadings may be requested using a variety of parameters, including:

- Specific meter, using the EndDevice mRID or Names.name (see Annex G for discussion of the Names class)
- EndDeviceGroups, where a EndDeviceGroup identifies a group address used within the Metering System
- UsagePoint where a meter is located, using UsagePoint mRID or Names.name
- UsagePointGroups, where UsagePointGroup identifies a groupAddress used within the Metering System
- As specified using a TimeSchedule
- ReadingTypes can be specified to identify the desired reading types

5.3.2.2 Manual meter reading

Meter readings can be obtained manually by a meter reader. Data collected may be maintained by the meter data manager. Meters may collect a number of different measurement types. Some types of meters may measure more than one phase, or may collect values for non-electrical measurements, such as water or gas.

A meter reader may input data shown on the panel of meter into a handheld device, which could be regarded as a metering system. Data input may occur several hundred times per

day. A meter reader may present an account of the read to the customer. Note that this account is not an invoice. Billing would be generated normally by the CIS even in the manual reading case. Figure 15 shows such an exchange.

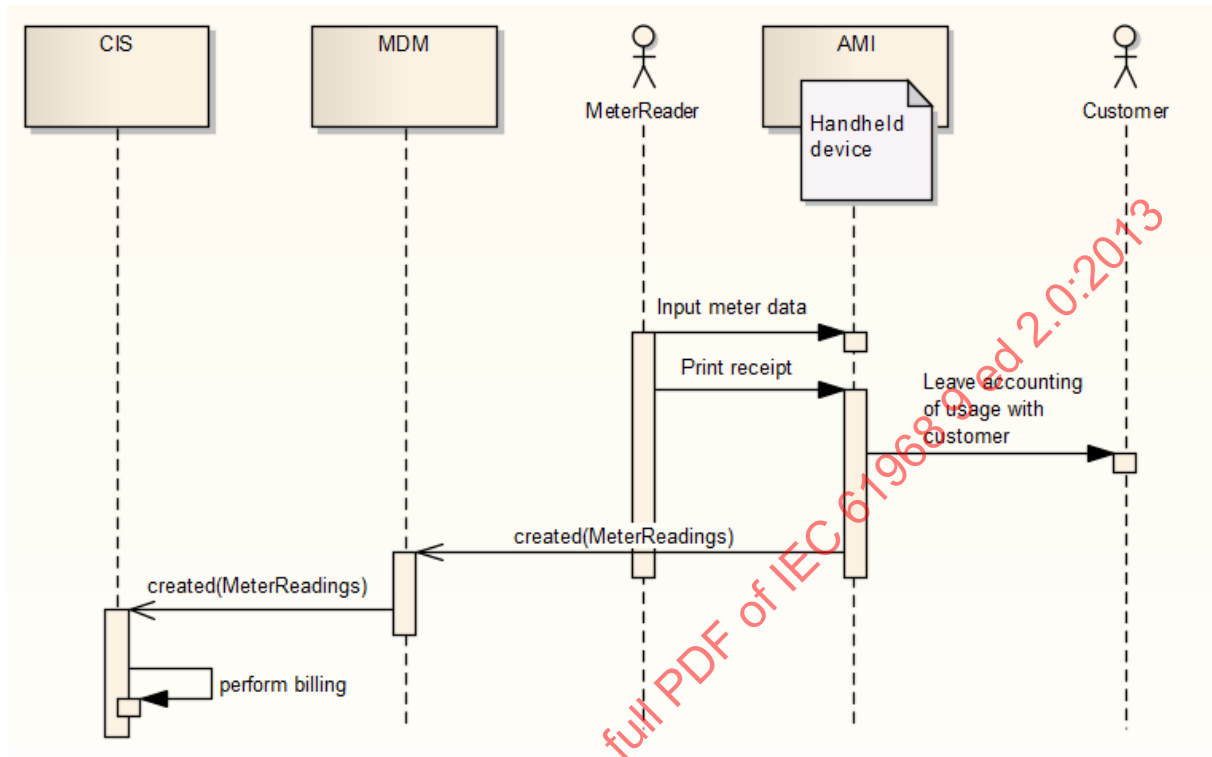


Figure 15 – Example manual meter reading exchange

At the end of the day of work, all data stored in the handheld device is sent to the MDM via a communication network. The MDM publishes a message to the CIS informing of the creation of MeterReading.

Schedules for walking a manual meter reading route are decided well in advance of performing the work.

5.3.2.3 On-Request meter read

Meter read requests are issued to a MS in order to obtain meter readings on a per request basis. The MS will send a request to the desired meters. These can be used for billing inquiries, outage extent verification, verification of restoration and other business purposes..

Many utilities have a policy of routing all revenue readings through the MDM so that all data will receive the same level of validation. However, not all MDM systems are able to offer validation services for outage data. For those that do, the utility shall weigh the value of MDM validation over the time delay it may introduce, as well as the ability of the particular OMS solution to reject incongruent data. For this reason, the example diagram shows revenue readings routed through the MDM, but outage data routed around it.

It is important to note that not all metering systems support "on request" readings. For those that do, the implementation can also vary significantly.

On-request reads may be initiated to the MS from systems such as any of the following:

- The CIS (in an effort to collect billing determinants).

- A Planning and Scheduling application (in an effort to acquire engineering data about the distribution network).
- An OMS (in order to verify if a customer is affected by an outage or has been restored)
- A meter data management system (in an effort to broker data for any or all of the above applications).
- The MS itself may also directly initiate a meter read.

An example for one such exchange (this one using an MDM) is shown in Figure 16.

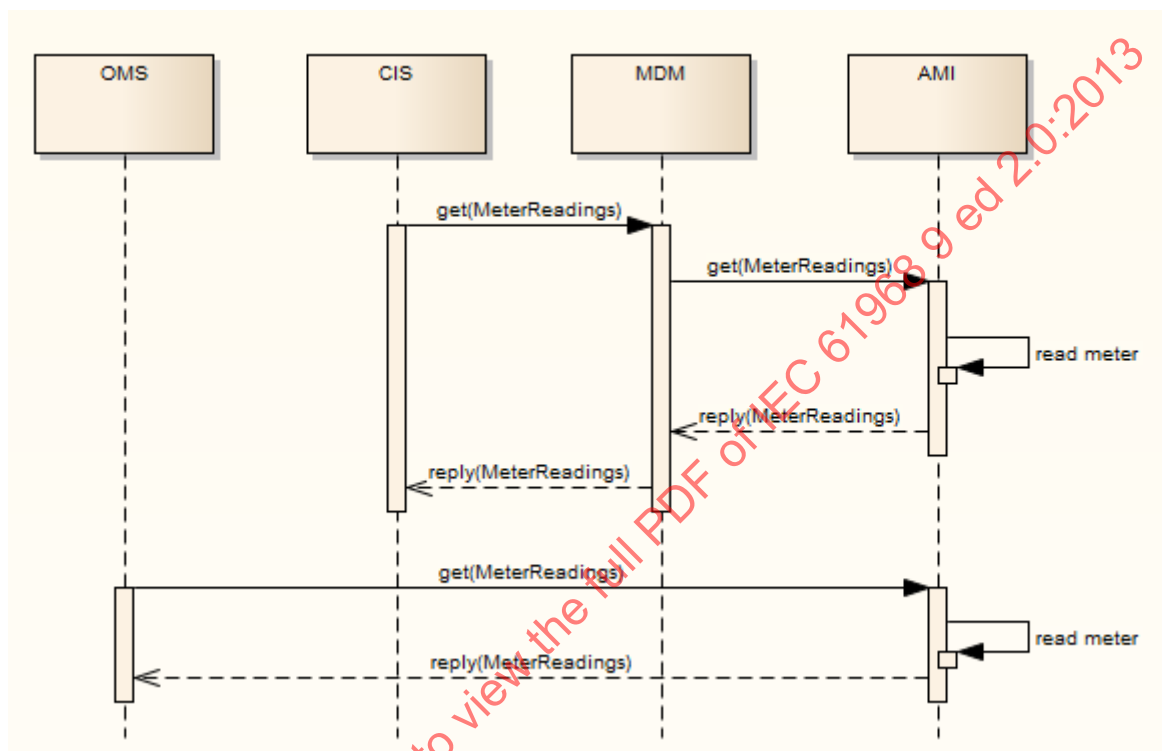


Figure 16 – Example On-Request meter read

5.3.2.4 Historical meter data access

A distribution network planner may use historical meter reading values as load information for capacity planning purposes. (See the request/reply example in Figure 17). This would permit usage to be aggregated to determine loads for a transformer or feeder.

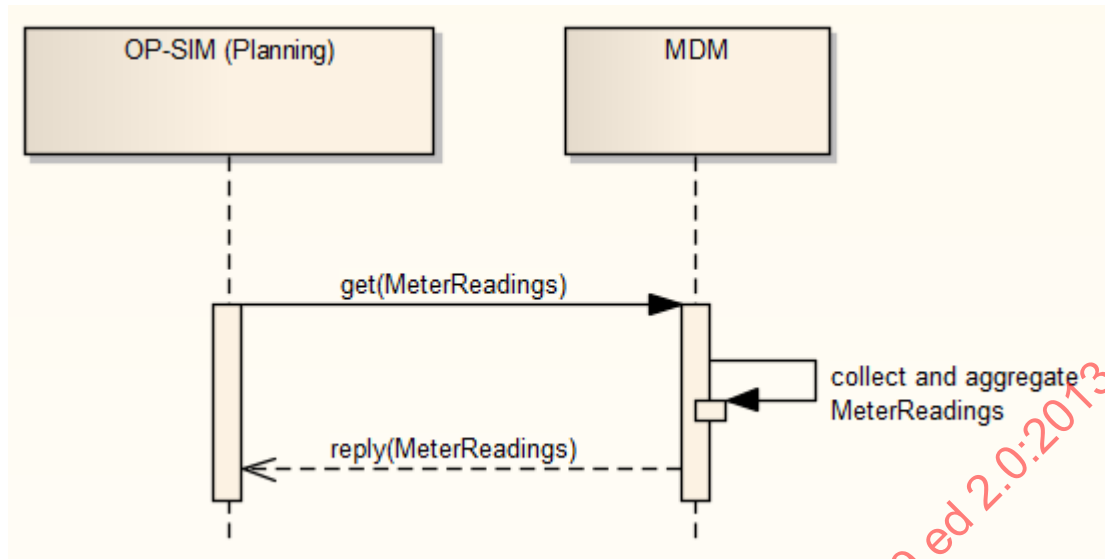


Figure 17 – Historical MeterData exchange

It is important to note the use of request parameters to qualify requests for meter data, filtering the results to obtain data for specific meters within specific timeframes.

5.3.2.5 Billing inquiry

A customer or an internal source may identify a customer billing issue. A meter read request in combination with historical meter reads may be used to resolve the billing issue. The top of Figure 18 shows an inquiry being satisfied by data which recently arrived, while later on in the day an inquiry is made which requires a fresh reading from the meter.

In some cases the desired data may be accessible from the MDM. In other cases, it may be necessary to issue a read request remotely through the MS, or manually through a meter service request.

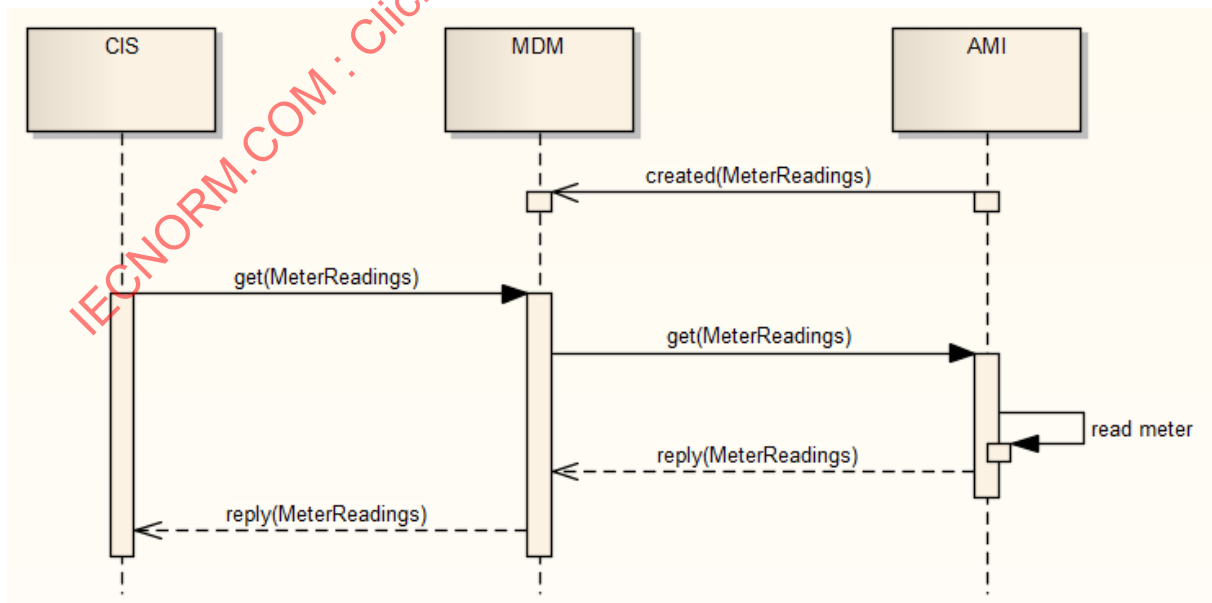


Figure 18 – Example billing inquiry message exchange

5.3.3 Message formats

The detailed XML schema for messages are described in Annex H. Figure 19 shows the message format used to present meter readings from one or more end devices.

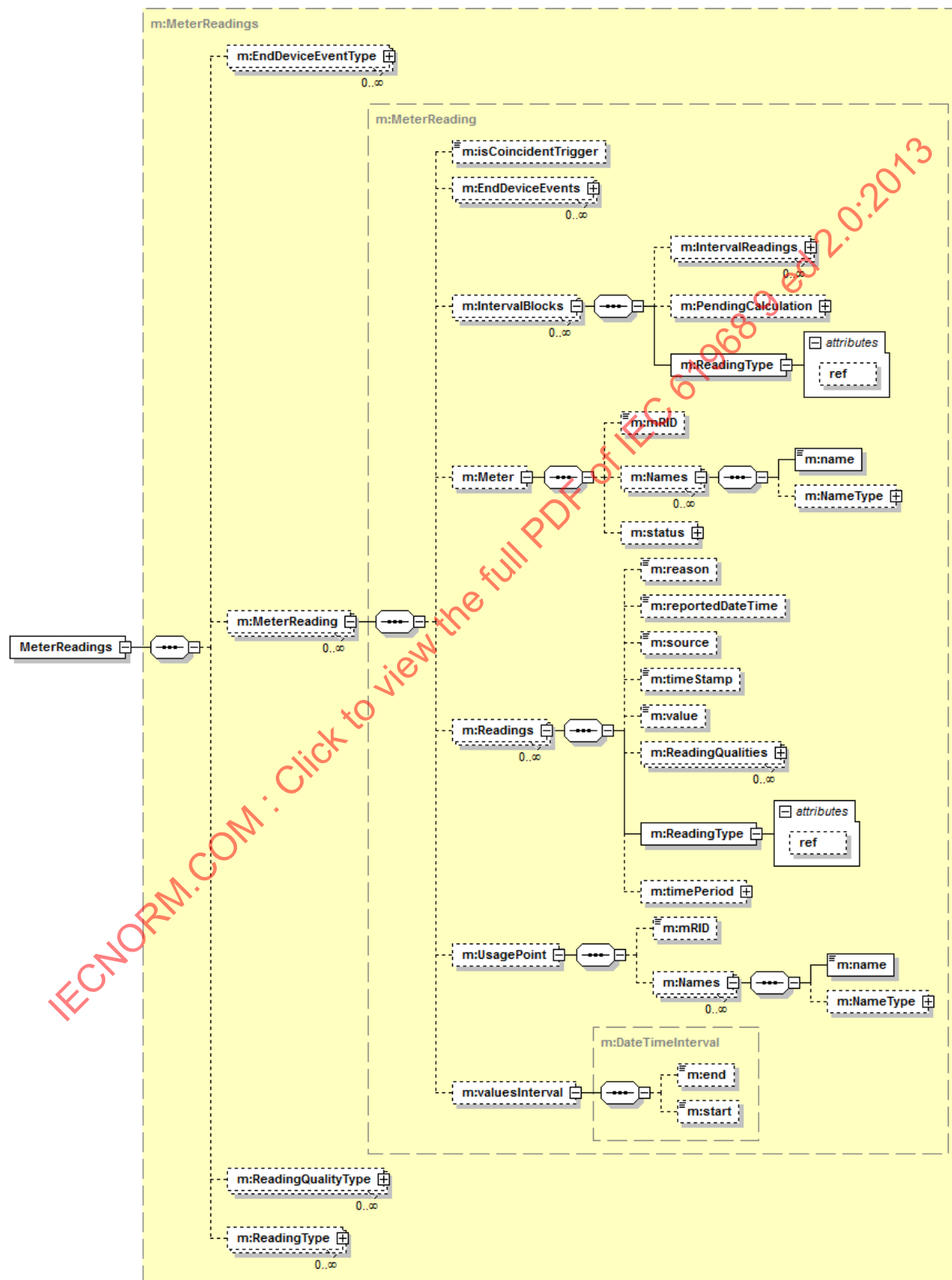


Figure 19 – Meter readings message format

The MeterReadings message structure allows for:

- readings from one or more meters
- reading values each have an associated reading type, timestamp and value
- many quality values can be associated with each reading value.
- readings can be supplied in the form of interval blocks, where readings of a common reading type are grouped together
- event histories can be returned with meter readings

Figure 20 shows the details of the structure used to convey Readings, where each Reading identifies a specific ReadingType (by reference), value and optional quality codes. The time Stamp is used to identify when the reading was captured. The timePeriod can be used to identify a specific time interval. The optional reportedDateTime can be used to identify when the reading was actually reported. The ReadingType is used to identify the meaning of the reading, data type of the value and the meaning of the different time values.

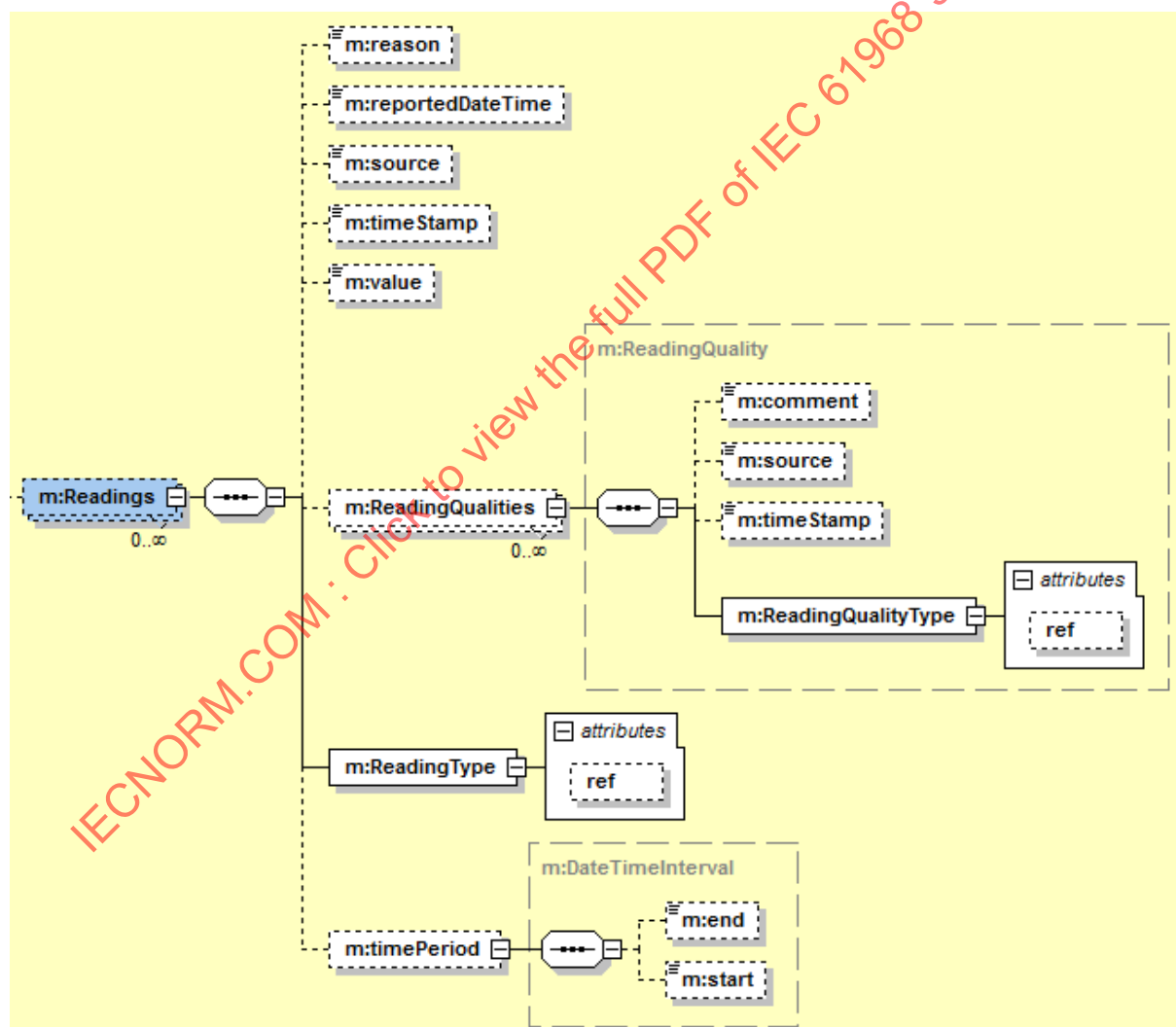


Figure 20 – Reading structure

Within a reading, the time Stamp and timePeriod attributes can be used to identify time-related aspects of the reading, with specific usage based upon reading type, where details are described in Annex C as needed. The following examples illustrate the general conventions for the use of time Stamp and timePeriod.

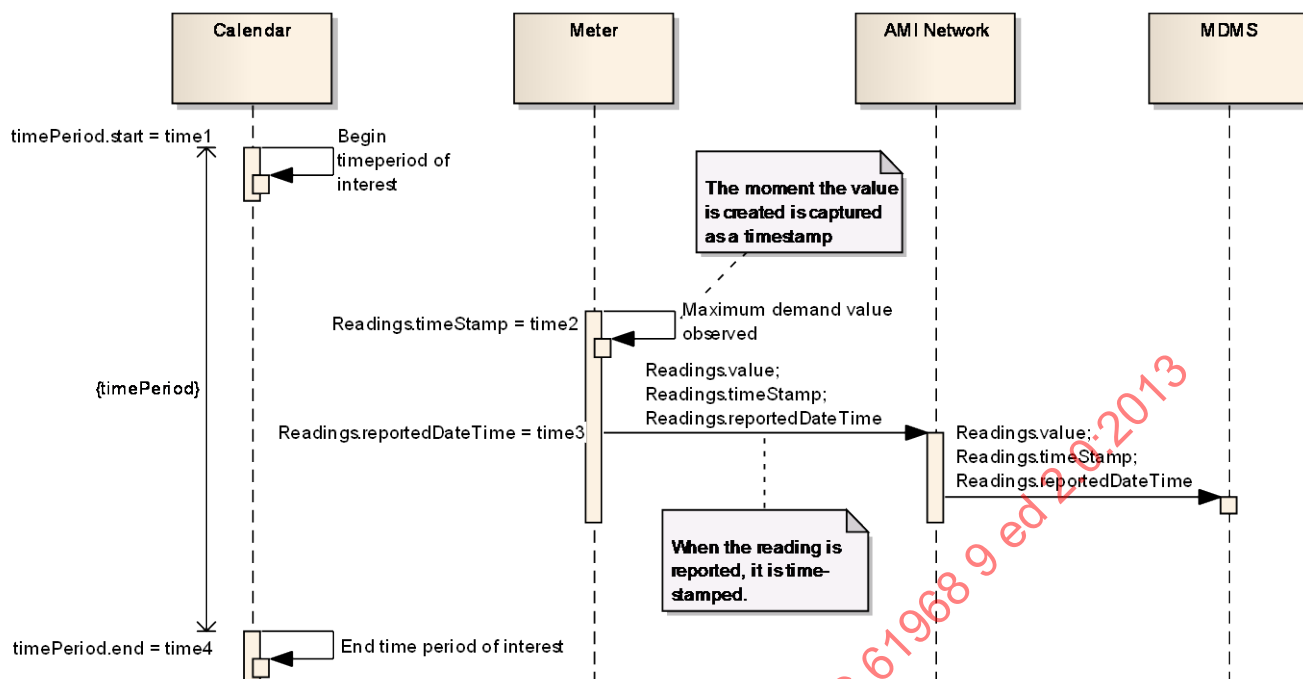


Figure 21 – Timestamps assigned between systems

Figure 21 shows the way that timestamps are assigned as values are created and passed between systems. From the perspective of the CIS and MDMS, there exists a "timePeriod" of interest for (perhaps) a billing period. A "get" request might specify this time range, and the AMI or MDMS would "reply" with readings that fall within this range. Important points in time regarding the generation and reporting of the value are also timestamped. All of these timestamps are found within the meterReadings schema. Another view of the same example (with real dates and times) is expressed below in Figure 22.

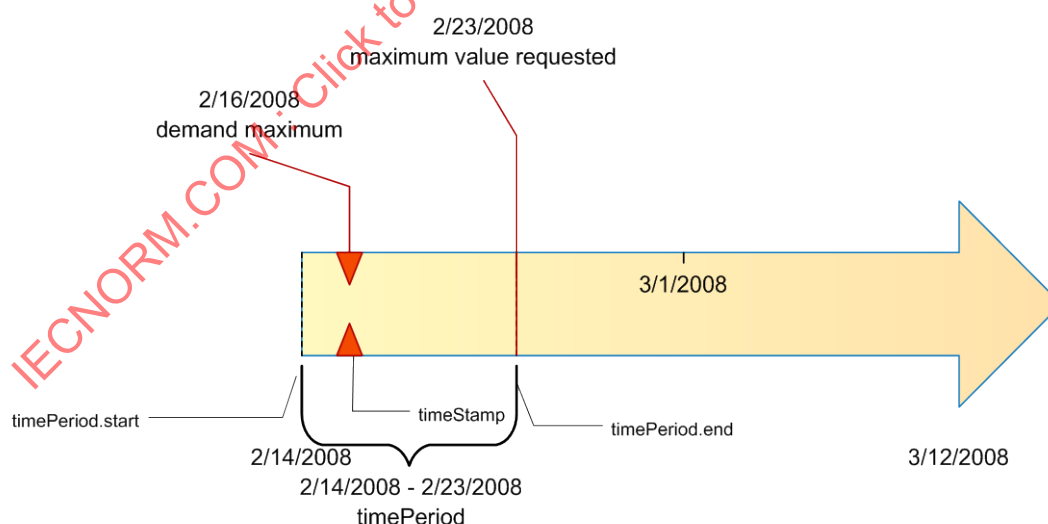


Figure 22 – Conventions for timeStamp and timePeriod

The IntervalBlock structure allows for a set of reading to be grouped by a common ReadingType and as a convenience for representation of a time series.

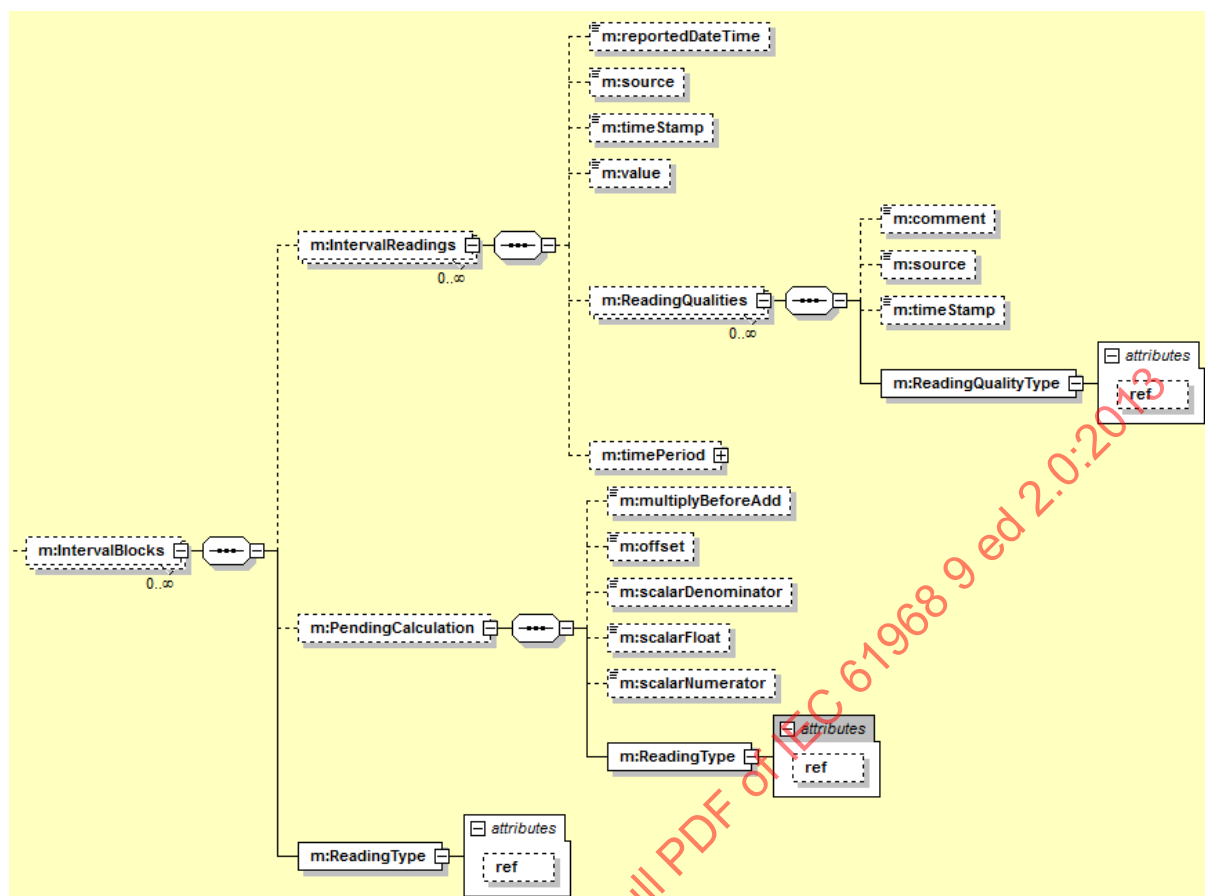


Figure 23 – IntervalBlock structure

The following diagram shows the convention for use of a timeStamp for interval data where an associated reading type identifies that the reading value is for a specified interval.

Different MR systems work in different ways, but for the purpose of the standard, timestamps denote the end of the interval. The implied generation process is described below in Figure 24.

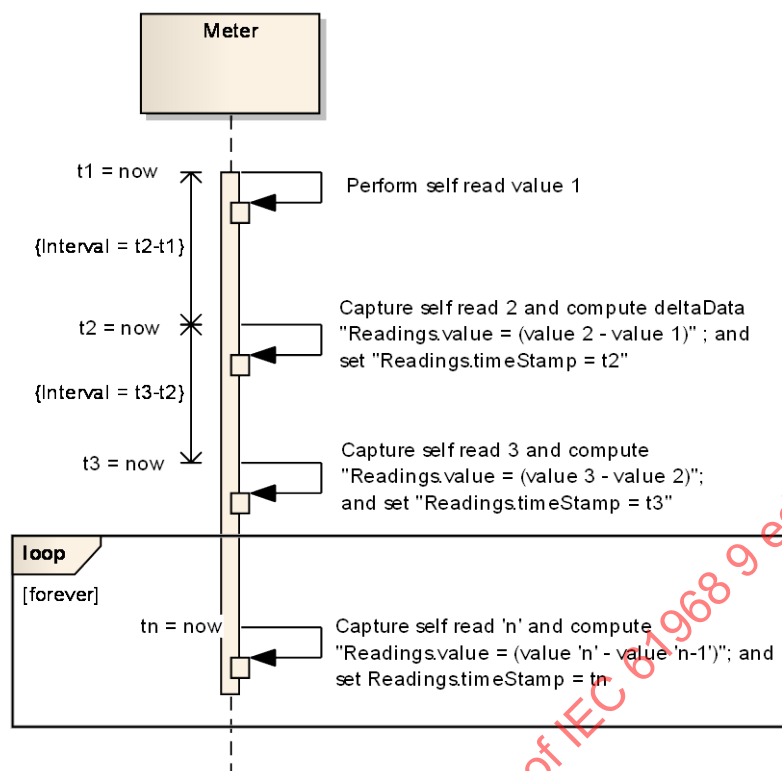


Figure 24 – Interval data timestamp generation

When a timestamp is used, it shall fall within a time range from 00:00:00 to 23:59:59 as depicted in Figure 25. A value of 23:59:59 plus 1 s places the time at midnight which is the start of the next day.



Figure 25 – Time interval conventions

Note that as defined by ISO 8601, the time 24:00 of the current day is the same as 00:00 for the next day. A day starts and ends at 00:00. It is important to note that interval data can be conveyed using IntervalBlocks with IntervalReadings or simply using Readings. IntervalBlocks shall be used in cases where the PendingCalculation elements are needed, otherwise they simply allow for a reduced XML footprint over Readings, which may be important in some situations.

Key to the reporting of a value from a meter is the reading type. The ReadingType class in the CIM is defined to allow capture of the following information as related to the description of a reading type, as is more thoroughly defined in Annex C.

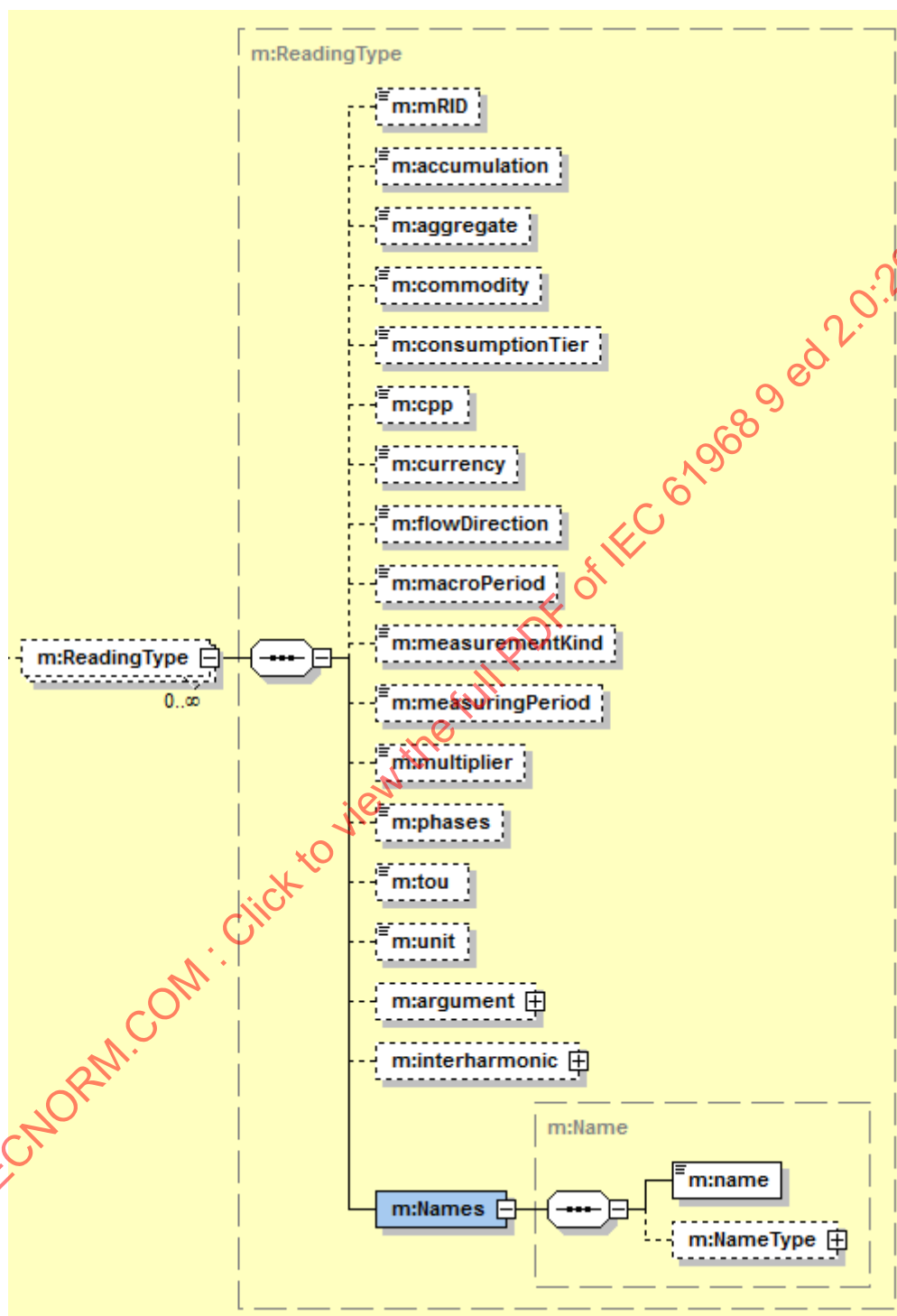


Figure 26 – ReadingType structure

While the ReadingType structure is present in the MeterReadings message, it should be expected that in normal practice it will not be populated, as it is anticipated that the consuming system will already be configured with the appropriate ReadingType definitions. The details of this and other classes specific to metering are described in the Metering package of the CIM. A more thorough discussion of reading types is provided in Annex C.

Readings are not limited to metering devices. Any EndDevice may potentially produce a measurement. In this edition of IEC 61968-9, the asset producing the reading shall be identified using the Meter class, even though the device may not be a meter. It is expected that all assets have a unique mRID or Names.name so that meters can be distinguished from remote connect/disconnect switches, and from other devices. It is expected that the future edition of IEC 61968-9 will provide a more explicit method of dealing with readings from devices other than Meters.

Interval data has unique timestamp requirements. The extended capabilities of ISO 8601 provide the means to specify both a formal interval length (as an ISO 8601 “period” of time), as well as a fixed reference point.

The following XML provides some XML example payloads of MeterReadings messages.

```
<?xml version="1.0" encoding="UTF-8"?>
<mr:MeterReadings xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#">
  <mr:MeterReading>
    <mr:Meter>
      <mr:Names>
        <mr:name>63.89.98.184</mr:name>
        <mr:NameType>
          <mr:description>This is an endpoint serial number</mr:description>
          <mr:name>EndpointID</mr:name>
          <mr:NameTypeAuthority>
            <mr:description>AssetManagementSystem</mr:description>
            <mr:name>com.company.assets</mr:name>
          </mr:NameTypeAuthority>
        </mr:NameType>
      </mr:Names>
    </mr:Meter>
    <mr:Readings>
      <mr:timeStamp>2011-12-05T17:21:40.628Z</mr:timeStamp>
      <mr:value>25.633</mr:value>
      <mr:ReadingType ref = "0.0.0.1.4.1.12.0.0.0.0.0.0.0.0.3.72.0"/>
    </mr:Readings>
    <mr:Readings>
      <mr:timeStamp>2011-12-05T17:21:40.628Z</mr:timeStamp>
      <mr:value>10.0</mr:value>
      <mr:ReadingType ref = "0.0.0.12.1.1.37.0.0.0.0.0.0.0.0.3.38.0"/>
    </mr:Readings>
  </mr:MeterReading>
</mr:MeterReadings>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<mr:MeterReadings xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#">
  <mr:MeterReading>
    <mr:Meter>
      <mr:Names>
        <mr:name>63.89.98.184</mr:name>
        <mr:NameType>
          <mr:description>This is an endpoint serial number</mr:description>
          <mr:name>EndpointID</mr:name>
          <mr:NameTypeAuthority>
            <mr:description>AssetManagementSystem</mr:description>
            <mr:name>com.company.assets</mr:name>
          </mr:NameTypeAuthority>
        </mr:NameType>
      </mr:Names>
    </mr:Meter>
    <mr:IntervalBlocks>
      <mr:IntervalReadings>
        <mr:reportedDateTime>2001-12-17T09:30:47Z</mr:reportedDateTime>
        <mr:timeStamp>2001-12-17T09:30:47Z</mr:timeStamp>
        <mr:value>25.44</mr:value>
        <mr:timePeriod>
          <mr:end>2001-12-17T09:30:47Z</mr:end>
          <mr:start>2001-12-17T09:30:47Z</mr:start>
        </mr:timePeriod>
      </mr:IntervalReadings>
      <mr:ReadingType ref = "0.0.2.4.1.1.12.0.0.0.0.0.0.0.0.3.72.0"/>
    </mr:IntervalBlocks>
```



```
<mr:Readings>
  <mr:timeStamp>2001-12-17T09:30:47Z</mr:timeStamp>
  <mr:value>10.0</mr:value>
  <mr:ReadingType ref = "0.0.0.12.1.1.37.0.0.0.0.0.0.0.3.38.0"/>
</mr:Readings>
</mr:MeterReading>
</mr:MeterReadings>
```

The concept of “coincident readings” deserves some attention. A coincident reading is a MeterReading that occurs at the same point in time as some other MeterReading or EndDeviceEvent.

Some meters have the ability to report a reading that was coincident with a certain other MeterReading or EndDeviceEvent (hereinafter referred to in IEC 61968-9 as the “trigger”). For example, it might record the “power factor coincident with the billing period maximum demand.

Additionally, some processes call for a coincident read to be reported. For example, when a meter is installed, it is common to capture an “initial reading.” Similarly, when a meter is disconnected, it is common practice to capture a “final read” coincident with the disconnection event.

Some systems may perform analysis of the data in storage to identify analytically derived coincident readings. For example:

- the voltage at UsagePoint A at the time of the peak daily demand on the distribution transformer (UsagePointB) that serves UsagePoint A. (UsagePoint “B” could be either a real or a virtual UsagePoint.)
- the 15-minute interval consumption at UsagePoint A at the time of the peak demand on a distribution network (UsagePoint C) on a hot, summer day
- a BulkQuantity kwh reading for a UsagePoint at the time of an EndDeviceEvent such as a meter disconnect.

The MeterReading class has an optional Boolean element called “isCoincidentTrigger.” The element doesn’t have to be used in a message, but if it is, there are rules for its interpretation. If any instance of a MeterReading message is marked with the isCoincidentTrigger Boolean set to “true”, then all other MeterReadings within the same MeterReadings message are considered to be coincident with the so marked MeterReading. Only one MeterReading element within a single MeterReadings message may have its isCoincidentTrigger Boolean set to “true”. If the isCoincidentTrigger Boolean is absent, it is defined to be “false”. It is recommended that the “trigger” MeterReading should have a timeStamp if this information is available.

The GetMeterReadings profile can be used to request MeterReadings that are coincident with a given MeterReading. This can be accomplished by including in the GetMeterReadings message a MeterReadings element in which the isCoincidentTrigger Boolean is set to “true” – in other words by specifying the “trigger” MeterReading in the GetMeterReadings filter criteria.

NOTE It is recognized that there may be small differences in time between a coincident trigger and the reading(s) that are coincident with the trigger. For example, a reading taken in conjunction with a meter disconnect can actually be taken several seconds after the operation of the disconnect switch. It is outside the scope of this Standard to define the window for readings to be considered coincident.

In the following example, a metering system identifies a power factor measurement that is coincident with the maximum demand for a given meter when the exact date and time of the maximum demand is not known:

```
<mr:MeterReadings
  xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterReadings#MeterReadings.xsd"
  xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <mr:MeterReading>
    <mr:Meter>
      <mr:Names>
```

```

        <mr:name>Meter_XYZ</mr:name>
      </mr:Names>
    </mr:Meter>
    <mr:Readings>
      <mr:value>0.0914159</mr:value>
      <mr:ReadingType ref = "0.0.0.6.0.1.38.0.0.0.0.0.0.0.0.0.65.0"/>
      <!--indicating electricitySecondaryMetered powerFactor (cos?)-->
    </mr:Readings>
  </mr:MeterReading>
  <mr:MeterReading>
    <mr:isCoincidentTrigger>true</mr:isCoincidentTrigger>
    <mr:Meter>
      <mr:Names>
        <mr:name>Meter_ABCx1</mr:name>
      </mr:Names>
    </mr:Meter>
    <mr:Readings>
      <mr:ReadingType ref = "8.8.0.6.1.1.8.0.0.0.0.0.0.0.0.3.38.0"/>
      <!--billingPeriod maximum indicating forward electricitySecondaryMetered demand (kW)-->
    </mr:Readings>
  </mr:MeterReading>
</mr:MeterReadings>

```

In the next example, a metering system or MDMS identifies the final meter reading coincident with disconnection of service via RCD:

```

<mr:MeterReadings
  xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterReadings#
    MeterReadings.xsd"
  xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <mr:MeterReading>
    <mr:isCoincidentTrigger>true</mr:isCoincidentTrigger>
    <mr:EndDeviceEvents>
      <mr:createdDateTime>2010-12-17T09:30:47Z</mr:createdDateTime>
      <mr:reason>moveOut</mr:reason>
      <mr:EndDeviceEventType ref = "3.31.0.68"/>
      <!--ElectricityMeter RCDSwitch Disconnected -->
    </mr:EndDeviceEvents>
    <mr:Meter>
      <mr:Names>
        <mr:name>Meter1</mr:name>
      </mr:Names>
    </mr:Meter>
  </mr:MeterReading>
  <mr:MeterReading>
    <mr:Meter>
      <mr:Names>
        <mr:name>Meter1</mr:name>
      </mr:Names>
    </mr:Meter>
    <mr:Readings>
      <mr:timeStamp>2010-12-17T09:30:49Z</mr:timeStamp>
      <mr:value>123456</mr:value>
      <mr:ReadingType ref = "0.0.0.1.4.1.12.0.0.0.0.0.0.0.0.3.72.0"/>
      <!--billingQuantity net electricitySecondaryMetered energy (kWh)-->
    </mr:Readings>
  </mr:MeterReading>
</mr:MeterReadings>

```

The next example demonstrates a request to get meter readings from a metering system or MDMS which are coincident with a disconnect that occurred within a specified time interval. The request is an open-ended invitation to send any type of MeterReading data which is coincident with an RCDSwitch disconnect for a given EndDevice (meter). The response to this request could very well be nothing more than the “final meter reading” example provided above. (If a more specific response was sought, it would be possible to filter for only the desired ReadingType(s) by populating the ReadingType element in the GetMeterReadings profile.)

```

<mr:GetMeterReadings
  xsi:schemaLocation="http://iec.ch/TC57/2011/GetMeterReadings#GetMeterReadings.xsd"

```

```

xmlns:m="http://iec.ch/TC57/2011/GetMeterReadings#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
<mr:EndDevice>
  <mr:Names>
    <mr:name>Meter1</mr:name>
  </mr:Names>
</mr:EndDevice>
<mr:MeterReadings>
  <mr:isCoincidentTrigger>true</mr:isCoincidentTrigger>
  <mr:EndDeviceEvents>
    <mr:EndDeviceEventType>
      <mr:Names>
        <mr:name>3.31.0.68</mr:name>
        <!--ElectricityMeter RCDSwitch Disconnected -->
      </mr:Names>
    </mr:EndDeviceEventType>
  </mr:EndDeviceEvents>
</mr:MeterReadings>
<mr:TimeSchedule>
  <mr:scheduleInterval>
    <mr:end>2010-12-31T23:59:59Z</mr:end>
    <mr:start>2010-12-01T00:00:00Z</mr:start>
  </mr:scheduleInterval>
</mr:TimeSchedule>
</mr:GetMeterReadings>

```

NOTE When using timestamps as filters, note that the TimeSchedule.scheduleInterval elements are used to frame a request for data falling within a certain range. The MeterReadings response may populate the MeterReadings.MeterReading.valuesInterval elements to identify the range of dates offered in the response. The user will also find that interval data (which contains a time-ordered series of values) has no place in a discussion of coincident data. Only one interval may be coincident with a given event or another MeterReading. It therefore seems inappropriate to populate a series of MeterReading.IntervalBlocks.IntervalReadings elements. A single value may be presented as an interval, or the single interval value may be presented as a stand alone MeterReading.Readings instead.

The ability to schedule when meter readings are obtained is provided through the use of a MeterReadSchedule request. The following is the structure used for the payload of a MeterReadSchedule request message:

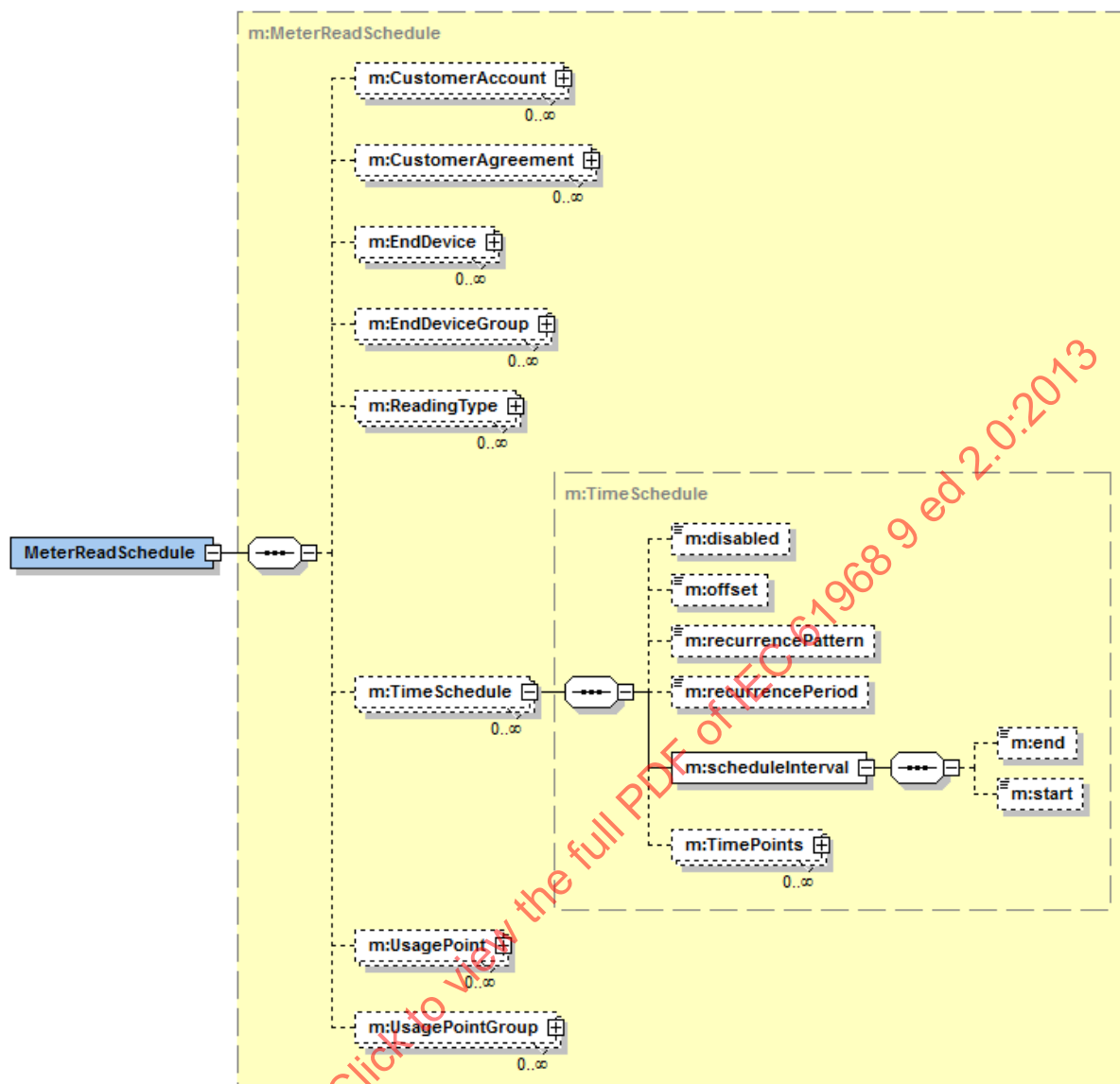


Figure 27 – Meter read schedule message format

Several elements in the TimeSchedule of the MeterReadSchedule are profile are unique to that profile and deserve special definition. These include:

disabled – True if this schedule is deactivated (disabled)

offset – The offset for the recurring (periodic) times in the TimeSchedule. Each point in the time series defined by scheduledInterval and either recurrencePeriod or recurrencePattern will be shifted by adding the offset value. The use of TimeSchedule.offset is not applicable when discrete TimePoints are specified in lieu of a recurrencePeriod or recurrencePattern.

recurrencePattern – Interval at which the scheduled action repeats, from the beginning of one action to the beginning of the next action (e.g., first Monday of every month, last day of the month, etc.). Used when the interval cannot be defined as a fixed number of seconds between points in time. The use of recurrencePattern is not applicable when recurrencePeriod is specified or when discrete TimePoints are specified in lieu of a recurrencePeriod or recurrencePattern.

recurrencePeriod – Duration between time points, from the beginning of one action to the beginning of the next action. Used when the interval can be defined as a fixed number of

seconds between points in time. The use of recurrencePeriod is not applicable when recurrencePattern is specified or when discrete TimePoints are specified in lieu of a recurrencePeriod or RecurrencePattern.

5.4 End device control messages

5.4.1 General

There are many types of end device control messages. These are used to send instructions to one or more end devices. EndDeviceControls may result in one or more consequential EndDeviceEvent message.

5.4.2 Applications

5.4.2.1 Load control

Load control (a.k.a. direct load control) requests can often be made to a MS for the purpose of load curtailment. This request would typically be initiated from network operations. Not all MS will have load control capabilities.

It should also be noted that this is different from a disconnect, where a disconnect results in the complete loss of power to a single customer.

A load control will typically result in the shedding of specifically configured loads (e.g. air conditioning, pumps, etc.)

The load control function executes load shed commands which are computed by load management software (contained in the network operations block). The load management software is used to compute an appropriate load-shed amount, and could potentially include many factors including the predicted duration of generation shortfalls, historical usage patterns, real-time usage data, and weather.

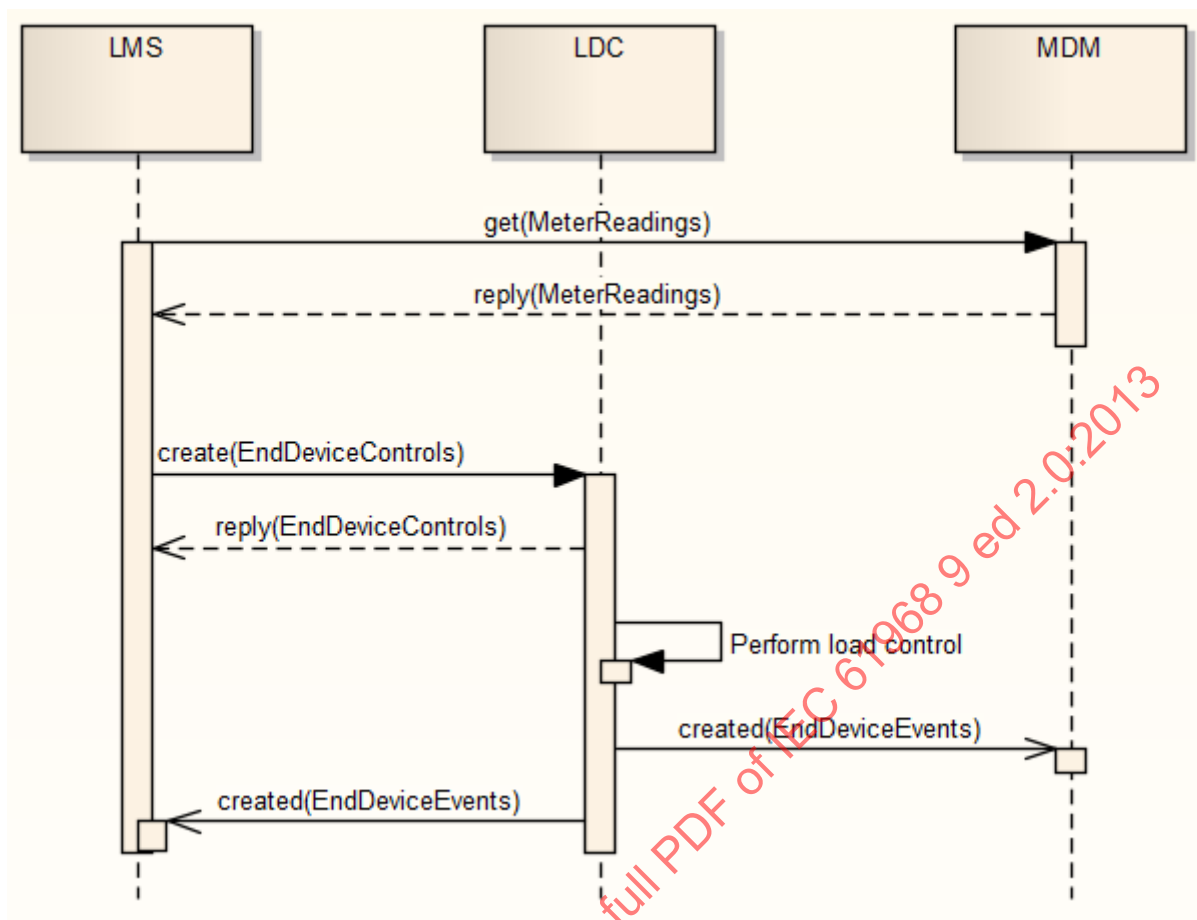


Figure 28 – Example load control message exchange

The example in Figure 28 shows how load history may be obtained from the MDM in the form of MeterReadings and used to perform load analysis. It also shows load control commands being issued by the LMS to the load control system. Deployments that don't support an MDM would interact directly with the MS instead.

Load control commands are implemented as a type of EndDeviceControl, where the command can be addressed by EndDeviceGroup (using a group address), by EndDevice (using mRID) or by CustomerAgreement.

Load control may also be implemented using PAN devices.

5.4.2.2 Load control device installation

The installation of load control units is usually more labour intensive than installing a meter, but the data exchange requirements are simpler. LC units are different from meters in the sense that they don't require periodic recalibration. Once an LC unit is installed it will probably remain in place for the life of the unit, even if the customer withdraws from the LC program, or if there is a change in tenancy.

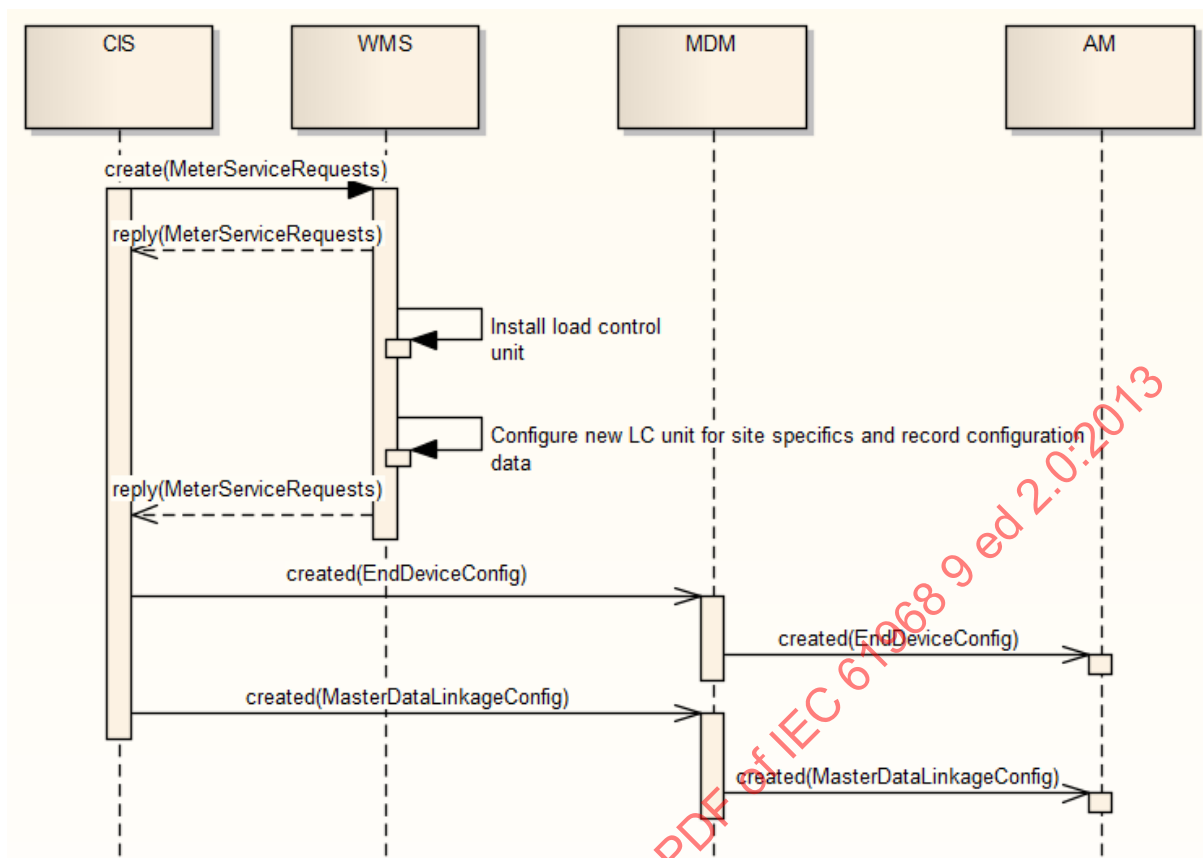


Figure 29 – Example message exchange for LC unit installation

Before travelling to the service location, the installer will know the customer account data, the type of load control unit to be installed, and the ratings of the device to be controlled. The installation data can confirm device ratings, and where appropriate, document the port number of the LC unit wired to the device. The results of the installation can be published to all of stakeholders as depicted in Figure 29.

5.4.2.3 Change of customer program

Particular metering solutions are usually chosen to fulfil specific metering needs as a result of customer program enrolment. In many cases, a flexible metering solution can provide coverage for a range of customer programs. When a customer transitions from enrolment in one program to another, it may simply require a change to the meter (or communication module) configuration. In extreme cases it may require a meter change out. In other cases, it may require no change at all. Changes to a configuration will need to be communicated amongst the stakeholders. An example exchange in which the deployment involves an MDM is described in Figure 30. Another example in which the deployment lacks an MDM is described in Figure 31.

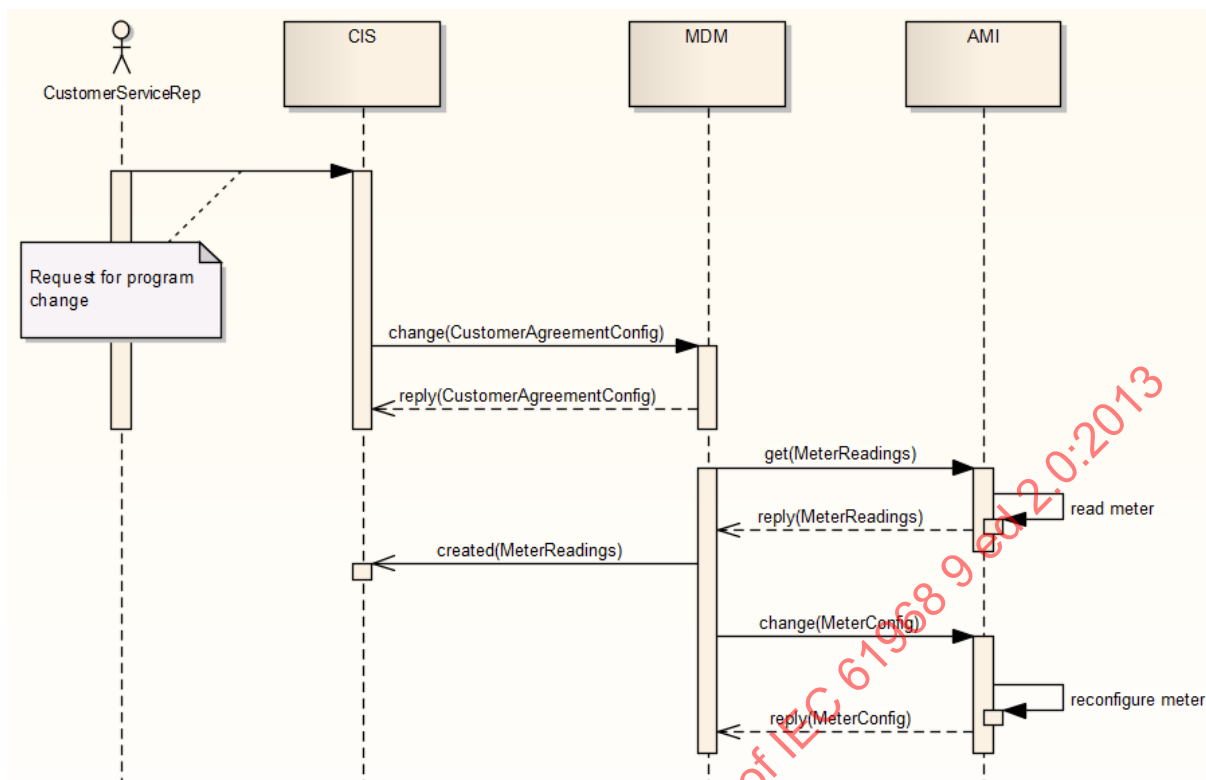


Figure 30 – Example message exchange for change of customer program

Changes to the meter configuration may be expressed as changes to the configuration of an EndDevice.

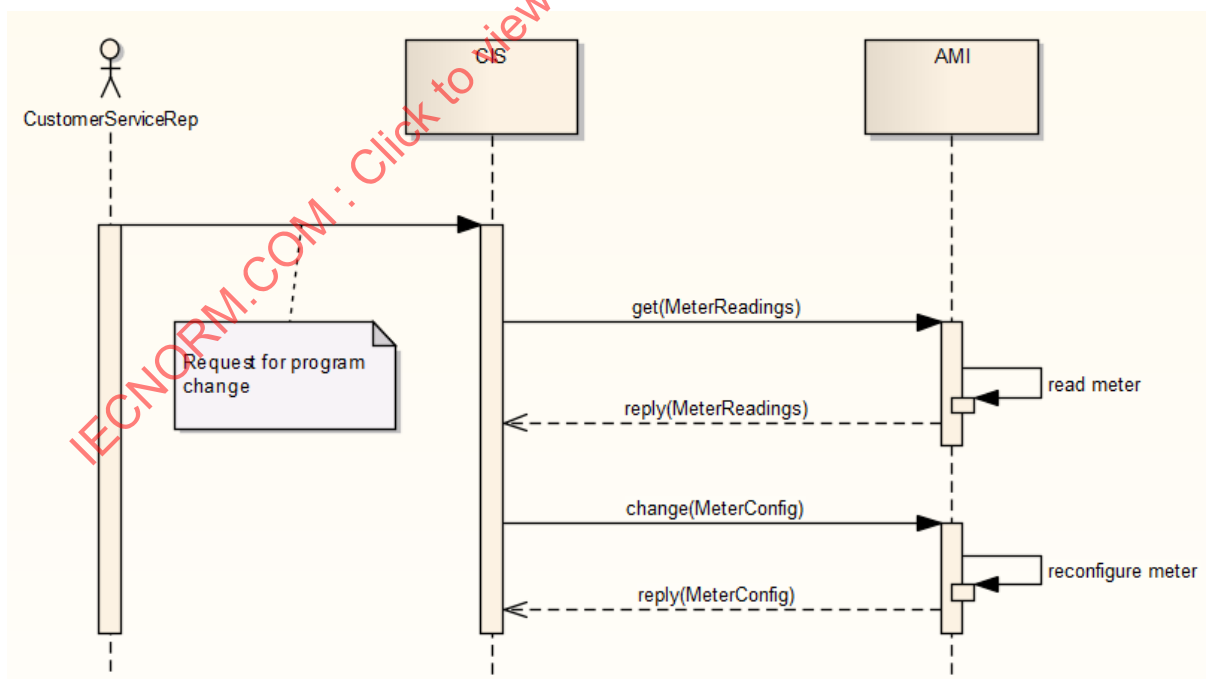


Figure 31 – Example message exchange for change of customer program w/o MDM

In other cases, a change to the customer program might not be accommodated with a meter reconfiguration. The program change may require a meter changeout (refer to 5.5 for more information on meter changeouts). Meter changeouts entail a different workflow than meter

reconfigurations. This will be reflected in the message exchange between systems. An example exchange is depicted in Figure 32.

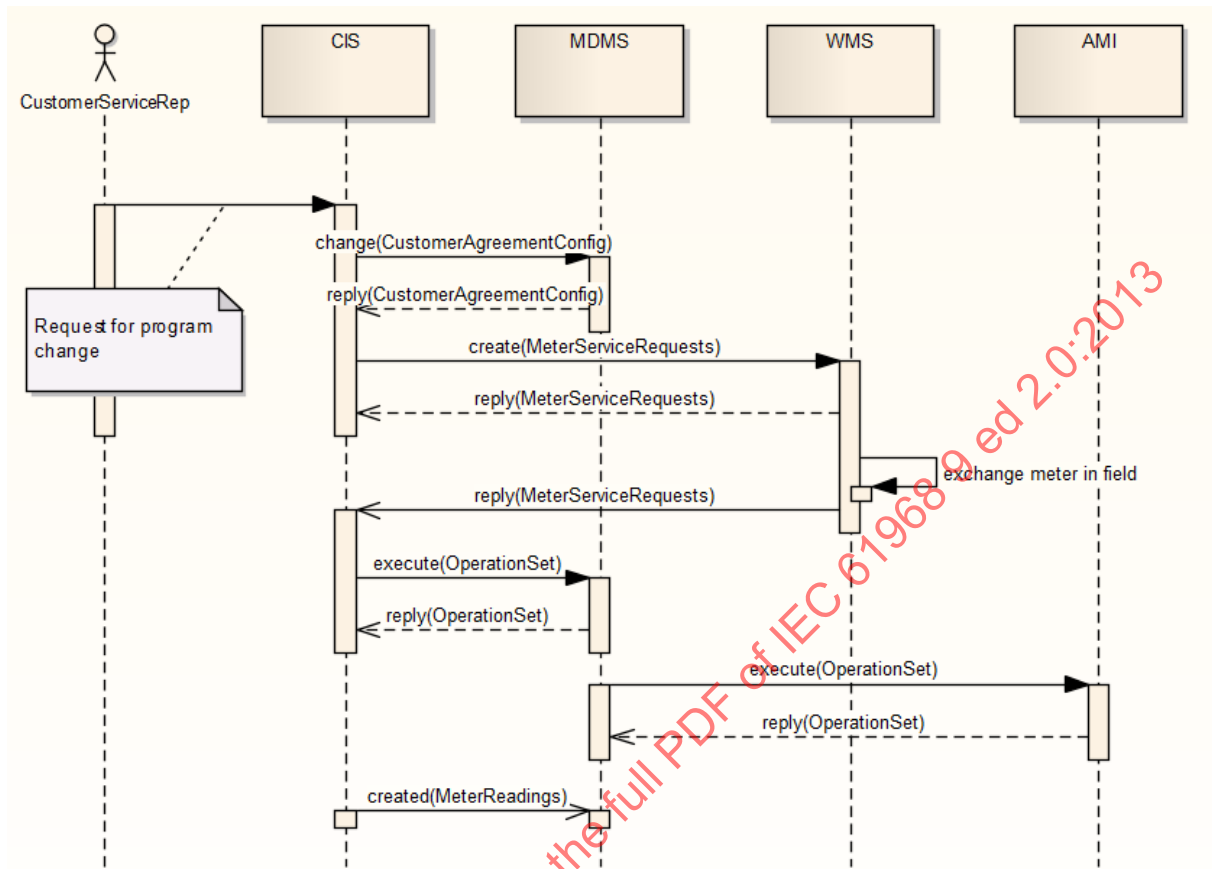


Figure 32 – Example for change of customer program with meter change out

See 5.6.2 on meter installation and removal for additional details on the MeterServiceRequest message.

5.4.2.4 Meter disconnect and reconnect

For a variety of reasons, such as non-payment, it may be necessary to disconnect or reconnect a customer. When disconnected, recorded usage should be zero and out of power complaints should be ignored. When it is not possible to perform a disconnect or reconnect remotely through an MS, a meter service request will typically be issued to perform the disconnect or reconnect manually. Example message exchanges for remote operation are depicted below in Figure 33 and Figure 34.

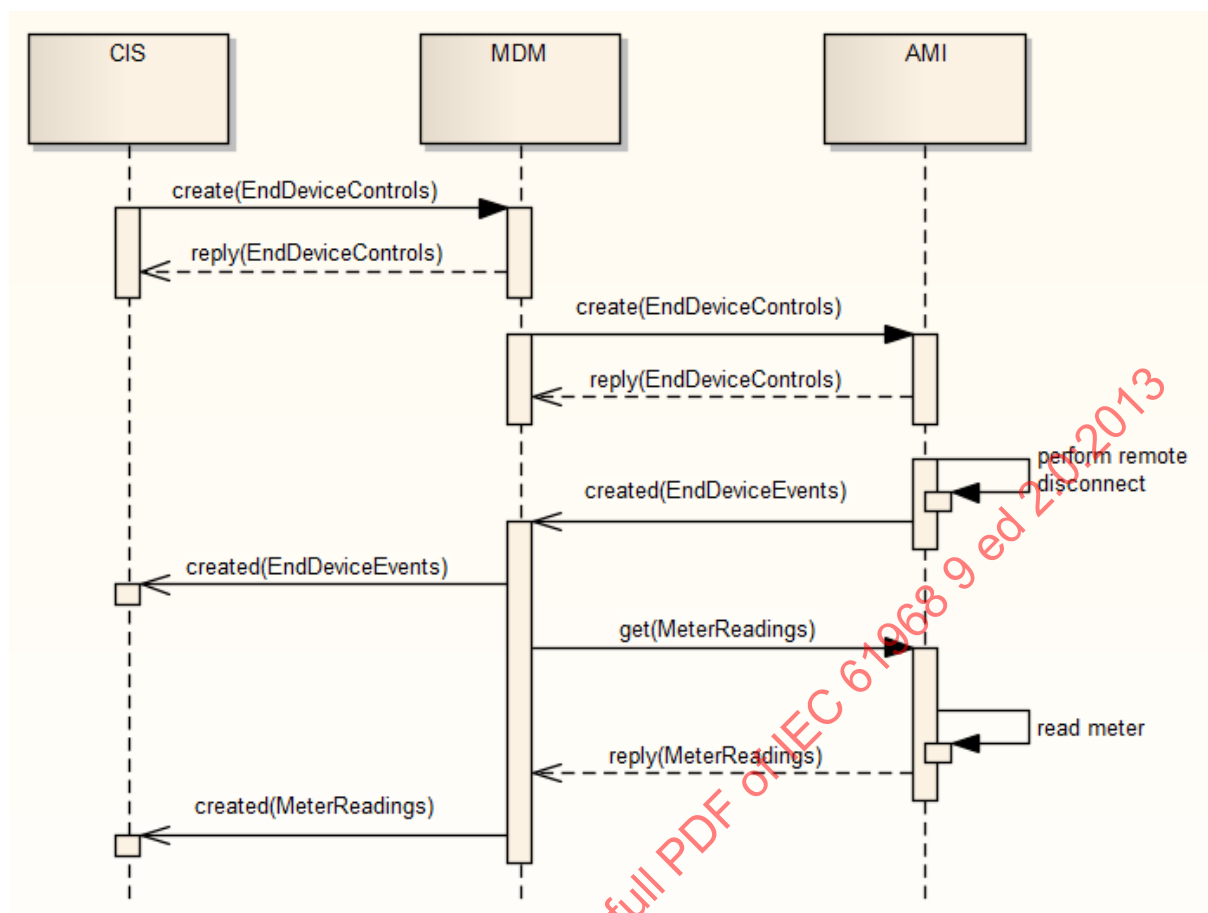


Figure 33 – Example message exchange for meter connect/disconnect

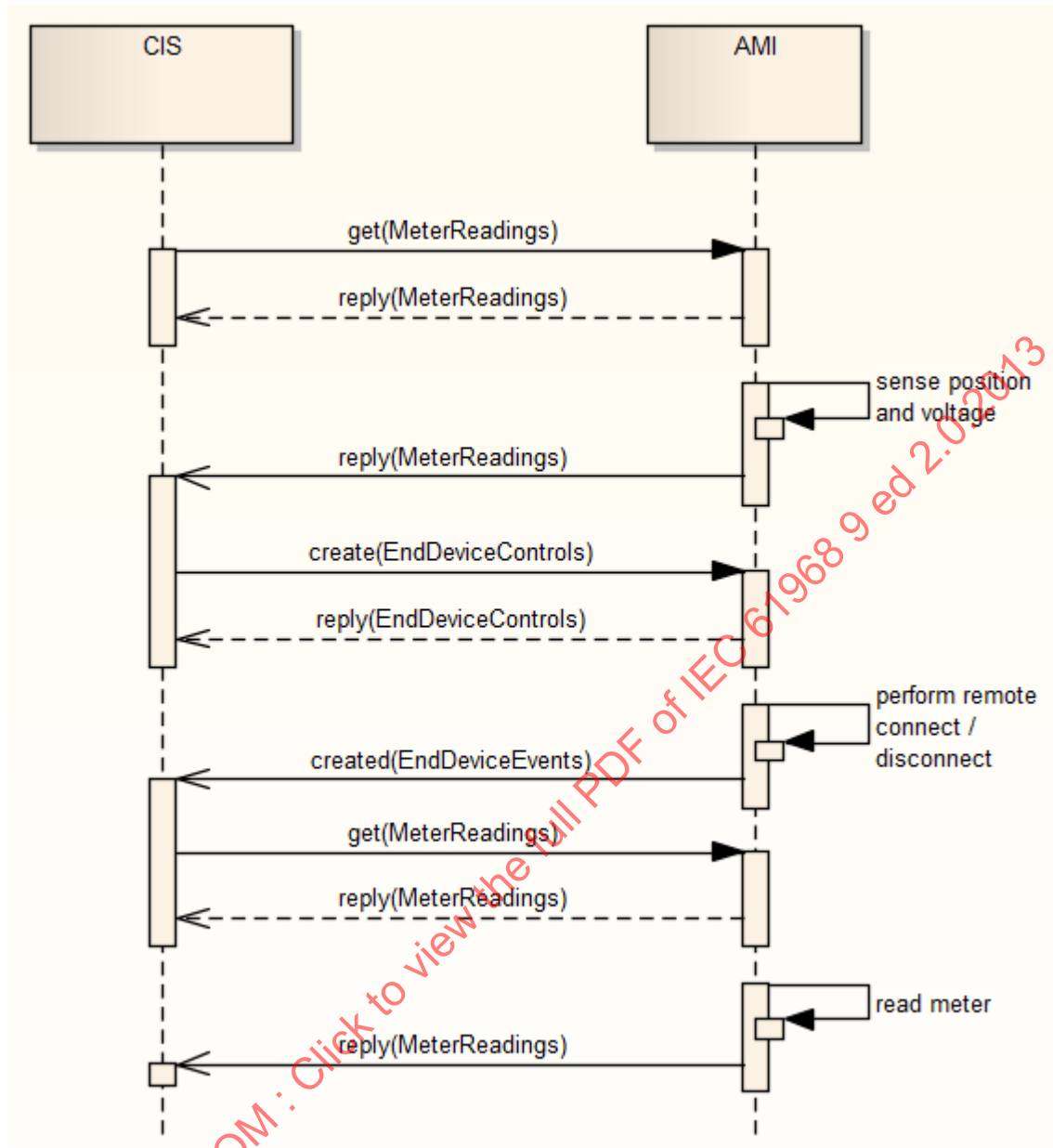


Figure 34 – Example of remote connect/disconnect directly between CIS and MS

5.4.2.5 Real-Time pricing

Real-time pricing signals and/or schedules can be sent to an end device via the MS. There are several ways this can be accomplished, such as:

- price signal issued in real-time identifying a price for a given time interval
- time of use (TOU) schedules published, which cause changes in the accumulation for each TOU Tier
- energy price schedules published in advance.

Often the EndDeviceGroup can be used to differentiate meters with different contracts or tariffs.

The example in Figure 35 shows a price signal being sent from network operations, to the MS. The MS then acts as a network service provider to communicate the price in real time to meters and other equipment.

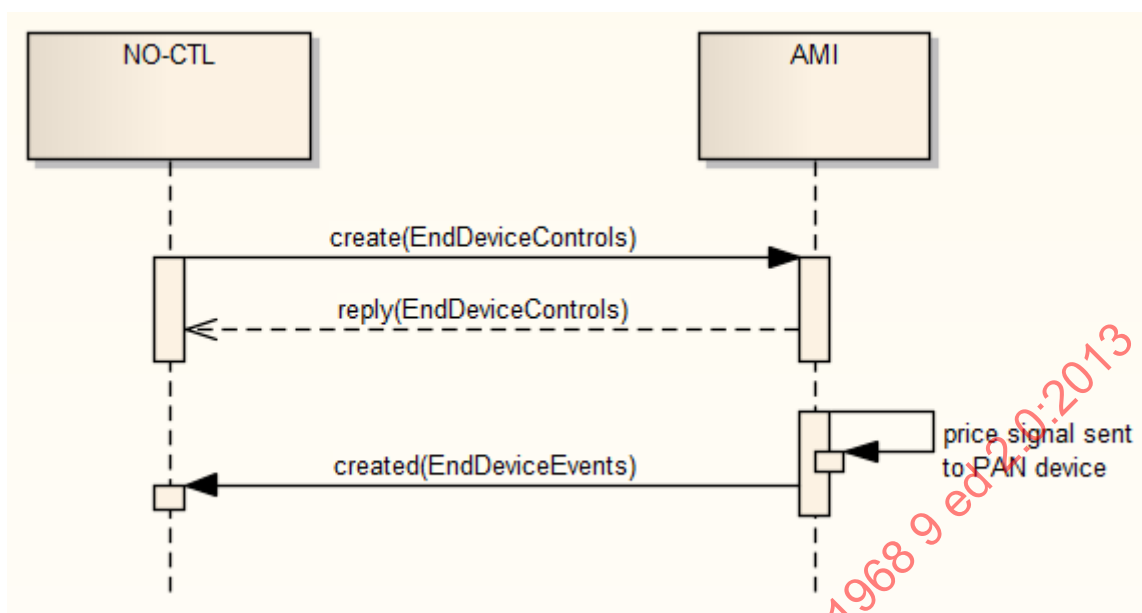


Figure 35 – Example message exchange for real-time price signal

Price signals are implemented as a subtype of EndDeviceControl, where the price is a message parameter.

5.4.3 Message format

5.4.3.1 General

Figure 36 describes the structure of an EndDeviceControls message. The XML schema for the EndDeviceControls message is defined in Annex H.

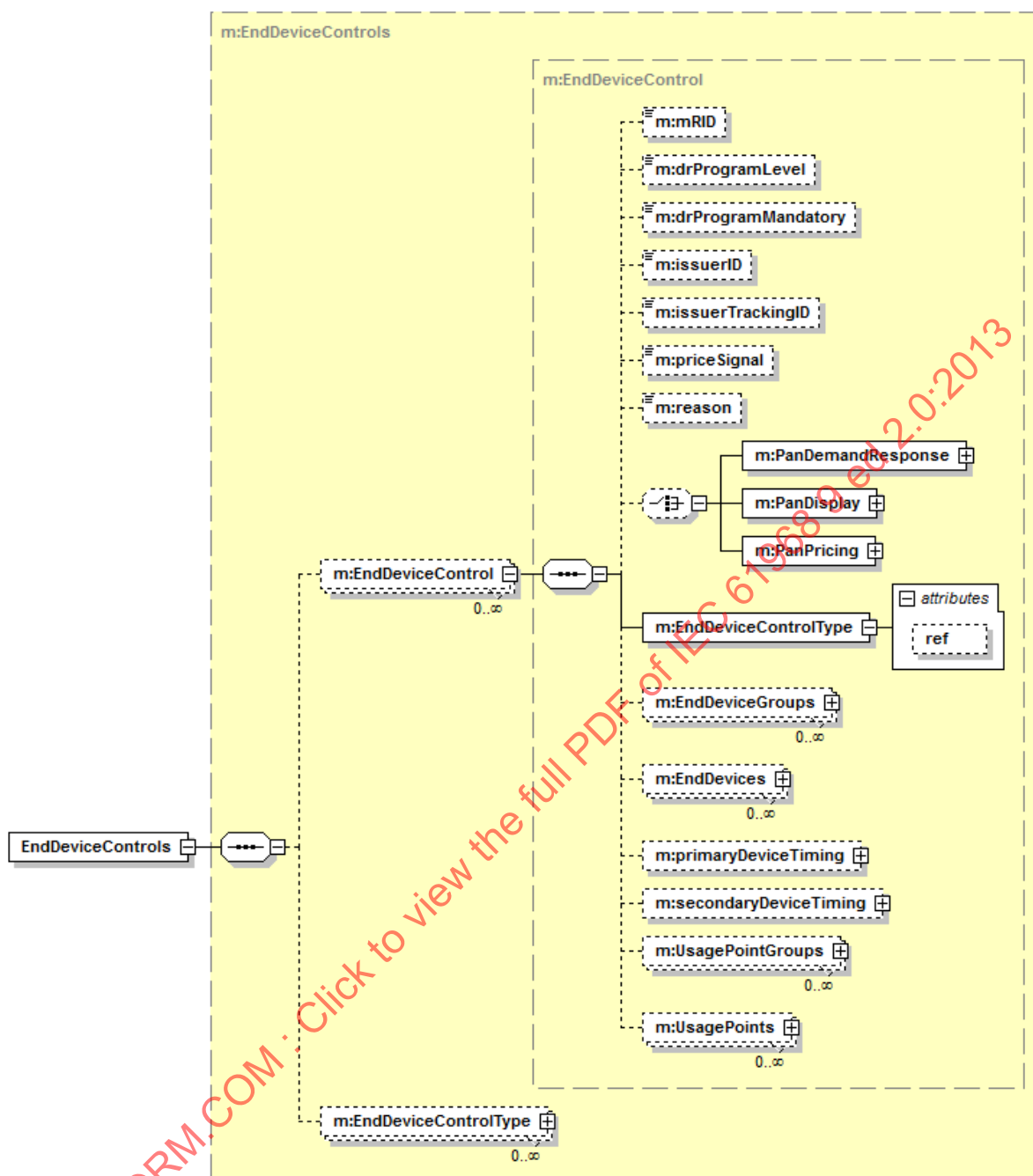


Figure 36 – End device controls message format

Within this message payload structure, specific meters may be addressed by EndDevice (e.g. meter) EndDeviceGroup, UsagePoint and/or UsagePointGroup. Aside from at least one address, the only required element is the EndDeviceControlType, which identifies the type of control to be performed. Examples of the different control types that could be used include, but are not limited to:

- load control signal
- price signal or schedule
- remote disconnect
- remote reconnect
- demand reset

- demand reduction signal
- sending a text message to a PAN device
- sending pricing signals to a PAN device
- sending load control / demand response events to a PAN device.

The following subclauses 5.4.3.2 to 5.4.3.5 are representative XML examples for EndDeviceControls.

5.4.3.2 Example of a demand reset payload

The following is an example for a demand reset. Note that in this example there are two devices being addressed, each of these is in its own EndDevices element. One of them is addressed by mRID and the other is addressed by Names.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:EndDeviceControls
  xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/EndDeviceControls#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:EndDeviceControlType ref = "3.8.0.214"/>
    <m:EndDevices>
      <m:mRID>3dc53ee5-777e-50b4-8699-a1c224f45f3d</m:mRID>
    </m:EndDevices>
    <m:EndDevices>
      <m:Names>
        <m:name>MeterABC</m:name>
        <m:NameType>
          <m:name>MeterID</m:name>
        </m:NameType>
      </m:Names>
    </m:EndDevices>
  </m:EndDeviceControl>
</m:EndDeviceControls>
```

5.4.3.3 Example of a meter disconnect by group

The following is an example of a meter disconnect by group.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:EndDeviceControls
  xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/EndDeviceControls#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:EndDeviceControlType ref = "3.31.0.23"/>
    <m:EndDeviceGroups>
      <m:mRID>3dc53ee5-777e-50b4-8699-a1c224f45f3d</m:mRID>
    </m:EndDeviceGroups>
  </m:EndDeviceControl>
</m:EndDeviceControls>
```

5.4.3.4 Example of a scheduled disconnect by group

The following is an example of a scheduled disconnect by group.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:EndDeviceControls
  xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/EndDeviceControls#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:EndDeviceControlType ref = "3.31.0.23"/>
    <m:EndDeviceGroups>
      <m:Names>
        <m:name>Disconnects in Region 123, May 2011</m:name>
      </m:Names>
    </m:EndDeviceGroups>
  </m:EndDeviceControl>
</m:EndDeviceControls>
```

```

        <m:NameType>
          <m:name>Regional Disconnect Group</m:name>
          <m:NameTypeAuthority>
            <m:name>Utility ABC</m:name>
          </m:NameTypeAuthority>
        </m:NameType>
      </m:Names>
    </m:EndDeviceGroups>
    <m:primaryDeviceTiming>
      <m:interval>
        <m:start>2001-12-17T09:30:47Z</m:start>
      </m:interval>
    </m:primaryDeviceTiming>
  </m:EndDeviceControl>
</m:EndDeviceControls>

```

5.4.3.5 Example of a meter connection by name

The following is an example of a meter connection, where the meter is specified by name.

```

<?xml version="1.0" encoding="UTF-8"?>
<!--Connect Meters by Meter Name-->
<m:EndDeviceControls
  xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
  xmlns:obj = "http://iec.ch/TC57/2011/EndDeviceControls#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:mRID>76e7a0a3-3e33-4d21-b78f-b42227823ec7</m:mRID>
    <m:issuerID>External System 1</m:issuerID>
    <m:issuerTrackingID>123</m:issuerTrackingID>
    <m:EndDeviceControlType ref = "3.31.0.18"/>
    <m:EndDevices>
      <m:mRID>45e7a0a3-3e99-4d17-b43f-b67221212ec0</m:mRID>
      <m:Names>
        <m:name>Meter 123</m:name>
        <m:NameType>
          <m:name>Meter Name</m:name>
          <m:NameTypeAuthority>
            <m:name>Utility ABC</m:name>
          </m:NameTypeAuthority>
        </m:NameType>
      </m:Names>
    </m:EndDevices>
  </m:EndDeviceControl>
  <m:EndDevices>
    <m:mRID>09e7a0a3-3e50-4d10-b40f-b40980088ec3</m:mRID>
    <m:Names>
      <m:name>Meter 456</m:name>
      <m:NameType>
        <m:name>Meter Name</m:name>
        <m:NameTypeAuthority>
          <m:name>Utility ABC</m:name>
        </m:NameTypeAuthority>
      </m:NameType>
    </m:Names>
  </m:EndDevices>
  <m:primaryDeviceTiming>
    <m:interval>
      <m:start>2011-06-17T09:30:47.0Z</m:start>
    </m:interval>
  </m:primaryDeviceTiming>
</m:EndDeviceControl>
</m:EndDeviceControls>

```

5.5 Meter service requests

5.5.1 General

Meter service requests are a subclass of Work, where an EndDevice is involved.

5.5.2 Applications

5.5.2.1 Meter installation and removal

It may be necessary to install, remove or configure meters as a consequence of the registration of a new customer, removal of a customer or the switch of a customer from one supplier to another. There may also be the need to change out a meter which involves the removal of the old meter, installation of the new meter and configuration of the new meter as needed by the metering system.

Prior to meter installation, subscriptions have been established between the MS and the MDM to receive updates to customer data (see 5.10 on master data management for more details). The workflow for a meter change out is shown in Figure 37. This encompasses both the meter installation and meter removal processes.

The OperationSet steps are included to synchronize the revised Master Data (the configuration data for the new and old meters and the association changes with the UsagePoint) with the MDM System and the Metering System. See 5.10 and Annexes K and L for additional information related to Master Data Management.

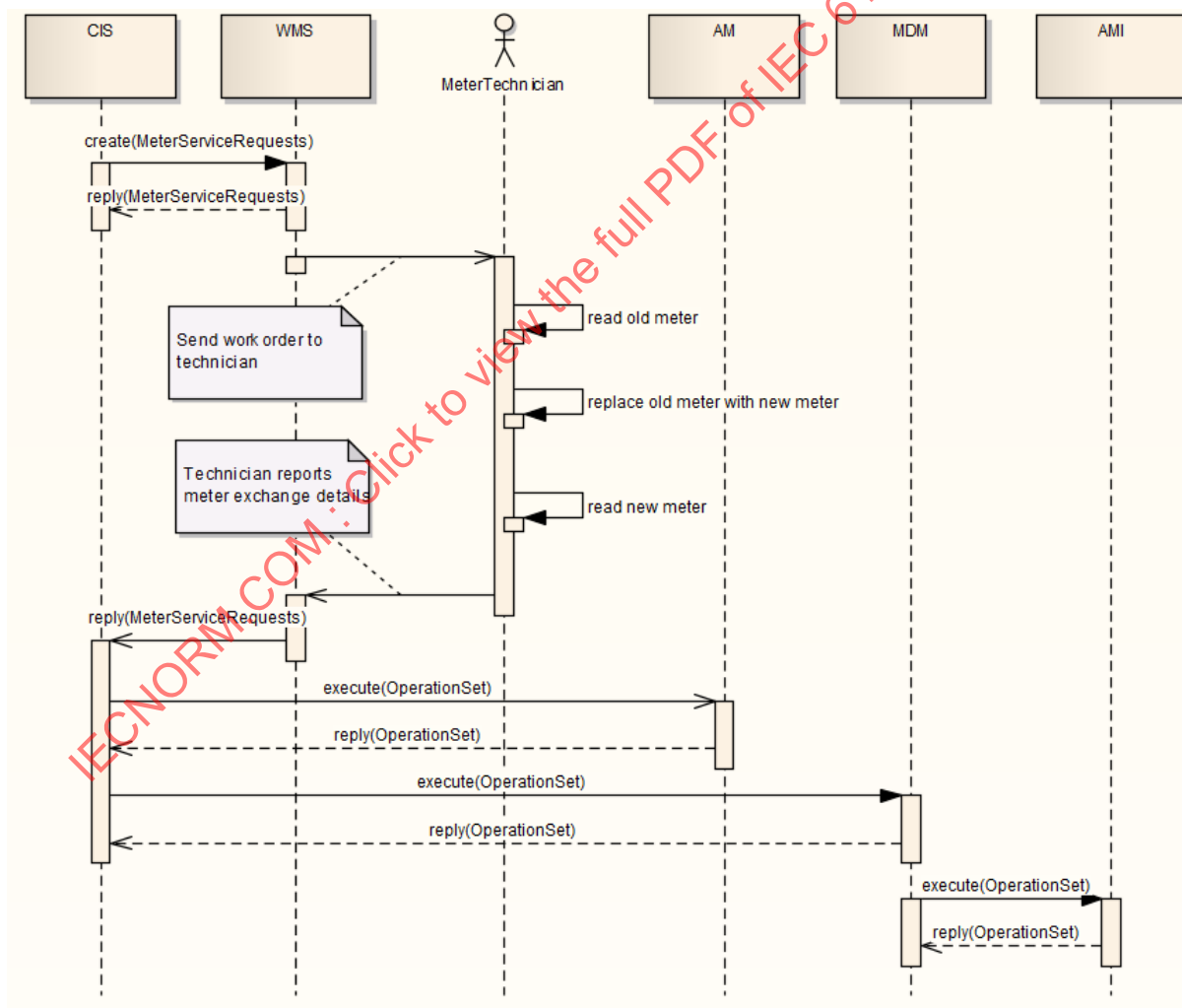


Figure 37 – Example meter installation and removal message exchange

The initial reading of the new meter and final reading of the old meter are of type MeterReading. MeterReading contains “UsagePoint” which is needed (in addition to ServiceLocation) to help identify the location of the new and old meters.

5.5.2.2 Meter replaced due to end device event

EndDeviceEvents (as described in 5.2) can cause an evaluation to occur which results in a request for a meter change out. Meter events may be published from the MS or MDM. Figure 38 describes an example exchange where the MDM has identified a problem, and brought it to the attention of the WMS which decides to change out the meter.

Once again, the OperationSet steps are included to synchronize the revised Master Data (the configuration data for the new and old meters and the association changes with the UsagePoint) with the MDM System and the Metering System. See 5.10 and Annexes K and L for additional information related to Master Data Management.

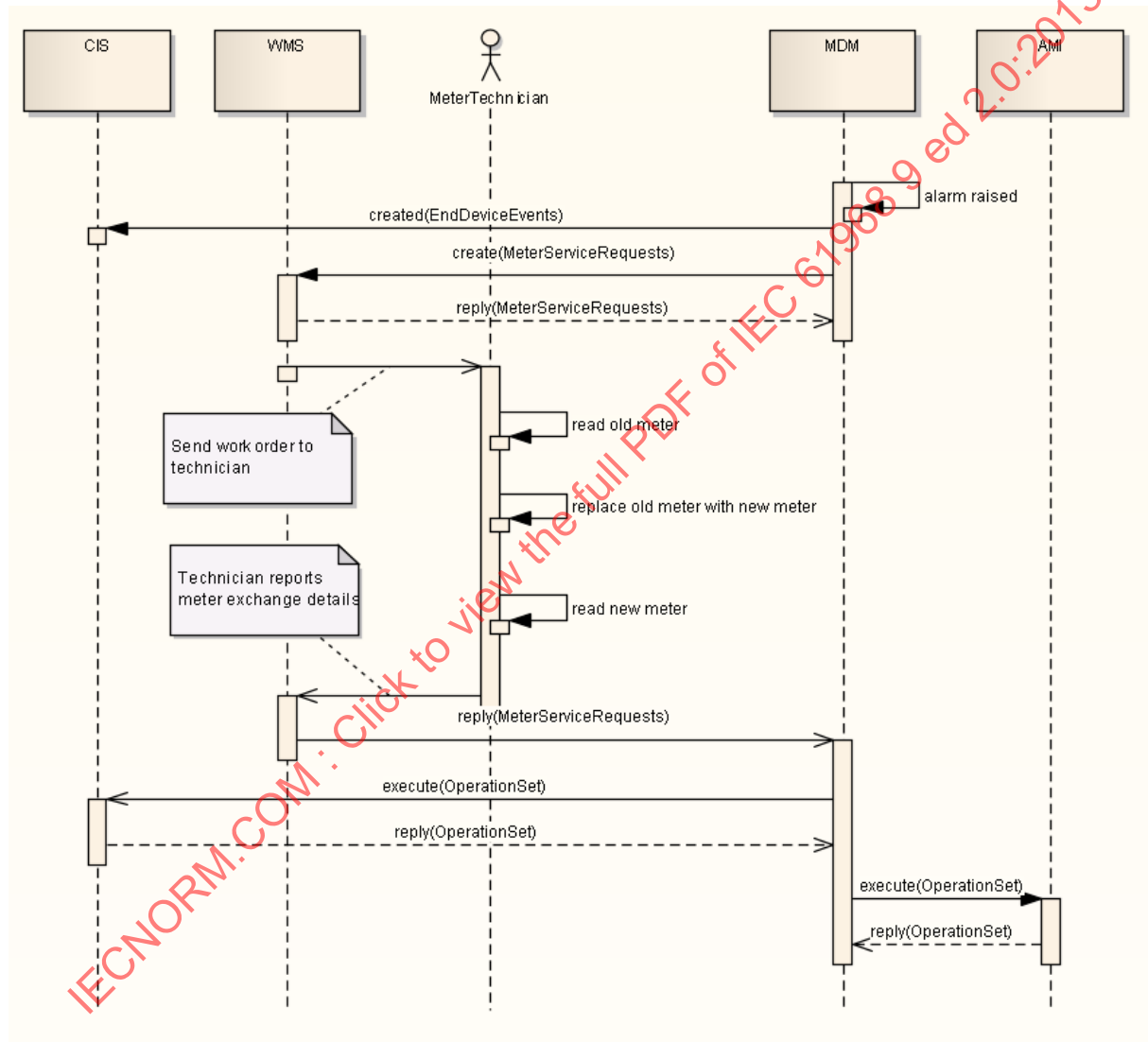


Figure 38 – Example end device event message exchange due to meter changeout

5.5.2.3 Meter changed-out due to CIS alarms or customer complaints

Data analysis by the CIS or customer billing complaints may cause the customer service department to request a site-visit to the customer location and possibly a meter change out. Figure 39 describes an example exchange where the CIS has identified a problem, and brought it to the attention of the WMS which decides to change out the meter.

Once again, the OperationSet steps are included to synchronize the revised Master Data (the configuration data for the new and old meters and the association changes with the

UsagePoint) with the MDM system and the metering system. See 5.10 and Annexes K and L for additional information related to master data management.

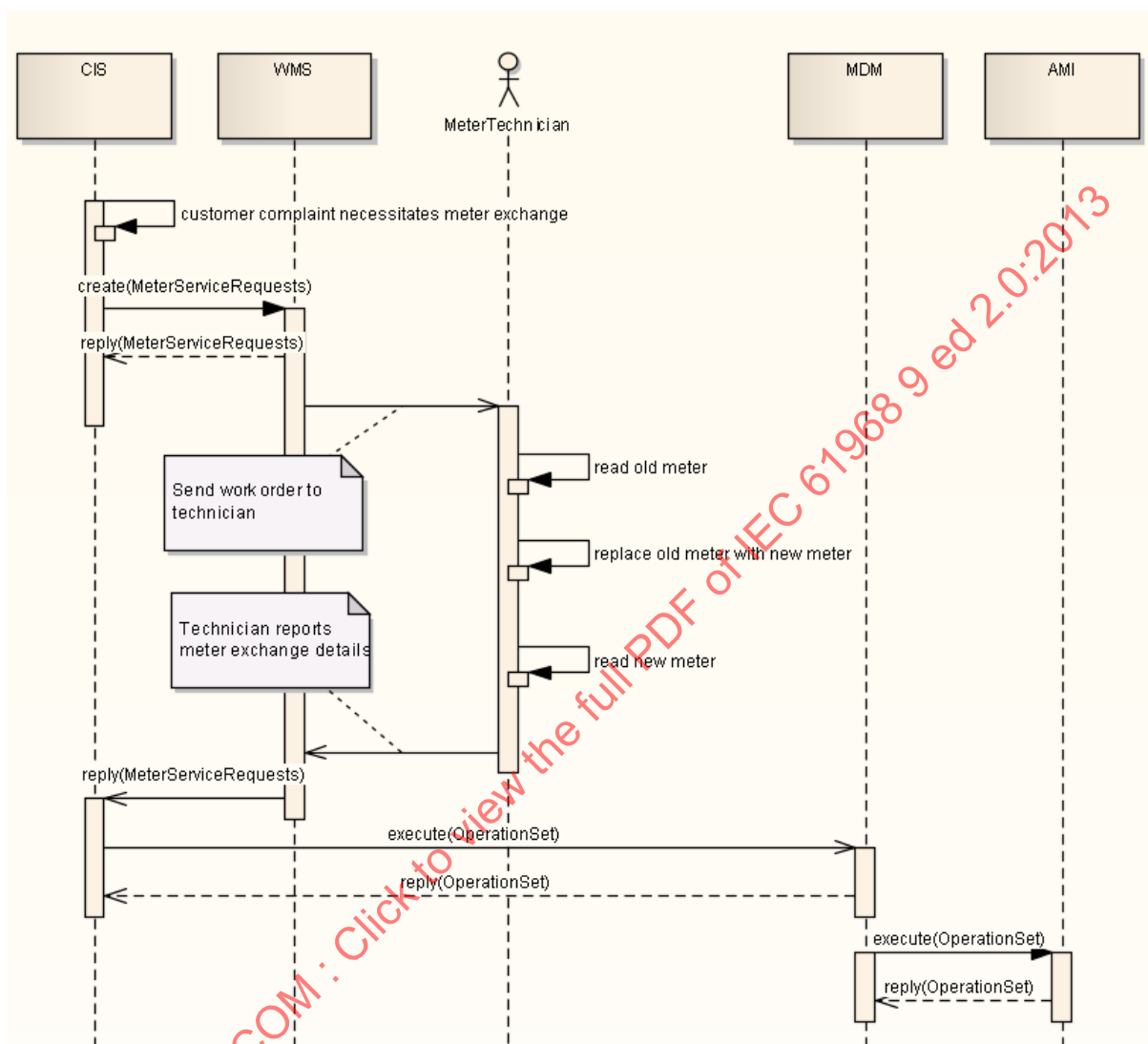


Figure 39 – Example message exchange due to CIS alarms

5.5.2.4 Meter changed-out for recalibration.

The WMS or other enterprise systems such as AM may track when meter recalibration is due, and change-out the meter. Some utilities may view the actual meter change out as a WMS issue as depicted in Figure 40, while others treat it as a MS issue.

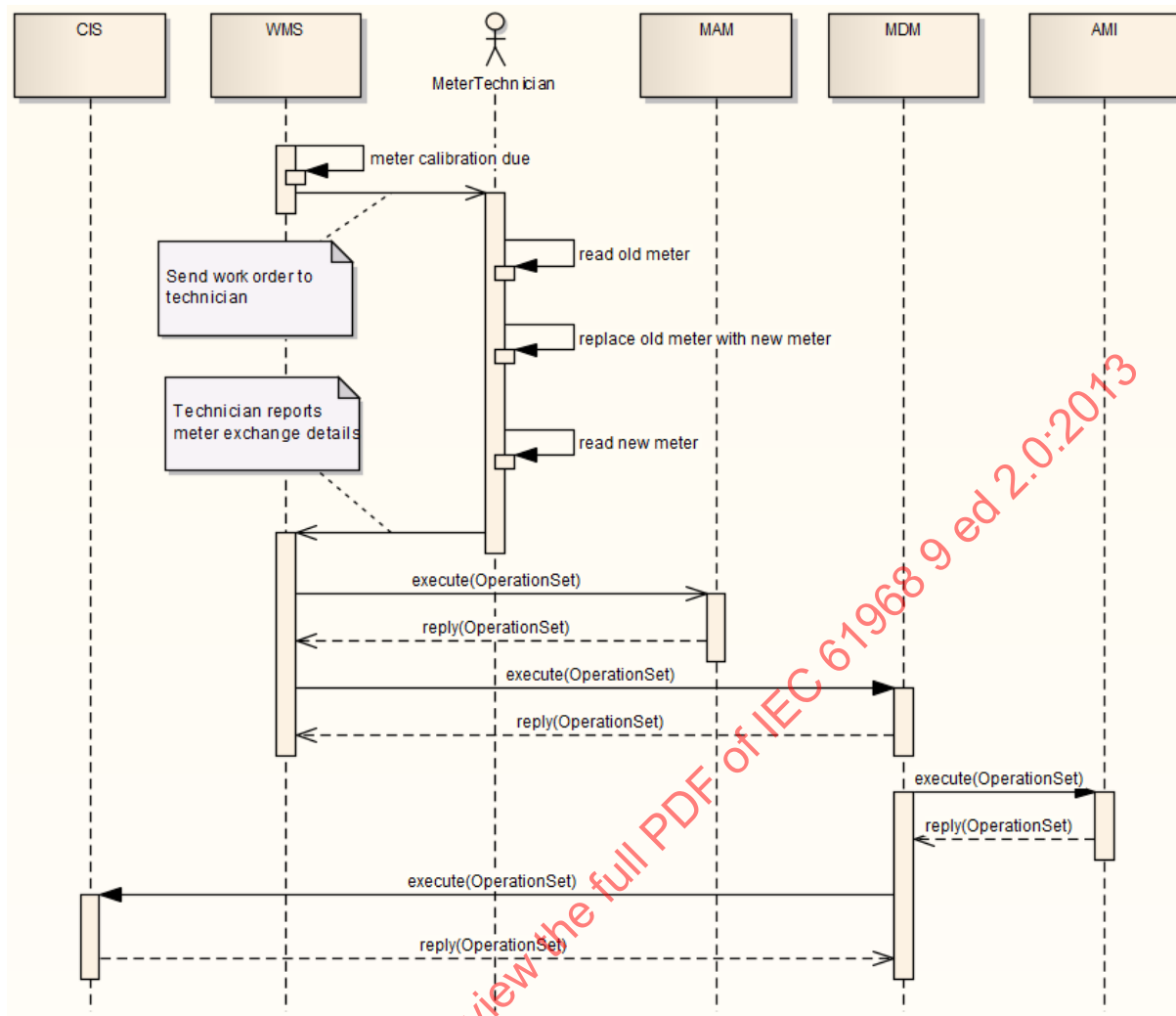


Figure 40 – Example message exchange when meter is changed out for recalibration

The OperationSet steps are included to synchronize the revised Master Data (the configuration data for the new and old meters and the association changes with the UsagePoint) with the MDM system and the metering system. See 5.10 and Annexes K and L for additional information related to MDM.

5.5.3 Message format

The message payload structure in Figure 41 describes MeterServiceRequests. It can be used for zero or more MeterServiceWork objects.

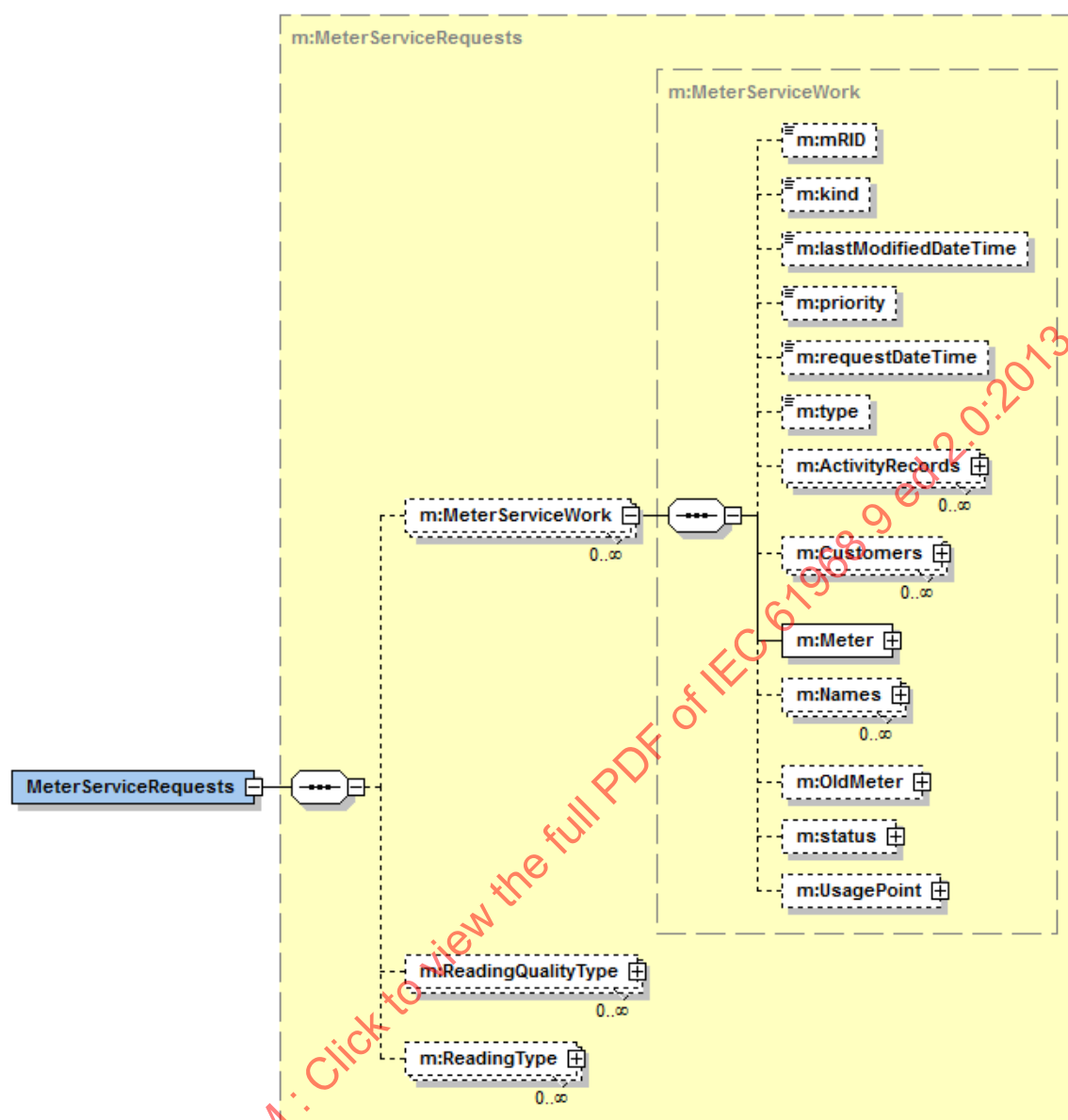


Figure 41 – Meter service requests message format

The message may include more than one MeterServiceWork item. Each item may refer to up to two meters to provide the means to replace a meter. Meter readings can be obtained as a part of the work. In the case of a meter replacement, readings for the old meter can be obtained as well as initial readings for the new meter. Location references can be supplied as a part of the customer data or for the meter asset, as appropriate for the work being done. The detailed, annotated XML schema is defined in Annex I.

5.6 Metering system events

5.6.1 General

There are different levels of need within the system for different kinds of messages.

The metering system (*per se*) may develop problems within its infrastructure which require a work order to fix. The data requirements for communicating this event are similar to the requirements of EndDeviceEvent as described in 5.2. With an EndDeviceEvent, a simple error code can be used to report a problem. This mechanism works when the recipient is able to look-up and interpret the meaning of the code. However, when a more detailed description of

the problem is required, a more elaborate schema shall be used. In some cases, the recipient is a human and requires a human-readable description of the problem, and the particular piece of equipment involved. When identifying the asset, it will probably be necessary to use vendor-specific terminology to describe the hardware.

5.6.2 Applications – Firmware upgrade

For an automated Metering System capable of two-way communication, it may be possible to upgrade the firmware of MS infrastructure in the field, or in some systems the communication assets in the end devices. Changes to the metering system that materially affect its operation shall be communicated to all of the relevant stakeholders. An example of such a publication using an EndDeviceConfig message is depicted in Figure 42.

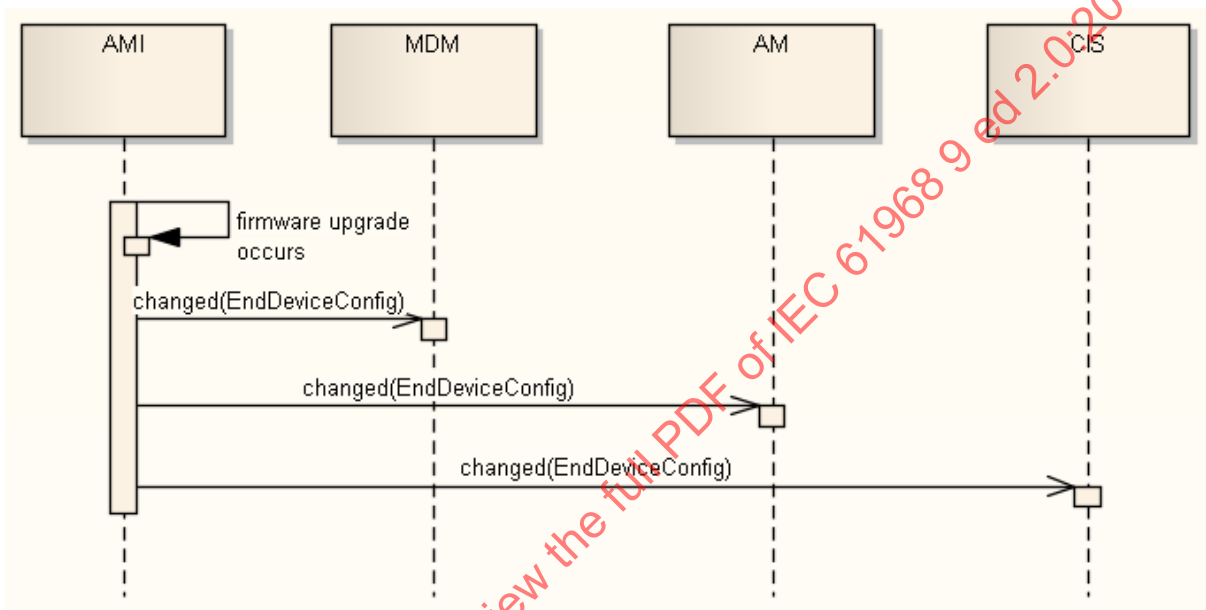


Figure 42 – Example firmware upgrade message exchange

The firmware upgrade may cause the EndDevice or CommEquipmentAsset to change in a number of ways, including device functional characteristics, firmware version and revision number, or configuration (expressed as a programId).

5.6.3 Message formats

Please refer to the EndDeviceConfig message format described in 5.10.3.

5.7 Customer switching

5.7.1 General

A customer in an open retail market can switch between energy suppliers. This may require reconfiguration and/or reinstallation of the meter. The reconfiguration or meter replacement may be a consequence of a customer changing energy programs at the time of the change of energy supplier. This process would likely involve an on request read as needed for final billing purposes. An example message exchange is provided below in Figure 43.

The OperationSet steps are included to synchronize the revised Master Data (the configuration data for the new and old retailers and the association changes with the Customer, CustomerAccount, and CustomerAgreement) with the MDM System and the Metering System. See 5.10 and Annexes K and L for additional information related to Master Data Management.

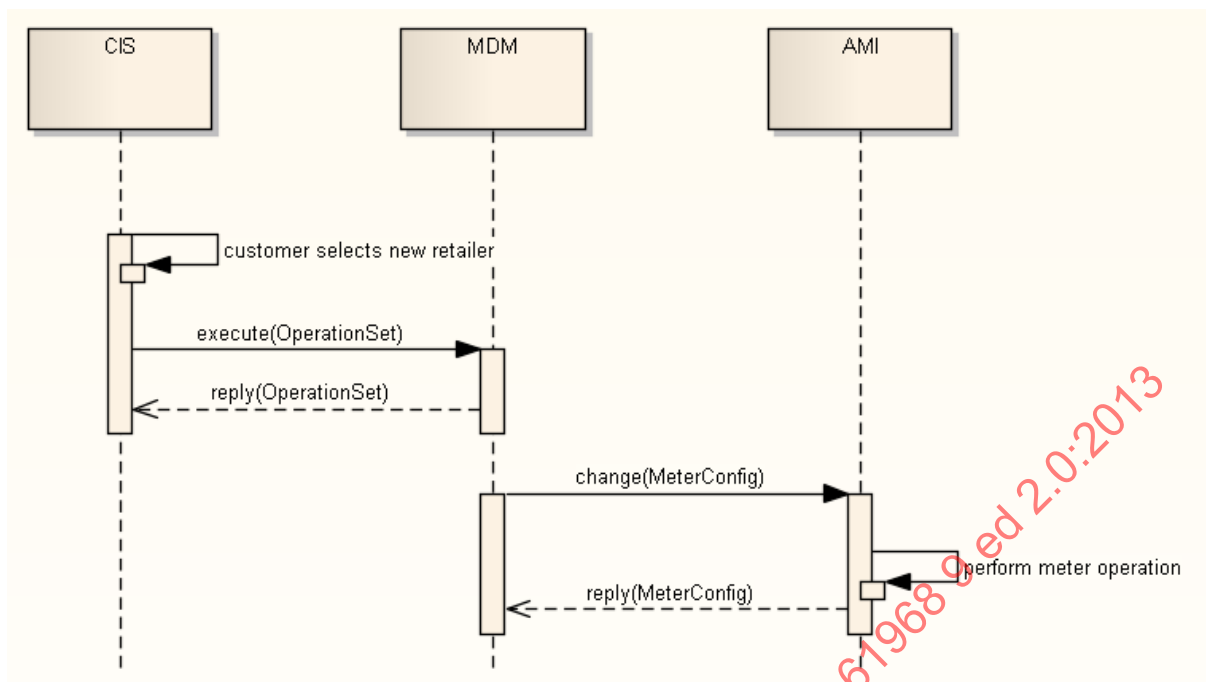


Figure 43 – Example customer switching message exchange

5.7.2 Message formats

The structure of a MeterServiceRequest was described by Figure 41. The structure of a MeterReading message was described by Figure 19.

5.8 Payment metering service messages

5.8.1 General

Payment metering services typically involve prepayment meters installed at customers' premises and token vending systems situated at convenient locations to serve the needs of customers. For the purpose of this standard, vending systems are regarded as being part of the metering system. Such vending systems typically require information about the meter, customer, service location, usage point, tariff, customer account, customer agreement and the supplier of the service that receives the revenue collected by the vending systems.

The information required by the vending systems usually originates in the CIS and billing system and is then transferred to the vending systems by means of the messages provided in 5.8.3.

Transaction and receipt information on the other hand originate in the vending systems when the customer makes a payment on an account or purchases a prepaid token at a point of sale. This information periodically needs to be transferred to the CIS and billing system for further processing, for which purpose the messages in 5.8.4 are provided.

In IEC 61968-9:2009, there were several profiles developed as a part of the efforts to support payment metering, where some of these were more general in nature. In this edition, those profiles are preserved in this subclause 5.8 where they are prefixed by "PrePay". It is hoped that these will be fully harmonized in future editions of IEC 61968-9.

5.8.2 Auxiliary agreements

Information about customer debt for collection may be configured into MS by means of AuxiliaryAgreementConfig message payload.

An example of a message exchange is given in Figure 44 and the message format is given in Figure 65.

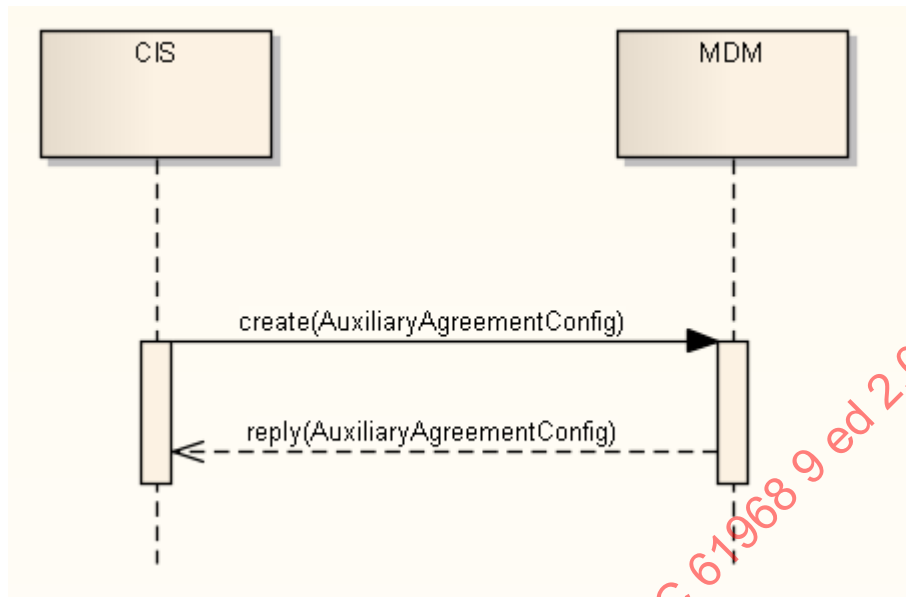


Figure 44 – Message exchange for transferring auxiliary agreement information

5.8.3 Applications

5.8.3.1 General

When a customer purchases a prepaid token at a point of sale or makes a payment on a billed account, financial information is originated in MS relating to this transaction. Typically this information is periodically transferred to the CIS and billing system for further processing.

The messages defined in 5.8.4 make provision for transferring this information to the CIS and billing system.

5.8.3.2 Receipts

When MS receives a payment, a receipt is generated and the relevant information about the payment is typically recorded as a receipt record. This information may be accessed by means of ReceiptRecord message payload.

In the case where a specified range (by date or mRID) of the message payload is to be specified in a particular contextual implementation, this may be realised by making use of the optional elements in the message header (see Figure B.2).

An example of a message exchange is given in Figure 45 and the message format given in Figure 48.

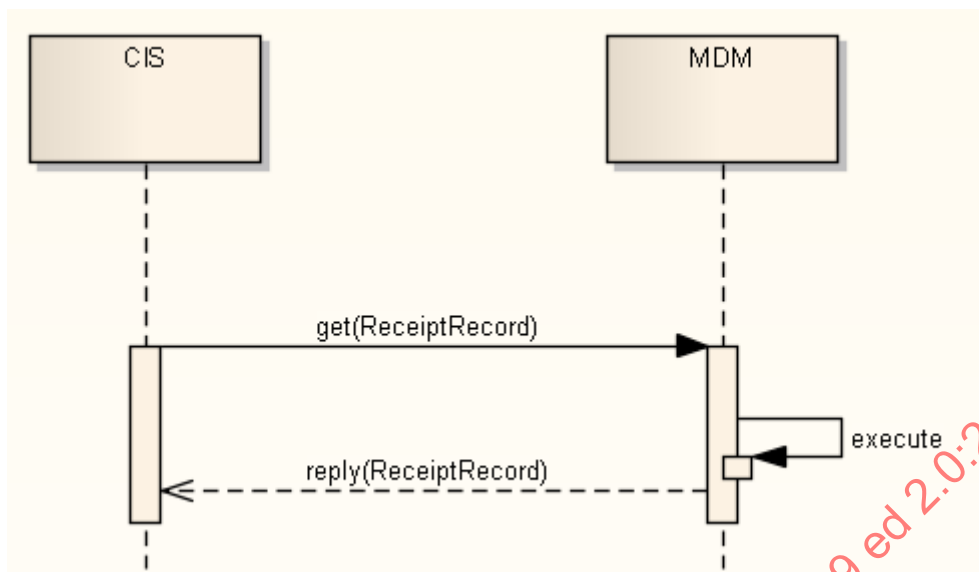


Figure 45 – Message exchange for transferring receipt information

5.8.3.3 Transactions

Information about the sale of a prepaid token or the receipt of an account payment is typically also recorded by MS in the form a financial transaction record, capturing the relevant details relating to the particular transaction. This information may be accessed by means of TransactionRecord message payload.

An example of a message exchange is given in Figure 46 and the message format is given in Figure 49.

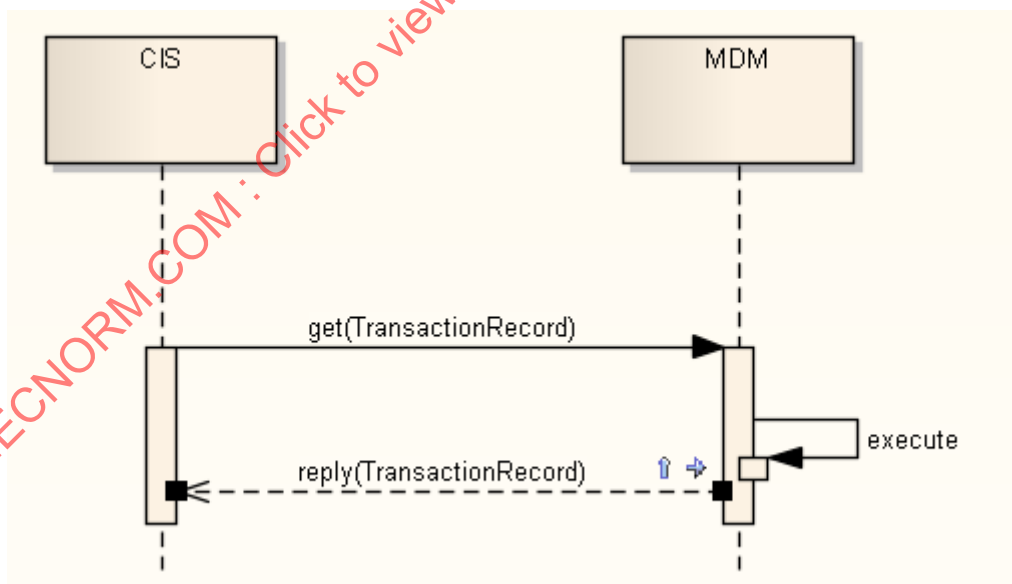


Figure 46 – Message exchange for transferring transaction information

5.8.4 Message formats

The diagram in Figure 47 describes the structure of message used to configure auxiliary agreements.

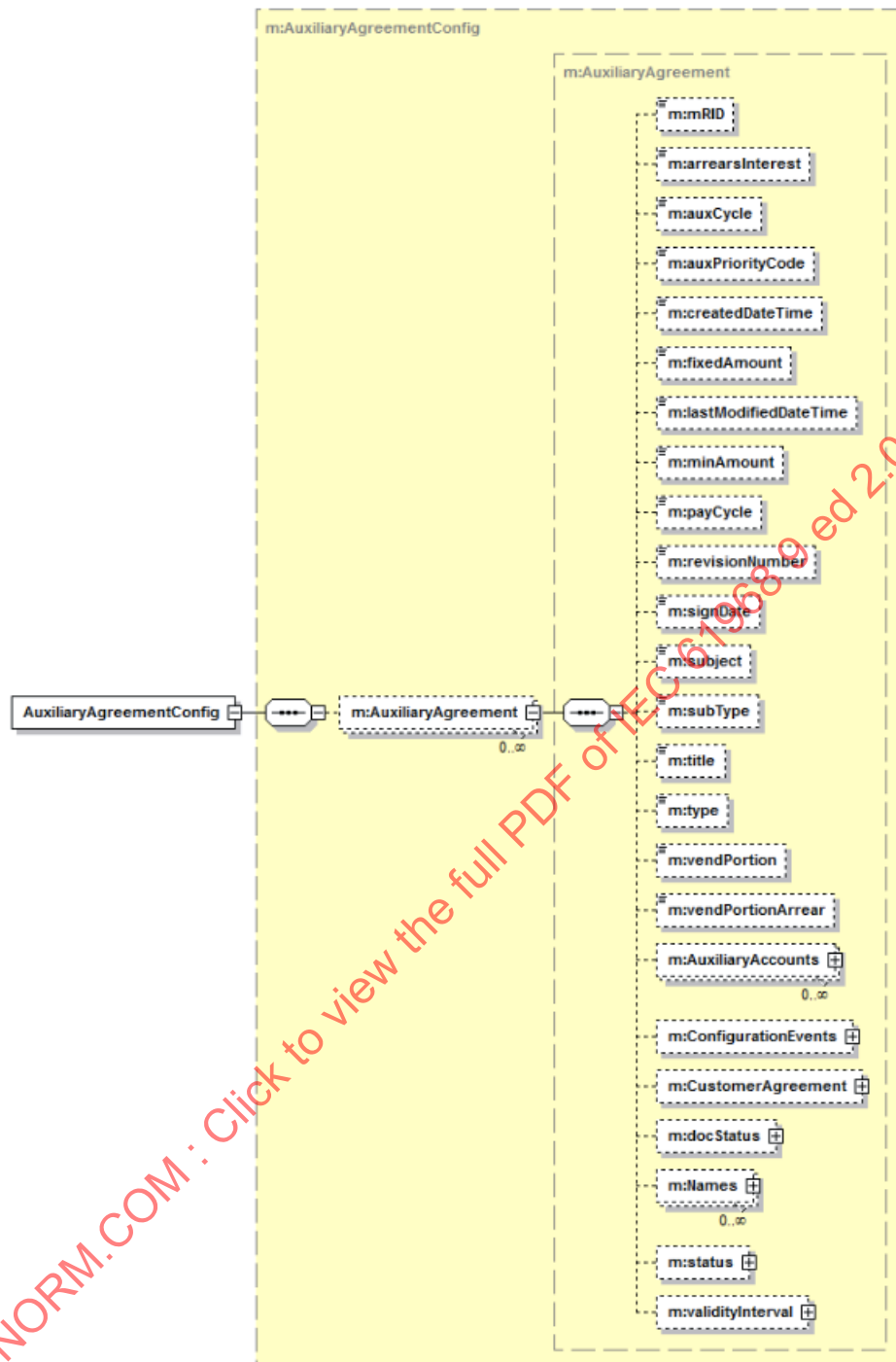


Figure 47 – Auxiliary agreement configuration message format

The message structure in Figure 48 is used to record receipts.

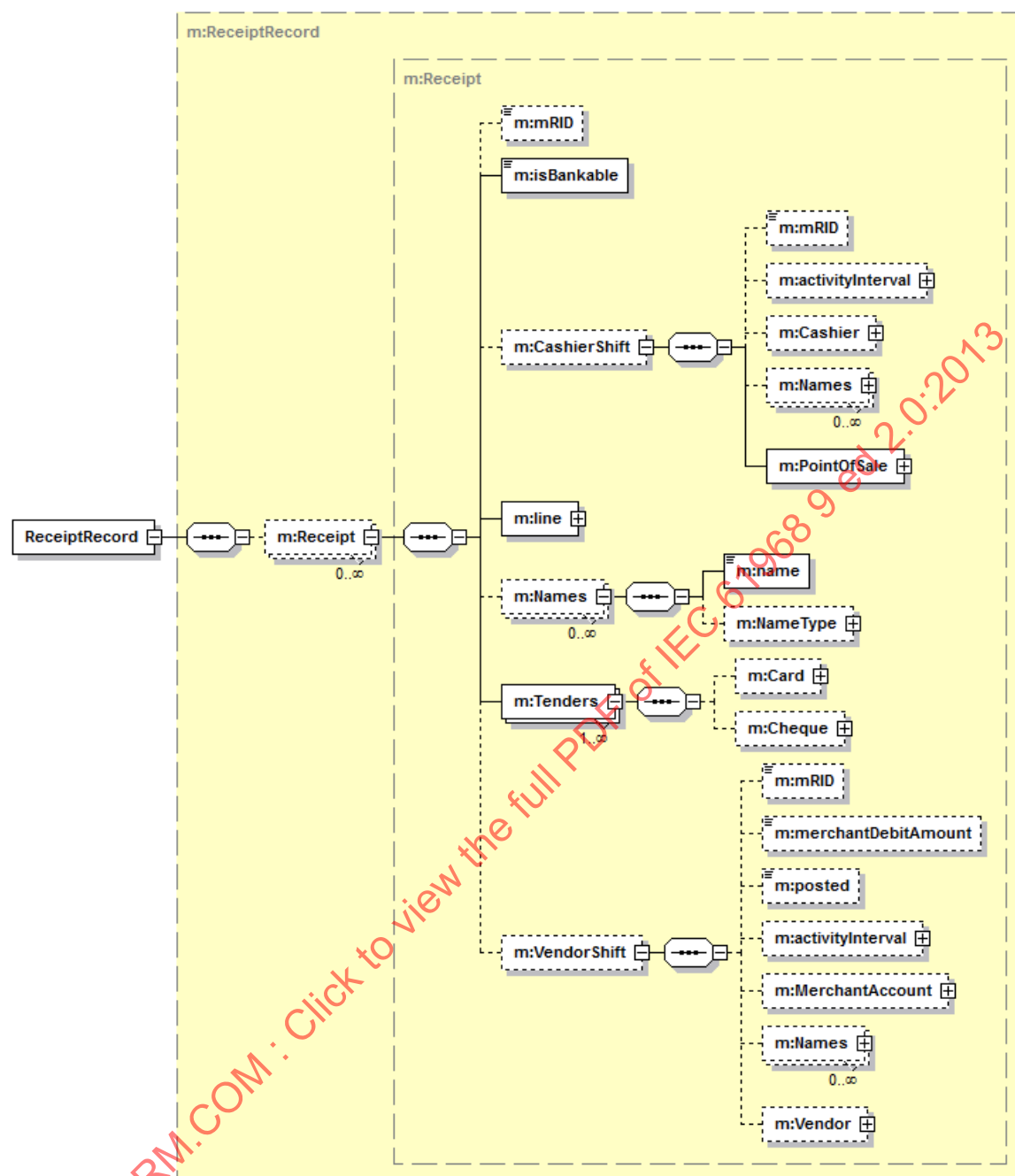


Figure 48 – ReceiptRecord message format

The message structure in Figure 49 is used to record transactions.

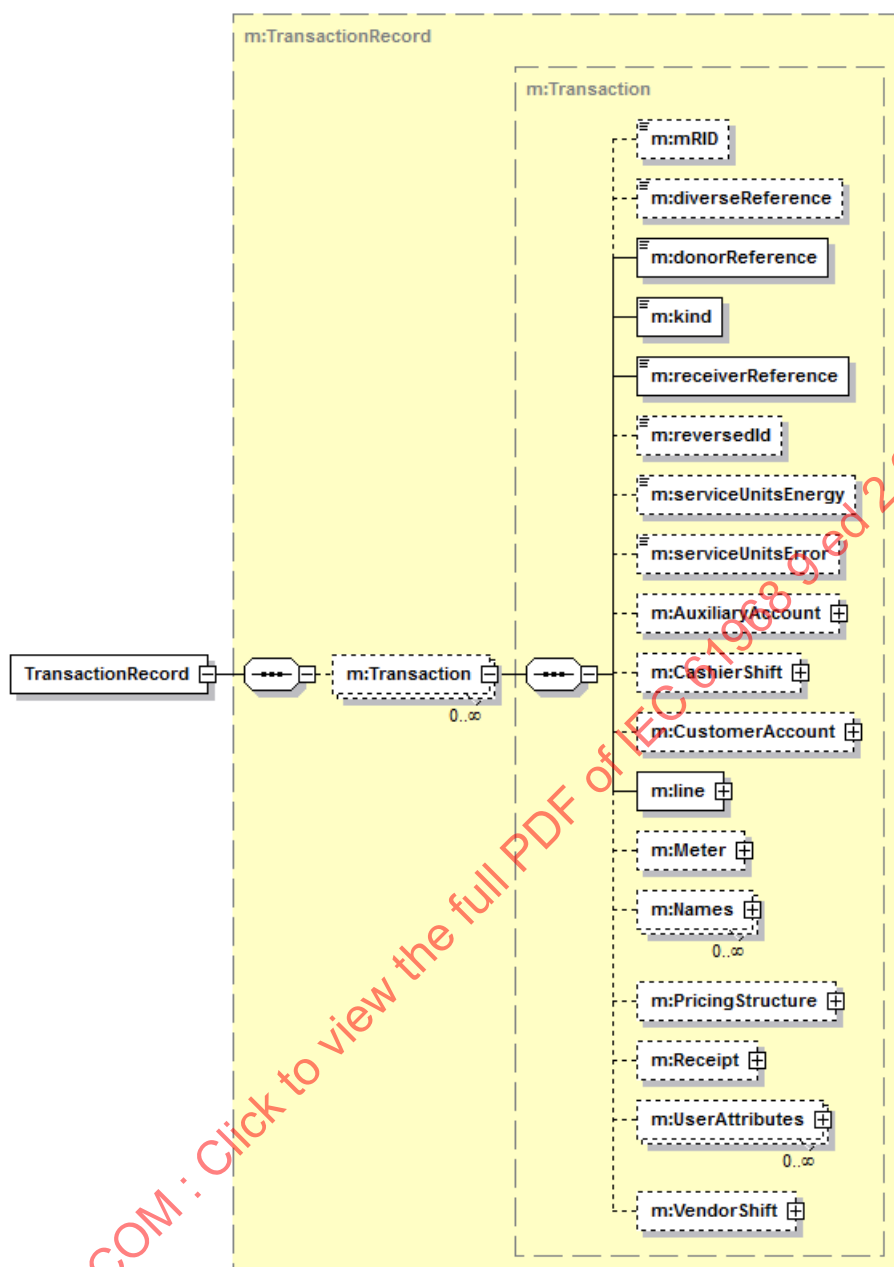


Figure 49 – TransactionRecord message format

5.9 Premise area networks

5.9.1 General

The metering system has been expanded to include devices that have been deployed within homes and businesses that are managed using the metering infrastructure. Within IEC 61968-9, these devices exist within a premise area network (PAN). This is inclusive of the commonly used term home area network (HAN). The PAN/HAN devices themselves are a special type of EndDevice.

Given the evolving nature of the underlying devices and communication protocols, IEC 61968-9 attempts to take a view that can be mapped as needed into a variety of device standards.

5.9.2 Applications

5.9.2.1 General

The applications for PAN devices primarily include dynamic pricing, demand response and providing information to customers. There are many types of PAN devices, including smart thermostats, in home displays, relays, etc.

5.9.2.2 PAN device pairing and unpairing

The pairing of a PAN device with a meter is required before the PAN device can be sent commands by the Metering System.

PAN device pairing (and un-pairing) is performed using an EndDeviceControls message as shown in the example of Figure 50. The following special conventions relative to the EndDeviceControl message apply to pairing a PAN device with a meter:

- The appropriate EndDeviceControlType code for pairing a PAN device should be selected from Annex F.
- Two (and only two) EndDevices are identified by mRid or the Names class – one is the meter and the other is the PAN device. The isPan Boolean will be set to true for the PAN device and the install code and electronicAddress.macAddress are also normally required.
- Successful or unsuccessful results for the pairing operation are reported using EndDeviceEvents messages, with the appropriate EndDeviceEventType enumerations found in Table E.24 of Annex E. It is possible for more than one EndDeviceEvent to be reported as a result of the EndDeviceControl.

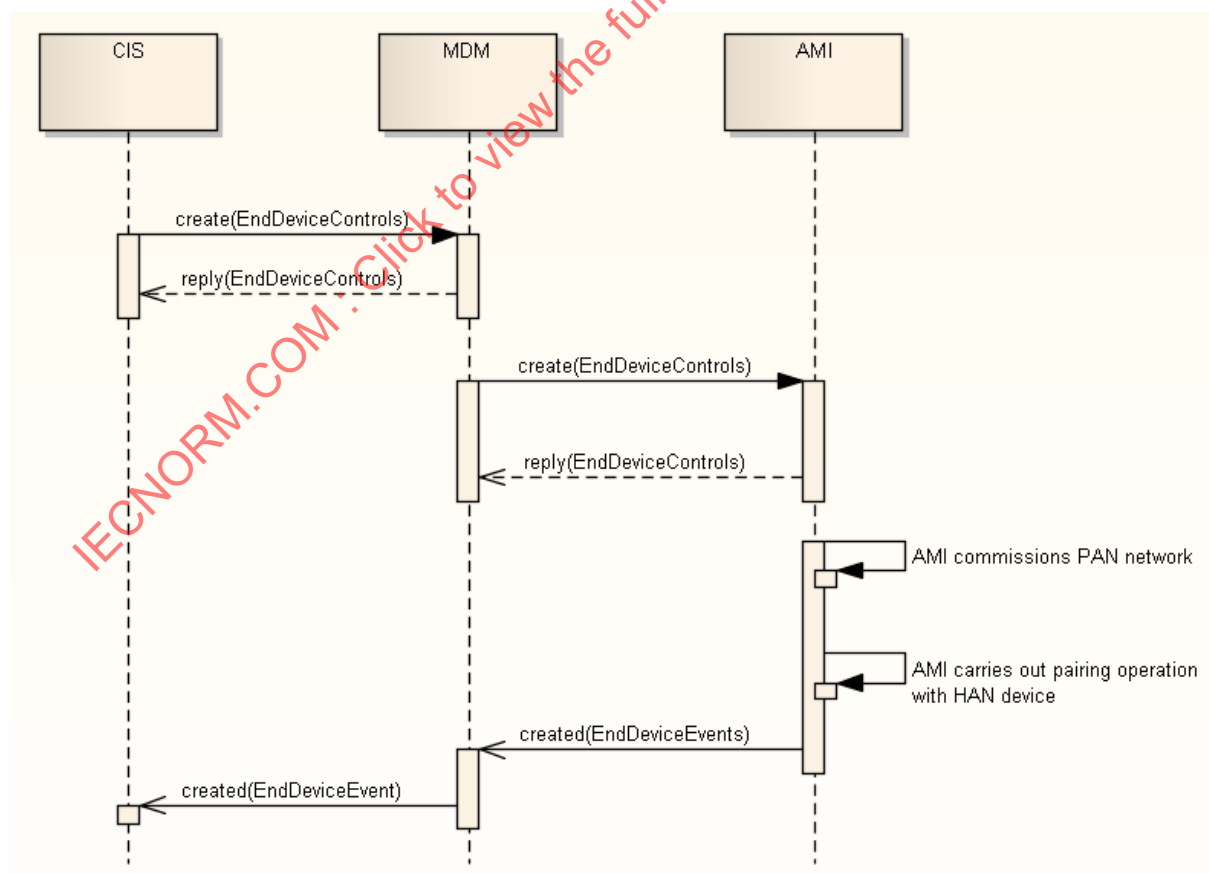


Figure 50 – Pairing of a PAN device

5.9.2.3 PAN Events

PAN device events are generated by a PAN device, where they are typically communicated through a meter or gateway to the metering system head end. The metering system head end will then publish the message to other enterprise applications that have subscribed. These events are conveyed using the EndDeviceEvents message. An example is shown in Figure 51.

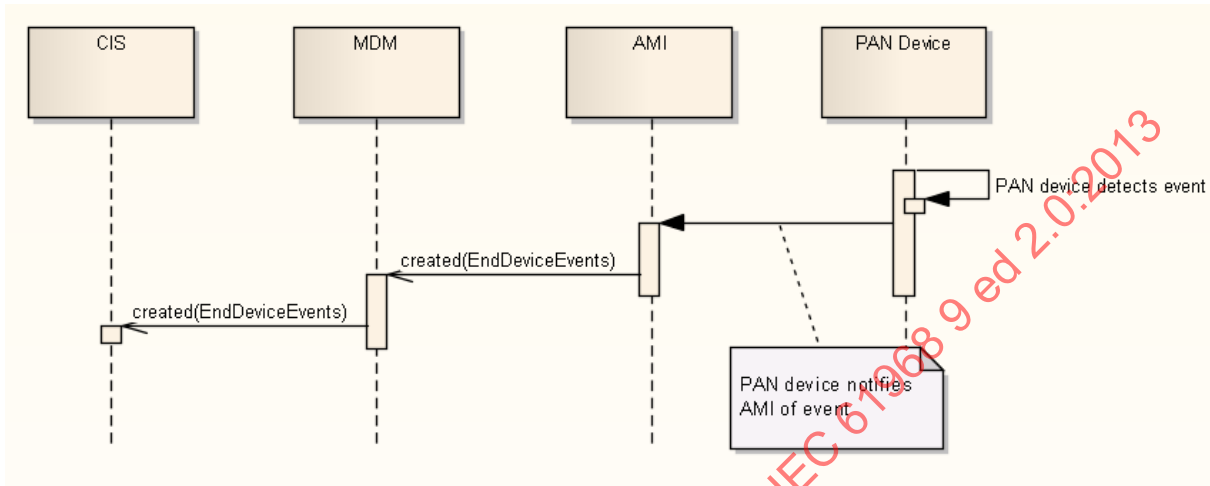


Figure 51 – PAN device events

5.9.2.4 PAN controls

Additional PAN device controls for purposes other than pairing may be initiated by an enterprise application such as a demand response management system to a metering system head end. These controls also use the EndDeviceControls message. Given that there are a variety of ways that the control can be addressed, there may be many target PAN devices. An example is shown in Figure 52.

EndDeviceControls messages intended for PAN devices will typically include one of the following special structures within the EndDeviceControl profile:

- PanDemandResponse
- PanDisplay
- PanPricing

The appropriate EndDeviceControlType and EndDeviceEventType enumerations for these functions can be found in Table E.24 and Table F.3.

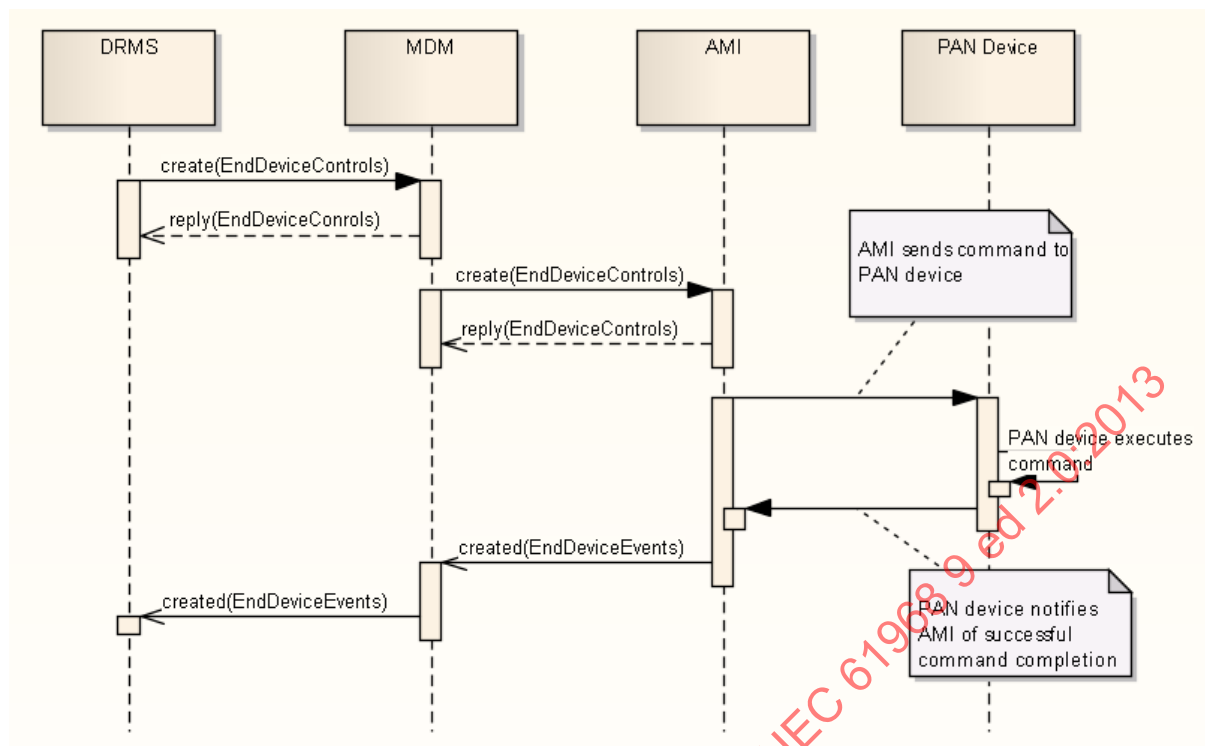


Figure 52 – PAN device controls

5.9.3 Message formats

There are no unique messages defined specifically for PAN devices. PAN devices are simply types of EndDevices.

5.10 Master data management messages

5.10.1 General

Enterprise systems exchanging messages in the Meter Reading and Control domain require a means of managing the non-transactional data that defines assets, other CIM objects and the relationships (or associations between them). Master Data Management (MDM) is the term used to describe the practice of creating, changing, and deleting these objects and relationships.

For IEC 61968-9 purposes, the CIM classes that fall within the scope of Master Data Management and the IEC 61968-9 profiles used to create/change/delete these objects (and their “configurations”) are included in Table 5:

Table 5 – IEC 61968-9 configuration profiles

CIM object	IEC 61968-9 profile
ComModule	ComModuleConfig
Customer	CustomerConfig
CustomerAccount	CustomerAccountConfig
CustomerAgreement	CustomerAgreementConfig
EndDevice	EndDeviceConfig
EndDeviceGroup	EndDeviceGroups
Meter	MeterConfig
PricingStructure	PricingStructureConfig
ServiceCategory	ServiceCategoryConfig
ServiceLocation	ServiceLocationConfig
ServiceSupplier	ServiceSupplierConfig
TransformerTank	^a
UsagePoint	UsagePointConfig
UsagePointGroup	UsagePointGroups
UsagePointLocation	UsagePointLocationConfig
^a For IEC 61968-9 purposes, the TransformerTank object has applicability to use cases involving Outage Management. The TransformerTank is technically outside the scope of IEC 61968-9, and there is no IEC 61968-9 profile for creation, modification or deletion of a TransformerTank. However, the TransformerTank can be referenced within the UsagePointConfig profile to identify the transformer that supplies power to the UsagePoint.	

ConfigurationEvents occur each time a create, change, or delete operation is performed using any of the “config” operations using the IEC 61968-9 profiles in Table 5 as well as any time that a MasterDataLinkageConfig transaction is executed to manage the relationships of MDM objects or an ObjectNamesConfig transaction is executed to add, delete, or change Names class identifiers for these objects.

The ConfigurationEvent class in the CIM is associated with each of the CIM classes in the first column of Table 5 and is incorporated into each of the IEC 61968-9 Profiles in column 2 of that table. It is also included in the MasterDataLinkageConfig and ObjectNamesConfig profiles. The function of the ConfigurationEvent class is to provide important business details about each “config” operation, including:

- the date and time at which the configuration or configuration change became effective or is to become effective,
- the entity performing the configuration operation, and
- free-form remarks providing additional business information related to the configuration event.

Refer to Annexes K and L for detailed descriptions of Master Data Management Use Cases and sample XML messages that clarify the intended use of the messages in this 5.10.

5.10.2 Applications

5.10.2.1 General

For the purposes of this standard, there are two methods used for managing the relationships between the CIM objects identified in 5.10.1. These are the MasterDataLinkage profile (described in 5.10.1) and, for a limited number of CIM objects, the relationships are explicitly

managed using profiles identified in 5.10.1. The following diagram identifies the object relationships that are critical to master data management within the scope of this standard and the specific method that is recommended to be used for managing each relationship.

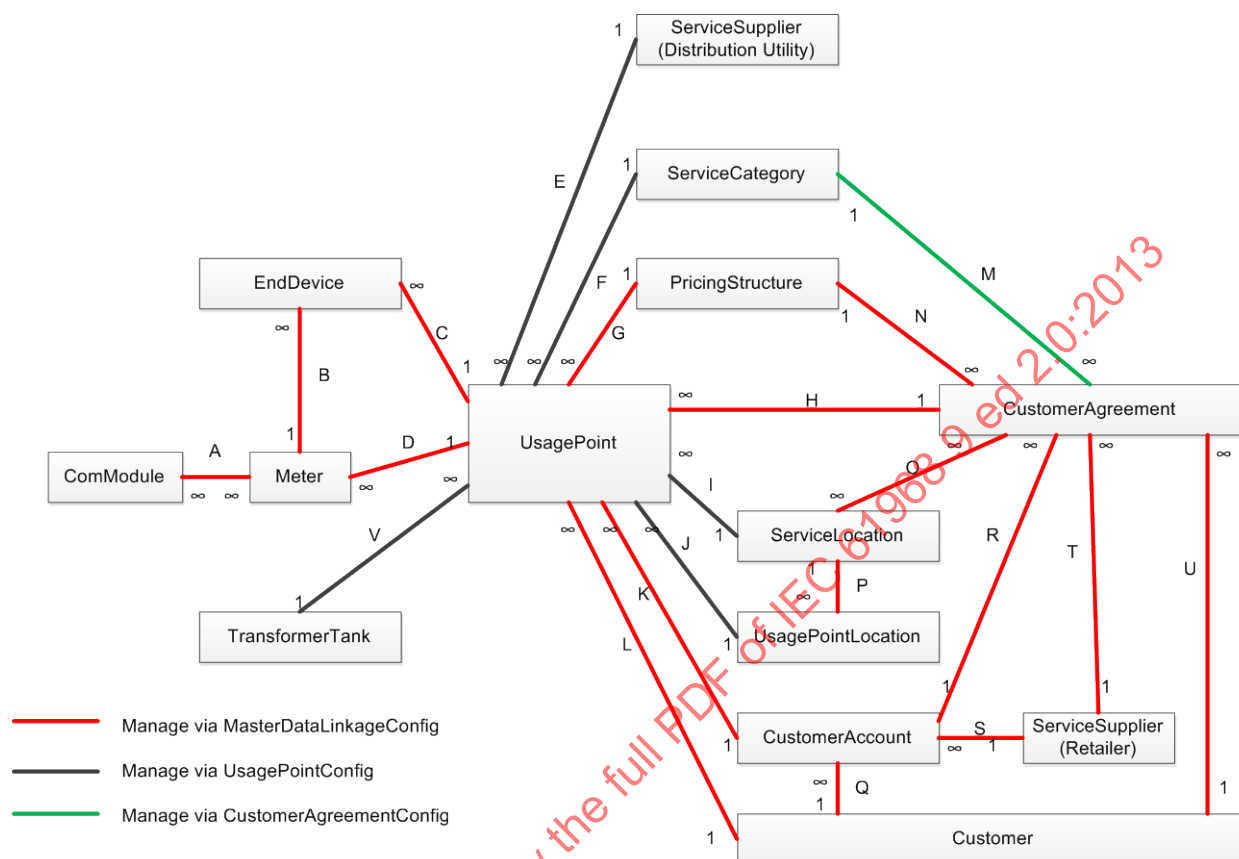


Figure 53 – Master data linkages

To fully comprehend Figure 53, it is necessary to understand that the IEC 61968-9 standard provides normative messages by which enterprise systems can exchange information; however there is no requirement that any given system implement an internal data model that is based upon or even consistent with the CIM. Accordingly, the above diagram presents the possibility of reflecting relationships in a variety of ways. For example, two systems may recognize the concepts of Customer, CustomerAccount and CustomerAgreement and choose to express the relationships between these entities and a UsagePoint by linking a Customer to a CustomerAccount (relationship Q), then linking the CustomerAccount to CustomerAgreement (relationship R) and finally linking the CustomerAgreement to the UsagePoint (relationship H). In this scenario, there may never be a need to utilize relationships K, L or U.

On the other hand, there may be two enterprise systems that do not materialize the concept of a CustomerAgreement in their internal data models. These systems may utilize messages that link a Customer to a CustomerAccount (relationship Q), and then link the CustomerAccount to the UsagePoint (relationship K). It is outside the scope of the IEC 61968-9 standard to be prescriptive on which of the relationships illustrated in Figure 53 are permissible or preferred. The MasterDataLinkageConfig profile may be used in a flexible manner to support the needs of any enterprise and its enterprise systems.

It is recommended that relationships E, F, I, J, M and V be managed by the “Config” profiles called out in the legend of the figure, rather than via the MasterDataLinkageConfig profile; however this is not a requirement and enterprises may choose to use the MasterDataLinkageConfig profile to manage these relationships as well. The reason for the

recommendation that these specific relationships be handled by the identified profiles rather than the MasterDataLinkageConfig is twofold:

- these specific relationships seldom change, and
- these specific relationships are viewed by almost all enterprise systems in a consistent way.

The converse is also true. Enterprises may choose to manage relationships depicted as red lines as if they were depicted by black lines provided that the relationship is supported by the CIM and is reflected in the appropriate IEC 61968-9 profile.

There is one additional IEC 61968-9 profile called the CustomerMeterDataSet. This profile is used only with a Header verb of get, and the resulting response provides a meter-centric detailed representation of all of the relationships in the above diagram.

Figure 53 is informative. Entities and relationships in Figure 53 may evolve over time as use of IEC 61968 IEC 61968-9 is extended to support new and revised business use cases.

5.10.2.2 Service Suppliers

Information about the supplier (retailer or utility for example) of the service may be configured into MS by means of SupplierConfig message payload.

An example of a message exchange is given in Figure 54 and the message format is given in 5.10.3.3.

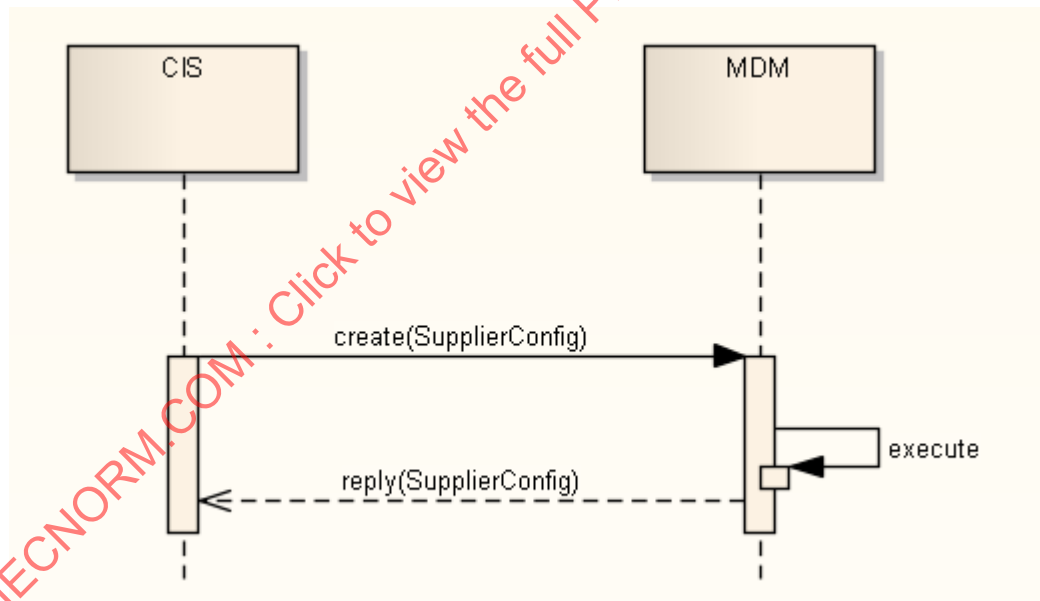


Figure 54 – Message exchange for transferring supplier information

5.10.2.3 Customers

Information about customers of the supplier of the service may be configured into MS by means of CustomerConfig message payload.

An example of a message exchange is given in Figure 55 and the message format is given in 5.10.3.4.

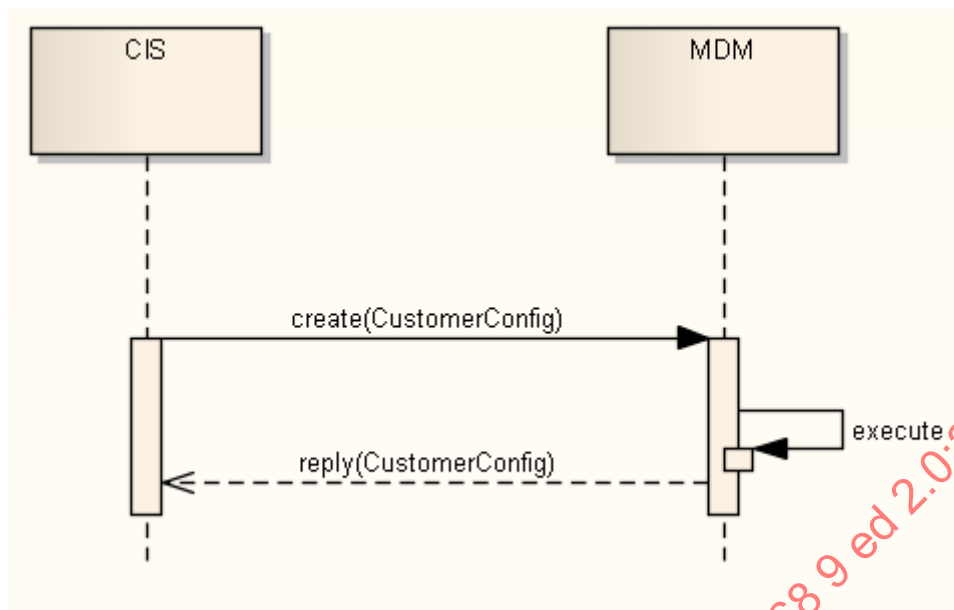


Figure 55 – Message exchange for transferring customer information

5.10.2.4 Customer agreements

Information about customer agreements may be configured into MS by means of CustomerAgreementConfig message payload.

An example of a message exchange is given in Figure 56 and the message format is given in 5.10.3.5.

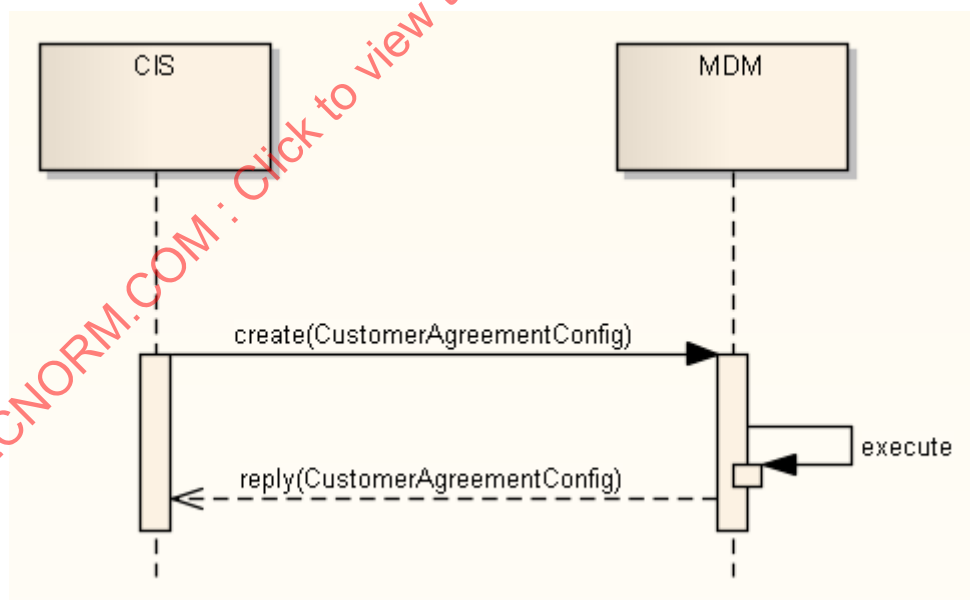


Figure 56 – Message exchange for transferring customer agreement information

5.10.2.5 Customer accounts

Information about customer accounts may be configured into MS by means of CustomerAccountConfig message payload.

An example of a message exchange is given in Figure 57 and the message format is given in 5.10.3.6.

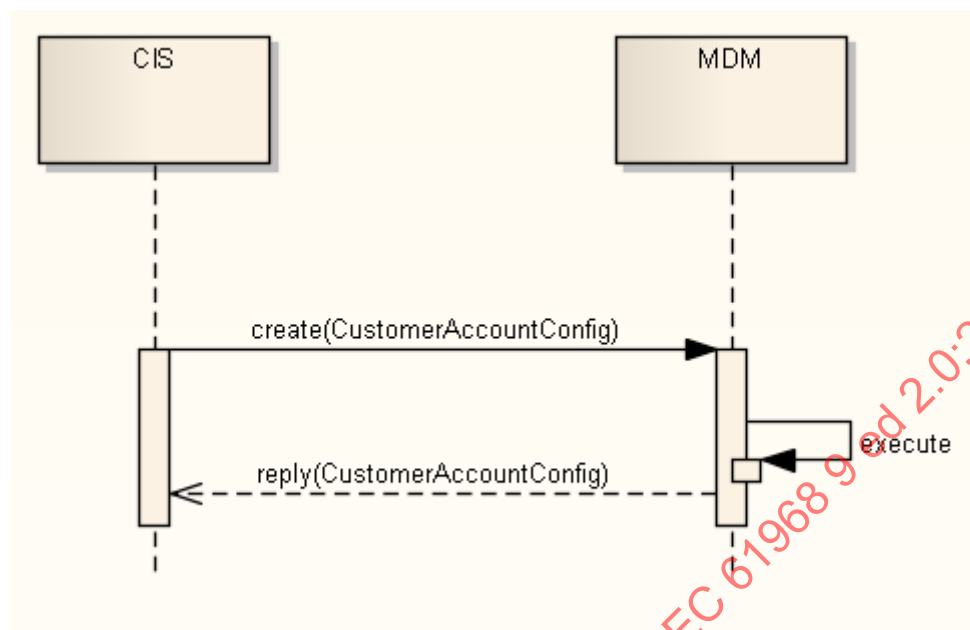


Figure 57 – Message exchange for transferring customer account information

5.10.2.6 Service categories

Information about the categories of service (electricity, water, gas for example) may be configured into MS by means of ServiceCategoryConfig message payload.

An example of a message exchange is given in Figure 58 and the message format is given in 5.10.3.7.

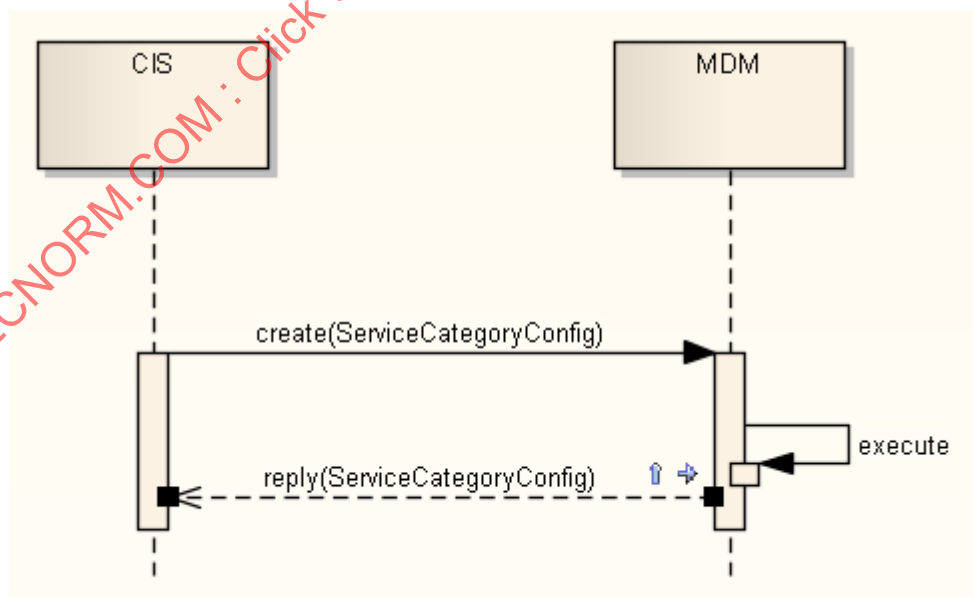


Figure 58 – Message exchange for transferring service category information

5.10.2.7 Usage points

Information about the usage points may be configured into MS by means of a UsagePointConfig message payload.

An example of a message exchange is given in Figure 59 and the message format is given in 5.10.3.8.

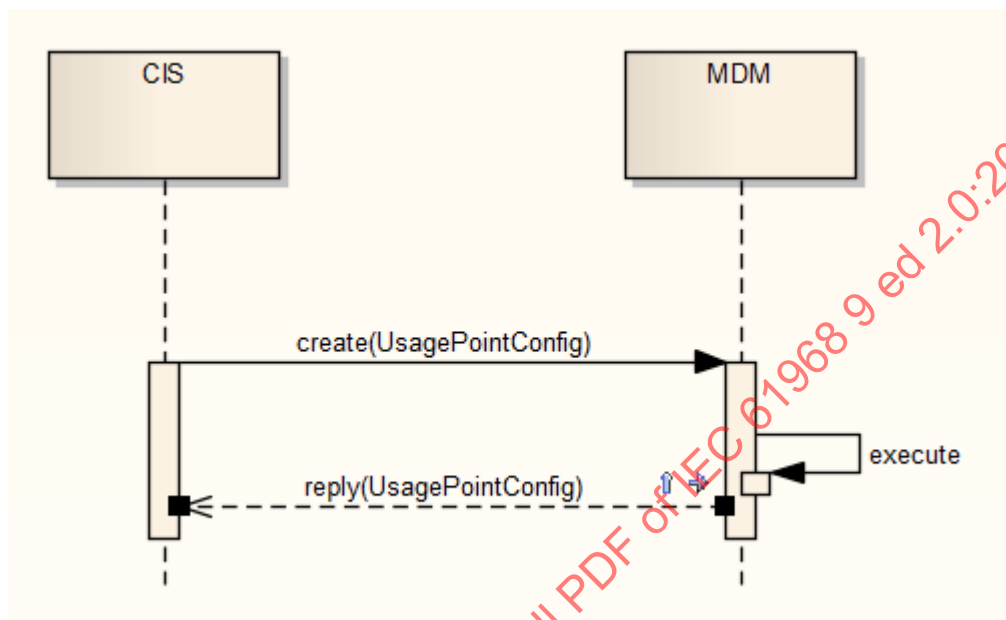


Figure 59 – Message exchange for transferring usage point information

5.10.2.8 Meters

Information about the meters in service may be configured into MS by means of MeterConfig message payload.

An example of a message exchange is given in Figure 60 and the message format is given in 5.10.3.11.

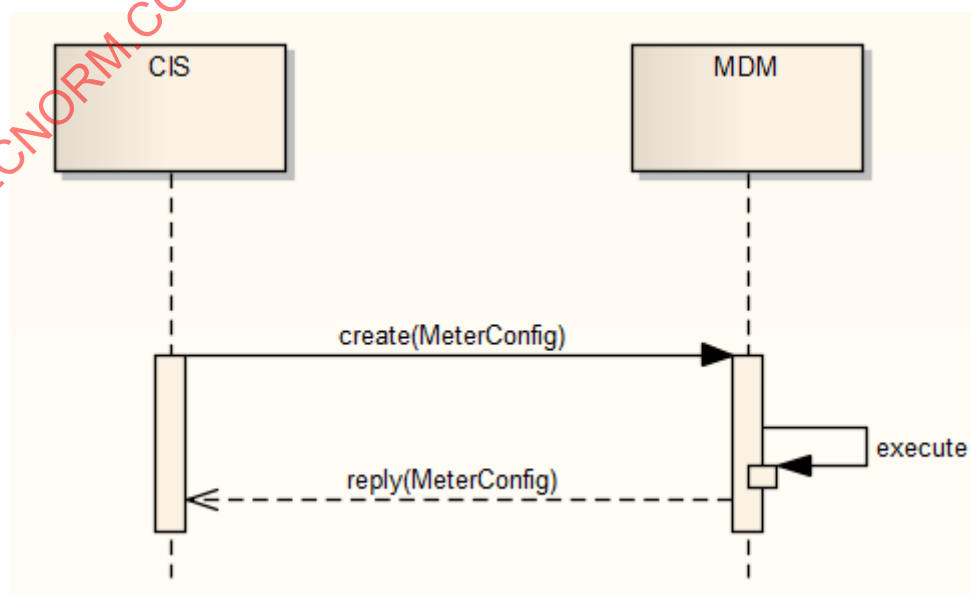


Figure 60 – Message exchange for transferring meter information

5.10.2.9 End devices

Information about end devices in service may be configured into MS by means of an EndDeviceConfig message payload.

An example of a message exchange is given in Figure 61 and the message format is given in 5.10.3.10.

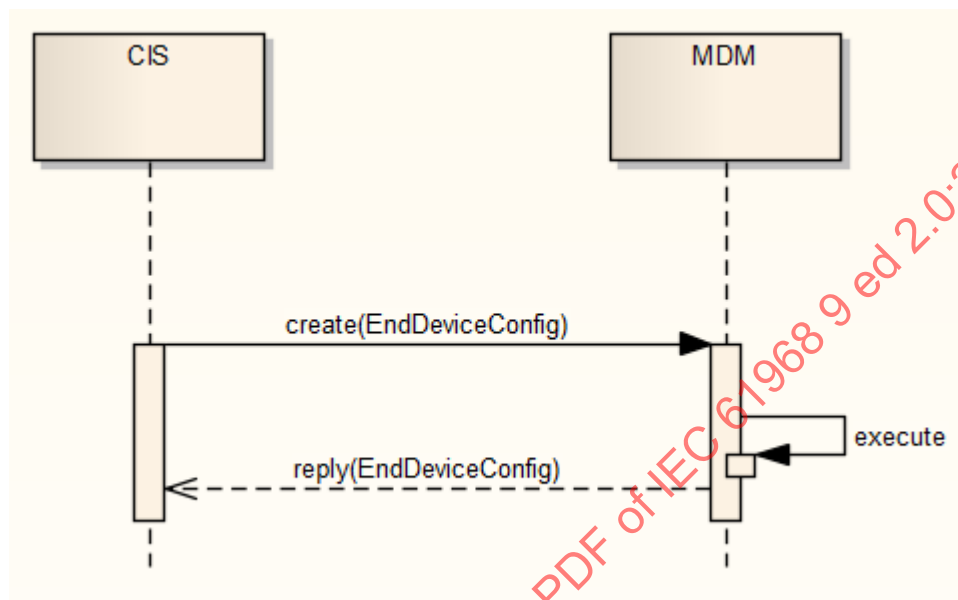


Figure 61 – Message exchange for transferring end device information

5.10.2.10 Service locations

Information about the service locations may be configured into MS by means of ServiceLocationConfig message payload.

An example of a message exchange is given in Figure 62 and the message format is given in 5.10.2.10.

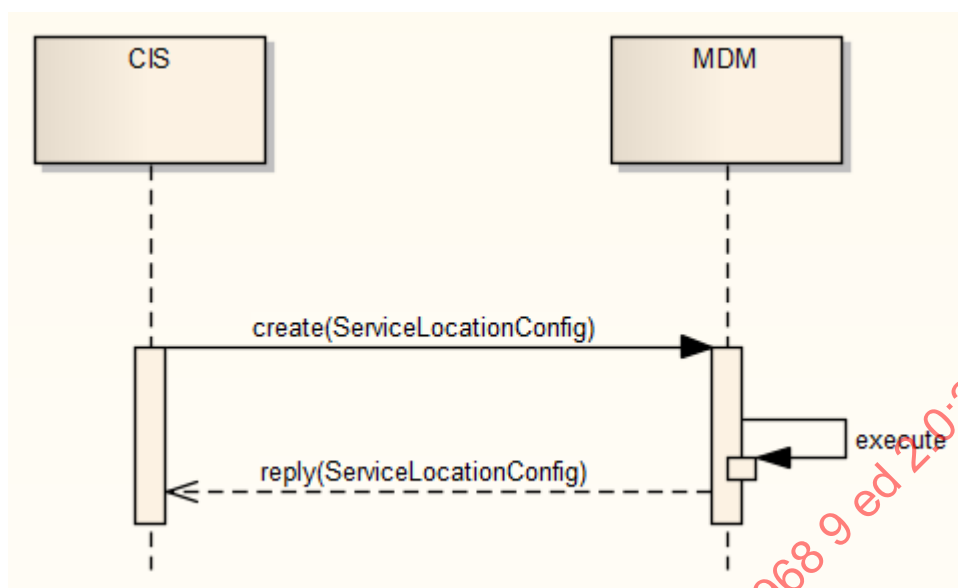


Figure 62 – Message exchange for transferring service location information

5.10.2.11 Pricing structure and tariffs

Information about pricing structures may be configured into MS by means of PricingStructureConfig message payload.

An example of a message exchange is given in Figure 63 and the message format is given in 5.10.3.14.

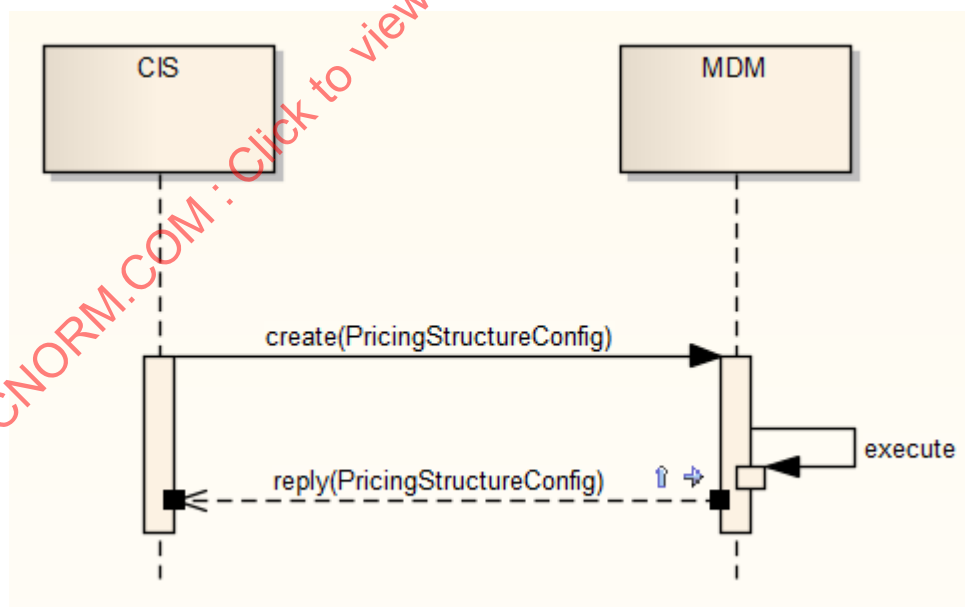


Figure 63 – Message exchange for transferring pricing structures

5.10.3 Message formats

5.10.3.1 General

This subclause 5.10.3 describes the message formats for the MasterDataLinkageConfig and other Master Data Management “config” messages. The detailed specification for each class

and attribute can be found in IEC 61968-11 and IEC 61970-301. The detailed, annotated XML schema is defined in Annex H.

5.10.3.2 MasterDataLinkageConfig

Figure 64 describes the top level structure of the Master Data Linkage Config message used to configure relationships between objects.

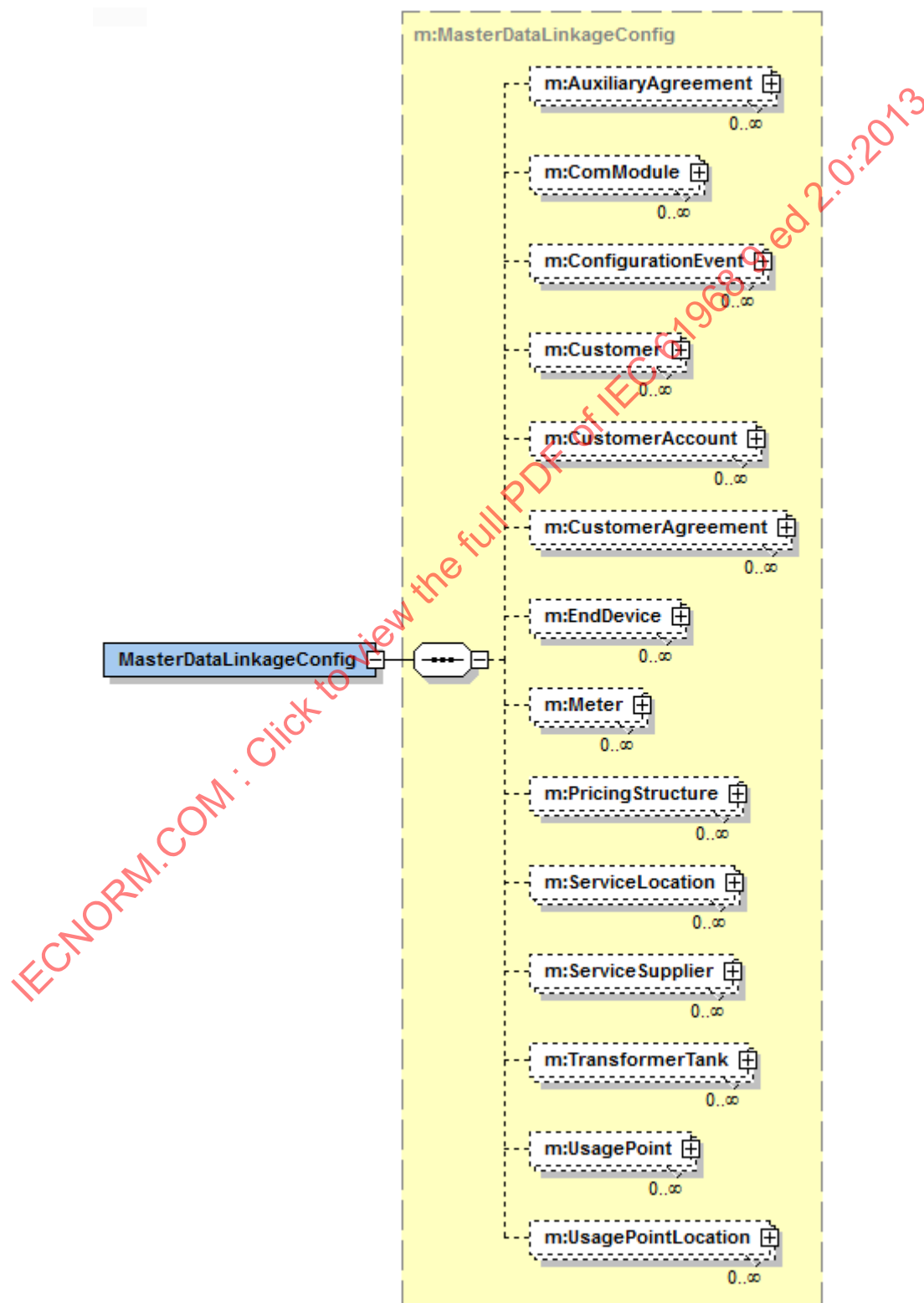


Figure 64 – MasterDataLinkageConfig message format

An example of MasterDataLinkageConfig is shown below. This message illustrates the “non-in-line” method of establishing an association between two CIM objects – in this case between the Meter and the UsagePoint are associated with each other using a MasterDataLinkageConfig command. This is the normative way to reflect the installation of a Meter at a UsagePoint.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:MasterDataLinkageConfig
  xsi:schemaLocation = "http://iec.ch/TC57/2011/MasterDataLinkageConfig#
    MasterDataLinkageConfig.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:ConfigurationEvent>
    <m:createdDateTime>2011-11-09T19:55:43.699Z</m:createdDateTime>
    <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
    <m:reason>MeterInstallation</m:reason>
  </m:ConfigurationEvent>
  <m:Meter>
    <m:Names>
      <m:name>1234LG</m:name>
    </m:Names>
  </m:Meter>
  <m:UsagePoint>
    <m:Names>
      <m:name>SDP1234E001001</m:name>
    </m:Names>
  </m:UsagePoint>
</m:MasterDataLinkageConfig>
```

5.10.3.3 SupplierConfig

The message structure in Figure 65 is used to configure service suppliers, replacing the SupplierConfig message defined in IEC 61968-9:2009.

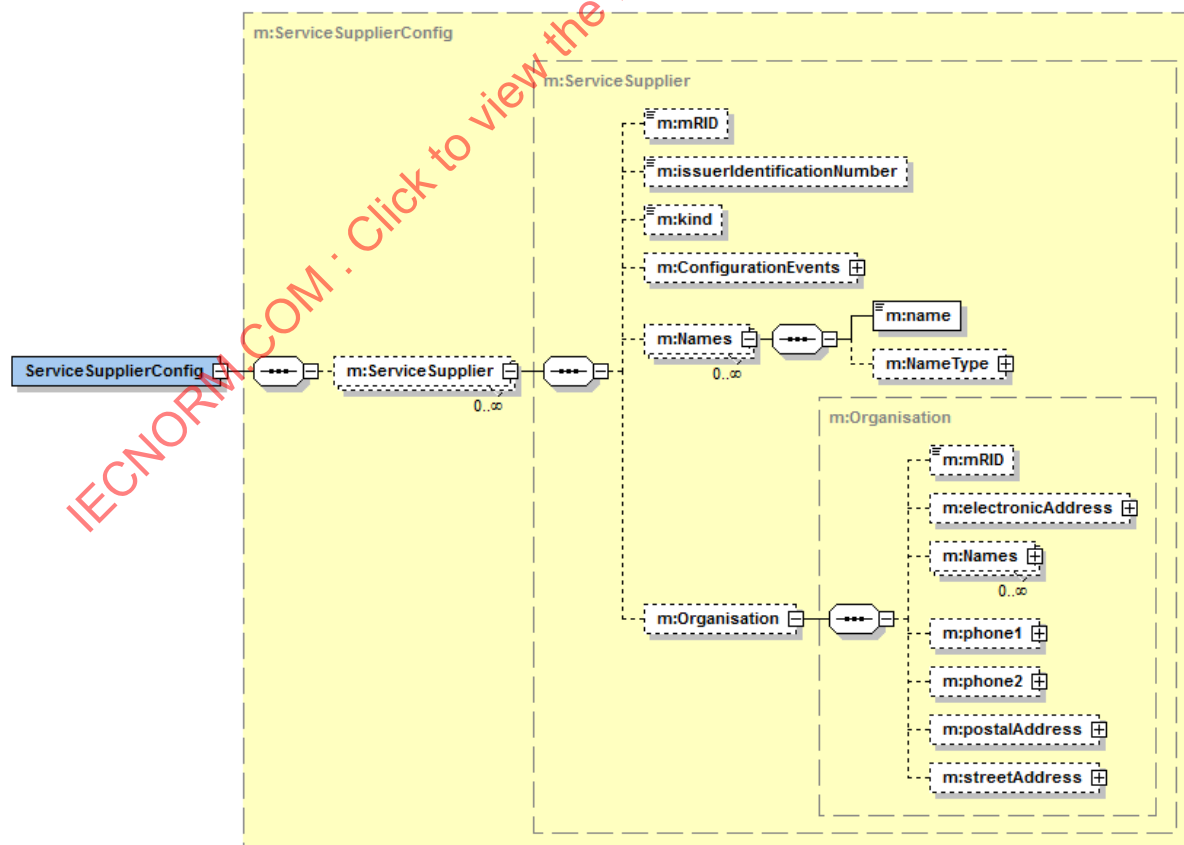


Figure 65 – Service supplier configuration message format

5.10.3.4 CustomerConfig

The message structure in Figure 66 is used to configure customers.

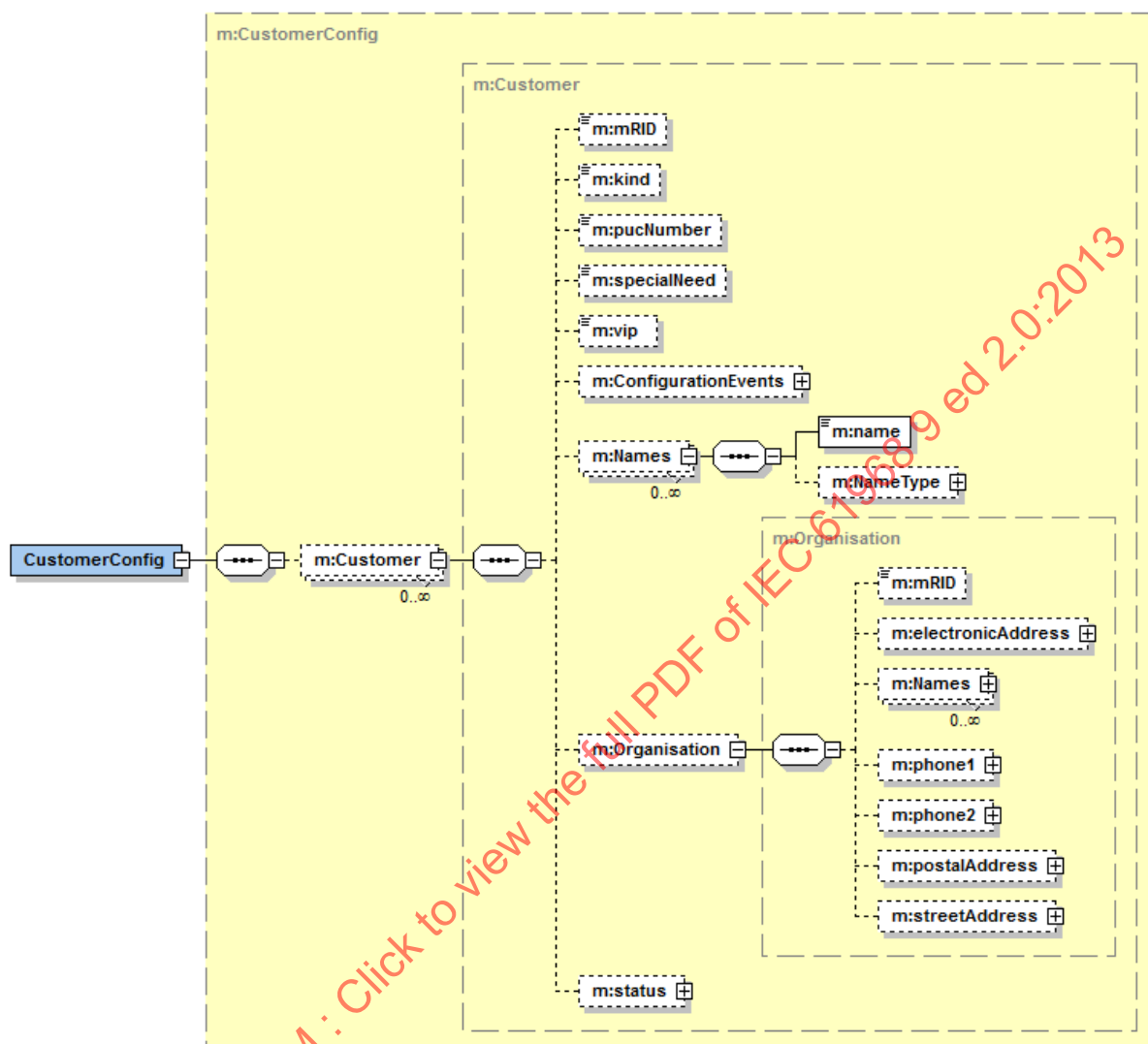


Figure 66 – Customer configuration message

5.10.3.5 CustomerAgreementConfig

The message structure in Figure 67 is used to configure customer agreements.

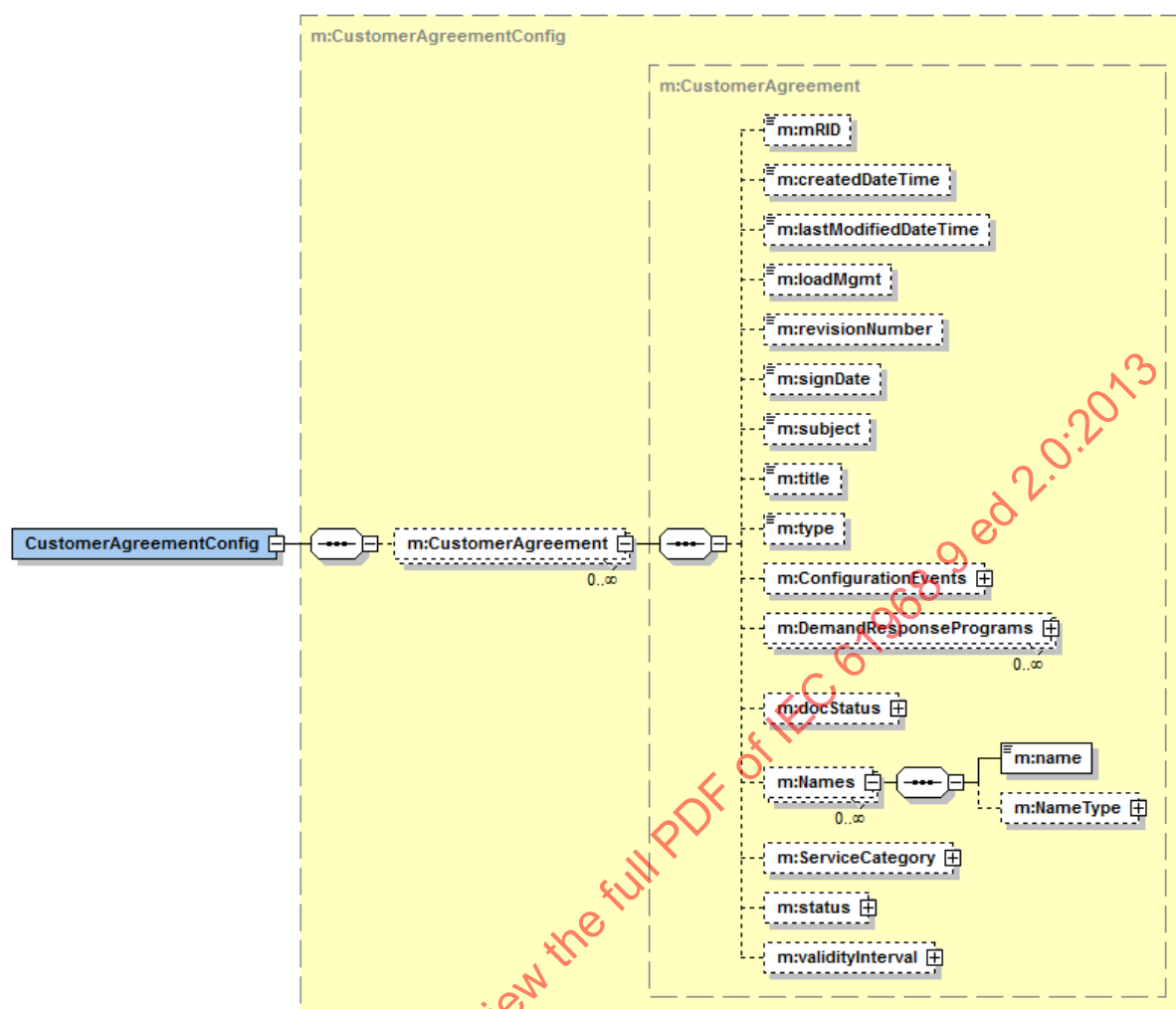


Figure 67 – Customer agreement configuration message

5.10.3.6 CustomerAccountConfig

The message structure in Figure 68 is used to configure customer accounts.

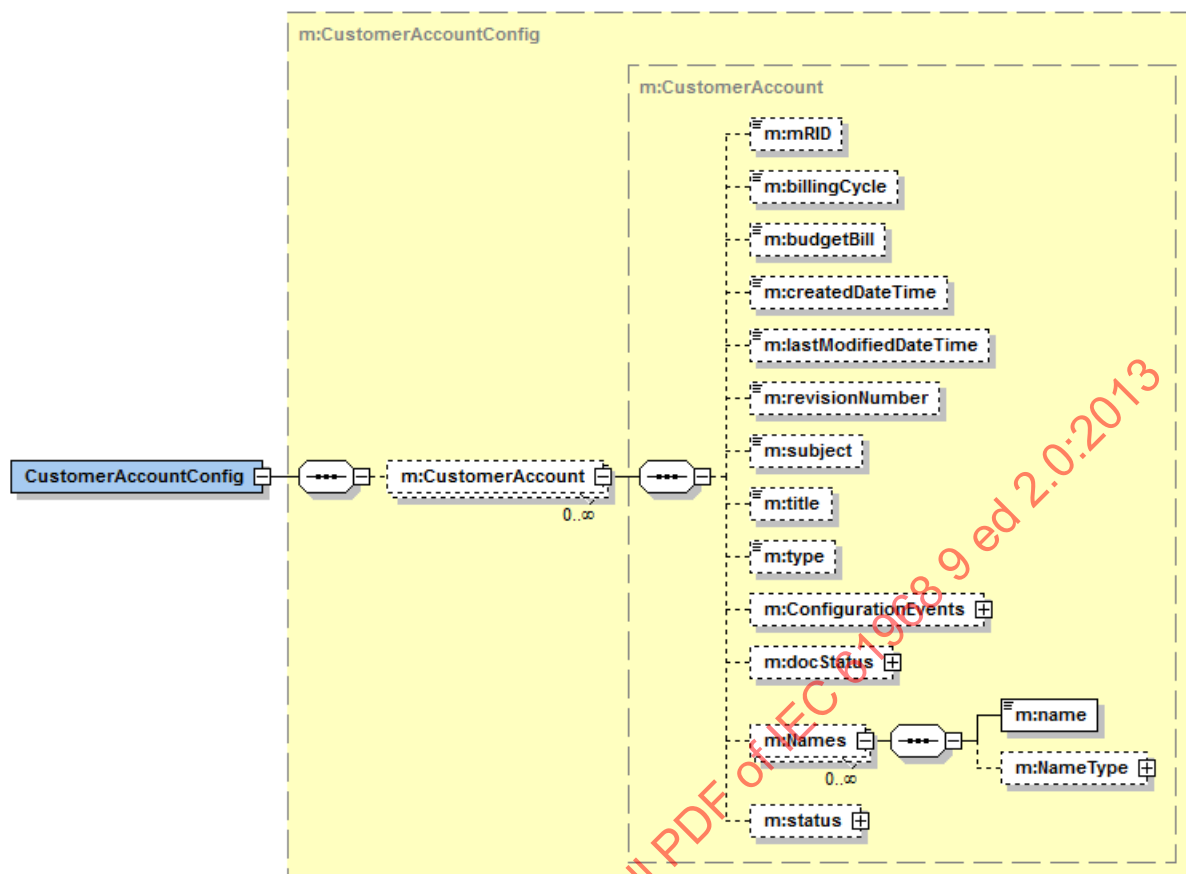


Figure 68 – Customer account configuration message

5.10.3.7 ServiceCategoryConfig

The message structure in Figure 69 is used to configure service categories.

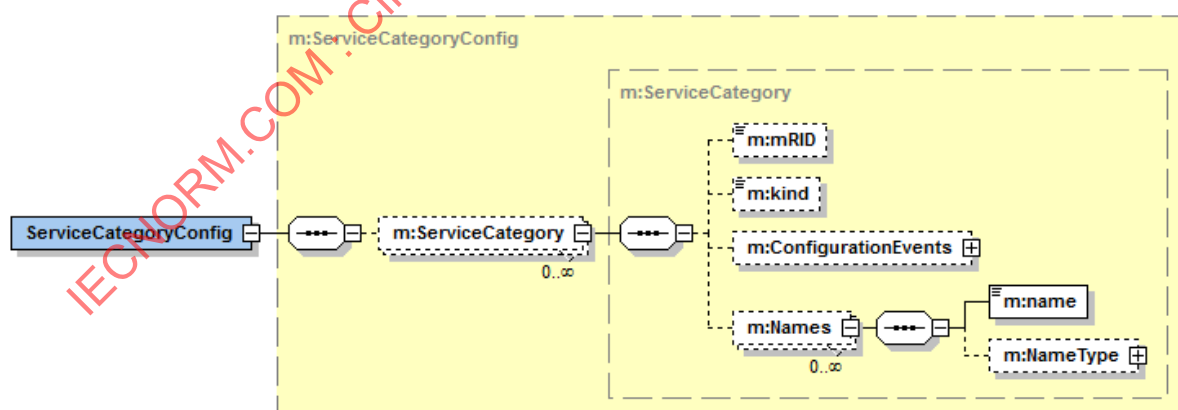


Figure 69 – ServiceCategoryConfig message format

5.10.3.8 UsagePointConfig

The message structure in Figure 70 is used to configure usage points. This replaces the service delivery points message defined in IEC 61968-9:2009.

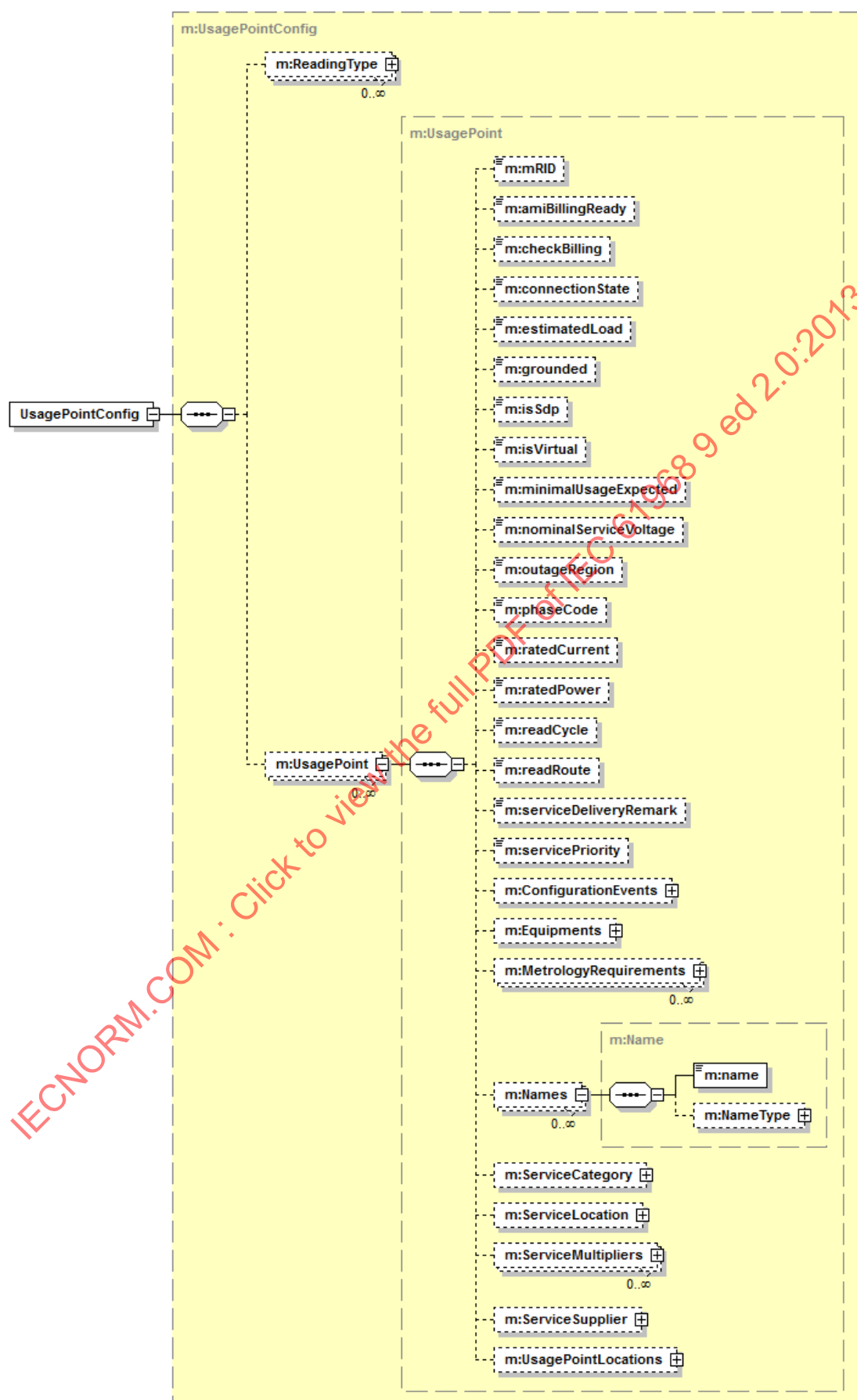


Figure 70 – UsagePointConfig message format

An example of UsagePointConfig payload is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:UsagePointConfig xsi:schemaLocation="http://iec.ch/TC57/2011/UsagePointConfig#
UsagePointConfig.xsd" xmlns:m="http://iec.ch/TC57/2011/UsagePointConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <m:UsagePoint>
    <m:isSdp>true</m:isSdp>
    <m:ConfigurationEvents>
      <m:createdDateTime>2011-11-09T10:58:03.616Z</m:createdDateTime>
      <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
    </m:ConfigurationEvents>
    <m:Names>
      <m:name>SDP1234E001001</m:name>
      <m:NameType>
        <m:name>PrimaryName</m:name>
      </m:NameType>
    </m:Names>
    <m:UsagePointLocation>
      <m:Names>
        <m:name>LOC1234</m:name>
        <m:NameType>
          <m:name>PrimaryName</m:name>
        </m:NameType>
      </m:Names>
    </m:UsagePointLocation>
  </m:UsagePoint>
</m:UsagePointConfig>
```

5.10.3.9 UsagePointLocation

The diagram in Figure 71 describes the structure of the message used to define UsagePointLocations.

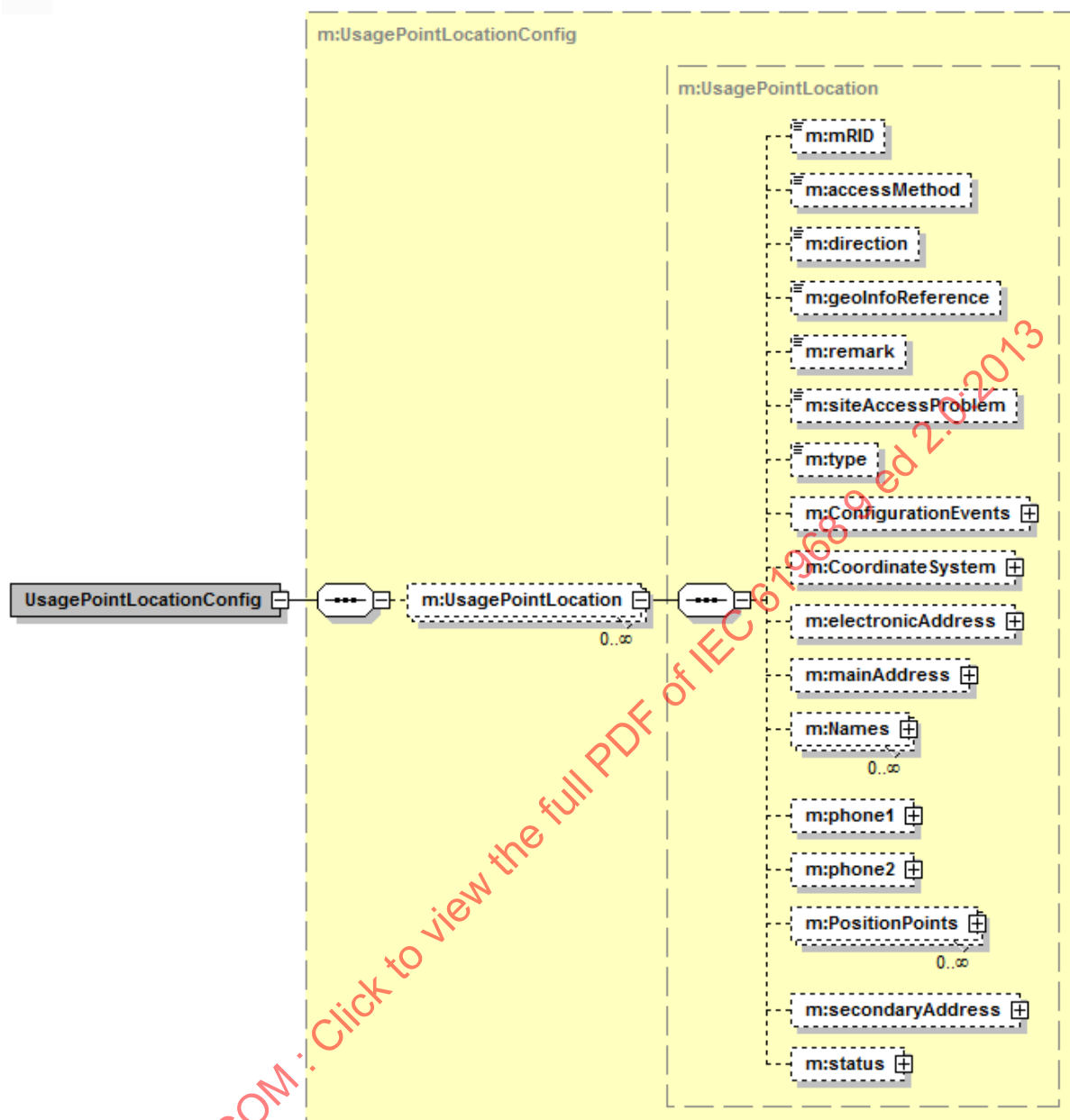


Figure 71 – UsagePointLocationConfig message format

An example payload of UsagePointLocationConfig is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:UsagePointLocationConfig
  xsi:schemaLocation = "http://iec.ch/TC57/2011/UsagePointLocationConfig#
UsagePointLocationConfig.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/UsagePointLocationConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:UsagePointLocation>
    <m:ConfigurationEvents>
      <m:createdDateTime>2011-11-09T10:57:02.583Z</m:createdDateTime>
      <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
    </m:ConfigurationEvents>
    <m:mainAddress>
      <m:streetDetail>
        <m:name>Main Street</m:name>
        <m:number>1234</m:number>
      </m:streetDetail>
      <m:townDetail>
        <m:country>US</m:country>
      </m:townDetail>
    </m:mainAddress>
  </m:UsagePointLocation>
</m:UsagePointLocationConfig>
```

```

        <m:name>Austin</m:name>
        <m:stateOrProvince>TX</m:stateOrProvince>
    </m:townDetail>
</m:mainAddress>
<m:Names>
    <m:name>LOC1234</m:name>
    <m:NameType>
        <m:name>PrimaryName</m:name>
    </m:NameType>
</m:Names>
</m:UsagePointLocation>
</m:UsagePointLocationConfig>

```

5.10.3.10 EndDeviceConfig

The diagram in Figure 72 describes the top level of the EndDeviceConfig message, which is used to provide for basic configuration of end devices.

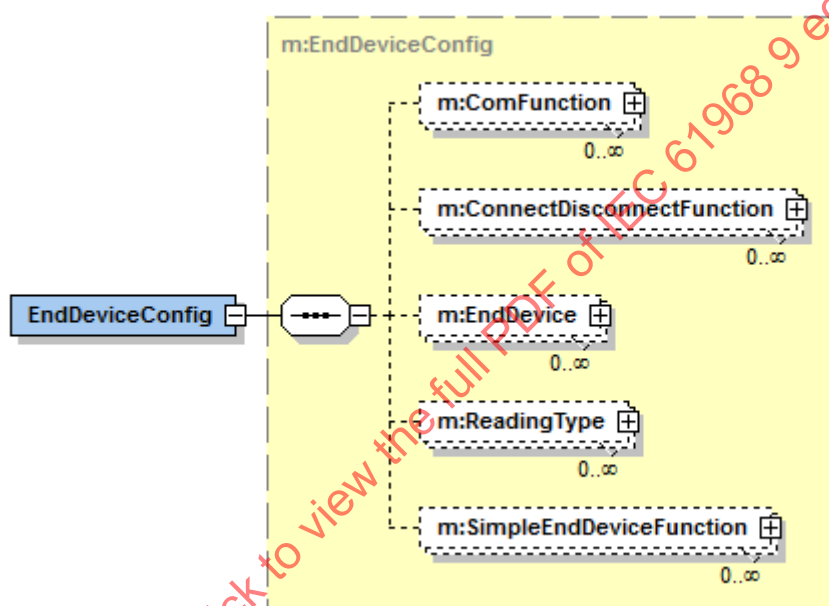


Figure 72 – End device config message format

5.10.3.11 MeterConfig

The message structure in Figure 73 is used to configure meters, where it is possible to supply information more specific to meters.

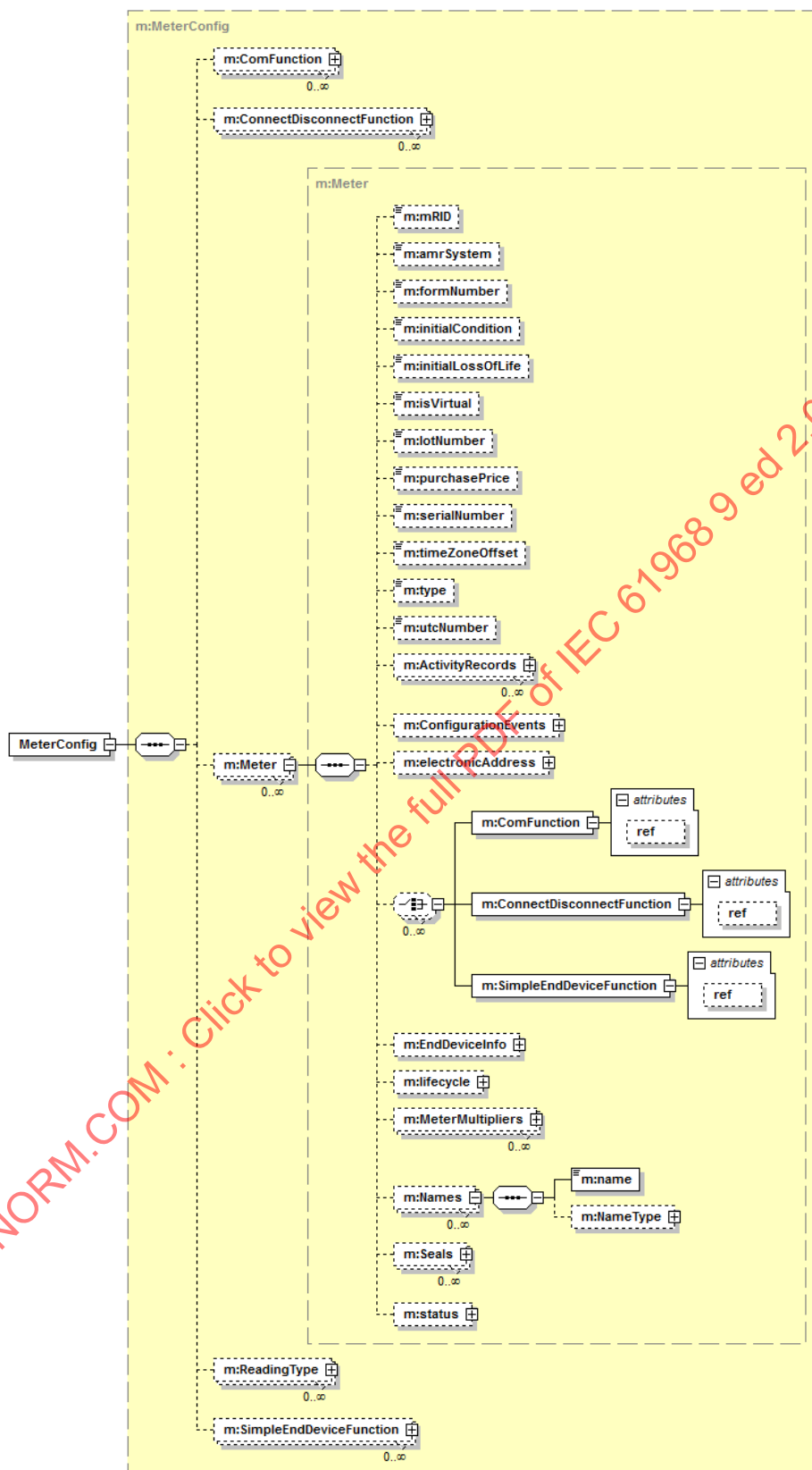


Figure 73 – Meter configuration message

An example of a MeterConfig payload is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:MeterConfig
```



```

xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterConfig# MeterConfig.xsd"
xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
<m:Meter>
  <m:amrSystem>CCTR</m:amrSystem>
  <m:serialNumber>82000001</m:serialNumber>
  <m:ConfigurationEvents>
    <m:createdDateTime>2011-11-09T13:55:02.776Z</m:createdDateTime>
    <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
    <m:reason>AssetCreation</m:reason>
  </m:ConfigurationEvents>
  <m:EndDeviceInfo>
    <m:AssetModel>
      <m:modelNumber>F60</m:modelNumber>
      <m:Manufacturer>
        <m:Names>
          <m:name>LG</m:name>
        </m:Names>
      </m:Manufacturer>
    </m:AssetModel>
  </m:EndDeviceInfo>
  <m:Names>
    <m:name>1234LG</m:name>
    <m:NameType>
      <m:name>PrimaryName</m:name>
    </m:NameType>
  </m:Names>
</m:Meter>
</m:MeterConfig>

```

5.10.3.12 ComModuleConfig

The diagram in Figure 74 provides the top level structure of the message used to configure communication modules.

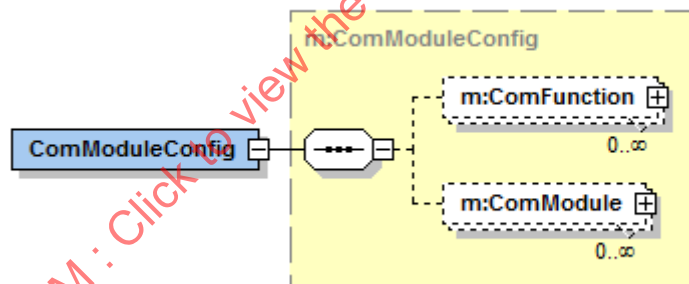


Figure 74 – ComModuleConfig message format

5.10.3.13 ServiceLocationConfig

The message structure in Figure 75 is used to configure service locations.

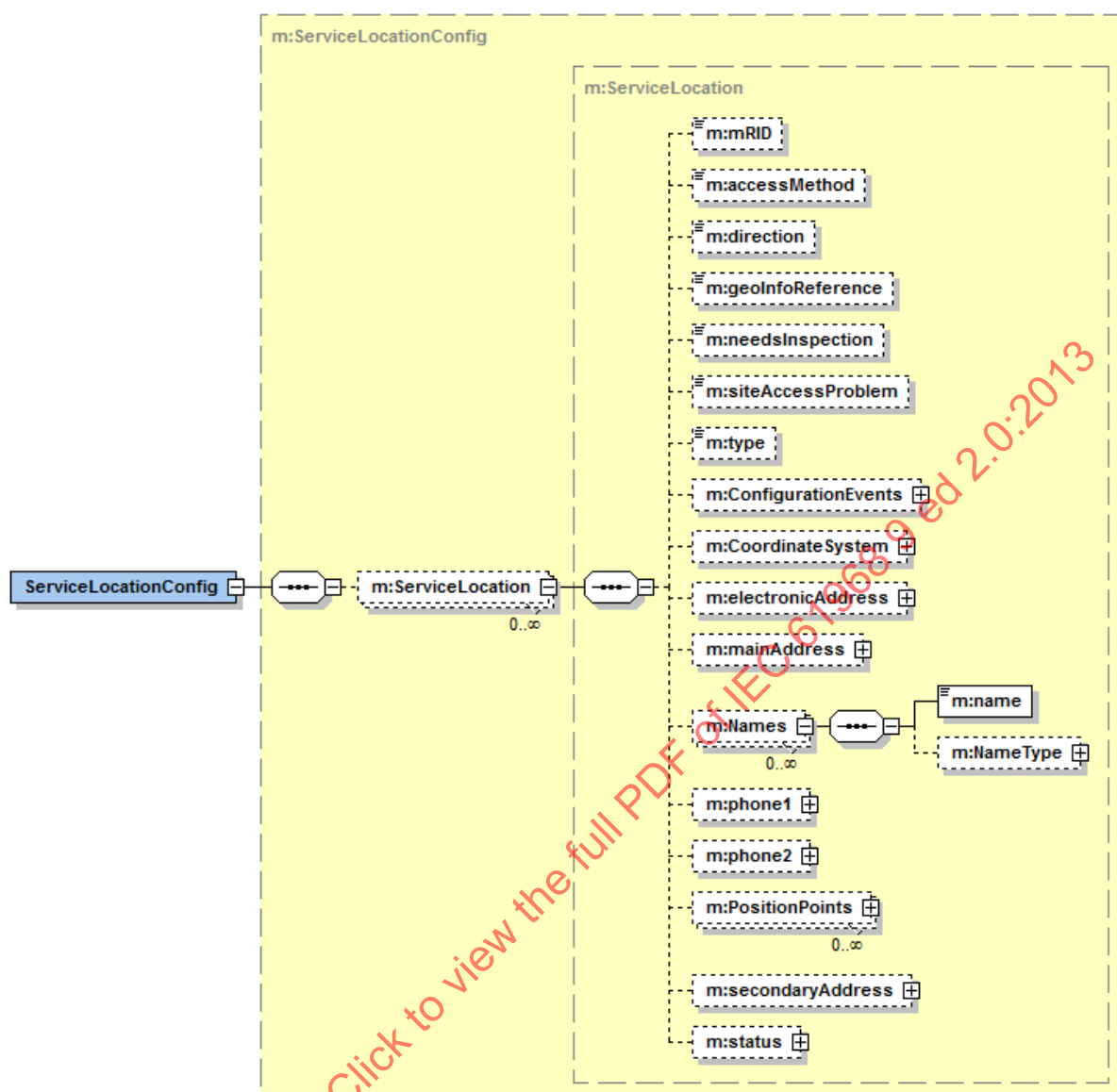


Figure 75 – ServiceLocationConfig message format

5.10.3.14 PricingStructureConfig

The message structure in Figure 76 is used to configure pricing structures.

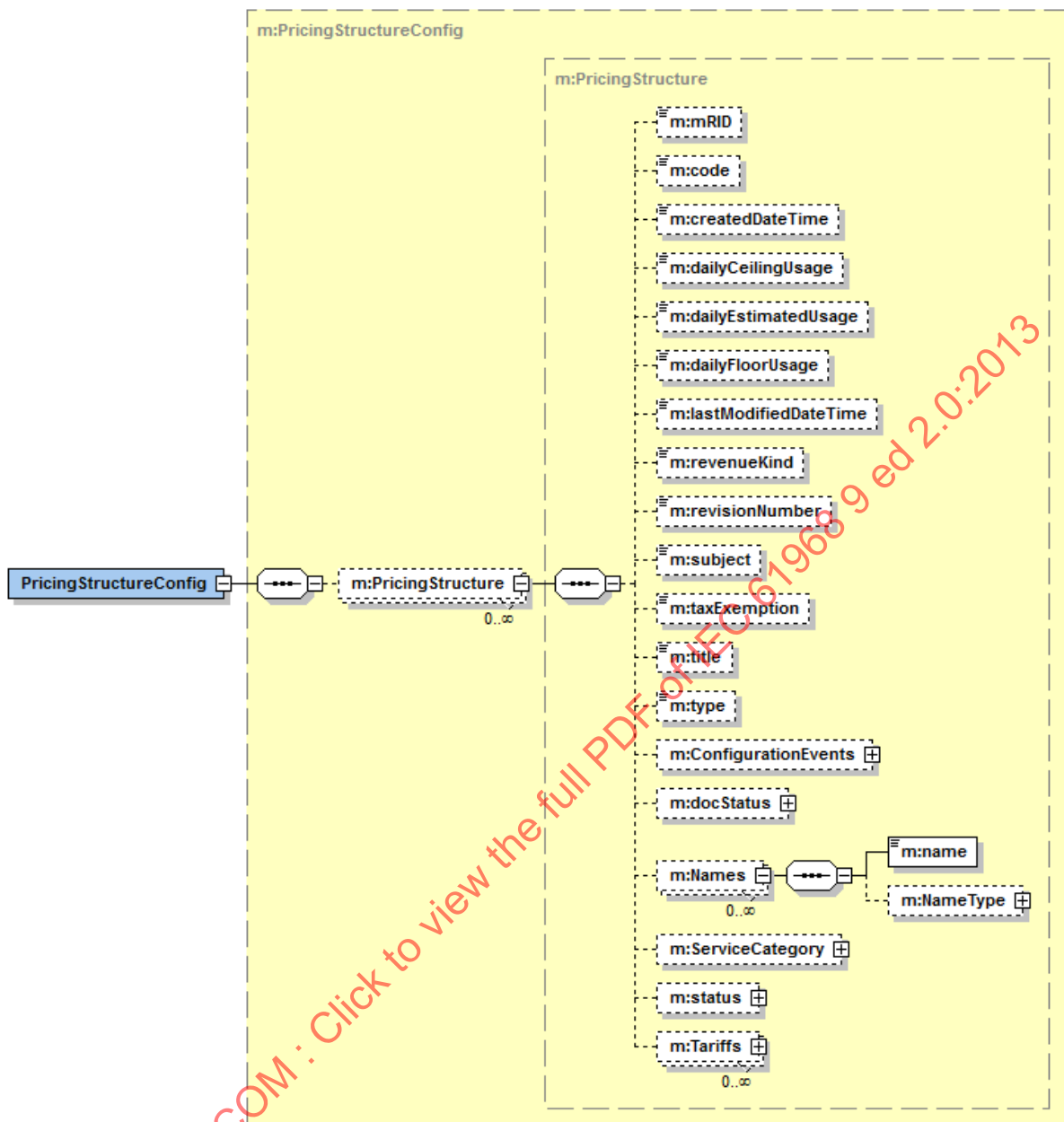


Figure 76 – PricingStructureConfig message format

6 Document conventions

6.1 UML diagrams

All UML-based sequence diagrams contained herein are to be considered as informative examples of how a message exchange could occur.

One of the strengths of the CIM is its flexibility. As technology advances, and new needs develop, new messages can be created. These new messages might involve additional systems (not pictured.) These new messages may leverage different options than the ones depicted in the example.

All UML-based communication diagrams and message flow diagrams contained herein are to be considered informative.

All UML-based class diagrams contained herein are to be considered informative. The reader is referred to IEC 61968-1 to locate the document that contains the normative definitions of the classes used in the CIM.

6.2 Message definitions

6.2.1 General

Message format diagrams contained in the body of this document are to be considered as either normative or informative, with the normative XML schemas being supplied in Annex H, and informative XML schemas being provided by Annex I.

Use cases and sequence diagrams presented in this document are for informative purposes only, and represent usage examples for the normative message definitions.

6.2.2 Mandatory vs. optional

The messages described within this standard were derived from use cases which satisfy an underlying business need for a specific information exchange. Each use case provides a given context for the use of the CIM. Message format diagrams describe the elements which are passed. The elements depicted in dashed-line boxes are to be considered optional in a given context. The elements depicted in solid boxes are to be considered mandatory in a given context. If a diagram should depict an entire class as mandatory or optional, the reader should interpret this to mean that the use of the class is either mandatory or optional, but not that every element within the class is now mandatory or optional. The reader shall refer to the normative definition of the class to determine this.

6.2.3 Verb tense

CIM verbs illustrated in some of the sequence diagrams within this standard are shown in UPPER CASE; however, the verbs in the headers of all IEC 61968-9 CIM messages are required to be in lower case.

6.3 Synchronous versus asynchronous messages

The use of asynchronous or synchronous messages in the sequence diagrams in this document is for illustrative purposes only and is not prescriptive.

6.4 Depiction of simple acknowledgment messages

In web services implementations, there is always a synchronous acknowledgment to request messages even if the overall exchange pattern is asynchronous. This synchronous acknowledgment is performed using a simple IEC 61968-9 response stereotype message having:

An IEC 61968-100 header

An IEC 61968-100 reply structure with:

Reply.Result = "OK"

Reply.Error.code = "0.3" (refer to Annex B)

When using JMS messaging, this simple acknowledgment is also included in the messaging pattern if the AckRequired Boolean is set to "true" in the 61968-100 Header of the request message. However; this simple acknowledgment is suppressed if the AckRequired Boolean is set to "false".

The depiction or lack of depiction of these simple acknowledgment messages in sequence diagrams within this document is intentionally inconsistent as the sequence diagrams are informative and no assumption is made as to whether JMS or web services are being used or whether the AckRequired Boolean is set to "true". Refer to IEC 61968-100 for further information on this subject.

Annex A (normative)

Description of message type verbs

Table A.1 is copied here from Annex B of IEC 61968-100:2013 for convenience purposes only.

Table A.1 – Commonly used verbs

Verbs	Meaning	Message structure
create	The "create" verb is used to publish a request to the master system to create a new object. The master system may in turn publish the new object as an event using the verb "created". The master system may also use the verb "reply" to respond to the "create" request, indicating whether the request has been processed successfully or not.	Request message will include HeaderType and Payload structures.
change	The "change" verb is used to publish a request to the master system to make a change to an object based on the information in the message. The master system may in turn publish the changed object as an event using the verb "changed" to notify that the object has been changed since last published. The master system may also use the verb "reply" to respond to the "change" request, indicating whether the request has been processed successfully or not.	Request message will include HeaderType, RequestType and optionally Payload structures. The requestType structure will potentially identify specific object IDs.
cancel	The "cancel" verb is used to publish a request to the master system to cancel the object, most commonly in the cases where the object represents a business document. The master system may in turn publish the cancelled message as an event using the verb "canceled" to notify that the document has been cancelled since last published. The master system may also use the verb "reply" to respond to the "cancel" request, indicating whether the request has been processed successfully or not. The "cancel" verb is used when the business content of the document is no longer valid due to error(s).	Request message will include HeaderType, RequestType and optionally Payload structures. The requestType structure will potentially identify specific object IDs.
close	The "close" verb is used to publish a request to the master system to close the object, most commonly in cases where the object represents a business document. The master system may in turn publish the closed message as an event using the verb "closed" to notify that the document has been closed since last published. The master system may also use the verb "reply" to respond to the "close" request, indicating whether the request has been processed successfully or not. The "close" verb is used when the business document reaches the end of its life cycle due to successful completion of a business process.	Request message will include HeaderType, RequestType and optionally Payload structures. The requestType structure will potentially identify specific object IDs.
delete	The "delete" verb is used to publish a request to the master system to delete one or more objects. The master system may in turn publish the closed message as an event using the verb "deleted" to notify that the object has been deleted since last published. The master system may also use the verb "reply" to respond to the "delete" request, indicating whether the request has been processed successfully or not. The "delete" verb is used when the business object should no longer be kept in the integrated systems either due to error(s) or due to archiving needs. However, the master system will most likely retain a historical record of the object after deletion.	Request message will include HeaderType, RequestType and optionally Payload structures. The requestType structure will potentially identify specific object IDs.
execute	This is used when the message is conveying a transaction that involves a variety of create, delete and/or change operations. See Annexes K and L.	See OperationSet in Message.xsd.

Verbs	Meaning	Message structure
get	The "get" verb is used to issue a query request to the master system to return a set of zero or more objects that meet a specified criteria. The master system may in turn return zero or more objects using the "reply" verb in a response message.	Request message will include HeaderType and RequestType structures. The requestType structure will potentially identify specific parameters to qualify the request, such as object IDs.
created	The "created" verb is used to publish an event that is a notification of the creation of an object as a result of either an external request or an internal action within the master system of that object. This message type is usually subscribed by interested systems and could be used for mass updates. There is no need to reply to this message type.	Event message will include HeaderType and Payload structures.
changed	The "changed" verb is used to publish an event that is a notification of the change of an object as a result of either an external request or an internal action within the master system of that object. This could be a generic change in the content of the object or a specific status change such as "approved", "issued" etc. This message type is usually subscribed by interested systems and could be used for mass updates. There is no need to reply to this message type.	Event message will include HeaderType and Payload structures.
closed	The "closed" verb is used to publish an event that is a notification of the normal closure of an object as a result of either an external request or an internal action within the master system of that object. This message type is usually subscribed by interested systems and could be used for mass updates. There is no need to reply to this message type.	Event message will include HeaderType and Payload structures.
canceled	The "canceled" verb is used to publish an event that is a notification of the cancellation of an object as a result of either an external request or an internal action within the master system of that object. This message type is usually subscribed by interested systems and could be used for mass updates. There is no need to reply to this message type.	Event message will include HeaderType and Payload structures.
deleted	The "deleted" verb is used to publish an event that is a notification of the deletion of an object as a result of either an external request or an internal action within the master system of that object. This message type is usually subscribed by interested systems and could be used for mass updates. There is no need to reply to this message type.	Event message will include HeaderType and Payload structures.
executed	This provides for an event that indicates the execution of a transaction.	See OperationSet in Message.xsd.
reply	There are two primary usages of the "reply" verb, but in both cases it is only used in response to request messages, whether the pattern used is synchronous or asynchronous. The first usage is to indicate the success, partial success or failure of a transactional request to the master system to create, change, delete, cancel, or close a document. The second usage is in response to a "get" request, where objects of interest may be returned in the response.	Used only for response messages. For responses to transactional requests, the message will contain HeaderType and ReplyType structures. For responses to get requests, the message will contain HeaderType, ReplyType and potentially Payload structures.
NOTE 1 Verbs are listed in this standard for convenience purposes and also to reflect changes that may be reflected in future versions of IEC 61968-1. NOTE 2 Within this standard (e.g. on sequence diagrams), verbs are case insensitive. However, within the standard Message they shall be lower case. The verb SUBSCRIBE has been deprecated. Any usage of SUBSCRIBE is an indication that transport level (e.g. JMS) messages may be conveyed between parties, but these are not IEC 61968-9 messages.		

Annex B (informative)

Reply error codes

B.1 Overview

The message structure to carry Reply.Error.Codes is defined in IEC 61968-1. Additional detail may be provided in supportive documents such as IEC 61968-100. Application specific codes are provided by individual parts. The application specific reply codes for IEC 61968-9 are defined here.

The normative reply codes are defined by IEC 61968-100.

B.2 Reply code categories

The ReplyCodes can be categorized into families as described in Table B.1:

Table B.1 – ReplyCode Categories

ReplyCode Category	Error	Normative Status
0	Error free	N
1	Bad or Missing element	N
2	Parameter invalid	N
3	Too many values	N
4	Request aborted	N
5	Application Error	N
6	Business rule violation	N
7	Security issue	N
N	Normative	
I	Informative	
D	Deprecated	

B.3 Code Construction

These categories can serve as the basis for a numbering scheme to form codes such as those described by the formula below.

ReplyCode ::= <ReplyCode Category> "." <ReplyCode Index>

B.4 Code Indexes

The indexes for each category are described in Tables B.2 through B.9 below.

Table B.2 – Error-free Enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
0	0	Success / No errors	N
0	1	Partial result (additional results conveyed in separate messages)	N
0	2	Partial result (no further results to follow)	N
0	3	Simple acknowledgement	N

Table B.3 – Missing-element Enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
1	1	Noun element(s) not found in message	N
1	2	Revision element not found in message	N
1	3	Verb element(s) not found in message	N
1	5	Mandatory Header elements missing	N
1	6	Mandatory Request elements missing	N
1	7	Mandatory Payload elements missing	N
1	8	Format of request does not validate against schema	N
1	9	Unsupported Revision in message Header	N

Table B.4 – Bad-value Enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
2	1	Meter / RCD switch mismatch	N ^a
2	2	Invalid Feeder(s)	I
2	3	Feeder / Substation mismatch	I ^a
2	4	Invalid Meter(s)	N
2	5	Invalid Noun	N
2	6	Invalid ReadingType(s)	N
2	7	Invalid Substation(s)	I
2	8	Switch / Substation mismatch	I ^a
2	9	Invalid Verb	N
2	10	Unsupported Reading Type(s)	N
2	11	Payload mismatch	I
2	12	Invalid UsagePoint(s)	N
2	13	Meter / UsagePoint mismatch	N ^a
2	14	Invalid Source	N
2	15	Invalid Request ID(s)	N

ReplyCode Category	ReplyCode Index	Error	Normative Status
2	16	Invalid ServiceLocation(s)	N
2	17	Meter / ServiceLocation mismatch*	N
2	18	ComModule / Meter mismatch*	N ^a
2	19	Invalid CustomerAccount(s)	N
2	20	Invalid ServiceSupplier(s)	N
2	21	CustomerAccount / ServiceSupplier mismatch	N ^a
2	22	Invalid Customer(s)	N
2	23	Customer / CustomerAccount mismatch	N ^a
2	24	Invalid CustomerAgreement(s)	N
2	25	CustomerAccount / CustomerAgreement mismatch	N ^a
2	26	CustomerAgreement / UsagePoint mismatch	N ^a
2	27	CustomerAccount / UsagePoint mismatch	N ^a
2	28	ServiceSupplier / UsagePoint mismatch	N ^a
2	29	Object relationship mismatch	N
2	30	Invalid ComModule(s)	N
2	31	Invalid Service Category(ies)	N
2	32	Invalid UsagePointLocation(s)	N
2	33	Invalid PricingStructure(s)	N
^a Retained for backward compatibility. Intended for deprecation in the future edition of IEC 61968-9 and 2.29 will be used instead.			

Table B.5 – Too-many-values enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
3	1	Too many items in request	N
3	2	Too many pending requests	N
3	3	Too many ReadingTypes in request	I

Table B.6 – Request-timed-out enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
4	1	Request timed out	N
4	2	Service not available	I
4	3	Local error in processing	I

Table B.7 – Application-error enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
5	1	Unable to process the request - high system activity level	N
5	2	Unable to process request -transaction not attempted	N
5	3	Unable to process the request - transaction attempted and failed	N
5	4	Unable to process the request - multiple error types encountered	N
5	5	Some or all of the requested reading types are unavailable in MDMS	N
5	6	Some or all of the requested reading types are unavailable in AMI	N
5	7	Some or all of the requested data is unavailable	N
5	8	Unable to process the request – mandatory field(s) missing	N
5	9	Transaction aborted to maintain transactional integrity	N
5	10	Unable to process request – functionality not supported	N
5	11	Failure due to security	N

Table B.8 – Business-rule-violation enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
6	1	Request canceled per business rule	N
6	2	Request placed on hold per business rule	N
6	3	Request released from business rule hold	N
6	4	Request rescheduled per business rule	N
6	5	Request canceled by user	N

Table B.9 – Security issue enumerations

ReplyCode Category	ReplyCode Index	Error	Normative Status
7	1	Temporary authentication failure	I
7	2	Authentication Required	I
7	3	Authentication mechanism insufficient	I
7	4	Authentication failure	I
7	5	Action not authorized for user	I
7	6	Authentication mechanism requires encryption	I
7	7	Policy violation	I

B.5 Reply.Error.code examples

Reply codes are constructed according to a formula that creates a dot notation which is expressed in the form a string. Example Reply.Error.codes are provided in Table B.10.

Table B.10 – Common enumerations

Reply Code	Description
0.0	Success / No errors
0.1	Partial result (additional results conveyed in separate messages)
0.2	Partial result (no further results to follow)
0.3	Simple acknowledgment
1.5	Mandatory Header elements missing
1.6	Mandatory Request elements missing
1.7	Mandatory Payload elements missing
1.8	Format of request does not validate against schema
1.9	Unsupported message revision in Header
2.4	Invalid Meter(s)
2.5	Invalid Noun
2.6	Invalid ReadingType(s)
2.9	Invalid Verb
2.10	Unsupported ReadingType(s)
2.12	Invalid UsagePoint(s)
2.13	Meter / UsagePoint mismatch
2.14	Invalid Source
2.15	Invalid Request ID(s)
2.16	Invalid ServiceLocation(s)
2.17	Meter / ServiceLocation mismatch*
2.18	ComModule / Meter mismatch*
2.19	Invalid CustomerAccount(s)
2.20	Invalid ServiceSupplier(s)
2.21	CustomerAccount / ServiceSupplier mismatch
2.22	Invalid Customer(s)
2.23	Customer / CustomerAccount mismatch
2.24	Invalid CustomerAgreement(s)
2.25	CustomerAccount / CustomerAgreement mismatch
2.26	CustomerAgreement / UsagePoint mismatch
2.27	CustomerAccount / UsagePoint mismatch
2.28	ServiceSupplier / UsagePoint mismatch
2.29	Object relationship mismatch
2.30	Invalid ComModule(s)
2.31	Invalid ServiceCategory(ies)
2.32	Invalid UsagePointLocation(s)
2.33	Invalid PricingStructure(s)
3.1	Too many items in request

Reply Code	Description
3.2	Too many pending requests
4.1	Request timed out
5.1	Unable to process the request - high system activity level
5.2	Unable to process request -transaction not attempted
5.3	Unable to process the request - transaction attempted and failed
5.4	Unable to process the request - multiple error types encountered
5.5	Some or all of the requested ReadingTypes are unavailable in MDMS
5.6	Some or all of the requested ReadingTypes are unavailable in AMI
5.7	Some or all of the requested data is unavailable
5.8	Unable to process the request – mandatory field(s) missing
5.9	Transaction aborted to maintain transactional integrity
6.1	Request canceled per business rule
6.2	Request placed on hold per business rule
6.3	Request released from business rule hold
6.4	Request rescheduled per business rule
6.5	Request canceled by user
7.1	Temporary authentication failure
7.2	Authentication required
7.3	Authentication mechanism insufficient
7.4	Authentication failure
7.5	Action not authorized for user
7.6	Authentication mechanism requires encryption
7.7	Policy violation

The standard message envelope also has a single Reply.Result value. This should be populated in the following manner:

"OK" if there are no errors and all results have been returned. There is no requirement that a Reply.Error record with code of "0.0" be present.

"PARTIAL" if only a partial set of results has been returned, with or without errors. A Reply.Error record with code of "0.1" may be present, as well as records that indicate errors.

"ERROR" if any Error records with a code other than "0.*" are returned, indicating actual errors.

This is represented by the following state transition diagram in Figure B.1.

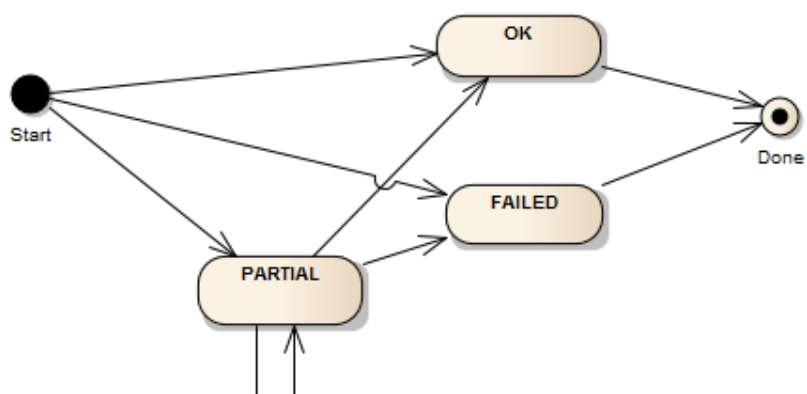


Figure B.1 – Reply Message States

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Annex C

(normative)

Procedure for the generation of a ReadingType name

C.1 General

The ReadingType enumeration is an important identifier in MeterReading messages. This standard specifies a profile which will be considered normative. IEC 61968-9 was developed with several design principles in mind:

The messages should be simple and general purposed.

A “Readings” message should be able to carry any type of value that might be in a meter, e.g. Power, Energy, Relay actuation counts, Status information, and Currency. The Readings.ReadingType should be able to describe whatever the Readings.value is.

It is easier for a data consumer to throw away information it has but does not need, than it is for it to recreate information it needs but does not have.

This third principle implies that data producers should be as explicit as possible when publishing data. The data therefore should be entirely self-describing so that other consumers who access the data (perhaps when it is residing in a data warehouse) can determine for themselves the suitability for use of the data. This will help avoid the need for the data consumer to attempt to reconstruct any implicit agreements which were in place at the time of publication.

It is understood that there will be occasions in which a data consumer (making a request for information) might not know all of the specific details regarding what is being asked. For example, a requestor may wish to obtain the “voltage” at a given location. It may not know if the service is single-phase or poly-phase. It should be able to make the request with the knowledge it has, and the data producer attempt to fulfil it and in the response supply additional detail as appropriate. This may result in the ReadingType(s) used in the response to differ slightly from the ReadingType used in the request.

C.2 Understanding the important attributes of a data element name

C.2.1 General

Data elements can be described in terms of 18 key attributes (several of which are compound attributes.) Every attribute has the feature that a value of zero (“0”) represents that it is not applicable to the description. The only exception to this rule is in the compound attributes. In this case dual zeros represent that the attribute is not applicable.

C.2.2 Attribute #1, macroPeriod

The macroPeriod describes an aspect of the data that reflects how it is viewed or captured over a long period of time. These are enumerated in Table C.1.

Table C.1 – Time-period of interest enumerations

Code	Enumeration	Comments	Normative Status
0	none	Not Applicable	N
8	billingPeriod	Captured during the billing period starting at midnight of the first day of the billing period (as defined by the billing cycle day). If during the current billing period, it specifies a period from the start of the current billing period until "now".	N
11	daily	Daily Period starting at midnight. If for the current day, this specifies the time from midnight to "now".	N
13	monthly	Monthly period starting at midnight on the first day of the month. If within the current month, this specifies the period from the start of the month until "now."	N
22	seasonal	A season of time spanning multiple months. E.g. "Summer," "Spring," "Fall," and "Winter" based cycle. If within the current season, it specifies the period from the start of the current season until "now."	N
24	weekly	Weekly period starting at midnight on the first day of the week and ending the instant before midnight the last day of the week. If within the current week, it specifies the period from the start of the week until "now."	N
32	specifiedPeriod	For the period defined by the start and end of the TimePeriod element in the message.	N

C.2.3 Attribute #2, aggregate

C.2.3.1 General

The way in which a reading is viewed in the aggregate (compared to others) serves as the second attribute. Possible enumerations include those described in Table C.2. This attribute may be used to define a mathematical operation carried out over the period of interest defined by attribute #1.

Table C.2 – Data qualifier enumerations

Code	Enumeration	Comments	Normative Status
0	none	Not Applicable	N
2	average		N
4	excess	The value represents an amount over which a threshold was exceeded.	I
5	highThreshold	The value represents a programmed threshold.	I
7	lowThreshold	The value represents a programmed threshold.	I
8	maximum	The highest value observed	N
9	minimum	The smallest value observed	N
11	nominal		I
12	normal		I
16	secondMaximum	The second highest value observed	N
17	secondMinimum	The second smallest value observed	N
23	thirdMaximum	The third highest value observed	N
24	fourthMaximum	The fourth highest value observed	N

Code	Enumeration	Comments	Normative Status
25	fifthMaximum	The fifth highest value observed	N
26	sum	The accumulated sum	N
27	high	Typically used to identify the high volume flow port of a compound water meter.	I
28	low	Typically used to identify the low volume flow port of a compound water meter.	I
N = Normative I = Informative D = Deprecated since last edition			

C.2.3.2 Changes with this edition

In IEC 61968-9:2009, it was suggested that “TestData” could be used as an enumeration to indicate that a value was not a real billing value. In this edition of IEC 61968-9, we encourage instead the use of ReadingQuality codes to identify test data. In a similar fashion, “missing” or “unstable” data should be identified by a suitable ReadingQuality code. Information on ReadingQuality codes may be found in Annex D.

In this edition of IEC 61968-9, attribute #2 is used strictly for range qualifiers. Terms such as “absolute” which may be used to qualify a pressure reading, or to qualify interval data are instead handled elsewhere. Separate units of measure have been created to differentiate gauge pressure from absolute pressure. Furthermore, the distinction between “absolute intervalData” and “incremental intervalData” is now handled by the message schema. Individual readings (of a “bulkQuantity” or “indicating” nature) are simply presented as readings with the “absolute” attribute being implied. “Incremental intervalData” is now described by the “DeltaData” term, and by presentation of the data in the “intervalReadings” portion of the message.

C.2.4 Attribute #3, measuringPeriod

C.2.4.1 General

The measuringPeriod supplies an “adjective” to describe aspects of a “time period” with regard to the measurement. This attribute describes a “time attribute” which is inherent or fundamental to the reading value. The attribute refers to the way the value was originally measured and not to the frequency at which it is reported or presented. For example, an hourly interval of consumption data would have “hourly” as an attribute. However in the case of an hourly sampled voltage value the meterReadings schema would carry the “hourly” interval size information. Enumerated values include the values described in Table C.3. When compared to attribute #1, the measuringPeriod is a small interval of time which is characteristic of the way the reading was captured, while the macroPeriod is a long interval of time related to the way in which the reading is reported. Either of these attributes are invoked only as needed to describe the data. Many dial readings need only the accompanying timestamp to be meaningful.

Table C.3 – measuringPeriod enumerations

Code	Enumeration	Comments	Normative Status
0	none	Not Applicable	N
1	tenMinute	10 min	N
2	fifteenMinute	15 min	N
3	oneMinute	1 min	N

Code	Enumeration	Comments	Normative Status
4	twentyfourHour	24 min	N
5	thirtyMinute	30 min	N
6	fiveMinute	5 min	N
7	sixtyMinute	60 min	N
10	twoMinute	2 min	N
14	threeMinute	3 min	N
15	present	Within the present period of time	I
16	previous	Shifted within the previous monthly cycle and data set	I
31	twentyMinute	20 min interval	N
50	fixedBlock60Min	60 min Fixed Block	N
51	fixedBlock30Min	30 min Fixed Block	N
52	fixedBlock20Min	20 min Fixed Block	N
53	fixedBlock15Min	15 min Fixed Block	N
54	fixedBlock10Min	10 min Fixed Block	N
55	fixedBlock5Min	5 min Fixed Block	N
56	fixedBlock1Min	1 min Fixed Block	N
57	rollingBlock60MinIntvl30MinSubIntvl	60 min Rolling Block with 30-minute sub-intervals	N
58	rollingBlock60MinIntvl20MinSubIntvl	60 min Rolling Block with 20-minute sub-intervals	N
59	rollingBlock60MinIntvl15MinSubIntvl	60 min Rolling Block with 15-minute sub-intervals	N
60	rollingBlock60MinIntvl12MinSubIntvl	60 min Rolling Block with 12-minute sub-intervals	N
61	rollingBlock60MinIntvl10MinSubIntvl	60 min Rolling Block with 10-minute sub-intervals	N
62	rollingBlock60MinIntvl6MinSubIntvl	60 min Rolling Block with 6-minute sub-intervals	N
63	rollingBlock60MinIntvl5MinSubIntvl	60 min Rolling Block with 5-minute sub-intervals	N
64	rollingBlock60MinIntvl4MinSubIntvl	60 min Rolling Block with 4-minute sub-intervals	N
65	rollingBlock30MinIntvl15MinSubIntvl	30 min Rolling Block with 15-minute sub-intervals	N
66	rollingBlock30MinIntvl10MinSubIntvl	30 min Rolling Block with 10-minute sub-intervals	N
67	rollingBlock30MinIntvl6MinSubIntvl	30 min Rolling Block with 6-minute sub-intervals	N
68	rollingBlock30MinIntvl5MinSubIntvl	30 min Rolling Block with 5-minute sub-intervals	N
69	rollingBlock30MinIntvl3MinSubIntvl	30 min Rolling Block with 3-minute sub-intervals	N
70	rollingBlock30MinIntvl2MinSubIntvl	30 min Rolling Block with 2-minute sub-intervals	N
71	rollingBlock15MinIntvl5MinSubIntvl	15 min Rolling Block with 5-minute sub-intervals	N
72	rollingBlock15MinIntvl3MinSubIntvl	15 min Rolling Block with 3-minute sub-intervals	N
73	rollingBlock15MinIntvl1MinSubIntvl	15 min Rolling Block with 1-minute sub-intervals	N

Code	Enumeration	Comments	Normative Status
74	rollingBlock10MinIntvl5MinSubIntvl	10 min Rolling Block with 5-minute sub-intervals	N
75	rollingBlock10MinIntvl2MinSubIntvl	10 min Rolling Block with 2-minute sub-intervals	N
76	rollingBlock10MinIntvl1MinSubIntvl	10 min Rolling Block with 1-minute sub-intervals	N
77	rollingBlock5MinIntvl1MinSubIntvl	5 min Rolling Block with 1-minute sub-intervals	N
78	twelveMinute	12 min	N
79	twoHour	2 h	N
80	fourHour	4 h	N
81	sixHour	6 h	N
82	twelveHour	12 h	N
83	threeHour	3 h	N
100	specifiedInterval	The interval length is described in attribute #10 in seconds. Attribute #11 should be "1" for whole seconds.	N
101	specifiedFixedBlock	The fixed block duration is described in attribute #10 in seconds. Attribute #11 should be "1" for whole seconds.	N
102	specifiedRollingBlock	The rolling block size is described by attribute #10 in seconds, and the sub-interval size by attribute #11 in seconds.	N
N = Normative I = Informative D = Deprecated since last edition			

It is common for meters to report demand in a form that is measured over the course of a portion of an hour. In Enterprise Applications however, it is commonly understood that demand (which has a unit of measure of "kW" or "kVAR") has been normalized to 1 h. The Metering System shall perform this transformation before publication and use by the other systems. The scalar used is chosen based on the block size (not any sub-interval size). These scalars are listed in Table C.4

Table C.4 – Demand normalization scalars

Demand block size	Normalization scalar
1 h	1
30 min	2
20 min	3
15 min	4
10 min	6
1 min	60

For example, before normalization, "15minuteFixedBlock" data might be said to have units of "kilo quarter-watt-hours" (kWh). After normalization, the unit of measure would become "kilo-watt-hours." Since "kilo quarter-watt-hours" is not a usable unit of measure, systems that find the need to communicate raw data in this form should use a unit of measure such as "count" and the PendingCalculation element to carry the scalar (or multiplier) needed and the resulting unit of measure when applied,

C.2.4.2 Common Usages (Informative)

Interval data is commonly found in 60 min, 30 min, and 15 min sizes. Larger sizes such as 24 h and smaller sizes down to 1 min are also possible but are less common. Users of the standard should leverage existing interval enumerations where they exist, but if the needed interval size does "not exist, a "specifiedInterval" may be used. This allows the enumeration itself to imbed the size of the interval in the enumeration. Similarly, uncommon fixed block and rolling block sizes may be specified.

IEC 61968-9:2009 offered the terms "Shifted," "Present," and "Previous" as adjectives that might be used to describe the state of the meter. While this works well for publishing data from a Metering System, it may be difficult to use between other enterprise applications. It seems that while "present" and "previous" are important attributes of the data while it is at the meter, the further one gets away from the meter, the less important these attributes become. With this edition of IEC 61968-9 we propose that the timespan over which the data is recorded be relied upon to determine if a value belongs to the "present" billing period or the "previous" billing period rather than the enumerations "present" or "previous." Furthermore, the rules used to compute demand are quite important. A single "Daily" demand is usually not adequate to compute a customer's bill. A complete collection of "Daily" demands or a single "Billing" demand are usually required. A distinction in the Daily/Billing/Seasonal observation period should be made in the ReadingType. In all cases, the timestamp associated with the maximum demand could be used to resolve which day, month, or season a "daily," "billing," or "seasonal" demand fell into.

In a utility where multiple techniques for capturing demand exist, it becomes important to communicate between systems the definition by which demand data is captured. Enumerations are provided in this edition which enable the data producer to be as specific as it knows how in describing the type of demand data being passed.

C.2.5 Attribute #4, accumulation

C.2.5.1 General

The "accumulation" attribute indicates how the value is represented to accumulate over time. Enumerated values include those described in Table C.5.

One benefit to explicitly declaring the accumulation behaviour as part of the readingType in an exchange between a MS and MDM is to help the MDM ensure that appropriate validation rules are applied to the data supplied by the MS.

Table C.5 – Accumulation behaviour enumerations

Code	Enumeration	Comments	Normative status
0	none	Not Applicable, or implied by the unit of measure.	N
1	bulkQuantity	A value from a register which represents the bulk quantity of a commodity. This quantity is computed as the integral of the commodity usage rate. This value is typically used as the basis for the dial reading at the meter, and as a result, will roll over upon reaching a maximum dial value. NOTE 1 With the metering system, the roll-over behaviour typically implies a roll-under behavior so that the value presented is always a positive value (e.g. unsigned integer or positive decimal.) However, when communicating data between enterprise applications a negative value might occur in a case such as net metering. NOTE 2 A BulkQuantity refers primarily to the dial reading and not the consumption over a specific period of time.	N
2	continuousCumulative	The sum of the previous billing period values and the present period value. Note: "ContinuousCumulative" is commonly used in conjunction with "demand." The "ContinuousCumulative Demand" would be the cumulative sum of the previous billing period maximum demand values (as occurring with each demand reset) summed with the present period maximum demand value (which has yet to be reset).	N
3	cumulative	The sum of the previous billing period values. Note: "Cumulative" is commonly used in conjunction with "demand." Each demand reset causes the maximum demand value for the present billing period (since the last demand reset) to accumulate as an accumulative total of all maximum demands. So instead of "zeroing" the demand register, a demand reset has the affect of adding the present maximum demand to this accumulating total.	N
4	deltaData	The difference between the value at the end of the prescribed interval and the beginning of the interval. This is used for incremental interval data. NOTE 3 One common application would be for load profile data, another use might be to report the number of events within an interval (such as the number of equipment energizations within the specified period of time.)	N
6	indicating	As if a needle is swung out on the meter face to a value to indicate the current value. (Note: An "indicating" value is typically measured over hundreds of milliseconds or greater, or may imply a "pusher" mechanism to capture a value. Compare this to "instantaneous" which is measured over a shorter period of time.)	N
9	summation	A form of accumulation which is selective with respect to time. NOTE 4 "Summation" could be considered a specialization of "Bulk Quantity" according to the rules of inheritance where "Summation" selectively accumulates pulses over a timing pattern, and "BulkQuantity" accumulates pulses all of the time.	I
10	timeDelay	A form of computation which introduces a time delay characteristic to the data value	I

Code	Enumeration	Comments	Normative status
12	instantaneous	Typically measured over the fastest period of time allowed by the definition of the metric (usually milliseconds or tens of milliseconds.) (Note: "Instantaneous" was moved to attribute #4 in 61968-9Ed2 from attribute #1 in 61968-9:2009.)	N
13	latchingQuantity	When this description is applied to a metered value, it implies that the value is a time-independent cumulative quantity much a BulkQuantity, except that it latches upon the maximum value upon reaching that value. Any additional accumulation (positive or negative) is discarded until a reset occurs. NOTE 5 A LatchingQuantity may also occur in the downward direction – upon reaching a minimum value. The terms "maximum" or "minimum" will usually be included as an attribute when this type of accumulation behaviour is present. When this description is applied to an encoded value (UOM= "Code"), it implies that the value has one or more bits which are latching. The condition that caused the bit to be set may have long since evaporated. In either case, the timestamp that accompanies the value may not coincide with the moment the value was initially set. In both cases a system will need to perform an operation to clear the latched value.	N
14	boundedQuantity	A time-independent cumulative quantity much a BulkQuantity or a LatchingQuantity, except that the accumulation stops at the maximum or minimum values. When the maximum is reached, any additional positive accumulation is discarded, but negative accumulation may be accepted (thus lowering the counter.) Likewise, when the negative bound is reached, any additional negative accumulation is discarded, but positive accumulation is accepted (thus increasing the counter.)	N
N = Normative I = Informative D = Deprecated since last edition			

C.2.5.2 Types of IntervalReadings

In IEC 619689:2009, it was said IntervalReadings might be expressed in a number of styles qualified by attribute #2 (i.e. "Incremental," "Relative," or "Absolute") and also described "RecordedData" and "DeltaData".

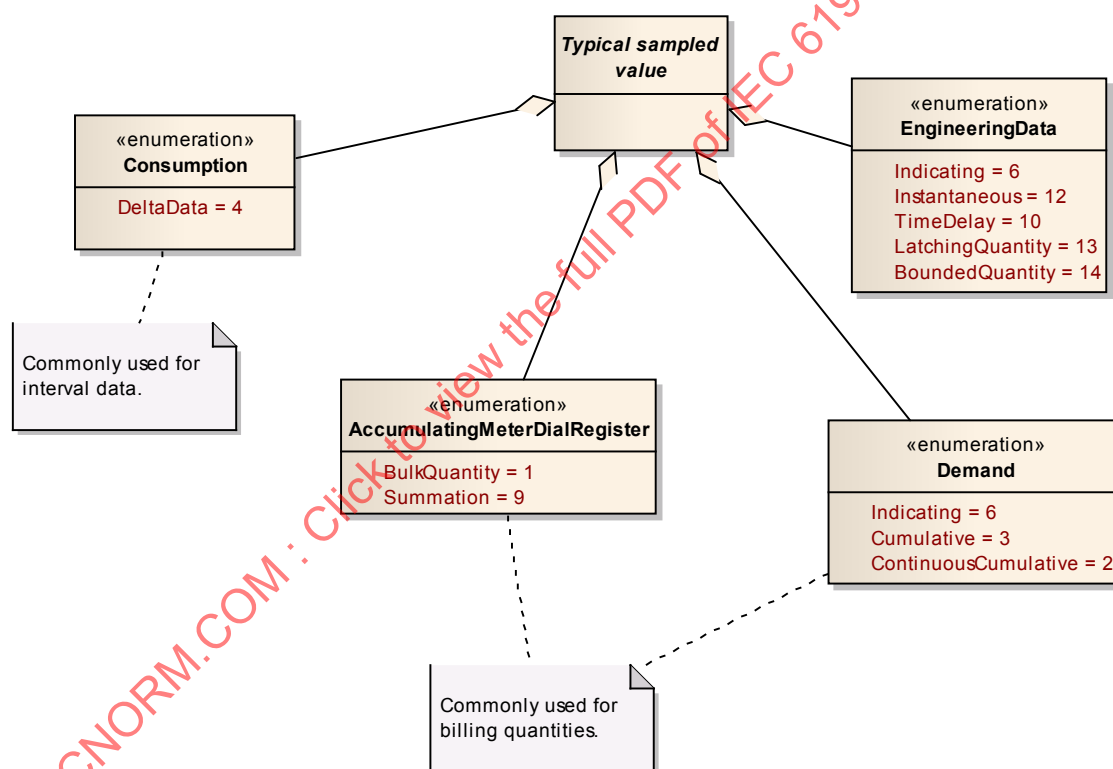
In this edition of IEC 61968-9 we have made an effort to simplify the presentation of data. A sampled value which would have been called an "absolute interval" reading in IEC 61968-9:2009 may be presented without the word "absolute." Indeed such readings may be published in the MeterReading.Readings portion of the message as ordinary readings rather than in the MeterReading.IntervalBlock.IntervalReadings portion of the message. The concept of "Relative IntervalData" is no longer found in the enumerations because the concept is supported in the message schema as a form of "pending" data scalars.

C.2.5.3 Common usages

The attributes described in Table C.5 are customarily used in particular ways to describe energy and demand values. These customs are described in Table C.6.

Table C.6 – Customary accumulation behaviour enumerations

Metrology data type	Common usages
Energy (Measured by simple counting and displayed to the user on the face of the meter.)	BulkQuantity
Demand (Ordinarily measured by integrating a power value over a specific period of time.)	Indicating, Cumulative, ContinuousCumulative
Power (Ordinarily measured in real time in solid-state meters.)	Instantaneous, TimeDelay
Time Of Use (TOU) Energy data (Measured by accumulating values in assorted registers depending on the time of day and day of the week.)	Summation
Time Of Use (TOU) Demand data (Derived by integrating energy values over a specified demand interval, with additional dependencies on the TOU calendar.)	Indicating, Cumulative, or ContinuousCumulative
Counters	BulkQuantity, LatchingQuantity

**Figure C.1 – Typical enumerations for accumulation behaviourAttribute #5, flowDirection****C.2.6.1 General**

Anything involving current might have a flow direction. Flow direction is very important, but when it is unknown, it should remain unspecified. Possible enumerations include those described in Table C.7.

The “flow direction” encompasses the electrical concept of four quadrant metering as well as the needs of various regional tariffs to describe how energy is billed.

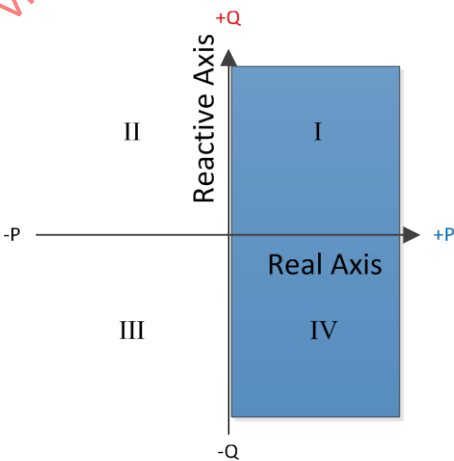
It should be recognized that different parts of the world operate according to different frames of reference for their tariff practices. Most regions define power delivery according to a

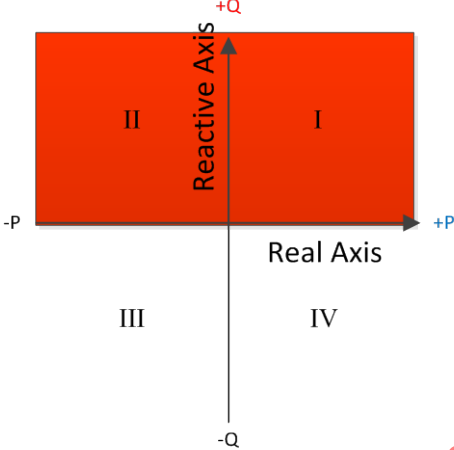
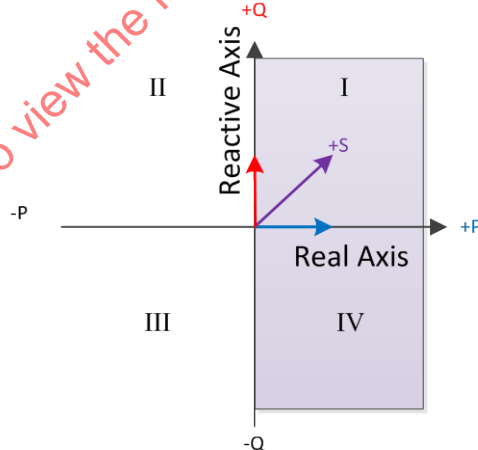
Producer's Reference Frame. Power is generated by the utility, flows through the utility grid, through the meter, and into the customer's wiring. The meter captures the energy sold to the customer. Some regions however take a customer-centric view. A Consumer Reference Frame says that power may be purchased by a consumer from the grid. Any forward flow through the meter registers the energy purchased by the consumer.

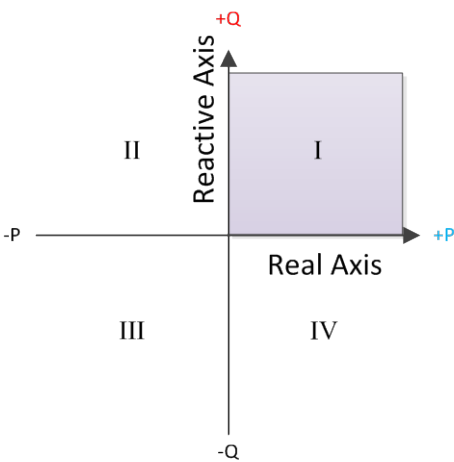
This standard attempts to circumnavigate the frame-of-reference issue by recognizing that these two views are equivalent. The energy bought is the energy sold. The "forward" flow from the meter's "source" side to the meter's "load" side (or equivalent terminology such as "V+" and a "V–") creates a measurement that can be used for either tariff definition. This standard will leverage the numeric code for a given semantic concept to be "normative," while the text used to name the concept is considered "informative."

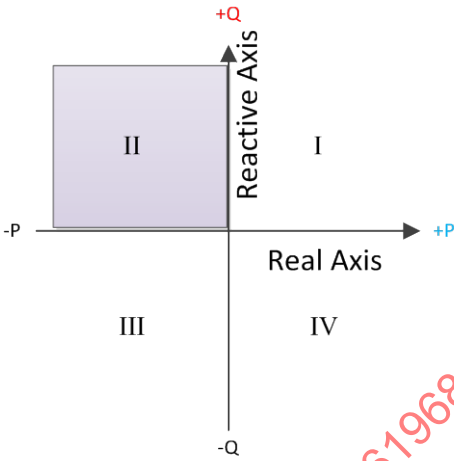
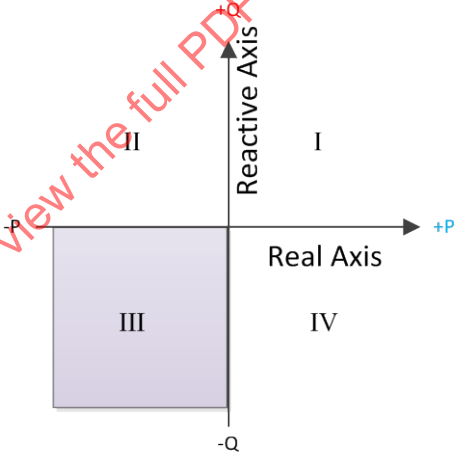
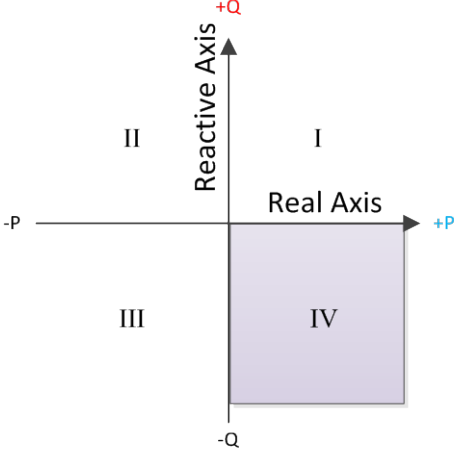
A second reason to keep the textual descriptions informative is due to the genuine language differences among the various participating countries in the IEC.

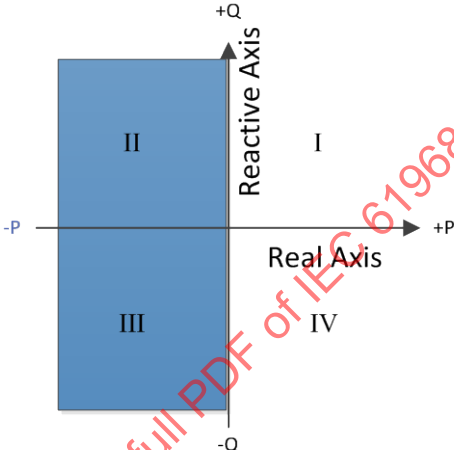
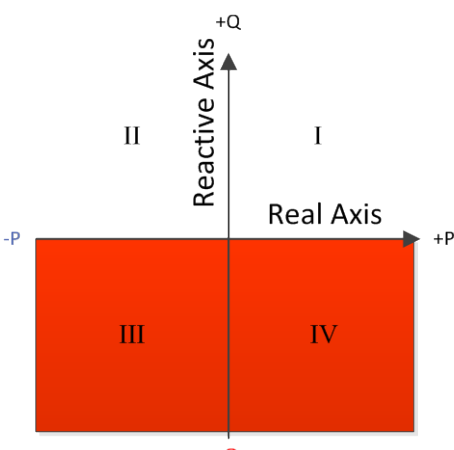
Table C.7 – Direction of flow enumeration

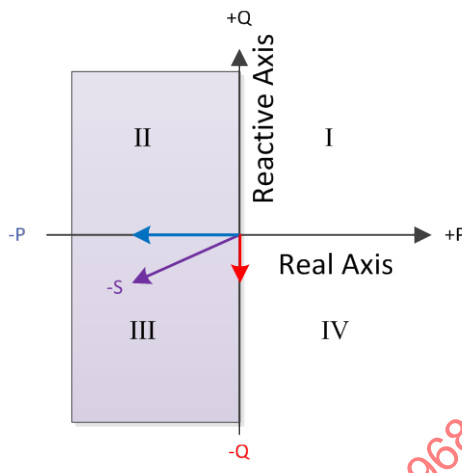
Code	Enumeration Name (informative)	Comments	Normative status of code
0	none	Not Applicable (N/A)	N
1	forward	Also known as "Delivered," or "Imported" as defined in IEC/TS 61968-2. Forward Active Energy is a positive kWh value as one would naturally expect to find as energy is supplied by the utility and consumed at the service. Forward Active Energy is accumulated in a single phase service by observing the power flow (+P) in quadrants I and IV.  Forward Reactive Energy is a positive VARh value as one would naturally expect to find in the presence of inductive loading. Forward Reactive Energy is accumulated in a single phase service by observing the power flow (+Q) in quadrants I and II.	N

Code	Enumeration Name (informative)	Comments	Normative status of code
		 Forward Apparent Energy is a positive VAh value much like Forward Active Energy. It is accumulated in a single phase service by observing the power flow ($S = P + jQ$) in quadrants I and IV.  In polyphase metering, the forward energy register is incremented when the sum of the phase energies is greater than zero: $\text{Energy}_A + \text{Energy}_B + \text{Energy}_C > 0$	
2	lagging	Typically used to describe that a power factor is lagging the reference value (or to say that the current is lagging the voltage.) NOTE 1 When used to describe power factor, the term “Lagging” implies that the PF is negative. The term “lagging” in this case takes the place of the negative sign. If a signed PF value is to be passed by the data producer, then the direction of flow enumeration zero (none) should be used in order to avoid the possibility of creating an expression that employs a double negative. The data consumer should be able to tell from the sign of the data if the PF is leading or lagging. This	N

Code	Enumeration Name (informative)	Comments	Normative status of code
		principle is analogous to the concept that "Reverse" energy is an implied negative value, and to publish a negative reverse value would be ambiguous. NOTE 2 Lagging power factors typically indicate inductive loading.	
3	leading	Typically used to describe that a power factor is leading the reference value (or to say that the current is leading the voltage.) NOTE 3 Leading power factors typically indicate capacitive loading.	N
4	net	Defined as Forward - Reverse , See IEC/TS 61968-2. NOTE 4 In some systems, the value passed as a "net" value could become negative. In other systems the value passed as a "net" value is always a positive number, and rolls-over and rolls-under as needed.	N
5	q1plusQ2	Reactive positive quadrants.	I
7	q1plusQ3	Quadrants 1 and 3	I
8	q1plusQ4	Quadrants 1 and 4 usually represent forward active energy	I
9	q1minusQ4	Q1 minus Q4	I
10	q2plusQ3	Quadrants 2 and 3 usually represent reverse active energy	I
11	q2plusQ4	Quadrants 2 and 4	I
12	q2minusQ3	Q2 minus Q3	I
13	q3plusQ4	Reactive negative quadrants.	I
14	q3minusQ2	Q3 minus Q2	I
15	quadrant1	Q1 only 	I

Code	Enumeration Name (informative)	Comments	Normative status of code
16	quadrant2	Q2 only 	I
17	quadrant3	Q3 only 	I
18	quadrant4	Q4 only 	I

Code	Enumeration Name (informative)	Comments	Normative status of code
19	reverse	Reverse Active Energy is equivalent to "Received," or "Exported" as defined in IEC/TS 61968-2. Reverse Active Energy is a positive kWh value as one would expect to find when energy is produced and backed by the service onto the utility network. Reverse Active Energy is accumulated in a single phase service by observing the power flow ($-P$) in quadrants II and III.  Reverse Reactive Energy is a positive VARh value as one would expect to find in the presence of capacitive loading and a leading Power Factor. Reverse Reactive Energy is accumulated in a single phase service by observing the power flow ($-Q$) in quadrants III and IV.  Reverse Apparent Energy is a positive VAh value much as reverse active energy. It is accumulated in a single phase service by observing the power flow ($S = P + jQ$) in quadrants II and III.	N

Code	Enumeration Name (informative)	Comments	Normative status of code
		 In polyphase metering, the reverse energy register is incremented when the sum of the phase energies is less than zero: $\text{Energy}_A + \text{Energy}_B + \text{Energy}_C < 0$ NOTE 5 The value passed as a reverse value is always a positive value. It is understood by the label "reverse" that it represents negative flow.	
20	total	Forward + Reverse , See IEC/TS 61968-2. The sum of the commodity in all quadrants $Q1+Q2+Q3+Q4$. In polyphase metering, the total energy register is incremented when the absolute value of the sum of the phase energies is greater than zero: $ \text{Energy}_A + \text{Energy}_B + \text{Energy}_C > 0$	N
21	totalByPhase	In polyphase metering, the total by phase energy register is incremented when the sum of the absolute values of the phase energies is greater than zero: $ \text{Energy}_A + \text{Energy}_B + \text{Energy}_C > 0$ In single phase metering, the formulas for "Total" and "Total by phase" collapse to the same expression. For communication purposes however, the "Total" enumeration should be used with single phase meter data.	N
N = Normative I = Informative D = Deprecated since last edition			

C.2.6.2 Common usages

The terminology used to specify the flow direction for reactive energy and reactive power is varies considerably by vendor. Table C.8 describes a number of equivalent flow directions by power (or energy) type, and recommends a preferred flow direction enumeration for communication.

Table C.8 – DirectionOfFlow enumeration equivalencies

Type of energy or power	Unit Of Measure	Equivalent flow directions commonly used in industry	Preferred flow direction for messaging
Active or Real	W or Wh	Forward, Delivered, Positive, Q1+Q4	Forward
		Reverse, Received, Negative, Q2+Q3	Reverse
		Net, Q1+Q4-(Q2+Q3)	Net
		Total, Q1+Q2+Q3+Q4	Total
Reactive	VAr or VArh	Forward, Delivered, Positive, Lagging, Q1+Q2	Forward
		Reverse, Received, Negative, Leading, Q3+Q4	Reverse
		Net, Q1+Q2-(Q3+Q4)	Net
		Total, Q1+Q2+Q3+Q4	Total
Apparent	VA or VAh	Forward, Delivered	Forward
		Reverse, Received	Reverse
		Net	Net
		Total	Total

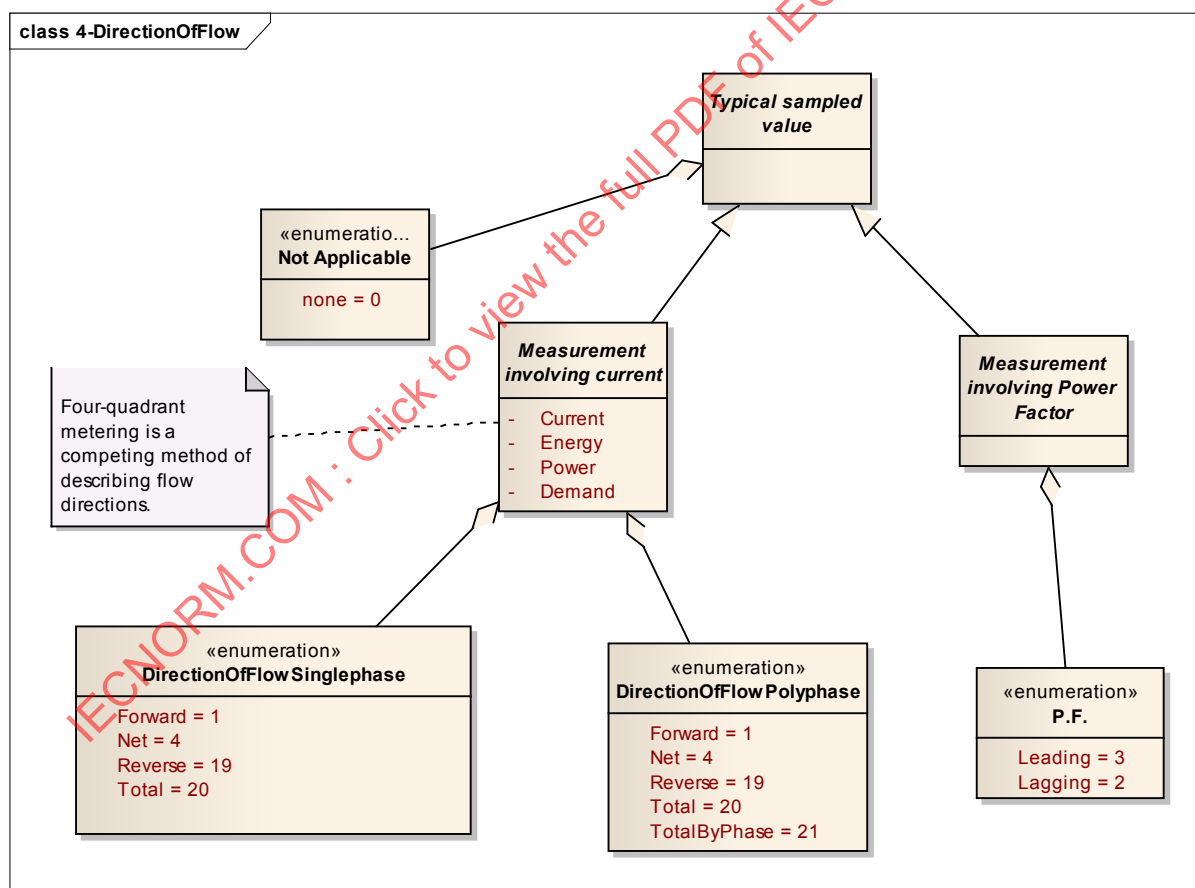


Figure C.2 – Typical enumerations for direction of flow

C.2.7 Attribute #6, commodity

In this standard, the commodity which is being measured has been isolated to become an attribute by itself. It is enumerated in Table C.9.

Table C.9 – Commodity

Code	Enumeration	Comments	Normative status
0	none	Not Applicable	N
1	electricity SecondaryMetered	All types of metered quantities. This type of reading comes from the meter and represents a “secondary” metered value.	N
2	electricity PrimaryMetered	It is possible for a meter to be outfitted with an external VT and/or CT. The meter might not be aware of these devices, and the display not compensate for their presence. Ultimately, when these scalars are applied, the value that represents the service value is called the “primary metered” value. The “index” in sub-category 3 mirrors those of sub-category 0.	N
3	communication	A measurement of the communication infrastructure itself.	N
4	air		N
5	insulativeGas	(SF ₆ is found separately below.)	N
6	insulativeOil		N
7	naturalGas		N
8	propane		N
9	potableWater	Drinkable water	N
10	steam	Water in steam form, usually used for heating.	N
11	wasteWater	(Sewerage)	N
12	heatingFluid	This fluid is likely in liquid form. It is not necessarily water or water based. The warm fluid returns cooler than when it was sent. The heat conveyed may be metered.	N
13	coolingFluid	The cool fluid returns warmer than when it was sent. The heat conveyed may be metered.	N
14	nonpotableWater	Reclaimed water – possibly used for irrigation but not sufficiently treated to be considered safe for drinking. Moisture in oil	N
15	nox	Nitrous Oxides, NO _x	N
16	so2	Sulfur Dioxide, SO ₂	N
17	ch4	Methane, CH ₄	N
18	co2	Carbon Dioxide, CO ₂	N
19	carbon	C	I
20	hch	Hexachlorocyclohexane, HCH	N
21	pfc	Perfluorocarbons, PFC	N
22	sf6	Sulfurhexafluoride, SF ₆	N
23	tvLicence	Television	N
24	internet	Internet service	N
25	refuse	Trash	N
26	h2	Hydrogen, H ₂	N
27	c2h2	Acetylene, C ₂ H ₂	N
28	c2h4	Ethylene, C ₂ H ₄	N
29	c2h6	Ethane, C ₂ H ₆	N
30	co	Carbon monoxide, CO	N
31	o2	Oxygen, O ₂	N

Code	Enumeration	Comments	Normative status
32	dissolvedCombustibleGas	Dissolved Combustible Gas (A combination of combustible gasses such as H ₂ , CH ₄ , C ₂ H ₂ , C ₂ H ₄ , C ₂ H ₆ , and/or CO in some mixture.)	N
33	co2e	Carbon Dioxide CO ₂ Equivalent	N
34	lead	Lead, Pb	N
35	mercury	Mercury, Hg	N
36	ozone	Ozone, O ₃	N
37	pm10	Particulate matter whose maximum size is 10 µm.	N
38	pm25	Particulate matter whose maximum size is 2,5 µm.	N
39	sox	Sulfur Oxides, SO _x	N
40	weather	Weather or meteorological conditions.	N
41	device	Condition of the meter or end device itself. For example, this enumeration might be used in combination with an enumeration for temperature to represent the internal temperature of a meter.	N
N = Normative I = Informative D = Deprecated since last edition			

C.2.8 Attribute #7, measurementKind

The “measurementKind” helps identify “what” is being measured. It further refines the commodity to provide a reading category. This attribute works in conjunction with the units attribute in creative ways to provide detail to the unit of measure. For example, “Energy” with a unit of measure of “kWh” indicates to the user that active energy is being measured, “Energy” with “kVAh” indicates apparent energy, and “Energy” with “kVAh” indicates reactive energy. “Power” can be combined in a similar way with various power units of measure. Distortion power (“DistortionVoltAmperes”) with “kVA” is different from “Power” with “kVA”. More information can be found by studying the examples at the end of this annex. Measurement kinds are enumerated in Table C.10.

Table C.10 – measurementKind Index

Code	Enumeration	Comments	Normative Status
0	none	Not Applicable	N
2	apparentPowerFactor		N
3	currency	funds	N
4	current		N
5	currentAngle		N
6	currentImbalance		N
7	date		N
8	demand		N
9	distance		N
10	distortionVoltAmperes		N
11	energization		N
12	energy		N

Code	Enumeration	Comments	Normative Status
13	energizationLoadSide		N
14	fan		N
15	frequency		N
16	Funds	Dup with "currency"	D
17	ieee1366ASAI		N
18	ieee1366ASIDI		N
19	ieee1366ASIFI		N
20	ieee1366CAIDI		N
21	ieee1366CAIFI		N
22	ieee1366CEMIn		N
23	ieee1366CEMSMIn		N
24	ieee1366CTAIDI		N
25	ieee1366MAIFI		N
26	ieee1366MAIFle		N
27	ieee1366SAIDI		N
28	ieee1366SAIFI		N
31	lineLosses		N
32	losses		N
33	negativeSequence		N
34	phasorPowerFactor		N
35	phasorReactivePower		N
36	positiveSequence		N
37	power		N
38	powerFactor		N
40	quantityPower		N
41	sag	or Voltage Dip	N
42	swell		N
43	switchPosition		N
44	tapPosition		I
45	tariffRate		N
46	temperature		N
47	totalHarmonicDistortion		N
48	transformerLosses		N
49	unipedeVoltageDip10to15		N
50	unipedeVoltageDip15to30		N
51	unipedeVoltageDip30to60		N
52	unipedeVoltageDip60to90		N
53	unipedeVoltageDip90to100		N
54	Voltage (rms)		N
55	voltageAngle		N
56	voltageExcursion		N
57	voltageImbalance		N

Code	Enumeration	Comments	Normative Status
58	volume	Clarified from IEC 61968-9:2009 to indicate fluid volume	N
59	zeroFlowDuration		N
60	zeroSequence		N
64	distortionPowerFactor		N
81	frequencyExcursion	Usually expressed as a "count"	N
90	applicationContext		I
91	apTitle		I
92	assetNumber		I
93	bandwidth		I
94	batteryVoltage		N
95	broadcastAddress		I
96	deviceAddressType1		I
97	deviceAddressType2		I
98	deviceAddressType3		I
99	deviceAddressType4		I
100	deviceClass		I
101	electronicSerialNumber		I
102	endDeviceID		I
103	groupAddressType1		I
104	groupAddressType2		I
105	groupAddressType3		I
106	groupAddressType4		I
107	ipAddress		I
108	macAddress		I
109	mfgAssignedConfigurationID		I
110	mfgAssignedPhysicalSerialNumber		I
111	mfgAssignedProductNumber		I
112	mfgAssignedUniqueCommunicationAddress		I
113	multiCastAddress		I
114	oneWayAddress		I
115	signalStrength		I
116	twoWayAddress		I
117	signaltoNoiseRatio	Moved here from Attribute #9 UOM	I
118	alarm		I
119	batteryCarryover		I
120	dataOverflowAlarm		I
121	demandLimit		N

Code	Enumeration	Comments	Normative Status
122	demandReset	Usually expressed as a count as part of a billing cycle	N
123	diagnostic		I
124	emergencyLimit		I
125	encoderTamper		I
126	ieee1366MomentaryInterruption		N
127	ieee1366MomentaryInterruptionEvent		N
128	ieee1366SustainedInterruption		N
129	interruptionBehaviour		I
130	inversionTamper		I
131	loadInterrupt		I
132	loadShed		I
133	maintenance		I
134	physicalTamper		I
135	powerLossTamper		I
136	powerOutage		I
137	powerQuality		I
138	powerRestoration		I
139	programmed		I
140	pushbutton		N
141	relayActivation		N
142	relayCycle	Usually expressed as a count	N
143	removalTamper		I
144	reprogrammingTamper		I
145	reverseRotationTamper		I
146	switchArmed		I
147	switchDisabled		I
148	tamper		I
149	watchdogTimeout		I
150	billLastPeriod	Customer's bill for the previous billing period Expressed as currency.	N
151	billToDate	Customer's bill, as known thus far within the present billing period. Expressed as currency.	N

Code	Enumeration	Comments	Normative Status
152	billCarryover	Customer's bill, part of a previous obligation carried over from a previous billing period. Expressed as currency.	N
153	connectionFee	Monthly fee for connection to commodity.	I
154	audibleVolume	Sound	I
155	volumetricFlow		I
156	relativeHumidity	Most common usage is in expressing weather or meteorological conditions	N
157	skyCover	Degree of sky cover. Used in expressing weather or meteorological conditions.	N
158	voltage	Unspecified	I
159	dcVoltage		I
160	acVoltagePeak	$V_p = \sqrt{2} \times V_{rms}$	I
161	acVoltagePeakToPeak	$V_{pp} = 2 \times V_p$	I
N = Normative I = Informative D = Deprecated since last edition NOTE In this edition of IEC 61968-9 additional distinction has been made with respect to the voltage frame of reference. The original enumeration for "voltage" is now explicitly used to identify Volts_{RMS}. This is because the most common type of measurement passed between systems is a Volts_{RMS} value. However, it is not the only way to measure a voltage. New enumerations have been created to also identify Volts-peak, Volts-peak-to-peak, Volts DC, and unspecified voltage waveforms. A number of voltage measurements are defined in figure C.3. When combined with the accumulation attribute it is possible to show an "indicating Volts_{RMS}" which is measured over the course of many cycles, an "instantaneous Volts_{RMS}" which is measured over a single cycle, or an "instantaneous voltage" which is a single point sample on the waveform captured in an instant of time.			

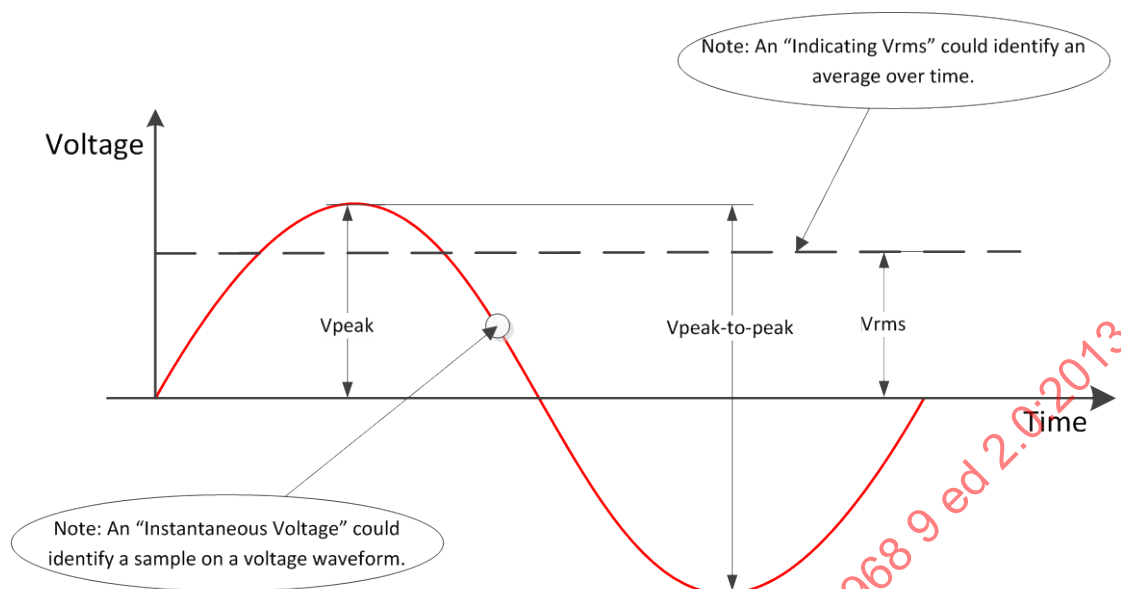


Figure C.3 – Voltage measurements

C.2.9 Attributes #8 interharmonicNumerator

See C.2.10.

C.2.10 Attribute #9 interharmonicDenominator

Interharmonics are represented as a rational number with a numerator and a denominator. Harmonics are represented using the same mechanism, and identified by having a denominator of "1."

This is represented formulaically as:

$$\text{Interharmonic} = \frac{\text{InterharmonicNumerator}}{\text{InterharmonicDenominator}}$$

and

$$\text{Harmonic} = \text{InterharmonicNumerator}$$

where the **InterharmonicDenominator** equals "1".

The harmonic or interharmonic enumeration is determined by a compound element:

$$\langle \text{interharmonic} \rangle ::= \langle \text{interharmonicNumerator} \rangle \langle \text{interharmonicDenominator} \rangle$$

The normative interharmonic numerator and denominators are defined in Table C.11. Additional values may be freely created using this approach and would be considered "informative" rather than "normative" values.

Table C.11 – Harmonic and Interharmonic enumerations

Interharmonic Numerator	Interharmonic Denominator	Enumeration	Comments	Normative Status
0	0	none	Not Applicable	N
1	2	interharmonic1/2	Interharmonic of ½	N
1	1	fundamental	fundamental	N
2	1	harmonic2	second harmonic	N
3	1	harmonic3	third harmonic	N
4	1	harmonic4	fourth harmonic	N
5	1	harmonic5	fifth harmonic	N
6	1	harmonic6	sixth harmonic	N
7	1	harmonic7	seventh harmonic	N
N = Normative I = Informative D = Deprecated since last edition				

C.2.11 Attributes #10 argumentNumerator

See C.2.12.

C.2.12 Attribute #11 argumentDenominator

The argument elements are used to introduce numbers into the unit of measure description where they are needed. The definition supports a rational number with a numerator and a denominator. Most arguments used in practice however will be integers. Integers will all have a “1” as their denominator.

$$\text{argument} = \frac{\text{numerator}}{\text{denominator}}$$

The argument enumeration is determined by a compound element:

<argument> ::= <numerator> <denominator>

The normative numerator and denominators are defined in Table C.12. Additional values may be freely created using this approach. For test purposes, values not shown in the table would be considered “informative” rather than “normative” values.

Table C.12 – Argument enumerations

Numerator	Denominator	Enumeration	Comments	Normative Status
0	0	none	Not Applicable	N
1	2	n½	One-half	I
0	1	n0	“Zero” (for systems that use zero based numbering schemes)	N
1	1	n1	“One,” where the measure needs an argument such as CEMI(n=1)	N
2	1	n2	“Two” where the measure needs an argument such as CEMI(n=2)	N

Numerator	Denominator	Enumeration	Comments	Normative Status
3	1	n3	"Three" where the measure needs an argument such as CEMI(n=3)	N
4	1	n4	"Four" where the measure needs an argument such as CEMI(n=4)	N
5	1	n5	"Five" where the measure needs an argument	N
6	1	n6	Six	N
7	1	n7	Seven	N
8	1	n8	Eight	N
9	1	n9	Nine	N
10	1	n10	Ten	N
15	1	n15	Fifteen	N
30	1	n30	Thirty	N
45	1	n45	Fourtyfive	N
60	1	n60	Sixty	N
120	1	n120	$2 \times 60 = 120$	N
155	1	n155	One hundred fifty five	N
240	1	n240	$4 \times 60 = 240$	N
305	1	n305	Three hundred and five.	N
360	1	n360	$6 \times 60 = 360$	N
480	1	n480	$8 \times 60 = 480$	N
720	1	n720	$12 \times 60 = 720$	N
720	60	n720/60	$12 \times 60/1 \times 60$	N
720	120	n720/120	$12 \times 60/2 \times 60$	N
720	180	n720/180	$12 \times 60/3 \times 60$	N
720	240	n720/240	$12 \times 60/4 \times 60$	N
720	360	n720/360	$12 \times 60/6 \times 60$	N
N = Normative I = Informative D = Deprecated since last edition				

C.2.13 Attribute #12, tou

The Time Of Use (TOU) element is used to describe any attribution of the value to a specific TOU bucket. The TOU enumerations are defined in Table C.13.

Table C.13 – Time Of Use Enumerations

Code	Enumeration	Comments	Normative Status
0	none	Not Applicable	N
1	touA	Usage in the first defined TOU bucket	N
2	touB	Usage in the second defined TOU bucket	N
3	touC	Usage in the third defined TOU bucket	N
4	touD	Usage in the fourth defined TOU bucket	N
5	touE	Usage in the fifth defined TOU bucket	N

Code	Enumeration	Comments	Normative Status
6	touF	Usage in the sixth defined TOU bucket	N
7	touG	Etc.	I
N = Normative I = Informative D = Deprecated since last edition			

C.2.14 Attribute #13, cpp

The Critical Peak Period (CPP) element is used to describe any attribution of the value to a specific CPP bucket. Even though CPP is usually considered a specialized form of TOU, it is separated from TOU enumerations to facilitate modelling. The CPP enumerations are defined in Table C.14.

Table C.14 – Critical Peak Period Enumerations

Code	Enumeration	Comments	Normative Status
0	none	Not Applicable	N
1	cppA	Consumption associated with critical peak period A	N
2	cppB	Consumption associated with critical peak period B	N
3	cppC	Consumption associated with critical peak period C	N
4	cppD	Consumption associated with critical peak period D	N
5	cppE	Consumption associated with critical peak period E	N
6	cppF	Consumption associated with critical peak period F	N
7	cppG	Etc.	I
N = Normative I = Informative D = Deprecated since last edition			

C.2.15 Attribute #14, consumptionTier

Consumption tier pricing refers to the method of billing in which a certain “block” of energy is purchased (or sold) at one price, after which the next block of energy is purchased at another price, and so on, all throughout a defined period. At the start of the defined period, consumption is initially zero, and any usage is measured against ConsumptionTier1. If this block of energy is consumed before the end of the period, energy consumption moves to be reconed against ConsumptionTier2. If this block of energy is consumed before the end of the period, energy consumption moves to ConsumptionTier3, and so on. At the end of the defined period the consumption accumulator is reset, and usage within ConsumptionTier1 restarts.

This is in contrast to the common “flat rate” for power, in which all purchases are at a given rate. When flat-rate pricing is used, a consumptionTier of “not applicable” should be specified.

Enumerations for Consumption Tiers are defined in Table C.15.

Table C.15 – Consumption Tier Enumerations

Code	Enumeration	Comments	Normative Status
0	none	Not applicable	N
1	consumptionTier1	Usage in the first defined consumption bucket	N
2	consumptionTier2	Usage in the second defined consumption bucket	N
3	consumptionTier3	Usage in the third defined consumption bucket	N
4	consumptionTier4	Usage in the fourth defined consumption bucket	N
5	consumptionTier5	Usage in the fifth defined consumption bucket	N
6	consumptionTier6	Usage in the sixth defined consumption bucket	N
7	consumptionTier7	Additional consumption tiers may be created as necessary.	I
N = Normative I = Informative D = Deprecated since last edition			

TOU or CPP pricing may be used in conjunction with consumption tier pricing. The examples provided in Table C.16 may be useful:

Table C.16 – Example Combinations of TOU and Consumption Tier Enumerations

Tou Code	Consumption Tier Code	Comments
1	0	TOU Period A with flat rate pricing
1	1	TOU Period A with Consumption Tier 1
1	2	TOU Period A with Consumption Tier 2
1	3	TOU Period A with Consumption Tier 3
2	1	TOU Period B with Consumption Tier 1
2	2	TOU Period B with Consumption Tier 2
2	3	TOU Period B with Consumption Tier 3
3	1	TOU Period C with Consumption Tier 1
3	2	TOU Period C with Consumption Tier 2
3	3	TOU Period C with Consumption Tier 3

C.2.16 Attribute #15, phases

The metering phase enumerations are described in Table C.17.

Table C.17 – Phase enumerations

Code	Enumeration	Position	Comments	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Normative Status
0	none		Not applicable to any phase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N
16	phaseN		Neutral	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	N
17	phaseNtoGnd		Neutral to ground	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	N
32	phaseC		Phase C	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	N
33	phaseCtoN		Phase C to Neutral	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	N
40	phaseCtoAv		Phase C current or voltage relative to Phase A voltage	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	N
41	phaseCAtoN		CA to Neutral	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	N
64	phaseB		Phase B	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	N
65	phaseBtoN		Phase B to Neutral	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	N
66	phaseBtoC		Phase B to C	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	N
72	phaseBtoAv		Phase B current or voltage relative to Phase A voltage	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	N
97	phaseBCtoN		BC to Neutral	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	N
128	phaseA		Phase A	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	N
129	phaseAtoN		Phase A to Neutral	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	N
132	phaseAtoB		Phase A to B	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	N
136	phaseAtoAv		Phase A current relative to Phase A voltage	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	N
193	phaseABtoN		AB to Neutral	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	N
224	phasesABC		Involving all phases	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	N

Code	Enumeration	Position	Comments	14 Networked	13 Open	12 High leg	11 Delta	10 Wye	9 S ₁	8 S ₂	7 A ₁	6 B ₁	5 C ₁	4 N ₁	3 A ₂	2 B ₂	1 C ₂	0 N ₂	Normative Status
225	phaseABCtoN		ABC to Neutral	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	N
256	s2		Phase S2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	N
257	s2N		Phase S2 to Neutral	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	N
512	s1		Phase S1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	N
513	s1N		Phase S1 to Neutral	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	N
768	s12		Phase S1 to S2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	N
769	s12N		Phase S1, S2 to Neutral	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	N
1248	threeWireWye		3W Wye	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	N
1249	fourWireWye		4W Wye	0	0	0	0	1	0	0	1	1	1	0	0	0	0	1	N
2272	threeWireDelta		3W Delta	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	N
2273	fourWireDelta		4W Delta	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	N
6369	fourWireHLDelta		4W High-leg Delta	0	0	1	1	0	0	0	1	1	1	0	0	0	0	1	N
10465	fourWireOpenDelta		4W Open Delta	0	1	0	1	0	0	0	1	1	1	0	0	0	0	1	N
17153	networked		Networked meter	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	N

NOTE 1 The code values were computed by:

$$\text{Code} = \text{Networked} \times 2^{14} + \text{Open} \times 2^{13} + \text{HighLeg} \times 2^{12} + \text{Delta} \times 2^{11} + \text{Wye} \times 2^{10} + \text{S}_1 \times 2^9 + \text{S}_2 \times 2^8 + \text{A}_1 \times 2^7 + \text{B}_1 \times 2^6 + \text{C}_1 \times 2^5 + \text{N}_1 \times 2^4 + \text{A}_2 \times 2^3 + \text{B}_2 \times 2^2 + \text{C}_2 \times 2^1 + \text{N}_2$$

NOTE 2 Directional vectors (such as V_{AB} vs. V_{BA}) are created in the phase code by invoking the involved phase (left to right in the matrix) in the order in which they are to be described in the enumeration (left to right as one reads).

When current is measured, it is often simple a single phase conductor indicated such as:

- A
- B
- C
- N

The Neutral-to-ground “phase” can be used to indicate current flowing from the neutral wire to ground. In this case select both N_1 and N_2 . When only neutral is selected choose N_1 . In all other cases when referencing neutral select N_2 . The main goal is readability. These rules should provide the necessary readability.

When voltage is measured, it may contain a simple description of the phase conductor, or if measured relative to something else, an indication of the measurement being “line-to-neutral” or “line-to-line” measured. Common voltage measurements include:

- A
- B
- C
- AN
- BN
- CN
- AB
- BC
- CA
- ABC

When phase angles are measured, it is usually relative to a fixed reference such as voltage phase A. The word “angle” has already been described in a previous field. This field may therefore contain an angle designation such as:

- $A_{\text{current}}A_{\text{volts}}$
- $B_{\text{current}}A_{\text{volts}}$
- $C_{\text{current}}A_{\text{volts}}$

Where the first phase listed is understood to describe the current or voltage phase being measured, and the second phase (the “A”) describes what it is being measured against (voltage phase A.) Since the fact that the measurement is an angle can be determined from the context (provided by the unit of

measure), and the point of reference is always the second phase, there is no need to provide additional indications within the phase lettering. This allows the same code (such as "Phase-CA") to often be used as a line-to-line voltage descriptor, a voltage phase-angle descriptor, as well as a current phase-angle descriptor.

Residential or other two-phase secondary voltages may be identified as "S1" or "S2". These labels may be used when the "ABC" names of the phase(s) that feed the service are unknown or unimportant.

The various polyphase network wirings may be identified as:

- Wye
- Delta
- High-leg delta
- Open delta
- Networked

The use of 3 wires or 4 wires may be determined by simply counting the number of phases (including neutral) involved in the service.

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C.2.17 Attribute #16, multiplier

The ReadingType encoding offers a field to describe a power-of-ten multiplier against the data value. This is not quite the same as the customary SI-prefix, though in many cases it creates the same result. The user will have to decide what the appropriate displayable symbol is based on the dimensions of the unit of measure. The multiplier enumerations are described in Table C.18 for units of measure that have a single dimension (e.g. “V” not “V²”). The index value represents the power of ten.

Table C.18 – Power of ten enumerations

Code	Displayable symbol for single-dimensioned UOM	Comments	Normative status
–24	y	yocto = $\times 10^{-24}$	N
–21	z	zepto = $\times 10^{-21}$	N
–18	a	atto = $\times 10^{-18}$	N
–15	f	femto = $\times 10^{-15}$	N
–12	p	pico = $\times 10^{-12}$	N
–9	n	nano = $\times 10^{-9}$	N
–6	μ	micro = $\times 10^{-6}$	N
–3	m	milli = $\times 10^{-3}$	N
–2	c	centi = $\times 10^{-2}$	N
–1	d	deci = $\times 10^{-1}$	N
0		Not applicable or “ $\times 1$ ”	N
1	da	deca = $\times 10^1$	N
2	h	hecto = $\times 10^2$	N
3	k	kilo = $\times 10^3$	N
6	M	Mega = $\times 10^6$	N
9	G	Giga = $\times 10^9$	N
12	T	Tera = $\times 10^{12}$	N
15	P	Peta = $\times 10^{15}$	N
18	E	Exa = $\times 10^{18}$	N
21	Z	Zetta = $\times 10^{21}$	N
24	Y	Yotta = $\times 10^{24}$	N
N = Normative I = Informative D = Deprecated since last edition			

It should be remembered that this power-of-ten multiplier does not work the same way as the SI prefix. The SI prefix is considered to be part of the unit of measure. A power-of-ten multiplier is not part of the unit of measure. When a SI-Prefix is used, it is understood that “ 10^{-3} ” is represented as “milli”, and a mm³ is the same as (mm)³ which is the same as (0,001 m)³ or 10^{-9} m³. This is not the same result as $0,001 \times \text{m}^3$ (which is what a power-of-ten multiplier yields.).

Rules for the use of SI prefixes may be found in IEC 60050-112:2010, 02-03.

When the unit of measure being described is a ratio which is rendered as a dimensionless quantity (such as a concentration), it is sometimes customary to display a symbol other than the standard metric prefix symbol. The modern convention however is to use the SI-prefix symbols in front of the dimensionless ratio being described. For example, a ppm concentration by volume (“ppmv”) should instead be described as “ $\mu\text{L/L}$ ”. A few historical dimensionless scalars are provided in Table C.19 for reference.

Table C.19 – Historical concentration multiplier enumerations

Code	Displayable Symbol	Comments	Normative Status
0	PU	per unit = $\times 1 = 10^0$	I
–2	%	percent = $\times 0,01 = \times 10^{-2}$	I
–3	‰	permille = $\times 0,001 = \times 10^{-3}$	I
–6	ppm	parts per million, $\times 0,000\,001 = \times 10^{-6}$	I
–9	ppb	parts per billion, $\times 0,000\,000\,001 = \times 10^{-9}$	I
N = Normative I = Informative D = Deprecated since last edition			

C.2.18 Attribute #17, unit

In IEC 61968-9:2009, a “ppm” unit of measure was supported. In this edition this support was moved from the UOM attribute to the Power-of-ten multiplier attribute, and a number of “concentration” units of measure were introduced.

Tables C.20 through C.27 describe the unit of measure enumerations. They are organized by their relationships to the SI units of measure. SI-units are the preferred unit of measure, but as an international standard, it is understood that other units of measure shall also be supported in some regions.

In these tables, the “code” column is a unique value. The “normative status” indicates if the “code” is normative or informative. The “quantity” column indicates the category of measure. The “unit name” supplies the official name for the unit, and possibly comments regarding its use or relationship to other units. The “symbol” column indicates in most cases the official displayable symbol for the unit. Where there were cases for conflict because different measurement systems have been combined, preference is given to the SI unit of measure. (This happened in the case of rad (rd) and rod (rd).) The “enumeration” column creates a unique string which could be used by CIM modelers to capture a string value for the unit. The enumeration was created based on the following rules:

- A lower camel-case transformation of the symbol column is attempted. All spaces are removed from the symbol to create the enumeration.
- The symbol set is restricted to alpha-numeric characters.
- The symbols “_”, “(”, and “)” are removed.
- The symbol “/” is replaced by the string “Per”.
- The symbol “°” is replaced by the string “Deg”.
- Other special symbols such as “α”, “μ”, and “ħ” are replaced with alternative alpha text strings.
- Digits are not allowed as the first character in the enumeration.
- Text that is superscripted or subscripted is used as normal text in the enumeration (if conflicts are avoidable).
- If two different symbols would result in the same enumeration (due to capitalization rules) then one of them is changed (with preference being given to the base SI units). Exceptions were created for the symbols “A”, “B”, “G”, “H”, “ħ”, “M”, “m_e”, “S”, and “T”.

Table C.20 – Base SI units of measure

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
2	Length	metre	m	m	N
3	Mass	gram	g	g	N
5	Current	ampere	A	a	N
6	Temperature	Kelvin	K	degK	I
7	Amount of substance	mole	mol	mol	I
8	Luminous intensity	candela	cd	cd	I
27	Time	second	s	s	N

N = Normative
I = Informative
D = Deprecated since last edition

NOTE The British spelling “metre” and American spelling “meter” are equivalent.

Table C.21 – Derived SI units of measure with special names

Code	Quantity	Unit name (and comments)	Displayable Symbol	Enumeration	Normative Status
10	Plane angle	Radian (m/m)	rad	rad	N
11	Solid angle	Steradian (m ² /m ²)	sr	sr	I
21	Absorbed dose	Gray (J/kg)	Gy	gy	I
22	Radioactivity	Becquerel (1/s)	Bq	bq	I
23	Temperature	degrees Celsius	°C	degC	N
24	Dose equivalent	Sievert (J/kg)	Sv	sv	I
25	Electric capacitance	Farad (C/V)	F	f	N
26	Electric charge	Coulomb (Amp second)	C	c	I

Code	Quantity	Unit name (and comments)	Displayable Symbol	Enumeration	Normative Status
28	Electric inductance	Henry (Wb/A)	H	h	N
29	Electric potential	Volt (W/A)	V	v	N
30	Electric resistance	Ohm (V/A)	Ω	ohm	N
31	Energy joule	(N·m = C·V = W·s)	J	j	N
32	Force newton	(kg m/s ²)	N	n	N
33	Frequency	Cycles per second or (1/s)	Hz	hz	N
34	Illuminance lux	(lm/m ²)	lx	lx	I
35	Luminous flux	lumen (cd sr)	lm	lm	I
36	Magnetic flux	Weber (V s)	Wb	wb	I
37	Magnetic flux density	Tesla (Wb/m ²)	T	t	I
38	Real power	Watt. By definition, one Watt equals oneJoule per second. Electrical power may have real and reactive components. The real portion of electrical power (I ² R) or Vcos ϕ , is expressed in Watts. (See also apparent power and reactive power.)	W	w	N
39	Pressure	Pascal (N/m ²) Note: the absolute or relative measurement of pressure is implied with this entry. See below for more explicit forms.	Pa	pa	N
53	Electric Conductance	Siemens (A / V = 1 / Ω)	S	siemens	N
155	Pressure	Pascal, absolute pressure	PaA	paA	N
140	Pressure	Pascal, gauge pressure	PaG	paG	N
158	Catalytic activity	katal = mol / s	kat	kat	I
N = Normative					
I = Informative					
D = Deprecated since last edition					
NOTE The British spelling “litre” and American spelling “liter” are equivalent.					

Table C.22 – Derived SI Units of Measure without Special Names

Code	Quantity	Unit name (and comments)	Displayable Symbol	Enumeration	Normative Status
4	Rotational speed	rotations per second NOTE Compare to cycles per second, Hz	rev/s	revPerS	I
41	Area	square metre	m ²	m2	N
42	Volume	cubic metre	m ³	m3	N
43	Velocity	metre per second (m/s)	m/s	mPerS	N
44	Acceleration	metre per second squared	m/s ²	mPerS2	I
45	Volumetric flow rate	cubic metres per second	m ³ /s	m3PerS	N
46	Fuel efficiency	metre / cubic metre	m/m ³	mPerM3	I
47	Moment of mass	kilogram metre (kg·m) (first moment of mass) NOTE 1 Users shall supply the "k" prefix to obtain "kg m".	g m	gM	I
48	Density	gram/cubic metre NOTE 2 Users shall supply the prefix multiplier "k" to form kg/m ³	g/m ³	gPerM3	I
49	Viscosity	metre squared / second	m ² /s	m2PerS	I
50	Thermal conductivity	Watt/metre Kelvin	W/(m K)	wPerMK	I
51	Heat capacity	Joule/Kelvin	J/K	jPerK	I
54	Angular velocity	radians per second	rad/s	radPerS	I
61	Apparent power	Volt Ampere (See also real power and reactive power.)	VA	vA	N
63	Reactive power	Volt Ampere reactive. The "reactive" or "imaginary" component of electrical power (VISinθ). (See also real power and apparent power). NOTE 3 Different meter designs use different methods to arrive at their results. Some meters may compute reactive power as an arithmetic value, while others compute the value vectorially. The data consumer should determine the method in use and the suitability of the measurement for the intended purpose.	VAR	vAr	N
66	Volt seconds	Volt seconds (Ws/A)	Vs	vS	N
67	Volts squared	Volt squared (W ² /A ²)	V ²	v2	N
68	Amp seconds	Amp seconds	As	aS	N
69	Amps squared	Amp squared	A ²	a2	N

Code	Quantity	Unit name (and comments)	Displayable Symbol	Enumeration	Normative Status
70	Amps squared time	square Amp second	A ² s	a2S	I
71	Apparent energy	Volt Ampere hours	VAh	vAH	N
72	Real energy	Watt hours	Wh	wH	N
73	Reactive energy	Volt Ampere reactive hours	VArh	vArH	N
74	Magnetic flux	Volt per Hertz	V/Hz	vPerHz	I
75	Rate of change of frequency	Hertz per second	Hz/s	hzPerS	I
78	Moment of mass	kg m ² (Second moment of mass, commonly called the moment of inertia) NOTE 4 Users shall supply the "k" prefix to obtain "kg m ² ".	gm ²	gM2	I
81	Ramp rate	Watt per second	W/s	wPerS	I
82	Volumetric flow rate	litre per second	L/s	lPerS	I
100	Quantity power	Q	Q	q	I
101	Quantity energy	Qh	Qh	qh	I
102	resistivity	Ohm metre, ρ (rho)	Ωm	ohmM	I
103	A/m	magnetic field strength, Ampere per metre	A/m	aPerM	I
104	volt-squared hour	Volt-squared-hours	V ² h	v2H	I
105	ampere-squared hour	Ampere-squared hour	A ² h	a2H	I
106	Ampere-hours	Ampere-hours	Ah	aH	I
107	Wh/m ³	energy per volume	Wh/m ³	wHPerM3	I
108	Timestamp	time and date per ISO 8601 format	timeStamp	timeStamp	N
115	Kh-W/h	active energy metering constant	Wh/rev	wHPerRev	N
116	Kh-VArh	reactive energy metering constant	VArh/rev	vArHPerRev	N
117	Kh-Vah	apparent energy metering constant	VAh/rev	vAHPerRev	N
125	Volumetric flow rate	cubic metre per hour	m ³ /h	m3PerH	N
126	Volumetric flow rate	compensated cubic metre per hour	m ³ _(compensated) /h	m3CompensatedPerH	N
127	Volumetric flow rate	uncompensated cubic metre per hour	m ³ _(uncompensated) /h	m3UncompensatedPerH	N
137	Volumetric flow rate	litre per hour	L/h	lPerH	N
139	Volumetric flow rate	litre (uncompensated) per hour	L _(uncompensated) /h	lUncompensatedPerH	N

Code	Quantity	Unit name (and comments)	Displayable Symbol	Enumeration	Normative Status
138	Volumetric flow rate	litre (compensated) per hour	$L_{(\text{compensated})}/h$	lCompensatedPerH	N
161	Quantity power	Q measured at 45°	Q ₄₅	q45	I
162	Quantity power	Q measured at 60°	Q ₆₀	q60	I
163	Quantity energy	Qh measured at 45°	Q ₄₅ h	q45H	I
164	Quantity energy	Qh measured at 60°	Q ₆₀ h	q60H	I
165	Specific energy	Joule / kg	J/kg	jPerKg	I
166	Volume	cubic metre, with the value uncompensated for weather effects.	m ³ (uncompensated)	m3Uncompensated	N
167	Volume	cubic metre, with the value compensated for weather effects.	m ³ (compensated)	m3Compensated	N
173	Wavenumber	reciprocal metre, $\sigma, \tilde{\nu}$ (1/m)	M ⁻¹	m1	I
174	Specific volume	cubic metre per kilogram, ν	m ³ /kg	m3PerKg	I
175	Dynamic viscosity	Pascal second	Pa s	paS	I
176	Moment of force	Newton metre	N m	nM	I
177	Surface tension	Newton per metre	N/m	nPerM	I
178	Angular acceleration	radian per second squared	rad/s ²	radPerS2	I
179	Heat flux density, irradiance	Watt per square metre	W/m ²	wPerM2	I
180	Specific heat capacity, specific entropy	Joule per kilogram kelvin	J/(kg K)	jPerKgK	I
181	energy density	Joule per cubic metre	J/m ³	jPerM3	I
182	electric field strength	Volt per metre	V/m	vPerM	I
183	electric charge density	Coulomb per cubic metre	C/m ³	cPerM3	I
184	surface charge density	Coulomb per square metre	C/m ²	cPerM2	I
185	permittivity	Farad per metre	F/m	fPerM	I
186	permeability	Henry per metre	H/m	hPerM	I
187	molar energy	Joule per mole	J/mol	jPerMol	I
188	molar entropy, molar heat capacity	Joule per mole kelvin	J/(mol K)	jPerMolK	I

Code	Quantity	Unit name (and comments)	Displayable Symbol	Enumeration	Normative Status
189	exposure (x rays)	Coulomb per kilogram	C/kg	cPerKg	I
190	absorbed dose rate	Gray per second	Gy/s	gyPerS	I
191	radiant intensity	Watt per steradian	W/sr	wPerSr	I
192	radiance	Watt per square metre steradian	W/(m ² sr)	wPerM2Sr	I
193	catalytic activity concentration	katal per cubic metre	kat/m ³	katPerM3	I
280	Volt-hour	Volt hours	Vh	vH	N
N = Normative					
I = Informative					
D = Deprecated since last edition					

Table C.23 – Non-SI Units of Measure accepted for use with the International System of Units

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
159	Time	minute = 60 s	min	min	I
160	Time	hour = 60 min = 3 600 s	h	hr	I
195	Time	day = 24 h = 86 400 s	d	d	I
9	Plane angle	degree	°	deg	N
196	Plane angle	minute	"	angleMin	I
197	Plane angle	second	"	angleSec	I
198	Area	hectare	ha	ha	I
134	Volume	litre = dm ³ = m ³ /1 000	L	l	N
199	mass	"tonne" or "metric ton" (1 000 kg = 1 Mg)	t	tonne	I

N = Normative

I = Informative

D = Deprecated since last edition

NOTE The British spelling "litre" and American spelling "liter" are equivalent.

Table C.24 – Dimensionless and Concentration Units of Measure

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
0	N/A	none (not applicable)		none	N
65	Power factor	dimensionless $\cos \theta = \frac{P}{ S }$ NOTE 1 This definition of power factor only holds for balanced systems. See the alternative definition under code 153. NOTE 2 Beware of differing sign conventions in use between the IEC and EEI. It is assumed that the data consumer understands the type of meter in use and the sign convention in use by the utility.	cosθ	cosTheta	N
79	Logarithmic ratio	Bel NOTE 3 Users shall combine this unit with the multiplier prefix "d" to form decibels (dB)	B	bel	I
109	State	status, where: "1" = "true", "live", "on", "high", "set"; "0" = "false", "dead", "off", "low", "cleared" NOTE 4 A Boolean value is preferred but other values may be supported	status	status	N
111	Amount of substance	Counter value	count	count	N
113	Logarithmic ratio of signal strength	Bel-mW, normalized to 1mW. Note: to form dBm combine "Bm" with multiplier "d".	Bm	bm	N
114	Application Value	Encoded value	code	code	N
118	EndDeviceEvent	Value to be interpreted as a EndDeviceEventCode	meCode	meCode	N
143	Concentration	The ratio of the volume of a solute divided by the volume of the solution. NOTE 5 Users may need use a prefix such as "μ" to express a quantity such as "μL/L"	L/L	IPerL	N
144	Concentration	The ratio of the mass of a solute divided by the mass of the solution. NOTE 6 Users may need use a prefix such as "μ" to express a quantity such as "μg/g"	g/g	gPerG	N
145	Concentration	The amount of substance concentration, (c), the amount of solvent in moles divided by the volume of solution in m ³ .	mol/m ³	molPerM3	I
146	Concentration	Molar fraction (X), the ratio of the molar amount of a solute divided by the molar amount of the solution.	mol/mol	molPerMol	I

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
147	Concentration	Molality, the amount of solute in moles and the amount of solvent in kilograms.	mol/kg	molPerKg	I
148	Length	Ratio of length	m/m	mPerM	I
149	Time	Ratio of time NOTE 7 Users may need to supply a prefix such as "μ" to show rates such as "μs/s"	s/s	sPerS	N
150	Frequency	Rate of frequency change NOTE 8 Users may need to supply a prefix such as "m" to show rates such as "mHz/Hz"	Hz/Hz	hzPerHz	N
151	Voltage	Ratio of voltages NOTE 9 Users may need to supply a prefix such as "m" to show rates such as "mV/V"	V/V	vPerV	N
152	Current	Ratio of Amperages NOTE 10 Users may need to supply a prefix such as "m" to show rates such as "mA/A"	A/A	aPerA	I
153	Power factor	PF, the ratio of the active power to the apparent power. NOTE 11 The sign convention used for power factor will differ between IEC meters and EEI (ANSI) meters. It is assumed that the data consumers understand the type of meter being used and agree on the sign convention in use at any given utility.	W/VA	wPerVA	I
154	Amount of rotation	Revolutions	rev	rev	I
168	Signal Strength	Ratio of power NOTE 12 Users may need to supply a prefix such as "m" to show rates such as "mW/W"	W/W	wPerW	I
170	Refractive Index	n	n	refractiveIndexN	I
171	Relative Permeability	μ_r	μ_r	relativePermeabilityMur	I
172	Logarithmic ratio	Neper	Np	np	I
281	Humidity	Relative humidity expressed as the ratio of partial pressure of water vapor in the air-water mixture to the saturated vapor pressure of water at the prescribed temperature.	ϕ	relativeHumidity	N
282	Sky Cover	Ratio of covered sky to total sky.	skyCover	skyCover	N

N = Normative

I = Informative

D = Deprecated since last edition

Table C.25 – Non-SI units whose values in SI units shall be obtained experimentally

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
200	energy	electronvolt (1 eV = $1,602\,176 \times 10^{-19}$ J)	eV	eV	I
201	mass	dalton (1 Da = $1,660\,538 \times 10^{-27}$ kg)	Da	da	I
202	mass	unified atomic mass unit (1 u = 1 Da)	u	u	I
203	length	astronomical unit (1 ua = $1,495\,978 \times 10^{11}$ m)	ua	ua	I
204	speed	natural unit of speed (speed of light in a vacuum) = $299\,792\,458$ m/s	c ₀	c0	I
205	action	natural unit of action (reduced planck constant) = $1,054\,571 \times 10^{-34}$ J s	ħ	nuH	I
206	mass	natural unit of mass (electron mass) = $9,109\,382 \times 10^{-31}$ kg	m _e	nuMe	I
207	time	natural unit of time	ħ/(m _e c ₀ ²)	nuHPerNuMeC02	I
208	charge	atomic units of charge (elementary charge) = $1,602\,176 \times 10^{-19}$ C	e	auE	I
209	mass	atomic units of mass (electron mass) = $9,109\,382 \times 10^{-31}$ kg	m _e	auMe	I
210	action	atomic unit of action (reduced planck constant) = $1,054\,571 \times 10^{-34}$ J s	ħ	auH	I
211	length	atomic unit of length, bohr (Bohr radius) = $0,529\,177 \times 10^{-10}$ m	a ₀	auA0	I
212	energy	atomic unit of energy, hartree = $4,359\,744$	E _h	auEh	I

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
213	time	atomic unit of time	$\hbar/E_h$	auHPerAuEh	I
N = Normative					
I = Informative					
D = Deprecated since last edition					

Table C.26 – Other Non-SI Units of Measure

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
76	Number of characters	characters	char	char	N
77	Data rate	characters per second	char/s	charPerSec	I
80	Monetary unit	Generic money NOTE Specific monetary units are identified the currency class	¤	money	I
119	Volume	cubic foot	ft ³	ft3	N
120	Volume	cubic foot compensated for weather	ft ³ (compensated)	ft3Compensated	N
121	Volume	cubic foot uncompensated for weather	ft ³ (uncompensated)	ft3Uncompensated	N
122	Volumetric flow rate	cubic foot per hour	ft ³ /h	ft3PerH	N
123	Volumetric flow rate	compensated cubic feet per hour	ft ³ (compensated)/h	ft3CompensatedPerH	N
124	Volumetric flow rate	uncompensated cubic feet per hour	ft ³ (uncompensated)/h	ft3UncompensatedPerH	N
128	Volume	US gallon (1 gal = 231 in ³ = 128 fl oz.)	US gal	uSGal	N
129	Volumetric flow rate	US gallon per hour	US gal/h	uSGalPerH	N
130	Volume	Imperial gallon	imp gal	impGal	N
131	Volumetric flow rate	Imperial gallon per hour	imp gal/h	impGalPerH	N
132	Energy	British Thermal Unit	BTU	btu	N
133	Power	BTU per hour	BTU/h	btuPerH	N
141	Pressure	Pound per square inch, absolute	psiA	psiA	I
142	Pressure	Pound per square inch, gauge	psiG	psiG	I
156	Volume	Litre, with the value uncompensated for weather effects	L _(uncompensated)	IUncompensated	N

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
157	Volume	Litre, with the value compensated for weather effects	$L_{(compensated)}$	ICompensated	N
169	Energy	Therm	therm	therm	N
214	Pressure	bar (1 bar = 100 kPa)	bar	bar	I
215	Pressure	millimeter of mercury (1 mmHg $\approx$ 133,3 Pa)	mmHg	mmHg	I
216	Length	ångström (1 Å = 10^{-10} m)	Å	angstrom	I
217	Length	nautical mile (1 M = 1852 m)	M	nmi	I
218	Area	barn (1 b = $100 \text{ fm}^2 = 10^{-28} \text{ m}^2$)	b	barn	I
219	Speed	knot (1 kn = 1852/3600) m/s	kn	kn	I
220	Activity	curie (1 Ci = $3,7 \times 10^{10}$ Bq)	Ci	ci	I
221	exposure	roentgen (1 R = $2,58 \times 10^{-4}$ C/kg)	R	r	I
222	absorbed dose	rad (1 rd = 1 cGy)	rd	doseRad	I
223	dose equivalent	rem (1 rem = 10^{-2} Sv)	rem	rem	I
224	length	inch	in	in	I
225	length	foot (1 ft = 12 in)	ft	ft	I
226	length	rod (1 rod = 16,5 ft)	rod	rod	I
227	length	furlong (1 fur = 660 ft)	fur	fur	I
228	length	mile (1 statute mile = 8 fur = 80 chains = 320 rods = 5280 feet)	mi	mi	I
229	area	square foot (1 ft ² = 144 in ²)	ft ²	ft2	I
230	area	square yard (1 yd ² = 9 ft ²)	yd ²	yd2	I
231	area	square rod (1 rod ² = 272,25 ft ²)	rod ²	rod2	I
232	area	acre (1 acre = 160 rd ² = 43 560 ft ²)	acre	acre	I
233	area	square mile (1 mi ² = 640 acres)	mi ²	mi2	I
234	area	section of land (1 mi ² = 1 section of land)	section of land	sectionOfLand	I
235	area	township (1 township = 36 sections)	township	township	I
237	Volume	cubic yard (1 yd ³ = 27 ft ³)	yd ³	yd3	I
238	length	link (1 li = 0,66 ft)	li	li	I
239	length	chain (1 ch = 100 links = 4 rods = 66 ft)	ch	ch	I
240	Volume	US liquid pint (1 pt = 28,875 in ³ = 128 fl dr)	US liq pt	uSLiqPt	I

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
241	Volume	US liquid quart (1 qt = 2 pt)	US liq qt	uSLiqQt	I
242	Volume	Apothecaries fluid dram	fl dr ap	flDrAp	I
243	Volume	Apothecaries fluid ounce (1 fl oz ap = 8 fl dr ap)	fl oz ap	flOzAp	I
244	Volume	US dry pint (1 pt = 67.2 in ³)	US dry pt	usDryPt	I
245	Volume	US dry quart (1 qt = 2 pints)	US dry qt	usDryQt	I
246	Volume	US peck (1 pk = 8 qt)	US pk	usPk	I
247	Volume	US bushel (1 bu = 4 pk)	US bu	usBu	I
248	Mass	grain (1 grain = 1/7000 avdp lb) NOTE The "grain" is the same in the avoirdupois, troy, and apothecaries units of mass.	gr	gr	I
249	Mass	Avoirdupois dram (1 Avdp dr = 27-11/32 gr) NOTE The abbreviation "dr" may be used if there is no chance of confusing the avoirdupois dram with the troy or apothecaries dram.	avdp dr	avdpDr	I
250	Mass	Avoirdupois ounce (1 Avdp oz = 16 Avdp dr) NOTE The abbreviation "oz" may be used if there is no chance of confusing the avoirdupois ounce with the troy or apothecaries ounce.	avdp oz	avdpOz	I
251	Mass	Avoirdupois pound (1 lb = 16 oz) NOTE Although the term "pound" is commonly used in many countries simply as "pound (lb)", the historical term "avoirdupois" is added to provide context and distinguish it in this setting from the troy and apothecaries systems of measure which use the same names. The abbreviation "lb" may be used instead of "avdp lb" if no confusion is possible with the pound named in these other systems.	avdp lb	avdpLb	I
252	Mass	Avoirdupois hundredweight (1 cwt = 100 lbs)	short cwt	shortCwt	I
253	Mass	Avoirdupois ton (1 short ton = 2000 lbs)	short ton	shortTon	I
254	Mass	Avoirdupois gross or long hundredweight (1 long cwt = 112 lbs)	long cwt	longCwt	I
255	Mass	Avoirdupois gross or long ton (1 long ton = 20 long cwt)	long ton	longTon	I
256	Mass	Troy pennyweight (1 dwt = 24 grains)	dwt	dwt	I

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
257	Mass	Troy ounce (1 oz t = 20 dwt)	oz t	ozT	I
258	Mass	Troy pound (1 lb t = 12 oz t)	lb t	lbT	I
259	Mass	Apothecaries scruple (1 s ap = 20 grains)	s ap	sAp	I
260	Mass	Apothecaries dram (1 dr ap = 3 s ap)	dr ap	drAp	I
261	Mass	Apothecaries ounce (1 oz ap = 8 dr ap)	oz ap	ozAp	I
262	Mass	Apothecaries pound (1 lb ap = 12 oz ap)	lb ap	lbAp	I
263	Fuel economy	mile per imperial gallon	mpg (Imp)	mpgImp	I
264	Fuel economy	mile per US gallon	mpg (US)	mpgUS	I
265	Fuel economy	mile per US gallon equivalent	MPGe (US)	mPGeUS	I
266	Fuel economy	litre per 100 km	l/(100 km)	lPer100km	I
267	Fuel economy	kilowatt-hour per mile (Note: users shall supply the "k" prefix to create "kWh/mi")	Wh/mi	wHPeMi	I
268	Fuel economy	kilowatt-hour per 100 mile (Note: users shall supply the "k" prefix to create "kWh/(100 mi)")	Wh/(100 mi)	wHPe100Mi	I
279	Temperature	degrees Fahrenheit	°F	degF	I
N = Normative					
I = Informative					
D = Deprecated since last edition					

Table C.27 – Non-SI Units Associated with the CGS and the CGS-Gaussian System of Units

Code	Quantity	Unit name (and comments)	Symbol	Enumeration	Normative Status
269	Energy	erg (1 erg = 10^{-7} J)	erg	erg	I
270	Force	dyne (1 dyn = 10^{-5} N)	dyn	dyn	I
271	Dynamic viscosity	poise (1 P = 0,1 Pa s)	P	p	I
272	Kinematic viscosity	stokes (1 St = 1 cm ² /s)	St	st	I
273	Luminance	stilb (1 sb = 10^4 cd/m ²)	sb	sb	I
274	Illuminance	phot (1 ph = 10^4 lx)	ph	ph	I
275	Acceleration	gal (1 Gal = 10^{-2} m s ⁻²) NOTE This "Gal" is an abbreviation for "Galileo" not "gallon"	Gal	gal	I
276	Magnetic flux	Maxwell (1 Mx = 10^{-8} Wb)	Mx	mx	I
277	Magnetic flux density	Gauss (1 G = 10^{-4} T)	G	gauss	I
278	Magnetic field	Oersted (1 Oe = $(10^3/4\pi)$ A/m)	Oe	oe	I
N = Normative					
I = Informative					
D = Deprecated since last edition					

C.2.19 Attribute #18, currency

Currency codes are defined in ISO 4217. A handful of codes have been repeated in Table C.28 for reference. Additional currency codes may be drawn freely from ISO 4217.

Table C.28 – Currency units of measure (from ISO 4217)

Code	Displayable Symbol	Unit name	Normative Status
0		None	N
36	AUD	Australian Dollar	I
124	CAD	Canadian Dollar	I
156	CNY	Chinese Yuan Renminbi	I
208	DKK	Danish Crown	I
356	INR	India Rupee	I
392	JPY	Japanese Yen	I
578	NOK	Norwegian Crown	I
643	RUB	Russian Ruble	I
710	ZAR	South African Rand	I
752	SEK	Swedish Krona	I
756	CHF	Swiss Franc	I
826	GBP	British Pound	I
840	USD	US Dollar	I
978	EUR	Euro	I
N = Normative I = Informative D = Depreciated since last edition			

C.3 Using data element attributes to define the ReadingType name – Construction formula with example ReadingType codes

The “ReadingType” may be automatically generated by judiciously populating each of the attributes and presenting them in order side-by-side. It is recommended that attributes be as explicit as possible to identify a data element, but on the other hand, not become so explicit that it overspecifies the data element.

A ReadingType Name may be generated by presenting the numeric form of each attribute in side-by-side fashion separated by dots.

```
<ReadingType.Name.name>::= <macroPeriod> “.” <aggregate> “.”<measuringPeriod>”.”
<accumulation> “.” <flowDirection> “.” <commodity> ”.” <measurementKind> “.”
<interharmonicNumerator> “.” <interharmonicDenominator> “.” <argumentNumerator> “.”
<argumentDenominator> “.” <tou> “.” <cpp> “.” <consumptionTier> “.” <phases> “.”
<multiplier> “.” <unit> “.” <currency>
```

These fields can be converted to a regionalized pronounceable name by using the regional text form for each non-zero attribute, and presenting them in order, side-by-side, separated by spaces and other symbols as appropriate. For most applications, this usually provides more information than needs to be said (verbally) about the data. It is accepted practice in common speech to suppress descriptive adjectives which are mutually understood by the context of the

communication. Table C.29 provides examples of such conversions into English. One will note that in the EBNF formula below, that symbols such as "(", and ")" are introduced to improve readability. Spaces around the unit of measure are also omitted to improve readability.

```
<Name.description>::= [<macroPeriod> " "] [<aggregate> " "] [<measuringPeriod> " "]
[<accumulation> " "] [<flowDirection> " "] [<commodity> " "] [<measurementKind> " "]
[<interharmonicNumerator> " "] [<interharmonicDenominator> " "] [<argumentNumerator> " "]
[<argumentDenominator> " "] [<tou> " "] [<cpp> " "] [<consumptionTier> " "] [<phases> " "] "("
[<multiplier>] [<unit>] [<currency>] ")"
```

While a good interface will eliminate ambiguity, and not publish “anonymous” data, a good interface will also not go to the other extreme and overspecify the data it publishes. The concept is similar to the practice of publishing an appropriate number of digits of resolution for a numerical value. One system may know (for example) the phase on which a voltage was measured and supply it as an attribute of the measurement. Another system might not know the phase with good authority and simply publish the voltage measured at a given meter. The ReadingTypeIDs used in a response may (therefore) differ slightly than the ReadingTypeIDs used in a request. The ReadingType codes used by a data publisher should be appropriate for the data supplied.

The examples listed below are by no means an exhaustive list of what can be constructed given the enumeration values listed above. After searching the examples (below), and searching the lists of enumerations (above), and a needed enumeration cannot be found, custom made enumerations may be made. Some of the fields (such a “numerator”) are naturally an integer field. If the needed enumeration is merely an integer, then the user should supply the integer required. However, if the field is a list-type enumeration, some care should be used. Rather than merely using the next available number on the list, custom user enumerations should be created numbered 9,000 or above.

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Table C.29 – Reading Type Examples

Reading Type ID Code	Description	Normative Status
8.0.0.0.1.152.0.0.0.0.0.0.0.0.0.840	billingPeriod electricitySecondaryMetered billCarryover (USD)	N
8.0.0.0.1.150.0.0.0.0.0.0.0.0.0.840	billingPeriod electricitySecondaryMetered billLastPeriod (USD)	N
8.8.0.3.1.1.8.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum cumulative forward electricitySecondaryMetered demand (kW)	N
8.8.53.6.1.1.8.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum fixedBlock15Min indicating forward electricitySecondaryMetered demand (kW)	N
8.8.0.6.1.1.8.0.0.0.0.0.0.0.3.63.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand (kVAr)	N
8.8.0.6.1.1.8.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand (kW)	N
8.8.0.6.1.1.8.0.0.0.0.1.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touA (kW)	N
8.8.0.6.1.1.8.0.0.0.0.2.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touB (kW)	N
8.8.0.6.1.1.8.0.0.0.0.3.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touC (kW)	N
8.8.0.6.1.1.8.0.0.0.0.4.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touD (kW)	N
8.8.0.6.19.1.8.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum indicating reverse electricitySecondaryMetered demand (kW)	N
8.8.71.6.1.1.8.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum rollingBlock15MinIntvl5MinSubIntvl indicating forward electricitySecondaryMetered demand (kW)	N
8.8.101.6.1.1.8.0.0.720.1.0.0.0.0.3.38.0	billingPeriod maximum specifiedFixedBlock indicating forward electricitySecondaryMetered demand n720 (kW)	N
8.8.102.6.1.1.8.0.0.720.240.0.0.0.3.38.0	billingPeriod maximum specifiedRollingBlock indicating forward electricitySecondaryMetered demand n720/240 (kW)	N
8.0.0.9.1.1.12.0.0.0.0.1.0.0.0.3.72.0	billingPeriod summation forward electricitySecondaryMetered energy touA (kWh)	N
8.0.0.9.1.1.12.0.0.0.0.2.0.0.0.3.72.0	billingPeriod summation forward electricitySecondaryMetered energy touB (kWh)	N
8.0.0.9.1.1.12.0.0.0.0.3.0.0.0.3.72.0	billingPeriod summation forward electricitySecondaryMetered energy touC (kWh)	N
0.0.0.1.0.1.122.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered demandReset (count)	N
0.0.0.1.0.1.11.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered energization (count)	N
0.0.0.1.0.1.131.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered loadInterrupt (count)	N
0.0.0.1.0.1.141.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered relayActivation (count)	N
0.0.0.1.0.1.142.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered relayCycle (count)	N
0.0.0.1.1.1.12.0.0.0.0.0.0.0.3.73.0	bulkQuantity forward electricitySecondaryMetered energy (kVArh)	N
0.0.0.1.1.1.12.0.0.0.0.0.0.0.3.72.0	bulkQuantity forward electricitySecondaryMetered energy (kWh)	N
0.0.0.1.1.7.58.0.0.0.0.0.0.0.2.120.0	bulkQuantity forward naturalGas volume (hft ³ (compensated))	N
0.0.0.1.1.7.58.0.0.0.0.0.0.0.2.121.0	bulkQuantity forward naturalGas volume (hft ³ (uncompensated))	N

ReadingType ID Code	Description	Normative Status
0.0.0.1.1.7.58.0.0.0.0.0.0.0.3.120.0	bulkQuantity forward naturalGas volume (kft ³ (compensated))	N
0.0.0.1.1.7.58.0.0.0.0.0.0.0.3.121.0	bulkQuantity forward naturalGas volume (kft ³ (uncompensated))	N
0.0.0.1.4.1.12.0.0.0.0.0.0.0.3.73.0	bulkQuantity net electricitySecondaryMetered energy (kVArh)	N
0.0.0.1.4.1.12.0.0.0.0.0.0.0.3.72.0	bulkQuantity net electricitySecondaryMetered energy (kWh)	N
0.0.0.1.19.1.12.0.0.0.0.0.0.0.3.73.0	bulkQuantity reverse electricitySecondaryMetered energy (kVArh)	N
0.0.0.1.19.1.12.0.0.0.0.0.0.0.3.72.0	bulkQuantity reverse electricitySecondaryMetered energy (kWh)	N
0.0.0.1.20.1.12.0.0.0.0.0.0.0.3.73.0	bulkQuantity total electricitySecondaryMetered energy (kVArh)	N
0.0.0.1.20.1.12.0.0.0.0.0.0.0.3.73.0	bulkQuantity total electricitySecondaryMetered energy (kWh)	N
0.0.0.0.3.97.0.0.0.1.0.0.0.0.0.114.0	communication deviceAddressType2 n0 (code)	N
0.0.0.0.3.123.0.0.0.0.0.0.0.0.114.0	communication diagnostic (code)	N
0.0.0.0.3.104.0.0.0.1.0.0.0.0.0.114.0	communication groupAddressType2 n0 (code)	N
0.0.0.0.3.133.0.0.0.0.0.0.0.0.114.0	communication maintenance (code)	N
0.0.0.0.3.114.0.0.0.1.0.0.0.0.0.114.0	communication oneWayAddress n0 (code)	N
0.0.0.0.3.114.0.0.0.1.1.0.0.0.0.0.114.0	communication oneWayAddress n1 (code)	N
11.0.0.1.4.1.12.0.0.0.0.0.0.0.3.72.0	daily bulkQuantity net electricitySecondaryMetered energy (kWh)	N
11.0.0.4.0.1.126.0.0.0.0.0.0.0.0.111.0	daily deltaData electricitySecondaryMetered ieec1366MomentaryInterruption (count)	N
11.0.0.4.0.1.127.0.0.0.0.0.0.0.0.111.0	daily deltaData electricitySecondaryMetered ieec1366MomentaryInterruptionEvent (count)	N
11.0.0.4.0.1.128.0.0.0.0.0.0.0.0.111.0	daily deltaData electricitySecondaryMetered ieec1366SustainedInterruption (count)	N
11.0.0.4.0.1.128.0.0.0.0.0.0.0.0.27.0	daily deltaData electricitySecondaryMetered ieec1366SustainedInterruption (s)	N
11.8.0.6.1.1.8.0.0.0.0.0.0.0.3.38.0	daily maximum indicating forward electricitySecondaryMetered demand (kW)	N
11.0.0.9.4.1.12.0.0.0.0.1.0.0.0.3.72.0	daily summation net electricitySecondaryMetered energy touA (kWh)	N
0.0.0.4.1.1.12.0.0.0.0.0.0.0.3.73.0	deltaData forward electricitySecondaryMetered energy (kVArh)	N
0.0.0.4.1.1.12.0.0.0.0.0.0.0.3.72.0	deltaData forward electricitySecondaryMetered energy (kWh)	N
0.0.0.4.4.1.12.0.0.0.0.0.0.0.3.73.0	deltaData net electricitySecondaryMetered energy (kVArh)	N
0.0.0.4.4.1.12.0.0.0.0.0.0.0.3.72.0	deltaData net electricitySecondaryMetered energy (kWh)	N
0.0.0.4.19.1.12.0.0.0.0.0.0.0.3.73.0	deltaData reverse electricitySecondaryMetered energy (kVArh)	N
0.0.0.4.19.1.12.0.0.0.0.0.0.0.3.72.0	deltaData reverse electricitySecondaryMetered energy (kWh)	N
0.0.0.4.20.1.12.0.0.0.0.0.0.0.3.73.0	deltaData total electricitySecondaryMetered energy (kVArh)	N

Reading Type ID Code	Description	Normative Status
0.0.0.4.20.1.12.0.0.0.0.0.0.0.3.72.0	deltaData total electricitySecondaryMetered energy (kWh)	N
0.0.0.0.0.1.5.0.0.0.0.0.0.0.0.1.11.0	electricitySecondaryMetered currentAngle (count)	N
0.0.0.0.0.1.6.0.0.0.0.0.0.0.0.1.11.0	electricitySecondaryMetered currentImbalance (count)	N
0.0.0.0.0.1.11.0.0.0.0.0.0.0.0.1.09.0	electricitySecondaryMetered energization (status)	N
0.0.0.0.0.1.13.0.0.0.0.0.0.0.0.1.09.0	electricitySecondaryMetered energizationLoadSide (status)	N
0.0.0.0.0.1.43.0.0.0.0.0.0.0.0.1.09.0	electricitySecondaryMetered switchPosition (status)	N
0.0.0.0.0.1.57.0.0.0.0.0.0.0.0.1.11.0	electricitySecondaryMetered voltageImbalance (count)	N
0.0.0.0.0.1.59.0.0.0.0.0.0.0.0.1.11.0	electricitySecondaryMetered zeroFlowDuration (count)	N
0.4.0.0.0.1.55.0.0.0.0.0.0.0.0.1.11.0	excess electricitySecondaryMetered voltageAngle (count)	N
0.0.2.4.1.1.12.0.0.0.0.0.0.0.0.3.72.0	fifteenMinute deltaData forward electricitySecondaryMetered energy (kWh)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.0.0.0.5.0	indicating electricitySecondaryMetered current (A)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.1.28.0.5.0	indicating electricitySecondaryMetered current phaseA (A)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.0.64.0.5.0	indicating electricitySecondaryMetered current phaseB (A)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.0.32.0.5.0	indicating electricitySecondaryMetered current phaseC (A)	N
0.0.0.6.0.1.5.0.0.0.0.0.0.0.136.0.9.0	indicating electricitySecondaryMetered currentAngle phaseAtoAv (deg)	N
0.0.0.6.0.1.5.0.0.0.0.0.0.0.72.0.9.0	indicating electricitySecondaryMetered currentAngle phaseBtoAv (deg)	N
0.0.0.6.0.1.5.0.0.0.0.0.0.0.40.0.9.0	indicating electricitySecondaryMetered currentAngle phaseCtoAv (deg)	N
0.0.0.6.0.1.15.0.0.0.0.0.0.0.0.0.33.0	indicating electricitySecondaryMetered frequency (Hz)	N
0.0.0.6.0.1.38.0.0.0.0.0.0.0.0.0.65.0	indicating electricitySecondaryMetered powerFactor (cosθ)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.0.0.29.0	indicating electricitySecondaryMetered voltage (V)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.128.0.29.0	indicating electricitySecondaryMetered voltage phaseA (V)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.64.0.29.0	indicating electricitySecondaryMetered voltage phaseB (V)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.32.0.29.0	indicating electricitySecondaryMetered voltage phaseC (V)	N
0.0.0.6.0.1.55.0.0.0.0.0.0.0.72.0.9.0	indicating electricitySecondaryMetered voltageAngle phaseBtoAv (deg)	N
0.0.0.6.0.1.55.0.0.0.0.0.0.0.40.0.9.0	indicating electricitySecondaryMetered voltageAngle phaseCtoAv (deg)	N
0.0.0.6.19.1.8.0.0.0.0.0.0.0.0.3.38.0	indicating reverse electricitySecondaryMetered demand (kW)	N
0.0.0.12.1.1.37.0.0.0.0.0.0.0.0.3.63.0	instantaneous forward electricitySecondaryMetered power (kVA _r)	N
0.0.0.12.1.1.37.0.0.0.0.0.0.0.0.3.38.0	instantaneous forward electricitySecondaryMetered power (kW)	N
0.0.0.12.20.1.37.0.0.0.0.0.0.0.0.3.38.0	instantaneous total electricitySecondaryMetered power (kW)	N

Reading Type ID Code	Description	Normative Status
0.0.0.13.0.1.140.0.0.0.0.0.0.0.108.0	latchingQuantity electricitySecondaryMetered pushbutton (timeStamp)	N
0.8.0.6.1.1.8.0.0.0.0.0.0.0.3.38.0	maximum indicating forward electricitySecondaryMetered demand (kW)	N
0.9.0.6.0.1.38.0.0.0.0.0.0.0.0.65.0	minimum indicating electricitySecondaryMetered powerFactor (cosθ)	N
0.0.0.0.19.1.4.0.0.0.0.0.0.0.0.111.0	reverse electricitySecondaryMetered current (count)	N
22.0.0.1.1.12.0.0.0.0.0.0.0.3.73.0	seasonal bulkQuantity forward electricitySecondaryMetered energy (kVArh)	N
22.8.0.6.1.1.8.0.0.0.1.0.0.0.3.38.0	seasonal maximum indicating forward electricitySecondaryMetered demand touA (kW)	N
22.8.0.6.1.1.8.0.0.0.2.0.0.0.3.38.0	seasonal maximum indicating forward electricitySecondaryMetered demand touB (kW)	N
22.8.0.6.1.1.8.0.0.0.3.0.0.0.3.38.0	seasonal maximum indicating forward electricitySecondaryMetered demand touC (kW)	N
22.0.0.9.1.1.12.0.0.0.1.0.0.0.3.72.0	seasonal summation forward electricitySecondaryMetered energy touA (kWh)	N
22.0.0.9.1.1.12.0.0.0.2.0.0.0.3.72.0	seasonal summation forward electricitySecondaryMetered energy touB (kWh)	N
22.0.0.9.1.1.12.0.0.0.3.0.0.0.3.72.0	seasonal summation forward electricitySecondaryMetered energy touC (kWh)	N
0.0.7.4.1.1.12.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData forward electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.1.1.12.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData forward electricitySecondaryMetered energy (kWh)	N
0.0.7.4.1.12.0.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData net electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.4.1.12.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData net electricitySecondaryMetered energy (kWh)	N
0.0.7.4.19.1.12.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData reverse electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.19.1.12.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData reverse electricitySecondaryMetered energy (kWh)	N
0.0.7.4.20.1.12.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData total electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.20.1.12.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData total electricitySecondaryMetered energy (kWh)	N
0.0.100.4.1.1.12.0.0.30.1.0.0.0.0.3.72.0	specifiedInterval deltaData forward electricitySecondaryMetered energy n30 (kWh)	N
32.0.0.4.0.1.12.0.0.0.0.0.0.0.3.72.0	specifiedPeriod deltaData electricitySecondaryMetered energy (kWh)	N
32.0.0.0.0.1.151.0.0.0.0.0.0.0.0.0.840	specifiedPeriod electricitySecondaryMetered billToDate (USD)	N
0.0.0.9.20.1.12.0.0.0.1.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touA (kWh)	N
0.0.0.9.20.1.12.0.0.0.2.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touB (kWh)	N
0.0.0.9.20.1.12.0.0.0.3.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touC (kWh)	N
0.0.0.9.20.1.12.0.0.0.4.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touD (kWh)	N

N = Normative

I = Informative

D = Deprecated since last edition

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Annex D (normative)

Quality code enumerations

D.1 General

Quality codes may be returned with a Reading.value to indicate that there is something remarkable about the data. This Annex D describes a North American profile of enumerations for quality codes to be used in this context.

The presence of a quality code is optional. A missing element implies that no assertion regarding the goodness of the data is being offered by the data producer. Some systems (such as a MS) may have a policy of "no news is good news" and only add quality codes when problems are found. This keeps the volume of data to a minimum. Other systems (such as a MDM) will add value to the data by validating it. At this point quality codes may be added to the data to explicitly declare that the data is "valid" or has passed formal "validation" tests.

The quality code values defined by this Annex D are conveyed within a message using the ReadingQuality.quality element.

D.2 Identification of the system offering commentary on the data

Concievably, any piece of equipment which touches the data could introduce error, or offer remarks regarding the veracity of the data. For example, a meter might record interval data, and offer this data to the data collection system, but in doing so also indicate that something remarkable (such as a power outage or clock adjustment) occurred during some of the intervals. A meter data collection system might obtain readings from the field, but perform a sanity check on the values to find that some of them are unreasonable. A meter data management system, armed with a knowledge of the account history and usage patterns might scrutinize the data to find that certain values are suspect or possibly suggest that tampering may have occurred. All of these systems need an opportunity to comment on the data without (necessarily) changing it. When a system does change the data, this too can be noted in the quality codes.

D.3 Construction

The North American profile defines the ReadingQuality.quality code to be built from a three part field:

ReadingQuality.quality ::= <System Identifier> "." <Categorization> "." <Index>

This creates a name with 3 fields. The mappings to CIM ReadingQualityType are defined by IEC 61968-11 as follows:

System Identifier = ReadingQualityType.systemId

Categorization = ReadingQualityType.category

Index = ReadingQualityType.subCategory

D.4 Quality code system identifier

The first of the three fields provides an identification of the system which has declared the issue with the data. This is described in Table D.1. Other systems, outside of an IEC 61968-9 subsystem, may also identify problems with data.

Table D.1 – System identifier

System Identifier Code	Description	Normative Status
0	Not Applicable	N
1	End Device	N
2	Metering system (data collection) network	N
3	Meter Data Management System	N
4	Other system (not listed)	N
5	Externally specified (see accompany data)	I
I = Informative N = Normative D = Deprecated		

D.5 Quality code categorization

The second of the three fields in the quality code identifies a category for the issue. These are described individually in Table D.2.

Table D.2 – Example quality code categories

Category	Description	Comment	Normative Status
0	Valid	Data valid	N
1	Diagnostics related	The equipment producing or handling the data has identified a diagnostics related issue which may have some effect on this value.	N
2	Power quality related issues at the data collection point	The equipment producing the data has identified power quality related issues which may have some effect on the veracity of the data.	N
3	Tamper / Revenue Protection related	A system identifies that the data is questionable due to tamper or revenue-protection related reasons.	N
4	Data collection related	A significant event or condition has occurred (which is not tamper related, power quality related, or diagnostics related) which may effect the veracity of the data.	N
5	Failed reasonability testing	Data at first blush appears to be invalid.	N
6	Failed validation testing	Data fails one or more validation rules.	N
7	Edited	Replaced or approved by a human.	N
8	Estimated	Replaced by a machine computed value based on analysis of historical data using the same type of measurement.	N

Category	Description	Comment	Normative Status
9	Oscillatory	This category appears to be covered by other categories in this standard.	D
10	Questionable	The veracity of the data is suspect for a reason other than those described by categories 1 to 6.	N
11	Derived	Value has been calculated (using logic or mathematical operations) based upon one or more readings from the meter or device to which the value is attributed and/or readings from meter(s) or device(s) other than the meter or device to which the value is attributed.	N
12	Projected	Forecasted value.	N
I = Informative N = Normative D = Deprecated			

D.6 Quality code index

Each category provides the context with which to understand a particular index.

Table D.3 elaborates on the “category 0” defined in Table D.2.

Table D.3 – Validity related codes

Category	Index	Description	Definition	Normative Status
0	0	Data Valid	No data quality problems have been detected; however, the data has not been processed by a formal Validation, Editing, and Estimation (VEE) process.	N
0	1	Validated	Reading has successfully passed the validation portion of a formal Validation, Editing and Estimation (VEE) process and has not been subsequently edited or estimated.	N
I = Informative N = Normative D = Deprecated				

Table D.4 elaborates on the “category 1” defined in Table D.2..

Table D.4 – Diagnostics related codes

Category	Index	Description	Comments	Normative Status
1	0	DiagnosticsFlag	One or more diagnostics have been generated from the originating equipment.	N
1	1	BatteryLow		N
1	3	SensorFailure		N
1	4	WatchdogFlag	A timeout of the watchdog timer or another failure of the watchdog function has occurred in the originating equipment.	N
1	5	ParityError	A parity error has been generated from the originating equipment.	N
1	6	CRCErrror	A cyclic redundancy check error has been generated from the originating equipment.	N
1	7	RAMChecksumError	A checksum error has been detected in the random access memory of the equipment.	N
1	8	ROMChecksumError	A checksum error has been detected in the read only memory of the equipment.	N
1	9	ClockError	A failure or abnormality has been detected with the clock in the equipment.	N
I = Informative N = Normative D = Deprecated NOTE Diagnostic related codes may produce corresponding EndDeviceEvents to be generated.				

Table D.5 elaborates on the “category 2” defined in Table D.2.

Table D.5 – Power quality related codes

Category	Index	Description	Comments	Normative Status
2	0	PowerQualityFlag	Look for related MeterEvent(s)	N
2	1	ExcessiveOutageCount	Power outage threshold count exceeded	N
2	2	PqCounter	Power quality threshold count exceeded	N
2	3	ServiceDisconnectSwitching	Service Disconnect operation during data collection interval	N

Category	Index	Description	Comments	Normative Status
2	32	PowerFail	Power fail occurred during or at the start of this interval. ANSI C12.19. If power is out for the entire interval, the data value presented should be zero.	N
I = Informative N = Normative D = Deprecated				

Table D.6 elaborates on the “category 3” defined in Table D.2.

Table D.6 – Tamper / revenue protection related codes

Category	Index	Description	Comments	Normative Status
3	0	RevenueProtection	Generic	N
3	1	CoverOpened	The meter reports that a sealed cover has been opened.	N
3	2	LogicalDisconnect	Value originates from a meter which (in theory) should have no flow or very minimal flow.	N
3	3	RevenueProtectionSuspect		N
3	4	ReverseRotation	Reverse flow of the measured commodity has been detected. This may indicate tampering at sites which have not been identified as being capable of customer-side generation.	N
3	5	StaticDataFlag	The meter shows very little (if any) historical usage.	N
I = Informative N = Normative D = Deprecated				

Table D.7 elaborates on the “category 4” defined in Table D.2.

Table D.7 – Data collection related codes

Category	Index	Description	Comments	Normative Status
4	0	AlarmFlag	Generic alarm	N
4	1	OverflowConditionDetected	A numeric overflow condition for a reading value or pulse counter was detected.	N
4	2	PartialInterval	Partial (short) interval due to clock change, power outage, or some similar event.	N

Category	Index	Description	Comments	Normative Status
4	3	LongInterval	Long interval recorded due to a clock change or some similar event.	N
4	4	SkippedInterval	Skipped interval by the meter due to a clock change or similar event.	N
4	5	TestData	Data value was obtained while the equipment was in test mode.	N
4	6	ConfigurationChanged	A configuration change has occurred that may affect the reading value or its interpretation.	N
4	7	NotRecording	Load profile recording stopped	N
4	8	ResetOccurred	A reset has occurred that may affect the reading value or its interpretation.	N
4	9	ClockChanged	A change in the clock time has occurred.	N
4	10	LoadControlOccurred	Data value was obtained at a time when load control was in effect.	N
4	16	DstInEffect	Daylight saving time in effect during or at start of this interval	N
4	64	ClockSetForward	Clock set forward during or at the start of this interval. The interval may be short.	N
4	128	ClockSetBackward	Clock set backward during or at the start of this interval. The interval may be long.	N
4	129	FailedProbeAttempt	A failure occurred that prevented the reading from being obtained through a manual probe.	N
4	130	CustomerRead	The reading value was provided by a customer.	N
4	131	ManualRead	The reading value was obtained by a utility employee performing a manual read.	N
4	259	DstChangeOccurred	Data has been adversely affected by a change in Daylight Saving Time. Timestamps and/or data values may be incorrect. NOTE Compared to the ANSI C12.19 approach in which the DST flag is set for the entire Summer, this flag is only set for the affected data when the DST change occurs in the Spring and Fall.	N
I = Informative N = Normative D = Deprecated				

Table D.8 elaborates on the “category 5” defined in Table D.2.

Table D.8 – Failed reasonability testing related codes

Category	Index	Description	Comments	Normative Status
5	256	DataOutsideExpectedRange	Presented data was identified as "invalid" by the originating system.	N
5	257	ErrorCode	Data was identified as "invalid" by the originating system and replaced with a special coded value to indicate an error.	N
5	258	Suspect	Data should be scrutinized and considered suspect	N
5	259	KnownMissingRead	NOTE 1 The "value" element should be empty when the quality code indicates that it is (obviously) missing. NOTE 2 If a reason is known, this can be supplied in the MeterReadings.Reason element.	N
I = Informative N = Normative D = Deprecated				

Table D.9 elaborates on the "category 6" defined in Table D.2.

Table D.9 – Failed validation testing related codes

Category	Index	Enumeration	Comments	Normative Status
6	0	Failed validation – Generic	The reading failed one or more unspecified validation checks. This is a generic code that can be used if a more specific code is not available in this table.	N
6	1	Failed validation – ZeroUsageOn ActiveMeter	The reading failed validation due to zero usage on an active meter.	N
6	2	Failed validation – UsageOn InactiveMeter	The reading failed validation due to non-zero usage on an inactive meter.	N
6	3	Failed validation – UsageAbove Maximum	The reading failed validation because it represents usage greater than an allowed absolute maximum.	N
6	4	Failed validation – UsageBelow Minimum	The reading failed validation because it represents usage less than a required absolute minimum.	N
6	5	Failed validation – UsageAbove MaximumPct	The reading failed validation because it represents usage greater than an allowed maximum percentage.	N
6	6	Failed validation – UsageBelow MinimumPct	The reading failed validation because it represents usage less than a required minimum	N

Category	Index	Enumeration	Comments	Normative Status
			percentage.	
6	9	Failed Validation – TOU SumCheck Failure	The reading failed validation because the sum of interval values failed a comparison with the corresponding difference in register readings.	N
6	y	Failed Validation Rule Y	The reading failed one or more defined validation checks. “y” is to be replaced by a positive integer indicating which validation rule was failed. It is recommended that values for y begin at 1001 to allow for the build-out over time of the list of normative enumerations in the IEC standard up to 1000. There is no limit to how large a number can be used for “y”; however, the parties exchanging this code shall have a common understanding of what each validation rule #y means.	I
I = Informative N = Normative D = Deprecated				

Individual deployments will subscribe to particular sets of formal validation rules. While there is no one worldwide standard regarding validation rules, this standard provides a placeholder where the first rule for a given deployment can be defined as “rule #1,” the second rule “rule #2,” and so on as necessary until all of the rules are numbered. Each system then, operating at a given utility under a given set of rules, will all be subject to the same set of rules which have been formally listed and numbered.

Table D.10 describes the “category 7” defined in Table D.2.

Table D.10 – Edit related codes

Category	Index	Description	Comments	Normative Status
7	0	Manually Edited – Generic	The reading value was edited by a person using an unspecified manual estimation method. This is a generic code that can be used if a more specific code is not available in this table.	N
7	1	Manually Added	A reading value was added by a person.	N
7	3	Manually Rejected	A value was proposed by the system or failed some level of quality checking. The value was reviewed and rejected by a human user	N
7	Y	Manually Edited – Method Y	The reading value was edited by a person using a defined manual estimation method.	I

Category	Index	Description	Comments	Normative Status
			“y” is to be replaced by a positive integer indicating which manual estimation method was used. It is recommended that values for y begin at 1001 to allow for the build-out over time of the list of normative enumerations in the IEC standard up to 1 000. There is no limit to how large a number can be used for “y”; however; the parties exchanging this code shall have a common understanding of what each manual editing method #y means.	
I = Informative N = Normative D = Deprecated				

The concept of “edited” means that a human was involved in creating the value. It may be hand-keyed into the system. It may be suggested by the system using one of many approaches, but ultimately approved by a human. Values that are computer generated and never approved by a human belong to the “estimated” category. Values that are originally from a meter, identified as suspect, yet nonetheless accepted for use by a human fall into the “questionable” category.

Different systems may find different ways to assist the user in creating a new value. The numbering scheme allows the various ways to be listed and formally identified for a given deployment.

Table D.11 describes describes the “category 8” defined in Table D.2.

Table D.11 – Estimation related codes

Category	Index	Enumeration	Comments	Normative Status
8	0	Estimated – Generic	The reading value was machine-estimated by a computing algorithm using an unspecified estimation method. This is a generic code that can be used if a more specific code is not available in this table.	N
8	Y	Machine Estimated – Method Y	The reading value was machine-estimated by a computing algorithm using a defined estimation method. “y” is to be replaced by a positive integer indicating which estimation method was used. It is recommended that values for y begin at 1001 to allow for the build-out over time of the list of normative	I

Category	Index	Enumeration	Comments	Normative Status
			enumerations in the IEC standard up to 1000. There is no limit to how large a number can be used for “y”; however; the parties exchanging this code shall have a common understanding of what each estimation method #y means.	
I = Informative N = Normative D = Deprecated				

There are a number of ways in which estimates may be generated. For example, an estimate might be based on a combination of historical usage, trend analysis, and weather patterns. Another approach would be to create a value for one meter by leveraging a measurement of equivalent information from a different different meter. (For example there may be multiple feeder voltage measurement sources available. When the preferred source fails, a different source could be used with an equivalent outcome.) Some of the techniques used may be proprietary. Other estimation techniques may be a matter of public record and may be legally required by certain regulators in certain locations. The numbering scheme “approach #1,” “approach #2,” etc. provides a placeholder in which the approaches used may be formally listed at a given deployment and identified as a specific technique.

Table D.12 describes the “category 10” defined in Table D.2.

Table D.12 – Questionable related codes

Category	Index	Description	Comments	Normative Status
10	0	Indeterminate	Quality is unknown or cannot be determined. NOTE 1 This is similar to the case in which no quality codes are supplied at all, but in this case other codes may be present which cast doubt on the veracity of the data, or a situation may have arisen which prevents any kind of analysis from being performed on the data or the equipment which supplied the data. NOTE 2 When used in response to a request for Power (Energization) Status or Switch Position, an “Indeterminate” quality means that the energization state or switch position is unknown or cannot be determined. When used in response to a request for other reading types, “Indeterminate” means that the quality of the value supplied is explicitly unknown.	N
10	1	Manually accepted	Indicates that a value failed some level of quality checking, but the failure was overridden by a human user.	N
I = Informative				

Category	Index	Description	Comments	Normative Status
N = Normative				
D = Deprecated				

Table D.13 describes the “category 11” defined in Table D.2..

Table D.13 – Derived related codes

Category	Index	Enumeration	Comments	Normative Status
11	0	Derived - Deterministic	“Derived” indicates that the value has been calculated (using logic or mathematical operations) based upon one or more readings from the meter or device to which the value is attributed and/or readings from meter(s) or device(s) other than the meter or device to which the value is attributed. “Deterministic” (as differentiated from “Inferred” – see next entry) is used when a significant degree of uncertainty in the resulting value does not exist. For example, a quality of “x.11.0” or “Derived - Deterministic” can be used when a value for a virtual meter is computed as the sum of the values from two or more other meters.	N
11	1	Derived - Inferred	“Derived” indicates that the value has been calculated (using logic or mathematical operations) based upon one or more readings from the meter or device to which the value is attributed and/or readings from meter(s) or device(s) other than the meter or device to which the value is attributed. “Inferred” (as differentiated from “Deterministic” – see previous entry) is used when a significant degree of uncertainty in the resulting value may exist. When used in response to Power (Energization) Status Checks, “x.11.1” or “Derived – Inferred” is synonymous with “Inferred”. For example, a UsagePoint may be determined to have a value of “De-energized” and a Reading Quality of “Derived-Inferred” if it is being inferred as de-energized because one or more other UsagePoints on the same distribution transformer are confirmed to be “De-Energized”. In this case, there is a more than a negligible probability that the	N

Category	Index	Enumeration	Comments	Normative Status
			inference is incorrect.	
I = Informative N = Normative D = Deprecated				

Table D.14 describes the “category 12” defined in Table D.2.

Table D.14 – Projected related codes

Category	Index	Enumeration	Comments	Normative Status
12	0	Projected – Generic	The reading value was projected (forecast) by a computing algorithm using an unspecified projection (forecast) method. This is a generic code that can be used if a more specific code is not available in this table.	N
12	Y	Projected – Method Y	The reading value was projected (forecast) by a computing algorithm using a defined projection (forecast) method. “y” is to be replaced by a positive integer indicating which projection (forecast) method was used. It is recommended that values for y begin at 1001 to allow for the build-out over time of the list of normative enumerations in the IEC standard up to 1000. There is no limit to how large a number can be used for “y”; however; the parties exchanging this code shall have a common understanding of what each projection method #y means.	I
I = Informative N = Normative D = Deprecated				

Much like in the way “estimated” creates a computer generated value based on a historical view of the data for an event that has occurred in the past, “projected” creates a computer generated value which is forecast into the future. The numbering scheme “approach #1,” “approach #2,” etc. provides a placeholder in which the approaches used may be formally listed at a given deployment and identified as a specific technique.

D.7 Example quality codes

Some of the codes described in Table D.15 have been found to be in use in systems since the publication of IEC 61968-9:2009.

Table D.15 – Example Quality Codes

Quality Code	Origin (From Table D.1)		Category (From Table D.2)		Index (From Tables D.3 to D.15)		Normative Status
Not provided	Not provided		Not provided		AssumedValid	none	N
1.0.0	End Device	1	0	Validity	DataValid	0	N
1.1.4	End Device	1	1	Diag	WatchdogFlag	4	N
1.4.1	End Device	1	4	Data Collection	OverflowConditionDetected	1	N
1.4.16	End Device	1	4	Data Collection	DstInEffect	16	N
1.4.2	End Device	1	4	Data Collection	Partial (short) Interval	2	N
1.4.3	End Device	1	4	Data Collection	LongInterval	3	N
1.4.4	End Device	1	4	Data Collection	SkippedInterval	4	N
1.4.5	End Device	1	4	Data Collection	TestData	5	N
1.5.257	End Device	1	5	Reasonability	ErrorCode	257	N
2.0.0	Ms Network	2	0	Validity	DataValid	0	N
2.3.4	Ms Network	2	3	Tamper	ReverseRotation	4	N
2.3.5	Ms Network	2	3	Tamper	StaticDataFlag	5	N
2.4.259	Ms Network	2	4	Data Collection	DstChangeOccurred	259	N
2.5.256	Ms Network	2	5	Reasonability	DataOutsideExpectedRange	256	N
2.5.257	Ms Network	2	5	Reasonability	ErrorCode	257	N
3.0.0	MDM	3	0	Validity	DataValid	0	N
3.10.0	MDM	3	10	Questionable	Indeterminate	0	N
3.10.1	MDM	3	7	Edited	Manually accepted	1	N
3.11.0	MDM	3	11	Derived	Derived – generic	0	N
3.11.1	MDM	3	11	Derived	Derived – inferred	1	N
3.3.3	MDM	3	3	Tamper	RevenueProtectionSuspect	3	N
3.3.5	MDM	3	3	Tamper	StaticDataFlag	5	N
3.5.259	MDM	3	5	Reasonability	Known missing read	259	N
3.6.0	MDM	3	6	Validation	Failed validation – Generic	0	N
3.7.0	MDM	3	7	Edited	Manually edited – Generic	0	N
3.8.0	MDM	3	8	Estimated	Estimated – Generic	0	N

Annex E (normative)

EndDeviceEventType enumerations

E.1 General

Metering systems not only collect readings from meters, but also report events. This annex describes recommended codes to be used for properly identifying IEC 61968 events.

Codes for EndDeviceEventTypes are categorized in a manner that divides the enumerated code into 4 parts:

EndDeviceEventType:= <EndDeviceType>.<EndDeviceDomain>.<EndDeviceSubdomain>.<EndDeviceEventOrAction>	
where	
<EndDeviceType>	= a numeric value from the EndDeviceType enumeration (see EndDeviceType section)
<EndDeviceDomain>	= a numeric value from the EndDeviceDomain enumeration (see EndDeviceDomain section)
<EndDeviceSubdomain>	= a numeric value from the EndDeviceSubdomain enumeration (see EndDeviceSubdomain section)
<EndDeviceEventOrAction>	= a numeric value from the EndDeviceEventOrAction enumeration (see EndDeviceEventOrAction section)

E.2 Alarm conditions

E.2.1 General

While the EndDeviceEventType defines the event that has occurred, there is also a need to specify the severity of an event (Alarm, Advisory, Normal, etc.). These values should be set in the EndDeviceEvent.severity field. This allows each system implementing CIM events to classify the severity of its events specific to its intentions, rather than being forced to classify it according to something rigidly defined by IEC 61968-9.

E.2.2 Clearing alarm conditions and communicating state/condition changes

There are scenarios where the state change for a particular setting shall be communicated to an external system. In the small number of cases that we have uncovered, we have simply added a concise EndDeviceEventOrAction to describe it. The following events support this method of communication.

Event or Control Description	EndDeviceEvent Category (using enum mnemonics)
Diagnostic 8 Condition High Neutral Current Cleared	*.Power.NeutralCurrent.MaxLimitReachedCleared
Leading kvarh cleared Caution 040000 Leading kvarh Condition Cleared	*.Power.PowerFactor.OutofRangeCleared
High Distortion Cleared Diagnostic 5 High Distortion Cleared	*.Power.PowerQuality.HighDistortionCleared
Voltage Imbalance Cleared Diagnostic 2 Voltage Imbalance Cleared	*.Power.Voltage.ImbalanceCleared
Phase alert cleared, Condition Phase Angle Alert Cleared	*.Power.PhaseAngle.OutofRangeCleared
Cross phase cleared Diagnostic 1 Condition Polarity, Cross Phase, Rv Energy Flow	*.Power.Phase.CrossPhaseCleared

Event or Control Description	EndDeviceEvent Category (using enum mnemonics)
Cleared	
Inactive phase cleared Diagnostic 3 Inactive Phase Current Condition Cleared	*.Power.Phase.InactiveCleared
Voltage Swell Started (Phase A)	*.Power.PhaseAVoltage.SwellStarted
Voltage Swell Started (Phase B)	*.Power.PhaseBVoltage.SwellStarted
Voltage Swell Started (Phase C)	*.Power.PhaseCVoltage.SwellStarted
Voltage swell cleared Caution 004000 Demand Overload Condition Cleared	*.Power.Voltage.SwellStopped
Voltage Swell Stopped (Phase A); Diagnostic 7 Condition Over Voltage, Phase A Cleared	*.Power.PhaseAVoltage.SwellStopped
Voltage Swell Stopped (Phase B)	*.Power.PhaseBVoltage.SwellStopped
Voltage Swell Stopped (Phase C)	*.Power.PhaseCVoltage.SwellStopped
Voltage Sag Started (Phase A)	*.Power.PhaseAVoltage.SagStarted
Voltage Sag Started (Phase B)	*.Power.PhaseBVoltage.SagStarted
Voltage Sag Started (Phase C)	*.Power.PhaseCVoltage.SagStarted
Voltage sag cleared Caution 000400 Under Voltage Condition Cleared	*.Power.Voltage.SagStopped
Voltage Sag Stopped (Phase A);Diagnostic 6 Condition UnderVoltage, Phase A Cleared	*.Power.PhaseAVoltage.SagStopped
Voltage Sag Stopped (Phase B)	*.Power.PhaseBVoltage.SagStopped
Voltage Sag Stopped (Phase C)	*.Power.PhaseCVoltage.SagStopped

E.3 Event data

Certain events require or contain more details than just a description and a category. For example, specification of a particular channel number, alarm number, relay number, port number, formula number, version number, etc. These should be set on the EndDeviceEvent.EndDeviceEventDetails name/value pair element.

However, this construct should not be overused or misused. The intention for this construct is only to capture some ancillary data related to the event. It should not be used in place of sending a full set of EndDeviceEvent information, for example (see Figure E.1).

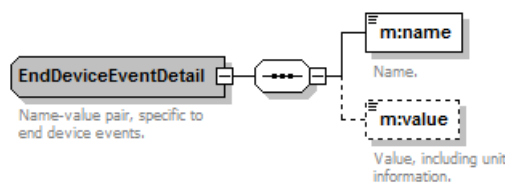


Figure E.1 – Event data

Some examples of its use:

A [PAN Pairing Completed] event may also provide the following data.

```
<m:EndDeviceEvent>
:
  <m:EndDeviceEventDetails>
    <m:name>InstallDate</m:dateTime>
    <m:value>2001-12-17</m:value>
  </m:EndDeviceEventDetails>
```

```

    <m:EndDeviceEventDetails>
      <m:name>ShortId</m:dateTime>
      <m:value>1002</m:value>
    </m:EndDeviceEventDetails>
    :
  </m:EndDeviceEvent>

```

A [Firmware Downloaded] event may also provide the following data.

```

  <m:EndDeviceEvent>
    :
    <m:EndDeviceEventDetails>
      <m:name>FirmwareVersion</m:dateTime>
      <m:value>1.2345</m:value>
    </m:EndDeviceEventDetails>
    :
  </m:EndDeviceEvent>

```

A [Voltage Exception] event may also provide the following data.

```

  <m:EndDeviceEvent>
    :
    <m:EndDeviceEventDetails>
      <m:name>VoltageThreshold</m:dateTime>
      <m:value>3</m:value>
    </m:EndDeviceEventDetails>
    :
  </m:EndDeviceEvent>

```

E.4 The 4-Part ID: EndDeviceEventType

Clauses E.5 to E.8 describe each part of the EndDeviceEventType enumeration:

- <EndDeviceType>
- <EndDeviceDomain>
- <EndDeviceSubdomain>
- <EndDeviceEventOrAction>

E.5 EndDeviceType

At the highest level, it is helpful to identify the type of device from which the event was created. Each of these should represent a physical device, although a value of zero (0) can be used in special cases. EndDeviceType codes are enumerated and described in Table E.1.

Table E.1 – EndDeviceType codes

EndDeviceType Enumeration		
mnemonic	Value	Description
n/a	0	Not applicable. Use when a device type is not known.
Collector	10	A device that acts as a central point of communication between HES and devices located on premises.
ComDevice	26	A communication device
DAPDevice	1	A data aggregation point device
DERDevice	2	A demand response device
DSPDevice	6	A digital signal processing device
ElectricMeter	3	A device located on premises to measure electricity usage.
ElectricVehicle	58	(or Plug-in Electric Vehicle, PEV) a vehicle that can be plugged into the

EndDeviceType Enumeration		
mnemonic	Value	Description
		grid.
EnergyRouter	23	An energy router, analogous to the familiar data and communications router, automatically detects demand for power and delivers processed electricity in the required form (AC or DC) at the correct voltage and frequency on an electrical power system.
Feeder	13	Feeders carry three-phase power, and tend to follow the major streets near the substation.
GasMeter	4	A device located on premises to measure gas usage.
Gateway	5	A gateway device.
Generator	14	Typically a spinning electrical generator. Something has to spin the generator -- it might be a water wheel in a hydroelectric dam, a large diesel engine or a gas turbine.
InPremisesDisplay(IPD/IHD)	15	The In-Premises (In-Home) Display (IPD/IHD) allows utility customers to track their energy usage in chart or graph form based upon kWh used.
LoadControlDevice	16	A device used to implement “deferrable” services – commonly referred to as “off-peak”.
NetworkRouter	11	A router distributes Digital computer information that is contained within a data packet on a network.
PANDevice	12	A “premises area network” device that is not specifically described in further detail.
PANGateway	7	A PAN gateway connects an external communications network to energy management devices within the premises.
PANMeter	17	A “premises area network” device whose function is to measure (e.g. electricity usage).
PrepaymentTerminal	18	A device that enables the customer to make advance payment before energy can be used.
ProgCtlThermostat(PCT)	19	A thermostat device whose settings can be controlled via an API (ie. without human intervention).
RangeExtender	20	Wireless range-extenders or wireless repeaters can extend the range of an existing wireless network.
Regulator	21	A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level.
Substation	22	An electrical substation is a subsidiary station of an electricity generation, transmission and distribution system where voltage is transformed from high to low or the reverse using transformers.
Transformer	8	A device that converts a generator's voltage (which is at the thousands of volts level) up to extremely high voltages for long-distance transmission on the transmission grid.
WasteWaterMeter	25	A device that measures waste water usage.
WaterMeter	24	A device that measures water usage.

E.6 EndDeviceDomain

After the type of device is known, the event should be classified by an EndDeviceDomain code. This code provides an indication as to the high-level nature of the event. Careful consideration shall given to the EndDeviceDomain in which an event is classified By properly classifying events by a small set of EndDeviceDomain codes, a system can more easily run reports based on the types of events that have occurred or been received. EndDeviceDomain codes are enumerated and described in Table E.2.

Table E.2 – EndDeviceDomain Codes

EndDeviceDomain Enumeration		
mnemonic	Value	Description
n/a	0	Not applicable. Use when a domain is not needed. This should rarely be used.
AssociatedDevice	39	A device (for example, a relay) that can be associated with an end device.
Battery	2	Any events or controls related to a device battery.
Billing	20	Events or controls related to cost of energy (Including Pricing, Tariff, TOU, etc.).
Cartridge	3	Events or controls related to cartridge fuses.
Clock	36	Events or controls related to a device internal clock.
Communication	1	Events or controls related to purely communication issues. Consider other domains before using this one.
Configuration	7	Events or controls related to device configuration.
Demand	8	Events or controls related to demand (ie. kW) and demand settings (as opposed to consumption (ie. kWh).
Firmware	11	Events or controls related to device firmware.
GasSupply	4	Events or controls related to the supply of natural gas or propane.
Installation	6	Events or controls related to device installation.
KYZPulseCounter	38	Pulse counting function inside a meter or other end device.
LoadControl	15	Events or controls related to the automatic restriction or control of a customer's energy consumption.
LoadProfile	16	Events or controls related to the energy consumption (ie. "load") over time on a device.
Logs	17	Events or controls related to device internal logs.
Memory	18	Events or controls related to device memory.
Metrology	21	Events or controls related to any type of measurement captured by a device.
MobileSecurity	14	Events or controls related to device security when the device is accessed via a mobile tool or device.
Modem	19	Events or controls related to a device's modem.
ModuleFirmware	9	Events or controls related to firmware on a module contained by a device.
Network	23	Events or controls generally related to a device's status on the network. Also used for general network events, such as commissioning of a PAN Area network.
Pairing	10	Events or controls related to linking devices together (e.g. PANDevice to Meter, ComDevice to Meter, etc.).
Power	26	Events or controls related to device energization status.
Pressure	29	Events or controls related to device pressure thresholds.
RCDSwitch	31	Events or controls related to device remote connect/disconnect activities.
Recoder	41	A device for encoding
Security	12	Events or controls related to device security (including SecurityKey, HMAC, Parity, Rotation, other TamperDetection, etc.).
Temperature	35	Events or controls related to device
VideoDisplay	13	Events or controls related to device CRT/display.
Volume	40	A quantity of 3-dimensional space enclosed by a boundary; the space occupied by a liquid or gas.
Watchdog	37	A hardware or software function triggered by a timer expiring.
WaterSupply	5	Events or controls related to the supply of water.

E.7 EndDeviceSubDomain

EndDeviceDomain can be subcategorized by EndDeviceSubdomain codes. EndDeviceSubdomain codes are enumerated and described in Table E.3.

Table E.3 – EndDeviceSubdomain codes

EndDeviceSubdomain enumeration		
mnemonic	Value	Description
n/a	0	Not applicable. Use when a subdomain is not needed. This should rarely be used
Access	1	Related to physical security (ie. Accessibility) or electronic permission to read/write digital media
Activation	283	Initiation of a function
AlarmTable	285	A table in a device for the tracking of alarms
ADConverter	142	Related to analog-to-digital conversion
AllEvents	148	Related to a set of events (typically used in a Load Control Cancel All Events Scenario)
ApparentPower	290	The magnitude of the complex power measured in volt-amps
Allocation	2	Related to designation or allotment; Typically related to memory (RAM/ROM)
Association	74	Related to the linking/pairing of one device/object to another device/object
AUTDProcess	3	Related to Always Up To Date processes; watchdog or keep-alive processes
AutoRegistration	5	Related to automatic registration process
AutoTime	7	Related to automatic setting of time
BTU	13	Related to British Thermal Units
Buffer	14	Related to temporary data storage
Cable	15	Related to a physical cable
Calculation	16	Related to mathematical computation
Calibration	18	Related to a set of gradations that show positions or values
Certificate	21	Related to a document testifying to the truth of something; typically a security certificate
Charge	22	Related to electrical charge; Related to billing charge
Checksum	284	A fixed-size datum computed from an arbitrary block of digital data for the purpose of detecting accidental errors
Concentration	39	Related to the density or composition of something
Constants	23	Related to statically defined values
ControlPoint	26	Related to load control settings
Cover	29	Related to something that provides shelter; a covering
CRC	30	Related to cyclical redundancy check
Credit	8	Related to the right-hand side of an account; billing
Current	6	Related to electrical power measured in amperes
Data	31	Related to factual information
DataLog	33	Related to a record (ie. Log) of factual information
Date	34	Related to calendar time
Day	35	Related to the day portion of calendar time

EndDeviceSubdomain enumeration		
mnemonic	Value	Description
DaylightSavingsTime	56	Related to the practice of setting the clock forward one hour in the spring.
DayLimit	299	A limit established for a daily period
Decryption	36	Related to making encrypted data readable
Display	143	Related to a CRT, LED, or other form of video device
Door	128	Related to a moveable barrier used to cover an opening; as in a door to a meter or collector
EmergencySupplyCapacityLimit	138	Related to emergency supply capacity limits
Encoder	40	Related to the thing that converts information from one format to another
EncoderRegister	41	Related to the encoder register (ie. On a meter)
EPROM	42	Related to erasable programmable read-only memory
Event	43	Related to something that has happened; other, more specific subdomains should be used before using this one
EventLog	44	Related to a record (ie. Log) of event data
EWM	45	Related to an external wireless module
Feature	46	Related to a non-specific characteristic
FirmwareReset	47	Related to reverting of firmware to original state
Flow	48	Related to the movement of a substance (electricity, gas, water, etc.)
FPV	49	Related to a form of super-compressibility
Frames	50	Related to fixed-sized blocks; as in memory
Frequency	4	Related to the number of cycles per unit of time
GCAAnalyzer	51	Related to gas chromatograph analyzer which is use to measure the component mixture of the natural gas delivers to a site
HeadEndSystem	52	Related to the metering/AMI system
HistoryLog	53	Related to a record (ie. Log) of historical data
HMAC	54	Related to hash-based message authentication code; a specific method for calculated a MAC
Holiday	97	Related to days set aside having special significance
Identity	10	Related to a unique identifier
Initialisation	298	Start-up function
Input	55	Related to data entered into the system
InstallDate	57	Related to the prepared for use date
IntelligentRegister	58	Related to a specific register on a device
Interval	59	Related to interval energy data; the time between to events
IO	60	Related to general input/output
IPAddress	127	Related to an IP Address (Internet Protocol Address)
LANAddress	61	Related to a unique identification of a device on a network of devices
LastRead	62	Related to the final reading from a meter
List	63	Related to an internal list [contained in memory or on firmware]
ListPointers	64	Related to a specific set of values kept by a meter
Login	65	Related to the process by which access is gained to a

EndDeviceSubdomain enumeration		
mnemonic	Value	Description
		device, computer, or system
LowSpeedBus	145	Related to a circuit that connects CPU with other devices; low-speed transmission
MagneticSwitch	66	Related to any type of magnetic switch
MaintMode	11	Related to a specific mode of operation into which a device can be set
Measurement	67	Relating to the magnitude of a quantity
MeasurementType	286	A code defining the kind of data under measurement
Mesh	68	Typically related to the type of meter network
MeterBus	147	Related to a circuit that connects a devices or module to a meter
MeteringMode	12	Related to a specific mode of operation into which a device can be set
Mobile	69	Related to devices that are not confined to one place
MOL%	70	Related to percentage of moles
NetworkId	71	Related to a unique identification of a device on a network of devices
NeutralCurrent	137	Related to the essential part of electroweak unification
NVRAM	72	Related to non-volatile random access memory
OptionBoard	146	Related to a type of module in a meter
Parameter	75	Related to a variable passed to a function
ParentDevice	76	Related to a device's owner
Parity	77	Typically related to an odd/even or on/off state; a symmetry property
Password	24	Related to a secret word used for authentication
Phase	25	Typically related to a means of distributing alternating current; When the specific phase is irrelevant, this should be used as the EndDeviceSubdomain
PhaseAngle	130	Related to the angular component of the polar coordinates
PhaseA	126	Related to the A phase of a multi-phase circuit
PhaseAApparentPower	291	The apparent power on phase A of a multi-phase circuit
PhaseACurrent	287	Related to the current of the first phase of 3-phase power
PhaseAReactivePower	295	The reactive power on phase A of a multi-phase circuit
PhaseAVoltage	131	Related to the voltage of the first phase of 3-phase power
PhaseAVoltagePotential	126	Related to the voltage potential of the first phase of 3-phase power
PhaseB	134	Related to the B phase of a multi-phase circuit
PhaseBApparentPower	292	The apparent power on phase B of a multi-phase circuit
PhaseBCurrent	288	Related to the current of the second phase of 3-phase power
PhaseBReactivePower	296	The reactive power on phase B of a multi-phase circuit
PhaseBVoltage	132	Related to the voltage of the second phase of 3-phase power
PhaseBVoltagePotential	134	Related to the voltage potential of the second phase of 3-phase power
PhaseC	135	Related to the C phase of a multi-phase circuit

EndDeviceSubdomain enumeration		
mnemonic	Value	Description
PhaseCApparentPower	293	The apparent power on phase C of a multi-phase circuit
PhaseCCurrent	289	Related to the current of the third phase of 3-phase power
PhaseCReactivePower	297	The reactive power on phase C of a multi-phase circuit
PhaseCVoltage	133	Related to the voltage of the third phase of 3-phase power
PhaseCVoltagePotential	135	Related to the voltage potential of the third phase of 3-phase power
PhaseSequence	78	Related to the order of the phases in multi-phase power
PhaseVoltage	79	In single-phase or in situations where the specific phase is irrelevant, this is related to voltage across the phase
PowerFactor	27	Related to the ratio of the real power flowing to the load to the apparent power in the circuit
PowerQuality	28	Related to the set of limits of electrical properties that allows electrical systems to function in their intended manner without significant loss of performance
PowerQualityRecording	80	Related to the capture and storage of power quality data
PrepaymentCredit	81	Related to the right-hand side of an account; billing for prepayment accounts
Pricing	9	Related to billing
Processor	82	Related to a CPU, typically
Program	83	Related to a pre-defined set of instructions
Pulse	84	Related to a means by which energy is measured
Queue	197	Related to a relatively temporary storage area used to hold requests or tasks until they can be processed
Radio	136	Related to a physical device that processes radio signals
RAM	85	Related to random access memory
Rate	86	Related to the speed or velocity
ReadAccess	202	Related to the permission level one has; as in read, write, update
Readings	87	Related to the collection of consumption, diagnostic, and status data from a meter
ReactivePower	294	Power that does not perform work measured in VA reactive (VAr)
Recoder	300	A device for encoding
Recovery	88	Related to a process of restoring from a broken state
Register	89	Related to a placeholder for information
Registration	90	Related to a process by which a device is recognized or added
Relay	91	Related to an electrically operated switch
RemoteAccess	211	Related to physical security (ie. accessibility) or electronic permission to read/write digital media from a mobile device or from a location other than where the object being accessed is
ROM	92	Related to read-only memory
Rotation	93	Related to the movement of an object in a circular motion
RTP	94	Related to real-time pricing
Schedule	95	Related to a timetable or plan of future events
Season	228	Related to the division of a year marked by changes in weather; typically winter, spring, summer, and fall

EndDeviceSubdomain enumeration		
mnemonic	Value	Description
SecondaryCredit	96	Related to a non-primary amount of credit
SecuredRegister	98	Related to a specific register on a device
SecuredTable	99	Related a table that requires authorization prior to access being granted
SecurityKey	32	Related to a piece of information that determines the functional output of a cryptographic cipher
SecurityKeyLength	119	Related to the length of a security key
SecurityKeyVersion	120	Related to the version of a security key
SelfRead	231	Related to a process where a device will read itself
SelfTest	100	Related to a process where a device will run an internal test on itself
Sensor	144	Related to a mechanical device that transmits a signal to a measuring device
Session	129	Related to a communication session, typically
SetPoint	101	Related to the threshold at which a feature is engaged; typically related to load control
SigmaticMessage	102	Related to sigmatic messages
Signature	103	Related to electronic security and signing of messages
SignatureLength	104	Related to the length of a security signature
SignatureTimestamp	105	Related to the timeframe within which a security signature is valid
SignatureUsage	106	Related to how a signature is being used
SpecificGravity	240	Related to the ratio of the density of a substance to the density of water
StandardTime	107	Related to the opposite of daylight savings time
StandbyMode	108	Related to a specific mode of operation into which a device can be set
Status	17	Related to the current state of something
Storage	109	Related to the medium on which information is kept; also related to the act of storing information
SupplyCapacityLimit	139	Related to supply capacity limits
Table	110	Relating to a structure containing rows and columns
Tariff	140	Billing term relating to cost or amount charged
Test	111	Related to a classification that specifies non-production
TestMode	19	Related to a specific mode of operation into which a device can be set
TextMessage	112	Related to a message or set of characters that are sent to a device
Threshold	261	Related to a level or point at which something will happen
Tier	113	Related to a level
Time	114	Related to time of day, as in hours:minutes:seconds:milliseconds
Timeout	125	Related to a specific threshold specifying when to automatically return after having received no response
TimeReset	115	Related to the resetting of the time of day
TimeSync	116	Related to the process of adjusting the time of day value on a device to match that of a trusted source for time of day
TimeVariance	117	Related to the acceptable difference of a device time of

EndDeviceSubdomain enumeration		
mnemonic	Value	Description
		day as compared to a trusted source for time of day
TimeZone	118	Related to the time regions around the Earth defined by the lines of longitude
TOU	121	Related to time of use
Tranceiver	122	Related to a device that has both a transmitter and a receiver
Usage	123	Related to how something is used
Version	124	Related to a specific iteration or translation
Voltage	38	Related to the electrical force that would drive an electric current between two points
Window	73	Related to a period of time during which a device can be linked/paired with a meter or other device
WriteAccess	282	Related to the permission level one has; as in read, write, update

E.8 EndDeviceEventOrAction

The most specific part of the EndDeviceEventType is its EndDeviceEventOrAction value. This part of the EndDeviceEventType enumeration is generally in the form of a verb that gives action to the event that just occurred.

EndDeviceEventOrAction codes are enumerated and described in Table E.4.

Table E.4 – EndDeviceEventOrAction codes

EndDeviceEventOrAction enumeration		
mnemonic	Value	Description
n/a	0	Not applicable. Use when a EndDeviceEventOrAction is not needed. This should rarely be used.
Aborted	1	An event that occurs when some intervention causes the item (identified by the EndDeviceDomain/EndDeviceSubdomain) to stop.
Accessed	2	Typically a security event that occurs when physical access or access to data has been obtained (whether permitted or not).
Acknowledged	3	An event that indicates the receipt of the item (identified by the EndDeviceDomain/EndDeviceSubdomain).
Activated	4	An event that indicates that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) that was inactive is now active.
AlmostFull	283	An event to indicate that a resource is near capacity
ArmedForClosure	11	An event that indicates that an ArmForClosure command has been completed successfully.
ArmedForOpen	12	An event that indicates that an ArmForOpen command has been completed successfully.
ArmForClosure	5	A command to indicate a request to arm a switch for closure.
ArmForClosureFailed	226	An event that indicates that an ArmForClosure has failed.
ArmForOpen	6	A command to indicate a request to arm a switch for open.
ArmForOpenFailed	222	An event that indicates that an ArmFor Open has failed.
Attempted	7	An event that indicates that the item (identified by the EndDeviceDomain/EndDeviceSubdomain), based on the EndDeviceDomain and EndDeviceSubdomain combination, has been tried.

EndDeviceEventOrAction enumeration		
mnemonic	Value	Description
Calculated	21	An event that indicates that the item (identified by the EndDeviceDomain/EndDeviceSubdomain), based on the EndDeviceDomain and EndDeviceSubdomain combination, has been computed.
Cancel	8	A command to indicate a request to terminate a prior issued command.
CancelFailed	86	An event that indicates that a Cancel has failed.
Cancelled	10	An event that indicates that a prior issued command or set of commands was terminated successfully.
Change	13	A command to indicate a request to make modifications.
Changed	24	An event that indicates that a related Change request has completed successfully.
ChangedOut	284	An event to indicate that an asset has been replaced.
ChangeOutRequired	27	A command to request that a device is replaced by a new device of the same kind.
ChangePending	14	An event that indicates that an update has not yet been performed.
Charged	15	An event that can indicate a billing-related state or in the form of being electrically charged.
Cleared	28	An event that indicates that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) on the device has been either resolved or emptied.
Close	299	A control command for the item described by EndDeviceDomain/EndDeviceSubdomain. NOTE This command might be used to close a pairing window. It should not be used to close a switch. The "Connect" command should be used instead.
Closed	16	An event that indicates the item (identified by the EndDeviceDomain/EndDeviceSubdomain) on the device that had been open is not open anymore.
ColdStarted	31	An event that indicates the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been started from a stopped state (as opposed to a WarmStart which implies that it was started from an already started state).
Confirmed	17	An event that indicates the receipt and agreement of the item (identified by the EndDeviceDomain/EndDeviceSubdomain).
Connect	18	A command to request that a device be put into service. NOTE This would effectively "close" an electrical switch or "open" a water valve.
Connected	42	An event to indicate that a device has been put into service.
ConnectFailed	67	An event that indicates a Connect request has failed.
Corrupted	43	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been altered from a correct state to an incorrect state.
CorruptionCleared	281	An event to indicate that a corruption condition has been cleared.
Create	82	A command to request that something be created.
Created	83	An event that indicates that a Create request succeeded.
CreateFailed	297	An event that indicates that a Create request failed.
CrossPhaseCleared	70	An event that indicates that instability due to cross-phase modulation has been corrected.
CrossPhaseDetected	45	An event that indicates instability due to cross-phase modulation.
Deactivated	19	An event that indicates that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) on the device that had previously been in an active state is no longer active.

EndDeviceEventOrAction enumeration		
mnemonic	Value	Description
Decreased	57	An event that indicates that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has a lower value or magnitude.
Delayed	20	An event that indicates the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is slower than expected or will complete later than expected.
Disable	22	A command to request that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) be rendered incapable.
Disabled	66	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) was successfully rendered incapable.
DisableFailed	220	An event that indicates that a Disable request has failed.
Disallowed	161	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) was not allowed.
Disconnect	23	A command to request that a device be pulled from service; can also mean a request to sever connection to the item (identified by the EndDeviceDomain/EndDeviceSubdomain). NOTE This would effectively “open” an electrical switch or “close” a water valve.
Disconnected	68	An event to indicate that a device was successfully pulled from service; can also mean that connection to the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been severed or terminated.
DisconnectFailed	84	An event that indicates that a Disconnect request has failed.
Display	77	A command to request the display of something (as in a TextMessage).
Displayed	78	An event that indicates that a Display request completed successfully.
DisplayFailed	87	An event that indicates that a Display request failed.
Distorted	91	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been altered from its expected state.
Downloaded	25	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) transmitted from the network to the device.
Enable	26	A command to request that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) be rendered capable.
Enabled	76	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) was successfully rendered capable.
EnableFailed	221	An event that indicates that an Enable request failed.
Error	79	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) did not complete successfully.
ErrorCleared	279	An event to indicate that an error condition has been cleared
Established	29	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been recognized.
EventStarted	287	An event to indicate that an event (for example, demand response event) has begun
EventStopped	288	An event to indicate that an event (for example, demand response event) has halted
Exceeded	139	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has gone higher than its expected value.
Execute	30	A command to request that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) be performed.

EndDeviceEventOrAction enumeration		
mnemonic	Value	Description
Expired	64	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has come to an end, typically by date or time.
Failed	85	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has not succeeded.
Frozen	88	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is in a static state.
Full	32	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is at capacity.
HighDistortion	69	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has had an undesired change in the waveform of a signal.
HighDistortionCleared	71	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is back to normal after having been in a HighDistortion state.
ImbalanceCleared	75	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is back in balance after having been in an imbalanced state.
Imbalanced	98	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is not balanced.
Inactive	100	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is at a dormant state.
InactiveCleared	72	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is now in an active state after having been in a dormant state.
Increased	102	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has gotten larger.
Initialized	33	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been set to starting values.
InProgress	34	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is currently advancing toward a goal or an end.
Installed	105	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been prepared for use.
Invalid	35	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is in a faulty state.
LimitChanged	296	An event to indicate that the set point for a limit has been changed
LimitReached	286	An event to indicate that an upper or lower limit has been breached
Loaded	36	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is now engaged.
LossDetected	47	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has experienced a deprived condition. This is typically used in relation to power, voltage, or current.
MaxLimitChanged	295	An event to indicate that the set point for a maximum limit has been changed
MaxLimitCleared	293	An event to indicate that a previous MaxLimitReached event has been cleared
MaxLimitReached	93	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has reached a maximum acceptable value.
MaxLimitReachedCleared	73	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has returned to an acceptable state after having been as a MaxLimitReached state.
MinLimitChanged	294	An event to indicate that the set point for a minimum limit has been

EndDeviceEventOrAction enumeration		
mnemonic	Value	Description
		changed
MinLimitCleared	292	An event to indicate that a previous MinLimitReached event has been cleared
MinLimitReached	150	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has reached a minimum acceptable value.
Mismatched	159	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is not compatible with itself or something within its environment.
Missing	285	An event to indicate that an entity (for example, asset, measurement, etc.) is missing
Normal	37	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is in its typical state (or norm).
NotArmed	290	An event to indicate that a device is longer in an armed state
NotAuthorized	38	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been accessed without permission.
NotFound	160	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is lost or missing.
Open	298	A control command for the item described by EndDeviceDomain/EndDeviceSubdomain. NOTE This command might be used to open a pairing window. It should not be used to open a switch. The "Disconnect" command should be used instead.
Opened	39	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is accessible.
Opted-In	80	An event that indicates that a consumer has agreed to join a program.
Opted-Out	81	An event that indicates that a consumer does not want to join a program.
OutOfRange	40	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has gone outside of acceptable values.
OutOfRangeCleared	74	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has gone back to acceptable values.
Overflow	177	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has exceeded its size or volume.
Preempted	41	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) been replaced by another that has precedence over it.
Processed	44	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been successfully been put through the steps of a prescribed procedure.
Read	46	This can be an event (if treated as the past-tense of the verb, read) or a command (if treated as the verb, read).
Ready	48	An event that indicates that a ready condition has been reached on a device.
ReadyForActivation	280	An event to indicate that a device has been made ready
Re-established	49	An event that indicates that a condition, typically a connection, has achieved after having been lost.
Registered	50	An event that indicates that a device or condition of a device has been recorded.
Released	51	An event to indicate that the item (identified by the

EndDeviceEventOrAction enumeration		
mnemonic	Value	Description
		EndDeviceDomain/EndDeviceSubdomain) has been freed.
Removed	212	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been pulled out of service.
Replaced	52	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) replaced by an new item, usually as a consequence of being old or worn out.
Reprogrammed	213	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has had a change to its directions or program.
Reset	214	A command to request that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) should be set back to a zero-state or original-state.
ResetFailed	65	An event that indicates that a Reset request has failed.
ResetOccurred	215	An event that indicates that a Reset request has completed successfully.
Restarted	53	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has started again typically from an already started state.
Restored	216	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been put back to its prior state.
Reversed	219	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has changed to be the opposite of its normal state. This is typically used for rotation.
SagStarted	223	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has dipped or shrunk from its expected state.
SagStopped	224	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has stopped sagging. Typically used in conjunction with the SagStarted event.
Schedule	300	A control command to ask that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) will be set to execute at a future date.
Scheduled	225	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been set to execute at a future date.
ScheduleFailed	301	An event to indicate that the command to ask that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) to execute at a future date failed to schedule.
Sealed	227	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is in an airtight enclosure or cannot be accessed directly.
Start	54	A command to request that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) be triggered or begun.
Started	242	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has started.
StartFailed	217	An event that indicates that a Start request has failed.
Stop	55	A command to request that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) be shut down normally.
StopFailed	218	An event that indicates that a Stop request has failed.
Stopped	243	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has ceased. When this has resulted from a Stop command, it is assumed that things have stopped normally (ie. With no errors).
Substituted	56	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) replaced by an alternate

EndDeviceEventOrAction enumeration		
mnemonic	Value	Description
		item.
Succeeded	58	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) was accomplished.
SwellStarted	248	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has grown from its expected state.
SwellStopped	249	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has stopped swelling. Typically used in conjunction with the SwellStarted event.
SwitchPositionChanged	289	An event to indicate that a switch position has changed
TamperCleared	291	An event to indicate that a tamper alarm has been cleared
TamperDetected	257	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been secretly modified or altered. These events are typically associated with security or billing.
Terminate	302	A control command to request that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) end immediately and abruptly.
Terminated	59	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has ended abruptly.
TerminateFailed	303	An event to indicate that the attempt to terminate the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has failed.
Tilted	263	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been caused to lean, incline, slope, or slant.
Uninitialized	61	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has all its values in their starting state.
Unlocked	62	An event to indicate that the item's (identified by the EndDeviceDomain/EndDeviceSubdomain) lock, physical or software, is undone.
Unsealed	269	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is not sealed.
Unsecure	63	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is in an unprotected state.
Unstable	270	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) is in an irregular state.
Uploaded	60	An event to indicate that the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been transmitted from the device to the network.
WarmStarted	278	An event that indicates the item (identified by the EndDeviceDomain/EndDeviceSubdomain) has been started from an already started state (as opposed to a ColdStart which implies that it was started from a stopped state).
WriteFailed	282	An event to indicate that a write operation has failed

E.9 Normative EndDeviceEventTypes

EndDeviceType, EndDeviceDomain, EndDeviceSubdomain, and EndDeviceEventOrAction fields are combined and presented as a single string. The normative events are listed in the following Tables E.5 through E.31, grouped by EndDeviceDomain.

Table E.5 – Battery events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Battery low condition detected Module Low Battery Detected Low Battery Module Low Battery Detected	*.2.22.150	*	Battery	Charge	MinLimitReached
Battery OK Rf Battery OK	*.2.22.37	*	Battery	Charge	Normal
Battery failed	*.2.0.85	*	Battery	n/a	Failed
Battery installed	*.2.0.105	*	Battery	n/a	Installed
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.6 – Billing events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Adjusted the remaining credit	*.20.8.24	*	Billing	Credit	Changed
Subtracted from remaining credit	*.20.8.57	*	Billing	Credit	Decreased
Added to remaining credit	*.20.8.102	*	Billing	Credit	Increased
Pre-payment emergency credit	*.20.81.102	*	Billing	PrepaymentCredit	Increased
Tariff program changed	*.20.83.24	*	Billing	Program	Changed
RTP activation	*.20.94.4	*	Billing	RTP	Activated
RTP deactivation	*.20.94.19	*	Billing	RTP	Deactivated
Special schedule activation	*.20.95.4	*	Billing	Schedule	Activated
Secondary emergency credit	*.20.96.102	*	Billing	SecondaryCredit	Increased
Daily tariff changed Week tariff changed Rate change	*.20.140.24	*	Billing	Tariff	Changed
Unscheduled billing reset Billing reset	*.20.140.214	*	Billing	Tariff	Reset
Tier changed	*.20.113.24	*	Billing	Tier	Changed
TOU start mismatch TOU mismatch TOU years mismatch	*.20.121.159	*	Billing	TOU	Mismatched
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.7 – Cartridge events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Cartridge error	*.3.17.79	*	Cartridge	Status	Error
Cartridge frozen	*.3.17.88	*	Cartridge	Status	Frozen
Cartridge installed	*.3.17.105	*	Cartridge	Status	Installed
No cartridge inserted	*.3.17.160	*	Cartridge	Status	NotFound
Cartridge removed	*.3.17.212	*	Cartridge	Status	Removed
Cartridge changed Pushbutton cartridge changed Handheld terminal cartridge Cartridge change mode, unable to read	*.3.17.52	*	Cartridge	Status	Replaced
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.8 – Clock events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Auto time set performed	*.36.7.58	*	Clock	AutoTime	Succeeded
Date setting changed	*.36.34.24	*	Clock	Date	Changed
Invalid execution date and time Invalid complete date and time range	*.36.34.35	*	Clock	Date	Invalid
Day change error	*.36.35.79	*	Clock	Day	Error
Day of wrong length	*.36.35.35	*	Clock	Day	Invalid
DST change to new time	*.36.56.24	*	Clock	DaylightSavingsTime	Changed
Daylight savings or standard time variance error	*.36.56.40	*	Clock	DaylightSavingsTime	OutOfRange
DST change to previous time	*.36.56.214	*	Clock	DaylightSavingsTime	Reset
Change to Spring daylight savings time	*.36.56.242	*	Clock	DaylightSavingsTime	Started
Holiday changed Holidays changed	*.36.97.24	*	Clock	Holiday	Changed
Invalid installation date	*.36.57.35	*	Clock	InstallDate	Invalid
Temporary clock problem	*.36.0.79	*	Clock	n/a	Error
Clock malfunction E-clock failure	*.36.0.85	*	Clock	n/a	Failed
Season changed	*.36.228.24	*	Clock	Season	Changed
Change to Fall standard time	*.36.107.242	*	Clock	StandardTime	Started
Time setting changed to new time Working register time set to new time Time setting changed	*.36.114.24	*	Clock	Time	Changed

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
(old time) Time setting changed Collector Radio Set TimeKeeper Meter Time Adjustment					
Time change > 10 seconds	*.36.114.40	*	Clock	Time	OutofRange
Time setting reset to previous time Working register time set to previous time Time reset	*.36.114.214	*	Clock	Time	Reset
Unable to reset time	*.36.115.85	*	Clock	TimeReset	Failed
Time synchronization error	*.36.116.79	*	Clock	TimeSync	Error
Time sync failed: Meter I/O/clock failure(38)	*.36.116.85	*	Clock	TimeSync	Failed
Time synchronization of recorder	*.36.116.58	*	Clock	TimeSync	Succeeded
Time variance exceeded limits even after module tries to correct it Time variance exceeded limits without attempt to correct automatically	*.36.117.139	*	Clock	TimeVariance	Exceeded
Invalid time zone ID	*.36.118.35	*	Clock	TimeZone	Invalid
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.9 – Communication events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Watch dog or keep-alive failure detected	*.1.3.85	*	Communication	AUTDProcess	Failed
Cut cable	*.1.15.85	*	Communication	Cable	Failed
Encoder register communication failure	*.1.41.85	*	Communication	EncoderRegister	Failed
RF HES Comm Established	*.1.52.29	*	Communication	HeadEndSystem	Established
Rf No HES Comm	*.1.52.85	*	Communication	HeadEndSystem	Failed
Intelligent register communication failure	*.1.58.85	*	Communication	IntelligentRegister	Failed
Communications between modules within a meter lost	*.1.60.85	*	Communication	IO	Failed
I/O board definition mismatch	*.1.60.159	*	Communication	IO	Mismatched
Rf No Mesh Comm	*.1.68.85	*	Communication	Mesh	Failed
Call-in failure Communications failure	*.1.0.85	*	Communication	n/a	Failed
Communications re-established	*.1.0.49	*	Communication	n/a	Re-established
Communication terminated normally	*.1.0.59	*	Communication	n/a	Terminated

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Queue alarm	*.1.197.85	*	Communication	Queue	Failed
Collector Communication Delay	*.1.17.20	*	Communication	Status	Delayed
Rf Transceiver Reset	*.1.122.214	*	Communication	Transceiver	Reset
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.10 – Configuration events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Constants changed Primary constant changed Secondary constant changed Output constant changed	*.7.23.24	*	Configuration	Constants	Changed
Meter hard ID changed	*.7.10.24	*	Configuration	Identity	Changed
Invalid gateway ID Invalid Transformer ID	*.7.10.35	*	Configuration	Identity	Invalid
Missing node	*.7.10.160	*	Configuration	Identity	NotFound
Collector Radio Set IP List	*.7.127.24	*	Configuration	IPAddress	Changed
Maintenance mode Meter shop mode started	*.7.11.242	*	Configuration	MaintMode	Started
Meter shop mode stopped	*.7.11.243	*	Configuration	MaintMode	Stopped
Begin recording meter readings Begin idle mode	*.7.12.242	*	Configuration	MeteringMode	Started
Metering mode stopped	*.7.12.243	*	Configuration	MeteringMode	Stopped
Request customer configuration	*.7.0.13	*	Configuration	n/a	Change
Collector Radio Set Network Settings	*.7.0.24	*	Configuration	n/a	Changed
Configuration error detected	*.7.0.79	*	Configuration	n/a	Error
Configuration Initialized	*.7.0.33	*	Configuration	n/a	Initialized
Gateway reprogrammed	*.7.0.213	*	Configuration	n/a	Reprogrammed
Sum definition changed Sum type changed Meter counts synch Sum counts synch Output link changed Energy format changed Power format changed	*.7.75.24	*	Configuration	Parameter	Changed
Meter program change complete	*.7.83.24	*	Configuration	Program	Changed
Rate changed	*.7.86.24	*	Configuration	Rate	Changed
Setpoint exceeded, channel #	*.7.101.139	*	Configuration	SetPoint	Exceeded
Standby mode started	*.7.108.242	*	Configuration	StandbyMode	Started

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Storage medium changed	*.7.109.24	*	Configuration	Storage	Changed
Test button pushed	*.7.19.76	*	Configuration	TestMode	Enabled
Test mode started	*.7.19.242	*	Configuration	TestMode	Started
Test mode ended	*.7.19.243	*	Configuration	TestMode	Stopped
Invalid timeout date and time	*.7.125.35	*	Configuration	Timeout	Invalid
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.11 – Demand events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Unable to reset demand	*.8.0.65	*	Demand	n/a	ResetFailed
Demand reset detected	*.8.0.215	*	Demand	n/a	ResetOccurred
Demand definitions mismatch	*.8.0.159	*	Demand	n/a	Mismatched
Demand overload threshold	*.8.261.139	*	Demand	Threshold	Exceeded
Demand threshold caution	*.8.261.93	*	Demand	Threshold	MaxLimitReached
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.12 – Firmware events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
A/D converter error	*.11.142.79	*	Firmware	ADConverter	Error
Constants invalid	*.11.23.35	*	Firmware	Constants	Invalid
Unknown in analysis Diagnostic marker	*.11.31.79	*	Firmware	Data	Error
Unrecognized recorder event code Unintelligible message received	*.11.31.35	*	Firmware	Data	Invalid
Frozen error display	*.11.143.88	*	Firmware	Display	Frozen
Alarm acknowledged, alarm #	*.11.43.3	*	Firmware	Event	Acknowledged
Alarm activated, alarm # Area alarm	*.11.46.4	*	Firmware	Feature	Activated
Alarm disabled, alarm # Remote setup disabled Remote synch disabled	*.11.46.66	*	Firmware	Feature	Disabled
Alarm enabled, alarm # Remote setup enabled Remote synch enabled Alarm value set, alarm #	*.11.46.76	*	Firmware	Feature	Enabled
Delayed command failure	*.11.46.85	*	Firmware	Feature	Failed

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Illegal command	*.11.46.35	*	Firmware	Feature	Invalid
Unable to reset	*.11.47.85	*	Firmware	FirmwareReset	Failed
Internal device ID mismatch	*.11.10.159	*	Firmware	Identity	Mismatched
Unstable input, input #	*.11.55.270	*	Firmware	Input	Unstable
Read item list error	*.11.63.79	*	Firmware	List	Error
No protocol list, unable to find type No read items in list	*.11.63.160	*	Firmware	List	NotFound
Low speed bus error	*.11.145.79	*	Firmware	LowSpeedBus	Error
Meter bus alarm	*.11.147.79	*	Firmware	MeterBus	Error
Cold start	*.11.0.31	*	Firmware	n/a	ColdStarted
Firmware image corrupted	*.11.0.43	*	Firmware	n/a	Corrupted
Configuration lost	*.11.0.79	*	Firmware	n/a	Error
Collector Radio Load DCW	*.11.0.85	*	Firmware	n/a	Failed
Meter reprogram End device programmed Configuration written/changed Reprogrammed Meter reconfigured Device has been synchronized	*.11.0.213	*	Firmware	n/a	Reprogrammed
Last reset by watchdog Metering equipment reset	*.11.0.214	*	Firmware	n/a	Reset
Unscheduled restart	*.11.0.53	*	Firmware	n/a	Restarted
Meter not programmed	*.11.0.61	*	Firmware	n/a	Uninitialized
Warm start	*.11.0.278	*	Firmware	n/a	WarmStarted
Option board error	*.11.146.79	*	Firmware	OptionBoard	Error
Parameter error Configuration error	*.11.75.79	*	Firmware	Parameter	Error
Invalid re-programming data Invalid device type, e.g. not TOU	*.11.75.35	*	Firmware	Parameter	Invalid
Miscellaneous configuration mismatch	*.11.75.159	*	Firmware	Parameter	Mismatched
Alternate phone number used	*.11.75.56	*	Firmware	Parameter	Substituted
Register processor failed	*.11.82.85	*	Firmware	Processor	Failed
Illegal command processor state	*.11.82.35	*	Firmware	Processor	Invalid
Processor reset	*.11.82.214	*	Firmware	Processor	Reset
Un-programmed caution	*.11.83.79	*	Firmware	Program	Error
Program malfunction	*.11.83.85	*	Firmware	Program	Failed
Self-check error Diagnostic failure	*.11.100.79	*	Firmware	SelfTest	Error
Self test failure	*.11.100.85	*	Firmware	SelfTest	Failed
Sensor malfunction	*.11.144.85	*	Firmware	Sensor	Failed

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Alter option command executed	*.11.17.24	*	Firmware	Status	Changed
Firmware update pending	*.11.17.14	*	Firmware	Status	ChangePending
Firmware downloaded	*.11.17.25	*	Firmware	Status	Downloaded
Firmware download status Meter health checked	*.11.17.37	*	Firmware	Status	Normal
Firmware replaced Zigbee firmware change complete	*.11.17.52	*	Firmware	Status	Replaced
Device reset occurred	*.11.17.214	*	Firmware	Status	Reset
End of data event table reached	*.11.110.79	*	Firmware	Table	Error
Display table mismatch	*.11.110.159	*	Firmware	Table	Mismatched
Test call-in	*.11.111.58	*	Firmware	Test	Succeeded
Test mode display mismatch	*.11.19.159	*	Firmware	TestMode	Mismatched
Invalid down limit	*.11.261.35	*	Firmware	Threshold	Invalid
Calculation correction factor > max	*.11.261.40	*	Firmware	Threshold	OutOfRange
Invalid meter software version	*.11.124.35	*	Firmware	Version	Invalid

An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.

Table E.13 – GasSupply events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Complete loss of gas supply	*.4.0.85	*	GasSupply	n/a	Failed
Gas supply restored	*.4.0.216	*	GasSupply	n/a	Restored

An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.

Table E.14 – Installation events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Auto registration status	*.6.5.34	*	Installation	AutoRegistration	InProgress
Auto registration confirmation	*.6.5.58	*	Installation	AutoRegistration	Succeeded
Meter change-out	*.6.0.27	*	Installation	n/a	ChangeOut

An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.

Table E.15 – LoadControl events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Control point changed by condition Control point changed by command Control point changed due to prepayment Control point changed by schedule	*.15.26.24	*	Loadcontrol	ControlPoint	Changed
Abort command executed	*.15.0.1	*	Loadcontrol	n/a	Aborted
Load Control User option	*.15.83.4	*	LoadControl	Program	Activated
Load control relay momentary closure, relay # Output control relay toggled, relay #	*.15.91.24	*	Loadcontrol	Relay	Changed
Switch schedule aborted	*.15.95.1	*	Loadcontrol	Schedule	Aborted
Schedule loaded	*.15.95.36	*	Loadcontrol	Schedule	Loaded
Load control restore	*.15.17.216	*	Loadcontrol	Status	Restored
Load control initiate Load control relay closed Load control relay permanent closure, relay # Load control pattern started	*.15.17.242	*	Loadcontrol	Status	Started
Load control relay opened Load control relay opened, relay #	*.15.17.243	*	Loadcontrol	Status	Stopped
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.16 – LoadProfile events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
List Pointers reset	*.16.64.214	*	Loadprofile	ListPointers	Reset
Load survey readings failed	*.16.87.85	*	Loadprofile	Readings	Failed
Load profile data corrupt	*.16.109.43	*	Loadprofile	Storage	Corrupted
Load profile data area almost full	*.16.109.32	*	Loadprofile	Storage	Full
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.17 – Logs events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Data log uploaded	*.17.33.60	*	Logs	DataLog	Transmitted
Event log last read entry updated	*.17.44.24	*	Logs	EventLog	Changed
Event log cleared	*.17.44.28	*	Logs	EventLog	Cleared
Event log error	*.17.44.79	*	Logs	EventLog	Error
Event log full	*.17.44.32	*	Logs	EventLog	Full
Event log uploaded Event call-in	*.17.44.60	*	Logs	EventLog	Transmitted
History log last read entry updated	*.17.53.24	*	Logs	HistoryLog	Changed
History log cleared	*.17.53.28	*	Logs	HistoryLog	Cleared
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.18 – Memory events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Memory allocation error	*.18.2.79	*	Memory	Allocation	Error
Buffer overflow/overrun error	*.18.14.177	*	Memory	Buffer	Overflow
EPROM read	*.18.42.2	*	Memory	EPROM	Accessed
EPROM written	*.18.42.24	*	Memory	EPROM	Changed
EPROM failure	*.18.42.85	*	Memory	EPROM	Failed
Framing error	*.18.50.79	*	Memory	Frames	Error
Interval overflow – pulses > 65,535	*.18.59.177	*	Memory	Interval	Overflow
Data corruption detection	*.18.0.43	*	Memory	n/a	Corrupted
Mass memory mismatch	*.18.0.159	*	Memory	n/a	Mismatched
NVRAM failure	*.18.72.85	*	Memory	NVRAM	Failed
Family definitions mismatch	*.18.75.159	*	Memory	Parameter	Mismatched
Redundant pulse monitoring error	*.18.84.79	*	Memory	Pulse	Error
RAM error	*.18.85.79	*	Memory	RAM	Error
RAM failure	*.18.85.85	*	Memory	RAM	Failed
RAM memory full	*.18.85.32	*	Memory	RAM	Full
Data recovery error	*.18.88.85	*	Memory	Recovery	Failed
ROM error	*.18.92.79	*	Memory	ROM	Error
ROM failure	*.18.92.85	*	Memory	ROM	Failed
Disk almost full	*.18.109.32	*	Memory	Storage	Full
Data table full	*.18.110.32	*	Memory	Table	Full
Table slot overflow	*.18.110.177	*	Memory	Table	Overflow
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.19 – Metrology events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
BTU alarm BTU out of range	*.21.13.40	*	Metrology	BTU	OutofRange
Corrected volume calculation error	*.21.16.79	*	Metrology	Calculation	Error
Calibration change Calibration value set, #	*.21.18.24	*	Metrology	Calibration	Changed
Calibration over- deviation, #	*.21.18.40	*	Metrology	Calibration	OutofRange
Calibration expired	*.21.18.64	*	Metrology	Calibration	Expired
Concentration alarm	*.21.39.40	*	Metrology	Concentration	OutofRange
Event Log Cleared	*.21.44.28	*	Metrology	EventLog	Cleared
EWM potential failure	*.21.45.85	*	Metrology	EWM	Failed
FPV calculated unreasonably	*.21.49.40	*	Metrology	FPV	OutofRange
GC analyzer failure	*.21.51.85	*	Metrology	GCAnalyzer	Failed
History Log Cleared	*.21.53.28	*	Metrology	HistoryLog	Cleared
Form C error, input #	*.21.55.79	*	Metrology	Input	Error
Invalid value, channel #	*.21.55.35	*	Metrology	Input	Invalid
Interval read succeeded	*.21.59.58	*	Metrology	Interval	Succeeded
Last read entry updated	*.21.62.24	*	Metrology	LastRead	Changed
Update list pointers	*.21.63.24	*	Metrology	List	Changed
List cleared	*.21.63.28	*	Metrology	List	Cleared
Reset list pointers	*.21.63.214	*	Metrology	List	Reset
Measurement error detected	*.21.67.79	*	Metrology	Measurement	Error
Measurement failed	*.21.67.85	*	Metrology	Measurement	Failed
Total MOL % out of range	*.21.70.40	*	Metrology	MOL%	OutofRange
Measurement error detected	*.21.0.79	*	Metrology	n/a	Error
Meter return within limits, channel #	*.21.0.37	*	Metrology	n/a	Normal
Meter reprogrammed End Device Programmed	*.21.0.213	*	Metrology	n/a	Reprogrammed
Nonvolatile memory failure detected	*.21.72.85	*	Metrology	NVRAM	Failed
Turbine Pulse Error	*.21.84.79	*	Metrology	Pulse	Error
Pulse initiator	*.21.84.85	*	Metrology	Pulse	Failed
Pulse overflow, channel #	*.21.84.177	*	Metrology	Pulse	Overflow
Meter readings failed	*.21.87.85	*	Metrology	Readings	Failed
kWh received – alarm cleared	*.21.87.37	*	Metrology	Readings	Normal
Expected read missed	*.21.87.160	*	Metrology	Readings	NotFound
Scheduled call-in	*.21.87.225	*	Metrology	Readings	Scheduled
Register error	*.21.89.79	*	Metrology	Register	Error

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Previous kW > register capacity	*.21.89.139	*	Metrology	Register	Exceeded
Register full	*.21.89.32	*	Metrology	Register	Full
Register definitions mismatch	*.21.89.159	*	Metrology	Register	Mismatched
Register read succeeded	*.21.89.58	*	Metrology	Register	Succeeded
Self meter read	*.21.231.58	*	Metrology	SelfRead	Succeeded
Invalid sigmatic message	*.21.102.35	*	Metrology	SigmaticMessage	Invalid
Specific gravity alarm	*.21.240.40	*	Metrology	SpecificGravity	OutOfRange
Self check error detected	*.21.17.79	*	Metrology	Status	Error
Pending table activation	*.21.110.4	*	Metrology	Table	Activated
Table written to	*.21.110.24	*	Metrology	Table	Changed
Pending table clear	*.21.110.28	*	Metrology	Table	Cleared
Meter over hi-hi threshold, channel # Meter over threshold, channel # Delta rate over threshold, channel #	*.21.261.139	*	Metrology	Threshold	Exceeded
Limit alarm reported	*.21.261.93	*	Metrology	Threshold	MaxLimitReached
Meter under threshold, channel # Meter over lo-lo threshold, channel # Low limit alarm	*.21.261.150	*	Metrology	Threshold	MinLimitReached
Meter over/under threshold	*.21.261.40	*	Metrology	Threshold	OutOfRange
Gas day high limit exceeded	*.21.123.139	*	Metrology	Usage	Exceeded
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.20 – MobileSecurity events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
MAT Token Random Data or Target LAN Error	*.14.31.79	*	MobileSecurity	Data	Error
MAT Token Invalid LAN Address Block	*.14.61.35	*	MobileSecurity	LANAddress	Invalid
MAT Token Invalid Network ID	*.14.71.35	*	MobileSecurity	NetworkId	Invalid
MAT Token Message Generation Error	*.14.32.79	*	MobileSecurity	SecurityKey	Error
MAT Token Expired MAT Token Expired, Keep Alive Timeout Exceeded	*.14.32.64	*	MobileSecurity	SecurityKey	Expired

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
MAT Token Invalid Options	*.14.32.35	*	MobileSecurity	SecurityKey	Invalid
MAT Token pre-empted	*.14.32.41	*	MobileSecurity	SecurityKey	Preempted
MAT Token Processed	*.14.32.44	*	MobileSecurity	SecurityKey	Processed
MAT Token released	*.14.32.51	*	MobileSecurity	SecurityKey	Released
MAT Token Invalid Length	*.14.119.35	*	MobileSecurity	SecurityKeyLength	Invalid
MAT Token Invalid Version	*.14.120.35	*	MobileSecurity	SecurityKeyVersion	Invalid
Prior session already established	*.14.129.161	*	MobileSecurity	Session	Disallowed
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.21 – Modem events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Power outage modem battery low	*.19.22.150	*	Modem	Charge	MinLimitReached
Modem failure detected	*.19.17.85	*	Modem	Status	Failed
Modem initialized	*.19.17.33	*	Modem	Status	Initialized
Modem change-out	*.19.17.105	*	Modem	Status	Installed
No modem	*.19.17.160	*	Modem	Status	NotFound
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.22 – ModuleFirmware events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Module firmware replaced	*.9.17.52	*	ModuleFirmware	Status	Replaced
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.23 – Network events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Network association failure	*.23.74.85	*	Network	Association	Failed
Collector First Connect	*.23.52.42	*	Network	HeadEndSystem	Connected
Parent device not enabled	*.23.76.66	*	Network	ParentDevice	Disabled
Radio faults	*.23.136.85	*	Network	Radio	Failed

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Collector Radio Registration Data	*.23.136.50	*	Network	Radio	Registered
Optional input closure, generator	*.23.17.42	*	Network	Status	Connected
Device not enabled Gateway not enabled	*.23.17.66	*	Network	Status	Disabled
Optional input opening, generator Device disconnected	*.23.17.68	*	Network	Status	Disconnected
DAP error DSP error	*.23.17.79	*	Network	Status	Error
Node failure Node link failure	*.23.17.85	*	Network	Status	Failed
Meter installed Gateway installed	*.23.17.105	*	Network	Status	Installed
End device sealed	*.23.17.227	*	Network	Status	Sealed
End device unsealed	*.23.17.269	*	Network	Status	Unsealed
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.24 – PAN / HAN events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
PAN pairing window closed	*.10.73.16	*	Pairing	Window	Closed
PAN pairing window opened (Ready To Pair)	*.10.73.39	*	Pairing	Window	Opened
PAN pairing succeeded	*.10.0.58	*	Pairing	n/a	Succeeded
PAN pairing failed	*.10.0.85	*	Pairing	n/a	Failed
PAN text message canceled	*.13.112.10	*	VideoDisplay	TextMessage	Canceled
PAN text message displayed	*.13.112.78	*	VideoDisplay	TextMessage	Displayed
PAN pricing succeeded	*.20.9.58	*	Billing	Pricing	Succeeded
PAN pricing failed	*.20.9.85	*	Billing	Pricing	Failed
PAN load control all events cancel failed	*.15.148.86	*	LoadControl	AllEvents	CancelFailed
PAN load control all events canceled	*.15.148.10	*	LoadControl	AllEvents	Canceled
PAN load control event cancel failed	*.15.43.86	*	LoadControl	Event	CancelFailed
PAN load control event canceled	*.15.43.10	*	LoadControl	Event	Canceled
PAN load control event scheduled	*.15.43.225	*	LoadControl	Event	Scheduled
PAN load control event opt-in	*.15.43.80	*	LoadControl	Event	Opt-In
PAN load control event opt-out	*.15.43.81	*	LoadControl	Event	Opt-Out

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
PAN device removed PAN load control device removed PAN gateway removed	*.0.0.212	*	n/a	n/a	Removed
PAN network enabled	*.23.0.76	*	Network	n/a	Enabled
PAN network disabled	*.23.0.66	*	Network	n/a	Disabled
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.25 – Power events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Low current limit exceeded	*.26.6.150	*	Power	Current	MinLimitReached
Line Frequency Unstable	*.26.4.270	*	Power	Frequency	Unstable
High neutral current	*.26.137.93	*	Power	NeutralCurrent	MaxLimitReached
High neutral current Cleared	*.26.137.y3	*	Power	NeutralCurrent	MaxLimitReachedCleared
Cross phase condition	*.26.25.45	*	Power	Phase	CrossPhaseDetected
Cross phase condition Cleared	*.26.25.70	*	Power	Phase	CrossPhaseCleared
Loss of phase, Phase drop out	*.26.25.85	*	Power	Phase	Failed
Inactive phase condition (voltage is present, current is not)	*.26.25.100	*	Power	Phase	Inactive
Inactive phase condition Cleared	*.26.25.72	*	Power	Phase	InactiveCleared
Phase alert cleared	*.26.25.37	*	Power	Phase	Normal
Phase threshold	*.26.25.40	*	Power	Phase	OutofRange
Phase restoration	*.26.25.216	*	Power	Phase	Restored
Phase angle limit above/below threshold	*.26.130.40	*	Power	PhaseAngle	OutofRange
Phase angle limit above/below threshold Cleared	*.26.130.74	*	Power	PhaseAngle	OutofRangeCleared

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Phase angle limit exceeded	*.26.130.139	*	Power	PhaseAngle	Exceeded
Voltage Sag Started (PhaseA)	*.26.131.223	*	Power	PhaseAVoltage	SagStarted
Voltage Sag Stopped (PhaseA)	*.26.131.224	*	Power	PhaseAVoltage	SagStopped
Voltage Swell Started (PhaseA)	*.26.131.248	*	Power	PhaseAVoltage	SwellStarted
Voltage Swell Stopped (PhaseA)	*.26.131.249	*	Power	PhaseAVoltage	SwellStopped
Phase A inactive	*.26.126.100	*	Power	PhaseA	Inactive
Voltage Sag Started (PhaseB)	*.26.132.223	*	Power	PhaseBVoltage	SagStarted
Voltage Sag Stopped (PhaseB)	*.26.132.224	*	Power	PhaseBVoltage	SagStopped
Voltage Swell Started (PhaseB)	*.26.132.248	*	Power	PhaseBVoltage	SwellStarted
Voltage Swell Stopped (PhaseB)	*.26.132.249	*	Power	PhaseBVoltage	SwellStopped
Phase B inactive	*.26.134.100	*	Power	PhaseB	Inactive
Voltage Sag Started (PhaseC)	*.26.133.223	*	Power	PhaseCVoltage	SagStarted
Voltage Sag Stopped (PhaseC)	*.26.133.224	*	Power	PhaseCVoltage	SagStopped
Voltage Swell Started (PhaseC)	*.26.133.248	*	Power	PhaseCVoltage	SwellStarted
Voltage Swell Stopped (PhaseC)	*.26.133.249	*	Power	PhaseCVoltage	SwellStopped
PhaseC inactive	*.26.135.100	*	Power	PhaseC	Inactive
Phase Sequence Error	*.26.78.79	*	Power	PhaseSequence	Error
Loss of voltage transducer on one phase Loss of voltage per phase	*.26.79.47	*	Power	PhaseVoltage	LossDetected
Power factor exceeded limits	*.26.27.139	*	Power	PowerFactor	Exceeded

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Leading kvarh cleared Leading kvarh Condition Cleared	*.26.27.24	*	Power	PowerFactor	OutofRangeCleared
Leading kvarh caution Leading kvarh Condition	*.26.27.40	*	Power	PowerFactor	OutofRange
High distortion detected	*.26.28.69	*	Power	PowerQuality	HighDistortion
High Distortion Cleared	*.26.28.71	*	Power	PowerQuality	HighDistortionCleared
Generic Power Quality Event	*.26.28.40	*	Power	PowerQuality	OutofRange
Recording disabled	*.26.80.66	*	Power	PowerQualityRecording	Disabled
Recording enabled	*.26.80.76	*	Power	PowerQualityRecording	Enabled
Verify Section Power Verify Meter Power Verify Feeder Power Verify Transformer Power	*.26.17.68	*	Power	Status	Disconnected
Rf Collector Power Outage Power outage Power out Undetected power outage Last gasp outage alarm Transformer Outage	*.26.0.85	*	Power	n/a	Failed
Loss of power or voltage on phase A	*.26.126.85	*	Power	PhaseA	Failed
Loss of power or voltage on phase B	*.26.134.85	*	Power	PhaseB	Failed
Loss of power or voltage on phase C	*.26.135.85	*	Power	PhaseC	Failed
Meter Restoration Power on / restored Transformer Restoration	*.26.0.216	*	Power	n/a	Restored
Restoration of power or voltage on phase A	*.26.126.216	*	Power	PhaseA	Restored

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Restoration of power or voltage on phase B	*.26.134.216	*	Power	PhaseB	Restored
Restoration of power or voltage on phase C	*.26.135.216	*	Power	PhaseC	Restored
Voltage exception	*.26.38.139	*	Power	Voltage	Exceeded
Voltage Imbalance Condition	*.26.38.98	*	Power	Voltage	Imbalanced
Voltage Imbalance Condition Cleared	*.26.38.75	*	Power	Voltage	ImbalanceCleared
Loss of voltage transducer VT Low loss potential detected	*.26.38.47	*	Power	Voltage	LossDetected
High Voltage	*.26.38.93	*	Power	Voltage	MaxLimitReached
Low voltage	*.26.38.150	*	Power	Voltage	MinLimitReached
Voltage Imbalance Cleared	*.26.38.37	*	Power	Voltage	Normal
Voltage swell cleared	*.26.38.37	*	Power	Voltage	Normal
Voltage sag	*.26.38.223	*	Power	Voltage	SagStarted
Voltage sag cleared	*.26.38.224	*	Power	Voltage	SagStopped
Voltage swell condition	*.26.38.248	*	Power	Voltage	SwellStarted
Voltage swell cleared	*.26.38.249	*	Power	Voltage	SwellStopped
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.26 – Pressure events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Sensed pressure equals P max	*.29.261.93	*	Pressure	Threshold	MaxLimitReached
Sensed pressure equals P min	*.29.261.150	*	Pressure	Threshold	MinLimitReached
Pressure is out of range	*.29.261.40	*	Pressure	Threshold	OutofRange
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.27 – RCDSwitch events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Service turn-on Status input closure, # Meter connected Connect executed	*.31.0.42	*	RCDswitch	n/a	Connected
Connect failed	*.31.0.67	*	RCDSwitch	n/a	ConnectFailed
Service turn-off Status input opening, # Meter disconnected Breaker operation Disconnect executed	*.31.0.68	*	RCDswitch	n/a	Disconnected
Connect failed Disconnect failed	*.31.0.84	*	RCDswitch	n/a	DisconnectFailed
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.28 – Security events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Unauthorized access attempted	*.12.1.38	*	Security	Access	NotAuthorized
Unit accessed Unit accessed by reader Unit accessed by recorder	*.12.1.58	*	Security	Access	Succeeded
Certificate expiration alert Certificate expiration	*.12.21.64	*	Security	Certificate	Expired
Cover removal detected	*.12.29.212	*	Security	Cover	Removed
CRC error	*.12.30.79	*	Security	CRC	Error
Decryption Error Plain Text	*.12.31.63	*	Security	Data	Unsecure
Decryption Error General	*.12.36.79	*	Security	Decryption	Error
Decryption Failure	*.12.36.85	*	Security	Decryption	Failed
Collector Door Event	*.12.128.2	*	Security	Door	Accessed
Door closed	*.12.141.16	*	Security	Enclosure	Closed
Door opened	*.12.141.39	*	Security	Enclosure	Opened
Encoder tamper	*.12.40.257	*	Security	Encoder	TamperDetected
Crypto Init Failure	*.12.298.85	*	Security	Initialisation	Failed
Reverse flow detected	*.12.48.219	*	Security	Flow	Reversed
Decryption Error HMAC Failure	*.12.54.85	*	Security	HMAC	Failed
User login failure Gateway login failure	*.12.65.85	*	Security	Login	Failed
Magnetic switch alarm	*.12.66.257	*	Security	MagneticSwitch	TamperDetected

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Physical tamper Tamper indication Tamper attempt suspected	*.12.0.257	*	Security	n/a	TamperDetected
Tilt detected	*.12.0.263	*	Security	n/a	Tilted
Configuration Token Invalid Network ID	*.12.71.35	*	Security	NetworkId	Invalid
Parity error	*.12.77.79	*	Security	Parity	Error
Password changed	*.12.24.24	*	Security	Password	Changed
Invalid password	*.12.24.35	*	Security	Password	Invalid
Unit accessed remotely	*.12.211.58	*	Security	RemoteAccess	Succeeded
Inverted meter or reverse rotation detected Reverse Rotation detected	*.12.93.219	*	Security	Rotation	Reversed
Read secured register Read secured table	*.12.98.2	*	Security	SecuredRegister	Accessed
Local key disable	*.12.32.66	*	Security	SecurityKey	Disabled
Local key enable	*.12.32.76	*	Security	SecurityKey	Enabled
Configuration Token Message Generation Error	*.12.32.79	*	Security	SecurityKey	Error
Invalid security key	*.12.32.35	*	Security	SecurityKey	Invalid
Configuration Token Invalid Options	*.12.32.35	*	Security	SecurityKey	Invalid
Previous Key Used	*.12.32.41	*	Security	SecurityKey	Preempted
Configuration Token Processed	*.12.32.44	*	Security	SecurityKey	Processed
Local key unlock	*.12.32.62	*	Security	SecurityKey	Unlocked
Configuration Token Invalid Length	*.12.119.35	*	Security	SecurityKeyLength	Invalid
Configuration Token Invalid Version	*.12.120.35	*	Security	SecurityKeyVersion	Invalid
Signature General Error	*.12.103.79	*	Security	Signature	Error
Signature Algorithm Error Signature Verify Failure Signature Algorithm Error Signature Verify Failure Signature Algorithm Error Signature Verify Failure	*.12.103.85	*	Security	Signature	Failed

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Invalid Signature Key Specified Signature Verification Error Invalid Signature Key Specified Signature Verification Error Invalid Signature Key Specified Signature Verification Error	*.12.103.35	*	Security	Signature	Invalid
Signature Missing	*.12.103.160	*	Security	Signature	NotFound
Invalid Length	*.12.104.35	*	Security	SignatureLength	Invalid
Invalid Signature Timestamp	*.12.105.35	*	Security	SignatureTimestamp	Invalid
Signature Usage Error	*.12.106.79	*	Security	SignatureUsage	Error
End device accessed for write	*.12.282.58	*	Security	WriteAccess	Succeeded
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.29 – Temperature events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Temperature returns within range	*.35.0.37	*	Temperature	n/a	Normal
Temperature is out of range	*.35.0.40	*	Temperature	n/a	OutOfRange
Sensed temperature equals T max	*.35.261.93	*	Temperature	Threshold	MaxLimitReached
Sensed temperature equals T min	*.35.261.150	*	Temperature	Threshold	MinLimitReached
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.30 – VideoDisplay events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Display failure	*.13.17.85	*	VideoDisplay	Status	Failed
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table E.31 – WaterSupply events

Event or Control Description	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Complete loss of water supply	*.5.0.47	*	WaterSupply	n/a	Failed
Water supply restored	*.5.0.270	*	WaterSupply	n/a	Restored
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

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Annex F (normative)

EndDeviceControlType enumerations

F.1 General

Many metering systems have the capability to issue a command to equipment in the field that takes an action. The action might be to perform a demand-reset, open or close a switch, or a number of other activities. This Annex F describes example codes that may be used for such applications.

EndDeviceControlType enumerations are categorized in the same manner as the EndDeviceEventType enumerations described in Annex E. The code is divided into 4 parts:

EndDeviceControl.type:=
 <EndDeviceType>.<EndDeviceDomain>.<EndDeviceSubdomain>.<EndDeviceEventOrAction>

where

<EndDeviceType>	a numeric value from the EndDeviceType enumeration (see EndDeviceType section in Annex E)
<EndDeviceDomain>	a numeric value from the EndDeviceDomain enumeration (see EndDeviceDomain section in Annex E)
<EndDeviceSubdomain>	a numeric value from the EndDeviceSubdomain enumeration (see EndDeviceSubdomain section in Annex E)
<EndDeviceEventOrAction>	a numeric value from the EndDeviceEventOrAction enumeration (see EndDeviceEventOrAction section in Annex E)

These control types are inclusive of the control types used for PAN device controls. Controls may cause an event to be generated by the end device, which would then be reported using a EndDeviceEvents message.

F.2 Normative EndDeviceControlType Enumerations

EndDeviceType, EndDeviceDomain, EndDeviceSubdomain, and EndDeviceEventOrAction fields are combined and presented as a single string. The normative events are listed in the following Tables F.1 through F.4, grouped by EndDeviceDomain.

Table F.1 – Demand Controls

Event or Control Description	EndDeviceControl Type	Expected Events	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Reset Demand	*.8.0.214	*.8.0.215 *.8.0.65	Demand	n/a	Reset
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table F.2 – LoadControl Controls

Event or Control Description	EndDeviceControl Type	Expected Events	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Load control initiate, port 0	*.15.0.54	*.15.17.242 *.15.17.217	LoadControl	n/a	Start
Load control stop/terminate, port 1	*.15.0.55	*.15.17.216 *.15.17.218	LoadControl	n/a	Stop
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table F.3 – PAN / HAN Controls

Event or Control Description	EndDeviceControl Type	Expected Events	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
PAN Pairing Window Open	*.10.73.298	*.10.73.39	Pairing	Window	Open
PAN Pairing Window Close	*.10.73.299	*.10.73.16	Pairing	Window	Close
PAN Text Message Display	*.13.112.77	*.13.112.78	VideoDisplay	TextMessage	Display
PAN Text Message Cancel	*.13.112.8	*.13.112.10	VideoDisplay	TextMessage	Cancel
PAN Price Signal Create	*.20.9.82	*.20.9.58	Billing	Pricing	Create
PAN Load Control All Event Cancel	*.15.148.8	*.15.148.10	LoadControl	AllEvents	Cancel
PAN Load Control Event Cancel	*.15.43.8	*.15.43.10	LoadControl	Event	Cancel
PAN Load Control Event Schedule	*.15.43.300	*.15.43.225	LoadControl	Event	Schedule
PAN Network Enable	*.23.0.26	*.23.0.76	Network	n/a	Enable
PAN Network Disable	*.23.0.22	*.23.0.66	Network	n/a	Disable
An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.					

Table F.4 – RCDSwitch Controls

Event or Control Description	EndDeviceControl Type	Expected Events	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Disable RCD Emergency Supply Capacity Limit	*.31.138.22	*.31.138.66 *.31.138.220	RCDSwitch	EmergencySupplyCapacityLimit	Disable
Enable RCD Emergency Supply Capacity Limit	*.31.138.26	*.31.138.76 *.31.138.221	RCDSwitch	EmergencySupplyCapacityLimit	Enable
Arm Remote Connect/Disconnect Switch for Closure	*.31.0.5	*.31.0.11 *.31.0.226	RCDSwitch	n/a	ArmForClosure
Arm Remote Connect/Disconnect Switch for Open	*.31.0.6	*.31.0.12 *.31.0.222	RCDSwitch	n/a	ArmForOpen
Close Remote Connect/Disconnect Switch	*.31.0.18	*.31.0.42 *.31.0.67	RCDSwitch	n/a	Connect

Event or Control Description	EndDeviceControl Type	Expected Events	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Disable Demand Limiting formula #1 for RCD Switch Disable RCD Switch	*.31.0.22	*.31.0.66 *.31.0.220	RCDSwitch	n/a	Disable
Open Remote Connect/Disconnect Switch	*.31.0.23	*.31.0.68 *.31.0.84	RCDSwitch	n/a	Disconnect
Enable Demand Limiting formula #2 for RCD Switch Enable RCD Switch	*.31.0.26	*.31.0.76 *.31.0.221	RCDSwitch	n/a	Enable
Disable RCD Supply Capacity Limit	*.31.139.22	*.31.139.66 *.31.139.220	RCDSwitch	SupplyCapacityLimit	Disable
Enable RCD Supply Capacity Limit	*.31.139.26	*.31.139.76 *.31.139.221	RCDSwitch	SupplyCapacityLimit	Enable

An asterisk (*) denotes any of the EndDeviceType values. It is assumed that the value used in any production use of these events will be relevant to the device that is actually sending this event.

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Annex G (normative)

Conventions for naming and identifying objects

G.1 General

This Annex G describes an example of the use of object identifiers as needed by IEC 61968 messages to maintain synchronization and correlation of information between systems.

G.2 Object identifiers

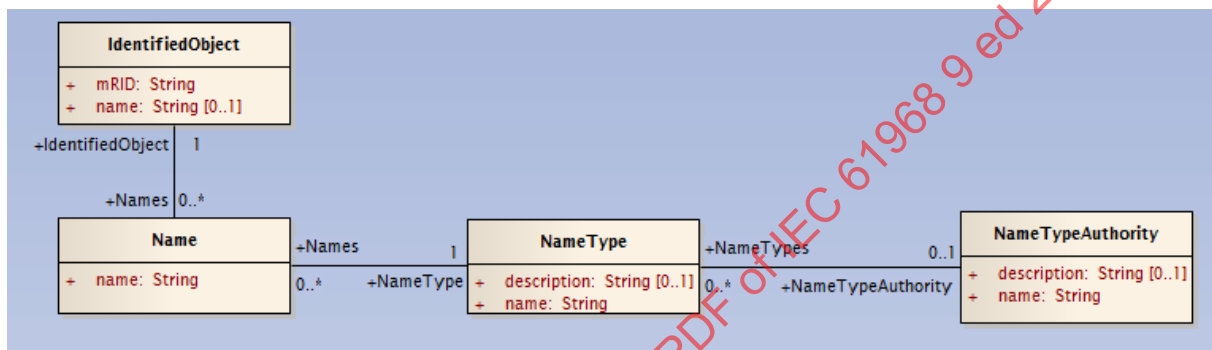


Figure G.1 – CIM naming

The CIM recognizes that an object can be known by many names. Objects should be given a “name” by the system of record by using one of the naming elements. Where the mRID value should be a globally unique identifier using a GUID, the name values are typically more human friendly and human useful. The uniqueness constraints may also be relaxed, as defined for rules by a given name type. Uniqueness rules may range from:

- globally unique
- globally unique within a name type and associated name type authority
- unique within a device (e.g. a meter)
- physical location (e.g. a substation)
- no uniqueness constraint.

In all cases, consuming applications need to be aware of uniqueness limitations for a given name type if any exist.

G.3 Object identifiers within messages

Figure G.1 shows the CIM models used for names. In Figure G.2, the model is seen from the perspective of an example XML structure that would be realized within a message profile.

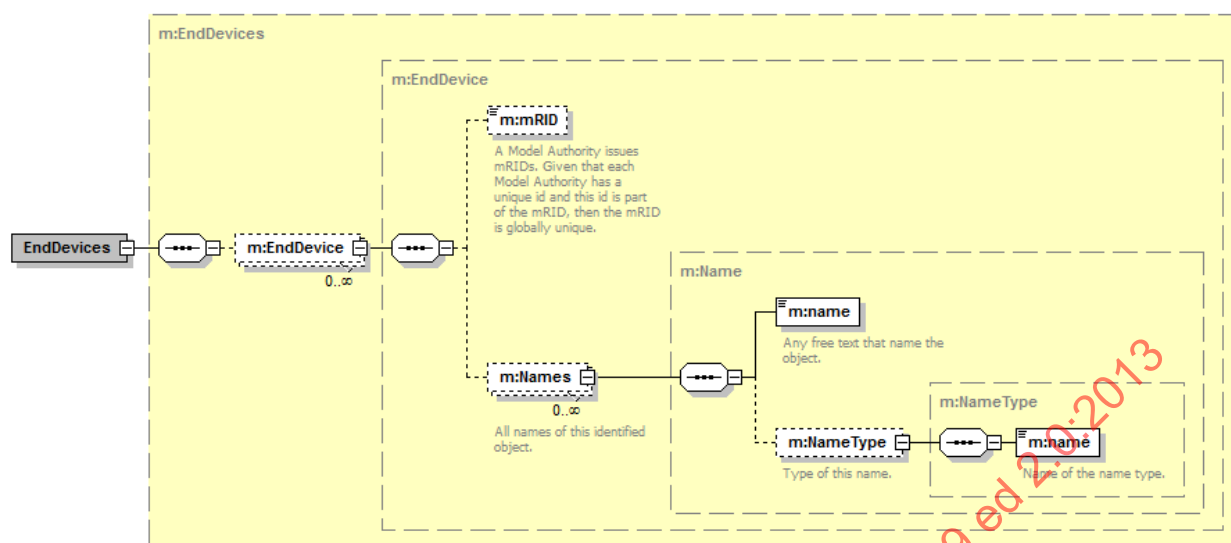


Figure G.2 – Example XML structure for names

Using the above example as a reference, there are a number of important rules that shall be followed:

An object may be identified using a globally unique mRID

An object may be identified using one or more Name.name values

Both mRID and Name.name values may be supplied

If more than one Name.name value is supplied, each Name should identify a corresponding NameType.name value

While the IdentifiedObject.name value is defined in the CIM, it is not used within IEC 61968-9 profiles in order to avoid ambiguities where a producer could choose to use IdentifiedObject.name, but a consumer could expect IdentifiedObject.Name.name. Therefore, from the perspective of IEC 61968-9 IdentifiedObject.name is deprecated.

Producers and consumers shall agree upon the use of mRID or Name.name values to be used for object correlation, where this can vary for a given implementation although the use of Name.name values is strongly recommended.

In the implementation cases where multiple consumers may exist, a producer may need to supply multiple Name.name values, each with a different NameType.name in order to support the specific needs of each consumer.

G.4 Object References within messages

Within message profiles, it is possible to refer to an object "by reference" as well as the common (nested) 'by value'. These references may be done using mRID or Name.name values. A common example of this for IEC 61968-9 can be seen for the reference of ReadingTypes (see Figure G.3).

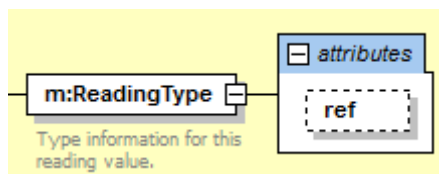


Figure G.3 – Use of names for references

Within an XML message the "ref" attribute would then identify a specific ReadingType using a Name.name value for the reading type. This scheme has many benefits, such as reducing the size of the XML message and allowing for aliasing of objects, where an object can be known by more than one name.

References are also used to identify specific types of EndDeviceControls or EndDeviceEvents, using references to an EndDeviceControlType or EndDeviceEventType as appropriate.

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Annex H (normative)

XML schemas for message payloads

H.1 General

The purpose of this Annex H is to provide XML schemas for message payloads to augment the descriptions provided earlier in this document. These XML schemas were defined using profile definitions within CIMTool. These schemas may be extended as needed for specific implementation needs. This Annex H is supplemented by the informative XML schemas provided in Annex I.

H.2 CustomerAccountConfig

```
<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns="http://langdale.com.au/2005/Message#"
  xmlns:a="http://langdale.com.au/2005/Message#"
  xmlns:m="http://iec.ch/TC57/2011/CustomerAccountConfig#"
  xmlns:sawsdl="http://www.w3.org/ns/sawsdl" xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://iec.ch/TC57/2011/CustomerAccountConfig#" elementFormDefault="qualified"
  attributeFormDefault="unqualified">

  <xs:element name="CustomerAccountConfig" type="m:CustomerAccountConfig"/>
  <xs:complexType name="CustomerAccountConfig">
    <xs:sequence>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="billingCycle" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.billingCycle"/>
      <xs:element name="budgetBill" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.budgetBill"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
      <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    </xs:sequence>
  </xs:complexType>

```

```

        <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
        <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
        <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
        <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.ConfigurationEvents"/>
        <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.3 CustomerAgreementConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/CustomerAgreementConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/CustomerAgreementConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="CustomerAgreementConfig" type="m:CustomerAgreementConfig"/>
    <xs:complexType name="CustomerAgreementConfig">

```

```

    <xs:sequence>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
      <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
      <xs:element name="loadMgmt" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement.loadMgmt"/>
      <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
      <xs:element name="signDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Agreement.signDate"/>
      <xs:element name="subject" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
      <xs:element name="title" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
      <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.ConfigurationEvents"/>
      <xs:element name="DemandResponsePrograms" type="m:DemandResponseProgram" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement.DemandResponsePrograms"/>
      <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>

```



```

        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement.ServiceCategory"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
        <xs:element name="validityInterval" type="m:DateTimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Agreement.validityInterval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="DemandResponseProgram" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DemandResponseProgram">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceCategory">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="electricity"/>
        <xs:enumeration value="gas"/>
        <xs:enumeration value="heat"/>
        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
    </xs:restriction>
</xs:simpleType>

```

```

        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.4 CustomerConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/CustomerConfig#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/CustomerConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
    <xs:element name="CustomerConfig" type="m:CustomerConfig"/>
    <xs:complexType name="CustomerConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
            <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
            <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
            <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
            <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
            <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
            <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
            <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
            <xs:element name="pucNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.pucNumber"/>
            <xs:element name="specialNeed" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.specialNeed"/>
            <xs:element name="vip" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.vip"/>
        </xs:sequence>
    </xs:complexType>

```

```

        <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.ConfigurationEvents"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="Organisation" type="m:Organisation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.Organisation"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.status"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ElectronicAddress">
    <xs:sequence>
        <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
        <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
        <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
        <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
        <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
        <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
        <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
        <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="Organisation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Organisation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.electronicAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone1"/>
    <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone2"/>
    <xs:element name="postalAddress" type="m:PostalAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.postalAddress"/>
    <xs:element name="streetAddress" type="m:StreetAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.streetAddress"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PostalAddress" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PostalAddress">
  <xs:sequence>
    <xs:element name="poBox" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.poBox"/>
    <xs:element name="postalCode" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.postalCode"/>
    <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.streetDetail"/>
    <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.townDetail"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetAddress" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetAddress">
  <xs:sequence>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.status"/>
    <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.streetDetail"/>
    <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.townDetail"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetDetail" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetDetail">
  <xs:sequence>
    <xs:element name="addressGeneral" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.addressGeneral"/>
    <xs:element name="buildingName" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.buildingName"/>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.code"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.name"/>
    <xs:element name="number" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.number"/>
    <xs:element name="prefix" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.prefix"/>
    <xs:element name="suffix" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suffix"/>
    <xs:element name="suiteNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suiteNumber"/>
  </xs:sequence>
</xs:complexType>

```

```

        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.type"/>
        <xs:element name="withinTownLimits" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.withinTownLimits"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TelephoneNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TelephoneNumber">
    <xs:sequence>
        <xs:element name="areaCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.areaCode"/>
        <xs:element name="cityCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.cityCode"/>
        <xs:element name="countryCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.countryCode"/>
        <xs:element name="extension" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.extension"/>
        <xs:element name="localNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.localNumber"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TownDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TownDetail">
    <xs:sequence>
        <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.code"/>
        <xs:element name="country" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.country"/>
        <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.name"/>
        <xs:element name="section" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.section"/>
        <xs:element name="stateOrProvince" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.stateOrProvince"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.5 EndDeviceConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/EndDeviceConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
    <xs:element name="EndDeviceConfig" type="m:EndDeviceConfig"/>
    <xs:complexType name="EndDeviceConfig">
        <xs:sequence>
            <xs:element name="ComFunction" type="m:ComFunction" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ConnectDisconnectFunction" type="m:ConnectDisconnectFunction" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="SimpleEndDeviceFunction" type="m:SimpleEndDeviceFunction" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ActivityRecord" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord">
        <xs:sequence>
            <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
            <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
            <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
            <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
            <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
        </xs:sequence>
    </xs:complexType>

```



```

<xs:simpleType name="AssetModelUsageKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#AssetModelUsageKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="customerSubstation"/>
    <xs:enumeration value="distributionOverhead"/>
    <xs:enumeration value="distributionUnderground"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="streetlight"/>
    <xs:enumeration value="substation"/>
    <xs:enumeration value="transmission"/>
    <xs:enumeration value="unknown"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="Channel" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Channel">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Channel.isVirtual"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="ReadingType" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Channel.ReadingType">
      <xs:complexType sawsdl:modelReference="">
        <xs:attribute name="ref" type="xs:string"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ComDirectionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComDirectionKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="biDirectional"/>
    <xs:enumeration value="fromDevice"/>
    <xs:enumeration value="toDevice"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ComFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrAddress" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrAddress"/>
    <xs:element name="amrRouter" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrRouter"/>
    <xs:element name="configID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
    <xs:element name="direction" type="m:ComDirectionKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.direction"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
    <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="programID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
    <xs:element name="technology" type="m:ComTechnologyKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.technology"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ComTechnologyKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComTechnologyKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="cellular"/>
    <xs:enumeration value="ethernet"/>
    <xs:enumeration value="homePlug"/>
    <xs:enumeration value="pager"/>
    <xs:enumeration value="phone"/>
    <xs:enumeration value="plc"/>
  </xs:restriction>
</xs:simpleType>

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        <xs:enumeration value="rf"/>
        <xs:enumeration value="rfMesh"/>
        <xs:enumeration value="zigbee"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
        <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
        <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
        <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ConnectDisconnectFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConnectDisconnectFunction">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
        <xs:element name="eventCount" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.eventCount"/>
        <xs:element name="isConnected" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isConnected"/>
        <xs:element name="isDelayedDiscon" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isDelayedDiscon"/>
        <xs:element name="isLocalAutoDisconOp" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isLocalAutoDisconOp"/>
        <xs:element name="isLocalAutoReconOp" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isLocalAutoReconOp"/>
        <xs:element name="isRemoteAutoDisconOp" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isRemoteAutoDisconOp"/>
        <xs:element name="isRemoteAutoReconOp" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isRemoteAutoReconOp"/>
        <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="rcdInfo" type="m:RemoteConnectDisconnectInfo" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.rcdInfo"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CorporateStandardKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CorporateStandardKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="experimental"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="standard"/>
        <xs:enumeration value="underEvaluation"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">

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<xs:sequence>
  <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
  <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ElectronicAddress">
  <xs:sequence>
    <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
    <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
    <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
    <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
    <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
    <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
    <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
    <xs:element name="initialCondition" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialCondition"/>
    <xs:element name="initialLossOfLife" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialLossOfLife"/>
    <xs:element name="installCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.installCode"/>
    <xs:element name="isPan" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isPan"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isVirtual"/>
    <xs:element name="lotNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lotNumber"/>
    <xs:element name="purchasePrice" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.purchasePrice"/>
    <xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
    <xs:element name="timeZoneOffset" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.timeZoneOffset"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
    <xs:element name="utcNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.utcNumber"/>
    <xs:element name="ActivityRecords" type="m:ActivityRecord" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ActivityRecords"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ConfigurationEvents"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.electronicAddress"/>
    <xs:choice minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceFunctions">
      <xs:element name="ComFunction" sawSDL:modelReference="">
        <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction">
          <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
      </xs:element>
      <xs:element name="ConnectDisconnectFunction" sawSDL:modelReference="">
        <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction">
          <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
      </xs:element>
    </xs:choice>
  </xs:sequence>
</xs:complexType>

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        <xs:element name="SimpleEndDeviceFunction" sawsdl:modelReference="">
            <xs:complexType sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SimpleEndDeviceFunction">
                <xs:attribute name="ref" type="xs:string"/>
            </xs:complexType>
        </xs:element>
    </xs:choice>
    <xs:element name="EndDeviceInfo" type="m:EndDeviceInfo" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceInfo"/>
    <xs:element name="lifecycle" type="m:LifecycleDate" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lifecycle"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Seals" type="m:Seal" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetContainer.Seals"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.status"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceCapability" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability">
    <xs:sequence>
        <xs:element name="autonomousDst" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.autonomousDst"/>
        <xs:element name="communication" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.communication"/>
        <xs:element name="connectDisconnect" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.connectDisconnect"/>
        <xs:element name="demandResponse" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.demandResponse"/>
        <xs:element name="electricMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.electricMetering"/>
        <xs:element name="gasMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.gasMetering"/>
        <xs:element name="metrology" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.metrology"/>
        <xs:element name="onRequestRead" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.onRequestRead"/>
        <xs:element name="outageHistory" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.outageHistory"/>
        <xs:element name="pressureCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.pressureCompensation"/>
        <xs:element name="pricingInfo" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.pricingInfo"/>
        <xs:element name="pulseOutput" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.pulseOutput"/>
        <xs:element name="relaysProgramming" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.relaysProgramming"/>
        <xs:element name="reverseFlow" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.reverseFlow"/>
        <xs:element name="superCompressibilityCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.superCompressibilityCompensation"/>
        <xs:element name="temperatureCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.temperatureCompensation"/>
        <xs:element name="textMessage" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.textMessage"/>
        <xs:element name="waterMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.waterMetering"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="EndDeviceFunctionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceFunctionKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="autonomousDst"/>
        <xs:enumeration value="demandResponse"/>
        <xs:enumeration value="electricMetering"/>
        <xs:enumeration value="gasMetering"/>
        <xs:enumeration value="metrology"/>
        <xs:enumeration value="onRequestRead"/>
        <xs:enumeration value="outageHistory"/>
        <xs:enumeration value="relaysProgramming"/>
    </xs:restriction>
</xs:simpleType>

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        <xs:enumeration value="reverseFlow"/>
        <xs:enumeration value="waterMetering"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDeviceInfo" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo">
    <xs:sequence>
        <xs:element name="isSolidState" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.isSolidState"/>
        <xs:element name="phaseCount" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.phaseCount"/>
        <xs:element name="ratedCurrent" type="m:CurrentFlow" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedCurrent"/>
        <xs:element name="ratedVoltage" type="m:Voltage" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedVoltage"/>
        <xs:element name="AssetModel" type="m:ProductAssetModel" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetInfo.AssetModel"/>
        <xs:element name="capability" type="m:EndDeviceCapability" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.capability"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="LifecycleDate" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate">
    <xs:sequence>
        <xs:element name="installationDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.installationDate"/>
        <xs:element name="manufacturedDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.manufacturedDate"/>
        <xs:element name="purchaseDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.purchaseDate"/>
        <xs:element name="receivedDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.receivedDate"/>
        <xs:element name="removalDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.removalDate"/>
        <xs:element name="retiredDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.retiredDate"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Manufacturer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Manufacturer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="ProductAssetModel" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel">
  <xs:sequence>
    <xs:element name="corporateStandardKind" type="m:CorporateStandardKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.corporateStandardKind"/>
    <xs:element name="modelName" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelName"/>
    <xs:element name="modelVersion" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelVersion"/>
    <xs:element name="usageKind" type="m:AssetModelUsageKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.usageKind"/>
    <xs:element name="Manufacturer" type="m:Manufacturer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.Manufacturer"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="RationalNumber" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RationalNumber">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.denominator"/>
    <xs:element name="numerator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.numerator"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingInterharmonic" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ReadingInterharmonic">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.denominator"/>
    <xs:element name="numerator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.numerator"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="accumulation" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.accumulation"/>
    <xs:element name="aggregate" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.aggregate"/>
    <xs:element name="commodity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.commodity"/>
    <xs:element name="consumptionTier" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.consumptionTier"/>
    <xs:element name="cpp" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.cpp"/>
    <xs:element name="currency" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.currency"/>
    <xs:element name="flowDirection" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.flowDirection"/>
    <xs:element name="macroPeriod" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.macroPeriod"/>
    <xs:element name="measurementKind" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measurementKind"/>
    <xs:element name="measuringPeriod" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measuringPeriod"/>
    <xs:element name="multiplier" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.multiplier"/>
    <xs:element name="phases" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.phases"/>
    <xs:element name="tou" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.tou"/>
    <xs:element name="unit" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.unit"/>
    <xs:element name="argument" type="m:RationalNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.argument"/>
    <xs:element name="interharmonic" type="m:ReadingInterharmonic" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.interharmonic"/>
    <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>

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<xs:complexType name="Register" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Register">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.isVirtual"/>
    <xs:element name="leftDigitCount" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.leftDigitCount"/>
    <xs:element name="rightDigitCount" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.rightDigitCount"/>
    <xs:element name="touTierName" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTierName"/>
    <xs:element name="Channels" type="m:Channel" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.Channels"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="touTier" type="m:TimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTier"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="RemoteConnectDisconnectInfo"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo">
  <xs:sequence>
    <xs:element name="armedTimeout" type="m:Seconds" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.armedTimeout"/>
    <xs:element name="customerVoltageLimit" type="m:Voltage" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.customerVoltageLimit"/>
    <xs:element name="energyLimit" type="m:RealEnergy" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.energyLimit"/>
    <xs:element name="energyUsageStartDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.energyUsageStartDateTime"/>
    <xs:element name="energyUsageWarning" type="m:RealEnergy" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.energyUsageWarning"/>
    <xs:element name="isArmConnect" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.isArmConnect"/>
    <xs:element name="isArmDisconnect" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.isArmDisconnect"/>
    <xs:element name="isEnergyLimiting" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.isEnergyLimiting"/>
    <xs:element name="needsPowerLimitCheck" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.needsPowerLimitCheck"/>
    <xs:element name="needsVoltageLimitCheck" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.needsVoltageLimitCheck"/>
    <xs:element name="powerLimit" type="m:ActivePower" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.powerLimit"/>
    <xs:element name="usePushbutton" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RemoteConnectDisconnectInfo.usePushbutton"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Seal" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal">
  <xs:sequence>
    <xs:element name="appliedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.appliedDateTime"/>
    <xs:element name="condition" type="m:SealConditionKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.condition"/>
    <xs:element name="kind" type="m:SealKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.kind"/>
    <xs:element name="sealNumber" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.sealNumber"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="SealConditionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SealConditionKind">

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    <xs:restriction base="xs:string">
      <xs:enumeration value="broken"/>
      <xs:enumeration value="locked"/>
      <xs:enumeration value="missing"/>
      <xs:enumeration value="open"/>
      <xs:enumeration value="other"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="SealKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SealKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="lead"/>
      <xs:enumeration value="lock"/>
      <xs:enumeration value="other"/>
      <xs:enumeration value="steel"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="SimpleEndDeviceFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#SimpleEndDeviceFunction">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="configID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
      <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
      <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
      <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
      <xs:element name="kind" type="m:EndDeviceFunctionKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction.kind"/>
      <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
      <xs:element name="programID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="Registers" type="m:Register" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.Registers"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
    <xs:sequence>
      <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
      <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeInterval">
    <xs:sequence>
      <xs:element name="end" type="xs:time" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.end"/>
      <xs:element name="start" type="xs:time" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.start"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="RealEnergy" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RealEnergy">
    <xs:restriction base="xs:float"/>
  </xs:simpleType>
  <xs:simpleType name="Voltage" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Voltage">
    <xs:restriction base="xs:float"/>
  </xs:simpleType>
  <xs:simpleType name="CurrentFlow" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CurrentFlow">
    <xs:restriction base="xs:float"/>
  </xs:simpleType>

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    <xs:simpleType name="ActivePower" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivePower">
      <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="Minutes" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Minutes">
      <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="Seconds" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seconds">
      <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="PerCent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PerCent">
      <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Money">
      <xs:restriction base="xs:decimal"/>
    </xs:simpleType>
  </xs:schema>

```

H.6 EndDeviceControls

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
  xmlns:m="http://iec.ch/TC57/2011/EndDeviceControls#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://iec.ch/TC57/2011/EndDeviceControls#" elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:element name="EndDeviceControls" type="m:EndDeviceControls"/>
  <xs:complexType name="EndDeviceControls">
    <xs:sequence>
      <xs:element name="EndDeviceControl" type="m:EndDeviceControl" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceControlType" type="m:EndDeviceControlType"
minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ControlledAppliance" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance">
    <xs:sequence>
      <xs:element name="isElectricVehicle" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isElectricVehicle"/>
      <xs:element name="isExteriorLighting" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isExteriorLighting"/>
      <xs:element name="isGenerationSystem" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isGenerationSystem"/>
      <xs:element name="isHvacCompressorOrFurnace" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isHvacCompressorOrFurnace"/>
      <xs:element name="isInteriorLighting" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isInteriorLighting"/>
      <xs:element name="isIrrigationPump" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isIrrigationPump"/>
      <xs:element name="isManagedCommercialIndustrialLoad" type="xs:boolean"
minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isManagedCommercialIndustrialLoad"/>
      <xs:element name="isPoolPumpSpaJacuzzi" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isPoolPumpSpaJacuzzi"/>
      <xs:element name="isSimpleMiscLoad" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isSimpleMiscLoad"/>
      <xs:element name="isSmartAppliance" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isSmartAppliance"/>
      <xs:element name="isStripAndBaseboardHeater" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isStripAndBaseboardHeater"/>
      <xs:element name="isWaterHeater" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isWaterHeater"/>
    </xs:sequence>
  </xs:complexType>

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```

</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
  <xs:sequence/>
</xs:complexType>
<xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ElectronicAddress" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ElectronicAddress">
  <xs:sequence>
    <xs:element name="email1" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
    <xs:element name="email2" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
    <xs:element name="lan" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
    <xs:element name="mac" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
    <xs:element name="radio" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
    <xs:element name="userID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
    <xs:element name="web" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="installCode" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.installCode"/>
    <xs:element name="isPan" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isPan"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.electronicAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceAction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceAction">
  <xs:sequence>
    <xs:element name="command" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
    <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
    <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.durationIndefinite"/>
    <xs:element name="startDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.startDateTime"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControl" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceControl">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="drProgramLevel" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.drProgramLevel"/>
    <xs:element name="drProgramMandatory" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.drProgramMandatory"/>
    <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.issuerID"/>
    <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.issuerTrackingID"/>

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        <xs:element name="priceSignal" type="m:FloatQuantity" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.priceSignal"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.reason"/>
        <xs:choice minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceControl.EndDeviceAction">
            <xs:element name="PanDemandResponse" type="m:PanDemandResponse"
sawSDL:modelReference=""/>
            <xs:element name="PanDisplay" type="m:PanDisplay"
sawSDL:modelReference=""/>
            <xs:element name="PanPricing" type="m:PanPricing"
sawSDL:modelReference=""/>
        </xs:choice>
        <xs:element name="EndDeviceControlType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.EndDeviceControlType">
            <xs:complexType sawSDL:modelReference=""/>
            <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
        </xs:element>
        <xs:element name="EndDeviceGroups" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.EndDeviceGroups"/>
        <xs:element name="EndDevices" type="m:EndDevice" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.EndDevices"/>
        <xs:element name="primaryDeviceTiming" type="m:EndDeviceTiming" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.primaryDeviceTiming"/>
        <xs:element name="secondaryDeviceTiming" type="m:EndDeviceTiming" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.secondaryDeviceTiming"/>
        <xs:element name="UsagePointGroups" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.UsagePointGroups"/>
        <xs:element name="UsagePoints" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.UsagePoints"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControlType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceControlType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="domain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType.domain"/>
        <xs:element name="eventOrAction" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType.eventOrAction"/>
        <xs:element name="subDomain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType.subDomain"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType.type"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceInfo" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceInfo">
    <xs:sequence/>
</xs:complexType>
<xs:complexType name="EndDeviceTiming" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceTiming">
    <xs:sequence>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceTiming.duration"/>
        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceTiming.durationIndefinite"/>
    </xs:sequence>

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        <xs:element name="randomisation" type="m:RandomisationKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceTiming.randomisation"/>
        <xs:element name="interval" type="m:DateTimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceTiming.interval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanDemandResponse" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PanDemandResponse">
    <xs:sequence>
        <xs:element name="avgLoadAdjustment" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.avgLoadAdjustment"/>
        <xs:element name="cancelControlMode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.cancelControlMode"/>
        <xs:element name="cancelDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.cancelDateTime"/>
        <xs:element name="cancelNow" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.cancelNow"/>
        <xs:element name="command" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
        <xs:element name="coolingOffset" type="m:Temperature" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.coolingOffset"/>
        <xs:element name="coolingSetpoint" type="m:Temperature" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.coolingSetpoint"/>
        <xs:element name="criticalityLevel" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.criticalityLevel"/>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.durationIndefinite"/>
        <xs:element name="dutyCycle" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.dutyCycle"/>
        <xs:element name="enrollmentGroup" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.enrollmentGroup"/>
        <xs:element name="heatingOffset" type="m:Temperature" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.heatingOffset"/>
        <xs:element name="heatingSetpoint" type="m:Temperature" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.heatingSetpoint"/>
        <xs:element name="startDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.startDateTime"/>
        <xs:element name="appliance" type="m:ControlledAppliance" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.appliance"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanDisplay" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDisplay">
    <xs:sequence>

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        <xs:element name="command" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
        <xs:element name="confirmationRequired" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDisplay.confirmationRequired"/>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.durationIndefinite"/>
        <xs:element name="priority" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDisplay.priority"/>
        <xs:element name="startDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.startDateTime"/>
        <xs:element name="textMessage" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDisplay.textMessage"/>
        <xs:element name="transmissionMode" type="m:TransmissionModeKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDisplay.transmissionMode"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanPricing" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricing">
    <xs:sequence>
        <xs:element name="command" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.durationIndefinite"/>
        <xs:element name="providerID" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricing.providerID"/>
        <xs:element name="startDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.startDateTime"/>
        <xs:element name="PanPricingDetails" type="m:PanPricingDetail" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricing.PanPricingDetails"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanPricingDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PanPricingDetail">
    <xs:sequence>
        <xs:element name="alternateCostDelivered" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricingDetail.alternateCostDelivered"/>
        <xs:element name="alternateCostUnit" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.alternateCostUnit"/>
        <xs:element name="currentTimeDate" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.currentTimeDate"/>
        <xs:element name="generationPrice" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.generationPrice"/>
        <xs:element name="generationPriceRatio" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricingDetail.generationPriceRatio"/>
        <xs:element name="price" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.price"/>
        <xs:element name="priceRatio" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceRatio"/>
        <xs:element name="priceTier" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceTier"/>
        <xs:element name="priceTierCount" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceTierCount"/>
        <xs:element name="priceTierLabel" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceTierLabel"/>
        <xs:element name="rateLabel" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.rateLabel"/>
        <xs:element name="registerTier" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.registerTier"/>
        <xs:element name="unitOfMeasure" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.unitOfMeasure"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="RandomisationKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#RandomisationKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="default"/>
        <xs:enumeration value="end"/>
        <xs:enumeration value="none"/>
        <xs:enumeration value="start"/>
    </xs:restriction>

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        <xs:enumeration value="startAndEnd"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence/>
</xs:complexType>
<xs:simpleType name="TransmissionModeKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TransmissionModeKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="anonymous"/>
        <xs:enumeration value="both"/>
        <xs:enumeration value="normal"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="Minutes" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Minutes">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="FloatQuantity" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#FloatQuantity">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="PerCent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PerCent">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Money">
    <xs:restriction base="xs:decimal"/>
</xs:simpleType>
<xs:simpleType name="Temperature" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Temperature">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
</xs:schema>

```

H.7 EndDeviceEvents

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceEvents#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/EndDeviceEvents#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
    <xs:element name="EndDeviceEvents" type="m:EndDeviceEvents"/>
    <xs:complexType name="EndDeviceEvents">
        <xs:sequence>
            <xs:element name="EndDeviceEvent" type="m:EndDeviceEvent" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="EndDeviceEventType" type="m:EndDeviceEventType" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Asset" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset">

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    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="EndDeviceEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerID"/>
      <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerTrackingID"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.userID"/>
      <xs:element name="Assets" type="m:Asset" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.Assets"/>
      <xs:element name="EndDeviceEventDetails" type="m:EndDeviceEventDetail" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.EndDeviceEventDetails"/>
      <xs:element name="EndDeviceEventType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.EndDeviceEventType">
        <xs:complexType sawSDL:modelReference="">
          <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
      </xs:element>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.UsagePoint"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="EndDeviceEventDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail">
    <xs:sequence>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail.name"/>
      <xs:element name="value" type="m:StringQuantity" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail.value"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="EndDeviceEventType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="domain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.domain"/>
      <xs:element name="eventOrAction" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.eventOrAction"/>
      <xs:element name="subDomain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.subDomain"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.type"/>
      <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
      <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
  </xs:complexType>

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</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="StringQuantity" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StringQuantity">
  <xs:restriction base="xs:string"/>
</xs:simpleType>
</xs:schema>

```

H.8 GetCustomerAccountConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetCustomerAccountConfig#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetCustomerAccountConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetCustomerAccountConfig" type="m:GetCustomerAccountConfig"/>
  <xs:complexType name="GetCustomerAccountConfig">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>

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        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">

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        <xs:restriction base="xs:string">
            <xs:enumeration value="other"/>
            <xs:enumeration value="retailer"/>
            <xs:enumeration value="utility"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
</xs:schema>

```

H.9 GetCustomerAgreementConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetCustomerAgreementConfig#"
xmlns:sawsdl="http://www.w3.org/ns/sawsdl" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetCustomerAgreementConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetCustomerAgreementConfig" type="m:GetCustomerAgreementConfig"/>
    <xs:complexType name="GetCustomerAgreementConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="PricingStructure" type="m:PricingStructure" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>

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    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="commercialIndustrial"/>
      <xs:enumeration value="energyServiceScheduler"/>
      <xs:enumeration value="energyServiceSupplier"/>
      <xs:enumeration value="internalUse"/>
      <xs:enumeration value="other"/>
      <xs:enumeration value="pumpingLoad"/>
      <xs:enumeration value="residential"/>
      <xs:enumeration value="residentialAndCommercial"/>
      <xs:enumeration value="residentialAndStreetlight"/>
      <xs:enumeration value="residentialFarmService"/>
      <xs:enumeration value="residentialStreetlightOthers"/>
      <xs:enumeration value="windMachine"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
      <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
      <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
      <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
      <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
      <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="PricingStructure" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PricingStructure">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.code"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ServiceCategory" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="electricity"/>
      <xs:enumeration value="gas"/>
      <xs:enumeration value="heat"/>
    </xs:restriction>
  </xs:simpleType>

```



```

        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="other"/>
        <xs:enumeration value="retailer"/>
        <xs:enumeration value="utility"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.10 GetCustomerConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetCustomerConfig#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetCustomerConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetCustomerConfig" type="m:GetCustomerConfig"/>
    <xs:complexType name="GetCustomerConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```

```

<xs:element name="kind" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer.kind">
  <xs:simpleType sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="commercialIndustrial"/>
      <xs:enumeration value="energyServiceScheduler"/>
      <xs:enumeration value="energyServiceSupplier"/>
      <xs:enumeration value="internalUse"/>
      <xs:enumeration value="other"/>
      <xs:enumeration value="pumpingLoad"/>
      <xs:enumeration value="residential"/>
      <xs:enumeration value="residentialAndCommercial"/>
      <xs:enumeration value="residentialAndStreetlight"/>
      <xs:enumeration value="residentialFarmService"/>
      <xs:enumeration value="residentialStreetlightOthers"/>
      <xs:enumeration value="windMachine"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAccount">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>

```

```

    </xs:sequence>
  </xs:complexType>
</xs:schema>

```

H.11 GetEndDeviceConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
  xmlns:m="http://iec.ch/TC57/2011/GetEndDeviceConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://iec.ch/TC57/2011/GetEndDeviceConfig#" elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:element name="GetEndDeviceConfig" type="m:GetEndDeviceConfig"/>
  <xs:complexType name="GetEndDeviceConfig">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="commercialIndustrial"/>
      <xs:enumeration value="energyServiceScheduler"/>
      <xs:enumeration value="energyServiceSupplier"/>
      <xs:enumeration value="internalUse"/>
      <xs:enumeration value="other"/>
      <xs:enumeration value="pumpingLoad"/>
      <xs:enumeration value="residential"/>
      <xs:enumeration value="residentialAndCommercial"/>
    </xs:restriction>
  </xs:simpleType>

```

```

        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="isPan" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isPan"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```

```

        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.12 GetEndDeviceControls

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetEndDeviceControls#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetEndDeviceControls#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetEndDeviceControls" type="m:GetEndDeviceControls"/>
    <xs:complexType name="GetEndDeviceControls">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDeviceControl" type="m:EndDeviceControl" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDeviceControlType" type="m:EndDeviceControlType"
minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>

```

```

<xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="commercialIndustrial"/>
    <xs:enumeration value="energyServiceScheduler"/>
    <xs:enumeration value="energyServiceSupplier"/>
    <xs:enumeration value="internalUse"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="pumpingLoad"/>
    <xs:enumeration value="residential"/>
    <xs:enumeration value="residentialAndCommercial"/>
    <xs:enumeration value="residentialAndStreetlight"/>
    <xs:enumeration value="residentialFarmService"/>
    <xs:enumeration value="residentialStreetlightOthers"/>
    <xs:enumeration value="windMachine"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControl" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceControl">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.issuerID"/>
    <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.issuerTrackingID"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.reason"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControlType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceControlType">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>

```



```

</xs:complexType>
<xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="electricity"/>
    <xs:enumeration value="gas"/>
    <xs:enumeration value="heat"/>
    <xs:enumeration value="internet"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="rates"/>
    <xs:enumeration value="refuse"/>
    <xs:enumeration value="sewerage"/>
    <xs:enumeration value="time"/>
    <xs:enumeration value="tvLicence"/>
    <xs:enumeration value="water"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="TimeSchedule" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule">
  <xs:sequence>
    <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.scheduleInterval"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.13 GetEndDeviceEvents

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetEndDeviceEvents#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetEndDeviceEvents#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetEndDeviceEvents" type="m:GetEndDeviceEvents"/>
  <xs:complexType name="GetEndDeviceEvents">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceEvent" type="m:EndDeviceEvent" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceEventType" type="m:EndDeviceEventType" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>

```



```

        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
        <xs:restriction base="xs:string">
            <xs:enumeration value="commercialIndustrial"/>
            <xs:enumeration value="energyServiceScheduler"/>
            <xs:enumeration value="energyServiceSupplier"/>
            <xs:enumeration value="internalUse"/>
            <xs:enumeration value="other"/>
            <xs:enumeration value="pumpingLoad"/>
            <xs:enumeration value="residential"/>
            <xs:enumeration value="residentialAndCommercial"/>
            <xs:enumeration value="residentialAndStreetlight"/>
            <xs:enumeration value="residentialFarmService"/>
            <xs:enumeration value="residentialStreetlightOthers"/>
            <xs:enumeration value="windMachine"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
        <xs:sequence>
            <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
            <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDeviceEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceEvent">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerID"/>
            <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerTrackingID"/>
            <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
            <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDeviceEventType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceEventType">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDeviceGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
        <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="electricity"/>
        <xs:enumeration value="gas"/>
        <xs:enumeration value="heat"/>
        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```

```

        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeSchedule" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule">
    <xs:sequence>
        <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.scheduleInterval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.14 GetMeterConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetMeterConfig#" xmlns:sawsd1="http://www.w3.org/ns/sawsd1"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/GetMeterConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
    <xs:element name="GetMeterConfig" type="m:GetMeterConfig"/>
    <xs:complexType name="GetMeterConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAccount" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
        <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDeviceGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>

```

```

        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.15 GetMeterReadings

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetMeterReadings#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/GetMeterReadings#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
    <xs:element name="GetMeterReadings" type="m:GetMeterReadings"/>
    <xs:complexType name="GetMeterReadings">
        <xs:sequence>
            <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="MeterReadings" type="m:MeterReadings" minOccurs="0"/>
            <xs:element name="Reading" type="m:Reading" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ReadingQuality" type="m:ReadingQuality" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="TransformerTank" type="m:TransformerTank" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CoincidentReading" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Reading">
        <xs:sequence>
            <xs:element name="reason" type="m:ReadingReasonKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Reading.reason"/>
            <xs:element name="source" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.source"/>
            <xs:element name="ReadingType" type="m:ReadingType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Reading.ReadingType"/>
            <xs:element name="timePeriod" type="m:DateTimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.timePeriod"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">

```

```

<xs:sequence>
  <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
  <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceEvent">
  <xs:sequence>
    <xs:element name="EndDeviceEventType" type="m:EndDeviceEventType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.EndDeviceEventType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEventType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceEventType">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MeterReadings" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MeterReading">
  <xs:sequence>
    <xs:element name="isCoincidentTrigger" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.isCoincidentTrigger"/>
    <xs:element name="EndDeviceEvents" type="m:EndDeviceEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.EndDeviceEvents"/>
    <xs:element name="Meter" type="m:Meter" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.Meter"/>
    <xs:element name="Readings" type="m:CoincidentReading" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.Readings"/>
    <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.UsagePoint"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>

```



```

        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Reading" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Reading">
    <xs:sequence>
        <xs:element name="reason" type="m:ReadingReasonKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Reading.reason"/>
        <xs:element name="source" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.source"/>
        <xs:element name="timePeriod" type="m:DateTimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.timePeriod"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingQuality" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQuality">
    <xs:sequence>
        <xs:element name="ReadingQualityType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQuality.ReadingQualityType">
            <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQualityType">
                <xs:sequence>
                    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
                    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ReadingReasonKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingReasonKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="billing"/>
        <xs:enumeration value="demandReset"/>
        <xs:enumeration value="inquiry"/>
        <xs:enumeration value="installation"/>
        <xs:enumeration value="loadManagement"/>
        <xs:enumeration value="loadResearch"/>
        <xs:enumeration value="moveIn"/>
        <xs:enumeration value="moveOut"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="removal"/>
        <xs:enumeration value="serviceConnect"/>
        <xs:enumeration value="serviceDisconnect"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ReadingType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeSchedule" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule">
    <xs:sequence>
        <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.scheduleInterval"/>

```

```

    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TransformerTank" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TransformerTank">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointGroup">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
</xs:schema>

```

H.16 GetServiceCategoryConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetServiceCategoryConfig#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/GetServiceCategoryConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetServiceCategoryConfig" type="m:GetServiceCategoryConfig"/>
  <xs:complexType name="GetServiceCategoryConfig">
    <xs:sequence>
      <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
      <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
      <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
      <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
      <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>

```



```

        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="electricity"/>
        <xs:enumeration value="gas"/>
        <xs:enumeration value="heat"/>
        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
</xs:schema>

```

H.17 GetServiceLocationConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetServiceLocationConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetServiceLocationConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetServiceLocationConfig" type="m:GetServiceLocationConfig"/>
    <xs:complexType name="GetServiceLocationConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
        <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```

```

        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.18 GetServiceSupplierConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetServiceSupplierConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetServiceSupplierConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetServiceSupplierConfig" type="m:GetServiceSupplierConfig"/>
    <xs:complexType name="GetServiceSupplierConfig">
        <xs:sequence>
            <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
        <xs:sequence>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
            <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
            <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ServiceSupplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="SupplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">

```

```

        <xs:restriction base="xs:string">
            <xs:enumeration value="other"/>
            <xs:enumeration value="retailer"/>
            <xs:enumeration value="utility"/>
        </xs:restriction>
    </xs:simpleType>
</xs:schema>

```

H.19 GetUsagePointConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetUsagePointConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetUsagePointConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetUsagePointConfig" type="m:GetUsagePointConfig"/>
    <xs:complexType name="GetUsagePointConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="PricingStructure" type="m:PricingStructure" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
        <xs:restriction base="xs:string">
            <xs:enumeration value="commercialIndustrial"/>

```

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        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PricingStructure" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PricingStructure">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.code"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="electricity"/>
        <xs:enumeration value="gas"/>
        <xs:enumeration value="heat"/>
        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
    </xs:restriction>

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```

        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="other"/>
        <xs:enumeration value="retailer"/>
        <xs:enumeration value="utility"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.20 GetUsagePointLocationConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetUsagePointLocationConfig#"
xmlns:sawsdl="http://www.w3.org/ns/sawsdl" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetUsagePointLocationConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetUsagePointLocationConfig" type="m:GetUsagePointLocationConfig"/>
    <xs:complexType name="GetUsagePointLocationConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>

```



```

        <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="electricity"/>
    <xs:enumeration value="gas"/>
    <xs:enumeration value="heat"/>
    <xs:enumeration value="internet"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="rates"/>
    <xs:enumeration value="refuse"/>
    <xs:enumeration value="sewerage"/>
    <xs:enumeration value="time"/>
    <xs:enumeration value="tvLicence"/>
    <xs:enumeration value="water"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="other"/>
    <xs:enumeration value="retailer"/>
    <xs:enumeration value="utility"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
  <xs:sequence>

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        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.21 MasterDataLinkageConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/MasterDataLinkageConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/MasterDataLinkageConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="MasterDataLinkageConfig" type="m:MasterDataLinkageConfig"/>
    <xs:complexType name="MasterDataLinkageConfig">
        <xs:sequence>
            <xs:element name="AuxiliaryAgreement" type="m:AuxiliaryAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ComModule" type="m:ComModule" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ConfigurationEvent" type="m:ConfigurationEvent" minOccurs="0"/>
            <xs:element name="Customer" type="m:Customer" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="PricingStructure" type="m:PricingStructure" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="TransformerTank" type="m:TransformerTank" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="UsagePointLocation" type="m:UsagePointLocation" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="AuxiliaryAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#AuxiliaryAgreement">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ComModule" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComModule">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
            <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
            <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
            <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>

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        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
        <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PricingStructure" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PricingStructure">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceSupplier">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TransformerTank" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TransformerTank">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePointLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>

```

```
</xs:schema>
```

H.22 MeterConfig

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/MeterConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/MeterConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="MeterConfig" type="m:MeterConfig"/>
  <xs:complexType name="MeterConfig">
    <xs:sequence>
      <xs:element name="ComFunction" type="m:ComFunction" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ConnectDisconnectFunction" type="m:ConnectDisconnectFunction" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="SimpleEndDeviceFunction" type="m:SimpleEndDeviceFunction" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ActivityRecord" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord">
    <xs:sequence>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="AssetModelUsageKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#AssetModelUsageKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="customerSubstation"/>
      <xs:enumeration value="distributionOverhead"/>
      <xs:enumeration value="distributionUnderground"/>
      <xs:enumeration value="other"/>
      <xs:enumeration value="streetlight"/>
      <xs:enumeration value="substation"/>
      <xs:enumeration value="transmission"/>
      <xs:enumeration value="unknown"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="Channel" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Channel">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Channel.isVirtual"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="ReadingType" minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Channel.ReadingType">
        <xs:complexType sawSDL:modelReference="">
          <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="ComDirectionKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComDirectionKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="biDirectional"/>
      <xs:enumeration value="fromDevice"/>
      <xs:enumeration value="toDevice"/>
    </xs:restriction>
  </xs:simpleType>
```

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<xs:complexType name="ComFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrAddress" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrAddress"/>
    <xs:element name="amrRouter" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrRouter"/>
    <xs:element name="configID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
    <xs:element name="direction" type="m:ComDirectionKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.direction"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
    <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="programID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
    <xs:element name="technology" type="m:ComTechnologyKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.technology"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ComTechnologyKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComTechnologyKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="cellular"/>
    <xs:enumeration value="ethernet"/>
    <xs:enumeration value="homePlug"/>
    <xs:enumeration value="pager"/>
    <xs:enumeration value="phone"/>
    <xs:enumeration value="plc"/>
    <xs:enumeration value="rf"/>
    <xs:enumeration value="rfMesh"/>
    <xs:enumeration value="zigbee"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
    <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
    <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
    <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ConnectDisconnectFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConnectDisconnectFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>

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    <xs:element name="eventCount" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.eventCount"/>
    <xs:element name="isConnected" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isConnected"/>
    <xs:element name="isDelayedDiscon" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isDelayedDiscon"/>
    <xs:element name="isLocalAutoDisconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isLocalAutoDisconOp"/>
    <xs:element name="isLocalAutoReconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isLocalAutoReconOp"/>
    <xs:element name="isRemoteAutoDisconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isRemoteAutoDisconOp"/>
    <xs:element name="isRemoteAutoReconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isRemoteAutoReconOp"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="Names" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names">
      <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
        <xs:sequence>
          <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
          <xs:element name="NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType">
            <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
              <xs:sequence>
                <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
                <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
                <xs:element name="NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority">
                  <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
                    <xs:sequence>
                      <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
                      <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
                    </xs:sequence>
                  </xs:complexType>
                </xs:element>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="rcdInfo" type="m:RemoteConnectDisconnectInfo" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.rcdInfo"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="CorporateStandardKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CorporateStandardKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="experimental"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="standard"/>
    <xs:enumeration value="underEvaluation"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>

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</xs:complexType>
<xs:complexType name="ElectronicAddress" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ElectronicAddress">
  <xs:sequence>
    <xs:element name="email1" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
    <xs:element name="email2" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
    <xs:element name="lan" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
    <xs:element name="mac" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
    <xs:element name="radio" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
    <xs:element name="userID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
    <xs:element name="web" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceCapability" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability">
  <xs:sequence>
    <xs:element name="autonomousDst" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.autonomousDst"/>
    <xs:element name="communication" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.communication"/>
    <xs:element name="connectDisconnect" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.connectDisconnect"/>
    <xs:element name="demandResponse" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.demandResponse"/>
    <xs:element name="electricMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.electricMetering"/>
    <xs:element name="gasMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.gasMetering"/>
    <xs:element name="metrology" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.metrology"/>
    <xs:element name="onRequestRead" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.onRequestRead"/>
    <xs:element name="outageHistory" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.outageHistory"/>
    <xs:element name="pressureCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.pressureCompensation"/>
    <xs:element name="pricingInfo" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.pricingInfo"/>
    <xs:element name="pulseOutput" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.pulseOutput"/>
    <xs:element name="relaysProgramming" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.relaysProgramming"/>
    <xs:element name="reverseFlow" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.reverseFlow"/>
    <xs:element name="superCompressibilityCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.superCompressibilityCompensation"/>
    <xs:element name="temperatureCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.temperatureCompensation"/>
    <xs:element name="textMessage" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.textMessage"/>
    <xs:element name="waterMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.waterMetering"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="EndDeviceFunctionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceFunctionKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="autonomousDst"/>
    <xs:enumeration value="demandResponse"/>
    <xs:enumeration value="electricMetering"/>
    <xs:enumeration value="gasMetering"/>
    <xs:enumeration value="metrology"/>
  </xs:restriction>
</xs:simpleType>

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    <xs:enumeration value="onRequestRead"/>
    <xs:enumeration value="outageHistory"/>
    <xs:enumeration value="relaysProgramming"/>
    <xs:enumeration value="reverseFlow"/>
    <xs:enumeration value="waterMetering"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDeviceInfo" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo">
  <xs:sequence>
    <xs:element name="isSolidState" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.isSolidState"/>
    <xs:element name="phaseCount" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.phaseCount"/>
    <xs:element name="ratedCurrent" type="m:CurrentFlow" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedCurrent"/>
    <xs:element name="ratedVoltage" type="m:Voltage" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedVoltage"/>
    <xs:element name="AssetModel" type="m:ProductAssetModel" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetInfo.AssetModel"/>
    <xs:element name="capability" type="m:EndDeviceCapability" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.capability"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="LifecycleDate" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate">
  <xs:sequence>
    <xs:element name="installationDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.installationDate"/>
    <xs:element name="manufacturedDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.manufacturedDate"/>
    <xs:element name="purchaseDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.purchaseDate"/>
    <xs:element name="receivedDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.receivedDate"/>
    <xs:element name="removalDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.removalDate"/>
    <xs:element name="retiredDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.retiredDate"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Manufacturer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Manufacturer">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
    <xs:element name="formNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter.formNumber"/>
    <xs:element name="initialCondition" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialCondition"/>
    <xs:element name="initialLossOfLife" type="m:PerCent" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialLossOfLife"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isVirtual"/>
    <xs:element name="lotNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lotNumber"/>
    <xs:element name="purchasePrice" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.purchasePrice"/>
    <xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
    <xs:element name="timeZoneOffset" type="m:Minutes" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.timeZoneOffset"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
    <xs:element name="utcNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.utcNumber"/>
  </xs:sequence>
</xs:complexType>

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<xs:element name="ActivityRecords" type="m:ActivityRecord" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ActivityRecords"/>
<xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ConfigurationEvents"/>
<xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.electronicAddress"/>
<xs:choice minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceFunctions">
  <xs:element name="ComFunction" sawSDL:modelReference="">
    <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction">
      <xs:attribute name="ref" type="xs:string"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="ConnectDisconnectFunction" sawSDL:modelReference="">
    <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction">
      <xs:attribute name="ref" type="xs:string"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="SimpleEndDeviceFunction" sawSDL:modelReference="">
    <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction">
      <xs:attribute name="ref" type="xs:string"/>
    </xs:complexType>
  </xs:element>
</xs:choice>
<xs:element name="EndDeviceInfo" type="m:EndDeviceInfo" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceInfo"/>
<xs:element name="lifecycle" type="m:LifecycleDate" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lifecycle"/>
<xs:element name="MeterMultipliers" type="m:MeterMultiplier" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter.MeterMultipliers"/>
<xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
<xs:element name="Seals" type="m:Seal" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetContainer.Seals"/>
<xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.status"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="MeterMultiplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:MeterMultiplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier.kind"/>
    <xs:element name="value" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier.value"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="MeterMultiplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplierKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="ctRatio"/>
    <xs:enumeration value="kE"/>
    <xs:enumeration value="kH"/>
    <xs:enumeration value="kR"/>
    <xs:enumeration value="ptRatio"/>
    <xs:enumeration value="transformerRatio"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
  <xs:sequence>

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    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ProductAssetModel" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel">
  <xs:sequence>
    <xs:element name="corporateStandardKind" type="m:CorporateStandardKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.corporateStandardKind"/>
    <xs:element name="modelName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelName"/>
    <xs:element name="modelVersion" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelVersion"/>
    <xs:element name="usageKind" type="m:AssetModelUsageKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.usageKind"/>
    <xs:element name="Manufacturer" type="m:Manufacturer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.Manufacturer"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="RationalNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RationalNumber">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.denominator"/>
    <xs:element name="numerator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.numerator"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingInterharmonic" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ReadingInterharmonic">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.denominator"/>
    <xs:element name="numerator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.numerator"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="accumulation" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.accumulation"/>
    <xs:element name="aggregate" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.aggregate"/>
    <xs:element name="commodity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.commodity"/>
    <xs:element name="consumptionTier" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.consumptionTier"/>
    <xs:element name="cpp" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.cpp"/>
    <xs:element name="currency" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.currency"/>
    <xs:element name="flowDirection" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.flowDirection"/>
    <xs:element name="macroPeriod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.macroPeriod"/>
    <xs:element name="measurementKind" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measurementKind"/>
    <xs:element name="measuringPeriod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measuringPeriod"/>

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        <xs:element name="multiplier" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.multiplier"/>
        <xs:element name="phases" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.phases"/>
        <xs:element name="tou" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.tou"/>
        <xs:element name="unit" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.unit"/>
        <xs:element name="argument" type="m:RationalNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.argument"/>
        <xs:element name="interharmonic" type="m:ReadingInterharmonic" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.interharmonic"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Register" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.isVirtual"/>
        <xs:element name="leftDigitCount" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.leftDigitCount"/>
        <xs:element name="rightDigitCount" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.rightDigitCount"/>
        <xs:element name="touTierName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTierName"/>
        <xs:element name="Channels" type="m:Channel" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.Channels"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="touTier" type="m:TimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTier"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="RemoteConnectDisconnectInfo"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo">
    <xs:sequence>
        <xs:element name="armedTimeout" type="m:Seconds" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.armedTimeout"/>
        <xs:element name="customerVoltageLimit" type="m:Voltage" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.customerVoltageLimit"/>
        <xs:element name="energyLimit" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyLimit"/>
        <xs:element name="energyUsageStartDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyUsageStartDateTime"/>
        <xs:element name="energyUsageWarning" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyUsageWarning"/>
        <xs:element name="isArmConnect" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isArmConnect"/>
        <xs:element name="isArmDisconnect" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isArmDisconnect"/>
        <xs:element name="isEnergyLimiting" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isEnergyLimiting"/>
        <xs:element name="needsPowerLimitCheck" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.needsPowerLimitCheck"/>
        <xs:element name="needsVoltageLimitCheck" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.needsVoltageLimitCheck"/>
        <xs:element name="powerLimit" type="m:ActivePower" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.powerLimit"/>
        <xs:element name="usePushbutton" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.usePushbutton"/>
    </xs:sequence>
</xs:complexType>

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</xs:sequence>
</xs:complexType>
<xs:complexType name="Seal" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="appliedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.appliedDateTime"/>
    <xs:element name="condition" type="m:SealConditionKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.condition"/>
    <xs:element name="kind" type="m:SealKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.kind"/>
    <xs:element name="sealNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.sealNumber"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="SealConditionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SealConditionKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="broken"/>
    <xs:enumeration value="locked"/>
    <xs:enumeration value="missing"/>
    <xs:enumeration value="open"/>
    <xs:enumeration value="other"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="SealKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SealKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="lead"/>
    <xs:enumeration value="lock"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="steel"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="SimpleEndDeviceFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="configID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
    <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
    <xs:element name="kind" type="m:EndDeviceFunctionKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction.kind"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="programID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Registers" type="m:Register" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.Registers"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>

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<xs:complexType name="TimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:time" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.end"/>
    <xs:element name="start" type="xs:time" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="RealEnergy" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RealEnergy">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Voltage" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Voltage">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="CurrentFlow" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CurrentFlow">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="ActivePower" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivePower">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Minutes" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Minutes">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Seconds" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Seconds">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="PerCent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PerCent">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Money">
  <xs:restriction base="xs:decimal"/>
</xs:simpleType>
</xs:schema>

```

H.23 MeterReadings

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/MeterReadings#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/MeterReadings#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="MeterReadings" type="m:MeterReadings"/>
  <xs:complexType name="MeterReadings">
    <xs:sequence>
      <xs:element name="EndDeviceEventType" type="m:EndDeviceEventType" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="MeterReading" type="m:MeterReading" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ReadingQualityType" type="m:ReadingQualityType" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Asset" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">
    <xs:sequence>
      <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>

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        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="createdDateTime" type="xs:dateTime"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
        <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerID"/>
        <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerTrackingID"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
        <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
        <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.userID"/>
        <xs:element name="Assets" type="m:Asset" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.Assets"/>
        <xs:element name="EndDeviceEventDetails" type="m:EndDeviceEventDetail" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.EndDeviceEventDetails"/>
        <xs:element name="EndDeviceEventType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.EndDeviceEventType">
            <xs:complexType sawSDL:modelReference="">
                <xs:attribute name="ref" type="xs:string"/>
            </xs:complexType>
        </xs:element>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
        <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.UsagePoint"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEventDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail.name"/>
        <xs:element name="value" type="m:StringQuantity" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEventType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="domain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.domain"/>
        <xs:element name="eventOrAction" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.eventOrAction"/>
        <xs:element name="subDomain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.subDomain"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.type"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="IntervalBlock" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IntervalBlock">
    <xs:sequence>
        <xs:element name="IntervalReadings" type="m:IntervalReading" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IntervalBlock.IntervalReadings"/>
        <xs:element name="PendingCalculation" type="m:PendingCalculation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IntervalBlock.PendingCalculation"/>
        <xs:element name="ReadingType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IntervalBlock.ReadingType">
            <xs:complexType sawSDL:modelReference="">

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        <xs:attribute name="ref" type="xs:string"/>
    </xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="IntervalReading" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IntervalReading">
    <xs:sequence>
        <xs:element name="reportedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.reportedDateTime"/>
        <xs:element name="source" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.source"/>
        <xs:element name="timeStamp" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeasurementValue.timeStamp"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.value"/>
        <xs:element name="ReadingQualities" type="m:ReadingQuality" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.ReadingQualities"/>
        <xs:element name="timePeriod" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.timePeriod"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="MeterReading" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MeterReading">
    <xs:sequence>
        <xs:element name="isCoincidentTrigger" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.isCoincidentTrigger"/>
        <xs:element name="EndDeviceEvents" type="m:EndDeviceEvent" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.EndDeviceEvents"/>
        <xs:element name="IntervalBlocks" type="m:IntervalBlock" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.IntervalBlocks"/>
        <xs:element name="Meter" type="m:Meter" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.Meter"/>
        <xs:element name="Readings" type="m:Reading" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.Readings"/>
        <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.UsagePoint"/>
        <xs:element name="valuesInterval" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading.valuesInterval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>

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    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PendingCalculation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PendingCalculation">
  <xs:sequence>
    <xs:element name="multiplyBeforeAdd" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PendingCalculation.multiplyBeforeAdd"/>
    <xs:element name="offset" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PendingCalculation.offset"/>
    <xs:element name="scalarDenominator" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PendingCalculation.scalarDenominator"/>
    <xs:element name="scalarFloat" type="xs:float" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PendingCalculation.scalarFloat"/>
    <xs:element name="scalarNumerator" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PendingCalculation.scalarNumerator"/>
    <xs:element name="ReadingType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PendingCalculation.ReadingType">
      <xs:complexType sawsdl:modelReference="">
        <xs:attribute name="ref" type="xs:string"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="RationalNumber" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RationalNumber">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.denominator"/>
    <xs:element name="numerator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.numerator"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Reading" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Reading">
  <xs:sequence>
    <xs:element name="reason" type="m:ReadingReasonKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Reading.reason"/>
    <xs:element name="reportedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.reportedDateTime"/>
    <xs:element name="source" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.source"/>
    <xs:element name="timeStamp" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeasurementValue.timeStamp"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.value"/>
    <xs:element name="ReadingQualities" type="m:ReadingQuality" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.ReadingQualities"/>
    <xs:element name="ReadingType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Reading.ReadingType">
      <xs:complexType sawsdl:modelReference="">
        <xs:attribute name="ref" type="xs:string"/>
      </xs:complexType>
    </xs:element>
    <xs:element name="timePeriod" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.timePeriod"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingInterharmonic" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ReadingInterharmonic">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.denominator"/>
    <xs:element name="numerator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.numerator"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingQuality" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQuality">
  <xs:sequence>
    <xs:element name="comment" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQuality.comment"/>
    <xs:element name="source" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQuality.source"/>

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        <xs:element name="timeStamp" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQuality.timeStamp"/>
        <xs:element name="ReadingQualityType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQuality.ReadingQualityType">
            <xs:complexType sawSDL:modelReference="">
                <xs:attribute name="ref" type="xs:string"/>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingQualityType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQualityType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="category" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQualityType.category"/>
        <xs:element name="subCategory" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQualityType.subCategory"/>
        <xs:element name="systemId" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQualityType.systemId"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ReadingReasonKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingReasonKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="billing"/>
        <xs:enumeration value="demandReset"/>
        <xs:enumeration value="inquiry"/>
        <xs:enumeration value="installation"/>
        <xs:enumeration value="loadManagement"/>
        <xs:enumeration value="loadResearch"/>
        <xs:enumeration value="moveIn"/>
        <xs:enumeration value="moveOut"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="removal"/>
        <xs:enumeration value="serviceConnect"/>
        <xs:enumeration value="serviceDisconnect"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ReadingType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="accumulation" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.accumulation"/>
        <xs:element name="aggregate" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.aggregate"/>
        <xs:element name="commodity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.commodity"/>
        <xs:element name="consumptionTier" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.consumptionTier"/>
        <xs:element name="cpp" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.cpp"/>
        <xs:element name="currency" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.currency"/>
        <xs:element name="flowDirection" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.flowDirection"/>
        <xs:element name="macroPeriod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.macroPeriod"/>
        <xs:element name="measurementKind" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measurementKind"/>
        <xs:element name="measuringPeriod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measuringPeriod"/>
        <xs:element name="multiplier" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.multiplier"/>
        <xs:element name="phases" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.phases"/>
        <xs:element name="tou" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.tou"/>
        <xs:element name="unit" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.unit"/>
    </xs:sequence>

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    <xs:element name="argument" type="m:RationalNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.argument"/>
    <xs:element name="interharmonic" type="m:ReadingInterharmonic" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.interharmonic"/>
    <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="StringQuantity" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StringQuantity">
  <xs:restriction base="xs:string"/>
</xs:simpleType>
</xs:schema>

```

H.24 ServiceCategoryConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/ServiceCategoryConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/ServiceCategoryConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="ServiceCategoryConfig" type="m:ServiceCategoryConfig"/>
  <xs:complexType name="ServiceCategoryConfig">
    <xs:sequence>
      <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>

```

```

</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceCategory">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.ConfigurationEvents"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="electricity"/>
    <xs:enumeration value="gas"/>
    <xs:enumeration value="heat"/>
    <xs:enumeration value="internet"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="rates"/>
    <xs:enumeration value="refuse"/>
    <xs:enumeration value="sewerage"/>
    <xs:enumeration value="time"/>
    <xs:enumeration value="tvLicence"/>
    <xs:enumeration value="water"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.25 ServiceLocationConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/ServiceLocationConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/ServiceLocationConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="ServiceLocationConfig" type="m:ServiceLocationConfig"/>
  <xs:complexType name="ServiceLocationConfig">
    <xs:sequence>
      <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CoordinateSystem" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CoordinateSystem">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="crsUrn" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CoordinateSystem.crsUrn"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress">
    <xs:sequence>
      <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
      <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
      <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
      <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
      <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
      <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
      <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
      <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    </xs:sequence>
  </xs:complexType>

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        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PositionPoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PositionPoint">
    <xs:sequence>
        <xs:element name="sequenceNumber" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.sequenceNumber"/>
        <xs:element name="xPosition" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PositionPoint.xPosition"/>
        <xs:element name="yPosition" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PositionPoint.yPosition"/>
        <xs:element name="zPosition" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.zPosition"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="accessMethod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation.accessMethod"/>
        <xs:element name="direction" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.direction"/>
        <xs:element name="geoInfoReference" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.geoInfoReference"/>
        <xs:element name="needsInspection" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation.needsInspection"/>
        <xs:element name="siteAccessProblem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation.siteAccessProblem"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.type"/>
        <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.ConfigurationEvents"/>
        <xs:element name="CoordinateSystem" type="m:CoordinateSystem" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.CoordinateSystem"/>
        <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.electronicAddress"/>
        <xs:element name="mainAddress" type="m:StreetAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.mainAddress"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone1"/>
        <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone2"/>
        <xs:element name="PositionPoints" type="m:PositionPoint" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.PositionPoints"/>
        <xs:element name="secondaryAddress" type="m:StreetAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.secondaryAddress"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.status"/>
    </xs:sequence>
</xs:complexType>

```



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<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetAddress" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetAddress">
  <xs:sequence>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.status"/>
    <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.streetDetail"/>
    <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.townDetail"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetDetail" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetDetail">
  <xs:sequence>
    <xs:element name="addressGeneral" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.addressGeneral"/>
    <xs:element name="buildingName" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.buildingName"/>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.code"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.name"/>
    <xs:element name="number" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.number"/>
    <xs:element name="prefix" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.prefix"/>
    <xs:element name="suffix" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suffix"/>
    <xs:element name="suiteNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suiteNumber"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.type"/>
    <xs:element name="withinTownLimits" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.withinTownLimits"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TelephoneNumber" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TelephoneNumber">
  <xs:sequence>
    <xs:element name="areaCode" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.areaCode"/>
    <xs:element name="cityCode" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.cityCode"/>
    <xs:element name="countryCode" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.countryCode"/>
    <xs:element name="extension" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.extension"/>
    <xs:element name="localNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.localNumber"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TownDetail" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TownDetail">
  <xs:sequence>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.code"/>
    <xs:element name="country" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.country"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.name"/>
    <xs:element name="section" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.section"/>
  </xs:sequence>
</xs:complexType>

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        <xs:element name="stateOrProvince" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.stateOrProvince"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.26 ServiceSupplierConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/ServiceSupplierConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/ServiceSupplierConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="ServiceSupplierConfig" type="m:ServiceSupplierConfig"/>
    <xs:complexType name="ServiceSupplierConfig">
        <xs:sequence>
            <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
            <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
            <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
            <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
            <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
            <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
            <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
            <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ElectronicAddress">
        <xs:sequence>
            <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
            <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
            <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
            <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
            <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
            <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
            <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
            <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
        <xs:sequence>
            <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
            <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
        </xs:sequence>
    </xs:complexType>

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<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Organisation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Organisation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.electronicAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone1"/>
    <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone2"/>
    <xs:element name="postalAddress" type="m:PostalAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.postalAddress"/>
    <xs:element name="streetAddress" type="m:StreetAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.streetAddress"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PostalAddress" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PostalAddress">
  <xs:sequence>
    <xs:element name="poBox" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.poBox"/>
    <xs:element name="postalCode" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.postalCode"/>
    <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.streetDetail"/>
    <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.townDetail"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceSupplier">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="issuerIdentificationNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceSupplier.issuerIdentificationNumber"/>
    <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.ConfigurationEvents"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Organisation" type="m:Organisation" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.Organisation"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>

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        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress">
    <xs:sequence>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.status"/>
        <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.streetDetail"/>
        <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.townDetail"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail">
    <xs:sequence>
        <xs:element name="addressGeneral" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.addressGeneral"/>
        <xs:element name="buildingName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.buildingName"/>
        <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.code"/>
        <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.name"/>
        <xs:element name="number" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.number"/>
        <xs:element name="prefix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.prefix"/>
        <xs:element name="suffix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suffix"/>
        <xs:element name="suiteNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suiteNumber"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.type"/>
        <xs:element name="withinTownLimits" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.withinTownLimits"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SupplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="other"/>
        <xs:enumeration value="retailer"/>
        <xs:enumeration value="utility"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="TelephoneNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber">
    <xs:sequence>
        <xs:element name="areaCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.areaCode"/>
        <xs:element name="cityCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.cityCode"/>
        <xs:element name="countryCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.countryCode"/>
        <xs:element name="extension" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.extension"/>
        <xs:element name="localNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.localNumber"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TownDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail">
    <xs:sequence>
        <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.code"/>
        <xs:element name="country" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.country"/>
        <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.name"/>

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    <xs:element name="section" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.section"/>
    <xs:element name="stateOrProvince" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.stateOrProvince"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.27 UsagePointConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/UsagePointConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/UsagePointConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="UsagePointConfig" type="m:UsagePointConfig"/>
  <xs:complexType name="UsagePointConfig">
    <xs:sequence>
      <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="AmiBillingReadyKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AmiBillingReadyKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="amiCapable"/>
      <xs:enumeration value="amiDisabled"/>
      <xs:enumeration value="billingApproved"/>
      <xs:enumeration value="enabled"/>
      <xs:enumeration value="nonAmi"/>
      <xs:enumeration value="nonMetered"/>
      <xs:enumeration value="operable"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="MetrologyRequirement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#MetrologyRequirement">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="reason" type="m:ReadingReasonKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MetrologyRequirement.reason"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="ReadingTypes" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MetrologyRequirement.ReadingTypes">
        <xs:complexType sawSDL:modelReference="">

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        <xs:attribute name="ref" type="xs:string"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="PhaseCode" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PhaseCode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="A"/>
    <xs:enumeration value="AB"/>
    <xs:enumeration value="ABC"/>
    <xs:enumeration value="ABCN"/>
    <xs:enumeration value="ABN"/>
    <xs:enumeration value="AC"/>
    <xs:enumeration value="ACN"/>
    <xs:enumeration value="AN"/>
    <xs:enumeration value="B"/>
    <xs:enumeration value="BC"/>
    <xs:enumeration value="BCN"/>
    <xs:enumeration value="BN"/>
    <xs:enumeration value="C"/>
    <xs:enumeration value="CN"/>
    <xs:enumeration value="N"/>
    <xs:enumeration value="s1"/>
    <xs:enumeration value="s12"/>
    <xs:enumeration value="s12N"/>
    <xs:enumeration value="s1N"/>
    <xs:enumeration value="s2"/>
    <xs:enumeration value="s2N"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="PricingStructure" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PricingStructure">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.code"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="RationalNumber" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#RationalNumber">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.denominator"/>

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        <xs:element name="numerator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.numerator"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingInterharmonic" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ReadingInterharmonic">
    <xs:sequence>
        <xs:element name="denominator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.denominator"/>
        <xs:element name="numerator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.numerator"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ReadingReasonKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ReadingReasonKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="billing"/>
        <xs:enumeration value="demandReset"/>
        <xs:enumeration value="inquiry"/>
        <xs:enumeration value="installation"/>
        <xs:enumeration value="loadManagement"/>
        <xs:enumeration value="loadResearch"/>
        <xs:enumeration value="moveIn"/>
        <xs:enumeration value="moveOut"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="removal"/>
        <xs:enumeration value="serviceConnect"/>
        <xs:enumeration value="serviceDisconnect"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ReadingType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="accumulation" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.accumulation"/>
        <xs:element name="aggregate" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.aggregate"/>
        <xs:element name="commodity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.commodity"/>
        <xs:element name="consumptionTier" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.consumptionTier"/>
        <xs:element name="cpp" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.cpp"/>
        <xs:element name="currency" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.currency"/>
        <xs:element name="flowDirection" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.flowDirection"/>
        <xs:element name="macroPeriod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.macroPeriod"/>
        <xs:element name="measurementKind" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measurementKind"/>
        <xs:element name="measuringPeriod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measuringPeriod"/>
        <xs:element name="multiplier" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.multiplier"/>
        <xs:element name="phases" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.phases"/>
        <xs:element name="tou" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.tou"/>
        <xs:element name="unit" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.unit"/>
        <xs:element name="argument" type="m:RationalNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.argument"/>
        <xs:element name="interharmonic" type="m:ReadingInterharmonic" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.interharmonic"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

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        <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="electricity"/>
        <xs:enumeration value="gas"/>
        <xs:enumeration value="heat"/>
        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceMultiplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceMultiplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceMultiplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.kind"/>
        <xs:element name="value" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.value"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceMultiplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceMultiplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="ctRatio"/>
        <xs:enumeration value="ptRatio"/>
        <xs:enumeration value="transformerRatio"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceSupplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>

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<xs:simpleType name="SupplierKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="other"/>
    <xs:enumeration value="retailer"/>
    <xs:enumeration value="utility"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="TransformerTank" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TransformerTank">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amiBillingReady" type="m:AmiBillingReadyKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.amiBillingReady"/>
    <xs:element name="checkBilling" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.checkBilling"/>
    <xs:element name="connectionState" type="m:UsagePointConnectedKind"
minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint.connectionState"/>
    <xs:element name="estimatedLoad" type="m:CurrentFlow" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.estimatedLoad"/>
    <xs:element name="grounded" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.grounded"/>
    <xs:element name="isSdp" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.isSdp"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.isVirtual"/>
    <xs:element name="minimalUsageExpected" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.minimalUsageExpected"/>
    <xs:element name="nominalServiceVoltage" type="m:Voltage" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.nominalServiceVoltage"/>
    <xs:element name="outageRegion" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.outageRegion"/>
    <xs:element name="phaseCode" type="m:PhaseCode" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.phaseCode"/>
    <xs:element name="ratedCurrent" type="m:CurrentFlow" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ratedCurrent"/>
    <xs:element name="ratedPower" type="m:ActivePower" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ratedPower"/>
    <xs:element name="readCycle" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.readCycle"/>
    <xs:element name="readRoute" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.readRoute"/>
    <xs:element name="serviceDeliveryRemark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.serviceDeliveryRemark"/>
    <xs:element name="servicePriority" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.servicePriority"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent"
minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint.ConfigurationEvents"/>
    <xs:element name="Equipments" type="m:TransformerTank" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.Equipments"/>
    <xs:element name="MetrologyRequirements" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.MetrologyRequirements">
      <xs:complexType sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#MetrologyRequirement">
        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="reason" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MetrologyRequirement.reason">
            <xs:simpleType
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingReasonKind">
              <xs:restriction base="xs:string">
                <xs:enumeration
value="billing"/>

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value="demandReset"/>
value="inquiry"/>
value="installation"/>
value="loadManagement"/>
value="loadResearch"/>
value="moveIn"/>
value="moveOut"/>
value="other"/>
value="removal"/>
value="serviceConnect"/>
value="serviceDisconnect"/>

</xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="Names" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names">
    <xs:complexType
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
        <xs:sequence>
            <xs:element name="name"
type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
            <xs:element name="NameType"
minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType">
                <xs:complexType
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
                    <xs:sequence>
                        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
                        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
                        <xs:element name="NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority">
                            <xs:complexType sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
                                <xs:sequence>
                                    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
                                    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
                                </xs:sequence>
                            </xs:complexType>
                        </xs:element>
                    </xs:sequence>
                </xs:complexType>
            </xs:element>
        </xs:sequence>
    </xs:complexType>
    <xs:element name="ReadingTypes" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MetrologyRequirement.ReadingTypes">
        <xs:complexType sawsdl:modelReference="">
            <xs:attribute name="ref"

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        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>
  <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  <xs:element name="PricingStructures" type="m:PricingStructure" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.PricingStructures"/>
  <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceCategory"/>
  <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceLocation"/>
  <xs:element name="ServiceMultipliers" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceMultipliers"/>
  <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceMultiplier">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.kind">
        <xs:simpleType
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplierKind">
          <xs:restriction base="xs:string">
            <xs:enumeration
value="ctRatio"/>
            <xs:enumeration
value="ptRatio"/>
            <xs:enumeration
value="transformerRatio"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
      <xs:element name="value" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.value"/>
      <xs:element name="Names" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names">
        <xs:complexType
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
          <xs:sequence>
            <xs:element name="name"
type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
            <xs:element name="NameType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType">
              <xs:complexType
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
                <xs:sequence>
                  <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
                  <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
                  <xs:element name="NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority">
                    <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
                      <xs:sequence>
                        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
                        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
                      </xs:sequence>
                    </xs:complexType>
                  </xs:element>

```



```

</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceSupplier"/>
<xs:element name="UsagePointLocation" type="m:UsagePointLocation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.UsagePointLocation"/>
</xs:sequence>
</xs:complexType>
<xs:simpleType name="UsagePointConnectedKind"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointConnectedKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="connected"/>
    <xs:enumeration value="logicallyDisconnected"/>
    <xs:enumeration value="physicallyDisconnected"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePointLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="Voltage" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Voltage">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="CurrentFlow" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CurrentFlow">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="ActivePower" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivePower">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
</xs:schema>

```

H.28 UsagePointLocationConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/UsagePointLocationConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/UsagePointLocationConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="UsagePointLocationConfig" type="m:UsagePointLocationConfig"/>
  <xs:complexType name="UsagePointLocationConfig">
    <xs:sequence>
      <xs:element name="UsagePointLocation" type="m:UsagePointLocation" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
    </xs:sequence>
  </xs:complexType>

```

```

        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
        <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CoordinateSystem" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CoordinateSystem">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="crsUrn" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CoordinateSystem.crsUrn"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress">
    <xs:sequence>
        <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
        <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
        <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
        <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
        <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
        <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
        <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
        <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PositionPoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint">

```

```

    <xs:sequence>
      <xs:element name="sequenceNumber" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.sequenceNumber"/>
      <xs:element name="xPosition" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PositionPoint.xPosition"/>
      <xs:element name="yPosition" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PositionPoint.yPosition"/>
      <xs:element name="zPosition" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.zPosition"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
    <xs:sequence>
      <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
      <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="StreetAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetAddress">
    <xs:sequence>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.status"/>
      <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.streetDetail"/>
      <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.townDetail"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="StreetDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetDetail">
    <xs:sequence>
      <xs:element name="addressGeneral" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.addressGeneral"/>
      <xs:element name="buildingName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.buildingName"/>
      <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.code"/>
      <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.name"/>
      <xs:element name="number" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.number"/>
      <xs:element name="prefix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.prefix"/>
      <xs:element name="suffix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suffix"/>
      <xs:element name="suiteNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suiteNumber"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.type"/>
      <xs:element name="withinTownLimits" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.withinTownLimits"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TelephoneNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TelephoneNumber">
    <xs:sequence>
      <xs:element name="areaCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.areaCode"/>
      <xs:element name="cityCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.cityCode"/>
      <xs:element name="countryCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.countryCode"/>
      <xs:element name="extension" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.extension"/>
      <xs:element name="localNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.localNumber"/>
    </xs:sequence>
  </xs:complexType>

```

```

<xs:complexType name="TownDetail" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail">
  <xs:sequence>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.code"/>
    <xs:element name="country" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.country"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.name"/>
    <xs:element name="section" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.section"/>
    <xs:element name="stateOrProvince" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.stateOrProvince"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="accessMethod" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointLocation.accessMethod"/>
    <xs:element name="direction" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.direction"/>
    <xs:element name="geoInfoReference" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.geoInfoReference"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointLocation.remark"/>
    <xs:element name="siteAccessProblem" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointLocation.siteAccessProblem"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.type"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.ConfigurationEvents"/>
    <xs:element name="CoordinateSystem" type="m:CoordinateSystem" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.CoordinateSystem"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.electronicAddress"/>
    <xs:element name="mainAddress" type="m:StreetAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.mainAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone1"/>
    <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone2"/>
    <xs:element name="PositionPoints" type="m:PositionPoint" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.PositionPoints"/>
    <xs:element name="SecondaryAddress" type="m:StreetAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.secondaryAddress"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.status"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

Annex I (informative)

XML schemas for message payloads

I.1 General

The purpose of this Annex I is to provide informative XML schemas for message payloads to augment the descriptions provided earlier in this document. These XML Schemas were defined using profile definitions within CIMTool. These schemas may be extended as needed for specific implementation needs. These schemas may be revised or promoted to a normative status in a future edition.

I.2 AuxiliaryAgreementConfig

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch C57/2011/AuxiliaryAgreementConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch
C57/2011/AuxiliaryAgreementConfig#" elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="AuxiliaryAgreementConfig" type="m:AuxiliaryAgreementConfig"/>
  <xs:complexType name="AuxiliaryAgreementConfig">
    <xs:sequence>
      <xs:element name="AuxiliaryAgreement" type="m:AuxiliaryAgreement" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AccountMovement" sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#AccountMovement">
    <xs:sequence>
      <xs:element name="amount" type="m:Money" minOccurs="0" sawSDL:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AccountMovement.amount"/>
      <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AccountMovement.dateTime"/>
      <xs:element name="reason" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AccountMovement.reason"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AccountingUnit" sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#AccountingUnit">
    <xs:sequence>
      <xs:element name="energyUnit" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AccountingUnit.energyUnit"/>
      <xs:element name="monetaryUnit" type="m:Currency" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AccountingUnit.monetaryUnit"/>
      <xs:element name="multiplier" type="m:UnitMultiplier" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AccountingUnit.multiplier"/>
      <xs:element name="value" type="xs:float" minOccurs="0" sawSDL:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AccountingUnit.value"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AuxiliaryAccount" sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#AuxiliaryAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="balance" type="m:Money" minOccurs="0" sawSDL:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AuxiliaryAccount.balance"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Document.createdDateTime"/>
      <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
      <xs:element name="principleAmount" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AuxiliaryAccount.principleAmount"/>
      <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Document.revisionNumber"/>
      <xs:element name="subject" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.subject"/>
    </xs:sequence>
  </xs:complexType>
</xs:schema>
```



```

    <xs:element name="title" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="Charges" type="m:Charge" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AuxiliaryAccount.Charges"/>
    <xs:element name="docStatus" type="m:Status" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.docStatus"/>
    <xs:element name="due" type="m:Due" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AuxiliaryAccount.due"/>
    <xs:element name="lastCredit" type="m:AccountMovement" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AuxiliaryAccount.lastCredit"/>
    <xs:element name="lastDebit" type="m:AccountMovement" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AuxiliaryAccount.lastDebit"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.status"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="AuxiliaryAgreement" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#AuxiliaryAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="arrearsInterest" type="m:PerCent" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AuxiliaryAgreement.arrearsInterest"/>
    <xs:element name="auxCycle" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AuxiliaryAgreement.auxCycle"/>
    <xs:element name="auxPriorityCode" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AuxiliaryAgreement.auxPriorityCode"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Document.createdDateTime"/>
    <xs:element name="fixedAmount" type="m:Money" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AuxiliaryAgreement.fixedAmount"/>
    <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    <xs:element name="minAmount" type="m:Money" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AuxiliaryAgreement.minAmount"/>
    <xs:element name="payCycle" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AuxiliaryAgreement.payCycle"/>
    <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Document.revisionNumber"/>
    <xs:element name="signDate" type="xs:date" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Agreement.signDate"/>
    <xs:element name="subject" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="subType" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#AuxiliaryAgreement.subType"/>
    <xs:element name="title" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="vendPortion" type="m:PerCent" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#AuxiliaryAgreement.vendPortion"/>
    <xs:element name="vendPortionArrear" type="m:PerCent" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#AuxiliaryAgreement.vendPortionArrear"/>
    <xs:element name="AuxiliaryAccounts" type="m:AuxiliaryAccount" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#AuxiliaryAgreement.AuxiliaryAccounts"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Document.ConfigurationEvents"/>
    <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#AuxiliaryAgreement.CustomerAgreement"/>
    <xs:element name="docStatus" type="m:Status" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.docStatus"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Document.status"/>
    <xs:element name="validityInterval" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Agreement.validityInterval"/>
  </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="Charge" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#Charge">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ChargeKind" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Charge.kind"/>
    <xs:element name="variablePortion" type="m:PerCent" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Charge.variablePortion"/>
    <xs:element name="ChildCharges" type="m:ChildCharge" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Charge.ChildCharges"/>
    <xs:element name="fixedPortion" type="m:AccountingUnit" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Charge.fixedPortion"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ChargeKind" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#ChargeKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="auxiliaryCharge"/>
    <xs:enumeration value="consumptionCharge"/>
    <xs:enumeration value="demandCharge"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="taxCharge"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ChildCharge" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#Charge">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ChargeKind" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Charge.kind"/>
    <xs:element name="variablePortion" type="m:PerCent" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Charge.variablePortion"/>
    <xs:element name="fixedPortion" type="m:AccountingUnit" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Charge.fixedPortion"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#ConfigurationEvent">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
    <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#ConfigurationEvent.effectiveDateTime"/>
    <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
    <xs:element name="reason" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
    <xs:element name="severity" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
    <xs:element name="type" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#ActivityRecord.type"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#ActivityRecord.status"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="Currency" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#Currency">
  <xs:restriction base="xs:string">
    <xs:enumeration value="AUD"/>
    <xs:enumeration value="CAD"/>
    <xs:enumeration value="CHF"/>
    <xs:enumeration value="CNY"/>
    <xs:enumeration value="DKK"/>

```

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        <xs:enumeration value="EUR"/>
        <xs:enumeration value="GBP"/>
        <xs:enumeration value="INR"/>
        <xs:enumeration value="JPY"/>
        <xs:enumeration value="NOK"/>
        <xs:enumeration value="RUR"/>
        <xs:enumeration value="SEK"/>
        <xs:enumeration value="USD"/>
        <xs:enumeration value="other"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Due" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Due">
    <xs:sequence>
        <xs:element name="arrears" type="m:Money" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Due.arrears"/>
        <xs:element name="charges" type="m:Money" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Due.charges"/>
        <xs:element name="current" type="m:Money" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Due.current"/>
        <xs:element name="interest" type="m:Money" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Due.interest"/>
        <xs:element name="principle" type="m:Money" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Due.principle"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Status.dateTime"/>

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    <xs:element name="reason" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
C57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="UnitMultiplier" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#UnitMultiplier">
  <xs:restriction base="xs:string">
    <xs:enumeration value="G"/>
    <xs:enumeration value="M"/>
    <xs:enumeration value="T"/>
    <xs:enumeration value="c"/>
    <xs:enumeration value="d"/>
    <xs:enumeration value="k"/>
    <xs:enumeration value="m"/>
    <xs:enumeration value="micro"/>
    <xs:enumeration value="n"/>
    <xs:enumeration value="none"/>
    <xs:enumeration value="p"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="RealEnergy" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#RealEnergy">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="PerCent" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-
cim15#PerCent">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch C57/2010/CIM-schema-cim15#Money">
  <xs:restriction base="xs:decimal"/>
</xs:simpleType>
</xs:schema>

```

I.3 ComModuleConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/ComModuleConfig#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/ComModuleConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="ComModuleConfig" type="m:ComModuleConfig"/>
  <xs:complexType name="ComModuleConfig">
    <xs:sequence>
      <xs:element name="ComFunction" type="m:ComFunction" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ComModule" type="m:ComModule" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ActivityRecord" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="AssetModelUsageKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#AssetModelUsageKind">
    <xs:restriction base="xs:string">

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        <xs:enumeration value="customerSubstation"/>
        <xs:enumeration value="distributionOverhead"/>
        <xs:enumeration value="distributionUnderground"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="streetlight"/>
        <xs:enumeration value="substation"/>
        <xs:enumeration value="transmission"/>
        <xs:enumeration value="unknown"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="ComDirectionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComDirectionKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="biDirectional"/>
        <xs:enumeration value="fromDevice"/>
        <xs:enumeration value="toDevice"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ComFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrAddress" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrAddress"/>
        <xs:element name="amrRouter" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrRouter"/>
        <xs:element name="configID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
        <xs:element name="direction" type="m:ComDirectionKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.direction"/>
        <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
        <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
        <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
        <xs:element name="password" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
        <xs:element name="programID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
        <xs:element name="technology" type="m:ComTechnologyKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.technology"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ComModule" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.amrSystem"/>
        <xs:element name="initialCondition" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialCondition"/>
        <xs:element name="initialLossOfLife" type="m:PerCent" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialLossOfLife"/>
        <xs:element name="lotNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lotNumber"/>
        <xs:element name="purchasePrice" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.purchasePrice"/>
        <xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
        <xs:element name="supportsAutonomousDst" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.supportsAutonomousDst"/>
        <xs:element name="timeZoneOffset" type="m:Minutes" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.timeZoneOffset"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
        <xs:element name="utcNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.utcNumber"/>
        <xs:element name="ActivityRecords" type="m:ActivityRecord" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ActivityRecords"/>
        <xs:element name="AssetInfo" type="m:EndDeviceInfo" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.AssetInfo"/>
    </xs:sequence>
</xs:complexType>

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        <xs:element name="ComFunctions" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.ComFunctions">
        <xs:complexType sawSDL:modelReference="">
            <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
    </xs:element>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ConfigurationEvents"/>
    <xs:element name="ElectronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ElectronicAddress"/>
    <xs:element name="Lifecycle" type="m:LifecycleDate" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.Lifecycle"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.Status"/>
</xs:sequence>
</xs:complexType>
<xs:simpleType name="ComTechnologyKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComTechnologyKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="cellular"/>
        <xs:enumeration value="ethernet"/>
        <xs:enumeration value="homePlug"/>
        <xs:enumeration value="pager"/>
        <xs:enumeration value="phone"/>
        <xs:enumeration value="plc"/>
        <xs:enumeration value="rf"/>
        <xs:enumeration value="rfMesh"/>
        <xs:enumeration value="zigbee"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
        <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.effectiveDateTime"/>
        <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
        <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="Status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.Status"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CorporateStandardKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CorporateStandardKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="experimental"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="standard"/>
        <xs:enumeration value="underEvaluation"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ElectronicAddress">
    <xs:sequence>
        <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
        <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
        <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
    </xs:sequence>
</xs:complexType>

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        <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
        <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
        <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
        <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
        <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceInfo" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceInfo">
    <xs:sequence>
        <xs:element name="AssetModel" type="m:ProductAssetModel" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetInfo.AssetModel"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="LifecycleDate" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#LifecycleDate">
    <xs:sequence>
        <xs:element name="installationDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.installationDate"/>
        <xs:element name="manufacturedDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.manufacturedDate"/>
        <xs:element name="purchaseDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.purchaseDate"/>
        <xs:element name="receivedDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.receivedDate"/>
        <xs:element name="removalDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.removalDate"/>
        <xs:element name="retiredDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.retiredDate"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Manufacturer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Manufacturer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ProductAssetModel" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel">
    <xs:sequence>

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    <xs:element name="corporateStandardKind" type="m:CorporateStandardKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.corporateStandardKind"/>
    <xs:element name="modelNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelNumber"/>
    <xs:element name="modelVersion" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelVersion"/>
    <xs:element name="usageKind" type="m:AssetModelUsageKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.usageKind"/>
    <xs:element name="Manufacturer" type="m:Manufacturer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.Manufacturer"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="Minutes" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Minutes">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="PerCent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PerCent">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Money" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Money">
  <xs:restriction base="xs:decimal"/>
</xs:simpleType>
</xs:schema>

```

I.4 CustomerMeterDataSet

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/CustomerMeterDataSet#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/CustomerMeterDataSet#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="CustomerMeterDataSet" type="m:CustomerMeterDataSet"/>
  <xs:complexType name="CustomerMeterDataSet">
    <xs:sequence>
      <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AccountingUnit" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#AccountingUnit">
    <xs:sequence>
      <xs:element name="energyUnit" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AccountingUnit.energyUnit"/>
      <xs:element name="monetaryUnit" type="m:Currency" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AccountingUnit.monetaryUnit"/>
      <xs:element name="multiplier" type="m:UnitMultiplier" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AccountingUnit.multiplier"/>
      <xs:element name="value" type="xs:float" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AccountingUnit.value"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="AmiBillingReadyKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#AmiBillingReadyKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="amiCapable"/>
      <xs:enumeration value="amiDisabled"/>
      <xs:enumeration value="billingApproved"/>
      <xs:enumeration value="enabled"/>
    </xs:restriction>
  </xs:simpleType>

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        <xs:enumeration value="nonAmi"/>
        <xs:enumeration value="nonMetered"/>
        <xs:enumeration value="operable"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="AssetInfo" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetInfo">
    <xs:sequence>
        <xs:element name="AssetModel" type="m:ProductAssetModel" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetInfo.AssetModel"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="AssetModelUsageKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetModelUsageKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="customerSubstation"/>
        <xs:enumeration value="distributionOverhead"/>
        <xs:enumeration value="distributionUnderground"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="streetlight"/>
        <xs:enumeration value="substation"/>
        <xs:enumeration value="transmission"/>
        <xs:enumeration value="unknown"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Channel" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Channel">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Channel.isVirtual"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="ReadingType" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Channel.ReadingType">
            <xs:complexType sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType">
                <xs:attribute name="ref" type="xs:string"/>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Charge" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ChargeKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.kind"/>
        <xs:element name="variablePortion" type="m:PerCent"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.variablePortion"/>
        <xs:element name="ChildCharges" type="m:ChildCharge" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.ChildCharges"/>
        <xs:element name="fixedPortion" type="m:AccountingUnit" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.fixedPortion"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ChargeKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ChargeKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="auxiliaryCharge"/>
        <xs:enumeration value="consumptionCharge"/>
        <xs:enumeration value="demandCharge"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="taxCharge"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ChildCharge" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ChargeKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.kind"/>

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    <xs:element name="variablePortion" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.variablePortion"/>
    <xs:element name="fixedPortion" type="m:AccountingUnit"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.fixedPortion"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ComDirectionKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComDirectionKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="biDirectional"/>
    <xs:enumeration value="fromDevice"/>
    <xs:enumeration value="toDevice"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ComFunction" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrAddress" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrAddress"/>
    <xs:element name="amrRouter" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrRouter"/>
    <xs:element name="configID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
    <xs:element name="direction" type="m:ComDirectionKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.direction"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
    <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="programID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
    <xs:element name="technology" type="m:ComTechnologyKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.technology"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ComModule" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComModule">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.amrSystem"/>
    <xs:element name="initialCondition" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialCondition"/>
    <xs:element name="initialLossOfLife" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialLossOfLife"/>
    <xs:element name="lotNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lotNumber"/>
    <xs:element name="purchasePrice" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.purchasePrice"/>
    <xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
    <xs:element name="supportsAutonomousDst" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.supportsAutonomousDst"/>
    <xs:element name="timeZoneOffset" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.timeZoneOffset"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
    <xs:element name="utcNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.utcNumber"/>
    <xs:element name="AssetInfo" type="m:AssetInfo" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.AssetInfo"/>
    <xs:element name="ComFunctions" type="m:ComFunction" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComModule.ComFunctions"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.electronicAddress"/>

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    <xs:element name="lifecycle" type="m:LifecycleDate" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lifecycle"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.status"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ComTechnologyKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComTechnologyKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="cellular"/>
    <xs:enumeration value="ethernet"/>
    <xs:enumeration value="homePlug"/>
    <xs:enumeration value="pager"/>
    <xs:enumeration value="phone"/>
    <xs:enumeration value="plc"/>
    <xs:enumeration value="rf"/>
    <xs:enumeration value="rfMesh"/>
    <xs:enumeration value="zigbee"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ConnectDisconnectFunction" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="eventCount" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.eventCount"/>
    <xs:element name="isConnected" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isConnected"/>
    <xs:element name="isDelayedDiscon" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isDelayedDiscon"/>
    <xs:element name="isLocalAutoDisconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isLocalAutoDisconOp"/>
    <xs:element name="isLocalAutoReconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isLocalAutoReconOp"/>
    <xs:element name="isRemoteAutoDisconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isRemoteAutoDisconOp"/>
    <xs:element name="isRemoteAutoReconOp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.isRemoteAutoReconOp"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="rcdInfo" type="m:RemoteConnectDisconnectInfo" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction.rcdInfo"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ConsumptionTariffInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConsumptionTariffInterval">
  <xs:sequence>
    <xs:element name="sequenceNumber" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConsumptionTariffInterval.sequenceNumber"/>
    <xs:element name="startValue" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConsumptionTariffInterval.startValue"/>
    <xs:element name="Charges" type="m:Charge" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConsumptionTariffInterval.Charges"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CoordinateSystem" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CoordinateSystem">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

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        <xs:element name="crsUrn" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CoordinateSystem.crsUrn"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CorporateStandardKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CorporateStandardKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="experimental"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="standard"/>
        <xs:enumeration value="underEvaluation"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="Currency" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Currency">
    <xs:restriction base="xs:string">
        <xs:enumeration value="AUD"/>
        <xs:enumeration value="CAD"/>
        <xs:enumeration value="CHF"/>
        <xs:enumeration value="CNY"/>
        <xs:enumeration value="DKK"/>
        <xs:enumeration value="EUR"/>
        <xs:enumeration value="GBP"/>
        <xs:enumeration value="INR"/>
        <xs:enumeration value="JPY"/>
        <xs:enumeration value="NOK"/>
        <xs:enumeration value="RUR"/>
        <xs:enumeration value="SEK"/>
        <xs:enumeration value="USD"/>
        <xs:enumeration value="other"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="pucNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.pucNumber"/>
        <xs:element name="specialNeed" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.specialNeed"/>
        <xs:element name="vip" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.vip"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="Organisation" type="m:Organisation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.Organisation"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="billingCycle" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.billingCycle"/>
        <xs:element name="budgetBill" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.budgetBill"/>
        <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
        <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
        <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
        <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
        <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    </xs:sequence>

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    <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
    <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    <xs:element name="loadMgmt" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement.loadMgmt"/>
    <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
    <xs:element name="signDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Agreement.signDate"/>
    <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="Customer" type="m:Customer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement.Customer"/>
    <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement.CustomerAccount"/>
    <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement.ServiceCategory"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
    <xs:element name="validityInterval" type="m:DateTimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Agreement.validityInterval"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="commercialIndustrial"/>
    <xs:enumeration value="energyServiceScheduler"/>
    <xs:enumeration value="energyServiceSupplier"/>
    <xs:enumeration value="internalUse"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="pumpingLoad"/>
    <xs:enumeration value="residential"/>
    <xs:enumeration value="residentialAndCommercial"/>
    <xs:enumeration value="residentialAndStreetlight"/>
    <xs:enumeration value="residentialFarmService"/>
    <xs:enumeration value="residentialStreetlightOthers"/>
    <xs:enumeration value="windMachine"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ElectronicAddress">
  <xs:sequence>
    <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>

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        <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
        <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
        <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
        <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
        <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
        <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
        <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="initialCondition" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialCondition"/>
        <xs:element name="initialLossOfLife" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialLossOfLife"/>
        <xs:element name="installCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.installCode"/>
        <xs:element name="isPan" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isPan"/>
        <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isVirtual"/>
        <xs:element name="lotNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lotNumber"/>
        <xs:element name="purchasePrice" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.purchasePrice"/>
        <xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
        <xs:element name="timeZoneOffset" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.timeZoneOffset"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
        <xs:element name="utcNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.utcNumber"/>
        <xs:choice minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceFunctions">
            <xs:element name="ComFunction" sawSDL:modelReference="">
                <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComFunction">
                    <xs:attribute name="ref" type="xs:string"/>
                </xs:complexType>
            </xs:element>
            <xs:element name="ConnectDisconnectFunction" sawSDL:modelReference="">
                <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction">
                    <xs:attribute name="ref" type="xs:string"/>
                </xs:complexType>
            </xs:element>
            <xs:element name="SimpleEndDeviceFunction" sawSDL:modelReference="">
                <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SimpleEndDeviceFunction">
                    <xs:attribute name="ref" type="xs:string"/>
                </xs:complexType>
            </xs:element>
        </xs:choice>
        <xs:element name="EndDeviceInfo" type="m:EndDeviceInfo" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceInfo"/>
        <xs:element name="lifecycle" type="m:LifecycleDate" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lifecycle"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="Seals" type="m:Seal" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetContainer.Seals"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.status"/>
    
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    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="EndDeviceCapability" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceCapability">
    <xs:sequence>
      <xs:element name="autonomousDst" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.autonomousDst"/>
      <xs:element name="communication" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.communication"/>
      <xs:element name="connectDisconnect" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.connectDisconnect"/>
      <xs:element name="demandResponse" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.demandResponse"/>
      <xs:element name="electricMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.electricMetering"/>
      <xs:element name="gasMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.gasMetering"/>
      <xs:element name="metrology" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.metrology"/>
      <xs:element name="onRequestRead" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.onRequestRead"/>
      <xs:element name="outageHistory" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.outageHistory"/>
      <xs:element name="pressureCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.pressureCompensation"/>
      <xs:element name="pricingInfo" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.pricingInfo"/>
      <xs:element name="pulseOutput" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.pulseOutput"/>
      <xs:element name="relaysProgramming" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.relaysProgramming"/>
      <xs:element name="reverseFlow" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.reverseFlow"/>
      <xs:element name="superCompressibilityCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.superCompressibilityCompensation"/>
      <xs:element name="temperatureCompensation" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.temperatureCompensation"/>
      <xs:element name="textMessage" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.textMessage"/>
      <xs:element name="waterMetering" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability.waterMetering"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="EndDeviceFunctionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceFunctionKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="autonomousDst"/>
      <xs:enumeration value="demandResponse"/>
      <xs:enumeration value="electricMetering"/>
      <xs:enumeration value="gasMetering"/>
      <xs:enumeration value="metrology"/>
      <xs:enumeration value="onRequestRead"/>
      <xs:enumeration value="outageHistory"/>
      <xs:enumeration value="relaysProgramming"/>
      <xs:enumeration value="reverseFlow"/>
      <xs:enumeration value="waterMetering"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="EndDeviceInfo" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceInfo">
    <xs:sequence>
      <xs:element name="isSolidState" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.isSolidState"/>
      <xs:element name="phaseCount" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.phaseCount"/>
      <xs:element name="ratedCurrent" type="m:CurrentFlow" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedCurrent"/>
      <xs:element name="ratedVoltage" type="m:Voltage" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedVoltage"/>
    </xs:sequence>
  </xs:complexType>

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    <xs:element name="AssetModel" type="m:ProductAssetModel" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetInfo.AssetModel"/>
    <xs:element name="capability" type="m:EndDeviceCapability" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.capability"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="LifecycleDate" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate">
  <xs:sequence>
    <xs:element name="installationDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.installationDate"/>
    <xs:element name="manufacturedDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.manufacturedDate"/>
    <xs:element name="purchaseDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.purchaseDate"/>
    <xs:element name="receivedDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.receivedDate"/>
    <xs:element name="removalDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.removalDate"/>
    <xs:element name="retiredDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.retiredDate"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Manufacturer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Manufacturer">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
    <xs:element name="formNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter.formNumber"/>
    <xs:element name="initialCondition" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialCondition"/>
    <xs:element name="initialLossOfLife" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialLossOfLife"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isVirtual"/>
    <xs:element name="lotNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lotNumber"/>
    <xs:element name="purchasePrice" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.purchasePrice"/>
    <xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
    <xs:element name="timeZoneOffset" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.timeZoneOffset"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
    <xs:element name="utcNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.utcNumber"/>
    <xs:choice minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetContainer.Assets">
      <xs:element name="ComModule" type="m:ComModule" sawSDL:modelReference=""/>
      <xs:element name="EndDevice" type="m:EndDevice" sawSDL:modelReference=""/>
    </xs:choice>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.electronicAddress"/>
    <xs:choice minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceFunctions">
      <xs:element name="ComFunction" type="m:ComFunction" sawSDL:modelReference=""/>
      <xs:element name="ConnectDisconnectFunction" type="m:ConnectDisconnectFunction"
sawSDL:modelReference=""/>
      <xs:element name="SimpleEndDeviceFunction" type="m:SimpleEndDeviceFunction"
sawSDL:modelReference=""/>
    </xs:choice>
    <xs:element name="EndDeviceInfo" type="m:EndDeviceInfo" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceInfo"/>

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    <xs:element name="lifecycle" type="m:LifecycleDate" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lifecycle"/>
    <xs:element name="MeterMultipliers" type="m:MeterMultiplier" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter.MeterMultipliers"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Seals" type="m:Seal" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetContainer.Seals"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.status"/>
    <xs:element name="UsagePoint" type="m:UsagePoint"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.UsagePoint"/>
  </xs:sequence>
</xs:complexType>
  <xs:complexType name="MeterMultiplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MeterMultiplier">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:MeterMultiplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier.kind"/>
      <xs:element name="value" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier.value"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="MeterMultiplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MeterMultiplierKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="ctRatio"/>
      <xs:enumeration value="kE"/>
      <xs:enumeration value="kH"/>
      <xs:enumeration value="kR"/>
      <xs:enumeration value="ptRatio"/>
      <xs:enumeration value="transformerRatio"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="MetrologyRequirement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#MetrologyRequirement">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="reason" type="m:ReadingReasonKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MetrologyRequirement.reason"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="ReadingTypes" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MetrologyRequirement.ReadingTypes">
        <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType">
          <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
          </xs:sequence>
        </xs:complexType>
      </xs:sequence>
    </xs:complexType>
  <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
      <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>

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        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Organisation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Organisation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.electronicAddress"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone1"/>
        <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone2"/>
        <xs:element name="postalAddress" type="m:PostalAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.postalAddress"/>
        <xs:element name="streetAddress" type="m:StreetAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.streetAddress"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="PhaseCode" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PhaseCode">
    <xs:restriction base="xs:string">
        <xs:enumeration value="A"/>
        <xs:enumeration value="AB"/>
        <xs:enumeration value="ABC"/>
        <xs:enumeration value="ABCN"/>
        <xs:enumeration value="ABN"/>
        <xs:enumeration value="AC"/>
        <xs:enumeration value="ACN"/>
        <xs:enumeration value="AN"/>
        <xs:enumeration value="B"/>
        <xs:enumeration value="BC"/>
        <xs:enumeration value="BCN"/>
        <xs:enumeration value="BN"/>
        <xs:enumeration value="C"/>
        <xs:enumeration value="CN"/>
        <xs:enumeration value="N"/>
        <xs:enumeration value="s1"/>
        <xs:enumeration value="s12"/>
        <xs:enumeration value="s12N"/>
        <xs:enumeration value="s1N"/>
        <xs:enumeration value="s2"/>
        <xs:enumeration value="s2N"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="PositionPoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PositionPoint">
    <xs:sequence>
        <xs:element name="sequenceNumber" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.sequenceNumber"/>
        <xs:element name="xPosition" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.xPosition"/>
        <xs:element name="yPosition" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.yPosition"/>
        <xs:element name="zPosition" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PositionPoint.zPosition"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PostalAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PostalAddress">
    <xs:sequence>
        <xs:element name="poBox" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.poBox"/>

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        <xs:element name="postalCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.postalCode"/>
        <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.streetDetail"/>
        <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.townDetail"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PricingStructure" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PricingStructure">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.code"/>
        <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
        <xs:element name="dailyCeilingUsage" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.dailyCeilingUsage"/>
        <xs:element name="dailyEstimatedUsage" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PricingStructure.dailyEstimatedUsage"/>
        <xs:element name="dailyFloorUsage" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.dailyFloorUsage"/>
        <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
        <xs:element name="revenueKind" type="m:RevenueKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.revenueKind"/>
        <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
        <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
        <xs:element name="taxExemption" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.taxExemption"/>
        <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
        <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.ServiceCategory"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
        <xs:element name="Tariffs" type="m:Tariff" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.Tariffs"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ProductAssetModel" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel">
    <xs:sequence>
        <xs:element name="corporateStandardKind" type="m:CorporateStandardKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.corporateStandardKind"/>
        <xs:element name="modelNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelNumber"/>
        <xs:element name="modelVersion" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.modelVersion"/>
        <xs:element name="usageKind" type="m:AssetModelUsageKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.usageKind"/>
        <xs:element name="Manufacturer" type="m:Manufacturer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.Manufacturer"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="RationalNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RationalNumber">
    <xs:sequence>
        <xs:element name="denominator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.denominator"/>
        <xs:element name="numerator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.numerator"/>
    </xs:sequence>
</xs:complexType>

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<xs:complexType name="ReadingInterharmonic" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ReadingInterharmonic">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.denominator"/>
    <xs:element name="numerator" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.numerator"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ReadingReasonKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingReasonKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="billing"/>
    <xs:enumeration value="demandReset"/>
    <xs:enumeration value="inquiry"/>
    <xs:enumeration value="installation"/>
    <xs:enumeration value="loadManagement"/>
    <xs:enumeration value="loadResearch"/>
    <xs:enumeration value="moveIn"/>
    <xs:enumeration value="moveOut"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="removal"/>
    <xs:enumeration value="serviceConnect"/>
    <xs:enumeration value="serviceDisconnect"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ReadingType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="accumulation" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.accumulation"/>
    <xs:element name="aggregate" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.aggregate"/>
    <xs:element name="commodity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.commodity"/>
    <xs:element name="consumptionTier" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.consumptionTier"/>
    <xs:element name="cpp" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.cpp"/>
    <xs:element name="currency" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.currency"/>
    <xs:element name="flowDirection" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.flowDirection"/>
    <xs:element name="macroPeriod" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.macroPeriod"/>
    <xs:element name="measurementKind" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measurementKind"/>
    <xs:element name="measuringPeriod" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measuringPeriod"/>
    <xs:element name="multiplier" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.multiplier"/>
    <xs:element name="phases" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.phases"/>
    <xs:element name="tou" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.tou"/>
    <xs:element name="unit" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.unit"/>
    <xs:element name="argument" type="m:RationalNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.argument"/>
    <xs:element name="interharmonic" type="m:ReadingInterharmonic" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.interharmonic"/>
    <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Register" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Register">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.isVirtual"/>
    <xs:element name="leftDigitCount" type="xs:integer" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.leftDigitCount"/>

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        <xs:element name="rightDigitCount" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.rightDigitCount"/>
        <xs:element name="touTierName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTierName"/>
        <xs:element name="Channels" type="m:Channel" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.Channels"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="touTier" type="m:TimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTier"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="RemoteConnectDisconnectInfo"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo">
    <xs:sequence>
        <xs:element name="armedTimeout" type="m:Seconds" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.armedTimeout"/>
        <xs:element name="customerVoltageLimit" type="m:Voltage" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.customerVoltageLimit"/>
        <xs:element name="energyLimit" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyLimit"/>
        <xs:element name="energyUsageStartDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyUsageStartDateTime"/>
        <xs:element name="energyUsageWarning" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyUsageWarning"/>
        <xs:element name="isArmConnect" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isArmConnect"/>
        <xs:element name="isArmDisconnect" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isArmDisconnect"/>
        <xs:element name="isEnergyLimiting" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isEnergyLimiting"/>
        <xs:element name="needsPowerLimitCheck" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.needsPowerLimitCheck"/>
        <xs:element name="needsVoltageLimitCheck" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.needsVoltageLimitCheck"/>
        <xs:element name="powerLimit" type="m:ActivePower" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.powerLimit"/>
        <xs:element name="usePushbutton" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.usePushbutton"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="RevenueKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RevenueKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercial"/>
        <xs:enumeration value="industrial"/>
        <xs:enumeration value="irrigation"/>
        <xs:enumeration value="nonResidential"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="streetLight"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Seal" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal">
    <xs:sequence>
        <xs:element name="appliedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.appliedDateTime"/>
        <xs:element name="condition" type="m:SealConditionKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.condition"/>
        <xs:element name="kind" type="m:SealKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.kind"/>
        <xs:element name="sealNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.sealNumber"/>
    </xs:sequence>

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</xs:complexType>
<xs:simpleType name="SealConditionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SealConditionKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="broken"/>
    <xs:enumeration value="locked"/>
    <xs:enumeration value="missing"/>
    <xs:enumeration value="open"/>
    <xs:enumeration value="other"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="SealKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SealKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="lead"/>
    <xs:enumeration value="lock"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="steel"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceCategory" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceCategory">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="electricity"/>
    <xs:enumeration value="gas"/>
    <xs:enumeration value="heat"/>
    <xs:enumeration value="internet"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="rates"/>
    <xs:enumeration value="refuse"/>
    <xs:enumeration value="sewerage"/>
    <xs:enumeration value="time"/>
    <xs:enumeration value="tvLicence"/>
    <xs:enumeration value="water"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="accessMethod" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation.accessMethod"/>
    <xs:element name="direction" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.direction"/>
    <xs:element name="geoInfoReference" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.geoInfoReference"/>
    <xs:element name="needsInspection" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation.needsInspection"/>
    <xs:element name="siteAccessProblem" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation.siteAccessProblem"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.type"/>
    <xs:element name="CoordinateSystem" type="m:CoordinateSystem" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.CoordinateSystem"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.electronicAddress"/>
    <xs:element name="mainAddress" type="m:StreetAddress" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.mainAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone1"/>
    <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone2"/>
  </xs:sequence>
</xs:complexType>

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    <xs:element name="PositionPoints" type="m:PositionPoint" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.PositionPoints"/>
    <xs:element name="secondaryAddress" type="m:StreetAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.secondaryAddress"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.status"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceMultiplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ServiceMultiplierKind"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.kind"/>
    <xs:element name="value" type="xs:float" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.value"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceMultiplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplierKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="ctRatio"/>
    <xs:enumeration value="ptRatio"/>
    <xs:enumeration value="transformerRatio"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceSupplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="issuerIdentificationNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.issuerIdentificationNumber"/>
    <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Organisation" type="m:Organisation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.Organisation"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="SimpleEndDeviceFunction" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="configID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
    <xs:element name="hardwareID" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
    <xs:element name="kind" type="m:EndDeviceFunctionKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction.kind"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="programID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Registers" type="m:Register" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.Registers"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>

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        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetAddress">
    <xs:sequence>
        <xs:element name="status" type="m:Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#StreetAddress.status"/>
        <xs:element name="streetDetail" type="m:StreetDetail"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.streetDetail"/>
        <xs:element name="townDetail" type="m:TownDetail"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.townDetail"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetDetail">
    <xs:sequence>
        <xs:element name="addressGeneral" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.addressGeneral"/>
        <xs:element name="buildingName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.buildingName"/>
        <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.code"/>
        <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.name"/>
        <xs:element name="number" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.number"/>
        <xs:element name="prefix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.prefix"/>
        <xs:element name="suffix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suffix"/>
        <xs:element name="suiteNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suiteNumber"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.type"/>
        <xs:element name="withinTownLimits" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.withinTownLimits"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="other"/>
        <xs:enumeration value="retailer"/>
        <xs:enumeration value="utility"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Tariff" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Tariff">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
        <xs:element name="endDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.endDate"/>
        <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
        <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
        <xs:element name="startDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.startDate"/>
        <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
        <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
        <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
    </xs:sequence>

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    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
    <xs:element name="TariffProfiles" type="m:TariffProfile" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.TariffProfiles"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TariffProfile" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TariffProfile">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
    <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
    <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="tariffCycle" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TariffProfile.tariffCycle"/>
    <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="ConsumptionTariffIntervals" type="m:ConsumptionTariffInterval" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TariffProfile.ConsumptionTariffIntervals"/>
    <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
    <xs:element name="TimeTariffIntervals" type="m:TimeTariffInterval" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TariffProfile.TimeTariffIntervals"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PhoneNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PhoneNumber">
  <xs:sequence>
    <xs:element name="areaCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PhoneNumber.areaCode"/>
    <xs:element name="cityCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PhoneNumber.cityCode"/>
    <xs:element name="countryCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PhoneNumber.countryCode"/>
    <xs:element name="extension" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PhoneNumber.extension"/>
    <xs:element name="localNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PhoneNumber.localNumber"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:time" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.end"/>
    <xs:element name="start" type="xs:time" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeTariffInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeTariffInterval">
  <xs:sequence>
    <xs:element name="sequenceNumber" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeTariffInterval.sequenceNumber"/>
    <xs:element name="startTime" type="xs:time" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeTariffInterval.startTime"/>
    <xs:element name="Charges" type="m:Charge" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeTariffInterval.Charges"/>
  </xs:sequence>
</xs:complexType>

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<xs:complexType name="TownDetail" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TownDetail">
  <xs:sequence>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.code"/>
    <xs:element name="country" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.country"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.name"/>
    <xs:element name="section" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.section"/>
    <xs:element name="stateOrProvince" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.stateOrProvince"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TransformerTank" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TransformerTank">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="UnitMultiplier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UnitMultiplier">
  <xs:restriction base="xs:string">
    <xs:enumeration value="G"/>
    <xs:enumeration value="M"/>
    <xs:enumeration value="T"/>
    <xs:enumeration value="c"/>
    <xs:enumeration value="d"/>
    <xs:enumeration value="k"/>
    <xs:enumeration value="m"/>
    <xs:enumeration value="micro"/>
    <xs:enumeration value="n"/>
    <xs:enumeration value="none"/>
    <xs:enumeration value="p"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amiBillingReady" type="m:AmiBillingReadyKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.amiBillingReady"/>
    <xs:element name="checkBilling" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.checkBilling"/>
    <xs:element name="connectionState" type="m:UsagePointConnectedKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.connectionState"/>
    <xs:element name="estimatedLoad" type="m:CurrentFlow" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.estimatedLoad"/>
    <xs:element name="grounded" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.grounded"/>
    <xs:element name="isSdp" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.isSdp"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.isVirtual"/>
    <xs:element name="minimalUsageExpected" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.minimalUsageExpected"/>
    <xs:element name="nominalServiceVoltage" type="m:Voltage" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.nominalServiceVoltage"/>
    <xs:element name="outageRegion" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.outageRegion"/>
    <xs:element name="phaseCode" type="m:PhaseCode" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.phaseCode"/>
    <xs:element name="ratedCurrent" type="m:CurrentFlow" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ratedCurrent"/>
    <xs:element name="ratedPower" type="m:ActivePower" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ratedPower"/>
    <xs:element name="readCycle" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.readCycle"/>
    <xs:element name="readRoute" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.readRoute"/>
  </xs:sequence>
</xs:complexType>

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    <xs:element name="serviceDeliveryRemark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.serviceDeliveryRemark"/>
    <xs:element name="servicePriority" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.servicePriority"/>
    <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.CustomerAgreement"/>
    <xs:element name="Equipments" type="m:TransformerTank" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.Equipments"/>
    <xs:element name="MetrologyRequirements" type="m:MetrologyRequirement" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint.MetrologyRequirements"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="PricingStructures" type="m:PricingStructure" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.PricingStructures"/>
    <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceCategory"/>
    <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceLocation"/>
    <xs:element name="ServiceMultipliers" type="m:ServiceMultiplier" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint.ServiceMultipliers"/>
    <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceSupplier"/>
    <xs:element name="UsagePointLocation" type="m:UsagePointLocation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.UsagePointLocation"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="UsagePointConnectedKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointConnectedKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="connected"/>
    <xs:enumeration value="logicallyDisconnected"/>
    <xs:enumeration value="physicallyDisconnected"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePointLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePointLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="accessMethod" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointLocation.accessMethod"/>
    <xs:element name="direction" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.direction"/>
    <xs:element name="geoInfoReference" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.geoInfoReference"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointLocation.remark"/>
    <xs:element name="siteAccessProblem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePointLocation.siteAccessProblem"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.type"/>
    <xs:element name="CoordinateSystem" type="m:CoordinateSystem" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.CoordinateSystem"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.electronicAddress"/>
    <xs:element name="mainAddress" type="m:StreetAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.mainAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone1"/>
    <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.phone2"/>
    <xs:element name="PositionPoints" type="m:PositionPoint" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.PositionPoints"/>
    <xs:element name="secondaryAddress" type="m:StreetAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.secondaryAddress"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.status"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="Voltage" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Voltage">

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        <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="CurrentFlow" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CurrentFlow">
        <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="RealEnergy" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RealEnergy">
        <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="ActivePower" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivePower">
        <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="Minutes" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Minutes">
        <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="Seconds" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Seconds">
        <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="PerCent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PerCent">
        <xs:restriction base="xs:float"/>
    </xs:simpleType>
    <xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Money">
        <xs:restriction base="xs:decimal"/>
    </xs:simpleType>
</xs:schema>

```

1.5 EndDeviceGroups

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceGroups#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/EndDeviceGroups#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
    <xs:element name="EndDeviceGroups" type="m:EndDeviceGroups"/>
    <xs:complexType name="EndDeviceGroups">
        <xs:sequence>
            <xs:element name="DemandResponseProgram" type="m:DemandResponseProgram" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="DemandResponseProgram" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DemandResponseProgram">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DemandResponseProgram.type"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDeviceGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceGroup">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

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<xs:element name="DemandResponsePrograms" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceGroup.DemandResponsePrograms">
  <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DemandResponseProgram">
    <xs:attribute name="ref" type="xs:string"/>
  </xs:complexType>
</xs:element>
<xs:element name="EndDevices" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceGroup.EndDevices"/>
<xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.6 GetAuxiliaryAgreementConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetAuxiliaryAgreementConfig#"
xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetAuxiliaryAgreementConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetAuxiliaryAgreementConfig" type="m:GetAuxiliaryAgreementConfig"/>
  <xs:complexType name="GetAuxiliaryAgreementConfig">
    <xs:sequence>
      <xs:element name="AuxiliaryAccount" type="m:AuxiliaryAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="AuxiliaryAgreement" type="m:AuxiliaryAgreement"
minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AuxiliaryAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AuxiliaryAccount">
    <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AuxiliaryAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AuxiliaryAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="subType" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AuxiliaryAgreement.subType"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">

```

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        <xs:sequence>
          <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
          <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
          <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
        <xs:sequence>
          <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
          <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="ServiceSupplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
          <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
      </xs:complexType>
      <xs:simpleType name="SupplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">
        <xs:restriction base="xs:string">
          <xs:enumeration value="other"/>
          <xs:enumeration value="retailer"/>
          <xs:enumeration value="utility"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:schema>

```

I.7 GetComModuleConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetComModuleConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns
s:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/GetComModuleConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="GetComModuleConfig" type="m:GetComModuleConfig"/>
  <xs:complexType name="GetComModuleConfig">
    <xs:sequence>
      <xs:element name="ComModule" type="m:ComModule" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ComModule" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComModule">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="amrSystem" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch
/TC57/2010/CIM-schema-cim15#ComModule.amrSystem"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawSDL:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>

```

```

<xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrSystem" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch
/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0" sawsdl:modelReference="http://iec.ch
/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.
ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0" sawsdl:modelRefere
nce="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.
ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.8 GetCustomerMeterDataSet

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetCustomerMeterDataSet#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetCustomerMeterDataSet#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetCustomerMeterDataSet" type="m:GetCustomerMeterDataSet"/>
  <xs:complexType name="GetCustomerMeterDataSet">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>

```

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        <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">

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        <xs:sequence>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
            <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
            <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ServiceCategory" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="ServiceKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
        <xs:restriction base="xs:string">
            <xs:enumeration value="electricity"/>
            <xs:enumeration value="gas"/>
            <xs:enumeration value="heat"/>
            <xs:enumeration value="internet"/>
            <xs:enumeration value="other"/>
            <xs:enumeration value="rates"/>
            <xs:enumeration value="refuse"/>
            <xs:enumeration value="sewerage"/>
            <xs:enumeration value="time"/>
            <xs:enumeration value="tvLicence"/>
            <xs:enumeration value="water"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ServiceSupplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="SupplierKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SupplierKind">

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        <xs:restriction base="xs:string">
            <xs:enumeration value="other"/>
            <xs:enumeration value="retailer"/>
            <xs:enumeration value="utility"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointGroup">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
</xs:schema>

```

I.9 GetEndDeviceGroups

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetEndDeviceGroups#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetEndDeviceGroups#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetEndDeviceGroups" type="m:GetEndDeviceGroups"/>
    <xs:complexType name="GetEndDeviceGroups">
        <xs:sequence>
            <xs:element name="DemandResponseProgram" type="m:DemandResponseProgram" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="DemandResponseProgram" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DemandResponseProgram">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DemandResponseProgram.type"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDeviceGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceGroup">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter">

```



```

<xs:sequence>
  <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
  <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.10 GetMeterReadSchedule

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetMeterReadSchedule#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetMeterReadSchedule#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetMeterReadSchedule" type="m:GetMeterReadSchedule"/>
  <xs:complexType name="GetMeterReadSchedule">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="Meter" type="m:Meter" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```

```

        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="electricity"/>
        <xs:enumeration value="gas"/>
        <xs:enumeration value="heat"/>
        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="TimeSchedule" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule">
    <xs:sequence>
        <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.scheduleInterval"/>
    </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.11 GetMeterServiceRequests

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetMeterServiceRequests#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetMeterServiceRequests#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetMeterServiceRequests" type="m:GetMeterServiceRequests"/>
  <xs:complexType name="GetMeterServiceRequests">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="MeterServiceWork" type="m:MeterServiceWork" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="MeterServiceWork" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#MeterServiceWork">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>

```

```

        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.12 GetPricingStructureConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetPricingStructureConfig#"
xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetPricingStructureConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetPricingStructureConfig" type="m:GetPricingStructureConfig"/>
    <xs:complexType name="GetPricingStructureConfig">
        <xs:sequence>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="PricingStructure" type="m:PricingStructure" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">

```



```

        <xs:sequence>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
            <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
            <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="PricingStructure" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.code"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
</xs:schema>

```

I.13 GetReceiptRecord

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetReceiptRecord#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetReceiptRecord#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetReceiptRecord" type="m:GetReceiptRecord"/>
    <xs:complexType name="GetReceiptRecord">
        <xs:sequence>
            <xs:element name="AuxiliaryAccount" type="m:AuxiliaryAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="AuxiliaryAgreement" type="m:AuxiliaryAgreement"
minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="PointOfSale" type="m:PointOfSale" minOccurs="0"
maxOccurs="unbounded"/>

```



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        <xs:element name="Receipt" type="m:Receipt" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AuxiliaryAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AuxiliaryAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AuxiliaryAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AuxiliaryAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>

```

```

        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PointOfSale" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PointOfSale">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="location" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PointOfSale.location"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Receipt" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Receipt">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeSchedule" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule">
    <xs:sequence>
        <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.scheduleInterval"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.14 GetTransactionRecord

```

<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetTransactionRecord#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetTransactionRecord#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetTransactionRecord" type="m:GetTransactionRecord"/>
    <xs:complexType name="GetTransactionRecord">
        <xs:sequence>

```

```

        <xs:element name="AuxiliaryAccount" type="m:AuxiliaryAccount" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="AuxiliaryAgreement" type="m:AuxiliaryAgreement"
minOccurs="0" maxOccurs="unbounded"/>
        <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="PointOfSale" type="m:PointOfSale" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="Transaction" type="m:Transaction" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AuxiliaryAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AuxiliaryAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AuxiliaryAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AuxiliaryAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
    </xs:restriction>
</xs:simpleType>

```

```

        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PointOfSale" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PointOfSale">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="location" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PointOfSale.location"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeSchedule" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule">
    <xs:sequence>
        <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.scheduleInterval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Transaction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Transaction">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.15 GetUsagePointGroups

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetUsagePointGroups#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetUsagePointGroups#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetUsagePointGroups" type="m:GetUsagePointGroups"/>
  <xs:complexType name="GetUsagePointGroups">
    <xs:sequence>
      <xs:element name="DemandResponseProgram" type="m:DemandResponseProgram" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="DemandResponseProgram" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DemandResponseProgram">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DemandResponseProgram.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
      <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
      <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
      <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="UsagePointGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePointGroup">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>

```

</xs:schema>

I.16 MeterReadSchedule

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
  xmlns:m="http://iec.ch/TC57/2011/MeterReadSchedule#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns
  :xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/MeterReadSchedule#" el
  ementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="MeterReadSchedule" type="m:MeterReadSchedule"/>
  <xs:complexType name="MeterReadSchedule">
    <xs:sequence>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0" maxOccurs="unbounded"/>
    >
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0" maxOccurs="unbound
ed"/>
      <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0" maxOccurs="unbounded"/>
    >
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAccount">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawSDL:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawSDL:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0" sawSDL:modelReference="http://iec.ch/TC5
7/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0" sawSDL:modelReference="http://iec.ch/T
C57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawSDL:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawSDL:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
```



```

        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0" sawsdl:modelReference="http://iec.ch
/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.
ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0" sawsdl:modelRefere
nce="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.
ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimePoint">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0" sawsdl:modelReference="http://iec.c
h/TC57/2010/CIM-schema-cim15#TimePoint.dateTime"/>
        <xs:element name="relativeTimeInterval" type="m:Seconds" minOccurs="0" sawsdl:modelReference="ht
tp://iec.ch/TC57/2010/CIM-schema-cim15#TimePoint.relativeTimeInterval"/>
        <xs:element name="sequenceNumber" type="xs:integer" minOccurs="0" sawsdl:modelReference="http://
iec.ch/TC57/2010/CIM-schema-cim15#TimePoint.sequenceNumber"/>
        <xs:element name="window" type="m:DateTimeInterval" minOccurs="0" sawsdl:modelReference="http://
iec.ch/TC57/2010/CIM-schema-cim15#TimePoint.window"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeSchedule" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule">
    <xs:sequence>
        <xs:element name="disabled" type="xs:boolean" minOccurs="0" sawsdl:modelReference="http://iec.ch
/TC57/2010/CIM-schema-cim15#TimeSchedule.disabled"/>
        <xs:element name="offset" type="m:Seconds" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC
57/2010/CIM-schema-cim15#TimeSchedule.offset"/>
        <xs:element name="recurrencePattern" type="xs:string" minOccurs="0" sawsdl:modelReference="http:
//iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.recurrencePattern"/>
        <xs:element name="recurrencePeriod" type="m:Seconds" minOccurs="0" sawsdl:modelReference="http://
iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.recurrencePeriod"/>
        <xs:element name="scheduleInterval" type="m:DateTimeInterval" minOccurs="0" sawsdl:modelReferenc
e="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.scheduleInterval"/>
        <xs:element name="TimePoints" type="m:TimePoint" minOccurs="0" maxOccurs="unbounded" sawsdl:mode
lReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeSchedule.TimePoints"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57
/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference
="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePointGroup">

```



```

<xs:sequence>
  <xs:element name="mRID" type="xs:string" minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
  <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
</xs:sequence>
</xs:complexType>
<xs:simpleType name="Seconds" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seconds">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
</xs:schema>

```

I.17 MeterServiceRequest

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
  xmlns:a="http://langdale.com.au/2005/Message#"
  xmlns:m="http://iec.ch/TC57/2011/MeterServiceRequests#"
  xmlns:sawsdl="http://www.w3.org/ns/sawsdl" xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://iec.ch/TC57/2011/MeterServiceRequests#" elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:element name="MeterServiceRequests" type="m:MeterServiceRequests"/>
  <xs:complexType name="MeterServiceRequests">
    <xs:sequence>
      <xs:element name="MeterServiceWork" type="m:MeterServiceWork"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ReadingQualityType" type="m:ReadingQualityType"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0"
        maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ActivityRecord"
    sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord">
    <xs:sequence>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
      <xs:element name="pucNumber" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.pucNumber"/>
      <xs:element name="specialNeed" type="xs:string" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.specialNeed"/>
      <xs:element name="vip" type="xs:boolean" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.vip"/>
      <xs:element name="CustomerAgreements" type="m:CustomerAgreement"
        minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.CustomerAgreements"/>
      <xs:element name="Names" type="m:Name" minOccurs="0"
        maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
        sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.status"/>
    </xs:sequence>
  </xs:complexType>

```

```

    <xs:complexType name="CustomerAgreement"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="formNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter.formNumber"/>
        <xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
        <xs:element name="MeterMultipliers" type="m:MeterMultiplier"
minOccurs="0" maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter.MeterMultipliers"/>
        <xs:element name="MeterReadings" type="m:MeterReading" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter.MeterReadings"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="MeterMultiplier"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:MeterMultiplierKind"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier.kind"/>
        <xs:element name="value" type="xs:float"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplier.value"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="MeterMultiplierKind"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterMultiplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="ctRatio"/>

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        <xs:enumeration value="kE"/>
        <xs:enumeration value="kH"/>
        <xs:enumeration value="kR"/>
        <xs:enumeration value="ptRatio"/>
        <xs:enumeration value="transformerRatio"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="MeterReading">
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterReading">
    <xs:sequence>
        <xs:element name="Readings" type="m:Reading" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MeterReading.Readings"/>
        <xs:element name="valuesInterval" type="m:DateTimeInterval"
minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MeterReading.valuesInterval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="MeterServiceWork">
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterServiceWork">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:WorkKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Work.kind"/>
        <xs:element name="lastModifiedDate" type="xs:dateTime"
minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Document.lastModifiedDate"/>
        <xs:element name="priority" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Work.priority"/>
        <xs:element name="requestDateTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Work.requestDateTime"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
        <xs:element name="ActivityRecords" type="m:ActivityRecord"
minOccurs="0" maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Document.ActivityRecords"/>
        <xs:element name="Customers" type="m:Customer" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Work.Customers"/>
        <xs:element name="Meter" type="m:Meter"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterServiceWork.Meter"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        <xs:element name="OldMeter" type="m:Meter" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterServiceWork.OldMeter"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
        <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeterServiceWork.UsagePoint"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority">
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">

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    <xs:sequence>
      <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
      <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="PhaseCode" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PhaseCode">
    <xs:restriction base="xs:string">
      <xs:enumeration value="A"/>
      <xs:enumeration value="AB"/>
      <xs:enumeration value="ABC"/>
      <xs:enumeration value="ABCN"/>
      <xs:enumeration value="ABN"/>
      <xs:enumeration value="AC"/>
      <xs:enumeration value="ACN"/>
      <xs:enumeration value="AN"/>
      <xs:enumeration value="B"/>
      <xs:enumeration value="BC"/>
      <xs:enumeration value="BCN"/>
      <xs:enumeration value="BN"/>
      <xs:enumeration value="C"/>
      <xs:enumeration value="CN"/>
      <xs:enumeration value="N"/>
      <xs:enumeration value="s1"/>
      <xs:enumeration value="s12"/>
      <xs:enumeration value="s12N"/>
      <xs:enumeration value="s1N"/>
      <xs:enumeration value="s2"/>
      <xs:enumeration value="s2N"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="Reading" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Reading">
    <xs:sequence>
      <xs:element name="reason" type="m:ReadingReasonKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Reading.reason"/>
      <xs:element name="reportedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#BaseReading.reportedDateTime"/>
      <xs:element name="source" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.source"/>
      <xs:element name="timeStamp" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MeasurementValue.timeStamp"/>
      <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.value"/>
      <xs:element name="ReadingQualities" type="m:ReadingQuality"
minOccurs="0" maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#BaseReading.ReadingQualities"/>
      <xs:element name="ReadingType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Reading.ReadingType">
        <xs:complexType sawSDL:modelReference="">
          <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
      </xs:element>
      <xs:element name="timePeriod" type="m:DateTimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BaseReading.timePeriod"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ReadingQuality"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQuality">
    <xs:sequence>
      <xs:element name="comment" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQuality.comment"/>
      <xs:element name="source" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQuality.source"/>
      <xs:element name="timeStamp" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQuality.timeStamp"/>
      <xs:element name="ReadingQualityType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQuality.ReadingQualityType">
        <xs:complexType sawSDL:modelReference="">
          <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>

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        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingQualityType"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQualityType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="category" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQualityType.category"/>
        <xs:element name="subCategory" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ReadingQualityType.subCategory"/>
        <xs:element name="systemId" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingQualityType.systemId"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ReadingReasonKind"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingReasonKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="billing"/>
        <xs:enumeration value="demandReset"/>
        <xs:enumeration value="inquiry"/>
        <xs:enumeration value="installation"/>
        <xs:enumeration value="loadManagement"/>
        <xs:enumeration value="loadResearch"/>
        <xs:enumeration value="moveIn"/>
        <xs:enumeration value="moveOut"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="removal"/>
        <xs:enumeration value="serviceConnect"/>
        <xs:enumeration value="serviceDisconnect"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ReadingType" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ReadingType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="accumulation" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.accumulation"/>
        <xs:element name="aggregate" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.aggregate"/>
        <xs:element name="commodity" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.commodity"/>
        <xs:element name="consumptionTier" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.consumptionTier"/>
        <xs:element name="cpp" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.cpp"/>
        <xs:element name="currency" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.currency"/>
        <xs:element name="flowDirection" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.flowDirection"/>
        <xs:element name="macroPeriod" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.macroPeriod"/>
        <xs:element name="measurementKind" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measurementKind"/>
        <xs:element name="measuringPeriod" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measuringPeriod"/>
        <xs:element name="multiplier" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.multiplier"/>
        <xs:element name="phases" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.phases"/>
        <xs:element name="tou" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.tou"/>
        <xs:element name="unit" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.unit"/>
        <xs:element name="argument" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.argument">
            <xs:complexType sawsd1:modelReference="">
                <xs:attribute name="ref" type="xs:string"/>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
</xs:element>

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        <xs:element name="interharmonic" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.interharmonic">
        <xs:complexType sawsd1:modelReference="">
            <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
    </xs:element>
    <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="accessMethod" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceLocation.accessMethod"/>
        <xs:element name="needsInspection" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceLocation.needsInspection"/>
        <xs:element name="siteAccessProblem" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceLocation.siteAccessProblem"/>
        <xs:element name="mainAddress" type="m:StreetAddress" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Location.mainAddress"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceMultiplier"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceMultiplierKind"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.kind"/>
        <xs:element name="value" type="xs:float"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplier.value"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceMultiplierKind"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceMultiplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="ctRatio"/>
        <xs:enumeration value="ptRatio"/>
        <xs:enumeration value="transformerRatio"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Status" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetAddress"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress">
    <xs:sequence>
        <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.streetDetail"/>
        <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.townDetail"/>
    </xs:sequence>
</xs:complexType>

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<xs:complexType name="StreetDetail"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail">
  <xs:sequence>
    <xs:element name="addressGeneral" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.addressGeneral"/>
    <xs:element name="buildingName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.buildingName"/>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.code"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.name"/>
    <xs:element name="number" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.number"/>
    <xs:element name="prefix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.prefix"/>
    <xs:element name="suffix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suffix"/>
    <xs:element name="suiteNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suiteNumber"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.type"/>
    <xs:element name="withinTownLimits" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.withinTownLimits"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TownDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TownDetail">
  <xs:sequence>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.code"/>
    <xs:element name="country" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.country"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.name"/>
    <xs:element name="section" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.section"/>
    <xs:element name="stateOrProvince" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.stateOrProvince"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="checkBilling" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.checkBilling"/>
    <xs:element name="grounded" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.grounded"/>
    <xs:element name="isSdp" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.isSdp"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.isVirtual"/>
    <xs:element name="nominalServiceVoltage" type="m:Voltage" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.nominalServiceVoltage"/>
    <xs:element name="phaseCode" type="m:PhaseCode" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.phaseCode"/>
    <xs:element name="ratedCurrent" type="m:CurrentFlow" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ratedCurrent"/>
    <xs:element name="ratedPower" type="m:ActivePower" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ratedPower"/>
    <xs:element name="serviceDeliveryRemark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.serviceDeliveryRemark"/>
    <xs:element name="servicePriority" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.servicePriority"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="ServiceLocation" type="m:ServiceLocation"
minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePoint.ServiceLocation"/>
  </xs:sequence>
</xs:complexType>

```



```

        <xs:element name="ServiceMultipliers" type="m:ServiceMultiplier"
minOccurs="0" maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint.ServiceMultipliers"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="WorkKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#WorkKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="construction"/>
        <xs:enumeration value="disconnect"/>
        <xs:enumeration value="inspection"/>
        <xs:enumeration value="maintenance"/>
        <xs:enumeration value="meter"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="reconnect"/>
        <xs:enumeration value="repair"/>
        <xs:enumeration value="service"/>
        <xs:enumeration value="test"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="CurrentFlow" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CurrentFlow">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Voltage" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Voltage">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="ActivePower" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ActivePower">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
</xs:schema>

```

I.18 ObjectNamesConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/ObjectNamesConfig#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema#" targetNamespace="http://iec.ch/TC57/2011/ObjectNamesConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="ObjectNamesConfig" type="m:ObjectNamesConfig"/>
    <xs:complexType name="ObjectNamesConfig">
        <xs:sequence>
            <xs:element name="AuxiliaryAgreement" type="m:AuxiliaryAgreement"
minOccurs="0"/>
            <xs:element name="ComModule" type="m:ComModule" minOccurs="0"/>
            <xs:element name="ConfigurationEvent" type="m:ConfigurationEvent"/>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement"
minOccurs="0"/>
            <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0"/>
            <xs:element name="Meter" type="m:Meter" minOccurs="0"/>
            <xs:element name="Name" type="m:Name" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="PricingStructure" type="m:PricingStructure" minOccurs="0"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"/>
            <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"/>
            <xs:element name="TransformerTank" type="m:TransformerTank" minOccurs="0"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"/>
            <xs:element name="UsagePointLocation" type="m:UsagePointLocation"
minOccurs="0"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="AuxiliaryAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AuxiliaryAgreement">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>

```

```

<xs:complexType name="ComModule" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComModule">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConfigurationEvent">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
    <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.effectiveDateTime"/>
    <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
    <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```

```

        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PricingStructure" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PricingStructure">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceSupplier">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TransformerTank" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TransformerTank">
    <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointLocation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePointLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

I.19 PricingStructureConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/PricingStructureConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/PricingStructureConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="PricingStructureConfig" type="m:PricingStructureConfig"/>
    <xs:complexType name="PricingStructureConfig">
        <xs:sequence>
            <xs:element name="PricingStructure" type="m:PricingStructure" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="AccountingUnit" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#AccountingUnit">
        <xs:sequence>
            <xs:element name="energyUnit" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AccountingUnit.energyUnit"/>
            <xs:element name="monetaryUnit" type="m:Currency" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AccountingUnit.monetaryUnit"/>
            <xs:element name="multiplier" type="m:UnitMultiplier" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AccountingUnit.multiplier"/>
            <xs:element name="value" type="xs:float" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AccountingUnit.value"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Charge" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Charge">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:ChargeKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.kind"/>
            <xs:element name="variablePortion" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.variablePortion"/>
            <xs:element name="ChildCharges" type="m:SimpleChildCharge" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.ChildCharges"/>
            <xs:element name="fixedPortion" type="m:AccountingUnit" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.fixedPortion"/>
            <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="ChargeKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ChargeKind">
        <xs:restriction base="xs:string">

```

```

        <xs:enumeration value="auxiliaryCharge"/>
        <xs:enumeration value="consumptionCharge"/>
        <xs:enumeration value="demandCharge"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="taxCharge"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ConfigurationEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
        <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.effectiveDateTime"/>
        <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
        <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ConsumptionTariffInterval" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConsumptionTariffInterval">
    <xs:sequence>
        <xs:element name="sequenceNumber" type="xs:integer"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConsumptionTariffInterval.sequenceNumber"/>
        <xs:element name="startValue" type="m:RealEnergy"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConsumptionTariffInterval.startValue"/>
        <xs:element name="Charges" type="m:Charge" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConsumptionTariffInterval.Charges"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="Currency" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Currency">
    <xs:restriction base="xs:string">
        <xs:enumeration value="AUD"/>
        <xs:enumeration value="CAD"/>
        <xs:enumeration value="CHF"/>
        <xs:enumeration value="CNY"/>
        <xs:enumeration value="DKK"/>
        <xs:enumeration value="EUR"/>
        <xs:enumeration value="GBP"/>
        <xs:enumeration value="INR"/>
        <xs:enumeration value="JPY"/>
        <xs:enumeration value="NOK"/>
        <xs:enumeration value="RUR"/>
        <xs:enumeration value="SEK"/>
        <xs:enumeration value="USD"/>
        <xs:enumeration value="other"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>

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    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PricingStructure" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PricingStructure">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.code"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
    <xs:element name="dailyCeilingUsage" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.dailyCeilingUsage"/>
    <xs:element name="dailyEstimatedUsage" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PricingStructure.dailyEstimatedUsage"/>
    <xs:element name="dailyFloorUsage" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.dailyFloorUsage"/>
    <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    <xs:element name="revenueKind" type="m:RevenueKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.revenueKind"/>
    <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
    <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="taxExemption" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.taxExemption"/>
    <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.ConfigurationEvents"/>
    <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.ServiceCategory"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
    <xs:element name="Tariffs" type="m:Tariff" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.Tariffs"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="RevenueKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RevenueKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="commercial"/>
    <xs:enumeration value="industrial"/>
    <xs:enumeration value="irrigation"/>
    <xs:enumeration value="nonResidential"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="residential"/>
    <xs:enumeration value="streetLight"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceCategory" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ServiceCategory">
  <xs:sequence>

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    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="electricity"/>
    <xs:enumeration value="gas"/>
    <xs:enumeration value="heat"/>
    <xs:enumeration value="internet"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="rates"/>
    <xs:enumeration value="refuse"/>
    <xs:enumeration value="sewerage"/>
    <xs:enumeration value="time"/>
    <xs:enumeration value="tvLicence"/>
    <xs:enumeration value="water"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="SimpleChildCharge" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ChargeKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.kind"/>
    <xs:element name="variablePortion" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.variablePortion"/>
    <xs:element name="fixedPortion" type="m:AccountingUnit" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.fixedPortion"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Tariff" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
    <xs:element name="endDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.endDate"/>
    <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
    <xs:element name="startDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.startDate"/>
    <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
  </xs:sequence>

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        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
        <xs:element name="TariffProfiles" type="m:TariffProfile" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.TariffProfiles"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TariffProfile" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TariffProfile">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
        <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
        <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
        <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
        <xs:element name="tariffCycle" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TariffProfile.tariffCycle"/>
        <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
        <xs:element name="ConsumptionTariffIntervals" type="m:ConsumptionTariffInterval" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TariffProfile.ConsumptionTariffIntervals"/>
        <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
        <xs:element name="TimeTariffIntervals" type="m:TimeTariffInterval" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TariffProfile.TimeTariffIntervals"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeTariffInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeTariffInterval">
    <xs:sequence>
        <xs:element name="sequenceNumber" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeTariffInterval.sequenceNumber"/>
        <xs:element name="startTime" type="xs:time" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeTariffInterval.startTime"/>
        <xs:element name="Charges" type="m:Charge" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeTariffInterval.Charges"/>
        <xs:element name="ConsumptionTariffIntervals" type="m:ConsumptionTariffInterval" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeTariffInterval.ConsumptionTariffIntervals"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="UnitMultiplier" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UnitMultiplier">
    <xs:restriction base="xs:string">
        <xs:enumeration value="G"/>
        <xs:enumeration value="M"/>
        <xs:enumeration value="T"/>
        <xs:enumeration value="c"/>
        <xs:enumeration value="d"/>
        <xs:enumeration value="k"/>
        <xs:enumeration value="m"/>
        <xs:enumeration value="micro"/>
        <xs:enumeration value="n"/>
        <xs:enumeration value="none"/>
        <xs:enumeration value="p"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="RealEnergy" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RealEnergy">
    <xs:restriction base="xs:float"/>
</xs:simpleType>

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    <xs:simpleType name="PerCent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PerCent">
      <xs:restriction base="xs:float"/>
    </xs:simpleType>
  </xs:schema>

```

I.20 ReceiptRecord

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/ReceiptRecord#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://iec.ch/TC57/2011/ReceiptRecord#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="ReceiptRecord" type="m:ReceiptRecord"/>
  <xs:complexType name="ReceiptRecord">
    <xs:sequence>
      <xs:element name="Receipt" type="m:Receipt" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="BankAccountDetail" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#BankAccountDetail">
    <xs:sequence>
      <xs:element name="accountNumber" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BankAccountDetail.accountNumber"/>
      <xs:element name="bankName" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#BankAccountDetail.bankName"/>
      <xs:element name="branchCode" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BankAccountDetail.branchCode"/>
      <xs:element name="holderID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BankAccountDetail.holderID"/>
      <xs:element name="holderName" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#BankAccountDetail.holderName"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Card" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Card">
    <xs:sequence>
      <xs:element name="accountHolderName" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Card.accountHolderName"/>
      <xs:element name="cvNumber" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Card.cvNumber"/>
      <xs:element name="expiryDate" type="xs:date" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Card.expiryDate"/>
      <xs:element name="pan" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Card.pan"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Cashier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Cashier">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CashierShift" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CashierShift">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="activityInterval" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Shift.activityInterval"/>
      <xs:element name="Cashier" type="m:Cashier" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CashierShift.Cashier"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="PointOfSale" type="m:PointOfSale"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CashierShift.PointOfSale"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Cheque" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Cheque">
    <xs:sequence>

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        <xs:element name="chequeNumber" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Cheque.chequeNumber"/>
        <xs:element name="date" type="xs:date" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Cheque.date"/>
        <xs:element name="kind" type="m:ChequeKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Cheque.kind"/>
        <xs:element name="micrNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Cheque.micrNumber"/>
        <xs:element name="bankAccountDetail" type="m:BankAccountDetail"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Cheque.bankAccountDetail"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ChequeKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ChequeKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="bankOrder"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="postalOrder"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="LineDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#LineDetail">
    <xs:sequence>
        <xs:element name="amount" type="m:Money" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#LineDetail.amount"/>
        <xs:element name="dateTime" type="xs:dateTime"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LineDetail.dateTime"/>
        <xs:element name="note" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LineDetail.note"/>
        <xs:element name="rounding" type="m:Money" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#LineDetail.rounding"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="MerchantAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MerchantAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="currentBalance" type="m:Money"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.currentBalance"/>
        <xs:element name="provisionalBalance" type="m:Money"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.provisionalBalance"/>
        <xs:element name="MerchantAgreement" type="m:MerchantAgreement" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.MerchantAgreement"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="Transactors" type="m:Transactor" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.Transactors"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="MerchantAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MerchantAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>

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<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PointOfSale" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PointOfSale">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="location" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PointOfSale.location"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Receipt" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Receipt">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="isBankable" type="xs:boolean"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Receipt.isBankable"/>
    <xs:element name="CashierShift" type="m:CashierShift" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Receipt.CashierShift"/>
    <xs:element name="line" type="m:LineDetail" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Receipt.line"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Tenders" type="m:Tender" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Receipt.Tenders"/>
    <xs:element name="VendorShift" type="m:VendorShift" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Receipt.VendorShift"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Tender" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Tender">
  <xs:sequence>
    <xs:element name="Card" type="m:Card" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tender.Card"/>
    <xs:element name="Cheque" type="m:Cheque" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tender.Cheque"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Transactor" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Transactor">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Vendor" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Vendor">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>

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</xs:complexType>
<xs:complexType name="VendorShift" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="merchantDebitAmount" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift.merchantDebitAmount"/>
    <xs:element name="posted" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift.posted"/>
    <xs:element name="activityInterval" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Shift.activityInterval"/>
    <xs:element name="MerchantAccount" type="m:MerchantAccount" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift.MerchantAccount"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Vendor" type="m:Vendor" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift.Vendor"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Money">
  <xs:restriction base="xs:decimal"/>
</xs:simpleType>
</xs:schema>

```

I.21 TransactionRecord

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/TransactionRecord#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/TransactionRecord#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="TransactionRecord" type="m:TransactionRecord"/>
  <xs:complexType name="TransactionRecord">
    <xs:sequence>
      <xs:element name="Transaction" type="m:Transaction" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="AuxiliaryAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AuxiliaryAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="balance" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AuxiliaryAccount.balance"/>
      <xs:element name="principleAmount" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AuxiliaryAccount.principleAmount"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Cashier" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Cashier">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CashierShift" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CashierShift">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="cashFloat" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CashierShift.cashFloat"/>
      <xs:element name="activityInterval" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Shift.activityInterval"/>
      <xs:element name="Cashier" type="m:Cashier" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CashierShift.Cashier"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>

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        <xs:element name="PointOfSale" type="m:PointOfSale"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CashierShift.PointOfSale"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Charge" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Charge">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ChargeKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.kind"/>
        <xs:element name="ChildCharges" type="m:ChildCharge" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.ChildCharges"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ChargeKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ChargeKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="auxiliaryCharge"/>
        <xs:enumeration value="consumptionCharge"/>
        <xs:enumeration value="demandCharge"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="taxCharge"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ChildCharge" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Charge">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ChargeKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.kind"/>
        <xs:element name="variablePortion" type="m:PerCent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Charge.variablePortion"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="billingCycle" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.billingCycle"/>
        <xs:element name="budgetBill" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.budgetBill"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="LineDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#LineDetail">
    <xs:sequence>
        <xs:element name="amount" type="m:Money" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#LineDetail.amount"/>
        <xs:element name="dateTime" type="xs:dateTime"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LineDetail.dateTime"/>
        <xs:element name="note" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LineDetail.note"/>
        <xs:element name="rounding" type="m:Money" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#LineDetail.rounding"/>
    </xs:sequence>
</xs:complexType>

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<xs:complexType name="MerchantAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MerchantAccount">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
    <xs:element name="currentBalance" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.currentBalance"/>
    <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    <xs:element name="provisionalBalance" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.provisionalBalance"/>
    <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
    <xs:element name="subject" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="MerchantAgreement" type="m:MerchantAgreement" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.MerchantAgreement"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Transactors" type="m:Transactor" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#MerchantAccount.Transactors"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MerchantAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#MerchantAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
    <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
    <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
    <xs:element name="subject" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="title" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Meter">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>

```



```

<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PointOfSale" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PointOfSale">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="location" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PointOfSale.location"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PricingStructure" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PricingStructure">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Tariffs" type="m:Tariff" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.Tariffs"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Receipt" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Receipt">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Tariff" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Tariff">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="endDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.endDate"/>
    <xs:element name="startDate" type="xs:date" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.startDate"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="TariffProfiles" type="m:TariffProfile" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Tariff.TariffProfiles"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TariffProfile" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TariffProfile">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Transaction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Transaction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="diverseReference" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.diverseReference"/>
    <xs:element name="donorReference" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.donorReference"/>
    <xs:element name="kind" type="m:TransactionKind"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.kind"/>
  </xs:sequence>
</xs:complexType>

```

```

        <xs:element name="receiverReference" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.receiverReference"/>
        <xs:element name="reversedId" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.reversedId"/>
        <xs:element name="serviceUnitsEnergy" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.serviceUnitsEnergy"/>
        <xs:element name="serviceUnitsError" type="m:RealEnergy" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.serviceUnitsError"/>
        <xs:element name="AuxiliaryAccount" type="m:AuxiliaryAccount" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.AuxiliaryAccount"/>
        <xs:element name="CashierShift" type="m:CashierShift" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.CashierShift"/>
        <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.CustomerAccount"/>
        <xs:element name="line" type="m:LineDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Transaction.line"/>
        <xs:element name="Meter" type="m:Meter" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.Meter"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="PricingStructure" type="m:PricingStructure" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.PricingStructure"/>
        <xs:element name="Receipt" type="m:Receipt" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.Receipt"/>
        <xs:element name="UserAttributes" type="m:UserAttribute" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.UserAttributes"/>
        <xs:element name="VendorShift" type="m:VendorShift" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Transaction.VendorShift"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="TransactionKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TransactionKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="accountPayment"/>
        <xs:enumeration value="auxiliaryChargePayment"/>
        <xs:enumeration value="diversePayment"/>
        <xs:enumeration value="meterConfigurationToken"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="serviceChargePayment"/>
        <xs:enumeration value="taxChargePayment"/>
        <xs:enumeration value="tokenCancellation"/>
        <xs:enumeration value="tokenExchange"/>
        <xs:enumeration value="tokenFreeIssue"/>
        <xs:enumeration value="tokenGrant"/>
        <xs:enumeration value="tokenSalePayment"/>
        <xs:enumeration value="transactionReversal"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Transactor" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Transactor">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UserAttribute" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UserAttribute">
    <xs:sequence>
        <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UserAttribute.name"/>
        <xs:element name="sequenceNumber" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UserAttribute.sequenceNumber"/>
        <xs:element name="value" type="m:StringQuantity"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UserAttribute.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Vendor" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Vendor">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>

```

```

</xs:complexType>
<xs:complexType name="VendorShift" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#VendorShift">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="merchantDebitAmount" type="m:Money" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift.merchantDebitAmount"/>
    <xs:element name="posted" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift.posted"/>
    <xs:element name="activityInterval" type="m:DateTimeInterval" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Shift.activityInterval"/>
    <xs:element name="MerchantAccount" type="m:MerchantAccount" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#VendorShift.MerchantAccount"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="Vendor" type="m:Vendor" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#VendorShift.Vendor"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="RealEnergy" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RealEnergy">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="StringQuantity" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StringQuantity">
  <xs:restriction base="xs:string"/>
</xs:simpleType>
<xs:simpleType name="PerCent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PerCent">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Money">
  <xs:restriction base="xs:decimal"/>
</xs:simpleType>
</xs:schema>

```

I.22 UsagePointGroups

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#" xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/UsagePointGroups#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/UsagePointGroups#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="UsagePointGroups" type="m:UsagePointGroups"/>
  <xs:complexType name="UsagePointGroups">
    <xs:sequence>
      <xs:element name="DemandResponseProgram" type="m:DemandResponseProgram" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="DemandResponseProgram" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DemandResponseProgram">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DemandResponseProgram.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
      <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Name.name"/>
      <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
  </xs:complexType>

```

```

</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePointGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="DemandResponsePrograms" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePointGroup.DemandResponsePrograms">
      <xs:complexType sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#DemandResponseProgram">
        <xs:attribute name="ref" type="xs:string"/>
      </xs:complexType>
    </xs:element>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="UsagePoints" type="m:UsagePoint" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointGroup.UsagePoints"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

Annex J (normative)

Request parameters

J.1 General

The purpose of this Annex J is to describe filters that can be used for "GET" requests in order to filter the contents of the payload that is returned on the REPLY message. This is in effect a "query" pattern. If needed, these filters can be defined as contextual profiles in a manner similar to those used to define payloads. Those structures are then realized as XML schemas. The payloads would be used in the "any ##other" element of the request structure in a request message (see Figure J.1).

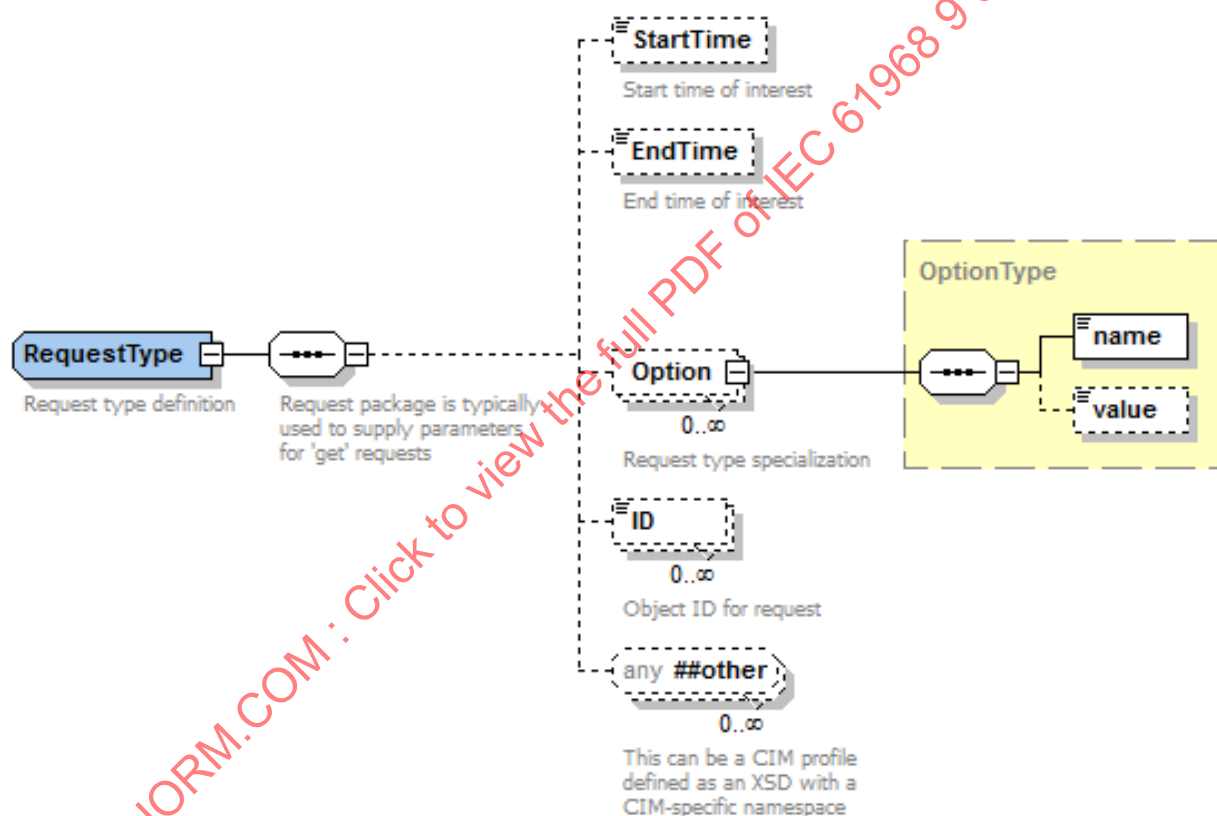


Figure J.1 – Message request structure

The "StartTime" and "EndTime" tags are often used to narrow the results to a given time interval. The "ID" tags can be used to specify the mRIDs for a set of objects of interest. The "Option" parameter provides for name/value pairs that can also be used to meet specific application needs.

Other qualifiers can be specified using the "any ##other" element as needed, which are referred to as "Get" profiles. When "Get" profiles are used, the Request.ID elements should not be used. A "Get" profile primarily is used to identify object IDs (by name or mRID) for specific classes of objects.

Clauses J.2 to J.5 describe "Get" profiles, which are named as "Get<Noun>" and corresponding XSD file name as "Get<Noun>.xsd". Except for "PrePay" profiles, the

convention for IEC 61968-9 is to define a "Get" profile for each noun. In the case of PrePay profiles, it would be possible to rename one of the existing "Get" profiles if needed. In all cases where a "Get" profile is used, the parameters defined within the "Get" profile shall be used in preference over generic parameters defined in the Request package.

J.2 GetMeterReadings

The following structure in Figure J.2 is a contextual profile that can be used to qualify "GET MeterReadings" requests. This provides a representative example of how mRIDs, names and time may be specified within a "Get" profile to qualify a query.

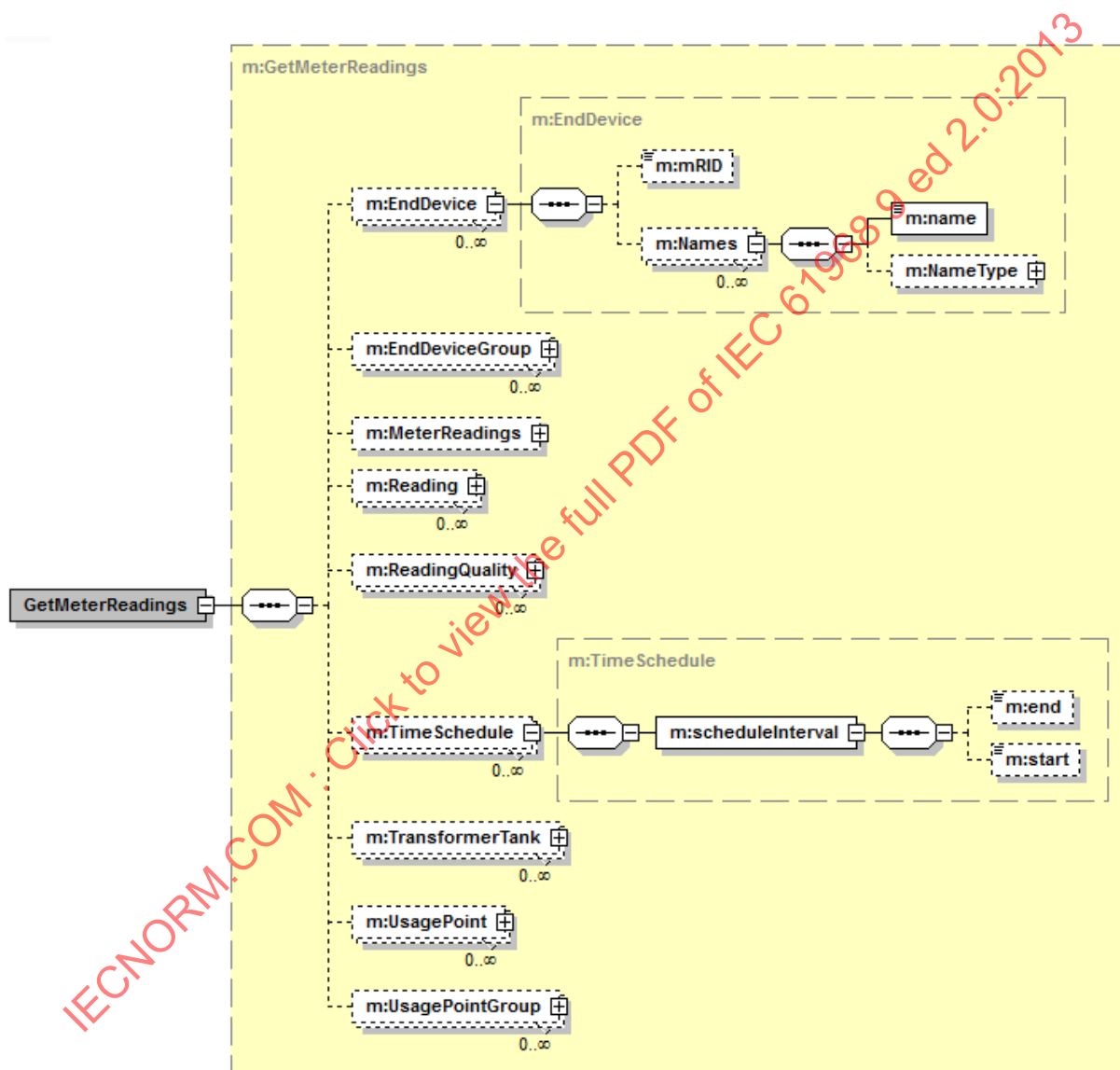


Figure J.2 – GetMeterReadings

J.3 GetEndDeviceConfig

The following structure in Figure J.3 is a contextual profile that can be used to qualify "GET EndDeviceConfig" requests.

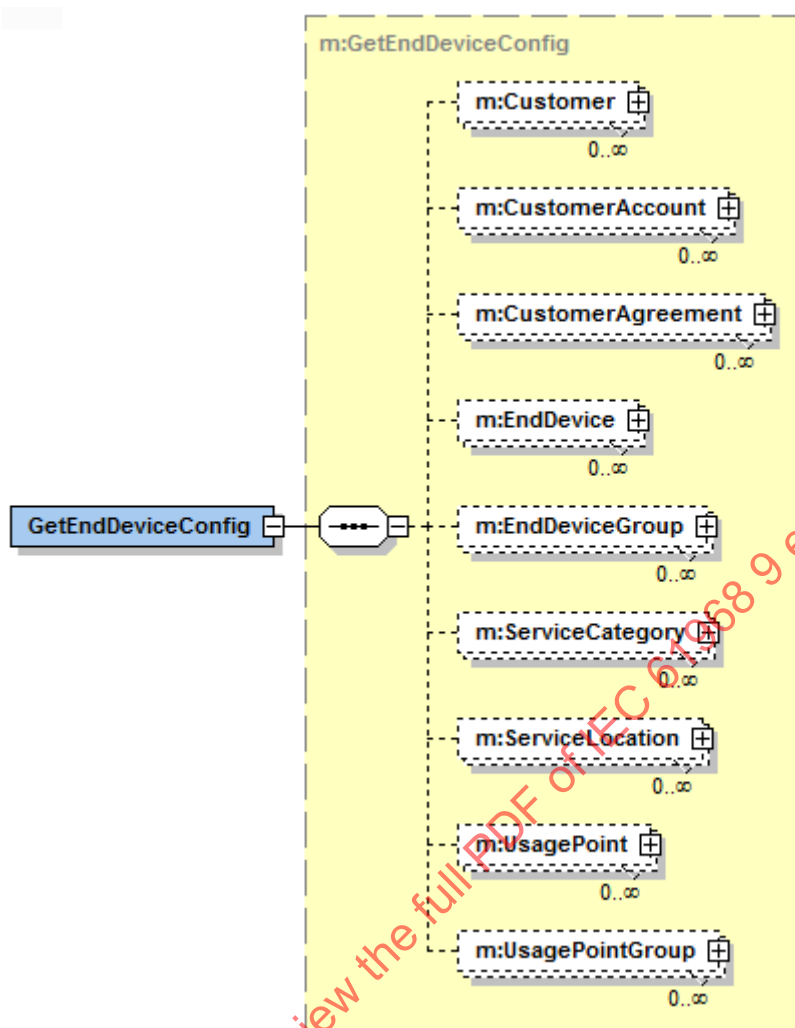


Figure J.3 – GetEndDeviceConfig

J.4 GetCustomerMeterDataSet

The following structure in Figure J.4 is a contextual profile that can be used to qualify "GET CustomerMeterDataSet" requests.

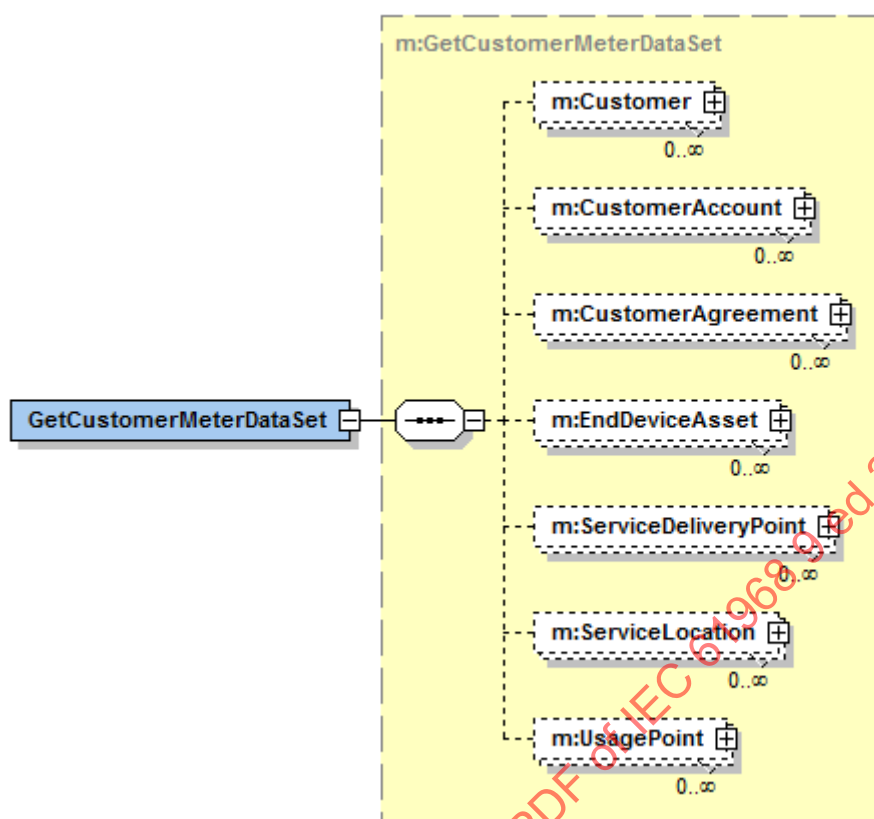


Figure J.4 – GetCustomerMeterDataSet

J.5 GetMeterServiceRequests

The following structure in Figure J.5 is a contextual profile that can be used to qualify "GET MeterService" requests.

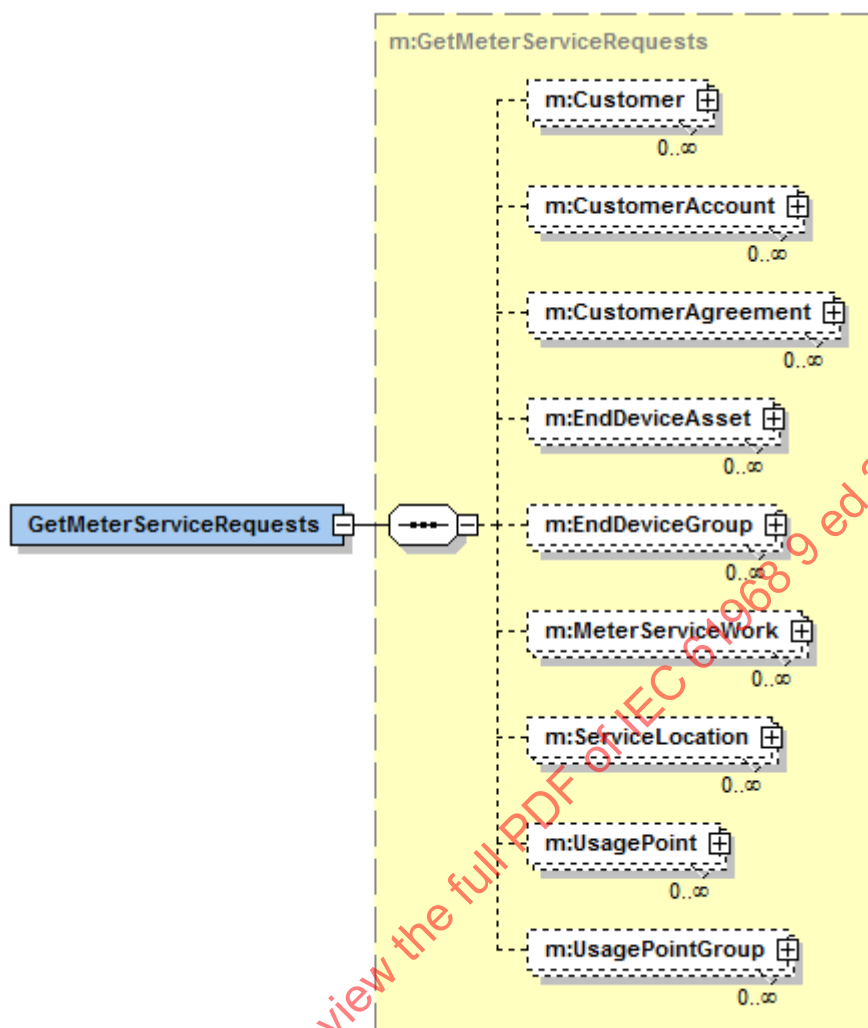


Figure J.5 – GetMeterServiceRequests

The previous ""Get" profiles are representative examples that are commonly used. The complete list of ""Get" profiles include the following:

- GetAuxiliaryAgreementConfig
- GetComModuleConfig
- GetCustomerAccountConfig
- GetCustomerAgreementConfig
- GetCustomerConfig
- GetCustomerMeterDataSet
- GetEndDeviceConfig
- GetEndDeviceControls
- GetEndDeviceEvents
- GetEndDeviceFirmware
- GetEndDeviceGroups
- GetMeterConfig
- GetMeterReadings
- GetMeterReadSchedule

- GetMeterServiceRequests
- GetPricingStructureConfig
- GetReceiptRecord
- GetServiceCategoryConfig
- GetServiceLocationConfig
- GetServiceSupplierConfig
- GetTransactionRecord
- GetUsagePointConfig
- GetUsagePointGroups
- GetUsagePointLocationConfig

The XML schemas for ""Get" profiles are provides in Annexes H and I.

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Annex K (normative)

Master data management transaction processing

K.1 General

The purpose of this Annex K is to describe how transaction processing is performed in order to support the master data management needs of IEC 61968-9.

For this edition of IEC 61968-9, the Message.xsd message envelope has been extended to accommodate an OperationSet construct in both the payload and reply portions of Message.xsd. Refer to Figures K.1 and K.2 for a depiction of the OperationSet constructs.

There are two circumstances where the use of OperationSet is normative in IEC 61968-9 master data management:

- When modifying the configuration of a CIM object related to master data management (e.g. nouns including but not limited to: MeterConfig, CustomerConfig, UsagePointConfig, PricingStructureConfig, etc.) and the modification involves deleting one or more attributes or one or more instances of associated CIM objects. An example is removing a Register configuration from a Meter.
- When performing two or more related Master Data Management actions that shall be handled in a specific sequence and/or with overall transactional integrity (i.e. either all actions shall succeed or all shall be rolled back).

An IEC 61968-9 message utilizing the OperationSet construct always has a Header verb of either “execute” or “executed” and a noun of “OperationSet”. An OperationSet in turn contains one or more Operations, and each Operation has an operationId which supplements the overall message CorrelationID to provide a fine-grained ability to correlate the contents of one or more reply messages with the individual Operations in an OperationSet. Individual Operations within an OperationSet have OperationSet-level verbs and nouns. Allowable verbs are create, created, change, changed, delete and deleted.

To support circumstance a) above, each Operation in an OperationSet includes an elementOperation boolean. This boolean is to be set to “true” when the Operation verb is either “delete” or “deleted” and the intent is to delete individual attributes or individual instances of associated CIM classes from the object specified by the OperationSet noun (as opposed to deleting the entire CIM object specified by the Operation noun). It is emphasized that in this case (with an elementOperation boolean set to “true”), use of the Operation verb “delete” or “deleted” effectively modifies rather than deletes the CIM object specified by the Operation noun. If omitted, elementOperation is assumed to be “false”.

To support circumstance b) above, each OperationSet may have either an enforceMsgSequence boolean or an enforceTransactionalIntegrity boolean, or both. The enforceMsgSequence boolean is to be set to “true” when the Operations in the OperationSet shall be executed in ascending order of their operationID. The enforceTransactionalIntegrity boolean is to be set to “true” if all Operations in the OperationSet shall succeed. In this case, if all such Operations do not succeed, all shall be aborted or rolled back. If either or both of these booleans are omitted, they are assumed to be “false”.

When modifying the configuration of a CIM object related to IEC 61968-9 master data management using any of the verbs “change”, “changed”, “delete” or “deleted”, only the ID of the object being changed and the information that is being changed is to be included. This is true whether or not an OperationSet is being used. It is for this reason that almost all elements within the IEC 61968-9 Master Data Management Profiles are optional in the profiles.

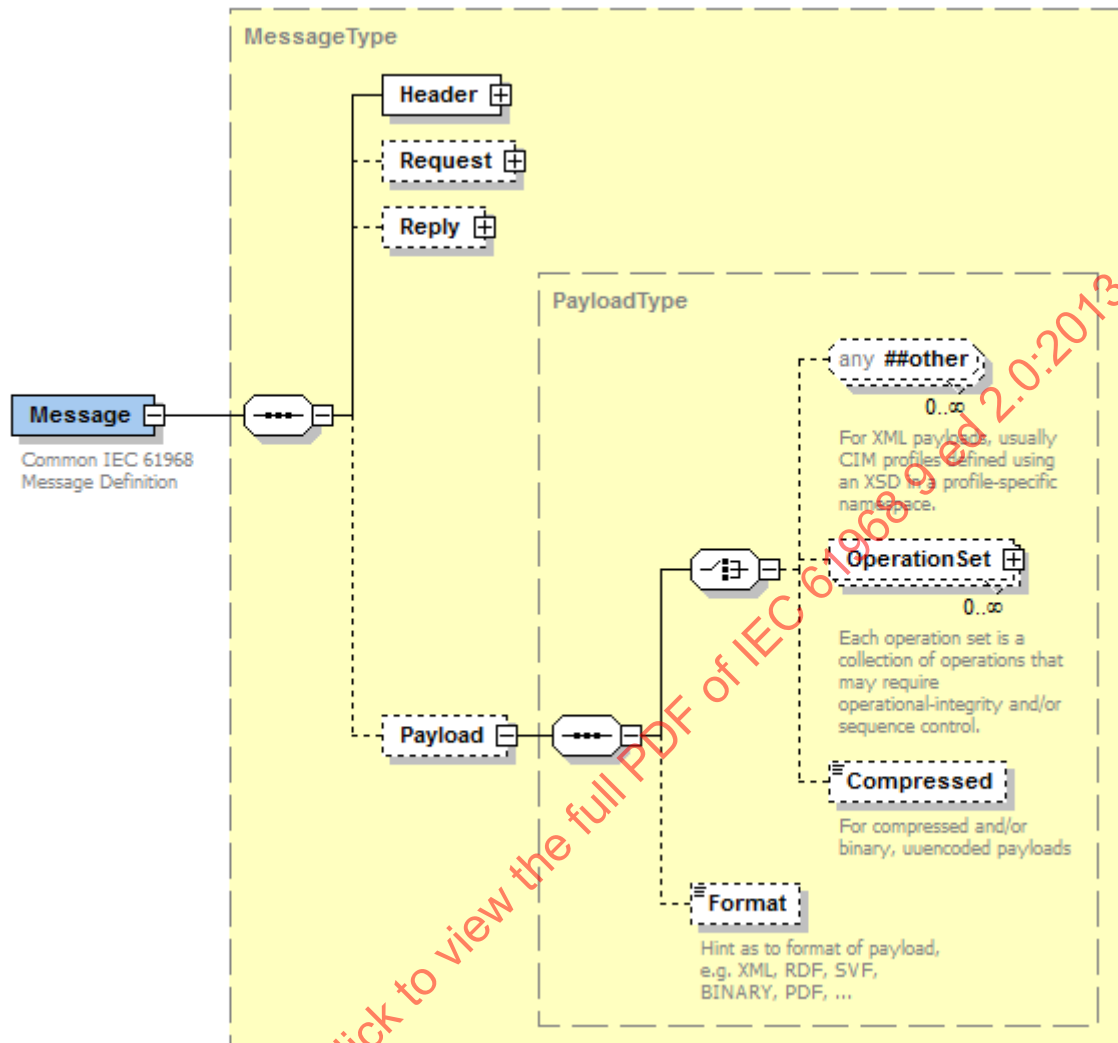


Figure K.1 – Message Envelope Extension

Only one OperationSet may be included in a single IEC 61968-9 master data management message.

It should also be noted that while this standard provides the means to convey master data management transactions using XML schema-based data structures, it is also technically possible to leverage IEC 61970-552 for transactions based upon RDF. Such capability may or may not be provided in future editions of the IEC 61968-9 and IEC 61968-100 standards.

K.2 OperationSet

The diagram in Figure K.2 describes the OperationSet element in more detail. An OperationSet can:

Require that each operation is sequentially executed by setting the enforceMsgSequence flag to "true".

Require that transactional integrity be maintained (i.e. all or nothing), by setting the enforceTransactionalIntegrity flag to "true".

Have one or more Operations, where each operation has a noun, verb and payload.

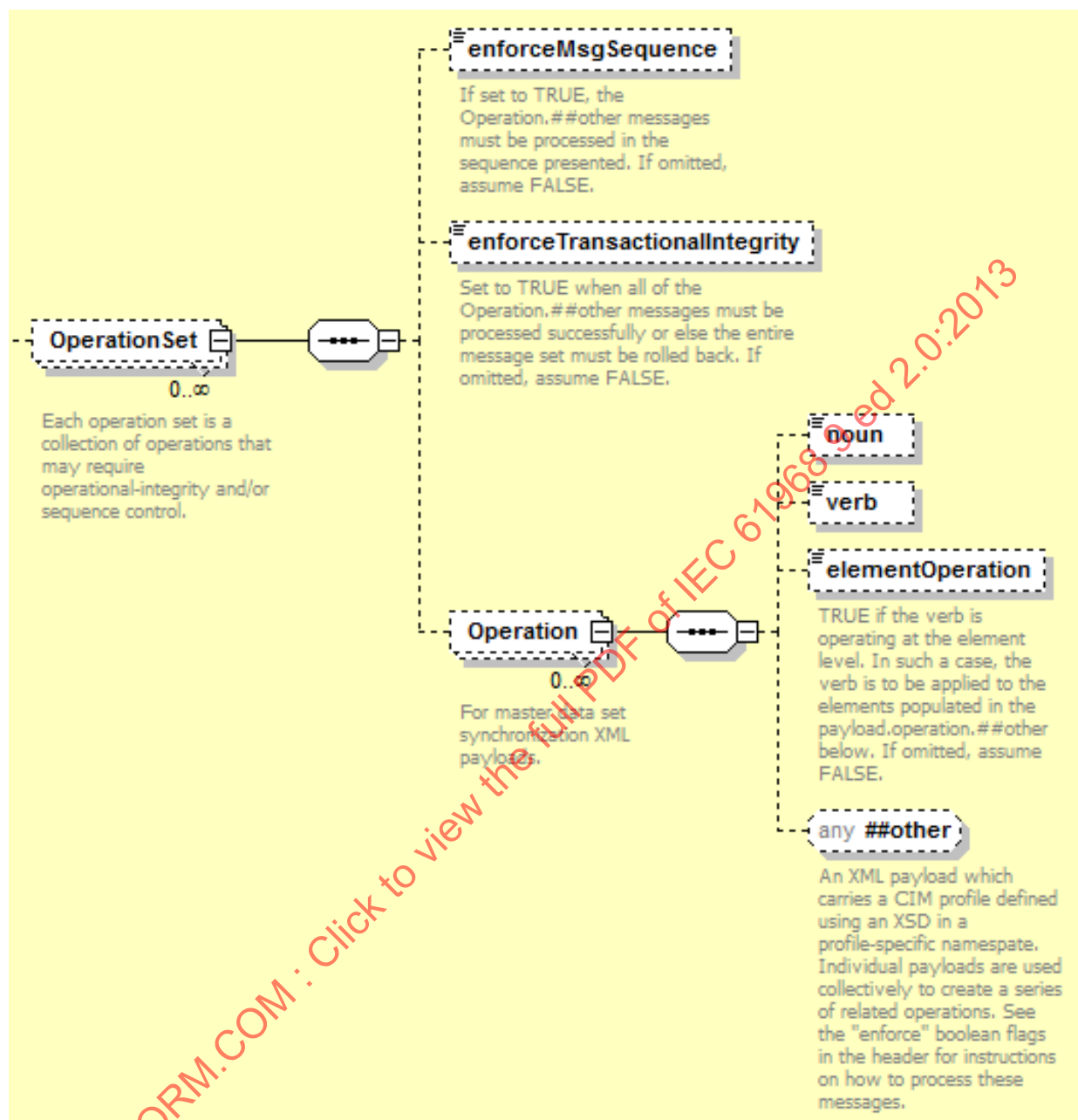


Figure K.2 – OperationSet

Within the Operation element, the noun will identify the type of the "any" element. The elementOperation value will cause the transaction to either act upon the object or elements within the object. Please refer also to examples provided at the end of Annex L.

K.3 Patterns

Any given IEC 61968-9 master data management transaction may be executed using either a request-response message pattern (request stereotype and response stereotype messages) or a published event message pattern (event stereotype messages). Four exemplary sequence diagrams effectively illustrate the possible variations.

NOTE The "source of record" for IEC 61968-9 master data management information is frequently a Customer Information System (IEC 61968-8). Recipients of this information are typically other enterprise systems such as

meter data management systems and metering systems. However, there are no restrictions on which systems may issue and receive IEC 61968-9 master data management messages.

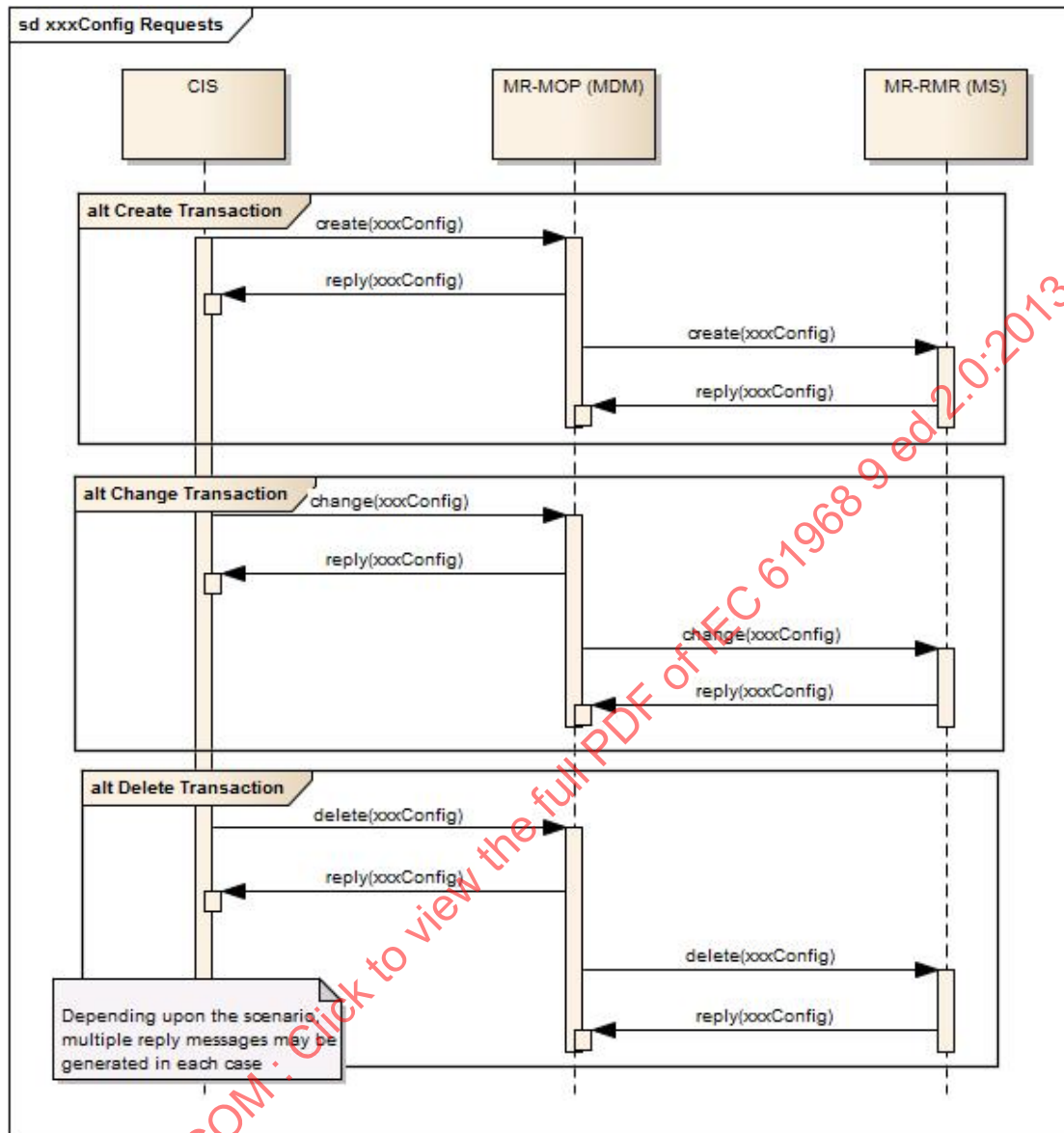


Figure K.3 – Pattern 1: Request/response (non-OperationSet)

This request / response pattern can be used for any of the Master Data Management “config” transactions identified in 5.10.3 as well as for the MasterDataLinkageConfig and ObjectNamesConfig transactions. Simply replace the occurrences of “xxxConfig” in the diagram with the appropriate profile name (noun). Allowable verbs are “create”, “change” and “delete”. Depending upon the scenario, there can be multiple replies to a given create, change, or delete message. For example, a single create message can be issued to create multiple meters. In this case, the responding system can send a single reply message for all meters or multiple reply messages with the reply data for one or more meters in each message.

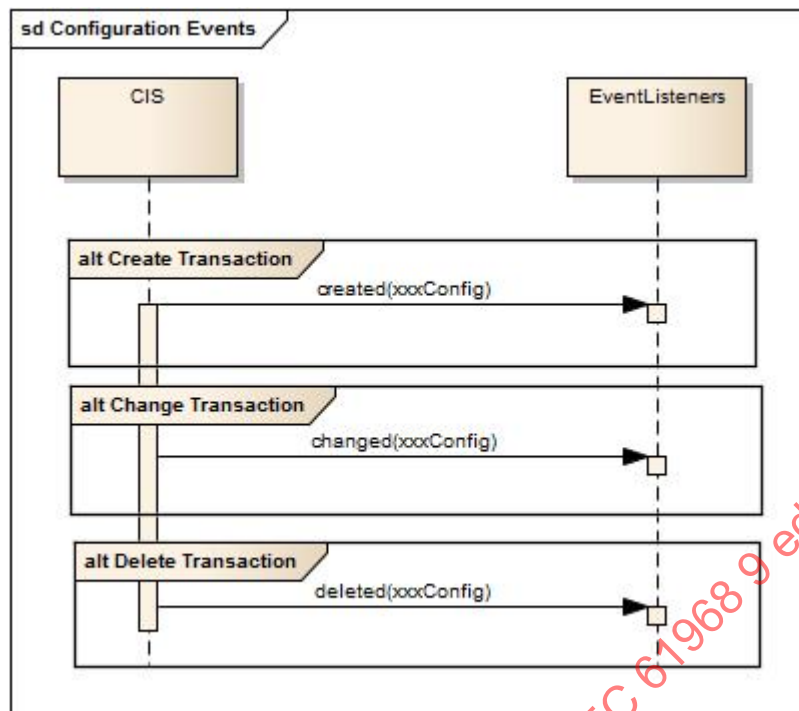


Figure K.4 – Pattern 2: published event (non-OperationSet)

This published event pattern can also be used for any of the Master Data Management “config” transactions identified in 5.10.3 as well as for the MasterDataLinkageConfig and ObjectNamesConfig transactions. Simply replace the occurrences of “xxxConfig” in the diagram with the appropriate profile name (noun). Allowable verbs are “created”, “changed” and “deleted”. Using this pattern, an enterprise system may notify one or more other enterprise systems of Master Data Management events without requiring any acknowledgment or confirmation of successful processing.

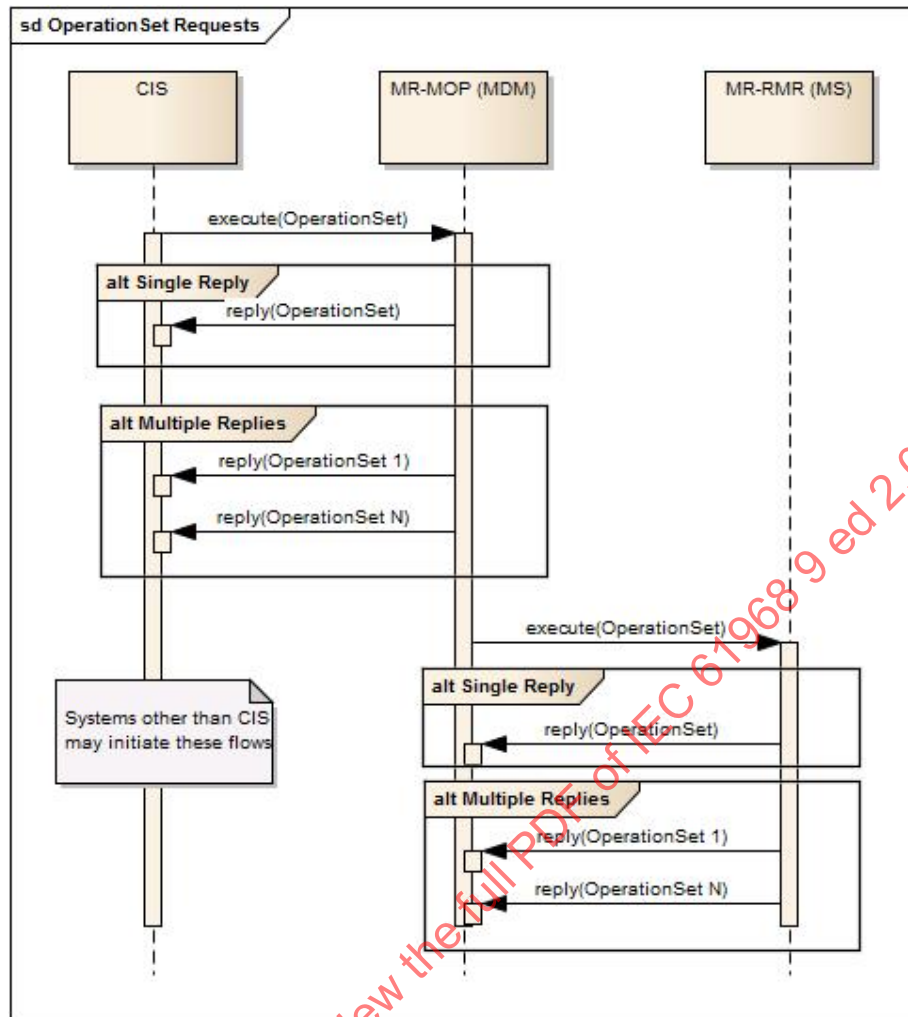


Figure K.5 – Pattern 3: Request/response (OperationSet)

This request / response pattern can be used for any Master Data Management transaction involving an OperationSet. The verb in the message Header is always “execute”. The individual Operation(s) within the Operation set can have verbs and nouns consistent with the request / response transaction in Pattern 1. Depending upon the scenario, there can be multiple replies to a given execute / OperationSet transaction. For example, a single reply message can be sent for the entire OperationSet, or multiple reply messages can be sent, each with the reply data for one or more Operations in each message. The operationID element for each Operation in the request message is supplied in the reply message(s). This is used, in conjunction with the overall CorrelationID in the message Header(s) to correlate replies with their corresponding requests.

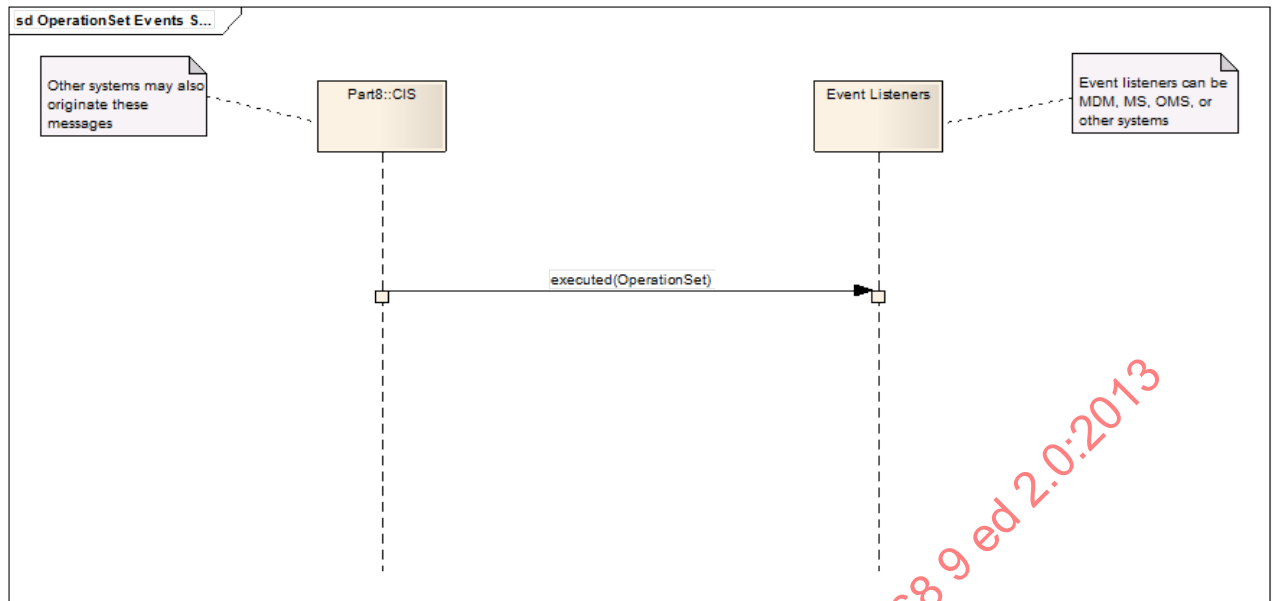


Figure K.6 – Pattern 4: published event (OperationSet)

This published event pattern can also be used for any Master Data Management transaction involving an OperationSet. The verb in the message Header is always “executed”. The individual Operation(s) within the Operation set can have verbs and nouns consistent with the published event transaction in Pattern 2. Using this pattern, an enterprise system may notify one or more other enterprise systems of Master Data Management OperationSet events without requiring any acknowledgment or confirmation of successful processing.

Annex L (informative)

Master data management use cases and sample XML

L.1 General

The purpose of this annex is to provide a description of informative use cases related to master data management. It also provides sample XML to illustrate the intended usage of the Master Data Management / Data Synchronization related profiles.

Table L.1 that follows identifies 53 exemplary Master Data Management / Data Synchronization use cases and provides guidance on how to construct and populate the request or event stereotype message for each use case.

In actual practice, use cases that utilize the request / response messaging pattern (See Annex K) will have an optional simple acknowledgment message (verb = “reply”, Result = “OK” and Reply.Error.code = “0.3”) and one or more response messages (verb = “reply”) indicating success or failure of each individual config operation in a given request message.

Following the table are sample XML examples that illustrate the messages exchanged for several exemplary use cases utilizing the request / response pattern. While only a limited number of use cases are presented with their sample XML, the examples provided are sufficient to illustrate the intended usage of all of the IEC 61968-9 master data management related profiles.

The sample XML provided includes population of the IEC 61968 elements from the Message envelope (Message.xsd from IEC 61968-100) as well as the payloads described in this standard. Including the content in the Header, Request, Reply and Payload sections of the message is necessary to illustrate the intended use of the messages, especially in the cases where OperationSet is employed.

The sample XML provided includes population of only a small subset of the attributes available for fully describing the “configurations” of Meters, UsagePoints, and other CIM objects. It is not the intent of these use cases to provide full configuration details for these objects; it is simply to illustrate the techniques involved in creating, modifying, and deleting these objects as well as the techniques for managing the relationships between these objects using the MasterDataLinkageConfig profile. Also illustrated is the use of the OperationSet in both of its two normative uses as described in 5.10 and Annex K:

- When modifying the configuration of a CIM object related to Master Data Management (e.g. nouns including but not limited to: MeterConfig, CustomerConfig, UsagePointConfig, PricingStructureConfig, etc.) and the modification involves deleting one or more attributes or one or more instances of associated CIM objects. An example is removing a Register configuration from a Meter.
- When performing two or more related Master Data Management actions that shall be handled in a specific sequence and/or with overall transactional integrity (i.e. either all actions shall succeed or all shall be rolled back).

Please refer also to 5.10, Annex K and IEC 61968-100 for additional information related to master data management / data synchronization.

Table L.1 – Exemplary master data management / data synchronization use cases

Use Case #	DS-1	DS-2	DS-3	DS-4
Use Case Description	Create a meter and / or receive meter into Inventory	Add or update one or more simple attributes for a meter in inventory	Delete one or more simple attributes for a meter in inventory	Add an additional instance of a class such as Register to a meter in inventory
Header Verb	create/created	change/changed	execute/executed	change/changed
Header Noun	MeterConfig	MeterConfig	OperationSet	MeterConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	delete/deleted	n/a
Op Set Noun	n/a	n/a	MeterConfig	n/a
Element Flag	n/a	n/a	"true"	n/a
Payload Description	1) ID of the Meter 2) As many details about the Meter as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the Meter 2) Attributes that are being added or modified 3) Effectivity dates and reason as appropriate	1) ID of the Meter 2) Attributes that are being deleted 3) Effectivity dates and reason as appropriate	1) ID of the Meter 2) ID and details of the Register being added 3) Effectivity dates and reason as appropriate
Relationship Line	n/a	n/a	n/a	n/a
Comments	Meter ID can be either an mRID and/or one or more Names.name. Present tense of verbs used for request/reply patterns; past tense used for published notifications (no reply).	Simple attributes have only one occurrence at any given location within the schema.	An OperationSet is required (even though there is only one operation specified) because it is necessary to set the Element Flag; otherwise the delete/deleted verb with the MeterConfig noun would be interpreted as deleting the Meter itself.	An OperationSet is not required because the change does not involve the concept of a "reverse" action.

Use Case #	DS-5	DS-6	DS-7	DS-8
Use Case Description	Delete an instance of a class such as Register from a meter in inventory	Configure meter to collect fwd kWh register and 15-minute interval readings	Re-configure meter to have Channel 2 of Register 1 collect 5-minute fwd kWh register readings rather than 15-minute fwd kWh interval readings	Delete a meter from inventory
Header Verb	execute/executed	change/changed	change/changed	delete/deleted
Header Noun	OperationSet	MeterConfig	MeterConfig	MeterConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	delete/deleted	n/a	n/a	n/a
Op Set Noun	MeterConfig	n/a	n/a	n/a
Element Flag	"true"	n/a	n/a	n/a
Payload Description	1) ID of the Meter 2) ID of the Register being deleted 3) Effectivity dates and reason as appropriate	1) ID of meter 2) ID of Register 1 3) As many details of Register 1 as available / desired 4) ID of Channel 1 of Register 1 5) As many details of Channel 1 of Register 1 as available / desired, including ReadingType for BulkQuantity fwd kWh 6) ID of Channel 2 of Register 1 7) As many details of Channel 2 of Register 1 as available / desired, including ReadingType for 15minute DeltaData fwd kWh 8) Effectivity dates and reason as appropriate	1) ID of meter 2) ID of Register 1 3) ID of Channel 2 of Register 1 4) As many details of Channel 2 of Register 1 as available / desired, including ReadingType for 5minute DeltaData fwd kWh 5) Effectivity dates and reason as appropriate	1) ID of meter 2) Effectivity dates and reason as appropriate
Relationship Line	n/a	n/a	n/a	n/a
Comments	An OperationSet is required (even though there is only one operation specified) because it is necessary to set the Element Flag; otherwise the delete/deleted verb with the MeterConfig noun would be interpreted as deleting the Meter itself.	An OperationSet is not required because the change does not involve the concept of a "reverse" action. (This assumes that registers and channels were not previously configured for this Meter.)	An OperationSet is not required because the change does not involve the concept of a "reverse" action. If Channel 2 was being deleted and Channel 3 was being added (rather than just modifying Channel 2), then an OperationSet would be required.	Many systems may choose not to delete meters but to mark the meters as removed and/or retired.

Use Case #	DS-9	DS-10	DS-11	DS-12
Use Case Description	Receive com module into inventory	Create a service category	Create a service supplier	Create a service location
Header Verb	create/created	create/created	create/created	create/created
Header Noun	ComModuleConfig	ServiceCategoryConfig	SupplierConfig	ServiceLocationConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the ComModule 2) As many details about the ComModule as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the ServiceCategory 2) As many details about the ServiceCategory as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the ServiceSupplier 2) As many details about the ServiceSupplier as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the ServiceLocation 2) As many details about the ServiceLocation as available / desired 3) Effectivity dates and reason as appropriate
Relationship Line	n/a	n/a	n/a	n/a
Comments	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a ComModule after it is in inventory.	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a ServiceCategory.	In de-regulated markets, the distribution utility and the retailer may be separate ServiceSuppliers (having different ServiceSupplier.kind) Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a ServiceSupplier.	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a ServiceLocation.

Use Case #	DS-13	DS-14	DS-15
Use Case Description	Create a usage point location	Create a usage point	Create a customer
Header Verb	create/created	create/created	create/created
Header Noun	UsagePointLocationConfig	UsagePointConfig	CustomerConfig
Enforce Seq	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a
Payload Description	1) ID of the UsagePointLocation 2) As many details about the UsagePointLocation as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the UsagePoint 2) As many details about the UsagePoint as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the Customer 2) As many details about the Customer as available / desired 3) Effectivity dates and reason as appropriate
Relationship Line	n/a	n/a	n/a
Comments	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a UsagePointLocation.	If the UsagePoint is also a service delivery point (point of demarcation between utility and customer ownership), set the isSdp Boolean to "true". If any of the following are to be included as part of the creation of the UsagePoint, they shall exist in advance of the create / created UsagePointConfig message: ServiceSupplier, ServiceCategory, ServiceLocation, UsagePointLocation. Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a UsagePoint.	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a Customer.

Use Case #	DS-16	DS-17	DS-18	DS-19
Use Case Description	Create a customer account	Create a customer agreement	Create a pricing structure	Create a non-meter end device (including a PAN device)
Header Verb	create/created	create/created	create/created	create/created
Header Noun	CustomerAccountConfig	CustomerAgreementConfig	Pricing StructureConfig	EndDeviceConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the CustomerAccount 2) As many details about the CustomerAccount as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAgreement 2) As many details about the Customer Agreement as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the PricingStructure 2) As many details about the PricingStructure as available / desired 3) Effectivity dates and reason as appropriate	1) ID of the EndDevice 2) As many details about the EndDevice as available / desired 3) Effectivity dates and reason as appropriate
Relationship Line	n/a	n/a	n/a	n/a
Comments	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a CustomerAccount.	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a CustomerAgreement.	Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of a PricingStructure.	If the EndDevice is a PAN device, set the isPan Boolean to "true" or meters, see Use Case DS-1. Follow the examples of Use Cases DS-2 through DS-8 for changes to or deletion of an EndDevice.

Use Case #	DS-20	DS-21	DS-22	DS-23
Use Case Description	Shop install a com module into a meter	Remove a com module from a meter	Reflect the pairing of an end device (e.g., a PAN device) to a meter	Reflect the unpairing of an end device (e.g., a PAN device) from a meter
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the ComModule 2) ID of the Meter 3) Effectivity dates and reason as appropriate	1) ID of the ComModule 2) ID of the Meter 3) Effectivity dates and reason as appropriate	1) ID of the EndDevice 2) ID of the Meter 3) Effectivity dates and reason as appropriate	1) ID of the EndDevice 2) ID of the Meter 3) Effectivity dates and reason as appropriate
Relationship Line	A	A	B	B
Comments	Assumes the Meter and the ComModule already exist. ComModules may not exist for meters with integral communications capabilities. Multiple com modules (e.g., one for AMI network and a ZigBee module for Home Area Networking) may be installed into a meter. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	ComModules may not exist for meters with integral communications capabilities. This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes the EndDevice and the Meter already exist. Multiple EndDevices devices may be paired with a given meter. An EndDevice may optionally be "paired" with a UsagePoint rather than a meter. This would most typically be done when the communication with a PAN device is not via the meter. See Use Case DS25. At any given time, a EndDevice should not be paired with both a Meter and a UsagePoint. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Multiple EndDevices may be paired with a given meter. Un-pairing an EndDevice does not delete the EndDevice but only takes it out-of-service for that meter. This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-24	DS-25	DS-26	DS-27
Use Case Description	Reflect the pairing of an end device (e.g., a PAN device) to a usage point	Reflect the unpairing of an end device (e.g., a PAN device) from a usage point	Reflect the installation of a meter at usage point	Reflect the removal of a meter from a usage point
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the EndDevice 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the EndDevice 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the Meter 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the Meter 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate
Relationship Line	C	C	D	D
Comments	Assumes the EndDevice and the UsagePoint already exist. Multiple end devices may be paired with a given UsagePoint. A EndDevice may optionally be "paired" with a meter rather than a UsagePoint. This would most typically be done when the communication with a PAN device is via the meter. See Use Case DS-23. At any given time, an EndDevice should not be paired with both a Meter and a UsagePoint. This transaction accomplishes only the "linkage" of these objects. There is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Multiple end devices may be paired with a given UsagePoint. Unpairing an EndDevice does not delete the EndDevice but only takes it out-of-service for that UsagePoint. This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes that both the Meter and the UsagePoint already exist. Multiple meters may be installed at a given UsagePoint, although some enterprise systems do not support doing so. This is the master data reflecting the meter installation. It may be preceded by or accompanied by another Part 9 message associated with a service request for the field work associated with the installation. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Multiple meters may be installed at a given UsagePoint, although some enterprise systems do not support doing so. Removing (uninstalling) a meter does not delete the Meter but only takes it out-of-service for that UsagePoint. This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-28	DS-29	DS-30	DS-31
Use Case Description	Associate a pricing structure with a usage point	Disassociate a pricing structure from a usage point	Associate a customer agreement with a usage point	Disassociate a customer agreement from a usage point
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the PricingStructure 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the PricingStructure 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAgreement 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAgreement 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate
Relationship Line	G	G	H	H
Comments	Assumes that both the PricingStructure and the UsagePoint already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes that both the CustomerAgreement and the UsagePoint already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-32	DS-33	DS-34	DS-35
Use Case Description	Associate a customer account with a usage point	Disassociate a customer account from a usage point	Associate a customer with a usage point	Disassociate a customer from a usage point
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the CustomerAccount 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAccount 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the Customer 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of the Customer 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate
Relationship Line	K	K	L	L
Comments	Assumes that both the CustomerAccount and the UsagePoint already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes that both the Customer and the UsagePoint already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-36	DS-37	DS-38	DS-39
Use Case Description	Associate a pricing structure with a customer agreement	Disassociate a pricing structure from a customer agreement	Associate a service location with a customer agreement	Disassociate a service location from a customer agreement
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the PricingStructure 2) ID of the CustomerAgreement 3) Effectivity dates and reason as appropriate	1) ID of the PricingStructure 2) ID of the CustomerAgreement 3) Effectivity dates and reason as appropriate	1) ID of the ServiceLocation 2) ID of the CustomerAgreement 3) Effectivity dates and reason as appropriate	1) ID of the ServiceLocation 2) ID of the CustomerAgreement 3) Effectivity dates and reason as appropriate
Relationship Line	N	N	O	O
Comments	Assumes that both the PricingStructure and the CustomerAgreement already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes that both the ServiceLocation and the CustomerAgreement already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-40	DS-41	DS-42	DS-43
Use Case Description	Associate a usage point location with a service location	Disassociate a usage point location from a service location	Associate a customer account with a customer	Disassociate a customer account from a customer
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the UsagePointLocation 2) ID of the ServiceLocation 3) Effectivity dates and reason as appropriate	1) ID of the UsagePointLocation 2) ID of the ServiceLocation 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAccount 2) ID of the Customer 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAccount 2) ID of the Customer 3) Effectivity dates and reason as appropriate
Relationship Line	P	P	Q	Q
Comments	Assumes that both the UsagePointLocation and the ServiceLocation already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes that both the CustomerAccount and the Customer already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-44	DS-45	DS-46	DS-47
Use Case Description	Associate a customer agreement with a customer account	Disassociate a customer agreement from a customer account	Associate a service supplier with a customer account	Disassociate a service supplier from a customer account
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the CustomerAgreement 2) ID of the CustomerAccount 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAgreement 2) ID of the CustomerAccount 3) Effectivity dates and reason as appropriate	1) ID of the ServiceSupplier 2) ID of the CustomerAccount 3) Effectivity dates and reason as appropriate	1) ID of the ServiceSupplier 2) ID of the CustomerAccount 3) Effectivity dates and reason as appropriate
Relationship Line	R	R	S	S
Comments	Assumes that both the CustomerAgreement and the Customer account already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes that both the ServiceSupplier and the CustomerAccount already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-48	DS-49	DS-50	DS-51
Use Case Description	Associate a service supplier with a customer agreement	Disassociate a service supplier from a customer agreement	Associate a customer agreement with a customer	Disassociate a customer agreement from a customer account
Header Verb	create/created	delete/deleted	create/created	delete/deleted
Header Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig	MasterDataLinkageConfig
Enforce Seq	n/a	n/a	n/a	n/a
Enforce Trans	n/a	n/a	n/a	n/a
Op Set Verb	n/a	n/a	n/a	n/a
Op Set Noun	n/a	n/a	n/a	n/a
Element Flag	n/a	n/a	n/a	n/a
Payload Description	1) ID of the ServiceSupplier 2) ID of the CustomerAgreement 3) Effectivity dates and reason as appropriate	1) ID of the ServiceSupplier 2) ID of the CustomerAgreement 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAgreement 2) ID of the Customer 3) Effectivity dates and reason as appropriate	1) ID of the CustomerAgreement 2) ID of the Customer 3) Effectivity dates and reason as appropriate
Relationship Line	T	T	U	U
Comments	Assumes that both the ServiceSupplier and the CustomerAgreement already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	Assumes that both the CustomerAgreement and the Customer already exist. This transaction accomplishes only the "linkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.	This transaction accomplishes only the "delinkage" of these objects. If there is a desire to update either or both of the object records, additional messages can be created. Additionally, the multiple actions may be combined with control over sequence and overall transaction integrity using the OperationSet construct in Message.xsd. This approach is illustrated in a number of separate use cases.

Use Case #	DS-52				
Use Case Description	Exchange meter 2 for meter 1 at a usage point and update the install date for meter 2 and the removal date for meter 1				
Header Verb	execute/executed				
Header Noun	OperationSet				
Enforce Seq	"true"				
Enforce Trans	"true"				
Op Set Verb	delete/deleted	create/created	change/changed	change/changed	
Op Set Noun	MasterDataLinkageConfig	MasterDataLinkageConfig	MeterConfig	MeterConfig	
Element Flag	"false"	"false"	"false"	"false"	
Payload Description	1) ID of Meter 1 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of Meter 2 2) ID of the UsagePoint 3) Effectivity dates and reason as appropriate	1) ID of Meter 1 2) Removal date for Meter 1 3) Effectivity dates and reason as appropriate	1) ID of Meter 2 2) Installation date for Meter 2 3) Effectivity dates and reason as appropriate	
Relationship Line	D	D	n/a	n/a	
Comments	Assumes creation / configuration of meter 2 occurred in advance of the meter exchange transaction. The enforceMessageSequence flag is set to "true" to ensure that meter 1 is removed before meter 2 is installed. The enforceTransactionalIntegrity flag is set to "true" to ensure that all portions of this transaction are rolled back (voided) if any of the transactions fail. This ensures overall integrity of the database in the receiving system.				

Use Case #	DS-53	
Use Case Description	Reflect the creation of a PAN device and its pairing with an existing meter	
Header Verb	execute/execute	
Header Noun	OperationSet	
Enforce Seq	"true"	
Enforce Trans	"true"	
Op Set Verb	create/created	create/created
Op Set Noun	EndDeviceConfig	MasterDataLinkageConfig
Element Flag	"false"	"false"
Payload Description	1) ID of the EndDevice (PAN device) 2) As many details about the EndDevice (PAN device) as available / desired 3) Effectivity dates and reason as appropriate	
Relationship Line	n/a	B
Comments	For this Pan device example, the isPan Boolean in the EndDeviceConfig will be set to "true". Assumes the meter was created in advance of the this composite transaction. The enforceMessageSequence flag is set to "true" to ensure that the PAN device is created before it is associated with the meter. The enforceTransactionalIntegrity flag is set to "true" to ensure that all portions of this transaction are rolled back (voided) if any of the transactions fail. This ensures overall integrity of the database in the receiving system.	

L.2 Sample XML for Exemplary Master Data management use cases

The remainder of this Annex provides sample XML for a set of use cases that illustrates the intended use of the part 9 Master Data Management Transaction profile set.

Although only a small subset of the available profiles is included, the examples are applicable to the remaining Master Data Management use cases and profiles.

In most of the examples below, there are 4 steps for each use case:

- a CIS system sends a create message to the Meter Data Management System (MDMS) to synchronize certain master data,
- the MDMS sends a simple acknowledgment response message to the CIS to indicate it has received the request. (This is an optional step that is bypassed when using JMS messaging if the AckRequired in the Header of the Step 1 request message is set to "false"),
- the MDMS sends a response message to the CIS to indicate that the request was completed successfully, or
- the MDMS sends a response message to the CIS to indicate that the request failed to complete successfully.

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L.2.1 Create MeterConfig – Two Meters – Step 1

```
<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  <xsi:import namespace = "http://iec.ch/TC57/2011/MeterConfig#" schemaLocation =
    "MeterConfig.xsd"/>
  <Header>
    <Verb>create</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:30:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>8B3EF3E8-C61C-4C91-BEF0-A1775570656A</MessageID>
    <CorrelationID>8B3EF3E8-C61C-4C91-BEF0-A1775570656A</CorrelationID>
  </Header>
  <Payload>
    <m:MeterConfig>
      <m:ComFunction>
        <m:mRID>14470EB8-F28F-433E-9A34-D61C845FD976</m:mRID>
        <m:direction>biDirectional</m:direction>
        <m:technology>cellular</m:technology>
      </m:ComFunction>
      <m:Meter>
        <m:mRID>B95ED625-2EDB-437F-977C-6E2991EE61CB</m:mRID>
        <m:amrSystem>AmrSystemName</m:amrSystem>
        <m:formNumber>2S</m:formNumber>
        <m:ConfigurationEvents>
          <m:createdDateTime>2001-12-17T09:30:47Z</m:createdDateTime>
          <m:effectiveDateTime>2001-12-19T00:00:00Z</m:effectiveDateTime>
        </m:ConfigurationEvents>
        <m:electronicAddress>
          <m:mac>00:24:E8:A7:69:E7</m:mac>
        </m:electronicAddress>
        <m:ComFunction ref = "14470EB8-F28F-433E-9A34-D61C845FD976"/>
        <m:EndDeviceInfo>
          <m:isSolidState>true</m:isSolidState>
          <m:phaseCount>1</m:phaseCount>
          <m:capability>
            <m:autonomousDst>true</m:autonomousDst>
            <m:communication>true</m:communication>
            <m:connectDisconnect>false</m:connectDisconnect>
            <m:electricMetering>true</m:electricMetering>
            <m:metrology>true</m:metrology>
            <m:onRequestRead>true</m:onRequestRead>
          </m:capability>
        </m:EndDeviceInfo>
        <m:Names>
          <m:name>A47129</m:name>
          <m:NameType>
            <m:name>MeterBadgeNumber</m:name>
            <m:NameTypeAuthority>
              <m:name>UtilityXYZ</m:name>
            </m:NameTypeAuthority>
          </m:NameType>
        </m:Names>
      </m:Meter>
    </m:MeterConfig>
    <m:Meter>
      <m:mRID>ED04579E-FF0F-418E-92AC-B8BBE5721870</m:mRID>
      <m:amrSystem>AmrSystemName</m:amrSystem>
      <m:formNumber>2S</m:formNumber>
      <m:ConfigurationEvents>
        <m:createdDateTime>2001-12-17T09:30:47Z</m:createdDateTime>
        <m:effectiveDateTime>2001-12-19T00:00:00Z</m:effectiveDateTime>
      </m:ConfigurationEvents>
      <m:electronicAddress>
        <m:mac>00:24:E8:B7:79:E7</m:mac>
      </m:electronicAddress>
      <m:ComFunction ref = "14470EB8-F28F-433E-9A34-D61C845FD976"/>
      <m:EndDeviceInfo>
        <m:isSolidState>true</m:isSolidState>
        <m:phaseCount>1</m:phaseCount>
      </m:EndDeviceInfo>
    </m:Meter>
  </Payload>
</RequestMessage>
```



```

        <m:capability>
            <m:autonomousDst>true</m:autonomousDst>
            <m:communication>true</m:communication>
            <m:connectDisconnect>false</m:connectDisconnect>
            <m:electricMetering>true</m:electricMetering>
            <m:metrology>true</m:metrology>
            <m:onRequestRead>true</m:onRequestRead>
        </m:capability>
    </m:EndDeviceInfo>
    <m:Names>
        <m:name>C57129</m:name>
        <m:NameType>
            <m:name>MeterBadgeNumber</m:name>
            <m:NameTypeAuthority>
                <m:name>UtilityXYZ</m:name>
            </m:NameTypeAuthority>
        </m:NameType>
    </m:Names>
</m:Meter>
</m:MeterConfig>
</Payload>
</RequestMessage>

```

L.2.2 Create MeterConfig – Two Meters – Step 2

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:31:47Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>4AB99350-38CE-421C-8CD8-A0446D299E62</MessageID>
    <CorrelationID>8B3EF3E8-C61C-4C91-BEF0-A1775570656A</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.3</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.3 Create MeterConfig – Two Meters – Step 3

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:33:47Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>5624858B-9365-482E-8335-746A9A06F3FB</MessageID>
    <CorrelationID>8B3EF3E8-C61C-4C91-BEF0-A1775570656A</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.4 Create MeterConfig – Two Meters – Step 4

```
<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-17T09:30:47Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>3C42D9B1-65C5-4588-972B-AEF4D6B5B86C</MessageID>
    <CorrelationID>8B3EF3E8-C61C-4C91-BEF0-A1775570656A</CorrelationID>
  </Header>
  <Reply>
    <Result>FAILED</Result>
    <Error>
      <code>2.4</code>
      <level>FATAL</level>
      <details>Meter ID already exists</details>
      <object>
        <Name>
          <name>C57129</name>
          <NameType>
            <name>MeterBadgeNumber</name>
            <NameTypeAuthority>
              <name>UtilityXYZ</name>
            </NameTypeAuthority>
          </NameType>
        </Name>
        <objectType>Meter</objectType>
      </object>
    </Error>
  </Reply>
</ResponseMessage>
```

L.2.5 Change MeterConfig (add/change details) – Step 1

```
<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>change</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-18T09:30:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>A98D203B-35CB-44F0-AE4F-026ECC771A76</MessageID>
    <CorrelationID>A98D203B-35CB-44F0-AE4F-026ECC771A76</CorrelationID>
  </Header>
  <Payload>
    <m:MeterConfig>
      xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterConfig# MeterConfig.xsd"
      xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
      xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
        <m:Meter>
          <m:formNumber>12S</m:formNumber>
          <m:ConfigurationEvents>
            <m:createdDateTime>2001-12-18T09:30:47Z</m:createdDateTime>
            <m:effectiveDateTime>2001-12-19T00:00:00Z</m:effectiveDateTime>
            <m:Names>
              <m:name>A47129</m:name>
              <m:NameType>
                <m:name>MeterBadgeNumber</m:name>
                <m:NameTypeAuthority>
                  <m:name>UtilityXYZ</m:name>
                </m:NameTypeAuthority>
              </m:NameType>
            </m:Names>
          </m:Meter>
        </m:MeterConfig>
      </xsi:schemaLocation>
    </m:MeterConfig>
  </Payload>
</RequestMessage>
```

```

        </m:ConfigurationEvents>
        <m:MeterMultipliers>
            <m:kind>kH</m:kind>
            <m:value>14.4</m:value>
        </m:MeterMultipliers>
    </m:Meter>
</m:MeterConfig>
</Payload>
</RequestMessage>

```

L.2.6 Change MeterConfig (add/change details) – Step 2

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-18T09:30:48Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>FAD69463-6311-4A1E-89B4-0A22C76CA4B8</MessageID>
    <CorrelationID>A98D203B-35CB-44F0-AE4F-026ECC771A76</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.3</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.7 Change MeterConfig (add/change details) – Step 3

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-18T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>C0D5BF89-412B-43B7-8713-68993EB4B0C0</MessageID>
    <CorrelationID>A98D203B-35CB-44F0-AE4F-026ECC771A76</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.8 Change MeterConfig (add/change details) – Step 4

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>

```

```

    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-17T09:30:47Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>3C42D9B1-65C5-4588-972B-AEF4D6B5B86C</MessageID>
    <CorrelationID>8B3EF3E8-C61C-4C91-BEF0-A1775570656A</CorrelationID>
  </Header>
  <Reply>
    <Result>FAILED</Result>
    <Error>
      <code>2.4</code>
      <level>FATAL</level>
      <details>Meter ID not found</details>
      <object>
        <Name>
          <name>C57129</name>
          <NameType>
            <name>MeterBadgeNumber</name>
            <NameTypeAuthority>
              <name>UtilityXYZ</name>
            </NameTypeAuthority>
          </NameType>
        </Name>
        <objectType>Meter</objectType>
      </object>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.9 Change MeterConfig (delete details) – Step 1

This use case deletes information concerning a Meter – not the Meter itself

```

<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>execute</Verb>
    <Noun>OperationSet</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-20T09:30:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>07515735-060C-4125-9A1F-E75AEA19CA76</MessageID>
    <CorrelationID>07515735-060C-4125-9A1F-E75AEA19CA76</CorrelationID>
  </Header>
  <Payload>
    <OperationSet>
      <Operation>
        <operationId>1</operationId>
        <noun>MeterConfig</noun>
        <verb>delete</verb>
        <elementOperation>true</elementOperation>
        <m:MeterConfig
          xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterConfig#
MeterConfig.xsd"
          xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
          xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
          <m:Meter>
            <m:formNumber>12S</m:formNumber>
            <m:ConfigurationEvents>
              <m:createdDateTime>2001-12-18T09:30:47Z</m:createdDateTime>
              <m:effectiveDateTime>2001-12-19T00:00:00Z</m:effectiveDateTime>
              <m:Names>
                <m:name>A47129</m:name>
                <m:NameType>
                  <m:name>MeterBadgeNumber</m:name>
                  <m:NameTypeAuthority>
                    <m:name>UtilityXYZ</m:name>
                  </m:NameTypeAuthority>
                </m:NameType>
              </m:Names>
            </m:ConfigurationEvents>
          </m:Meter>
        </m:MeterConfig>
      </Operation>
    </OperationSet>
  </Payload>
</RequestMessage>

```

```

        </m:ConfigurationEvents>
        <m:MeterMultipliers>
            <m:kind>kH</m:kind>
            <m:value>14.4</m:value>
        </m:MeterMultipliers>
    </m:Meter>
</m:MeterConfig>
</Operation>
</OperationSet>
</Payload>
</RequestMessage>

```

L.2.10 Change MeterConfig (delete details) – Step 2

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>OperationSet</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-20T09:30:48Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>61BEB87B-490F-4108-A70A-FB25EA56BA0A</MessageID>
    <CorrelationID>07515735-060C-4125-9A1F-E75AEA19CA76</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.3</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.11 Change MeterConfig (delete details) – Step 3

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>OperationSet</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-20T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>280D0D3E-E899-49FE-A912-C2A4EB952546</MessageID>
    <CorrelationID>07515735-060C-4125-9A1F-E75AEA19CA76</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.12 Change MeterConfig (delete details) – Step 4

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>

```

```

<Noun>OperationSet</Noun>
<Revision>2.0</Revision>
<Timestamp>2012-12-20T09:30:49Z</Timestamp>
<Source>MDMS</Source>
<MessageID>1D5C5DDE-9849-449A-8DF5-E8144585A9EC</MessageID>
<CorrelationID>07515735-060C-4125-9A1F-E75AEA19CA76</CorrelationID>
</Header>
<Reply>
  <Result>FAILED</Result>
  <Error>
    <code>2.4</code>
    <level>FATAL</level>
    <details>Meter ID not found</details>
    <object>
      <Name>
        <name>C57129</name>
        <NameType>
          <name>MeterBadgeNumber</name>
          <NameTypeAuthority>
            <name>UtilityXYZ</name>
          </NameTypeAuthority>
        </NameType>
      </Name>
      <objectType>Meter</objectType>
    </object>
  </Error>
  <operationId>1</operationId>
</Reply>
</ResponseMessage>

```

L.2.13 Delete MeterConfig – Step 1

This use case deletes the Meter itself – not just information concerning a Meter. Note that this may actually involve marking the meter as deleted rather than actually purging it from a system.

```

<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>delete</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-21T09:30:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>805C655B-4429-44C4-91C5-7692810627A7</MessageID>
    <CorrelationID>805C655B-4429-44C4-91C5-7692810627A7</CorrelationID>
  </Header>
  <Payload>
    <m:MeterConfig>
      xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterConfig# MeterConfig.xsd"
      xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
      xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
        <m:Meter>
          <m:ConfigurationEvents>
            <m:createdDateTime>2001-12-18T09:30:47Z</m:createdDateTime>
            <m:effectiveDateTime>2001-12-24T00:00:00Z</m:effectiveDateTime>
            <m:Names>
              <m:name>A47129</m:name>
              <m:NameType>
                <m:name>MeterBadgeNumber</m:name>
                <m:NameTypeAuthority>
                  <m:name>UtilityXYZ</m:name>
                </m:NameTypeAuthority>
              </m:NameType>
            </m:Names>
          </m:ConfigurationEvents>
        </m:Meter>
      </m:MeterConfig>
    </Payload>

```

```
</RequestMessage>
```

L.2.14 Delete MeterConfig – Step 2

```
<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-21T09:30:48Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>F5BA23D4-E1F7-4889-AB2A-CF3ED2BB06C9</MessageID>
    <CorrelationID>805C655B-4429-44C4-91C5-7692810627A7</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.3</code>
    </Error>
  </Reply>
</ResponseMessage>
```

L.2.15 Delete MeterConfig – Step 3

```
<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-21T09:30:48Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>F5BA23D4-E1F7-4889-AB2A-CF3ED2BB06C9</MessageID>
    <CorrelationID>805C655B-4429-44C4-91C5-7692810627A7</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.3</code>
    </Error>
  </Reply>
</ResponseMessage>
```

L.2.16 Delete MeterConfig – Step 3

```
<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>
    <Noun>MeterConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-21T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>E45F5726-A4A4-4FCD-A3F2-400675911D64</MessageID>
    <CorrelationID>805C655B-4429-44C4-91C5-7692810627A7</CorrelationID>
  </Header>
  <Reply>
    <Result>FAILED</Result>
```



```

<Error>
  <code>2.4</code>
  <level>FATAL</level>
  <details>Meter ID not found</details>
  <object>
    <Name>
      <name>C57129</name>
      <NameType>
        <name>MeterBadgeNumber</name>
        <NameTypeAuthority>
          <name>UtilityXYZ</name>
        </NameTypeAuthority>
      </NameType>
    </Name>
    <objectType>Meter</objectType>
  </object>
</Error>
</Reply>
</ResponseMessage>

```

L.2.17 Create UsagePointConfig – Step 1

```

<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/UsagePointConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>create</Verb>
    <Noun>UsagePointConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:30:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>530E10E4-BE8D-4BE3-B346-72013D575395</MessageID>
    <CorrelationID>530E10E4-BE8D-4BE3-B346-72013D575395</CorrelationID>
  </Header>
  <Payload>
    <m:UsagePointConfig>
      <m:UsagePoint>
        <m:amiBillingReady>amiCapable</m:amiBillingReady>
        <m:connectionState>connected</m:connectionState>
        <m:isSdp>true</m:isSdp>
        <m:isVirtual>false</m:isVirtual>
        <m:phaseCode>A</m:phaseCode>
        <m:readCycle>ReadCycleB</m:readCycle>
        <m:ConfigurationEvents>
          <m:createdDateTime>2012-12-17T09:30:47Z</m:createdDateTime>
          <m:effectiveDateTime>2012-12-18T00:00:00Z</m:effectiveDateTime>
        </m:ConfigurationEvents>
        <m:Names>
          <m:name>UP124179</m:name>
          <m:NameType>
            <m:name>ServiceDeliveryPointID</m:name>
            <m:NameTypeAuthority>
              <m:name>UtilityXYZ</m:name>
            </m:NameTypeAuthority>
          </m:NameType>
        </m:Names>
      </m:UsagePoint>
    </m:UsagePointConfig>
  </Payload>
</RequestMessage>

```

L.2.18 Create UsagePointConfig – Step 2

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"

```

```

xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
  <Verb>reply</Verb>
  <Noun>UsagePointConfig</Noun>
  <Revision>2.0</Revision>
  <Timestamp>2012-01-17T09:30:48Z</Timestamp>
  <Source>MDMS</Source>
  <MessageID>73767FEB-A962-44A0-B0D3-79E1F21EE307</MessageID>
  <CorrelationID>530E10E4-BE8D-4BE3-B346-72013D575395</CorrelationID>
</Header>
<Reply>
  <Result>OK</Result>
  <Error>
    <code>0.3</code>
  </Error>
</Reply>
</ResponseMessage>

```

L.2.19 Create UsagePointConfig – Step 3

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>UsagePointConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>AA31AE3A-1AA2-4016-96C7-548BB0688822</MessageID>
    <CorrelationID>530E10E4-BE8D-4BE3-B346-72013D575395</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.20 Create UsagePointConfig – Step 4

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>
    <Noun>UsagePointConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>1A8A58DF-BDC9-47C6-9FDB-E86BCF726F77</MessageID>
    <CorrelationID>530E10E4-BE8D-4BE3-B346-72013D575395</CorrelationID>
  </Header>
  <Reply>
    <Result>FAILED</Result>
    <Error>
      <code>2.12</code>
      <level>FATAL</level>
      <details>UsagePoint ID already exists</details>
      <object>
        <Name>
          <name>UP124179</name>
          <NameType>
            <name>ServiceDeliveryPointID</name>
            <NameTypeAuthority>
              <name>UtilityXYZ</name>

```

```

        </NameTypeAuthority>
      </NameType>
    </Name>
    <objectType>UsagePoint</objectType>
  </object>
</Error>
</Reply>
</ResponseMessage>

```

L.2.21 Create MasterDataLinkageConfig – Step 1

This use case links the previously created Meter with the previously created UsagePoint (reflecting a meter installation).

```

<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>create</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T10:00:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>F47F3703-D16A-4D3C-901A-553E1E26EA03</MessageID>
    <CorrelationID>F47F3703-D16A-4D3C-901A-553E1E26EA03</CorrelationID>
  </Header>
  <Payload>
    <m:MasterDataLinkageConfig>
      <m:ConfigurationEvent>
        <m:createdDateTime>2012-01-17T10:00:47Z</m:createdDateTime>
        <m:effectiveDateTime>2012-12-25T10:30:47Z</m:effectiveDateTime>
      </m:ConfigurationEvent>
      <m:Meter>
        <m:Names>
          <m:name>A47129</m:name>
          <m:NameType>
            <m:name>MeterBadgeNumber</m:name>
            <m:NameTypeAuthority>
              <m:name>UtilityXYZ</m:name>
              </m:NameTypeAuthority>
            </m:NameType>
          </m:Names>
        </m:Meter>
        <m:UsagePoint>
          <m:Names>
            <m:name>UP124179</m:name>
            <m:NameType>
              <m:name>ServiceDeliveryPointID</m:name>
              <m:NameTypeAuthority>
                <m:name>UtilityXYZ</m:name>
                </m:NameTypeAuthority>
              </m:NameType>
            </m:Names>
          </m:UsagePoint>
        </m:MasterDataLinkageConfig>
      </Payload>
    </RequestMessage>

```

L.2.22 Create MasterDataLinkageConfig – Step 2

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>

```

```

    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T10:00:48Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>86BDABD8-AA7F-4139-9292-050A93E3DA71</MessageID>
    <CorrelationID>F47F3703-D16A-4D3C-901A-553E1E26EA03</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.3</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.23 Create MasterDataLinkageConfig – Step 3

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>91C9B6B5-4915-4B4C-91DA-4820DD4E621F</MessageID>
    <CorrelationID>F47F3703-D16A-4D3C-901A-553E1E26EA03</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.24 Create MasterDataLinkageConfig – Step 4

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-01-17T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>3A854405-BEB6-418B-B6BC-6EEE172D1A2A</MessageID>
    <CorrelationID>F47F3703-D16A-4D3C-901A-553E1E26EA03</CorrelationID>
  </Header>
  <Reply>
    <Result>FAILED</Result>
    <Error>
      <code>2.12</code>
      <level>FATAL</level>
      <details>UsagePoint ID not found</details>
      <object>
        <Name>
          <name>UP124179</name>
          <NameType>
            <name>ServiceDeliveryPointID</name>
            <NameTypeAuthority>
              <name>UtilityXYZ</name>
            </NameTypeAuthority>
          </NameType>
        </Name>
      </object>
    </Error>
  </Reply>
</ResponseMessage>

```

```

        <objectType>UsagePoint</objectType>
    </object>
</Error>
</Reply>
</ResponseMessage>

```

L.2.25 Delete MasterDataLinkageConfig – Step 1

This use case deletes the previously created linkage between a Meter and a UsagePoint (reflecting a meter removal).

```

<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>delete</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-02-01T10:00:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>D0DAF9E1-D62F-4711-9C05-8698EBEC5D77</MessageID>
    <CorrelationID>D0DAF9E1-D62F-4711-9C05-8698EBEC5D77</CorrelationID>
  </Header>
  <Payload>
    <m:MasterDataLinkageConfig>
      <m:ConfigurationEvent>
        <m:createdDateTime>2012-02-01T10:00:47Z</m:createdDateTime>
        <m:effectiveDateTime>2012-02-02T00:00:00Z</m:effectiveDateTime>
      </m:ConfigurationEvent>
      <m:Meter>
        <m:Names>
          <m:name>A47129</m:name>
          <m:NameType>
            <m:name>MeterBadgeNumber</m:name>
            <m:NameTypeAuthority>
              <m:name>UtilityXYZ</m:name>
            </m:NameTypeAuthority>
          </m:NameType>
        </m:Names>
      </m:Meter>
      <m:UsagePoint>
        <m:Names>
          <m:name>UP124179</m:name>
          <m:NameType>
            <m:name>ServiceDeliveryPointID</m:name>
            <m:NameTypeAuthority>
              <m:name>UtilityXYZ</m:name>
            </m:NameTypeAuthority>
          </m:NameType>
        </m:Names>
      </m:UsagePoint>
    </m:MasterDataLinkageConfig>
  </Payload>
</RequestMessage>

```

L.2.26 Delete MasterDataLinkageConfig – Step 2

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>

```

```

        <Timestamp>2012-02-01T10:00:48Z</Timestamp>
        <Source>MDMS</Source>
        <MessageID>D83D7899-51D8-437D-AB28-328B78E57827</MessageID>
        <CorrelationID>D0DAF9E1-D62F-4711-9C05-8698EBEC5D77</CorrelationID>
    </Header>
    <Reply>
        <Result>OK</Result>
        <Error>
            <code>0.3</code>
        </Error>
    </Reply>
</ResponseMessage>

```

L.2.27 Delete MasterDataLinkageConfig – Step 3

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-02-01T10:00:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>61C7969C-1F72-4E82-ADA5-AA7813C4E09C</MessageID>
    <CorrelationID>D0DAF9E1-D62F-4711-9C05-8698EBEC5D77</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.28 Delete MasterDataLinkageConfig – Step 4

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-02-01T10:00:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>C31A2527-0DEC-476B-B10B-DAB9F2D8AC26</MessageID>
    <CorrelationID>D0DAF9E1-D62F-4711-9C05-8698EBEC5D77</CorrelationID>
  </Header>
  <Reply>
    <Result>FAILED</Result>
    <Error>
      <code>2.13</code>
      <level>FATAL</level>
      <details>Meter not installed at Usage Point</details>
      <object>
        <Name>
          <name>UP124179</name>
          <NameType>
            <name>ServiceDeliveryPointID</name>
            <NameTypeAuthority>
              <name>UtilityXYZ</name>
            </NameTypeAuthority>
          </NameType>
        </Name>
        <objectType>UsagePoint</objectType>
      </object>
    </Error>
  </Reply>
</ResponseMessage>

```

```

        <relatedObject>
            <Name>
                <name>A47129</name>
                <NameType>
                    <name>MeterBadgeNumber</name>
                    <NameTypeAuthority>
                        <name>UtilityXYZ</name>
                    </NameTypeAuthority>
                </NameType>
            </Name>
            <objectType>Meter</objectType>
        </relatedObject>
    </Error>
</Reply>
</ResponseMessage>

```

L.2.29 Execute OperationSet – Step 1

This use case utilizes an Operation Set to first create a Meter, then create a UsagePoint, and then link the Meter and the usagePoint (reflecting a meter installation). In essence, it performs the same functions as several of the previous uses, but does so in a single message. This example uses the appropriate Booleans to ensure that the steps are executed in the prescribed order and that all three steps shall succeed or the entire transaction shall fail.

```

<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
  xmlns:up = "http://iec.ch/TC57/2011/UsagePointConfig#"
  xmlns:mdlc = "http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>execute</Verb>
    <Noun>OperationSet</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-20T09:30:47Z</Timestamp>
    <Source>CIS</Source>
    <AckRequired>true</AckRequired>
    <MessageID>D921A053-80C1-4DB6-960E-2603127B7B92</MessageID>
    <CorrelationID>D921A053-80C1-4DB6-960E-2603127B7B92</CorrelationID>
  </Header>
  <Payload>
    <OperationSet>
      <enforceMsgSequence>true</enforceMsgSequence>
      <enforceTransactionalIntegrity>true</enforceTransactionalIntegrity>
      <Operation>
        <operationId>1</operationId>
        <noun>MeterConfig</noun>
        <verb>create</verb>
        <mdlc:MeterConfig>
          <mdlc:Meter>
            <mdlc:formNumber>2S</mdlc:formNumber>
            <mdlc:ConfigurationEvents>
              <mdlc:createdDateTime>2012-12-20T09:30:47Z</mdlc:createdDateTime>
              <mdlc:effectiveDateTime>2012-12-
21T00:00:00Z</mdlc:effectiveDateTime>
            <mdlc:Names>
              <mdlc:name>C34531</mdlc:name>
              <mdlc:NameType>
                <mdlc:name>MeterBadgeNumber</mdlc:name>
                <mdlc:NameTypeAuthority>
                  <mdlc:name>UtilityXYZ</mdlc:name>
                </mdlc:NameTypeAuthority>
              </mdlc:NameType>
            </mdlc:Names>
          </mdlc:ConfigurationEvents>
        </mdlc:Meter>
      </mdlc:MeterConfig>
    </Operation>
    <Operation>
      <operationId>2</operationId>

```



```

<noun>UsagePointConfig</noun>
<verb>create</verb>
<up:UsagePointConfig>
  <up:UsagePoint>
    <up:amiBillingReady>amiCapable</up:amiBillingReady>
    <up:connectionState>connected</up:connectionState>
    <up:isSdp>true</up:isSdp>
    <up:isVirtual>false</up:isVirtual>
    <up:phaseCode>B</up:phaseCode>
    <up:readCycle>ReadCycleJ</up:readCycle>
    <up:ConfigurationEvents>
      <up:createdDateTime>2012-12-20T09:30:47Z</up:createdDateTime>
      <up:effectiveDateTime>2012-12-21T00:00:00Z</up:effectiveDateTime>
    </up:ConfigurationEvents>
    <up:Names>
      <up:name>UP43639</up:name>
      <up:NameType>
        <up:name>ServiceDeliveryPointID</up:name>
        <up:NameTypeAuthority>
          <up:name>UtilityXYZ</up:name>
        </up:NameTypeAuthority>
      </up:NameType>
    </up:Names>
  </up:UsagePoint>
</up:UsagePointConfig>
</Operation>
<Operation>
  <operationId>3</operationId>
  <noun>MasterDataLinkageConfig</noun>
  <verb>create</verb>
  <mdlc:MasterDataLinkageConfig>
    <mdlc:ConfigurationEvent>
      <mdlc:createdDateTime>2012-12-17T09:30:47Z</mdlc:createdDateTime>
      <mdlc:effectiveDateTime>2012-12-21T00:00:00Z</mdlc:effectiveDateTime>
    </mdlc:ConfigurationEvent>
    <mdlc:Meter>
      <mdlc:Names>
        <mdlc:name>C34531</mdlc:name>
        <mdlc:NameType>
          <mdlc:name>MeterBadgeNumber</mdlc:name>
          <mdlc:NameTypeAuthority>
            <mdlc:name>UtilityXYZ</mdlc:name>
          </mdlc:NameTypeAuthority>
        </mdlc:NameType>
      </mdlc:Names>
    </mdlc:Meter>
    <mdlc:UsagePoint>
      <mdlc:Names>
        <mdlc:name>UP43639</mdlc:name>
        <mdlc:NameType>
          <mdlc:name>ServiceDeliveryPointID</mdlc:name>
          <mdlc:NameTypeAuthority>
            <mdlc:name>UtilityXYZ</mdlc:name>
          </mdlc:NameTypeAuthority>
        </mdlc:NameType>
      </mdlc:Names>
    </mdlc:UsagePoint>
  </mdlc:MasterDataLinkageConfig>
</Operation>
</OperationSet>
</Payload>
</RequestMessage>

```

L.2.30 Execute OperationSet – Step 2

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>OperationSet</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-20T09:30:48Z</Timestamp>
  </Header>

```

```

    <Source>MDMS</Source>
    <MessageID>08A2E193-F5D3-4672-B26D-A99A55591799</MessageID>
    <CorrelationID>D921A053-80C1-4DB6-960E-2603127B7B92</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.3</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.31 Execute OperationSet – Step 3

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>OperationSet</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-20T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>A8E8FE70-6960-4724-BF1C-CE2804EEA633</MessageID>
    <CorrelationID>D921A053-80C1-4DB6-960E-2603127B7B92</CorrelationID>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>

```

L.2.32 Execute OperationSet – Step 4

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
  xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd"
  xmlns = "http://iec.ch/TC57/2011/schema/message"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <Header>
    <Verb>reply</Verb>
    <Noun>OperationSet</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2012-12-20T09:30:49Z</Timestamp>
    <Source>MDMS</Source>
    <MessageID>929BFC21-06FA-4D7E-94FE-C58B3C94EFAC</MessageID>
    <CorrelationID>D921A053-80C1-4DB6-960E-2603127B7B92</CorrelationID>
  </Header>
  <Reply>
    <Result>FAILED</Result>
    <Error>
      <code>2.12</code>
      <level>FATAL</level>
      <details>UsagePoint ID already exists</details>
      <ID idType="ServiceDeliveryPoint"
        idAuthority="UtilityXYZ" objectType="UsagePoint">UP43639</ID>
      <operationId>2</operationId>
    </Error>
    <Error>
      <code>5.9</code>
      <level>FATAL</level>
      <details>Transaction aborted to maintain transactional integrity</details>
      <ID idType="MeterBadgeNumber"
        idAuthority="UtilityXYZ" objectType="Meter">C34531</ID>
      <operationId>1</operationId>
    </Error>
    <Error>
      <code>5.9</code>
      <level>FATAL</level>

```

```

<details>Transaction aborted to maintain transactional integrity</details>
<ID idType="ServiceDeliveryPointID"
    idAuthority="UtilityXYZ" objectType="UsagePoint">UP43639</ID>
<relatedID idType="MeterBadgeNumber"
    idAuthority="UtilityXYZ" objectType="Meter">C34531</relatedID>
<operationId>3</operationId>
</Error>
</Reply>
</ResponseMessage>

```

L.2.33 Change ObjectNamesConfig

This use case utilizes the ObjectNamesConfig profile to request that the Meter identified by mRID = "B9BCE6FE-763D-4AFB-A229-79FA885AEDC1" and MfgSerialNumber = "43531" (a Names.name value with associated NameType and NameTypeAuthority) be changed in the following way:

- the MfgSerialNumber be changed to "43532", and
- a new, additional Names.name be assigned with:
- Names.name = "A1473922"
- Names.NameType.name = "BarcodeNumber", and,
- Names.NameType.NameTypeAuthority.name = "UtilityXYZ"

The usage of the ObjectNamesConfig profile can be confusing.

The rules are as follows:

- The CIM object that is to have one or more instances of its Names class information added, changed, or deleted is identified by mRID and/or one or more existing Names in the element that corresponds to the object's type (in this example use case this is the Meter structure).
- If the verb in the request message is "create", then any Names (along with NameType and NameTypeAuthority) that appear in the Names structure (at the root level) of the message become new Names class identifier(s) for the CIM object.
- If the verb in the request message is "change", then
- any Names (along with NameType and NameTypeAuthority) that appear in the element that corresponds to the object's type (in this example use case this is the Meter structure) are deleted, and
- any Names (along with NameType and NameTypeAuthority) that appear in the Names structure (at the root level) of the message become new Names class identifier(s) for the CIM object.
- If the verb in the request message is "delete", then
- nothing is to be placed in the Names structure (at the root level) of the message, and
- any Names (along with NameType and NameTypeAuthority) that appear in the element that corresponds to the object's type (in this example use case this is the Meter structure) are deleted.

mRIDs are immutable and cannot be changed.

Any attempt to use ObjectNamesConfig that leaves a CIM object with no valid identifiers (an mRID and/or one or more Names class identifiers) will fail. Similarly, any attempt to use ObjectNamesConfig that leaves a CIM object with conflicting or ambiguous Names class identifiers will fail.

```

<?xml version="1.0" encoding="UTF-8"?>
<RequestMessage

```

```

xmlns = "http://iec.ch/TC57/2011/schema/message"
xmlns:m = "http://iec.ch/TC57/2011/ObjectNamesConfig#"
xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation = "http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
  <Verb>change</Verb>
  <Noun>ObjectNamesConfig</Noun>
  <Revision>2.0</Revision>
  <Timestamp>2012-01-17T10:00:47Z</Timestamp>
  <Source>CIS</Source>
  <AckRequired>true</AckRequired>
  <MessageID>1B37B91F-FE63-464A-A9FA-B239EB402169</MessageID>
  <CorrelationID>1B37B91F-FE63-464A-A9FA-B239EB402169</CorrelationID>
</Header>
<Payload>
  <m:ObjectNamesConfig>
    <m:ConfigurationEvent>
      <m:createdDateTime>2012-01-17T10:00:47Z</m:createdDateTime>
      <m:effectiveDateTime>2012-01-17T10:00:47Z</m:effectiveDateTime>
    </m:ConfigurationEvent>
    <m:Meter>
      <m:mRID>B9BCE6FE-763D-4AFB-A229-79FA885AEDC1</m:mRID>
      <m:Names>
        <m:name>43531</m:name>
        <m:NameType>
          <m:name>MfgSerialNumber</m:name>
          <m:NameTypeAuthority>
            <m:name>ManufacturerABC</m:name>
          </m:NameTypeAuthority>
        </m:NameType>
      </m:Names>
    </m:Meter>
    <m:Name>
      <m:name>43532</m:name>
      <m:NameType>
        <m:name>MfgSerialNumber</m:name>
        <m:NameTypeAuthority>
          <m:name>ManufacturerABC</m:name>
        </m:NameTypeAuthority>
      </m:NameType>
    </m:Name>
    <m:Name>
      <m:name>A1473922</m:name>
      <m:NameType>
        <m:name>BarcodeNumber</m:name>
        <m:NameTypeAuthority>
          <m:name>UtilityXYZ</m:name>
        </m:NameTypeAuthority>
      </m:NameType>
    </m:Name>
  </m:ObjectNamesConfig>
</Payload>
</RequestMessage>

```

The above sample XML is for a change/ObjectNamesConfig. The rules identified above explain the usage for create/ObjectNamesConfig and delete/ObjectNamesConfig.

The acknowledgment and response messages for each ObjectNamesConfig use case follow the pattern used throughout the other use case examples in this Annex.

Annex M (informative)

Notes on extended use of IEC 61968-100

The purpose of this Annex M is to describe some extended uses of IEC 61968-100 by IEC 61968-9. The usages in this Annex M are informative only, and may be subject to deprecation in the future.

In the case of "get MeterReadings", the current "GetMeterReadings" profile allows a request to be scheduled for a future time. There may sometimes be the need to cancel this request.

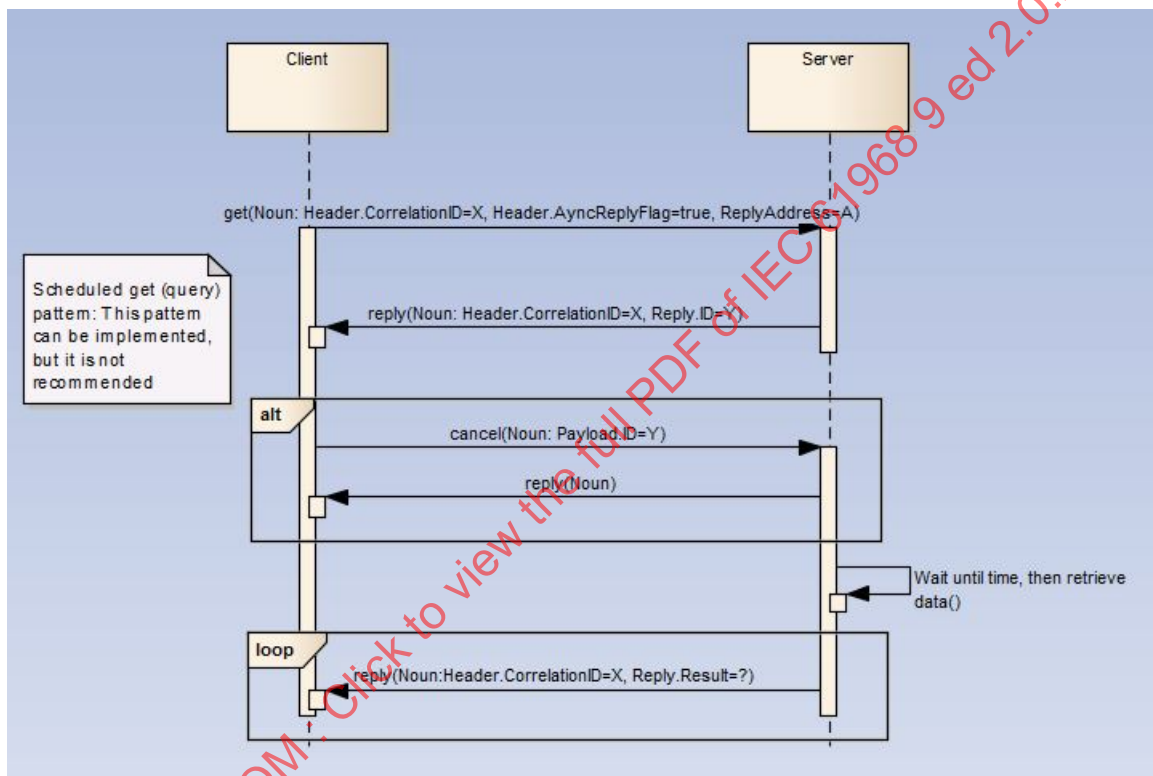


Figure M.1 – Get/cancel pattern which is not recommended

While the message structures support this "get/cancel" pattern shown in Figure M.1, a recommended approach would be through the use of a "create/cancel" pattern. In this pattern a request object is created in the target, which may be canceled. This is illustrated by the pattern in the sequence diagram in Figure M.2.

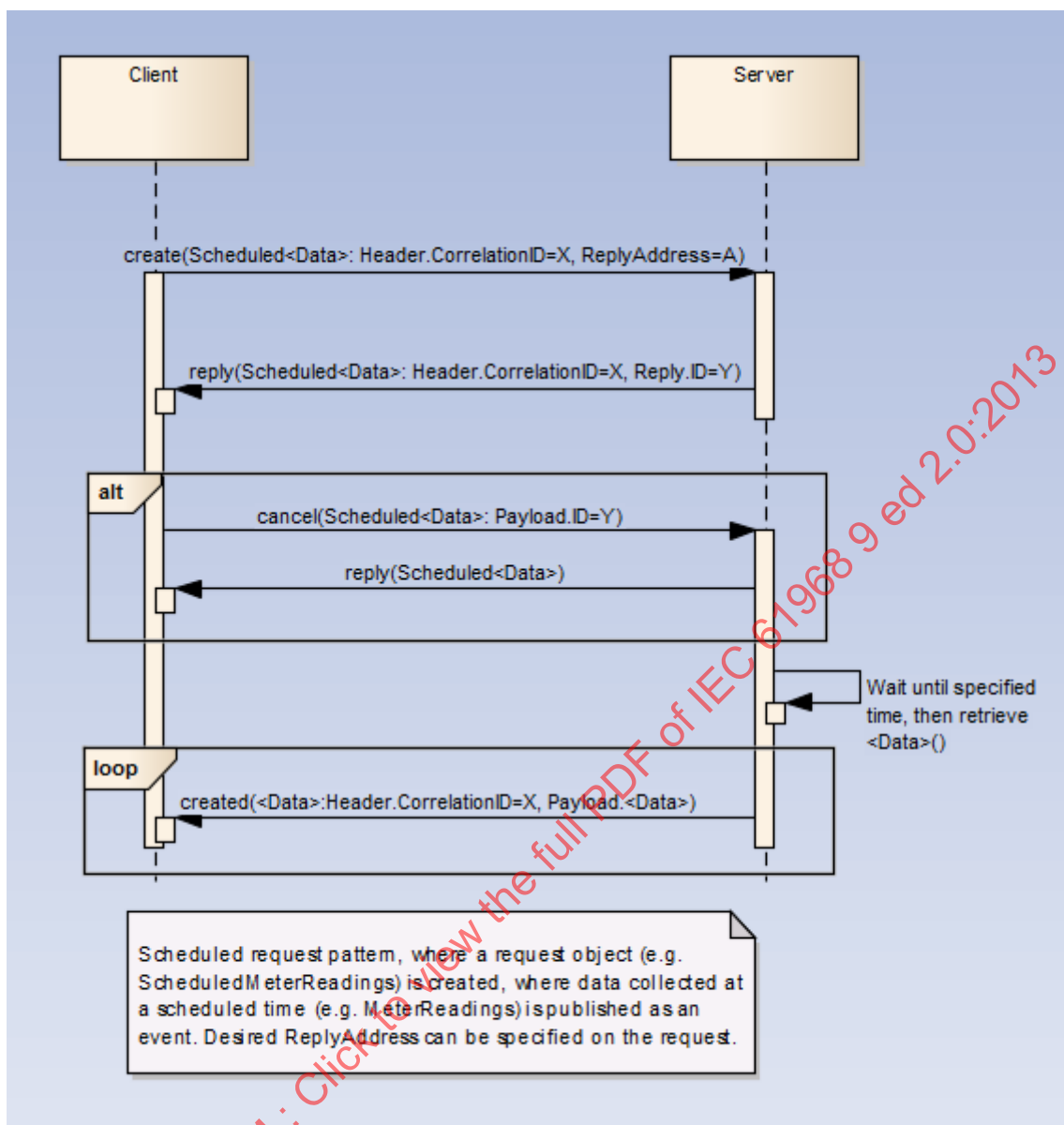


Figure M.2 – Get/cancel pattern which is recommended

Bibliography

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**INTÉGRATION D'APPLICATIONS POUR LES SERVICES ÉLECTRIQUES –
INTERFACES SYSTÈME POUR LA GESTION DE DISTRIBUTION –****Partie 9: Interfaces pour le relevé et la commande des compteurs**

AVANT-PROPOS

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La Norme internationale CEI 61968-9 a été établie par le comité d'études 57 de la CEI: Gestion des systèmes de puissance et échanges d'informations associés.

Cette deuxième édition annule et remplace la première édition parue en 2009. Cette édition constitue une révision technique et inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) modifications apportées à et ajout de nouveaux profils pour prendre en charge PAN et les UsagePoints;
- b) extensions pour prendre en charge les appareils PAN génériquement en tant qu'EndDevices;
- c) extensions du modèle et des profils MeterReading pour prendre en charge les descriptions plus riches des grandeurs comptées et pour assurer les relevés coïncidents;

- d) ajout de la classe CIM Name et des révisions correspondantes aux profils afin de permettre le référencement par nom et non par mRID. Lorsque le document peut identifier l'utilisation de valeurs mRID en tant que références, les valeurs Name.name peuvent également être utilisées. Cela est décrit de manière plus détaillée à l'Annexe G;
- e) référence de ReadingTypes, EndDeviceEventTypes et EndDeviceControlTypes à l'aide des références par nom;
- f) définition des énumérations normatives pour ReadingTypes, EndDeviceEventTypes et EndDeviceControlTypes dans les annexes;
- g) plusieurs corrections apportées aux diagrammes d'exemple de séquence;
- h) retrait du profil MeterAssetReading, lorsque la fonctionnalité est prise en charge en utilisant le profil MeterReading;
- i) la classe MeterAsset est désormais nommée Meter;
- j) le profil MeterAssetConfig est désormais nommé MeterConfig;
- k) le profil EndDeviceAssets est désormais nommé EndDeviceConfig;
- l) retrait du profil EndDeviceFirmware, lorsque la fonctionnalité est prise en charge en utilisant le profil EndDeviceConfig;
- m) utilisation de nouveaux espaces de noms pour refléter la nouvelle édition, lorsque les espaces de noms représentent l'année de définition d'un profil;
- n) adoption d'UsagePoint comme remplacement et généralisation de ServiceDeliveryPoint;
- o) SDPLocationConfig a été déconseillé au bénéfice d'UsagePointLocationConfig;
- p) certains profils précédemment définis ont été déplacés à la nouvelle section 5.10 qui est axée sur les liens de données;
- q) suppression du profil MeterSystemEvents, car il ne fournissait aucune fonctionnalité que le profil EndDeviceEvents ne pouvait atteindre;
- r) plusieurs profils avaient été définis à l'origine pour soutenir les cas d'utilisation du prépaiement qui ont été identifiés pour être de nature plus générale et ont par conséquent été déplacés en 5.10. Le paragraphe 5.8 ne comporte désormais que lesdits profils spécifiques au prépaiement. Dans tous les cas, ces profils ont été remaniés en vue de refléter d'autres modifications nécessaires qui ont été décrites;
- s) SupplierConfig a été renommé ServiceSupplierConfig;
- t) les messages qui utilisent le verb SUBSCRIBE (souscrire) ont été supprimés puisqu'ils sont relatifs au transport de communication sous-jacent et ne reflètent pas les messages réels CEI 61968.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
57/1377/FDIS	57/1394/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Une liste de toutes les parties de la série CEI 61968, publiées sous le titre général *Intégration d'applications pour les services électriques – Interfaces système pour la gestion de distribution*, peut être consultée sur le site web de la CEI.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de la CEI sous "<http://webstore.iec.ch>" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

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INTRODUCTION

Le but du présent document est de définir une norme pour l'intégration des systèmes de comptage (MS, Metering Systems) qui incluraient les systèmes de relevés de compteur automatisés (AMR, Automated Meter Reading) traditionnels (à une seule voie ou à deux voies) avec d'autres systèmes et fonctions métier s'inscrivant dans le domaine d'application de la CEI 61968. Le domaine d'application de la présente norme est l'échange d'informations concernant les transactions, les événements et les commandes liées au relevé des compteurs entre des systèmes au sein de l'entreprise de distribution et entre d'autres entreprises. Les détails spécifiques des protocoles de communications qu'utilisent les systèmes en question ne relèvent pas du domaine d'application de la présente norme. En revanche, la présente norme reconnaît et modélise les capacités générales qui peuvent être potentiellement assurées par des infrastructures de compteurs avancées et/ou héritées, y compris les capacités de communication bidirectionnelle telles que régulation de la charge, tarification dynamique, détection d'interruptions de service, signaux de commande de ressources énergétiques réparties (DER, distributed energy resource) et lecture sur demande. Ainsi, la présente norme ne subit pas l'impact de la spécification, du développement et/ou du déploiement d'infrastructures de compteurs de prochaine génération, et ce, ni par l'utilisation de normes ni par des moyens propriétaires.

La série des normes CEI 61968 est prévue pour faciliter l'intégration inter-applications, par opposition à l'intégration intra-applications. L'intégration intra-applications est destinée aux programmes d'un même système, qui communiquent habituellement les uns avec les autres via des intergiciels (middleware) intégrés dans leur environnement d'exécution sous-jacent et tendent à être optimisés pour des connexions proches, en temps réel et synchrones, ainsi que des interrogations/réponses interactives ou des modèles de communication conversationnels. La CEI 61968, en revanche, est prévue pour prendre en charge l'intégration inter-applications d'une entreprise de Distribution qui a besoin de relier des systèmes disparates existants ou futurs (applications héritées ou achetées), chacun supporté par des environnements d'exécution différents. Par conséquent, ces normes d'interface sont appropriées pour les applications faiblement couplées avec une plus grande hétérogénéité dans le langage, les systèmes d'exploitation, les protocoles et des outils de gestion. Cette série de normes est prévue pour prendre en charge des applications qui nécessitent l'échange de données environ toutes les secondes, minutes ou heures, plutôt que d'attendre un traitement de nuit par lot. Cette série de normes, qui est destinée à être mise en œuvre avec des services d'intergiciel, qui échangent des messages parmi des applications, complète, mais ne remplace pas, les entrepôts de données de l'entreprise de distribution, les passerelles de base de données et les archives opérationnelles.

Au sens de la CEI 61968, un Système de Gestion de Distribution (DMS, Distribution Management System) est constitué de divers composants d'application distribués permettant à l'entreprise de Distribution de gérer des réseaux de distribution électriques. Ces capacités incluent la surveillance et la commande des équipements de fourniture d'énergie, les processus de gestion qui assurent la fiabilité du système, la gestion de la tension, la gestion de la demande, la gestion des interruptions de service, la gestion des travaux, la mise en correspondance automatisée et la gestion des équipements. Des interfaces normalisées sont définies pour chaque classe d'applications identifiée dans le modèle d'interface de référence (IRM, Interface Reference Model), qui est décrit dans la CEI 61968-1: *Architecture des interfaces et exigences générales*.

La présente partie de la CEI 61968 contient les articles énumérés dans le Tableau 1 ci-dessous.

Tableau 1 – Vue d'ensemble du document CEI 61968-9

Article	Titre	Objectif
1	Domaine d'application	Le domaine d'application et l'objet du document sont décrits.
2	Références normatives	Documents qui contiennent des stipulations qui, par référence dans ce texte, constituent des conditions pour cette Norme Internationale.
3	Termes, définitions et abréviations	
4	Modèles de référence et d'informations	Description de l'approche générale au système de comptage, modèle de référence, cas d'utilisation, modèle d'interface de référence, fonctions et composants de lecture et de commande des compteurs, termes de types de messages et modèle statique d'informations.
5	Types de messages de relevé et de commande des compteurs	Types de messages relatifs à l'échange d'informations concernant des documents relatifs à la relève et à la commande de compteurs.
6	Conventions du document	
Annexe A	Verbes de types de message	Description des verbes (Verbs) utilisés pour les types de messages
Annexe B	Extensions du CIM	Extensions du CIM pour la prise en charge de la structure des messages recommandée pour la lecture et le contrôle de compteurs
Annexe C	Procédure pour la création d'un ReadingTypeId	Technique de construction, et offre des énumérations recommandées de nom textuel ReadingTypeId et mRID.
Annexe D	Énumérations des codes qualité	Technique de construction, et offre des énumérations recommandées pour les codes qualité de relevé
Annexe E	Énumérations des codes d'EndDeviceControl	Définit les codes d'alarme et d'événement de EndDevice
Annexe F	Énumérations des codes EndDeviceControl	Définit les codes de commande de EndDevice.
Annexe G	Maintenir les relations entre objets	Décrit l'utilisation de l'identificateur de ressources de référence (mRID, master resource identifier) et des Names (noms).
Annexe H	Schémas XML pour les charges utiles de message	Fournir des informations xsd utilisables par les développeurs pour créer des messages de la CEI 61968-9.
Annexe I	Mises en correspondance	Fournir des mises en correspondance entre les MeterReadings (relevés de compteur) CEI 61968-9 et les autres normes.
Annexe J	Paramètres de demande	Décrit la qualification des demandes GET à l'aide de paramètres de Request.
Annexe K	Traitement des transactions de Gestion de données de référence(Master Data Management)	Décrit la manière dont les transactions complexes de Gestion de données de référence/ synchronisation de données sont transmises, ainsi que les règles de traitement associées.
Annexe L	Cas d'utilisation de la Gestion de données de référenceet échantillon XML	Décrit nombre de cas courants d'utilisation de la Gestion de données de référenceet fournit un échantillon XML pour illustrer l'utilisation prévue des divers profils relatifs à la gestion de données de référence.

Les futures éditions de la CEI 61968-9 veilleront à comporter des modifications "liées", avec l'espace de noms de la version précédente qui peut être conservé, mais l'attribut de révision dans le XSD est incrémenté.

INTÉGRATION D'APPLICATIONS POUR LES SERVICES ÉLECTRIQUES – INTERFACES SYSTÈME POUR LA GESTION DE DISTRIBUTION –

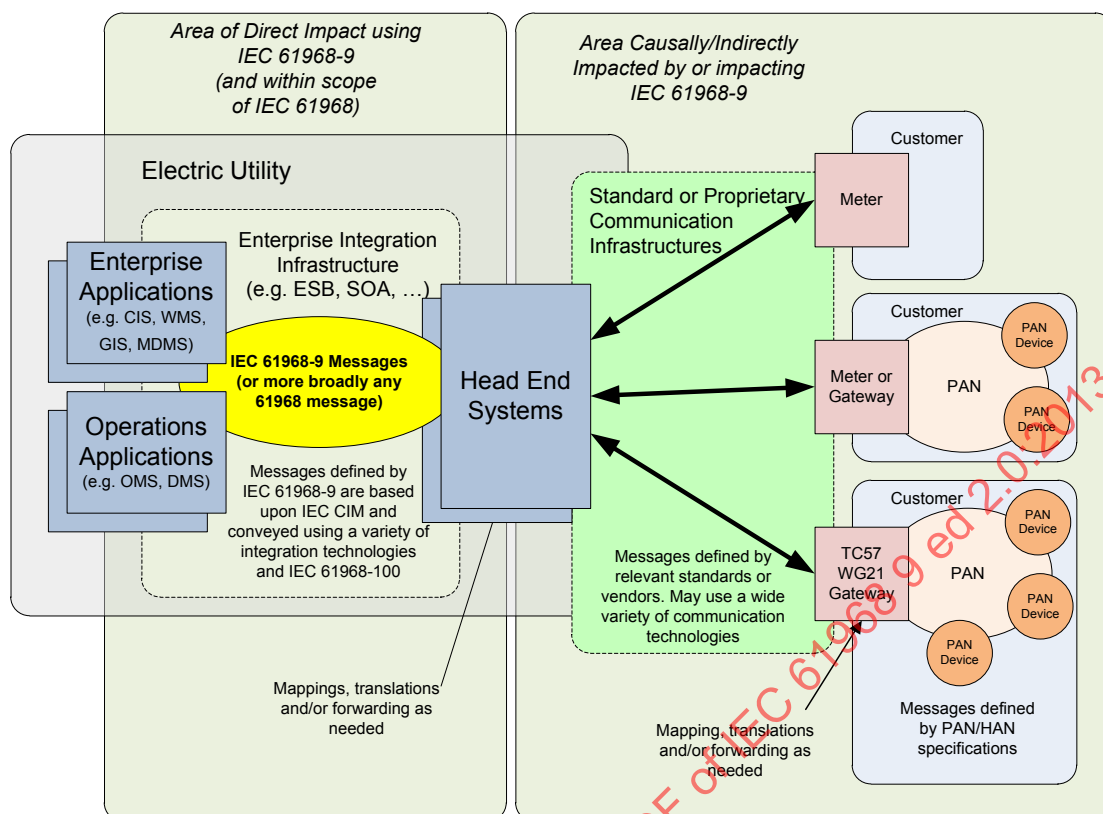
Partie 9: Interfaces pour le relevé et la commande des compteurs

1 Domaine d'application

La présente partie de la CEI 61968 spécifie le contenu informationnel d'un ensemble de types de messages qui peuvent être utilisés pour prendre en charge de nombreuses fonctions métier relatives au relevé et à la commande des compteurs. Les utilisations typiques des types de messages comprennent le relevé de compteurs, les commandes, les événements, la synchronisation des données client et la commutation de clientèle. Bien qu'elle soit principalement destinée aux réseaux de distribution électrique, la CEI 61968-9 peut être utilisée pour d'autres applications de comptage, y compris les grandeurs comptées non électriques qui sont nécessaires pour supporter les réseaux de gaz et d'eau.

Le but du présent document est de définir une norme pour l'intégration des systèmes de comptage (MS, Metering Systems) qui inclut les systèmes manuels traditionnels et les systèmes de relevés de compteur automatisés (AMR, Automated Meter Reading) (à une seule voie ou à deux voies), ainsi que les systèmes de gestion de données de compteur (MDM, Meter Data Management) avec d'autres systèmes et fonctions métier s'inscrivant dans le domaine d'application de la CEI 61968. Le domaine d'application de la présente norme est l'échange d'informations entre les systèmes de comptage, les systèmes MDM et d'autres systèmes au sein de l'entreprise de distribution. Les détails spécifiques des protocoles de communications qu'utilisent les systèmes en question ne relèvent pas du domaine d'application de la présente norme. En revanche, la présente norme reconnaît et modélise les capacités générales qui peuvent être potentiellement assurées par des infrastructures de compteurs avancées et/ou héritées, y compris les capacités de communication bidirectionnelle telles que régulation de la charge, tarification dynamique, détection d'interruptions de service, signaux de commande de ressources énergétiques réparties (DER, distributed energy resource) et lecture sur demande. Ainsi, la présente norme ne subit pas l'impact de la spécification, du développement et/ou du déploiement d'infrastructures de compteurs de prochaine génération, et ce, ni par l'utilisation de normes ni par des moyens propriétaires.

Le diagramme suivant décrit le domaine d'application de la présente spécification du point de vue des impacts directs et causals ou indirects des messages CEI 61968-9. Alors que l'axe de la norme CEI 61968-9 est de définir les messages standard pour l'intégration des applications d'entreprise, les dits messages peuvent être directement ou indirectement relatifs aux flux d'information d'un domaine d'application plus large. Des exemples peuvent inclure la messagerie entre les systèmes de tête de réseau et les compteurs ou les appareils PAN. Les différents composants décrits ultérieurement dans le présent document se rangeront en général dans la catégorie d'une tête de réseau de système de comptage (MS), d'un MDM ou de toute autre application d'entreprise (par exemple, OMS, DRMS, CIS).



Légende

Anglais	Français
Area of Direct Impact using IEC 61968-9 (and within scope of IEC 61968)	Zone d'impact direct de l'utilisation de la CEI 61968-9 (et relevant du domaine d'application de la CEI 61968)
Area Causally/Indirectly Impacted by or impacting IEC 61968-9	Zone directement/indirectement impactée par ou impactant la CEI 61968-9
Electric Utility	Entreprise d'électricité
Enterprise Integration Infrastructure (e.g. ESB, SOA, ...)	Infrastructure d'intégration d'entreprise (par exemple, ESB, SOA, ...)
Enterprise Applications	Applications d'entreprise
Head End Systems	Systèmes finaux de tête
IEC 61968-9 Messages (or more broadly any 61968 messages)	Messages CEI 61968-9 (ou plus largement, tout messages 61968)
operations Applications	Applications d'exploitation (par exemple OMS, DMS)
Messages defined by IEC 61968-9 and based upon IEC CIM and conveyed using a variety of integration technologies and IEC 61968-100	Messages définis par la CEI 61968-9 et basés sur le CIM de la CEI et acheminés via différentes technologies d'intégration et la CEI 61968-100
Mappings, translations and/or forwarding as needed	Mises en correspondance, traductions et/ou transferts comme nécessaire
Customer	Client
Meter	Compteur
Standard or Proprietary Communication Infrastructure	Infrastructure de communication standard ou propriétaire
Meter or Gateway	Compteur ou passerelle
PAN device	Appareil PAN
Messages defined by relevant standards or vendors. May use a wide variety of communication technologies	Messages définis par les fournisseurs ou les normes correspondants. Peut utiliser une large palette de technologies de communication
Messages defined by PAN/HAN specifications	Messages définis par les spécifications PAN/HAN

Figure 1 – Domaine d'application de la norme CEI 61968-9

Les capacités et les informations fournies par des systèmes de lecture de compteurs et de gestion de données de compteur sont importantes pour une diversité d'applications, y compris (mais de manière non exhaustive) les données d'intervalles, les données de demande basées sur la durée, les données d'énergie basées sur la durée (utilisation et production), la gestion des interruptions de service, l'interruption de service, le rétablissement du service, la surveillance de la qualité de service, l'analyse du réseau de distribution, la planification de la distribution, service de demande/réponse, la facturation des clients et la gestion des travaux. La présente norme étend également le CIM (Common Information Model, c'est-à-dire Modèle d'Information Commun) pour prendre en charge l'échange des données de compteurs.

2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

CEI 60050-300, *Vocabulaire Electrotechnique International (VEI) – Mesures et appareils de mesure électriques et électroniques – Partie 311: Termes généraux concernant les mesures – Partie 312: Termes généraux concernant les mesures électriques – Partie 313: Types d'appareils électriques de mesure – Partie 314: Termes spécifiques selon le type d'appareil*

CEI 61968-1, *Intégration d'applications pour les services électriques – Interfaces système pour la gestion de distribution – Partie 1: Architecture des interfaces et recommandations générales*

CEI/TS 61968-2, *Application integration at electric utilities – System interfaces for distribution management – Part 2: Glossary* (disponible en anglais seulement)

CEI 61968-11, *Intégration d'applications pour les services électriques – Interfaces système pour la gestion de distribution – Partie 11: Extensions du modèle d'information commun (CIM) pour la distribution*

CEI 61968-100:2013, *Application integration at electric utilities – System interfaces for distribution management – Part 100: Implementation profiles*

CEI 61970-301, *Interface de programmation d'application pour système de gestion d'énergie (EMS-API) – Partie 301: Base de modèle d'information commun (CIM)*

CEI/TR 62051-1, *Electricity metering – Data exchange for meter reading, tariff and load control – Glossary of terms – Part 1: Terms related to data exchange with metering equipment using DLMS/COSEM* (disponible en anglais seulement)

ISO 8601:2004, *Éléments de données et formats d'échange – Échange d'information – Représentation de la date et de l'heure* (disponible en anglais seulement)

3 Termes, définitions et abréviations

3.1 Termes et définitions

Pour les besoins de la présente norme, les termes et définitions donnés dans les normes CEI 60050-300, CEI/TS 61968-2, CEI/TR 62051-1, CEI 62055-31, ainsi que les termes suivants, s'appliquent.

NOTE En cas de différence entre les définitions de la présente norme et les définitions contenues dans d'autres normes CEI référencées, les définitions contenues dans la CEI/TS 61968-2 doivent alors être prioritaires par

rapport aux définitions répertoriées ailleurs et les définitions contenues dans la CEI 61968-9 doivent être prioritaires par rapport aux définitions répertoriées dans la CEI/TS 61968-2.

3.1.1

programme client

plan de classification pour la vente d'énergie aux clients selon une tarification particulière

Note 1 à l'article: Le programme peut spécifier le but, les conditions relatives à la durée d'utilisation, la/les tension(s) de service, les volumes consommés et/ou autres termes comme une condition de vente.

Note 2 à l'article: Des entreprises de distribution peuvent promouvoir des programmes particuliers à l'attention de leurs clients industriels, commerciaux, agriculteurs et résidentiels dans un effort visant à encourager un comportement particulier ou à les informer de leurs options.

3.1.2

demande réponse (en anglais *demand response*)

ensemble de processus et de programmes utilisés pour réduire la consommation

Note 1 à l'article: Cela peut être effectué sur une base économique, obligatoire ou d'urgence.

3.1.3

dispositif terminal (en anglais *end device*)

équipement situé à l'extrémité du système de communication, habituellement dans les locaux du client

Note 1 à l'article: Dispositif terminal qui peut accomplir des fonctions telles que les fonctions de métrologie, connexion / déconnexion, régulation de la charge, réponse à la demande ou autres fonctions, et peut avoir une capacité de relais de puissance et/ou de communications locales. Cela est représenté au sein du CIM par l'utilisation de la classe EndDevice. Les compteurs et les appareils PAN sont des exemples de dispositifs terminaux.

3.1.4

tête de réseau (en anglais *head end*)

composant d'un système de comptage qui collecte les données à partir de et émet des commandes pour les dispositifs terminaux

Note 1 à l'article: Une tête de réseau peut également gérer le système de communication utilisé pour communiquer avec les dispositifs terminaux. Du point de vue de l'intégration d'entreprise, la tête de réseau sert de proxy aux dispositifs terminaux.

3.1.5

passerelle (en anglais *gateway*)

appareil qui peut être utilisé pour gérer les appareils sur un PAN et participer aux interactions basées sur Internet. Une passerelle peut appliquer une transformation d'un protocole à un autre

3.1.6

dispositif de régulation de la charge (en anglais *load control device*)

type de EndDevice qui peut recevoir des signaux l'amenant à délester la charge aux fins de maintenir la fiabilité du réseau et/ou des accords commerciaux

3.1.7

compteur (en anglais *meter*)

type de dispositif terminal qui accomplit la métrologie et prend en charge la tarification du réseau de distribution et/ou de transport

Note 1 à l'article: Cela est représenté par l'utilisation de la classe Meter du CIM, qui est une sous-classe de la classe EndDevice.

Note 2 à l'article: En tant que dispositif terminal, un compteur aura généralement, mais pas toujours, un lien de communication avec un système de tête de réseau.

3.1.8

remplacement de compteur

échange de compteur

processus consistant à remplacer un compteur existant par un nouveau compteur

Note 1 à l'article: La personne chargée de l'installation suivra habituellement un bon de travail (ordre d'exécution) qui spécifie un emplacement donné et exige habituellement qu'elle saisisse les relevés de lecture des anciens et nouveaux compteurs et enregistre l'heure et la date d'exécution du travail.

3.1.9

gestionnaire des données de compteur (en anglais *meter data manager*)

système qui gère les données de compteur et fournit généralement diverses fonctionnalités à valeur ajoutée telles que VEE

3.1.10

réseau dans un local PAN (en anglais *premise area network*)

comprend l'ensemble du domaine d'application d'un réseau domestique (HAN), car il couvre également les locaux commerciaux

3.1.11

appareil PAN

type de dispositif terminal situé sur un local de client qui communique à l'aide d'un PAN

Note 1 à l'article: En général, un appareil PAN peut accepter des commandes et/ou des événements de rapport.

Note 2 à l'article: Les appareils PAN utilisent couramment les compteurs comme passerelles de communication.

3.1.12

compteur à paiement

compteur électrique avec des fonctionnalités supplémentaires qui peut être exploité et commandé pour permettre le flux d'énergie conformément à des modes de paiement convenus d'un commun accord

Note 1 à l'article: Cela implique en général le prépaiement de l'électricité.

3.1.13

mode de prépaiement

mode de paiement dans lequel l'interruption automatique se produit lorsque le crédit disponible est épuisé

3.2 Abréviations

Abbréviation	Anglais	Français
AM	asset management	gestion des biens
AMR	automated meter reading	relevé de compteur automatisé
AMI	advanced metering infrastructure	infrastructure de comptage avancée
CIM	common information model	modèle d'information commun
CIS	customer information system	système d'informations clients
COSEM	companion specification for energy metering	spécification d'accompagnement pour le comptage d'énergie
DLMS UA	device language message specification user association	spécification de message de langue d'appareil – association des utilisateurs
DMS	distribution management system	système de gestion de distribution
DR	demand response	réponse à la demande
DRMS	demand response management system	système de gestion de réponse à la demande
HAN	home area network	réseau domestique
IDR	interval data recorder	enregistreur de données d'intervalles

Abbréviation	Anglais	Français
IEC / CEI	International Electrotechnical Commission	Commission Electrotechnique Internationale
LC	load control	régulation de la charge
LDC	load control system	système de régulation de la charge
LMS	load management system	système de gestion de la charge
MAM	meter asset management	gestion de biens de compteur
MDM	meter data management	gestion de données de compteur
MDM	master data management	gestion de données de référence
MM	meter maintenance	maintenance de compteur
MR	meter reading	relevés de compteur
MS	metering system	système de comptage
NO	network operations	exploitation du réseau
OMS	outage management system	système de gestion des interruptions de service
POS	point of sale	point de vente
PAN	premise area network (includes scope of HAN)	réseau dans un local (comprend le domaine d'application du HAN)
RF	radio frequency	fréquence radio
SM	smart meter	compteur intelligent
UML	unified modeling language	langage de modélisation unifié
VEE	validating, editing, and estimating	validation, édition et estimation
WM	work management	gestion des travaux
XSD	XML schema	schéma XML

4 Modèles de référence et d'informations

4.1 Approche générale aux systèmes de comptage

Le disque rotatif dans un compteur électromécanique sert généralement d'initiateur d'impulsions pour le module enregistreur du compteur. De même, les compteurs à semi-conducteurs peuvent aussi utiliser une unité de métrologie qui génère des impulsions représentant une fraction de kWh. En outre, s'il est plus sophistiqué, le compteur à semi-conducteurs peut comporter un enregistreur de comptage capable d'accumuler un grand nombre de différentes sortes d'informations et de les stocker en vue de les présenter au module de communications du compteur en utilisant un protocole piloté par des messages et des tableaux tel que l'ANSI C12.19 ou la CEI 62056.

L'élément de donnée compté le plus commun est le kWh, mais de nombreux compteurs d'électricité peuvent aussi saisir les kW, kVAr, kVArh et autres grandeurs de facturation similaires. Certains compteurs peuvent aussi saisir des grandeurs techniques pures telles que tension, courant, facteur de puissance, etc.

Certains systèmes AMR tentent d'ajouter de la valeur à des compteurs en ajoutant la fonctionnalité dont le compteur peut manquer. Pour les compteurs simples (par exemple, compteur d'énergie seulement), il est courant pour un module de compteur AMR d'ajouter la capacité d'accomplir le comptage à la demande, l'enregistrement de données d'intervalle (IDR), de maintenir un compte d'alimentation en énergie ou même de fournir des estimations de certaines grandeurs techniques telles que la tension.

Les compteurs commerciaux et industriels utilisent souvent des transformateurs de courant et des transformateurs de tension pour compter le service réel. Les courants et tensions primaires sont réduits en proportion à l'aide de transformateurs de potentiel (PT, potential transformer) et de transformateurs de courant (CT, current transformer) et, de ce fait, il n'est pas obligatoire de construire le compteur pour qu'il supporte les forts courants et tensions

réellement délivrés à la charge. Les valeurs des tensions ou des courants secondaires sont souvent mesurées directement par le compteur. Les valeurs secondaires représentent un petit pourcentage des valeurs primaires qui peuvent être effectivement délivrées ou connectées à la charge. Si les tensions et courants secondaires sont mesurés par le compteur, ils peuvent être reconvertis en valeurs primaires à l'aide des rapports de transformation PT et CT, qui sont juste le rapport des valeurs primaires sur secondaires.

Le système de comptage achemine les données des compteurs et autres données à valeur ajoutée jusqu'à la destination en passant par le réseau du système de comptage. En fonction du système, le trajet peut impliquer plusieurs étapes à travers des réseaux publics ou privés, des spectres RF sous licence ou sans licence, des systèmes normalisés ou propriétaires, d'une façon unidirectionnelle ou bidirectionnelle.

Certains services ou opérations généraux peuvent être définis pour un système de comptage. Ces opérations générales se traduiront en des actions spécifiques dans le contexte d'une solution de comptage donnée.

Les opérations générales peuvent être programmées ou appelées sur demande. Chaque opération retourne une réponse avec un statut facultatif. Un message encapsule une opération générale.

Les lecteurs de la CEI 61968-9 intéressés par des informations complémentaires peuvent se référer à d'autres normes, y compris la CEI 62056, la DLMS UA (spécification de message de langue d'appareil – association des utilisateurs) et le modèle COSEM: Spécification d'accompagnement pour le comptage d'énergie (*COmpanion Specification for Energy Metering*, en anglais).

4.2 Modèle de référence

4.2.1 Généralités

Les diagrammes suivants servent de modèles de référence et donnent des exemples des composants logiques et flots de données relatifs à la présente Norme internationale. Le paragraphe 4.5.2 fournit les références à des termes définis par le CIM.

Le "compteur" est traité comme un "dispositif terminal". Le dispositif terminal peut contenir une capacité de métrologie, il peut contenir une capacité de communications, il peut être une unité de régulation de la charge et il peut contenir une combinaison d'un grand nombre de types différents de fonctionnalités. La Figure 2 tente de décrire essentiellement le concept de liste de choix possibles de fonctionnalités qui peuvent être disponibles dans le dispositif terminal (logique ou physique).

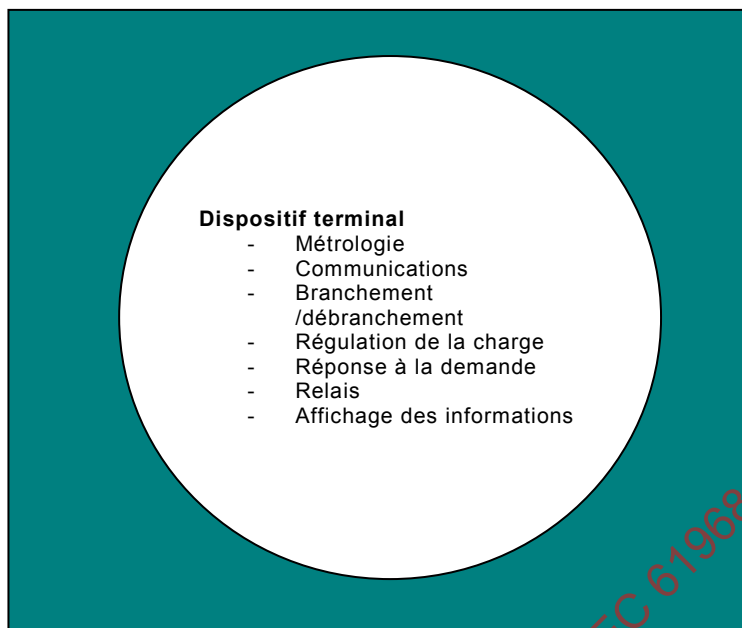


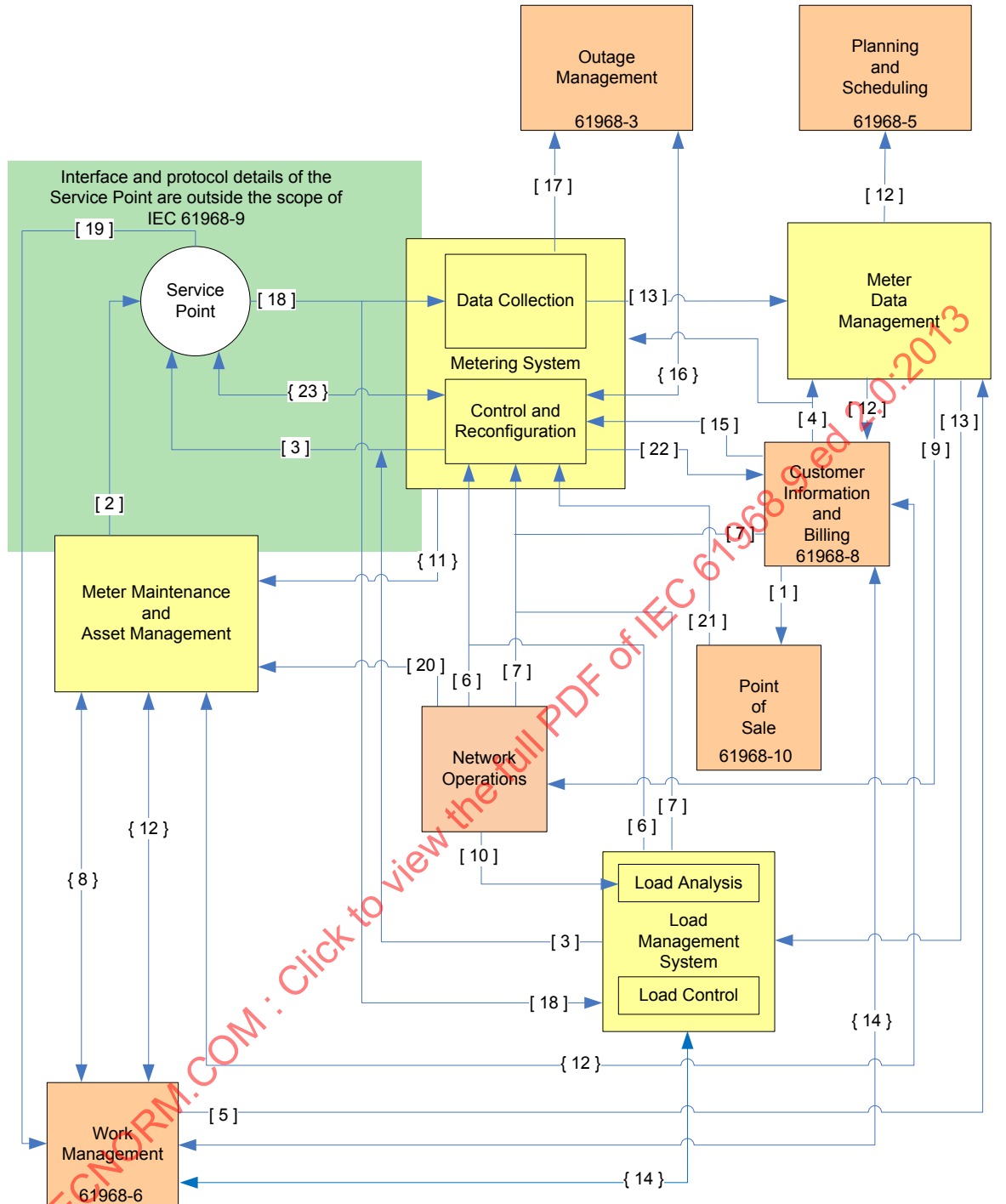
Figure 2 – Exemple d'un dispositif terminal avec des fonctions

Le dispositif terminal proprement dit, tout en présentant une myriade de fonctionnalités, n'est pas le sujet de la présente norme. Il existe de nombreuses interactions qui affectent in fine le dispositif terminal mais elles résultent d'une communication entre les systèmes à un niveau beaucoup plus élevé dans l'architecture de commande. L'interaction entre les systèmes relève du domaine d'application de la présente norme et la Figure 3 donne une vue informative des systèmes impliqués et une vue d'ensemble au paysage des parties prenantes.

Du point de vue de la présente norme, un dispositif terminal:

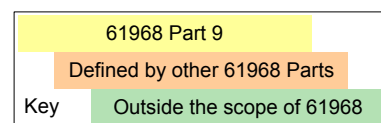
- a une identité unique (mRID et/ou un ou plusieurs cas de la classe Name)
- est géré comme un bien physique;
- peut émettre des événements;
- peut recevoir des demandes de commande;
- peut recueillir et rapporter des valeurs mesurées;
- peut participer à des processus métier de l'entreprise de distribution.

Les diagrammes des Figures 3 et 4 décrivent les flux entre les composants dans le modèle de référence. Deux diagrammes sont utilisés pour réduire la complexité que présenterait un seul diagramme. Les nombres entre crochets donnent les liens aux définitions des flux.



- [1] Account information
- [2] Configuration, installation etc.
- [3] Controls and signals
- [4] Customer data set
- [5] Data obtained by special read
- [6] Demand response signals
- [7] Disconnect/reconnect, demand reset
- { 8 } Install, remove, repair, disconnect, reconnect
- [9] Load curves, Measurement history, etc.
- [10] Load scenarios
- { 11 } Meter health and tamper detection
- { 12 } Meter history

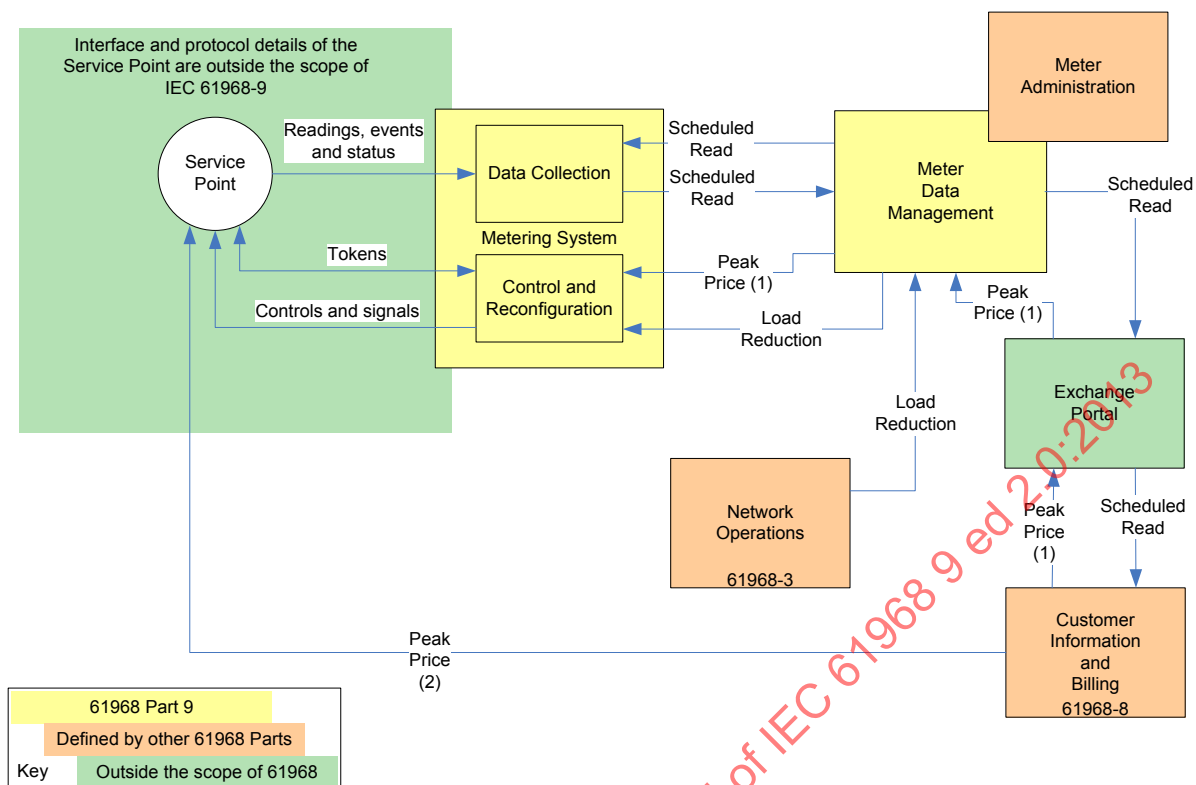
- [13] Meter readings
- { 14 } Meter service request
- [15] On request read
- [16] Outage and restoration verification
- [17] Power reliability and quality events
- [18] Readings, events and status
- [19] Special read
- [20] Tariffs, parameters
- [21] Transaction information
- [22] Transaction records
- { 23 } Tokens



Légende

Anglais	Français
Outage Management	Gestion des interruptions de service
Planning and Scheduling	Planification et programmation
Interface and protocol details of the Service Point are outside the scope of IEC 61968-9	Les détails relatifs à l'interface et au protocole du point de service ne relèvent pas du domaine d'application de la CEI 61968-9
Service Point	Point de service
Data Collection	Collecte de données
Metering System	Système de comptage
Control and Reconfiguration	Commande et reconfiguration
Meter Data Management	Gestion de données de compteur
Customer Information and Billing	Informations et facturation client
Meter Maintenance and Asset Management	Maintenance de compteur et Gestion de biens
Network Operations	Exploitation du réseau
Point of Sale	Point de vente
Load Analysis	Analyse de la charge
Load Management System	Système de gestion de la charge
Load Control	Régulation de la charge
Work Management	Gestion des travaux
Account information	Informations de compte
Configuration, installation, etc.	Configuration, installation, etc.
Controls and signals	Commandes et signaux
Customer data set	Jeu de données client
Data obtained by special read	Données obtenues par une lecture spéciale
Demand response signals	Signaux de réponse à une demande
Disconnect/reconnect, demand reset	Débranchement/rebranchement, réinitialisation de demande
Install, remove, repair, disconnect, reconnect	Installer, retirer, réparer, débrancher, rebrancher
Load curves, Measurement history, etc.	Courbes de charge, historique des mesures, etc.
Load scenarios	Scénarii de charge
Meter health and tamper detection	Détection de santé et de falsification du compteur
Meter history	Historique du compteur
Meter readings	Relevés de compteur
Meter service request	Demande de service compteur
On request read	Relevé sur demande
Outage and restoration verification	Interruption de service et vérification du rétablissement
Power reliability and quality events	Événements relatifs à la fiabilité et à la qualité de l'énergie
Readings, events and status	Relevés, événements et statut
Special read	Relevé spécial
Tariffs, parameters	Tarifs, paramètres
Transaction information	Informations sur la transaction
Transaction records	Enregistrements des transactions
Tokens	Jetons
61968 Part 9	61968 Partie 9
Defined by other IEC 61968 Parts	Défini par d'autres parties de la CEI 61968
Outside the scope of 61968	Hors du domaine d'application de la 61968
Key	Légende

Figure 3 – Modèle de référence de la CEI 61968-9



Légende

Anglais	Français
Interface and protocol details of the Service Point are outside the scope of IEC 61968-9	Les détails relatifs à l'interface et au protocole du point de service ne relèvent pas du domaine d'application de la CEI 61968-9
Service Point	Point de service
Readings, events and status	Relevés, événements et statut
Tokens	Jetons
Controls and signals	Commandes et signaux
Data Collection	Collecte de données
Metering System	Système de comptage
Control and Reconfiguration	Commande et reconfiguration
Scheduled Read	Lecture programmée
Peak Price (1)	Prix de pointe (1)
Load Reduction	Réduction de charge
Meter Administration	Administration de compteur
Meter Data Management	Gestion de données de compteur
Exchange Portal	Portail d'échange
Network Operations	Exploitation du réseau
Customer Information and Billing	Informations et facturation client
Key	Légende
61968 Part 9	61968 Partie 9
Defined by other 61968 Parts	Défini par d'autres parties de la CEI 61968
Outside the scope of 61968	Hors du domaine d'application de la 61968

Figure 4 – Modèle de référence avec informations de clients et système de facturation de la CEI 61968-9

L'architecture de référence reflète cinq principaux composants logiques (potentiellement réalisés sous forme de systèmes ou sous-systèmes) relatifs au comptage:

- a) système de comptage, incluant potentiellement la fonctionnalité de collecte, contrôle et reconfiguration des données
- b) gestion de données de compteur, qui peut inclure les fonctions d'administration de compteur
- c) maintenance de compteur
- d) gestion de la charge, incluant potentiellement la fonctionnalité de régulation de la charge et d'analyse de la charge
- e) gestion de biens de compteur.

Les composants système de comptage et système de maintenance de compteur peuvent être liés à un compteur spécifique et à la technologie de communication associée ou bien ils peuvent prendre en charge plusieurs types de compteurs (et plus génériquement de dispositifs terminaux) et la technologie de communication associée. Le composant système de gestion de données de compteur peut prendre en charge et consolider les données de comptage provenant de plus d'un système de comptage. Le système de comptage peut également prendre en charge la consolidation de diverses mises en œuvre de mesures et de collecte de données, assurant une interface cohérente au composant système de gestion de données de compteur.

4.2.2 Système de comptage (MS) – Collecte de données (Metering system – Data collection)

Les tâches du sous-composant de collecte de données dans le système de comptage peuvent comprendre:

- la collecte des relevés et des statuts. Les relevés et les statuts peuvent être obtenus par des moyens manuels ou automatisés, sur programmation ou à la demande
- transmission des relevés et du statut des compteurs vers un système de gestion de données de compteur
- transmission des données d'événements de qualité et de fiabilité de l'énergie vers des systèmes de gestion des interruptions de service, d'exploitation de réseau et de planification de capacité
- transmission d'informations de santé du réseau de communications vers les personnes responsables de la maintenance du réseau de communications.

Il est important de noter que les systèmes de comptage sont considérablement divers quant aux technologies utilisées, aux protocoles utilisés, aux capacités et à la fréquence de la collecte de données. Les détails des organes internes des compteurs, des transports et des protocoles de communication ne relèvent pas du domaine d'application de la présente Norme internationale.

Un appareil portable utilisé par un releveur de compteur humain pourrait être considéré comme un système de comptage. Dans un relevé typique de compteur par un humain, un lecteur injecte les données de compteur dans un appareil portable sur un terrain. L'appareil portable n'est pas relié à un réseau de communications sur un terrain. A la fin de la journée de travail, l'appareil portable est relié à un réseau de communications au domicile du releveur (et non à son bureau) et les données du compteur sont téléchargées vers l'amont vers un système de gestion de données de compteur. Dans ce cas, il convient que le réseau de communications soit partie intégrante d'un système de comptage. La collecte de données est décrite dans la CEI 61968-1 comme "MR-RMR."

4.2.3 Système de comptage (MS) – Commande et reconfiguration (Metering system – Control and reconfiguration)

Les tâches du sous-composant "Commande et reconfiguration" dans le système de comptage sont:

- interface principale pour l'exécution de commandes de commande du compteur
- communication d'informations relatives au système de paiement
- agir comme passerelle de communication pour des appareils de régulation de charge
- connexion/déconnexion de service;
- configuration des unités de mesure des tarifs et du calendrier
- configuration de la mesure de la qualité de l'énergie
- configuration de l'enregistrement d'événements du compteur
- relais des signaux de régulation de charge
- configuration des authentifiants d'identité et de sécurité du compteur
- détection de fraude.

Ce sous-composant est identifié séparément dans le système de comptage afin de reconnaître l'existence de systèmes de comptage qui n'ont pas la capacité d'envoyer des messages aux compteurs. La CEI 61968-1 décrit ce sous-composant comme "MR-MOP-Meter Configuration". Les systèmes de comptage qui comportent ces capacités sont souvent désignés par l'abréviation AMI.

4.2.4 Régulation de la charge

L'infrastructure du système de comptage peut souvent être utilisée comme passerelle de communication aux unités de régulation de la charge. Les unités de régulation de la charge sont des dispositifs terminaux avec capacité de régulation de la charge (LC). Ceux-ci sont câblés pour commander des appareils cibles individuels. Les dispositifs terminaux avec fonctionnalité LC peuvent prendre différentes formes. Le plus souvent, une unité LC spécialisée peut être située au niveau (ou à proximité) de l'appareil devant être commandé. Une autre approche consiste à utiliser des compteurs qui ont des relais configurés pour servir d'appareils LC. Une autre approche encore consiste à interfacer à un système de gestion d'énergie client (qui serait un autre type de dispositif terminal).

4.2.5 Système de gestion de la charge (LMS)

Un système de gestion de la charge est utilisé pour gérer et réguler la charge par l'entreprise de distribution afin de favoriser la fiabilité du système. Un système de gestion de la charge peut accomplir la prévision de charge, l'analyse de contingence et autres simulations avant de produire une commande de régulation de la charge.

4.2.6 Système de gestion de biens de compteur (MAM)

Des entreprises de distribution utiliseront une certaine forme de logiciels de gestion des biens dans un effort visant à maintenir des enregistrements détaillés concernant leurs biens physiques. La gestion des biens est traitée de manière catégorique dans la CEI 61968-4. Cependant, le comptage a des exigences tellement spéciales qu'il est commun pour une entreprise de distribution d'utiliser un logiciel spécialisé de gestion des biens de compteur. Le logiciel fait l'inventaire du bien, fournissant un enregistrement de ses attributs physiques ainsi que son emplacement. Pour les besoins du débat, le document de la CEI 61968-9 parlera d'un système MAM étroitement couplé au MS et à la MDM, mais certaines mises en œuvre réussiront à généraliser suffisamment l'application de gestion de biens pour qu'elle puisse s'inscrire dans un système AM plus générique.

4.2.7 Système de gestion de données de compteur (MDM)

D'un point de vue historique, il était commun pour une entreprise de distribution d'avoir plus d'un système automatisé de relevé de compteur. En variante, une entreprise de distribution pourrait externaliser les services de relevé de compteur à un ou plusieurs fournisseurs de services tiers qui exploitent un système AMR et/ou relèvent les compteurs manuellement. Le système de gestion de données de compteur (MDM) est utilisé pour fournir un référentiel commun, et point de gestion et d'accès de données de compteur recueillies qui proviennent de systèmes de comptage disparates. En plus de l'agrégation des données, très souvent la MDM fera aussi un effort pour examiner méticuleusement les données recueillies provenant des divers systèmes de comptage et fournir une capacité de validation, édition et estimation (VEE). Les systèmes MDM fourniront également souvent une fonctionnalité impliquant l'émission, la commande et le suivi des EndDeviceControls et endDeviceEvents.

4.2.8 Système d'informations clients (CIS)

Un CIS englobera typiquement les fonctionnalités relatives au service clientèle et à la facturation. Il s'agit d'un sujet externe à la norme CEI 61968-9. La fonction de facturation s'appuie sur les relevés, typiquement la demande ou la durée d'utilisation, obtenus du compteur. Le CIS est également souvent impliqué à des processus relatifs aux demandes de renseignements de facturation, à la déconnexion du compteur et à sa reconnexion, aux changements de programme de tarifs.

Le CIS est souvent la "source d'enregistrement" dans les entreprises de distribution pour les données de référence qui définissent les entités clés telles que les compteurs, d'autres dispositifs terminaux, les points d'usage, les fournisseurs de service, les clients, les structures de tarification, etc. et les relations entre lesdites entités. Voir 5.10 et les Annexes K et L pour obtenir des informations complémentaires relatives à la Gestion de données de référence/ synchronisation de données.

4.2.9 Système de gestion des interruptions de service (OMS)

Un système de gestion des interruptions de service (OMS) est utilisé par les opérateurs de distribution pour détecter et suivre les interruptions de service et pour aider au processus de vérification et/ou de rétablissement de service. Un système OMS combine typiquement (ou a des attaches à) la fonctionnalité telle que la gestion des défauts dans l'exploitation du réseau, la planification opérationnelle et l'optimisation, la simulation de l'exploitation du réseau, la maintenance et la construction, la maintenance et l'inspection, et la programmation et la répartition du travail.

Le système de comptage peut être une importante source d'informations pour identifier l'existence et l'étendue des interruptions de service et il peut servir à vérifier le rétablissement des interruptions de service. Le MS pourrait avoir la capacité d'éditer des données relatives aux interruptions de service et au rétablissement à l'attention de l'OMS à mesure qu'il les trouve. Ce type d'informations s'ajoute typiquement aux appels téléphoniques entrants des clients dans l'OMS pour permettre à celui-ci de mieux prédire l'emplacement de l'interruption de service. Cependant, en raison de la nature sensible au temps de la détection des interruptions de service, il existe aussi le besoin potentiel d'une interface de demande/réponse avec le MS, dans laquelle l'OMS peut demander qu'un équipement spécifique sur le réseau de distribution soit soumis à essai par le MS et un statut d'alimentation en énergie retourné pour analyse. L'interface de demande/réponse peut être utilisée par l'OMS pour fournir les données critiques nécessaires pour prédire une interruption de service ou par un "dispatcheur" qui souhaiterait vérifier que la puissance a été rétablie sur tous les points d'extrémité comptés à l'aval d'un commutateur particulier avant d'envoyer le monteur de ligne à l'emplacement suivant.

Les systèmes MDM servent aussi couramment d'agent intelligent dans le cadre des messages relatifs aux interruptions de service entre les systèmes de comptage et les systèmes de gestion des interruptions de service.

4.2.10 Exploitation du réseau (NO)

L'exploitation du réseau (CEI 61968-3) peut avoir occasionnellement besoin d'émettre des signaux de régulation de charge et de tarification vers les compteurs. Cela peut être réalisé pour des raisons économiques et aussi pour des raisons d'urgence.

4.2.11 Maintenance de compteur (MM)

La maintenance des compteurs est responsable de la fonctionnalité relative à la configuration et à la pose des compteurs. Ce type de fonctionnalité s'inscrit en général dans la gestion de biens de compteur ou dans la gestion de biens plus généralement. L'accomplissement de la maintenance des compteurs peut exiger des échanges avec la gestion des travaux.

4.2.12 Planification

La fonction de planification est décrite en tant que planification opérationnelle et optimisation, simulation de l'exploitation du réseau.

4.2.13 Gestion des travaux (WM)

Un système de gestion des travaux est responsable des travaux accomplis par les ressources de terrain. Ce sujet est traité dans "Maintenance et construction et Maintenance et inspection" (CEI 61968-6).

Pour ce qui est du comptage, WM inclut la pose, la maintenance et le remplacement des compteurs. Cela peut également impliquer le processus de lectures spéciales.

4.2.14 Point de vente (POS)

Un système de points de vente (POS) est utilisé pour gérer les compteurs de paiement, lorsqu'un client achète un jeton ou effectue un paiement pour un service.

4.2.15 Compteur (Meter)

Le compteur enregistre les données utilisées pour tarifier l'utilisation des réseaux publics et les données utilisées pour des mécanismes d'équilibrage de réseau. Les compteurs sont un sous-type d'EndDevice.

Les relevés saisis par le système de comptage sont rassemblés par un système tel que la MDM avant d'être présentés à des fins de facturation. Les entités de facturation peuvent corriger les données ou, dans certaines régions, le fournisseur d'énergie peut accomplir la validation, l'édition et l'estimation (VEE) selon des règles établies par l'organisme approprié de réglementation et de surveillance. Dans tous les cas, ces corrections sont mises à la disposition de l'utilisateur qui les demande.

Lorsque la présente Norme internationale se réfère à un "compteur", il convient de réaliser qu'un "compteur" est un dispositif terminal qui est doté d'une capacité de métrologie, il peut avoir ou peut ne pas avoir la capacité de communications; il peut en outre avoir ou peut ne pas avoir la capacité de branchement/débranchement ou d'être l'hôte d'autres capacités. Etant donné qu'un compteur aura une capacité de métrologie, il mesurera en toute vraisemblance les kWh, mais éventuellement aussi la demande, l'énergie réactive et la demande, les grandeurs de temps d'utilisation, les données d'intervalles, les grandeurs techniques d'étude et plus. De la même manière, les compteurs d'autres produits comme le gaz et l'eau peuvent surveiller des grandeurs analogues.

4.2.16 Appareils de régulation de charge

Les appareils de régulation de charge sont utilisés pour réguler les charges en un UsagePoint (c'est-à-dire point d'usage). Le système de comptage peut souvent comporter un réseau de communications qui peut être utilisé pour émettre des signaux de régulation de charge

(EndDeviceControls) afin de réguler la charge présentée par l'/les "EndDevice(s)". En variante, le réseau de communications pourrait être utilisé pour communiquer des signaux de réponse à la demande (prix) aux appareils afin d'affecter la charge présentée par l'/les "EndDevice(s)". Les appareils PAN peuvent également fournir des fonctions de régulation de charge.

4.2.17 Appareils PAN

Les appareils PAN sont utilisés à diverses fins dans les locaux d'un client. Le compteur est souvent utilisé comme passerelle de communication entre le système de tête de réseau et l'appareil PAN. Les appareils PAN peuvent réagir pour contrôler les messages ou générer des EndDeviceEvents. Certains appareils PAN, comme dans les affichages domestiques, peuvent également présenter des informations aux clients. Les appareils PAN peuvent être configurés pour réagir aux signaux liés à la tarification ou à d'autres réponses à la demande qui sont émis en tant que EndDeviceControls. Les appareils PAN sont modélisés en tant que EndDevices dans le CIM.

4.2.18 Système de gestion de réponse à la demande (DRMS)

Les systèmes de gestion de réponse à la demande sont utilisés pour gérer l'enregistrement dans les programmes DR, envoyer des événements aux participants du programme et collecter des informations de performances liées telles que nécessaires pour les règlements.

4.3 Modèle d'interface de référence

Il n'est pas dans l'intention de la présente norme de définir les applications et les systèmes qu'il convient que les fournisseurs proposent. On s'attend à ce qu'une application (physique) concrète offre la fonctionnalité d'un ou plusieurs composants (logiques) abstraits tels qu'ils sont énumérés dans cette norme. Ces composants abstraits sont regroupés par activité fonctionnelle du Modèle d'Interface de Référence.

Dans la présente norme, le terme "composant abstrait" est utilisé en référence à la partie d'un système logiciel qui prend en charge une ou plusieurs des interfaces définies dans les Parties 3 à 9. Il ne signifie pas nécessairement que le logiciel conforme soit livré sous forme de modules séparés ou de système unique.

La CEI 61968-1 décrit des services d'infrastructure communs à tous les composants abstraits, tandis que les parties CEI 61968-3 à -9 définissent le détail des informations échangées pour des types spécifiques de composants abstraits.

La CEI 61968 définit que:

- a) une infrastructure inter-applications est conforme si elle assure les services définis dans la Partie 1 pour prendre en charge au moins deux applications avec des interfaces conformes aux sections des Parties 3 à 9.
- b) Une interface d'application est conforme si elle prend en charge les normes d'interface définies dans les Parties 3 à 9 concernant les composants abstraits correspondants, définis dans le Modèle d'Interface de Référence.
- c) Une application doit seulement prendre en charge les normes d'interface de composants applicables, mentionnées sous la rubrique Composants Abstraits. Une application n'est pas nécessaire pour prendre en charge les interfaces devant être présentes pour d'autres composants abstraits de la même sous-fonction métier ou au sein de la même fonction métier. Alors que cette norme définit principalement les informations échangées entre des composants dans différentes fonctions métier, elle définira également occasionnellement les informations échangées entre des composants au sein d'une seule fonction métier, lorsqu'une forte demande du marché concernant ces possibilités a été appréhendée.

4.4 Fonctions de relevé et de commande de compteurs et composants

Il convient de noter que les types de messages définis dans la présente norme peuvent être envoyés ou reçus par tout type de composant au sein d'un système de gestion de distribution (DMS).

Le Tableau 2 indique les fonctions et les composants abstraits habituels qui sont réputés être des sources d'informations pour ces types de messages. Les consommateurs habituels d'informations comprennent, mais de manière non exhaustive, les autres composants énumérés dans la CEI 61968-1.

Tableau 2 – Fonctions métier et composants abstraits

Fonctions métier	Sous-fonctions métier	Composants abstraits
Relevé et commande des compteurs (MR)	Système de comptage (MS)	Collecte de données
		Commandes de points d'extrémité
		Reconfiguration de points d'extrémité
		Débranchement/rebranchement
		Réinitialisation de la demande
		Relevé sur demande
		Point de vente
		Détection des interruptions de service et vérification du rétablissement
		Evénements relatifs à la fiabilité et à la qualité de l'énergie
		Evénements relatifs au système de comptage
	Maintenance de compteur et Gestion de biens	Installation, configuration, suppression, réparation, débranchement, rebranchement de point d'extrémité
		Historique des biens de points d'extrémité
		Reconfiguration de points d'extrémité
		Relevé spécial
		Demande de service compteur
		Tarifs
	Gestion de données de compteur (MDM)	Référentiel de données de compteur
		Historique d'utilisation
		Validation, estimation et édition
		Données de facturation client
		Commandes et événements de dispositif terminal
	Réponse à la demande (DR)	Tarification en temps réel
		Réductions d'urgence
		Réductions économiques
		Enregistrement du programme
	Gestion de charge (LM)	Analyse de la charge
		Régulation de la charge
		Réponse à la demande
		Mesures de performances
		Gestion du risque

4.5 Modèle statique d'informations

4.5.1 Généralités

Le modèle d'informations concernant le relevé et la commande des compteurs se compose de classes qui fournissent un modèle relatif aux attributs de chaque message.

Les classes sont définies en détail dans la CEI 61968-11, *Extensions du modèle d'information commun (CIM) pour la distribution* ou dans la CEI 61970-301 *Interface de programmation d'application pour système de gestion d'énergie (EMS-API) – Base de Modèle d'Information Commun*.

4.5.2 Classes pour le relevé et la commande des compteurs

Le Tableau 3 énumère les classes utilisées dans les types de messages. Habituellement tous les attributs de ces classes sont contenus dans un type de message. Les descriptions fournies décrivent l'utilisation qui en est faite dans la présente partie.

Les classes décrites comme type "Asset" sont définies dans le paquetage "61968/Assets" du CIM.

Les classes décrites comme type "Customer" sont définies dans le paquetage "61968/Customers" du CIM.

Les classes décrites comme type "Metering" sont définies dans le paquetage "61968/Metering" du CIM.

Les classes décrites comme type "PaymentMetering" sont définies dans le paquetage "61968/PaymentMetering" du CIM.

Les classes décrites comme type "Profile" sont des profils contextuels définis pour la CEI 61968-9 qui décrivent les définitions de message établies en utilisant des objets du CIM.

Tableau 3 – Classes pour le relevé et la commande des compteurs

Classe/Nom	Type	Description
AuxiliaryAccount	PaymentMetering	Partie variable et dynamique d'AuxiliaryAgreement, représentant généralement l'état courant du compte relatif au solde impayé défini dans AuxiliaryAgreement.
AuxiliaryAgreement	PaymentMetering	Un accord de compte auxiliaire "ad-hoc" associé à un accord client, ne faisant pas partie du compte client, mais typiquement soumis à un accord formel entre client et fournisseur (entreprise de distribution). Typiquement, il est utilisé pour collecter un solde de recettes par le client pour d'autres services ou arriérés accumulés avec l'entreprise de distribution pour d'autres services. Il est typiquement lié à une transaction d'achat de jetons prépayés, forçant ainsi le client à effectuer un paiement en vue du règlement du solde de compte auxiliaire chaque fois qu'il a besoin d'acheter un jeton prépayé pour l'électricité. Le présent statut de l'accord AuxiliaryAgreement peut être défini dans le contexte des règles commerciales de l'entreprise de distribution, par exemple: activé, désactivé, en suspens, recouvré en trop, insuffisamment recouvré, radié, etc.
AuxiliaryAgreementConfig	Profile	Profil de messages pour les "AuxiliaryAgreement".
Card	PaymentMetering	Documentation de l'offre réelle lorsqu'il s'agit d'un type de carte (crédit, débit, etc.).
Cashier	PaymentMetering	L'opérateur du point de vente pour la durée de CashierShift. Cashier (c'est-à-dire le caissier) est sous le contrôle de gestion exclusif de Vendor (c'est-à-dire du fournisseur).

Classe/Nom	Type	Description
CashierShift	PaymentMetering	Période de travail opérationnelle pour un caissier, pendant laquelle il peut effectuer une transaction au débit de CashierShift, à condition que VendorShift soit ouvert.
Channel	Metering	Chemin simple utilisé pour la collecte ou la consignment des valeurs de registre sur une durée donnée. Par exemple, un registre qui mesure la puissance active peut avoir deux channels (canaux), un fournissant les relevés en quantité et l'autre fournissant des relevés d'intervalle d'une taille fixe.
Charge	PaymentMetering	Un élément de prix associé à d'autres entités telles que structures tarifaires, accords auxiliaires ou autres éléments de charge. Le montant total des charges applicable à cette instance de Charge est la somme de fixedPortion plus percentagePortion.
Cheque	PaymentMetering	L'offre réelle lorsqu'il s'agit d'un type de chèque. Le numéro de référence de chèque (tel qu'imprimé sur le chèque) est spécifié dans "nom".
ComFunction	Metering	Fonction de communication du matériel de communication ou d'un appareil tel qu'un compteur.
ComModuleConfig	Profile	Profil de configuration des modules de communications.
ConfigurationEvent	Metering	Utilisé pour consigner les détails sur la création, le changement ou la suppression d'une entité ou de sa configuration.
ConsumptionTariffInterval	PaymentMetering	L'une d'une séquence d'intervalles en termes de quantité de consommation d'un service tel que l'électricité, l'eau, le gaz, etc. Il est typiquement utilisé en association avec TariffProfile pour définir les échelons ou tranches dans une structure tarifaire à échelons, où startValue définit simultanément la valeur d'entrée de cet échelon et la valeur de fermeture de l'échelon précédent. Lorsque la consommation est $\geq$ startValue, elle s'inscrit dans le présent intervalle et lorsque la consommation est $<$ startValue, elle s'inscrit dans l'intervalle précédent.
Customer	Customers	Organisation recevant des services de la part de ServiceSupplier.
CustomerAccount	Customers	Affectation d'un groupe de produits et de services achetés par le client Customer par un accord client CustomerAgreement, utilisée comme mécanisme de facturation et paiement client. Il contient les informations communes issues de divers types d'accords CustomerAgreements pour créer des facturations (factures) pour un client Customer et recevoir un paiement.
CustomerAccountConfig	Profile	Profil de messages pour les "CustomerAccount".
CustomerAgreement	Customers	Accord entre le client Customer et le fournisseur de service pour payer le service en un emplacement spécifique de service. Il consigne certaines informations de facturation concernant le type de service fourni en l'emplacement ServiceLocation et est utilisé pendant la création du débit pour déterminer le type de service.
CustomerAgreementConfig	Profile	Profil de messages pour les "CustomerAgreement".
CustomerMeterDataSet	Profile	Le "CustomerMeterDataSet" (jeu de données de compteur client) comprend un ou plusieurs "CustomerAccount" (comptes clients) pour un ou plusieurs "ServiceLocations" (emplacements de service) pour un ou plusieurs "UsagePoint" (points d'usage). Le CustomerMeterDataSet peut comprendre un ou plusieurs EndDeviceGroup.
DemandResponseProgram	Metering	Programme de réponse à la demande.
DeviceFunction	Metering	Fonction accomplie par un appareil tel qu'un compteur, un équipement de communication, des contrôleurs, etc.
EndDevice	Metering	L'EndDevice est l'équipement qui joue le rôle d'un dispositif terminal. Il peut contenir des fonctionnalités telles que métrologie, communications, régulation de charge, branchement/débranchement, ou autres capacités. Il est connu comme étant "le compteur", "un compteur intelligent", un "compteur avancé", "climatiseur", "réfrigérateur", "pompe de piscine", etc. qu'un CommModule et/ou Meter peut surveiller

Classe/Nom	Type	Description
		et/ou commander. Le bien peut être la propriété d'un client, d'un fournisseur de service, d'une entreprise de distribution ou autre partie.
EndDeviceConfig	Profile	Message utilisé pour acheminer les descriptions d'un ou plusieurs EndDevice.
EndDeviceControl	Metering	Sert à émettre des commandes vers les EndDevice tels que les compteurs. Peut être traitée par EndDevice ou par EndDeviceGroup. Les commandes EndDeviceControl peuvent avoir des types et paramètres de commande.
EndDeviceControls	Profile	Message utilisé pour acheminer une ou plusieurs EndDeviceControls
EndDeviceControlType	Metering	Définit les types d'EndDeviceControls
EndDeviceEvent	Metering	Sert à rapporter des événements détectés par les dispositifs terminaux tels que les compteurs.
EndDeviceEvents	Profile	Message utilisé pour acheminer un ou plusieurs EndDeviceEvents.
EndDeviceEventType	Metering	Définit les types d'EndDeviceEvents
EndDeviceFirmware	Profile	Profil pour les messages de configuration de microprogramme d'EndDevice.
EndDeviceGroup	Metering	Un EndDeviceGroup est utilisé pour regrouper des dispositifs terminaux pour une diversité de besoins, y compris, mais de manière non exhaustive, la régulation de la charge et autres types de réponse à la demande. Un EndDeviceGroup peut appartenir à un autre EndDeviceGroup et un dispositif terminal peut appartenir à zéro, à un ou à plusieurs EndDeviceGroup. Dans certains cas, l'ID de groupe est maintenu au sein du dispositif terminal; dans d'autres cas, il peut être géré par un système de comptage.
EndDeviceGroups	Profile	Utiliser pour transmettre les modifications apportées aux adhésions au groupe
GetCustomerMeterDataSet	Profile	Profil pour les demandes GET. Voir l'Annexe J.
GetEndDeviceConfig	Profile	Profil pour les demandes GET. Voir l'Annexe J.
GetMeterReadings	Profile	Profil pour les demandes GET. Voir l'Annexe J.
GetMeterServiceRequests	Profile	Profil pour les demandes GET. Voir l'Annexe J.
Get<ProfileName>	Profile	Chaque profil aura un profil "Get" correspondant utilisé pour transmettre les paramètres des demandes GET.
IntervalBlock	Metering	Séquence temporelle de Readings du même ReadingType. Les IntervalReading contenus peuvent nécessiter une conversion par le biais de l'application d'un décalage et d'un scalaire définis dans l'élément en attente associé.
IntervalReading	Metering	Données saisies à intervalles de temps réguliers. Des données d'intervalles pourraient être saisies comme données différentielles, données absolues ou données relatives. La source pour les données est habituellement une grandeur tarifaire ou une grandeur technique. Les données sont typiquement saisies en des intervalles datés et uniformes, de longueur fixe, de 5, 10, 15, 30 ou 60 min. NOTE Les données d'intervalles sont parfois appelées "Relevés de lecture d'intervalles" (IDR, "Interval Data Readings").
MasterDataLinkageConfig	Profile	Un profil de message utilisé pour établir ou modifier les relations entre les objets.
MerchantAccount	PaymentMetering	Le compte opérationnel contrôlé par MerchantAgreement, au débit ou au crédit duquel chaque fournisseur Vendor peut vendre des jetons ou recevoir des paiements. Les transactions via VendorShift débitent le compte alors que les dépôts bancaires via BankStatement créditent le compte.
MerchantAgreement	PaymentMetering	Accord contractuel de contrôle formel entre le fournisseur Supplier et le marchand Merchant, aux termes duquel le marchand est autorisé à vendre des jetons et recevoir des paiements au nom du fournisseur. Le marchand Merchant est

Classe/Nom	Type	Description
		comptable vis-à-vis du fournisseur Supplier des recettes collectées au point de vente PointOfSale.
Meter	Metering	La classe Meter est utilisée pour décrire les compteurs. Un Meter est un type d'EndDevice utilisé typiquement pour mesurer et surveiller potentiellement une charge client. Il convient d'utiliser la définition de la classe EndDevice comme base pour la classe Meter.
MeterConfig	Profile	Profil de messages relatifs aux messages de configuration des Meter.
MeterReading	Metering	Jeu de valeurs relevées du compteur. Chaque MeterReading peut avoir plusieurs ReadingTypes, et chaque ReadingType peut contenir plusieurs valeurs.
MeterReadings	Profile	Profil pour acheminer des MeterReadings.
MeterReadSchedule	Profile	Un message MeterReadSchedule est utilisé pour programmer les relevés des compteurs.
MeterServiceRequests	Profile	Une demande de services de compteur est un type de tâche qui peut être utilisé pour une diversité d'activités liées aux services des compteurs. Ces activités incluraient la pose des compteurs, le remplacement des compteurs, le débranchement/rebranchement de client, etc.
MeterServiceWork	Metering	Tâches impliquant des compteurs.
ObjectNamesConfig	Profile	Utilisé pour ajouter, modifier ou supprimer les identificateurs de la classe Names des objets CIM.
Pending	Metering	Lorsqu'il est présent, conversion scalaire qui est associée à IntervalBlock et qu'il est nécessaire d'appliquer à chaque valeur IntervalReading contenue. Cette conversion se traduit en un nouveau ReadingType associé, reflétant les véritables dimensions des valeurs de relevés d'intervalles après la conversion.
PointOfSale	PaymentMetering	Point logique où les transactions ont lieu avec interaction opérationnelle entre le caissier Cashier et le système de paiement; dans certains cas, le point de vente PointOfSale interagit directement avec le client final, auquel cas le caissier Cashier pourrait ne pas être une personne réelle: par exemple un kiosque self-service ou sur internet.
PricingStructure	Client	Regroupement de composantes de tarification et de prix utilisé dans la création des débits client et les critères d'éligibilité selon lesquels ces termes peuvent être proposés à un client. Les raisons du regroupement sont notamment les exigences relatives à l'état, à la classification des clients, aux caractéristiques de site, à la classification (c'est-à-dire, structure de tarification des droits, structure de tarification des dépôts, structure de tarification des services d'électricité, etc.) et à la comptabilité.
PricingStructureConfig	Profile	Profil de configuration des structures de tarification.
Reading	Metering	Valeur spécifique mesurée par un compteur ou autre dispositif physique. Chaque Reading (relevé) est associé à un ReadingType spécifique.
ReadingQuality	Metering	Qualité d'une valeur de relevé spécifique ou d'une valeur de relevé d'intervalle. Note: plusieurs qualités peuvent être applicables à un Reading donné. En général non utilisé sauf s'il se produit des problèmes ou des conditions inhabituelles (c'est-à-dire, la qualité pour chaque Reading est censée être "Good" (bonne) sauf énoncé contraire dans le ReadingQuality associé).
ReadingQualityType	Metering	Définit les types des qualités qui peuvent être associées à une valeur de relevé de lecture.
ReadingType	Metering	Type de données véhiculé par un Reading spécifique.
Receipt	PaymentMetering	Enregistrement du paiement acquitté total de la part du client.
ReceiptRecord	Profile	Profil pour les messages de reçus.
ReceiptSummary	PaymentMetering	Enregistrement du détail des reçus (acquits) relatifs à une période de travail d'exploitation (un enregistrement par

Classe/Nom	Type	Description
		"tenderKind").
Register	Metering	Affichage pour la grandeur qui est comptée sur un dispositif terminal tel qu'un compteur.
ServiceCategory	Customers	Catégorie de service fourni au client.
ServiceCategoryConfig	Profile	Profil pour les messages de configuration de ServiceCategory.
ServiceLocationConfig	Profile	Profil pour les messages de configuration de ServiceLocation.
ServiceSupplier	PaymentMetering	Organisation qui fournit des services aux clients Customer.
ServiceSupplierConfig	Profile	Profil pour les messages de configuration de fournisseur de service.
Shift	PaymentMetering	Se réfère généralement à une période de fonctionnement ou à un travail accompli. Le fait qu'une période de travail soit ouverte/fermée peut être dérivé des attributs "activityInterval.start" et "activityInterval.end". Le total général pour les acquits (à savoir total cumulé de tous les montants réellement acquittés pendant cette période de travail; bancables + non bancables; totaux des erreurs d'arrondi exclus) peut être dérivé des attributs de Receipt: =sum(Receipt.receiptAmount); inclut les acquits qui peuvent ou non être déposés en banque.
SimpleEndDeviceFunction	Metering	Fonction simple d'un dispositif terminal qui se différencie par "type", utilisation de cette classe pour des instances qui ne peuvent pas être représentées par un autre sous-type de fonction de dispositif terminal.
Tariff	PaymentMetering	Document, approuvé par l'agence de régulation responsable, énumérant les termes et conditions, y compris un recueil des prix, dans lesquels les services publics seront fournis. Il a un numéro unique dans l'état ou la province. Pour les échelles tarifaires, il est fréquemment alloué par la commission des services publics (Public Utilities Commission) affiliée.
Tender	PaymentMetering	L'offre réelle, c'est-à-dire ce qui est "offert" par le client pour effectuer un paiement, est souvent supérieure au paiement qui doit être effectué (d'où le besoin de "change" c'est-à-dire d'appoint). Le paiement est ainsi la partie de l'offre réelle (c'est-à-dire Tender) qui tend vers le règlement d'une transaction particulière. L'offre réelle (c'est-à-dire Tender) est modélisée comme une agrégation de Cheque (c'est-à-dire chèque) et de Card (c'est-à-dire carte). Ces deux types d'offre peuvent coexister dans la même soumission et donc "accountHolderName" doit exister séparément dans chaque Cheque et Card car chacun de ceux-ci pourrait avoir un nom de titulaire de compte différent.
TimeTariffInterval	PaymentMetering	L'une d'une séquence d'intervalles de temps définis en termes de temps réel. Il est typiquement utilisé en association avec TariffProfile pour définir les intervalles dans une structure de tarifs fixés en fonction du temps d'utilisation, où startDateTime détermine simultanément le point de départ de cet intervalle et le point final de l'intervalle précédent.
Transaction	PaymentMetering	Enregistrement des détails du paiement pour le service ou la vente de jetons.
TransactionRecord	Profile	Profil pour les messages de transactions.
TransactionSummary	PaymentMetering	Enregistrement du détail des transactions de paiement relatives à une période de travail d'exploitation (un enregistrement par "transactionKind").
Transactor	PaymentMetering	(agent de transaction) L'entité qui exécute en dernier ressort la transaction et qui a le processus pour son contrôle; typiquement, elle est incorporée dans un logiciel sécurisé s'exécutant sur un serveur qui peut employer des appareils de chiffrement matériel pour un traitement sécurisé des transactions.
UsagePointLocation	Metering	Emplacement d'un point individuel d'usage. Pour les résidences ou la plupart des entreprises, il s'agit typiquement de l'emplacement d'un compteur dans les locaux d'un client.

Classe/Nom	Type	Description
		Pour le transport, il s'agit des points d'interconnexion sur le système de transport du fournisseur de transport où la capacité et/ou l'énergie transmise par le fournisseur de transport est mise à la disposition de la partie réceptrice. Les points de livraison sont spécifiés dans l'accord de service.
UsagePointLocationConfig	Profile	Message utilisé pour établir les associations aux UsagePointLocations.
UsagePoint	Metering	Point logique sur un réseau de distribution auquel les lectures de compteurs et/ou les événements de dispositifs terminaux peuvent être attribués. Utilisé à l'endroit où un compteur physique ou virtuel peut être installé; un compteur ne doit cependant pas être obligatoirement présent.
UsagePointConfig	Profile	Message utilisé pour établir les associations aux UsagePoints.
UsagePointGroup	Metering	Abstraction applicable à la gestion des communications de groupe au sein d'un système AMR bidirectionnel ou des données pour un groupe de points d'usage associés. Les commandes peuvent être émises à tous les points d'usage qui appartiennent à un groupe de points d'usage utilisant une adresse de groupe définie et l'infrastructure de communication AMR sous-jacente.
UsagePointGroups	Profile	Message utilisé pour établir les UsagePointGroups.
Vendor	PaymentMetering	Entité qui possède le point de vente PointOfSale et signe un contrat avec le caissier Cashier pour acquitter des paiements et vendre des jetons en utilisant le système de paiement. Le fournisseur Vendor a un contrat privé avec le marchand Merchant, et est géré par celui-ci, qui est un type d'Organisation. Le fournisseur Vendor est comptable vis-à-vis du marchand Merchant des recettes collectées, qui a son tour est comptable vis-à-vis du fournisseur Supplier.
VendorShift	PaymentMetering	La période opérationnelle de travail pour un fournisseur pendant laquelle il peut opérer des transactions portées au débit d'un compte du marchand. Elle rassemble les transactions et les acquits pendant la période de travail et débite périodiquement le compte d'un marchand. Il convient que les totaux dans VendorShift soient toujours égaux (=) à la somme des totaux accumulés dans toutes les périodes de travail de caissier qui étaient ouvertes pendant la période particulière de travail du fournisseur.
NOTE Les définitions de classes fournies ici sont données pour des raisons pratiques uniquement. Les définitions normatives sont fournies par le CIM.		

4.5.3 Classes relatives au relevé et à la commande des compteurs

Le Tableau 4 énumère les classes qui sont associées aux classes relatives au relevé et à la commande des compteurs, mais seul le nom d'une instance est donné dans les messages définis dans la présente norme. Les attributs détaillés de ces classes sont utilisés dans les types de messages définis dans d'autres parties de la CEI 61968.

Tableau 4 – Classes relatives au relevé et à la commande des compteurs

Classe connexe	Référence	Description
Organisation	Common	Cette classe est utilisée pour identifier des sociétés ou des divisions/départements au sein des sociétés. Les organisations pourraient jouer des rôles tels que ceux des entreprises de distribution, des entrepreneurs, des fournisseurs, des constructeurs, etc.
PowerSystemResource	Core (c'est-à-dire Cœur) (CEI 61970-301)	Une entité qui décrit la représentation logique d'une partie de composant d'une activité de Distribution. Les PowerSystemResources sont classés en plus comme EquipmentContainers, par exemple, Substations, ConductingEquipment, ProtectionEquipment, etc. Les instances de type PowerSystemResource peuvent être relatives à des instances du type Asset.
PowerTransformer	Wires (c'est-à-dire Fils) (CEI 61970-301)	Appareil électrique constitué de deux enroulements couplés ou plus, avec ou sans cœur magnétique, destiné à introduire un couplage mutuel entre les circuits électriques. Les transformateurs peuvent être utilisés pour contrôler la tension et le déplacement de phase (flux MW).
ServiceLocation	Customers	Un ServiceLocation (emplacement de service) de client possède un ou plusieurs UsagePoint. Les compteurs sont relatifs à un UsagePoint. L'emplacement peut être un point ou un polygone, selon les circonstances spécifiques. Pour la distribution, le ServiceLocation est typiquement l'emplacement du local du client du service public. Parce qu'un local de client peut avoir un ou plusieurs compteurs, l'UsagePoint est utilisé pour définir l'équipement conducteur réel auquel l'EndDevice se fixe en l'emplacement ServiceLocation du client de l'entreprise de distribution. Pour le transport, il s'agit des points d'interconnexion sur le système de transport du fournisseur de transport où la capacité et/ou l'énergie transmise par le fournisseur de transport est mise à la disposition de la Partie réceptrice.
TransformerTank	Wires (c'est-à-dire Fils) (CEI 61970-301)	Un enroulement du transformateur.
NOTE Les définitions de classes fournies ici sont données uniquement pour des raisons pratiques. Les définitions normatives sont fournies par la CEI 61968-11, qui décrit les extensions de distribution au CIM de la CEI.		

5 Types de messages de relevé et de commande des compteurs

5.1 Généralités

Le présent Article 5 a pour but de décrire les types de messages relatifs à la CEI 61968-9. Il est important de noter que certains de ces types de messages peuvent aussi être utilisés par d'autres parties de la CEI 61968. L'approche générale relative à la réalisation des structures de message et des schémas XML pour les messages CEI 61968 est décrite dans la CEI 61968-1 et la CEI 61968-100.

Bien qu'ils puissent être représentés dans des diagrammes de séquences pour le contexte et la complétude, le présent document ne décrit pas les formats de message qui sont définis par d'autres parties de la CEI 61968. Les structures de la charge utile des messages qui sont définies par la présente partie de la CEI 61968 sont décrites dans l'Article 5.

Les schémas XML normatifs pour les messages définis par la présente Partie sont donnés dans l'Annexe H, fournissant des descriptions annotées plus détaillées des structures de messages. L'Annexe I fournit les schémas XML qui sont informatifs. Les structures de

messages sont présentées dans l' Article 5. La convention de notation montre les éléments requis avec un contour en trait plein et les éléments facultatifs avec des contours en traits tiretés.

Il est également important de noter que les cas d'utilisation et les diagrammes de séquences fournis dans la présente norme sont de nature informative et sont censés présenter des exemples d'utilisation pour les définitions de message normatives. La présente norme ne vise nullement à normaliser des processus métier spécifiques.

5.2 Messages d'événements de dispositif terminal

5.2.1 Généralités

Un événement est un rapport d'une modification d'état qui peut avoir un intérêt potentiel. Les messages d'événement de dispositif terminal sont conçus comme étant un moyen de transmettre les modifications d'état d'un dispositif terminal par le biais de l'appareil lui-même ou d'un proxy pour le compte d'un dispositif terminal. Les événements de dispositif terminal sont vus comme un flot potentiel de données qui n'est pas nécessairement synchronisé à la collecte de relevés de compteur à des fins de facturation. Cependant, il peut encore être pertinent pour le processus de facturation. Une alarme relative à la santé du compteur peut être si sévère que tous les relevés du compteur sont à considérer comme non valides. Le client de données (par exemple, le système MDM) peut recevoir les données d'un événement pertinentes disponibles et les considérer lors du processus de validation, d'estimation et d'édition. Il peut également rapporter les données d'un événement à d'autres systèmes d'entreprise, puis les utiliser pour déclencher des actions telles que la création d'un MeterServiceRequest en vue de réparer ou de changer un compteur défectueux.

5.2.2 Applications

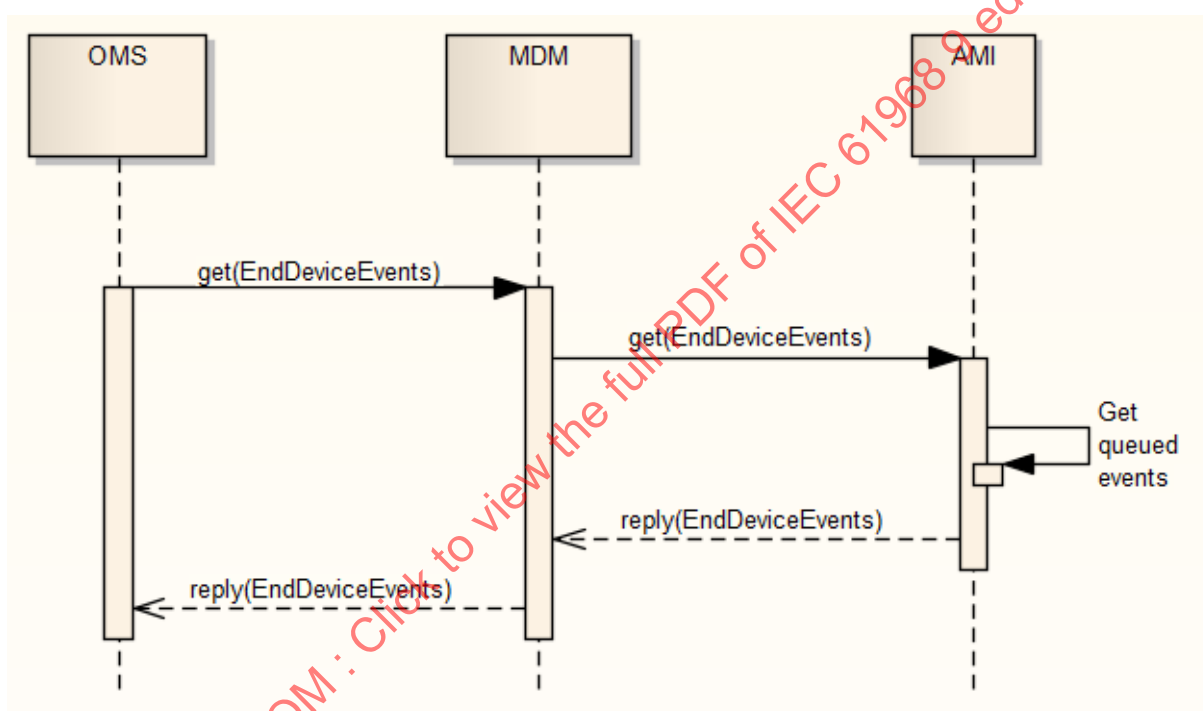
5.2.2.1 Généralités

La présente norme considère les "événements" comme étant différents des "statuts". La plupart des systèmes MR ne garantissent pas une livraison dans les délais d'un EndDeviceEvent. Par ailleurs, un "statut" n'est utile que lorsqu'il est frais. Le statut d'un EndDevice est généralement obtenu à l'aide d'un GetMeterReadings "OnRequest". Le rapport d'un EndDeviceEvent arrivera finalement au service d'administration de l'entreprise de distribution et sera traité à son tour. Cela implique que différentes applications seront naturellement divisées en différents types d'échanges de messages selon la technologie de communication sous-jacente utilisée par le système MR et le besoin d'avoir des données opportunes. Certains systèmes peuvent avoir la capacité de rapporter une interruption de service en tant qu'événement. D'autres systèmes peuvent la traiter en tant que statut. La plupart des systèmes MR rapporteront un changement de la santé du compteur en tant qu'événement, mais certains peuvent exiger qu'elle soit relevée en tant que statut. De la même manière, la plupart des systèmes MR rapporteront la qualité de l'énergie en tant qu'événement, bien que certains puissent la traiter en tant que statut.

5.2.2.2 Détection des interruptions de service

Lorsqu'une interruption de service n'est pas due à un déclenchement par le système SCADA (Supervisory Control and Data Acquisition, système d'acquisition et de contrôle des données), les entreprises de distribution d'électricité dépendent typiquement des appels émis par les clients pour identifier l'emplacement du défaut. Cependant, l'utilisation d'un MS peut fournir un autre moyen d'identifier l'emplacement du problème. Il est souvent possible pour un MS de déterminer qu'il a perdu le contact avec le compteur, auquel cas cela peut être consigné dans un rapport en tant qu'EndDeviceEvent afin d'être potentiellement utilisé par un système de gestion des interruptions de service. Il est important de noter que la perte de communications avec un compteur peut ne pas être suffisante pour identifier l'existence d'une interruption de service, car il est courant que certaines technologies MS perdent occasionnellement le contact avec les compteurs pendant de courtes périodes de temps.

Certains systèmes MS peuvent être enclins aux fausses alarmes à cause de la technologie particulière utilisée pour communiquer avec les compteurs. De nombreux fournisseurs travaillent à améliorer leur technologie et la précision de leurs données. Avec beaucoup de ressemblance avec le rôle qu'il joue parfois dans le nettoyage des données comptées pour des applications de facturation, la MDM peut aussi jouer un rôle dans le nettoyage des données relatives aux interruptions de service fournies par le MS avant qu'elles ne soient relayées à l'OMS. Une telle décision, à savoir acheminer par le truchement de la MDM les données relatives aux interruptions de service, dépend de la capacité du MS à fournir des données exactes, de l'aptitude de la MDM à nettoyer les données sans introduire de retards excessifs et de l'aptitude de l'OMS à tolérer les fausses alarmes et les retards. Afin de prendre en charge l'analyse des interruptions de service et le filtrage des données de mauvaise qualité, le MS peut fournir des données de vérification rétrospective et des données relatives à la qualité des mesures pour l'événement d'interruption de service, de la même manière qu'il fournit des données de vérification rétrospective pour les relevés pour facturation. La Figure 5 décrit un déploiement dans lequel la MDM est utilisée pour diffuser des informations relatives aux interruptions de service.



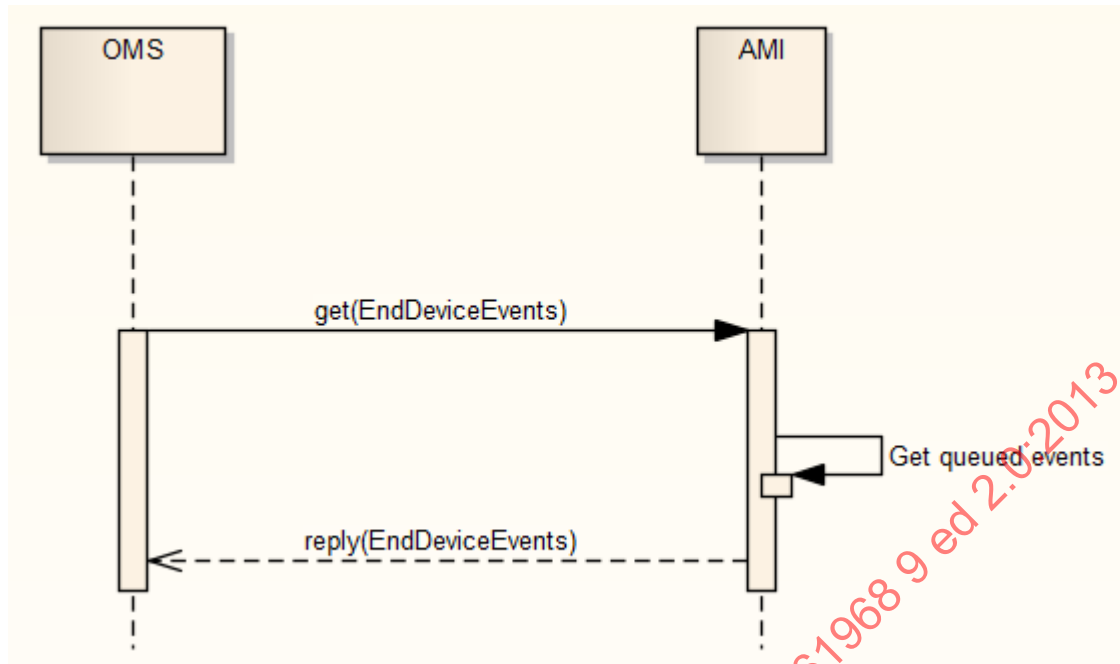
Légende

Anglais	Français
Get-queued events	Obtenir les événements en file d'attente

Figure 5 – Détection d'interruptions de service, échange de message de demande/réponse, exemple 1

Les systèmes de gestion des interruptions de service analysent le circuit en termes de topologie de réseau. "EndDeviceEventType" peut indiquer un événement tel que détecté par un dispositif terminal en vue de sa prise en compte dans l'analyse, ainsi que d'autres informations telles que les tickets d'incident. Lorsqu'un EndDeviceEvent peut indiquer un état intéressant qui peut s'avérer être une interruption de service, une interruption de service est habituellement le résultat de l'analyse de l'interruption de service au sein d'un OMS qui regroupera potentiellement plusieurs événements dans une seule interruption de service.

L'utilisation d'une MDM pour diffuser des données relatives aux interruptions de service est à la discrétion de l'entreprise de distribution. Dans certains déploiements, la demande de détection d'interruptions de service peut être émise directement de l'OMS vers le MS comme dans l'exemple de la Figure 6.



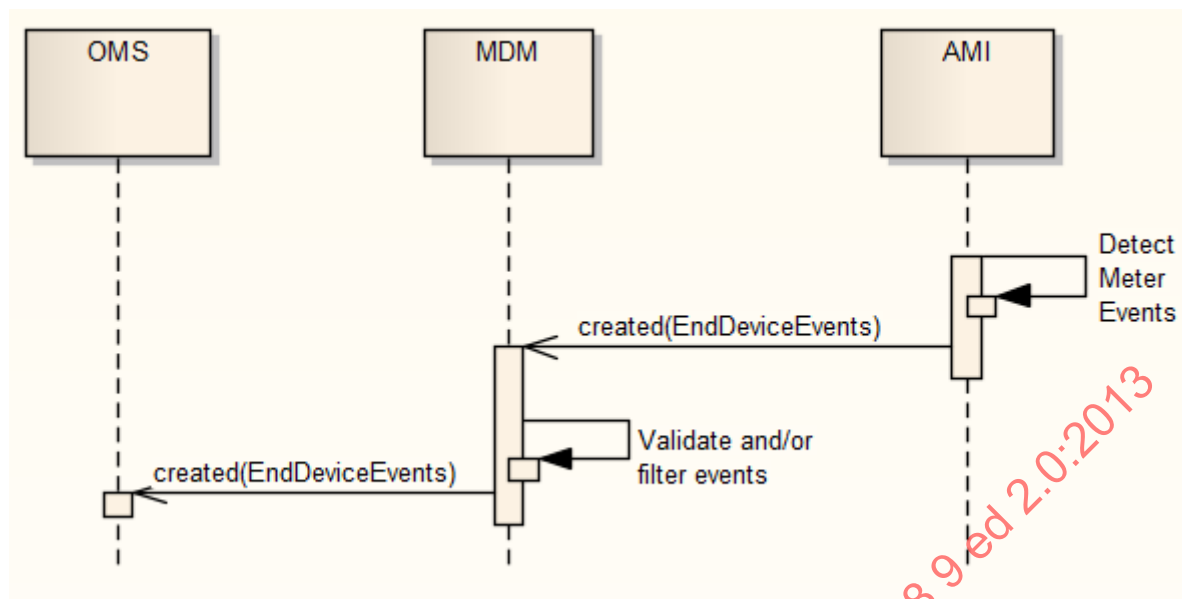
Légende

Anglais	Français
Get queued events	Obtenir les événements en file d'attente

Figure 6 – Détection d'interruptions de service, échange de message de demande/réponse, exemple 2

Une réponse (synchrone ou asynchrone) de la part du MS se présentera vraisemblablement sous la forme de zéro, un ou plusieurs EndDeviceEvents. Le mRID ou la structure de noms identifiera les dispositifs terminaux (par exemple: les compteurs) affectés par l'interruption de service ou le rétablissement. Certains consommateurs de données qui interagissent avec le MS pourraient savoir seulement comment traiter les ID des compteurs. Selon le déploiement, il peut être requis de limiter l'étendue des mRID échangés à celle des ID de compteurs à l'aide de la classe Nom, non à celle des ressources du réseau électrique en général. Le statut "EndDeviceEvent.status" peut indiquer "live" (c'est-à-dire actif) ou "dead" (c'est-à-dire hors tension). Certains systèmes de comptage peuvent compléter les informations de statut avec une preuve de collaboration en utilisant la classe EndDeviceEventDetails. EndDeviceEventType peut être utilisé pour indiquer que le statut s'applique à un compteur ou à un transformateur de puissance. La raison de l'événement peut être décrite (par exemple EndDeviceEvent.reason = "consecutiveFailCounter") et quantifiée (par exemple EndDeviceEvent.severity = "3").

Alors que l'échange de demande/réponse est utilisable chaque fois que l'OMS a besoin d'informations supplémentaires, certains MS sont capables de détecter automatiquement les interruptions de service. Un échange pub/sub (c'est-à-dire publication/abonnement) est idéal dans ces situations. La Figure 7 montre un tel échange en un déploiement où la MDM sert de courtier d'informations. La Figure 8 montre un déploiement avec des informations allant directement du MS à l'OMS.

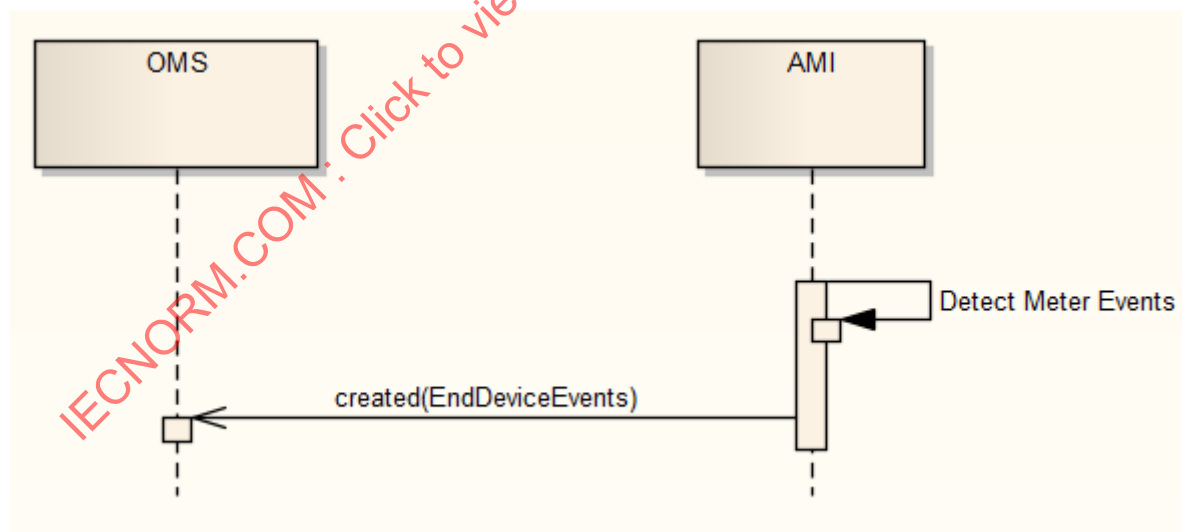


Légende

Anglais	Français
Detect Meter Events	Détecter les événements de compteur
Validate and/or filter events	Valider et/ou filtrer les événements

Figure 7 – Détection d'interruptions de service, échange de publication/abonnement, exemple 1

Le diagramme de séquence suivant montre un exemple de propagation d'événements sans avoir recours à une MDM.



Légende

Anglais	Français
Detect Meter Events	Détecter les événements de compteur

Figure 8 – Détection d'interruptions de service, échange de publication/abonnement, exemple 2

Certains déploiements peuvent souhaiter limiter le nombre d'interfaces prises en charge. La structure des messages MeterReadings fournit également le moyen d'acheminer des EndDeviceEvents.

Les exemples précédents reflètent l'échange de messages d'événement de dispositif terminal afin de prendre en charge les fonctions de gestion des interruptions de service. Comme cela a été expliqué auparavant, il est également souvent préférable de disposer d'un système de gestion des interruptions de service ou un système MDM qui effectue une requête de lecture sur demande au système de comptage en vue d'obtenir le statut d'excitation actuel d'un dispositif. Cela est réalisé en utilisant un échange get(MeterReadings) tel que décrit en 5.3. Dans de tels cas, le ReadingType (voir Annexe C) demandé indiquera que l'état d'excitation fait l'objet de la demande en cours.

5.2.2.3 Événements de santé des compteurs

Certains types de compteurs peuvent parfois générer des événements de santé de compteurs, qui peuvent être utilisés pour identifier les problèmes de matériel, de configuration ou de branchement de compteurs qu'il convient de résoudre. Les alarmes comprennent des éléments tels que les alarmes de diagnostic, alarmes de fraude ou autres conditions inhabituelles. La sévérité de l'alarme pourrait aller d'une simple notification à "fatal". Fréquemment, la résolution des événements liés à la santé du compteur exige une visite sur site et elle débouche sur la création d'un MeterServiceRequest. Les événements de santé des compteurs (Meter Health Events) sont communiqués à l'aide des messages EndDeviceEvent.

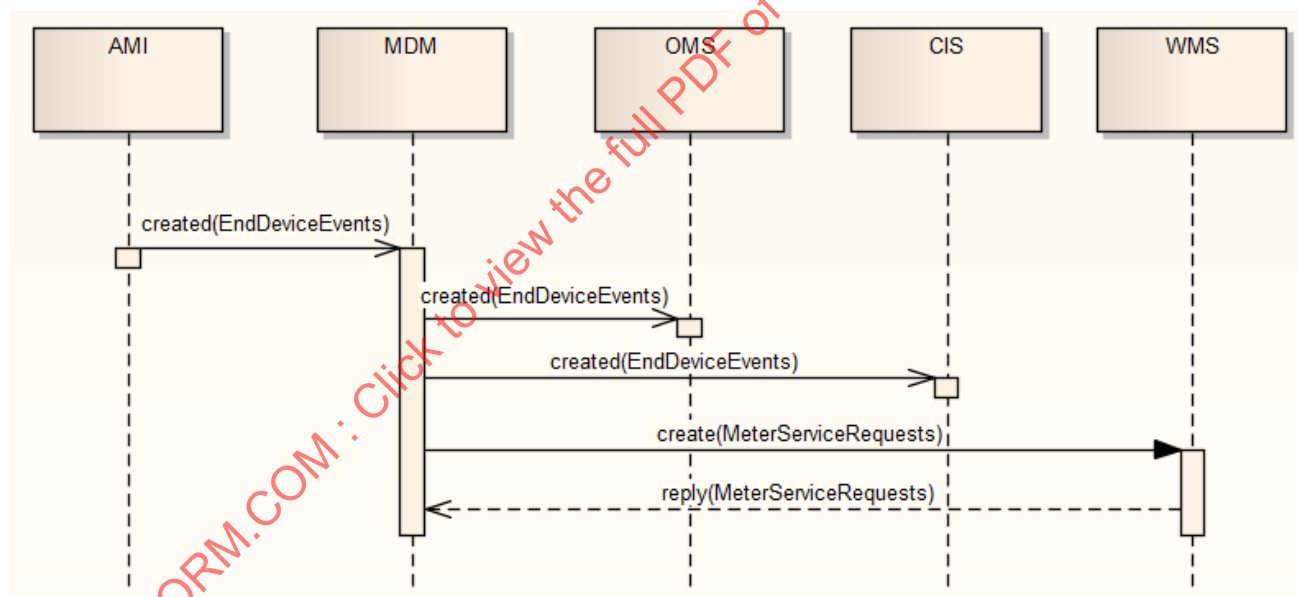


Figure 9 – Echange d'événements liés à la santé des compteurs, exemple 1

Lors de certains déploiements, la MDM sera présente pour diffuser les données de santé des compteurs pour d'autres parties prenantes et agira probablement en vue de déclencher des actions correctives telles que décrites dans le scénario de la Figure 9. Par contre, d'autres installations pourraient ne pas avoir une MDM ou l'utiliser de cette manière. Il est possible pour le MS d'éditer des données directement à l'attention des parties prenantes qui sont équipées pour les recevoir. Un tel échange est illustré à la Figure 10.

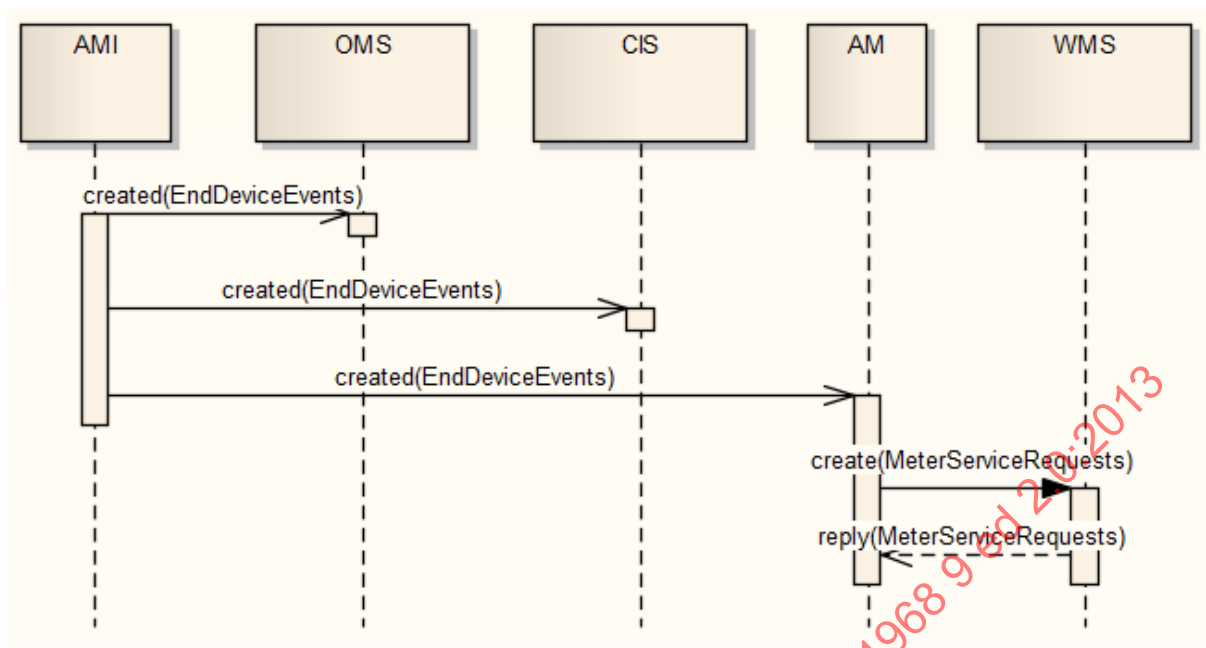


Figure 10 – Echange d'événements liés à la santé des compteurs, exemple 2

5.2.2.4 Événement relatif à la qualité d'énergie

Les compteurs peuvent recueillir des informations relatives à la qualité de l'énergie, y compris (mais de manière non exhaustive) les événements d'interruption momentanée du service, événements d'interruption durable du service, événements de haute ou basse tension et événements de forte distorsion. Ces informations pourraient être utilisées pour l'analyse des interruptions de service, la programmation de la maintenance ou la planification de la capacité. Les événements relatifs à la qualité de l'énergie sont un sous-type d'EndDeviceEvent.

Les événements liés à la qualité de l'énergie peuvent être diffusés (c'est-à-dire les publications gérées) par une MDM (comme décrit à la Figure 11), ou envoyés directement aux diverses parties prenantes (comme décrit à la Figure 12).

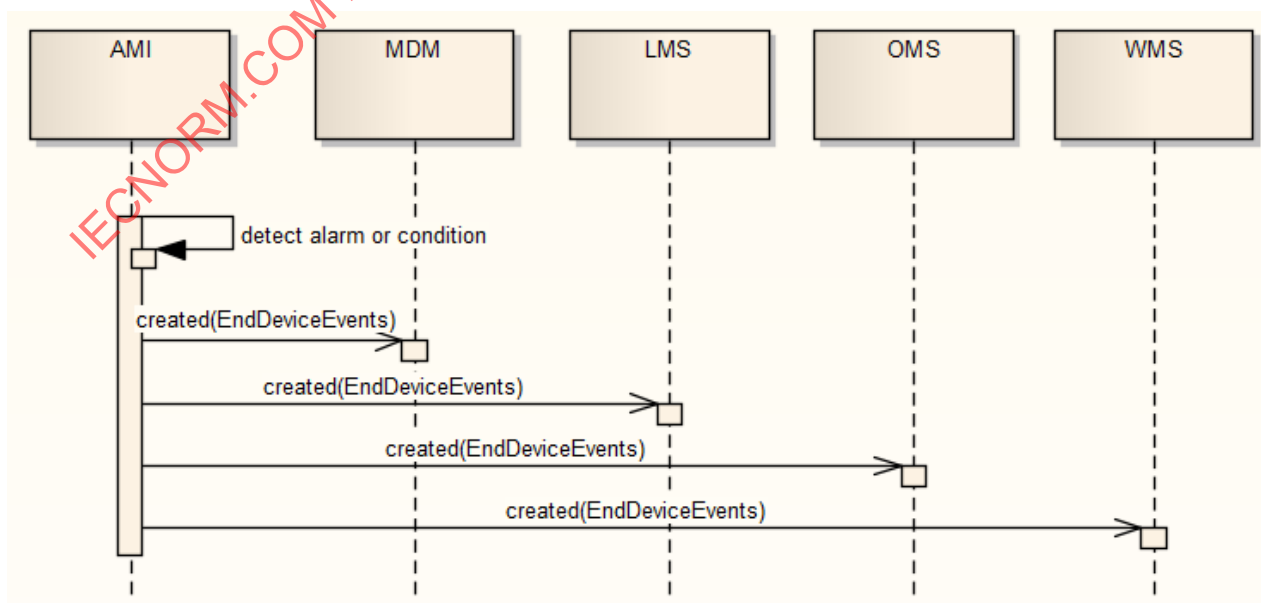


Figure 11 – Echange d'événements liés à la qualité de l'énergie, exemple 1

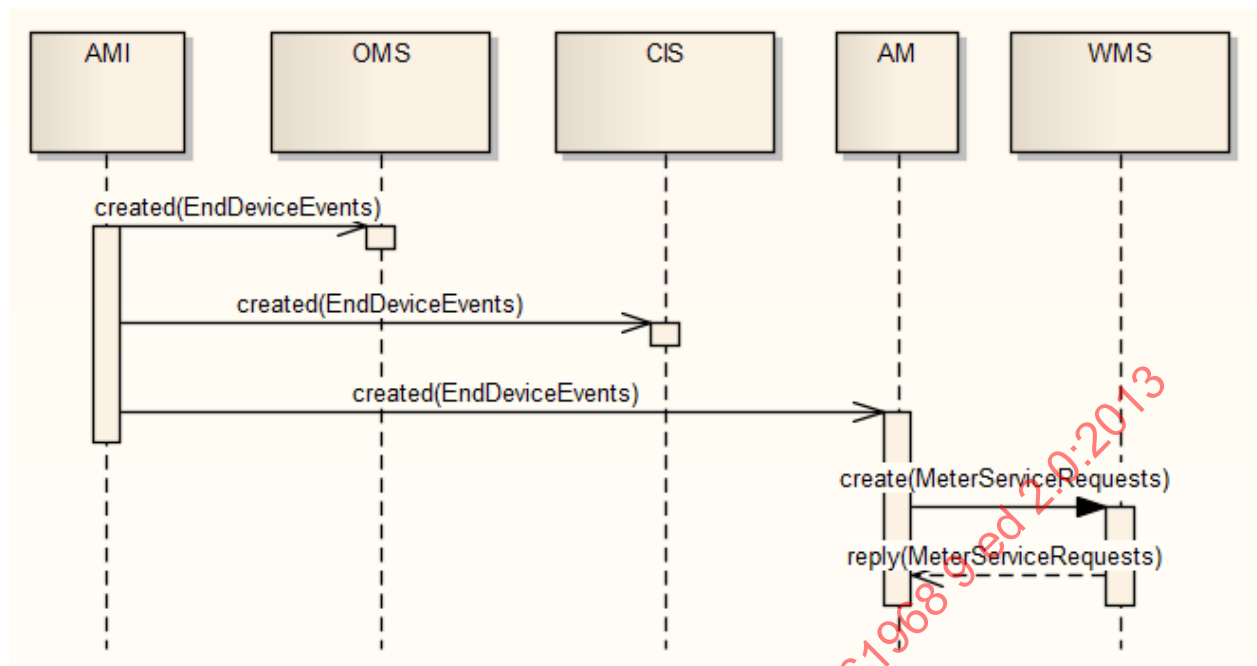


Figure 12 – Echange d'événements liés à la qualité de l'énergie, exemple 2

5.2.3 Format des messages

Les messages d'événements compteur sont mis en œuvre à l'aide de structures EndDeviceEvent afin de prendre en charge une plus vaste diversité de sources d'événements que les seuls compteurs. EndDeviceEvent.EndDeviceEventType (voir Annexe E) est une référence à une énumération qui indique le type d'événement, tel que détection d'interruption de service, santé de compteur ou qualité de l'énergie. L'horodatage et le mRID ou un nom unique du dispositif terminal sont également requis. Le format des messages est décrit à la Figure 13.

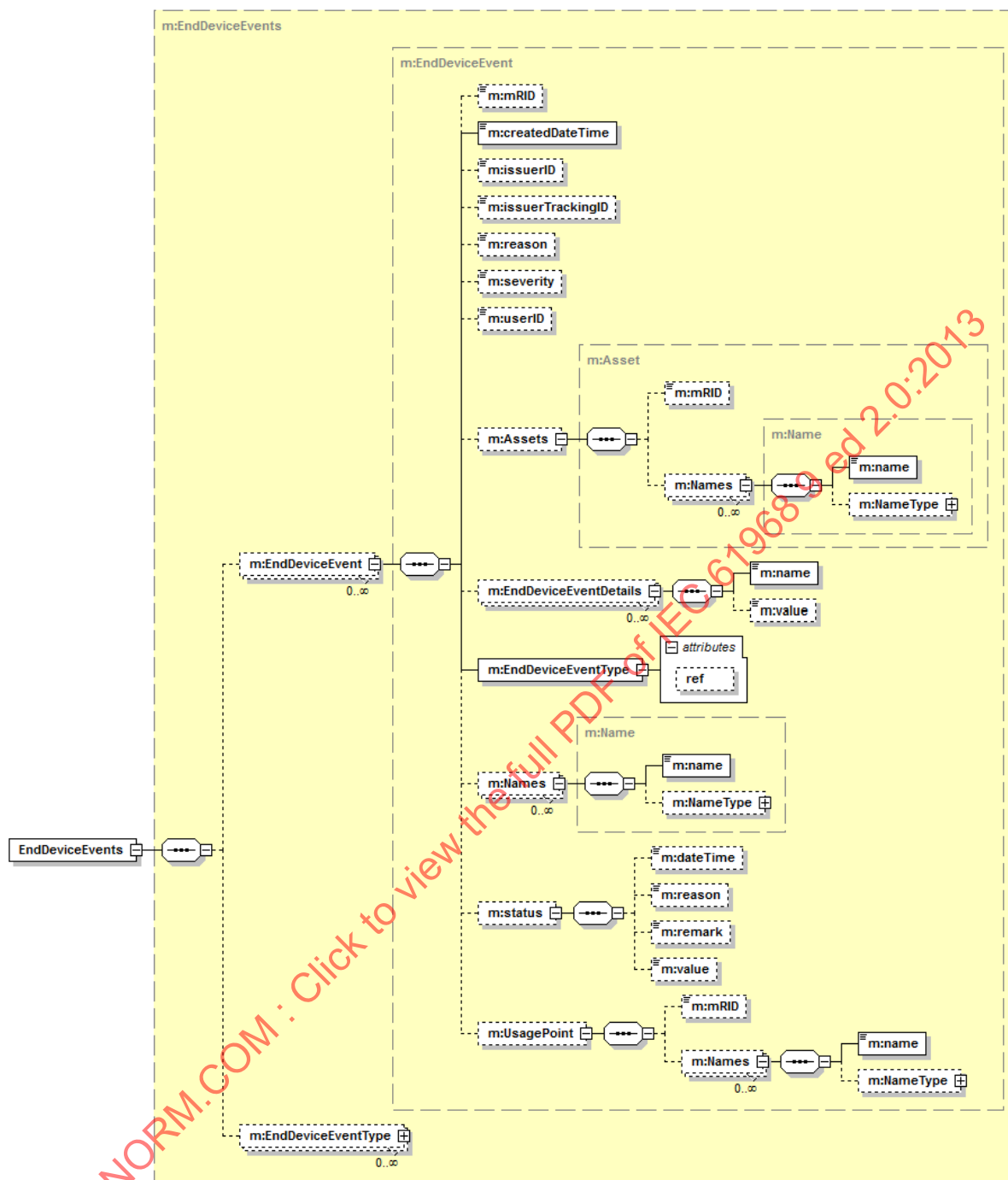


Figure 13 – Format des messages d'événements de dispositif terminal

Comme noté par la Figure 13, seuls les éléments timestamp et EndDeviceEventType sont requis, avec un mRID ou un nom unique du dispositif terminal. L'élément EndDeviceEventType permettra de différencier différents types d'événements (par exemple santé de compteur, détection d'interruption de service, etc.). Différents types d'événements permettraient à un message EndDeviceEvent d'acheminer des événements liés (y compris notamment) à:

- La détection d'interruptions prolongées de service
- La détection d'interruptions momentanées de service
- La détection de seuil basse tension
- La détection de seuil haute tension

La déformation
 La santé du compteur
 La détection de fraude
 L'événement recettes

Le schéma XML détaillé est fourni à l'Annexe H. Le XML suivant est un exemple d'EndDeviceEvent.

```
<?xml version="1.0" encoding="UTF-8"?> <end:EndDeviceEvents
xmlns:end="http://iec.ch/TC57/2011/EndDeviceEvents#" xmlns:xsi=
"http://www.w3.org/2001/XMLSchema-instance">
  <end:EndDeviceEvent>
    <end:createdDateTime>2011-11-10T21:54:53.404+01:00</end:createdDateTime>
    <end:issuerID>External System 1</end:issuerID>
    <end:issuerTrackingID>123</end:issuerTrackingID>
    <end:severity>5</end:severity>
    <end:Assets>
      <end:mRID>01f8b2e5-a677-4f2c-a6c0-1e79b409c55e</end:mRID>
      <end:Names>
        <end:name>Meter 123</end:name>
        <end:NameType>
          <end:name>Meter Name</end:name>
          <end:NameTypeAuthority>
            <end:name>Utility ABC</end:name>
          </end:NameTypeAuthority>
        </end:NameType>
      </end:Names>
    </end:Assets>
    <end:EndDeviceEventType ref="3.12.0.257"/>
  </end:EndDeviceEvent>
</end:EndDeviceEvents>
```

L'EndDeviceEvent est généré logiquement par un EndDevice et/ou un UsagePoint, l'un ou l'autre peut être identifié par mRID et/ou Name. Tout comme dans la première édition de la CEI 61968-9, un EndDeviceEvent est associé à un Asset, qui sera généralement un EndDevice.

5.3 Messages de relevé de compteur

5.3.1 Généralités

Les messages des relevés de compteur sont conçus pour pouvoir transmettre les données collectées par ou calculées pour le compte d'un compteur. Cela peut inclure les grandeurs mesurées, calculées, les informations d'état ou l'historique collecté. A chaque fois qu'un "measurement" (une mesure) est à fournir par un dispositif terminal, un échange MeterReading est vraisemblablement l'outil tout à fait approprié pour la tâche. Le dispositif terminal peut avoir une capacité de métrologie et dans ce cas, est le plus probablement appelé "compteur". Mais il existe d'autres applications potentielles pour MeterReading. Si un consommateur de données souhaite mesurer la position du commutateur sur un commutateur de branchement / débranchement, cela peut être accompli sous la forme d'un échange de MeterReading. Si un consommateur de données souhaite mesurer le statut "energisation" (c'est-à-dire alimentation en énergie ou non) du dispositif terminal, cela peut être accompli avec un échange de MeterReading ou, en variante, avec un échange d'EndDeviceEvent comme décrit en 5.2.

5.3.2 Applications

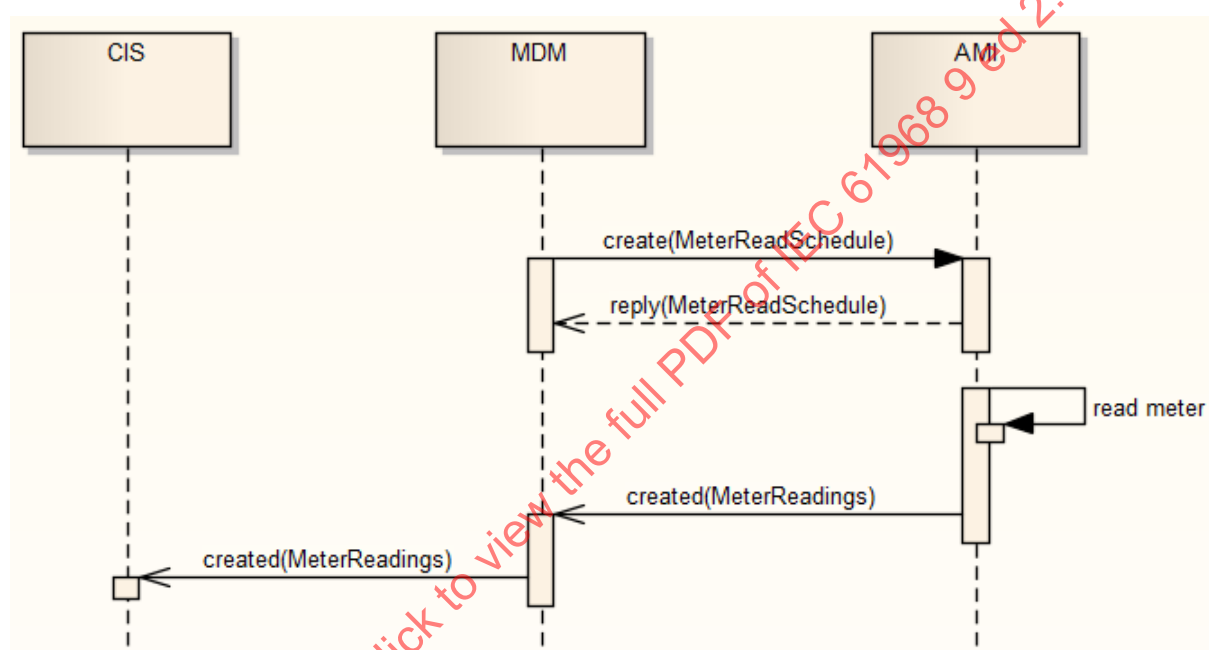
5.3.2.1 Relevés périodiques de compteur

Il est nécessaire de rassembler périodiquement les relevés de compteur d'un MS pour facturation à travers un système de facturation client. Il convient que le relevé de compteur spécifie un compteur ou un groupe de compteurs, un type de relevé à recueillir ainsi qu'une fréquence et une durée d'intérêt. La fréquence programmée peut consister en des périodes régulières ou irrégulières.

La demande de MeterReadSchedule peut être lancée vers le MS à partir d'un nombre quelconque des éléments suivants:

- Le CIS (dans un effort visant à recueillir les déterminants de facturation).
- Une application de planification et de programmation (dans un effort visant à acquérir des données techniques relatives au réseau de distribution).
- Un OMS (afin d'établir un flot d'informations de statut).
- Un système de gestion de données de compteur (dans un effort visant à relayer les données pour tout ou partie des applications ci-dessus).
- Le MS proprement dit, qui peut lancer de lui-même un MeterReadSchedule.

Un exemple d'un tel échange (celui-ci utilisant en l'occurrence une MDM) est montré à la Figure 14.



Légende

Anglais	Français
read meter	relever le compteur

Figure 14 – Exemple d'utilisation d'un programme de relevé de compteur pour créer un abonnement

Certains systèmes de comptage peuvent avoir la fonctionnalité permettant de dissocier collecte de MeterReading et compte-rendu de MeterReading. Pour les systèmes de comptage sans cette fonctionnalité, les relevés peuvent être communiqués immédiatement dès leur collecte. Dans la demande de MeterReadSchedule, des MeterReadings peuvent être demandés à l'aide d'une diversité de paramètres, y compris:

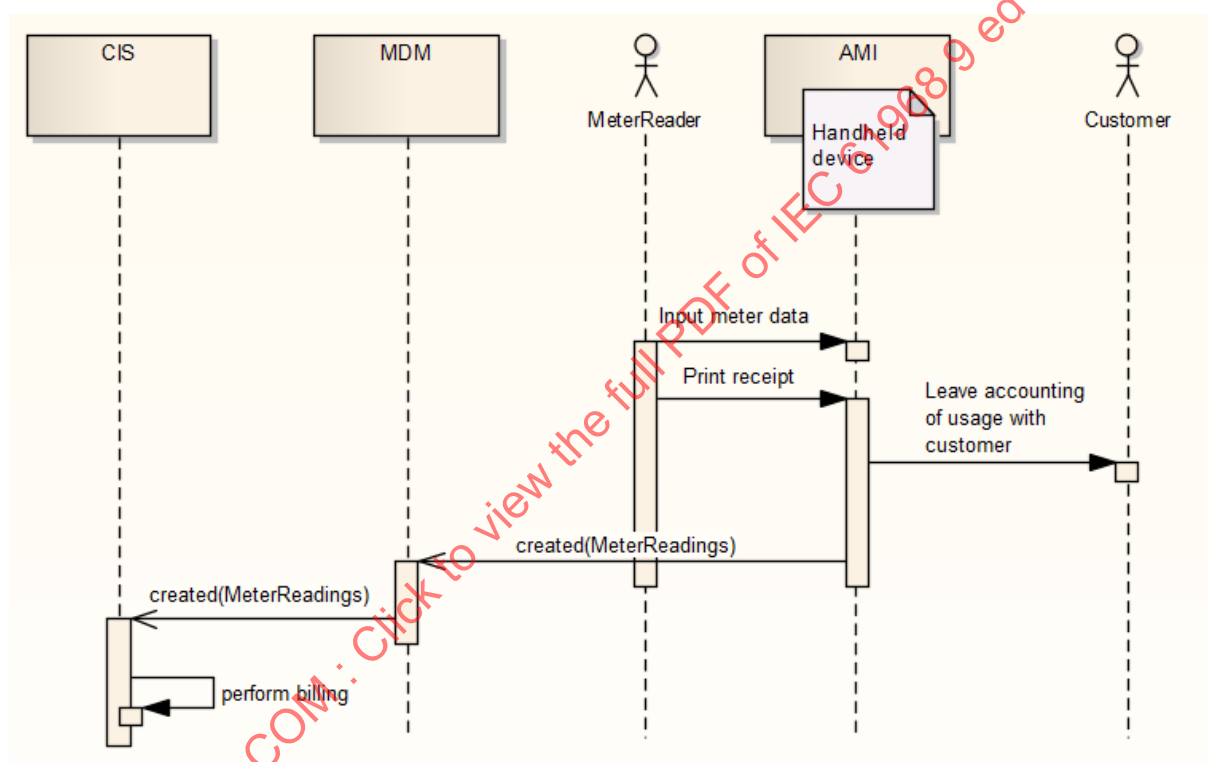
- Un compteur spécifique, en utilisant le mRID EndDevice ou Names.name (voir Annexe G pour une analyse de la classe Names)
- Des EndDeviceGroups, où un EndDeviceGroup identifie une adresse de groupe utilisée au sein du système de comptage
- Un UsagePoint où se situe un compteur, à l'aide du mRID UsagePoint ou de Names.name
- Les UsagePointGroups, où UsagePointGroup identifie un groupAddress utilisé au sein du système de comptage
- Comme indiqué lors de l'utilisation d'un TimeSchedule

- Les ReadingTypes peuvent être précisés pour identifier les types de lecture souhaités.

5.3.2.2 Relevé manuel de compteur

Les relevés de compteur peuvent être obtenus manuellement par un releveur de compteur. Les données recueillies peuvent être maintenues par le gestionnaire de données de compteur. Les compteurs peuvent collecter plusieurs types de mesure différents. Certains types de compteurs peuvent mesurer plus d'une phase ou peuvent recueillir des valeurs pour des mesures non électriques, telles que l'eau ou le gaz.

Un releveur de compteur peut entrer les données montrées sur le panneau du compteur dans un appareil portable qui pourrait être considéré comme un système de comptage. L'entrée de données peut se produire plusieurs centaines de fois par jour. Un releveur de compteur peut présenter un rapport du relevé au client. A noter que ce rapport n'est pas une facture. La facturation serait générée normalement par le CIS même dans le cas du relevé manuel. La Figure 15 montre un tel échange.



Légende

Anglais	Français
Meter Reader	Releveur de compteur
Handheld device	Appareil portable
Customer	Client
Input meter data	Entrer les données relatives au compteur
Print receipt	Imprimer une quittance
Leave accounting of usage with customer	Laisser le décompte de l'utilisation au client
perform billing	établir la facturation

Figure 15 – Exemple d'échange de relevé manuel

A la fin de la journée de travail, toutes les données stockées dans l'appareil portable sont envoyées vers la MDM via un réseau de communications. La MDM édite un message à l'attention du CIS informant de la création du MeterReading.

Les programmes pour emprunter un itinéraire de relevé manuel du compteur sont décidés bien avant d'accomplir le travail.

5.3.2.3 Relevé de compteur sur demande

Les demandes de relevé de compteur sont émises à l'attention du MS afin d'obtenir des relevés de compteur sur demande. Le MS enverra une demande aux compteurs souhaités. Celles-ci peuvent être utilisées pour des demandes de renseignements facturation, la vérification de l'étendue des interruptions de service, la vérification du rétablissement et à d'autres fins commerciales.

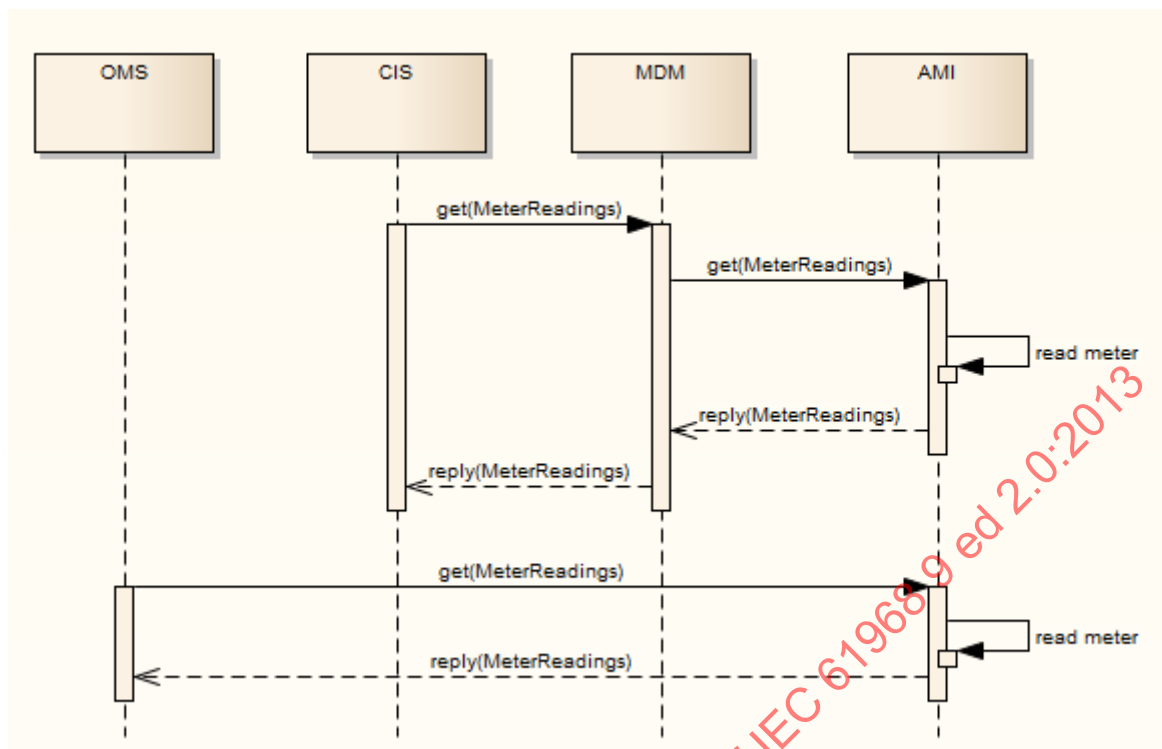
De nombreuses entreprises de distribution ont une politique qui consiste à acheminer, via la MDM, tous les relevés générateurs de recettes; ainsi, toutes les données recevront le même niveau de validation. Cependant, ce ne sont pas tous les systèmes MDM qui sont capables de proposer des services de validation pour les données relatives aux interruptions de service. Pour ceux qui en sont capables, l'entreprise de distribution doit pondérer la valeur de validation de la MDM en fonction du retard qui peut être introduit et de la capacité d'une solution OMS particulière de rejeter les données incohérentes. Pour cette raison, le diagramme exemple montre les relevés générateurs de recettes acheminés en passant par la MDM, mais les données relatives aux interruptions de service la contournent.

Il est important de noter que tous les systèmes de comptage ne prennent pas en charge les relevés "sur demande". Pour ceux qui le font, la mise en œuvre peut également varier considérablement.

Les relevés sur demande peuvent être lancés vers le MS à partir de systèmes tels que les suivants:

- Le CIS (dans un effort visant à recueillir les déterminants de facturation).
- Une application de planification et de programmation (dans un effort visant à acquérir des données techniques relatives au réseau de distribution).
- Un OMS (afin de vérifier si un client est affecté par une interruption de service ou s'il a été rétabli).
- Un système de gestion de données de compteur (dans un effort visant à relayer les données pour tout ou partie des applications ci-dessus).
- Le MS proprement dit, qui peut lancer de lui-même une lecture de compteur.

Un exemple d'un tel échange (celui-ci utilisant en l'occurrence une MDM) est montré à la Figure 16.



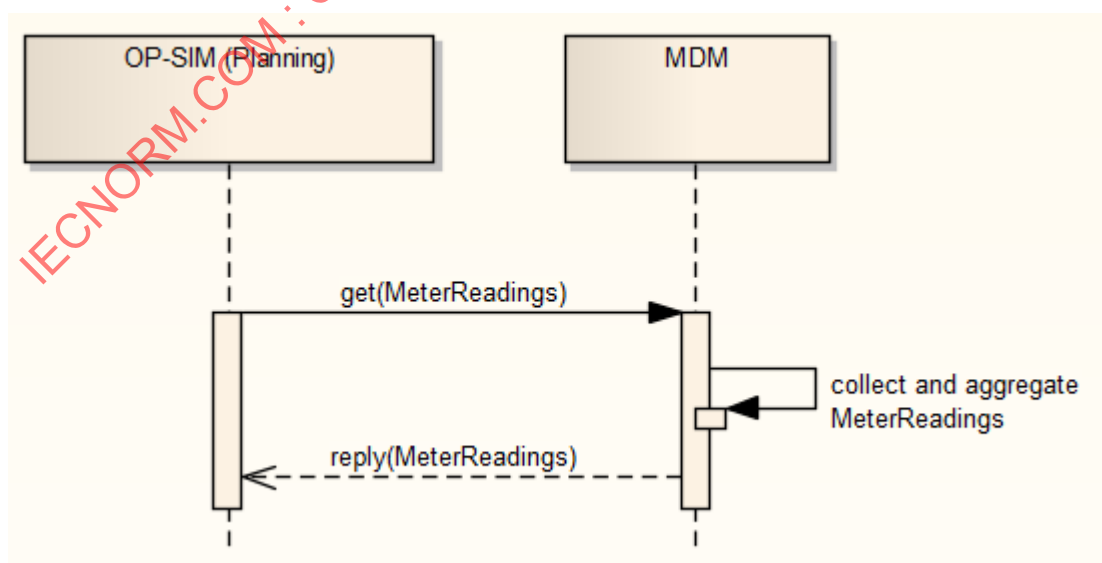
Légende

Anglais	Français
read meter	relever le compteur

Figure 16 – Exemple de relevé de compteur sur demande

5.3.2.4 Accès aux données historiques de compteur

Un planificateur de réseau de distribution peut utiliser les valeurs de relevés historiques de compteur comme informations relatives à la charge à des fins de planification de la capacité. (Voir l'exemple de demande/réponse présenté dans la Figure 17). Cela permettrait d'agréger l'usage afin de déterminer les charges pour un transformateur ou un départ.



Légende

Anglais	Français
collect and aggregate MeterReadings	collecter et rassembler les relevés du compteur

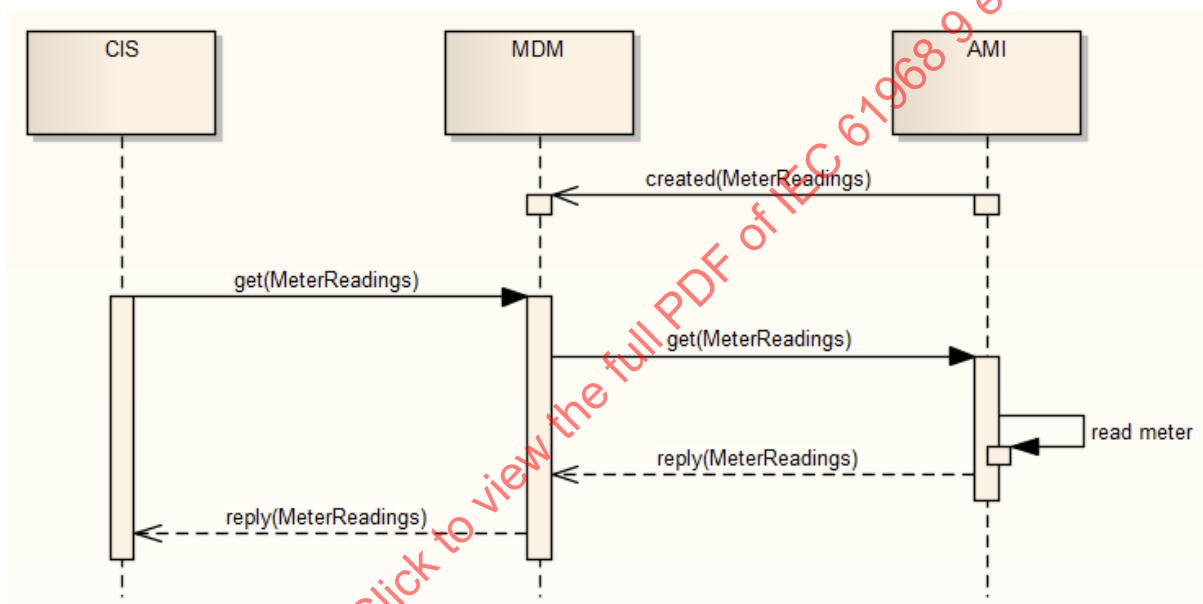
Figure 17 – Echange de MeterData d'historique

Il est important de noter l'utilisation de paramètres de demande pour qualifier les demandes de données de compteur, filtrant les résultats pour obtenir des données pour des compteurs spécifiques dans les limites de délais spécifiques.

5.3.2.5 Demande de renseignements de facturation

Un client ou une source interne peut identifier une question de facturation client. Une demande de relevé de compteur en combinaison avec des relevés historiques de compteur peut être utilisée pour résoudre le problème de facturation. Le haut de la Figure 18 montre une demande de renseignements dans le processus d'être satisfaite par des données qui sont arrivées récemment, alors que plus tard dans la journée, il est fait une demande de renseignements qui exige une lecture fraîche du compteur.

Dans certains cas, les données souhaitées peuvent être accessibles depuis la MDM. Dans d'autres cas, il peut être nécessaire d'émettre une demande de relevé, à distance par le truchement du MS ou manuellement par le biais d'une demande de service compteur.



Légende

Anglais	Français
read meter	relever le compteur

Figure 18 – Exemple d'échange de message de demande de renseignements de facturation

5.3.3 Format des messages

Le schéma XML détaillé pour les messages est décrit à l'Annexe H. La Figure 19 montre le format de message pour présenter les lectures de compteur relevées sur un ou plusieurs dispositifs terminaux.

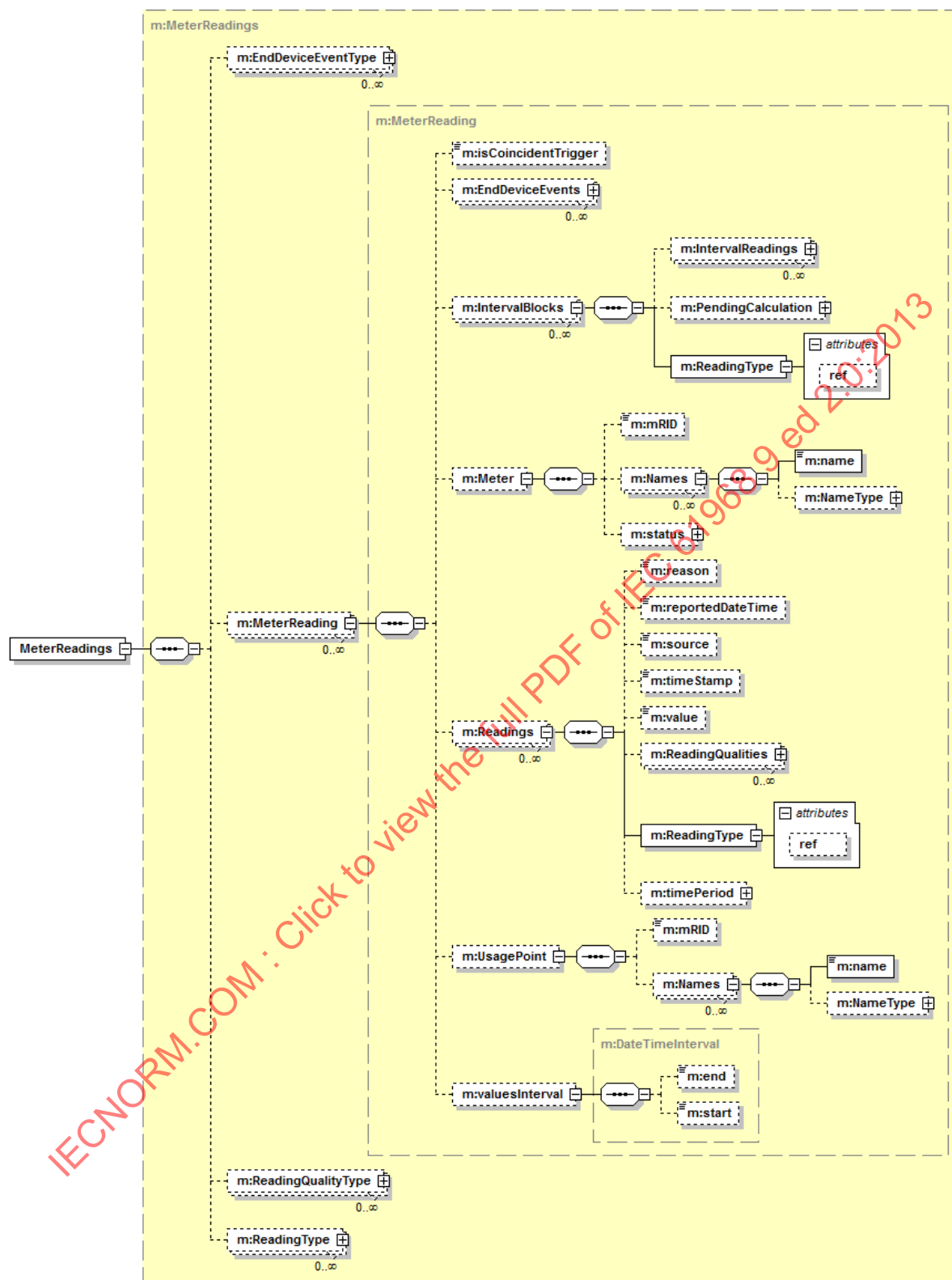


Figure 19 – Format de message pour les relevés de compteur

La structure du message pour les MeterReadings permet de prendre en compte les éléments suivants:

- les relevés provenant d'un ou plusieurs compteurs;
- les valeurs de relevé ont chacune un type de relevé, un horodatage et une valeur;

- plusieurs valeurs de qualité peuvent être associées à chaque valeur de relevé;
- les relevés peuvent être présentés sous la forme de blocs d'intervalles, où des relevés d'un même type de relevé sont groupés ensemble;
- les historiques d'événements peuvent être retournés avec les relevés de compteur.

La Figure 20 montre les détails de la structure qui transmet les relevés, où chaque relevé identifie un ReadingType spécifique (par référence), une valeur et des codes de qualité optionnels. Le timeStamp est utilisé pour identifier le moment où le relevé a été capturé. La timePeriod peut être utilisée pour identifier un intervalle de temps spécifique. Le reportedDateTime optionnel peut être utilisé pour identifier le moment où le relevé a réellement été rapporté. Le ReadingType est utilisé pour identifier la signification du relevé, le type de données de la valeur et la signification des différentes valeurs temporelles.

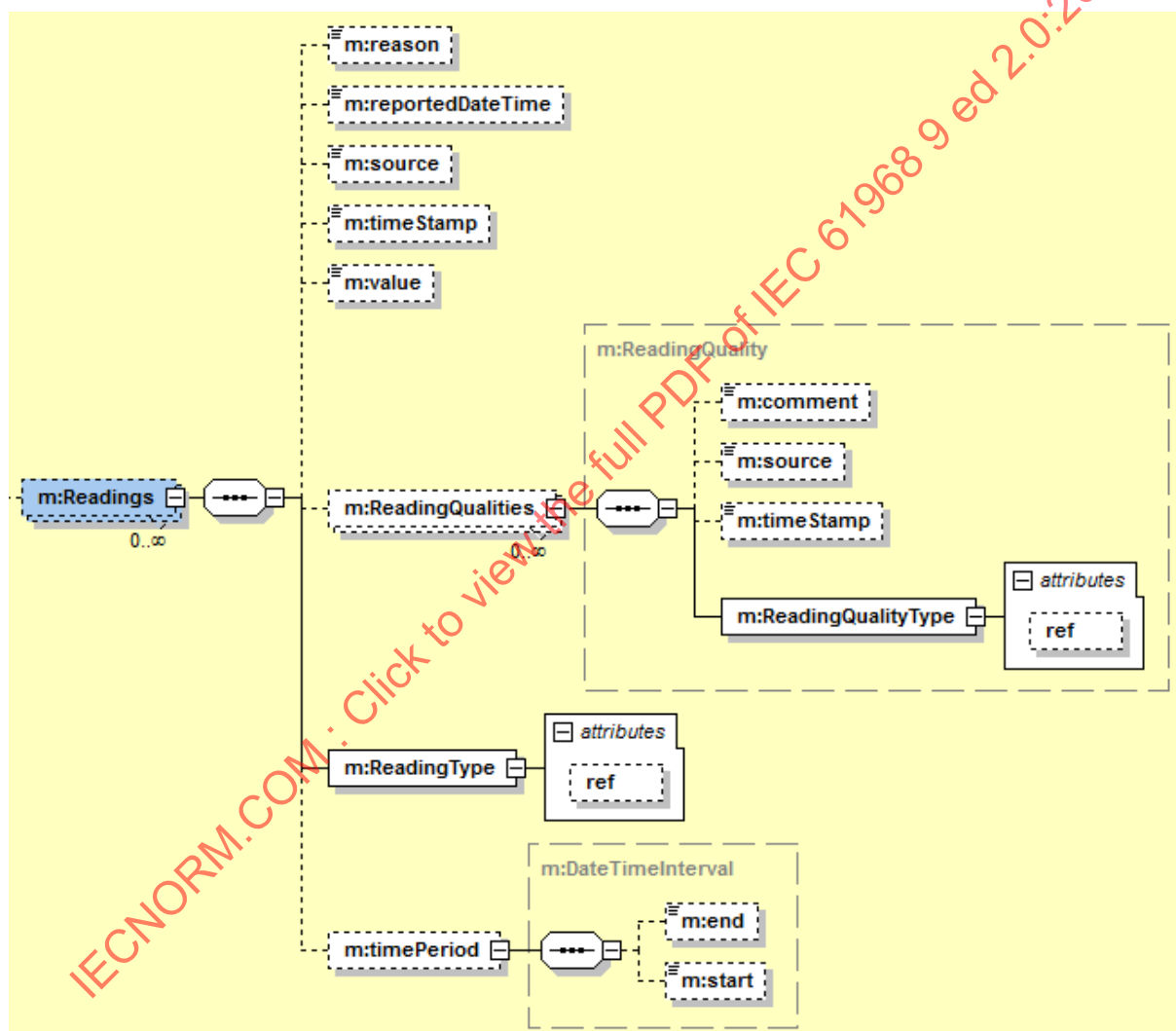
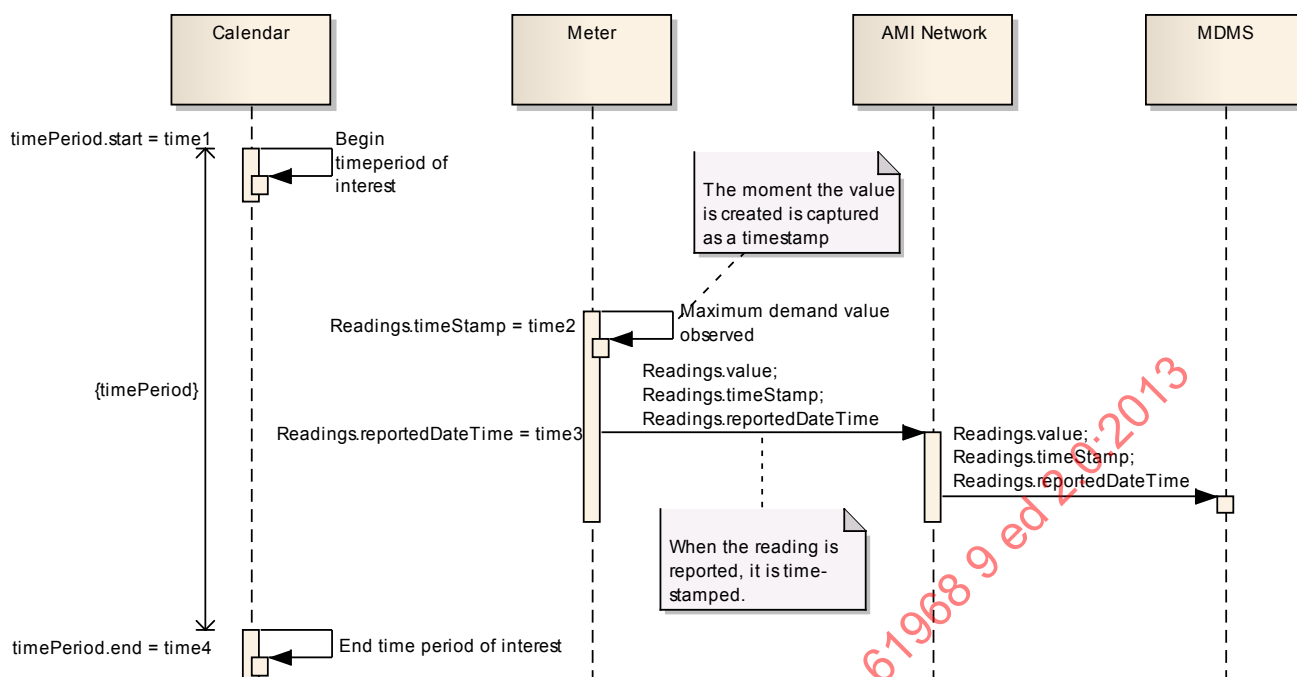


Figure 20 – Structure Reading

Dans un relevé, les attributs timeStamp et timePeriod peuvent être utilisés pour identifier les aspects temporels du relevé, avec un usage spécifique basé sur le type de relevé, dont les détails sont décrits à l'Annexe C selon les besoins. Les exemples suivants illustrent les conventions générales d'utilisation de timeStamp et timePeriod.

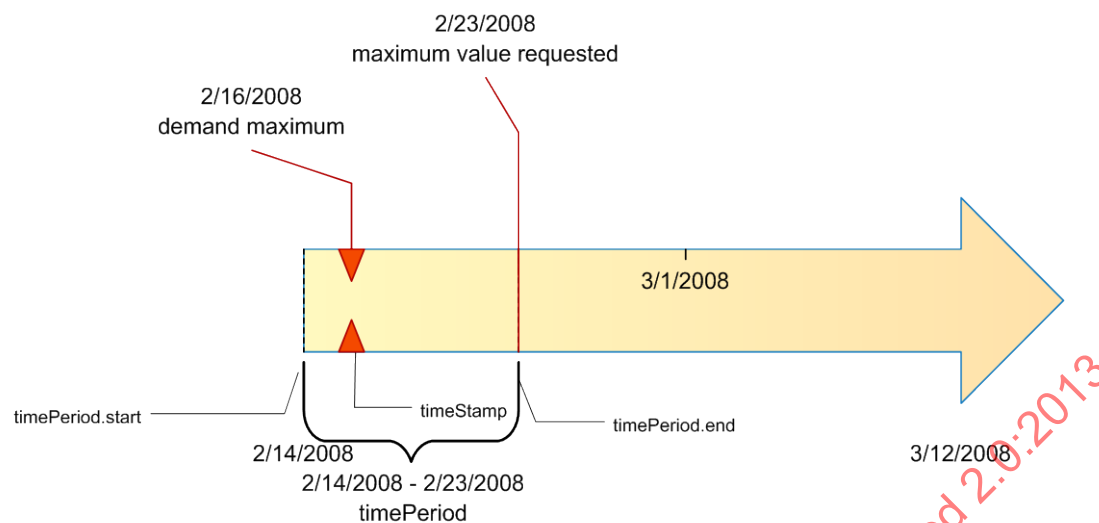


Légende

Anglais	Français
Calendar	Calendrier
Meter	Compteur
AMI Network	Réseau AMI
Begin timeperiod of interest	Début de la période étudiée
The moment the value is created is captured as a timestamp	Le moment auquel la valeur est créée est capturé sous forme d'horodatage
Maximum demand value observed	Valeur de demande maximum observée
When the reading is reported, it is timestamped.	Lorsque la lecture est relevée, elle fait l'objet d'un horodatage.

Figure 21 – Horodatages affectés entre les systèmes

La Figure 21 montre la façon dont les horodatages sont affectés et dont les valeurs sont créées et passées entre les systèmes. Du point de vue des CIS et MDMS, il existe une "timePeriod" intéressante pour (peut-être) une période de facturation. Une demande "get" pourrait préciser cette plage de temps, et l'AMI ou le MDMS "répondraient" à l'aide de relevés qui correspondent à cette plage. Les points importants dans le temps concernant la production et le compte-rendu de la valeur sont également marqués temporellement. L'ensemble de ces horodatages sont donnés dans le schéma meterReadings. Une autre vue du même exemple (avec des dates et des heures réelles) est présentée ci-dessous dans la Figure 22.



Légende

Anglais	Français
maximum value requested	valeur maximum demandée
demand maximum	maximum demandé
timeStamp	timeStamp (Horodatage)
timePeriod start	Début de timePeriod
timePeriod end	Fin de timePeriod

Figure 22 – Conventions pour timeStamp et timePeriod

La structure IntervalBlock permet de regrouper un ensemble de relevés selon un ReadingType commun et sert d'exemple pour représenter une série chronologique.

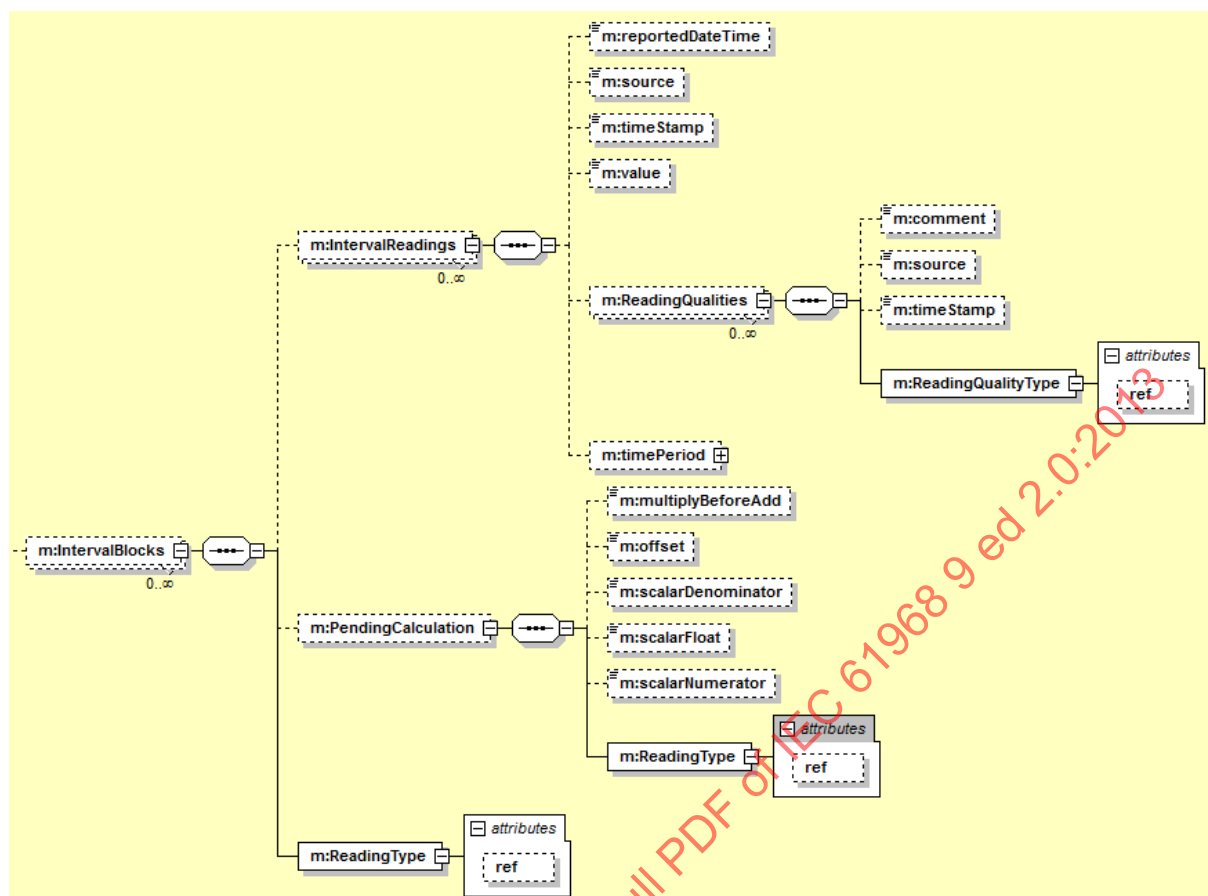
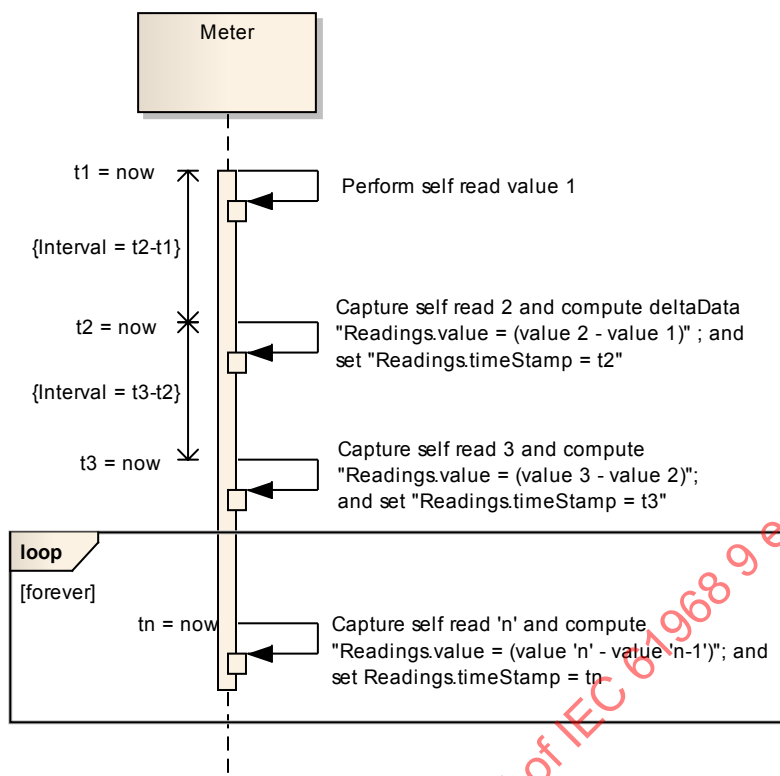


Figure 23 – Structure IntervalBlock

Le diagramme suivant montre la convention d'utilisation d'un timeStamp pour les données d'intervalles ayant un type de lecture associé qui identifie que la valeur de relevé correspond à un intervalle précis.

Les différents systèmes MR fonctionnent de diverses manières, mais aux fins de la norme, les horodatages représentent la fin de l'intervalle. Le processus de production implicite est décrit ci-après dans la Figure 24.



Légende

Anglais	Français
Meter	Compteur
t1 = now	t1 = maintenant
{Interval = t2-t1}	{Intervalle = t2-t1}
t2 = now	t2 = maintenant
{Interval = t3-t2}	{Intervalle = t3-t2}
t3 = now	t3 = maintenant
Perform self read value 1	Autorelevé de valeur 1
Capture self read 2 and compute deltaData	Capturer autorelevé 2 et calculer deltaData
"Readings.value = (value 2 – value 1)"; and	"Readings.value = (value 2 – value 1)"; et
set "Readings.timeStamp = t2"	définir "Readings.timeStamp = t2"
Capture self read 3 and compute	Capturer autorelevé 3 et calculer
"Readings.value = (value 3 – value 2)";	"Readings.value = (value 3 – value 2)";
and set "Readings.timeStamp = t3"	et définir "Readings.timeStamp = t3"
loop	boucle
tn = now	tn = maintenant
Capture self read 'n' and compute	Capturer autorelevé "n" et calculer
"Readings.value = (value 'n' – value 'n-1')"; and	"Readings.value = (value 'n' – value 'n-1')"; et
set Readings.timeStamp = tn	définir Readings.timeStamp = tn

Figure 24 – Production d'horodatages pour les données d'intervalle

Lorsqu'un horodatage est utilisé, il doit faire partie d'une plage temporelle allant de 00:00:00 à 23:59:59 telle que décrite à la Figure 25. Une valeur égale à 23:59:59 plus 1 s place l'heure à minuit, ce qui correspond au début du jour suivant.



Légende

Anglais	Français
Interval timeStamp	Intervalle d'horodatage
15-minute Interval	Intervalle de 15 minutes

Figure 25 – Conventions relatives aux intervalles de temps

A noter que conformément à l'ISO 8601, l'heure 24:00 du jour actuel est égale à 00:00 du jour suivant. Une journée commence et finit à 00:00. Il est important de noter que les données d'intervalle peuvent être transmises à l'aide des IntervalBlocks avec les IntervalReadings ou en utilisant simplement les Readings. Les IntervalBlocks doivent être utilisés lorsque les éléments PendingCalculation sont requis, sinon ils permettent simplement une empreinte XML réduite sur Readings, ce qui peut s'avérer important dans certaines situations.

La clé pour le compte-rendu d'une valeur issue d'un compteur est le type de relevé. La classe ReadingType dans le CIM est définie pour permettre la saisie des informations suivantes relatives à la description d'un type de relevé, ce qui est défini en profondeur à l'Annexe C.

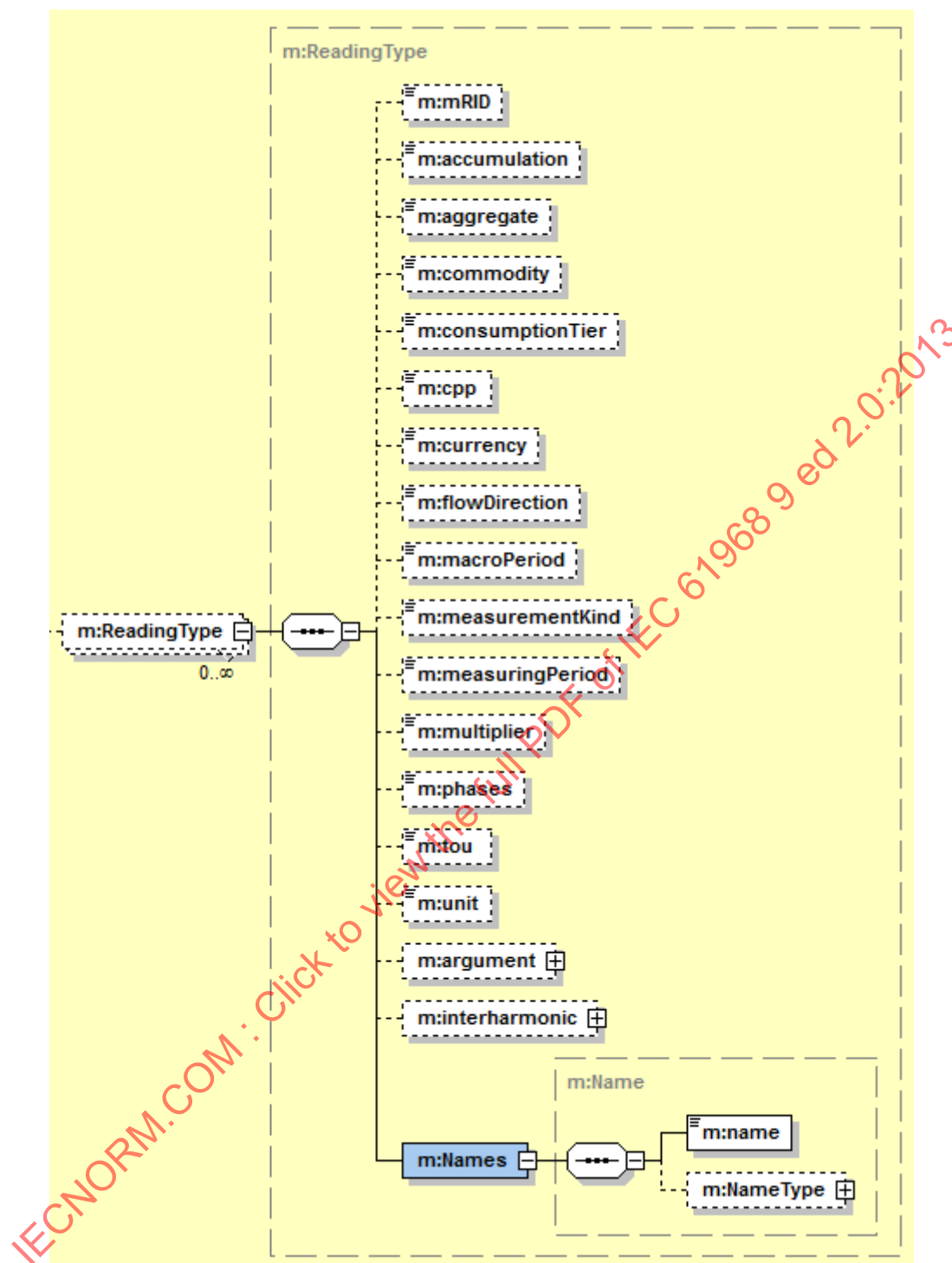


Figure 26 – Structure ReadingType

Tandis que la structure `ReadingType` est présente dans le message `MeterReadings`, il convient de prévoir que dans le cadre d'une pratique normale elle ne sera pas remplie, puisqu'il est anticipé que le système consommateur sera déjà configuré avec les définitions `ReadingType` appropriées. Les détails relatifs à cette classe et à d'autres classes spécifiques au comptage sont décrits dans le paquetage `Metering` du CIM. Un débat plus approfondi sur les types de relevé est présenté dans l'Annexe C.

Les relevés ne sont pas limités aux appareils de comptage. Tout `EndDevice` peut potentiellement produire une mesure. Dans cette édition de la CEI 61968-9, le bien produisant le relevé doit être identifié en utilisant la classe `Meter`, bien que l'appareil ne puisse pas nécessairement être un `Meter`. Il est prévu que tous les biens auront un `mRID`

unique ou un Names.name afin que les compteurs puissent être distingués par rapport aux commutateurs de branchement/débranchement à distance et par rapport à d'autres appareils. Il est convenu que future édition de la CEI 61968-9 fournira une méthode plus explicite de gestion des relevés issus d'appareils autres que les Meters.

Les données d'intervalle ont des exigences d'horodatage unique. Les fonctionnalités étendues selon l'ISO 8601 fournissent le moyen de spécifier une longueur d'intervalle formelle (telle qu'une "période" de temps selon l'ISO 8601) et aussi un point de référence fixe.

Le XML ci-après fournit certains exemples de charge utile en XML pour des messages MeterReadings.

```
<?xml version="1.0" encoding="UTF-8"?>
<mr:MeterReadings xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#">
  <mr:MeterReading>
    <mr:Meter>
      <mr:Names>
        <mr:name>63.89.98.184</mr:name>
        <mr:NameType>
          <mr:description>This is an endpoint serial number</mr:description>
          <mr:name>EndpointID</mr:name>
          <mr:NameTypeAuthority>
            <mr:description>AssetManagementSystem</mr:description>
            <mr:name>com.company.assets</mr:name>
          </mr:NameTypeAuthority>
        </mr:NameType>
      </mr:Names>
    </mr:Meter>
    <mr:Readings>
      <mr:timeStamp>2011-12-05T17:21:40.628Z</mr:timeStamp>
      <mr:value>25.633</mr:value>
      <mr:ReadingType ref = "0.0.0.1.4.1.12.0.0.0.0.0.0.0.3.72.0"/>
    </mr:Readings>
    <mr:Readings>
      <mr:timeStamp>2011-12-05T17:21:40.628Z</mr:timeStamp>
      <mr:value>10.0</mr:value>
      <mr:ReadingType ref = "0.0.0.12.1.1.37.0.0.0.0.0.0.0.3.38.0"/>
    </mr:Readings>
  </mr:MeterReading>
</mr:MeterReadings>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<mr:MeterReadings xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#">
  <mr:MeterReading>
    <mr:Meter>
      <mr:Names>
        <mr:name>63.89.98.184</mr:name>
        <mr:NameType>
          <mr:description>This is an endpoint serial number</mr:description>
          <mr:name>EndpointID</mr:name>
          <mr:NameTypeAuthority>
            <mr:description>AssetManagementSystem</mr:description>
            <mr:name>com.company.assets</mr:name>
          </mr:NameTypeAuthority>
        </mr:NameType>
      </mr:Names>
    </mr:Meter>
    <mr:IntervalBlocks>
      <mr:IntervalReadings>
        <mr:reportedDateTime>2001-12-17T09:30:47Z</mr:reportedDateTime>
        <mr:timeStamp>2001-12-17T09:30:47Z</mr:timeStamp>
        <mr:value>25.44</mr:value>
        <mr:timePeriod>
          <mr:end>2001-12-17T09:30:47Z</mr:end>
          <mr:start>2001-12-17T09:30:47Z</mr:start>
        </mr:timePeriod>
      </mr:IntervalReadings>
      <mr:ReadingType ref = "0.0.2.4.1.1.12.0.0.0.0.0.0.0.3.72.0"/>
    </mr:IntervalBlocks>
    <mr:Readings>
      <mr:timeStamp>2001-12-17T09:30:47Z</mr:timeStamp>
      <mr:value>10.0</mr:value>
      <mr:ReadingType ref = "0.0.0.12.1.1.37.0.0.0.0.0.0.0.3.38.0"/>
    </mr:Readings>
```

```

    </mr:Readings>
  </mr:MeterReading>
</mr:MeterReadings>

```

Le concept de "relevés coïncidents" mérite une certaine attention. Un relevé coïncident est un MeterReading qui survient au même instant que certains autres MeterReading ou EndDeviceEvent.

Certains compteurs ont la capacité de rapporter un relevé qui était coïncident avec un autre MeterReading ou EndDeviceEvent (ci-après dénommé "déclencheur" à la CEI 61968-9). Par exemple, il peut éventuellement enregistrer le "facteur de puissance coïncident avec la demande maximale de période de facturation."

En outre, certains processus demandent de rapporter un relevé coïncident. Par exemple, lorsqu'un compteur est installé, il est courant de capturer un "relevé initial." De même, lorsqu'un compteur est déconnecté, il est courant de capturer un "relevé final" coïncidant avec l'événement de déconnexion.

Certains systèmes peuvent réaliser des analyses de données stockées pour identifier analytiquement les relevés coïncidents dérivés. Par exemple,

- la tension de l'UsagePoint A au moment de demande quotidienne maximale sur le transformateur de distribution (UsagePointB) qui dessert UsagePoint A. (UsagePoint "B" pourrait être un UsagePoint réel ou virtuel.)
- la consommation toutes les 15 min au UsagePoint A au moment de demande quotidienne maximale sur le réseau de distribution (UsagePoint C) une chaude journée d'été.
- un relevé en kWh BulkQuantity pour un UsagePoint au moment où un EndDeviceEvent, comme un compteur, se déconnecte.

La classe MeterReading dispose d'un élément booléen optionnel appelé "isCoincidentTrigger." L'élément n'est pas à utiliser dans un message, mais si c'est le cas, des règles existent aux fins de son interprétation. Si toute instance d'un message MeterReading est marquée de l'isCoincidentTrigger booléen défini sur "vrai", tous les autres MeterReadings du même message MeterReadings sont alors considérés comme étant coïncidents avec le MeterReading marqué de la sorte. Un seul élément MeterReading au sein d'un seul message MeterReadings peut avoir son isCoincidentTrigger booléen défini sur "vrai". Si l'isCoincidentTrigger booléen est absent, il est défini comme étant "faux". Il est recommandé que le "déclencheur" MeterReading dispose d'un horodatage si ces informations sont disponibles.

Le profil GetMeterReadings peut être utilisé pour faire en sorte que MeterReadings soient coïncidents avec un MeterReading donné. Cela peut être réalisé en incluant dans le message GetMeterReadings un élément MeterReadings dans lequel le CoincidentTrigger booléen est défini sur "vrai," en d'autres termes, en spécifiant le "déclencheur" MeterReading dans les critères de filtre du GetMeterReadings.

NOTE Il est admis que de légères différences temporelles peuvent exister entre un déclencheur coïncident et le(s) relevé(s) qui sont coïncidents avec le déclencheur. Par exemple, un relevé pris conjointement au débranchement d'un compteur peut être réellement pris plusieurs secondes après l'utilisation du commutateur de débranchement. Définir la fenêtre des relevés qui seront considérés comme étant coïncidents ne relève pas du domaine d'application de la présente norme.

Dans l'exemple suivant, un système de comptage identifie une mesure du facteur de puissance qui est coïncident avec la demande maximale d'un compte donné, sans connaître la date et l'heure exactes de la demande maximale:

```

<mr:MeterReadings
  xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterReadings#MeterReadings.xsd"
  xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <mr:MeterReading>
    <mr:Meter>

```

```

    <mr:Names>
      <mr:name>Meter_XYZ</mr:name>
    </mr:Names>
  </mr:Meter>
  <mr:Readings>
    <mr:value>0.0914159</mr:value>
    <mr:ReadingType ref = "0.0.0.6.0.1.38.0.0.0.0.0.0.0.0.0.65.0"/>
    <!--indicating electricitySecondaryMetered powerFactor (cos?)-->
  </mr:Readings>
</mr:MeterReading>
<mr:MeterReading>
  <mr:isCoincidentTrigger>true</mr:isCoincidentTrigger>
  <mr:Meter>
    <mr:Names>
      <mr:name>Meter_ABCx1</mr:name>
    </mr:Names>
  </mr:Meter>
  <mr:Readings>
    <mr:ReadingType ref = "8.8.0.6.1.1.8.0.0.0.0.0.0.0.0.3.38.0"/>
    <!--billingPeriod maximum indicating forward electricitySecondaryMetered demand (kW)-->
  </mr:Readings>
</mr:MeterReading>
</mr:MeterReadings>

```

Dans l'exemple suivant, un système de comptage ou un MDMS identifie le relevé de compteur final coïncident avec le débranchement du service via DCR:

```

<mr:MeterReadings
  xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterReadings#
    MeterReadings.xsd"
  xmlns:mr = "http://iec.ch/TC57/2011/MeterReadings#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <mr:MeterReading>
    <mr:isCoincidentTrigger>true</mr:isCoincidentTrigger>
    <mr:EndDeviceEvents>
      <mr:createdDateTime>2010-12-17T09:30:47Z</mr:createdDateTime>
      <mr:reason>moveOut</mr:reason>
      <mr:EndDeviceEventType ref = "3.31.0.68"/>
      <!--ElectricityMeter RCDSwitch Disconnected -->
    </mr:EndDeviceEvents>
    <mr:Meter>
      <mr:Names>
        <mr:name>Meter1</mr:name>
      </mr:Names>
    </mr:Meter>
  </mr:MeterReading>
  <mr:MeterReading>
    <mr:Meter>
      <mr:Names>
        <mr:name>Meter1</mr:name>
      </mr:Names>
    </mr:Meter>
    <mr:Readings>
      <mr:timeStamp>2010-12-17T09:30:49Z</mr:timeStamp>
      <mr:value>123456</mr:value>
      <mr:ReadingType ref = "0.0.0.1.4.1.12.0.0.0.0.0.0.0.0.0.3.72.0"/>
      <!--billingQuantity net electricitySecondaryMetered energy (kWh)-->
    </mr:Readings>
  </mr:MeterReading>
</mr:MeterReadings>

```

Le prochain exemple montre une demande d'obtention de relevés de compteur à partir d'un système de comptage ou MDMS qui sont coïncidents avec un débranchement survenu dans un intervalle de temps précis. La demande est une invitation ouverte à envoyer tout type de données MeterReading coïncidents avec un RCDSwitch Disconnect pour un EndDevice donné (compteur). La réponse à cette demande pourrait parfaitement n'être rien de plus que l'exemple de "relevé de compteur final" fourni ci-dessus. (Si une réponse plus spécifique était souhaitée, il serait possible de filtrer uniquement le(s) ReadingType(s) désiré(s) en remplissant l'élément ReadingType dans le profil GetMeterReadings.)

```

<mr:GetMeterReadings
  xsi:schemaLocation="http://iec.ch/TC57/2011/GetMeterReadings#GetMeterReadings.xsd"
  xmlns:m="http://iec.ch/TC57/2011/GetMeterReadings#"

```

```

    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
<mr:EndDevice>
  <mr:Names>
    <mr:name>Meter1</mr:name>
  </mr:Names>
</mr:EndDevice>
<mr:MeterReadings>
  <mr:isCoincidentTrigger>true</mr:isCoincidentTrigger>
  <mr:EndDeviceEvents>
    <mr:EndDeviceEventType>
      <mr:Names>
        <mr:name>3.31.0.68</mr:name>
        <!--ElectricityMeter RCDSwitch Disconnected -->
      </mr:Names>
    </mr:EndDeviceEventType>
  </mr:EndDeviceEvents>
</mr:MeterReadings>
<mr:TimeSchedule>
  <mr:scheduleInterval>
    <mr:end>2010-12-31T23:59:59Z</mr:end>
    <mr:start>2010-12-01T00:00:00Z</mr:start>
  </mr:scheduleInterval>
</mr:TimeSchedule>
</mr:GetMeterReadings>

```

NOTE Lors de l'utilisation des horodatages comme filtres, les éléments TimeSchedule.scheduleInterval sont utilisés pour concevoir une demande de données s'inscrivant dans une certaine plage. La réponse MeterReadings peut remplir les éléments MeterReadings.MeterReading.valuesInterval afin d'identifier la plage de dates proposée dans la réponse. L'utilisateur trouvera également que les données d'intervalle (qui contiennent une série de valeurs chronologiques) n'ont pas leur place dans une discussion traitant des données coïncidentes. Un seul intervalle peut être coïncident avec un événement donné ou un autre MeterReading. Par conséquent, il paraît inapproprié de remplir une série d'éléments MeterReading.IntervalBlocks.IntervalReadings. Une seule valeur peut être présentée en tant qu'intervalle, ou bien l'unique valeur d'intervalle peut être présentée en tant que MeterReading.Readings autonome.

L'aptitude à planifier lors de l'obtention des relevés de compteur est donnée par le biais de l'utilisation d'une demande MeterReadSchedule. Ce qui suit est la structure utilisée pour la charge utile d'un message de demande MeterReadSchedule:

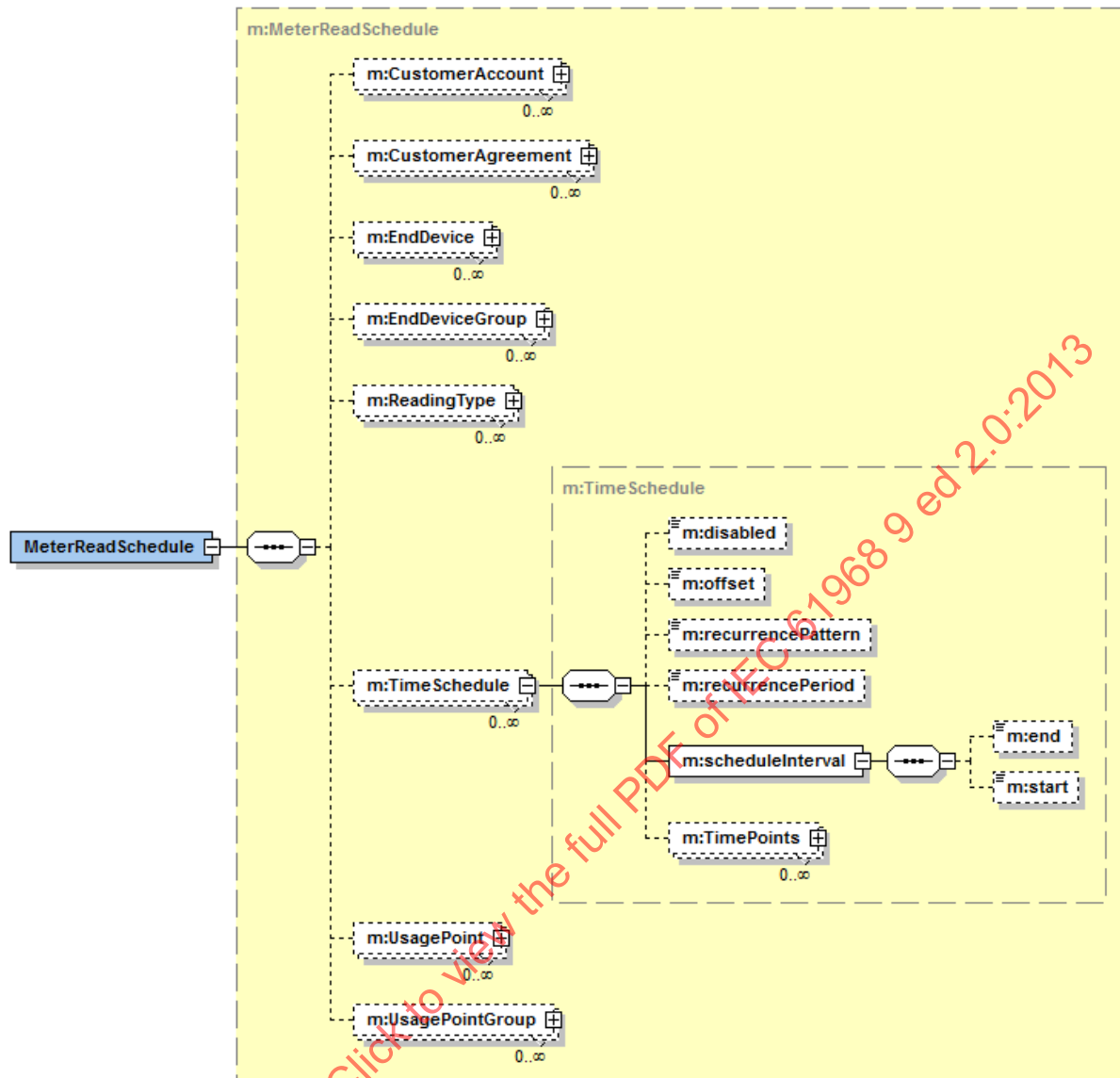


Figure 27 – Format de message pour le relevé de compteur

Plusieurs éléments dans le TimeSchedule du profil MeterReadSchedule sont uniques pour ce profil et méritent une définition spéciale. Notamment:

disabled – True (c'est-à-dire vrai) si ce programme est désactivé.

offset – Le décalage correspondant aux heures (périodiques) récurrentes dans le TimeSchedule. Chaque instant dans la série chronologique définie par scheduledInterval, et recurrencePeriod ou recurrencePattern sera décalé en ajoutant la valeur de décalage. L'utilisation de TimeSchedule.offset n'est pas applicable lorsque les TimePoints discrets sont spécifiés en lieu et place d'un recurrencePeriod ou recurrencePattern.

recurrencePattern – Intervalle auquel l'action programmée se répète, du début d'une action au début de l'action suivante (par exemple, premier lundi de chaque mois, dernier jour du mois, etc.). Utilisé lorsque l'intervalle ne peut pas être défini comme un nombre de secondes fixe entre différents instants. L'utilisation de recurrencePattern n'est pas applicable lorsque recurrencePeriod est spécifié ou lorsque les TimePoints discrets sont spécifiés en lieu et place d'un recurrencePeriod ou d'un recurrencePattern.

recurrencePeriod – Durée entre les instants, du début d'une action au début de l'action suivante. Utilisé lorsque l'intervalle peut être défini comme un nombre de secondes fixe entre différents instants. L'utilisation de recurrencePeriod n'est pas applicable lorsque recurrencePattern est spécifié ou lorsque les TimePoints discrets sont spécifiés en lieu et place d'un recurrencePeriod ou d'un RecurrencePattern.

5.4 Messages de commande de dispositif terminal

5.4.1 Généralités

Il existe de nombreux types de messages de commande de dispositifs terminaux. Ils sont utilisés pour envoyer des instructions à un ou plusieurs dispositifs terminaux. EndDeviceControls peut produire un ou plusieurs messages EndDeviceEvent consécutifs.

5.4.2 Applications

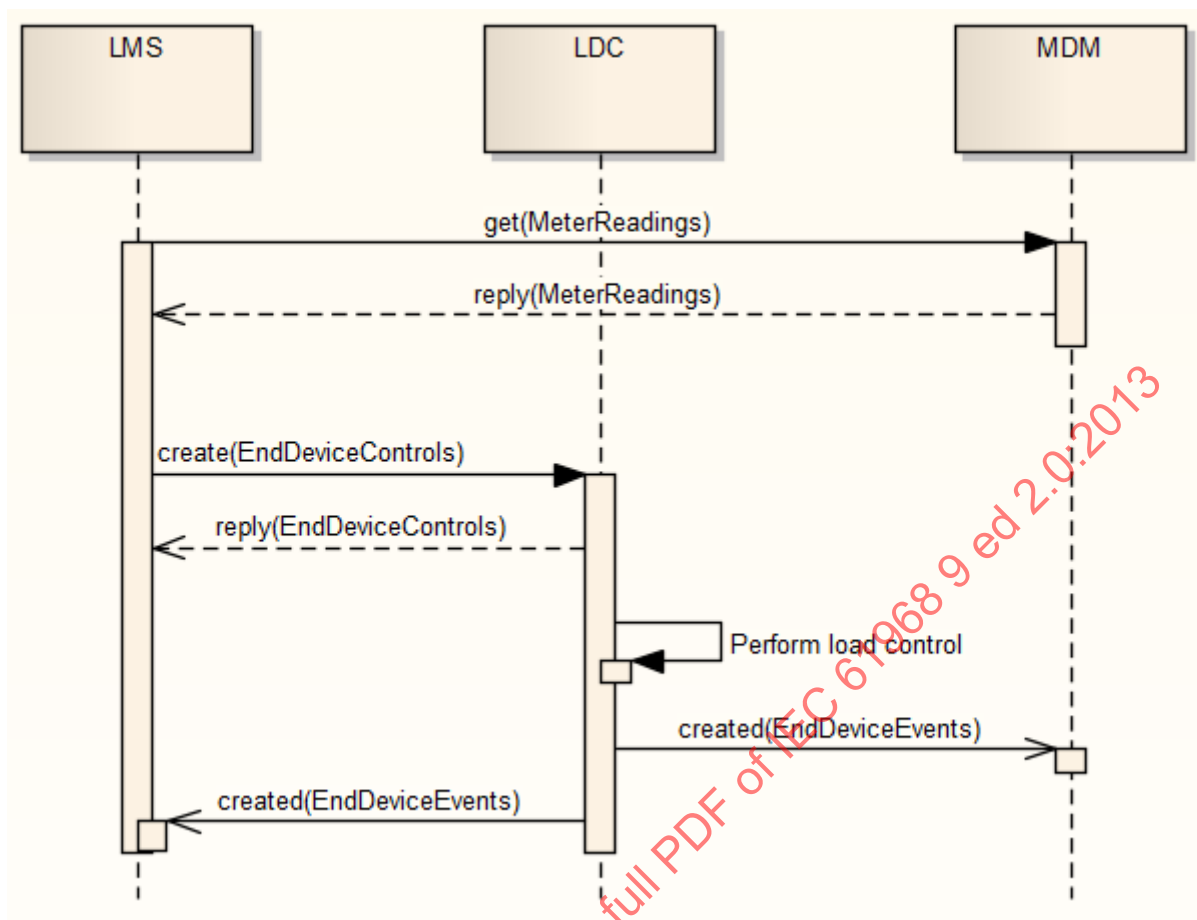
5.4.2.1 Régulation de la charge

Les demandes de régulation de la charge (également appelé régulation directe de la charge) peuvent souvent être faites à un MS à des fins de restriction des charges. Cette demande serait typiquement lancée à partir de l'exploitation du réseau. Tous les MS n'auront pas les fonctionnalités de régulation de la charge.

Il convient aussi de noter que cela diffère d'un débranchement, le débranchement donnant lieu à la perte complète de puissance pour un seul client.

Une régulation de charge se traduira typiquement par le délestage de charges spécifiquement configurées (par exemple, climatisation, pompes, etc.).

La fonction de régulation de la charge exécute des commandes de délestage de charge qui sont calculées par le logiciel de gestion de charge (contenu dans le bloc d'exploitation du réseau). Le logiciel de gestion de charge est utilisé pour calculer la quantité de charge délestée et pourrait potentiellement inclure de nombreux facteurs, notamment la durée prévue des déficits de production, les modèles d'utilisation historique, les données d'utilisation temps réel, et les conditions météorologiques.



Légende

Anglais	Français
Perform load control	Accomplir la régulation de la charge

Figure 28 – Exemple d'échange de message de régulation de charge

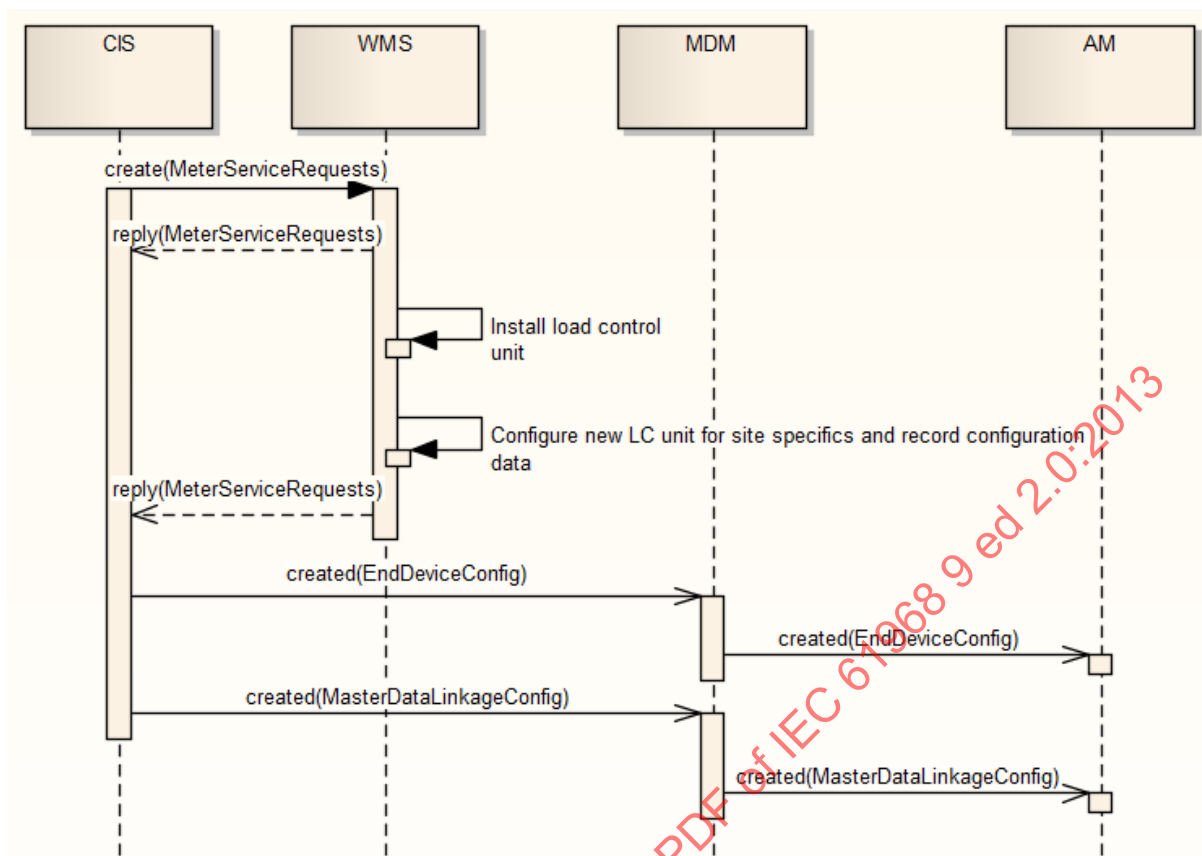
L'exemple à la Figure 28* montre comment un historique de charge peut être obtenu de la MDM sous la forme de MeterReadings et utilisé pour réaliser une analyse de charge. Il montre également des commandes de régulation de charge émises par le LMS vers le système de régulation de charge. Par contre, les déploiements qui ne prennent pas en charge une MDM interagiraient directement avec le MS.

Les commandes de régulation de charge sont mises en œuvre comme un type de EndDeviceControl, où la commande peut être traitée par EndDeviceGroup (en utilisant une adresse de groupe), par EndDevice (en utilisant le mRID) ou par CustomerAgreement.

La régulation de la charge peut également être mise en place à l'aide des appareils PAN.

5.4.2.2 Installation d'un appareil de régulation de charge

L'installation d'unités de régulation de charge utilise habituellement plus de main-d'œuvre que l'installation d'un compteur, mais les exigences relatives à l'échange de données sont plus simples. Les unités LC diffèrent des compteurs en ce sens qu'elles ne nécessitent pas de réétalonnage périodique. Une fois installée, l'unité LC restera probablement en place pendant toute sa durée de vie, même si le client se retire du programme LC ou s'il y a changement de locataire.



Légende

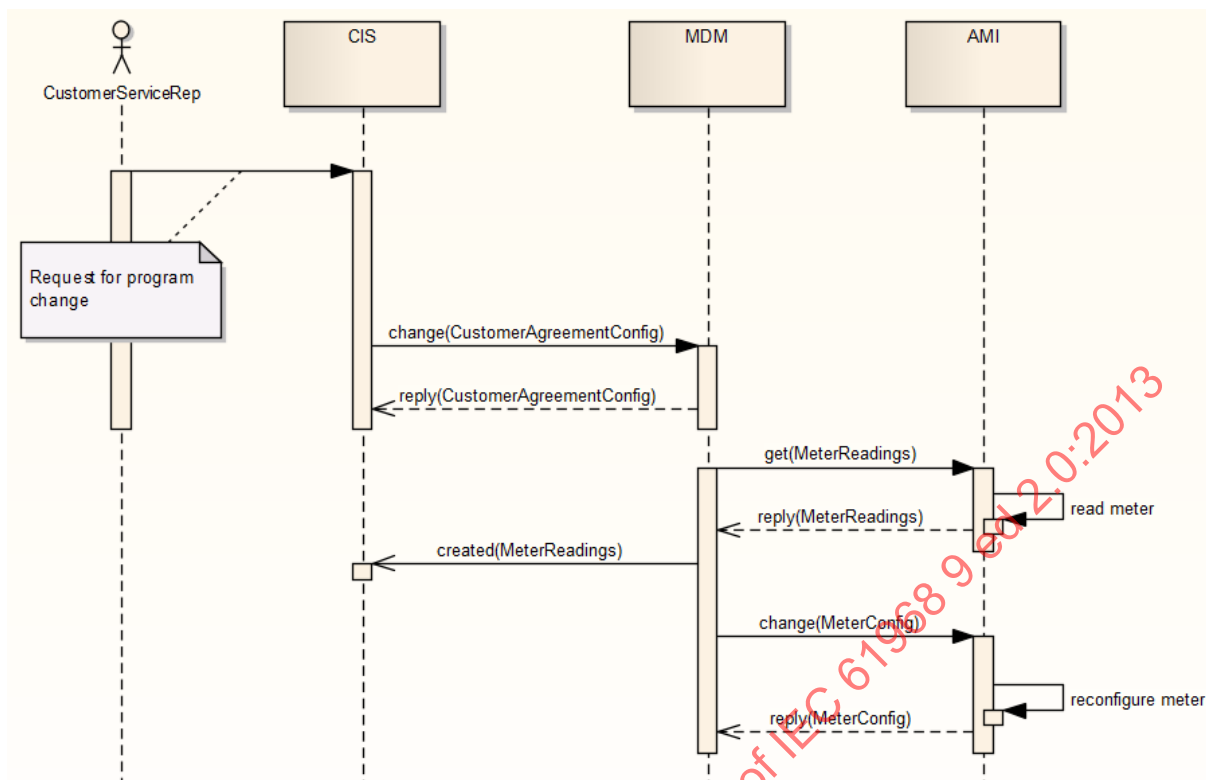
Anglais	Français
Install load control unit	Installer l'unité de régulation de la charge
Configure new LC unit for site specifics and record configuration data	Configurer la nouvelle unité de LC par rapport aux spécifications du site et enregistrer les données de configuration

Figure 29 – Exemple d'échange de message pour l'installation de l'unité de LC

Avant de se rendre à l'emplacement du service, la personne chargée de l'installation connaîtra les données du compte client, le type d'unité de régulation de charge à installer et les caractéristiques assignées de l'appareil à commander. Les données d'installation peuvent confirmer les caractéristiques nominales de l'appareil et, lorsque cela est approprié, documenter le numéro de port de l'unité LC raccordée à l'appareil. Les résultats de l'installation peuvent être publiés à l'attention de toutes les parties prenantes comme illustré à la Figure 29.

5.4.2.3 Changement de programme client

Des solutions de comptage particulières sont habituellement choisies pour satisfaire à des besoins de comptage spécifiques par suite de l'inscription des programmes client. Dans un grand nombre de cas, une solution de comptage flexible peut assurer un traitement pour une gamme de programmes client. Lorsqu'un client passe d'inscriptions à un certain programme à un autre, cela peut simplement demander un changement de configuration du compteur (ou du module de communication). Dans les cas extrêmes, cela peut exiger un remplacement du compteur. Dans d'autres cas, cela peut ne pas exiger de changement du tout. Il sera nécessaire de communiquer parmi les parties prenantes les modifications apportées à une configuration. Un exemple d'échange dans lequel le déploiement implique une MDM est décrit à la Figure 30. Un autre exemple dans lequel le déploiement manque d'une MDM est décrit à la Figure 31.

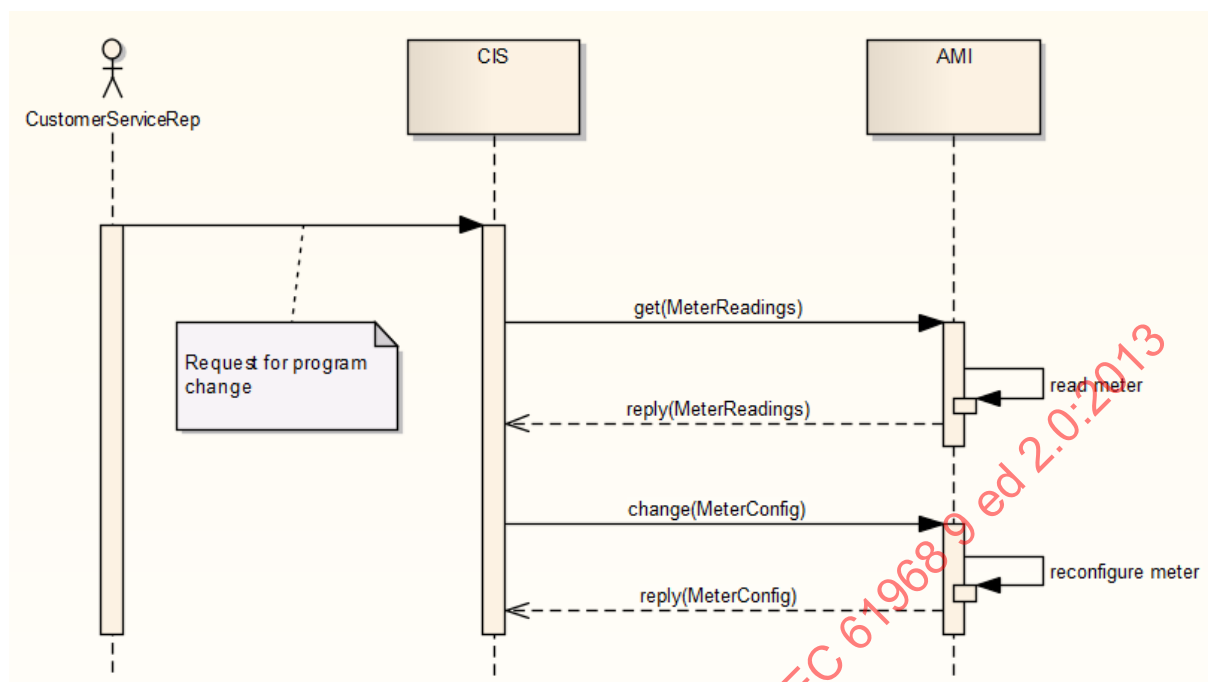


Légende

Anglais	Français
Request for program change	Demande de changement de programme
read meter	relever le compteur
reconfigure meter	reconfigurer le compteur

Figure 30 – Exemple d'échange de message en vue de changer le programme client

Les modifications apportées à la configuration du compteur peuvent être exprimées comme étant des modifications de la configuration d'un EndDevice.



Légende

Anglais	Français
Request for program change	Demande de changement de programme
read meter	relever le compteur
reconfigure meter	reconfigurer le compteur

Figure 31 – Exemple d'échange de message en vue de changer le programme client sans la MDM

Dans d'autres cas, un changement du programme client pourrait ne pas être pris en charge par une reconfiguration de compteur. Le changement du programme peut nécessiter un remplacement du compteur (se référer à 5.5 pour plus d'informations sur les remplacements de compteur.) Les remplacements de compteur impliquent un flux de travail différent de celui des reconfigurations de compteur. Cela sera reflété dans l'échange de messages entre les systèmes. Un exemple d'échange est illustré à la Figure 32.

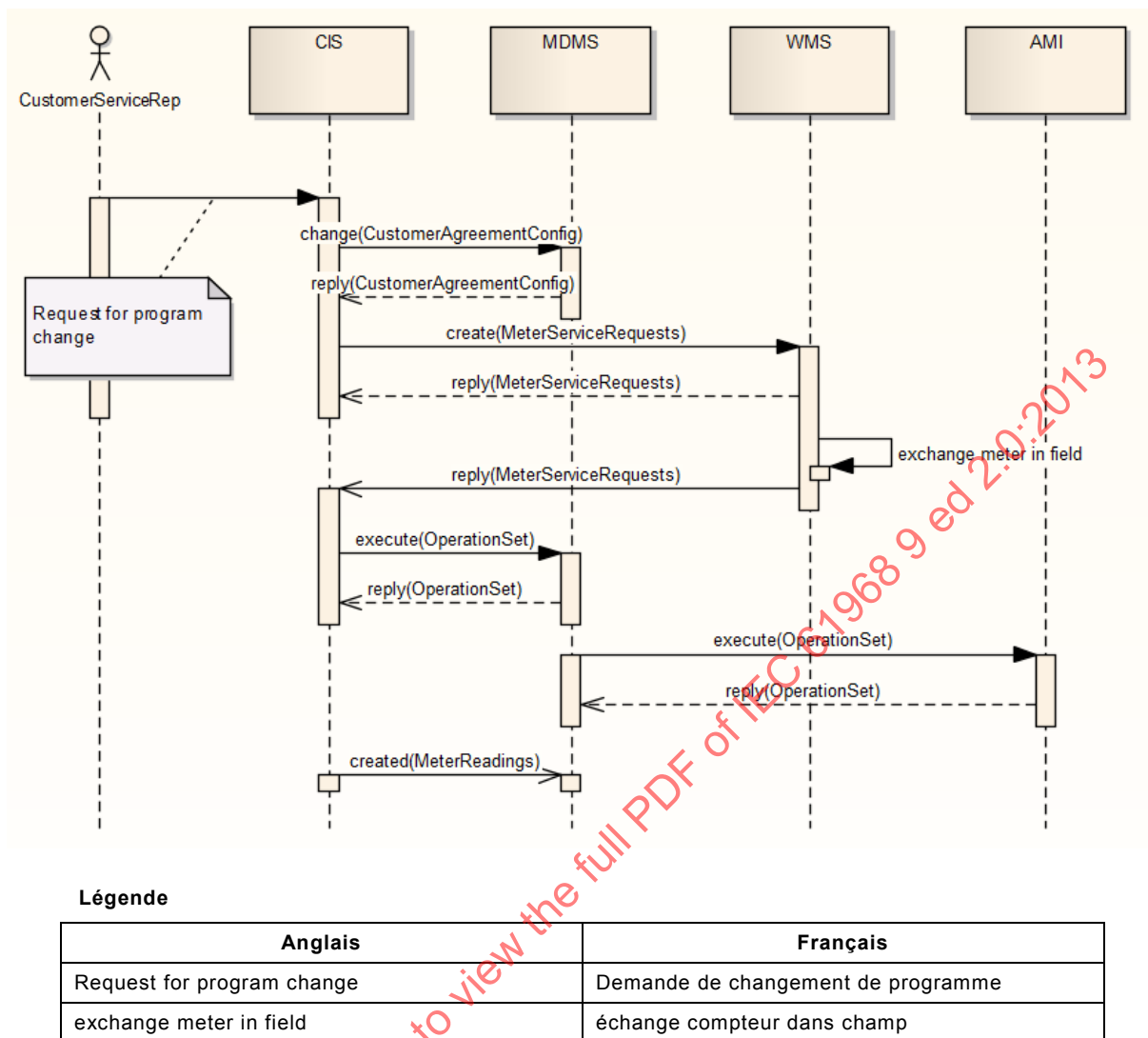
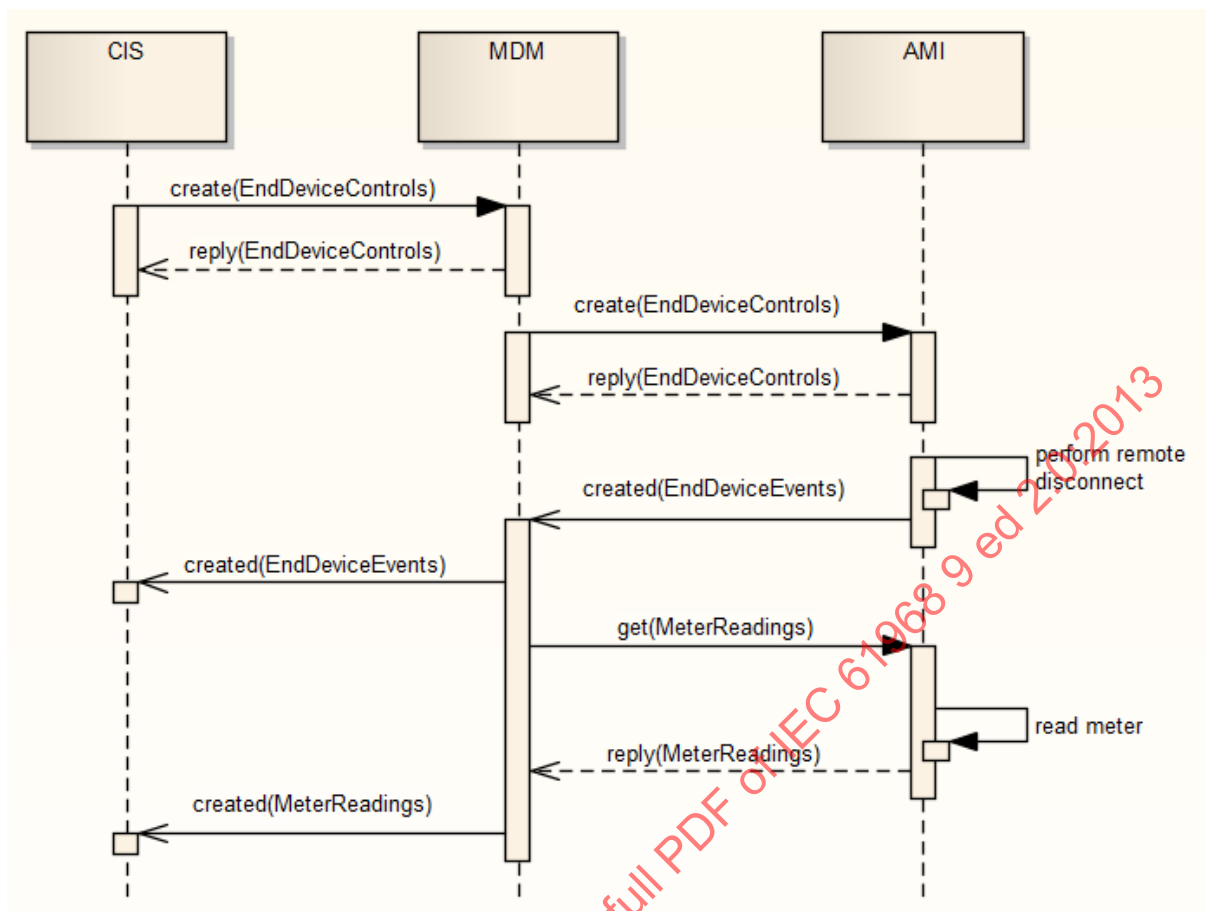


Figure 32 – Exemple de changement du programme client avec un remplacement du compteur

Voir 5.6.2 sur la pose et dépose de compteur pour des détails complémentaires concernant le message MeterServiceRequest.

5.4.2.4 Débranchement et rebranchement de compteur

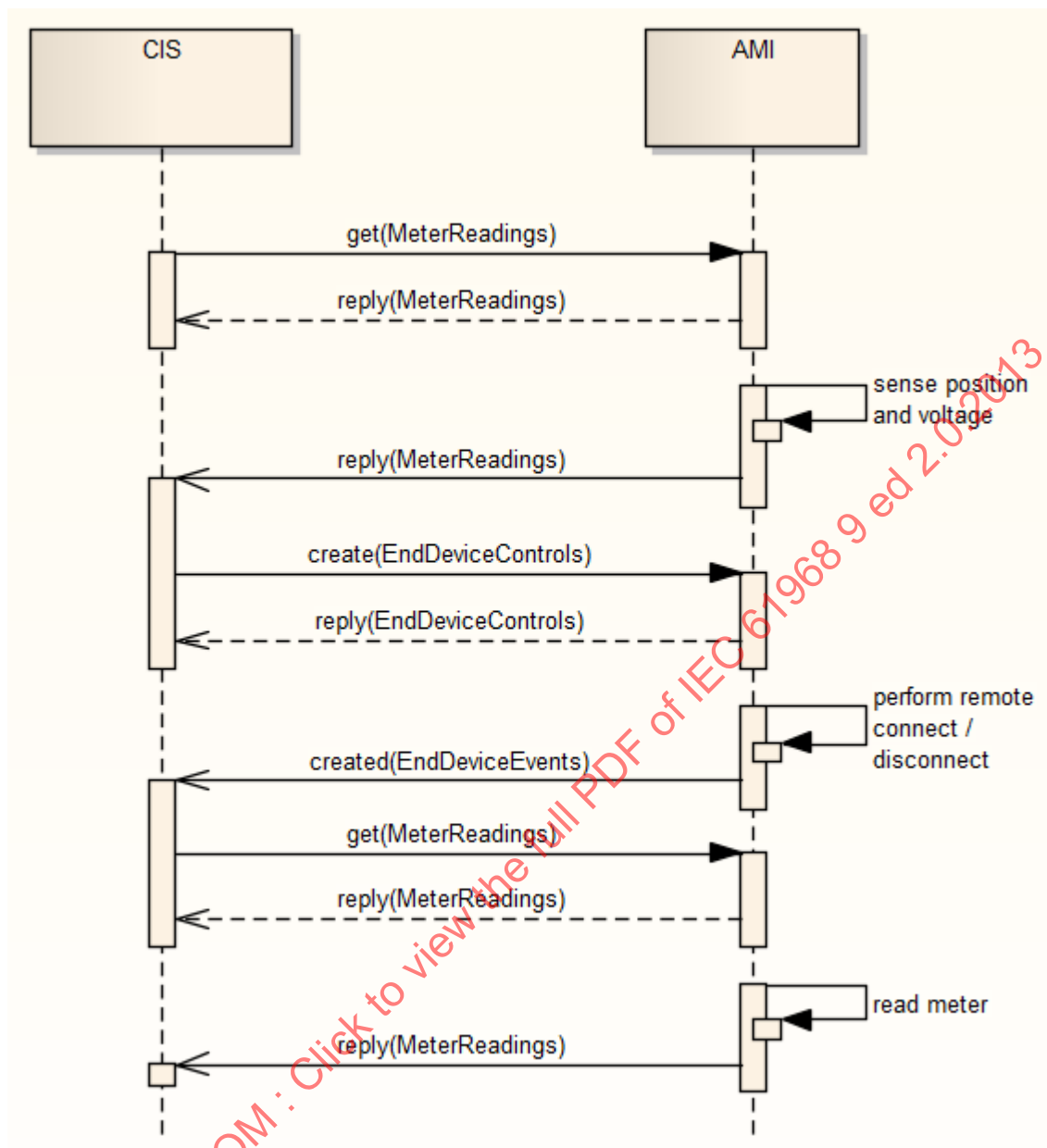
Pour diverses raisons, telles que non-paiement, il peut être nécessaire de débrancher ou rebrancher un client. Lorsqu'il est débranché, il convient que l'usage enregistré soit de zéro et il convient d'ignorer les plaintes relatives aux coupures de courant. Lorsqu'il n'est pas possible d'effectuer un débranchement ou un rebranchement à distance au moyen d'un MS, une demande de service de compteur sera typiquement produite pour effectuer manuellement le débranchement ou le rebranchement. Des exemples d'échanges de messages pour une exploitation à distance sont illustrés à la Figure 33 et à la Figure 34.



Légende

Anglais	Français
perform remote disconnect	effectuer un débranchement à distance
read meter	relever le compteur

Figure 33 – Exemple d'échange de messages pour le branchement/débranchement de compteur



Légende

Anglais	Français
Sense position and voltage	capter la position et la tension
perform remote connect / disconnect	effectuer un branchement / débranchement à distance
read meter	relever le compteur

Figure 34 – Exemple de branchement/débranchement à distance entre le CIS et le MS

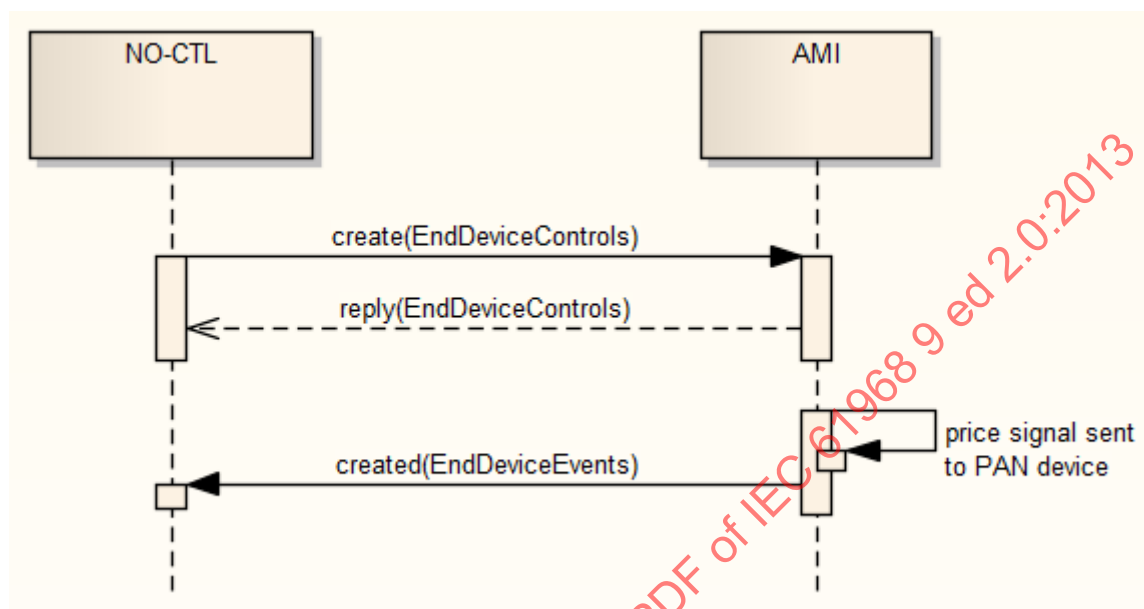
5.4.2.5 Tarification en temps réel

Les signaux et/ou bordereaux de prix peuvent être envoyés à un dispositif terminal via le MS. Cela peut se faire de plusieurs façons, telles que:

- signal de prix émis en temps réel identifiant un prix pour une durée déterminée
- programmes selon le temps d'utilisation (TOU, time of use) publiés, qui entraînent des changements dans l'accumulation pour chaque étage de TOU
- programmes de prix de l'énergie publiés à l'avance.

Souvent, l'EndDeviceGroup peut être utilisé pour différencier des compteurs avec des contrats ou des tarifs différents.

L'exemple de la Figure 35 montre un signal de prix envoyé vers le MS à partir de l'exploitation du réseau. Le MS agit alors comme un fournisseur de service réseau pour communiquer le prix en temps réel aux compteurs et autres équipements.



Légende

Anglais	Français
price signal sent to PAN device	signal de prix envoyé à l'appareil PAN

Figure 35 – Exemple d'échange de message pour le signal de prix en temps réel

Les signaux de prix sont mis en œuvre comme un sous-type d'EndDeviceControl, où le prix est un paramètre de message.

5.4.3 Format des messages

5.4.3.1 Généralités

La Figure 36 décrit la structure d'un message EndDeviceControls message. Le schéma XML du message EndDeviceControls est défini à l'Annexe H.

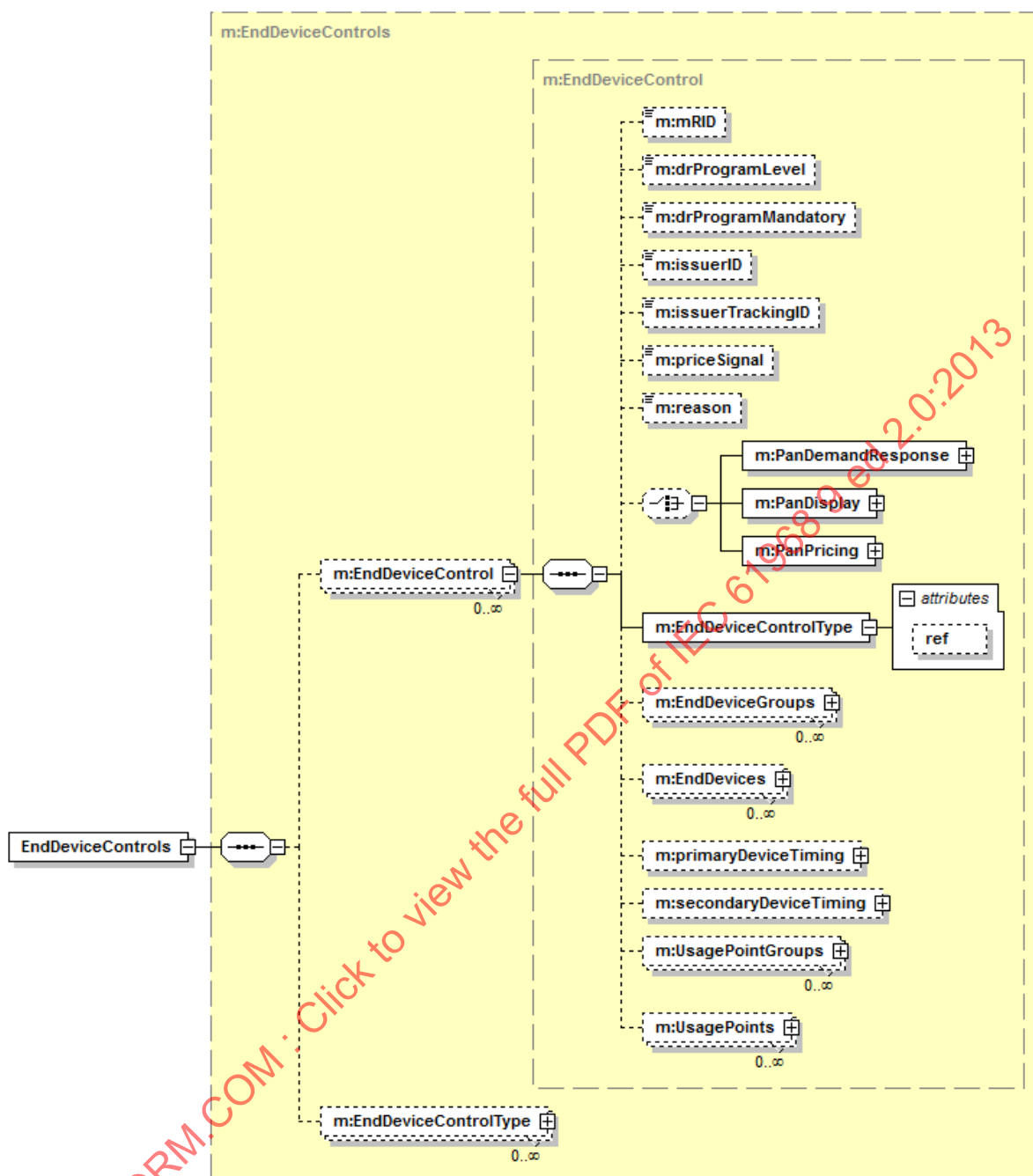


Figure 36 – Format des messages de commandes de dispositif terminal

Dans la structure de charge utile de message, des compteurs spécifiques peuvent être adressés par EndDevice (par exemple, compteur), EndDeviceGroup, UsagePoint et/ou UsagePointGroup. A part une adresse au moins, le seul élément requis est l'EndDeviceControlType, qui identifie le type de commande à exécuter. Les exemples des différents types de commandes qui pourraient être utilisés comprennent (mais de manière non exhaustive):

- signal de commande de charge
- signal ou bordereau de prix
- débranchement à distance
- rebranchement à distance
- réinitialisation de la demande

- signal de réduction de demande
- envoyer un message textuel à un appareil PAN
- envoyer des signaux de prix vers un appareil PAN
- envoyer des événements de régulation de charge / réponse à la demande à un appareil PAN

Les paragraphes 5.4.3.2 à 5.4.3.5 sont des exemples XML représentatifs des EndDeviceControls.

5.4.3.2 Exemple d'une charge utile de réinitialisation de demandes

Ce qui suit est un exemple de réinitialisation de demandes. A noter que dans le présent exemple, deux appareils sont adressés et chacun est dans son propre élément EndDevices. L'un d'eux est adressé par mRID et l'autre est adressé par Names.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:EndDeviceControls
  xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/EndDeviceControls#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:EndDeviceControlType ref = "3.8.0.214"/>
    <m:EndDevices>
      <m:mRID>3dc53ee5-777e-50b4-8699-a1c224f45f3d</m:mRID>
    </m:EndDevices>
    <m:EndDevices>
      <m:Names>
        <m:name>MeterABC</m:name>
        <m:NameType>
          <m:name>MeterID</m:name>
        </m:NameType>
      </m:Names>
    </m:EndDevices>
  </m:EndDeviceControl>
</m:EndDeviceControls>
```

5.4.3.3 Exemple de débranchement de compteur par groupe

Ce qui suit est un exemple de débranchement de compteur par groupe.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:EndDeviceControls
  xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/EndDeviceControls#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:EndDeviceControlType ref = "3.31.0.23"/>
    <m:EndDeviceGroups>
      <m:mRID>3dc53ee5-777e-50b4-8699-a1c224f45f3d</m:mRID>
    </m:EndDeviceGroups>
  </m:EndDeviceControl>
</m:EndDeviceControls>
```

5.4.3.4 Exemple de débranchement programmé par groupe

Ce qui suit est un exemple de débranchement programmé par groupe.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:EndDeviceControls
  xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/EndDeviceControls#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:EndDeviceControl>
    <m:EndDeviceControlType ref = "3.31.0.23"/>
    <m:EndDeviceGroups>
      <m:Names>
        <m:name>Disconnects in Region 123, May 2011</m:name>
        <m:NameType>
```

```

        <m:name>Regional Disconnect Group</m:name>
        <m:NameTypeAuthority>
            <m:name>Utility ABC</m:name>
        </m:NameTypeAuthority>
    </m:NameType>
</m:Names>
</m:EndDeviceGroups>
<m:primaryDeviceTiming>
    <m:interval>
        <m:start>2001-12-17T09:30:47Z</m:start>
    </m:interval>
</m:primaryDeviceTiming>
</m:EndDeviceControl>
</m:EndDeviceControls>

```

5.4.3.5 Exemple de branchement de compteur par Nom

Ce qui suit est un exemple de branchement de compteur, où le compteur est spécifié par nom.

```

<?xml version="1.0" encoding="UTF-8"?>
<!--Connect Meters by Meter Name-->
<m:EndDeviceControls
    xsi:schemaLocation = "http://iec.ch/TC57/2011/EndDeviceControls# EndDeviceControls.xsd"
    xmlns:obj = "http://iec.ch/TC57/2011/EndDeviceControls#"
    xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
    <m:EndDeviceControl>
        <m:mRID>76e7a0a3-3e33-4d21-b78f-b42227823ec7</m:mRID>
        <m:issuerID>External System 1</m:issuerID>
        <m:issuerTrackingID>123</m:issuerTrackingID>
        <m:EndDeviceControlType ref = "3.31.0.18"/>
    <m:EndDevices>
        <m:mRID>45e7a0a3-3e99-4d17-b43f-b67221212ec0</m:mRID>
        <m:Names>
            <m:name>Meter 123</m:name>
            <m:NameType>
                <m:name>Meter Name</m:name>
                <m:NameTypeAuthority>
                    <m:name>Utility ABC</m:name>
                </m:NameTypeAuthority>
            </m:NameType>
        </m:Names>
    </m:EndDevices>
    <m:EndDevices>
        <m:mRID>09e7a0a3-3e50-4d10-b40f-b40980088ec3</m:mRID>
        <m:Names>
            <m:name>Meter 456</m:name>
            <m:NameType>
                <m:name>Meter Name</m:name>
                <m:NameTypeAuthority>
                    <m:name>Utility ABC</m:name>
                </m:NameTypeAuthority>
            </m:NameType>
        </m:Names>
    </m:EndDevices>
    <m:primaryDeviceTiming>
        <m:interval>
            <m:start>2011-06-17T09:30:47.0Z</m:start>
        </m:interval>
    </m:primaryDeviceTiming>
</m:EndDeviceControl>
</m:EndDeviceControls>

```

5.5 Demande de services de compteur

5.5.1 Généralités

Les demandes de services de compteur sont une sous-classe de Work, où un EndDevice est impliqué.

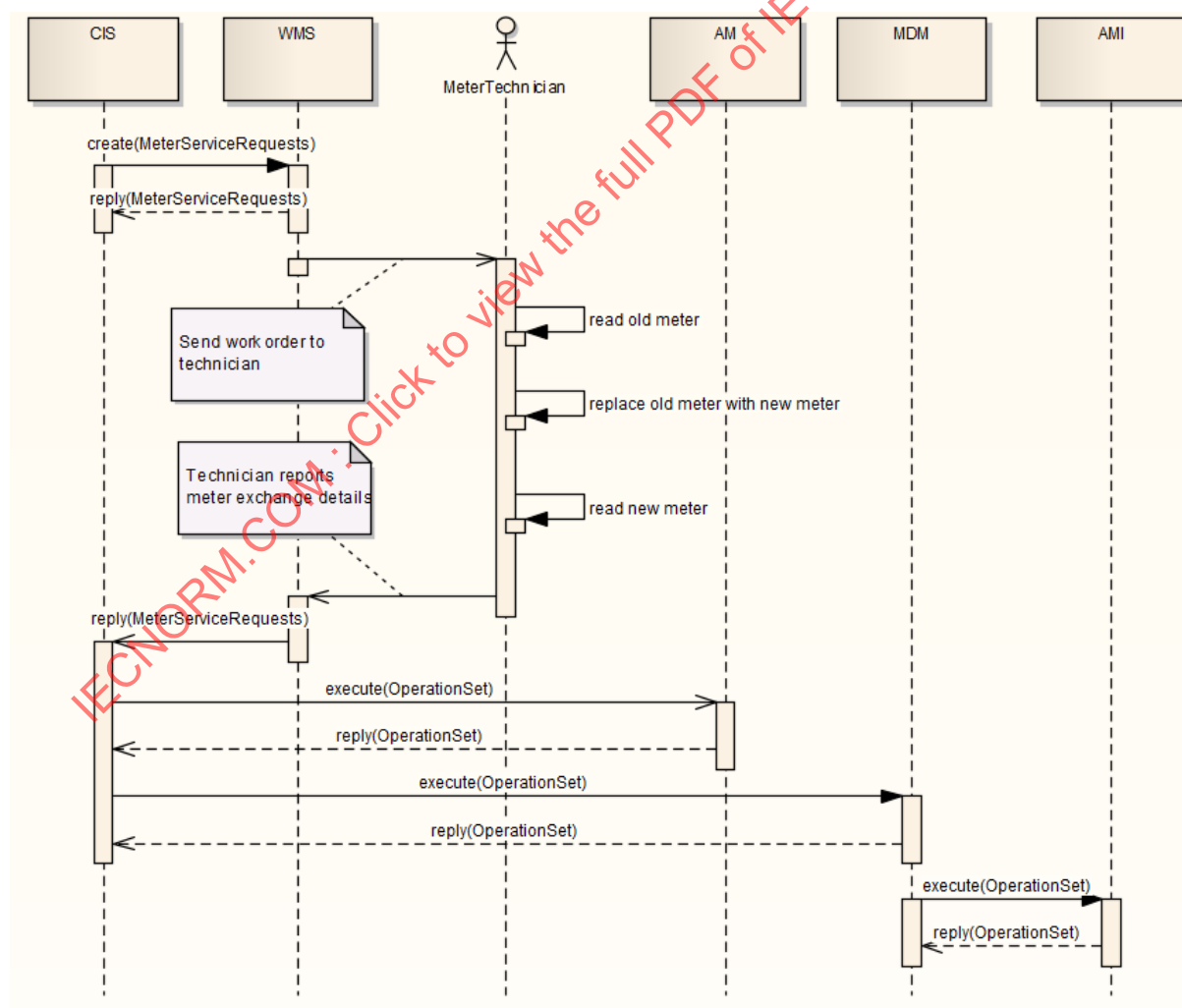
5.5.2 Applications

5.5.2.1 Pose et dépose de compteur

Il peut être nécessaire de poser, déposer ou configurer des compteurs suite à l'enregistrement d'un nouveau client, au retrait d'un client ou du passage d'un client d'un fournisseur à un autre. Il peut aussi y avoir la nécessité de remplacer un compteur qui implique la dépose de l'ancien compteur, la pose du nouveau compteur et la configuration du nouveau compteur dont a besoin le système de comptage.

Avant l'installation du compteur, des abonnements ont été établis entre le MS et la MDM pour recevoir des mises à jour des données client (pour plus de détails, voir 5.10 sur la gestion des données de référence). Le flux de travaux pour le remplacement d'un compteur est montré à la Figure 37. Cela englobe les processus de pose de compteur et de dépose de compteur.

Les étapes OperationSet sont incluses pour synchroniser les Master Data révisées (les données de configuration des compteurs neufs et anciens et les changements d'association avec l'UsagePoint) avec le système MDM et le système de comptage. Voir 5.10 et les Annexes K et L pour obtenir des informations complémentaires relatives à la gestion de données de référence.



Légende

Anglais	Français
MeterTechnician	Technicien en compteur
read old meter	relever l'ancien compteur
replace old meter with new meter	remplacer l'ancien compteur par le nouveau compteur
Send work order to technician	Envoyer un ordre d'exécution au technicien
Technician reports meter exchange details	Le technicien fait un rapport avec les détails d'échange du compteur
Read new meter	Relever le nouveau compteur

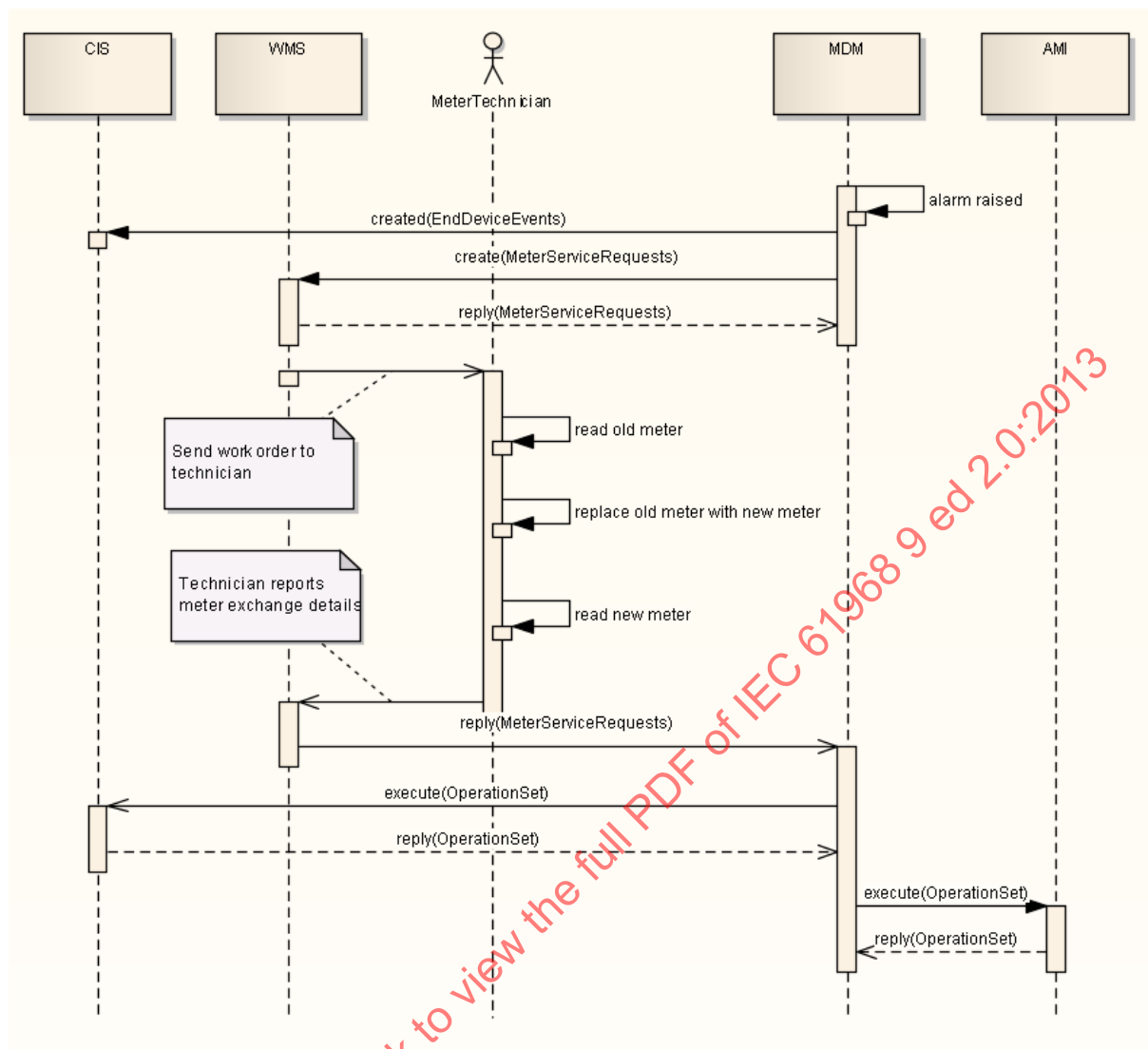
Figure 37 – Exemple d'échange de messages de pose et dépose de compteur

Le relevé initial du nouveau compteur et le relevé final de l'ancien compteur sont du type MeterReading. MeterReading contient "UsagePoint" qui est nécessaire (en plus de ServiceLocation) pour aider à identifier l'emplacement des nouveaux et anciens compteurs.

5.5.2.2 Compteur remplacé en raison d'un événement de dispositif terminal

Des EndDeviceEvents (tels que décrits en 5.2) peuvent entraîner une évaluation débouchant sur une demande de remplacement de compteur. Les événements du compteur peuvent être publiés à partir de MS ou MDM. La Figure 38 décrit un exemple d'échange où la MDM a identifié un problème et l'a porté à l'attention du WMS qui décide de remplacer le compteur.

De nouveau, les étapes OperationSet sont incluses pour synchroniser les Master Data révisées (les données de configuration des compteurs neufs et anciens et les changements d'association avec l'UsagePoint) avec le système MDM et le système de comptage. Voir 5.10 et les Annexes K et L pour obtenir des informations complémentaires relatives à la gestion de données de référence.



Légende

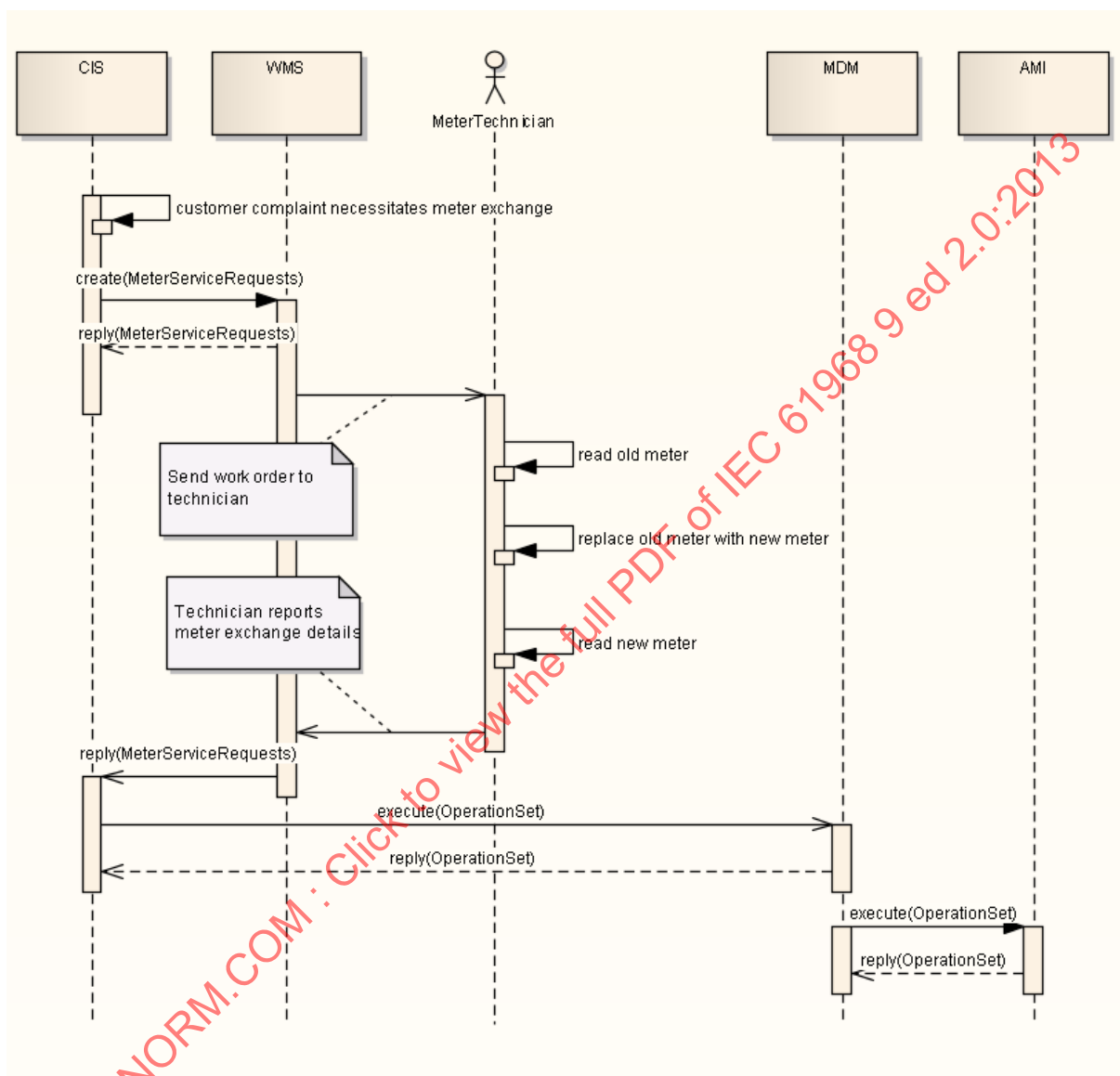
Anglais	Français
MeterTechnician	Technicien en compteur
read old meter	relever l'ancien compteur
replace old meter with new meter	remplacer l'ancien compteur par le nouveau compteur
Send work order to technician	Envoyer un ordre d'exécution au technicien
Technician reports meter exchange details	Le technicien fait un rapport avec les détails d'échange du compteur
Read new meter	Relever le nouveau compteur

Figure 38 – Exemple d'échange de messages d'événement de dispositif terminal en raison d'un changement de compteur

5.5.2.3 Compteur remplacé suite à des alarmes du CIS ou à des plaintes de client

L'analyse de données effectuée par le CIS ou les plaintes de client relatives à la facturation peuvent amener le département service clientèle à demander une visite sur site à l'emplacement du client et un possible remplacement du compteur. La Figure 39 décrit un exemple d'échange où le CIS a identifié un problème et l'a porté à l'attention du WMS qui décide de remplacer le compteur.

De nouveau, les étapes OperationSet sont incluses pour synchroniser les Master Data révisées (les données de configuration des compteurs neufs et anciens et les changements d'association avec l'UsagePoint) avec le système MDM et le système de comptage. Voir 5.10 et les Annexes K et L pour obtenir des informations complémentaires relatives à la gestion de données de référence.



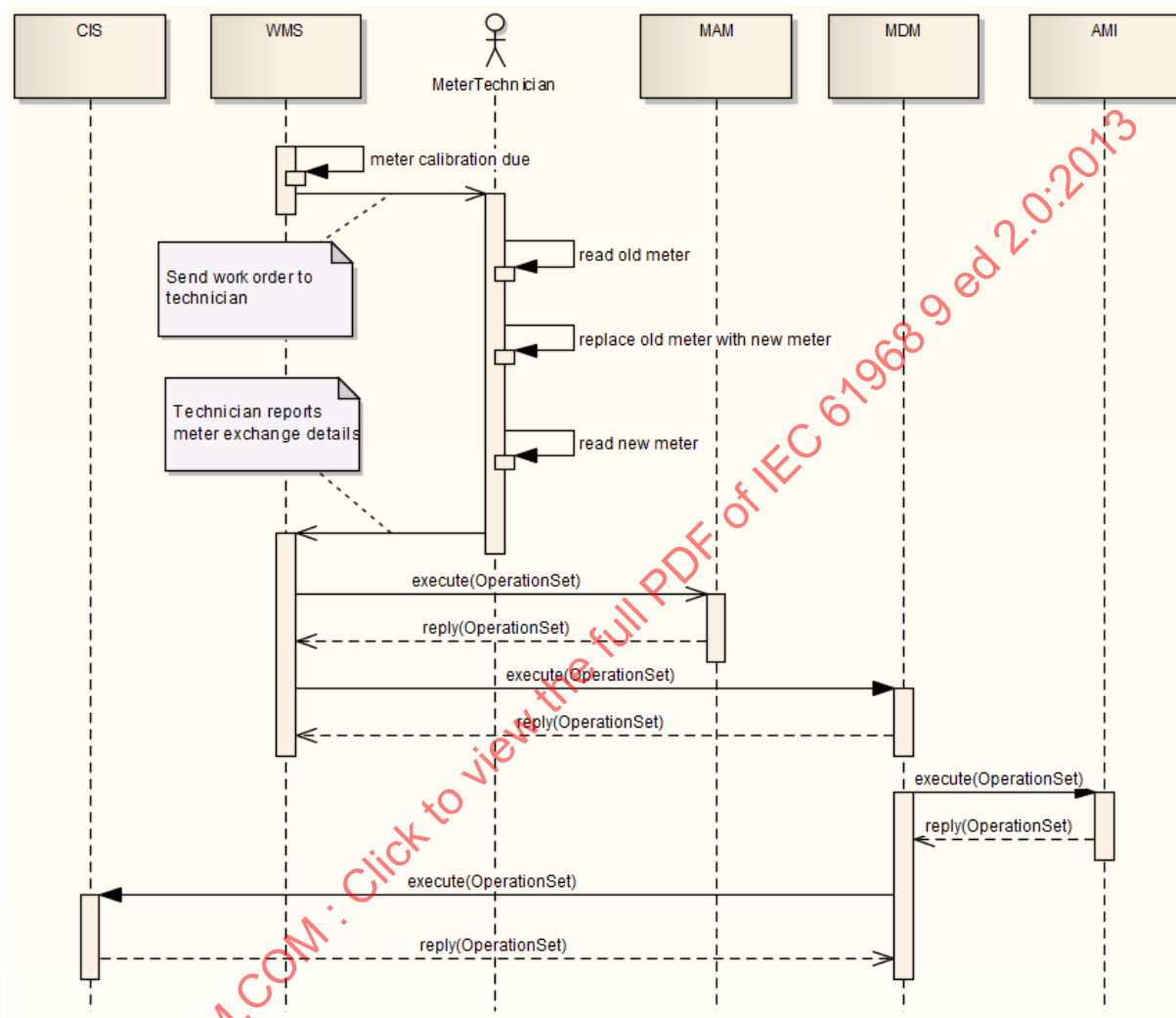
Légende

Anglais	Français
MeterTechnician	Technicien compteur
read old meter	relever l'ancien compteur
replace old meter with new meter	remplacer l'ancien compteur par le nouveau compteur
Send work order to technician	Envoyer un ordre d'exécution au technicien
Technician reports meter exchange details	Le technicien fait un rapport avec les détails d'échange du compteur
Read new meter	Relever le nouveau compteur

Figure 39 – Exemple d'échange de messages suite à des alarmes du CIS

5.5.2.4 Remplacement de compteur pour réétalonnage

Le WMS ou d'autres systèmes d'entreprise tels que le système AM peut suivre le moment où le réétalonnage du compteur est échu et remplacer le compteur. Certaines entreprises de distribution peuvent considérer le remplacement réel du compteur comme étant un problème relevant du WMS comme illustré à la Figure 40, alors que d'autres le traitent comme un problème relevant du MS.



Légende

Anglais	Français
MeterTechnician	Technicien compteur
Meter calibration due	Étalonnage du compteur échu
read old meter	relever l'ancien compteur
replace old meter with new meter	remplacer l'ancien compteur par le nouveau compteur
Send work order to technician	Envoyer un ordre d'exécution au technicien
Technician reports meter exchange details	Le technicien fait un rapport avec les détails d'échange du compteur
Read new meter	Relever le nouveau compteur

Figure 40 – Exemple d'échange de message lorsque le compteur est remplacé pour réétalonnage

Les étapes OperationSet sont incluses pour synchroniser les Master Data révisées (les données de configuration des compteurs neufs et anciens et les changements d'association avec l'UsagePoint) avec le système MDM et le système de comptage. Voir 5.10 et les Annexes K et L pour obtenir des informations complémentaires relatives à la gestion de données de référence.

5.5.3 Format des messages

La structure de charge utile de message ci-après décrit les MeterServiceRequests. Elle peut être utilisée pour zéro, un ou plusieurs objets MeterServiceWork.

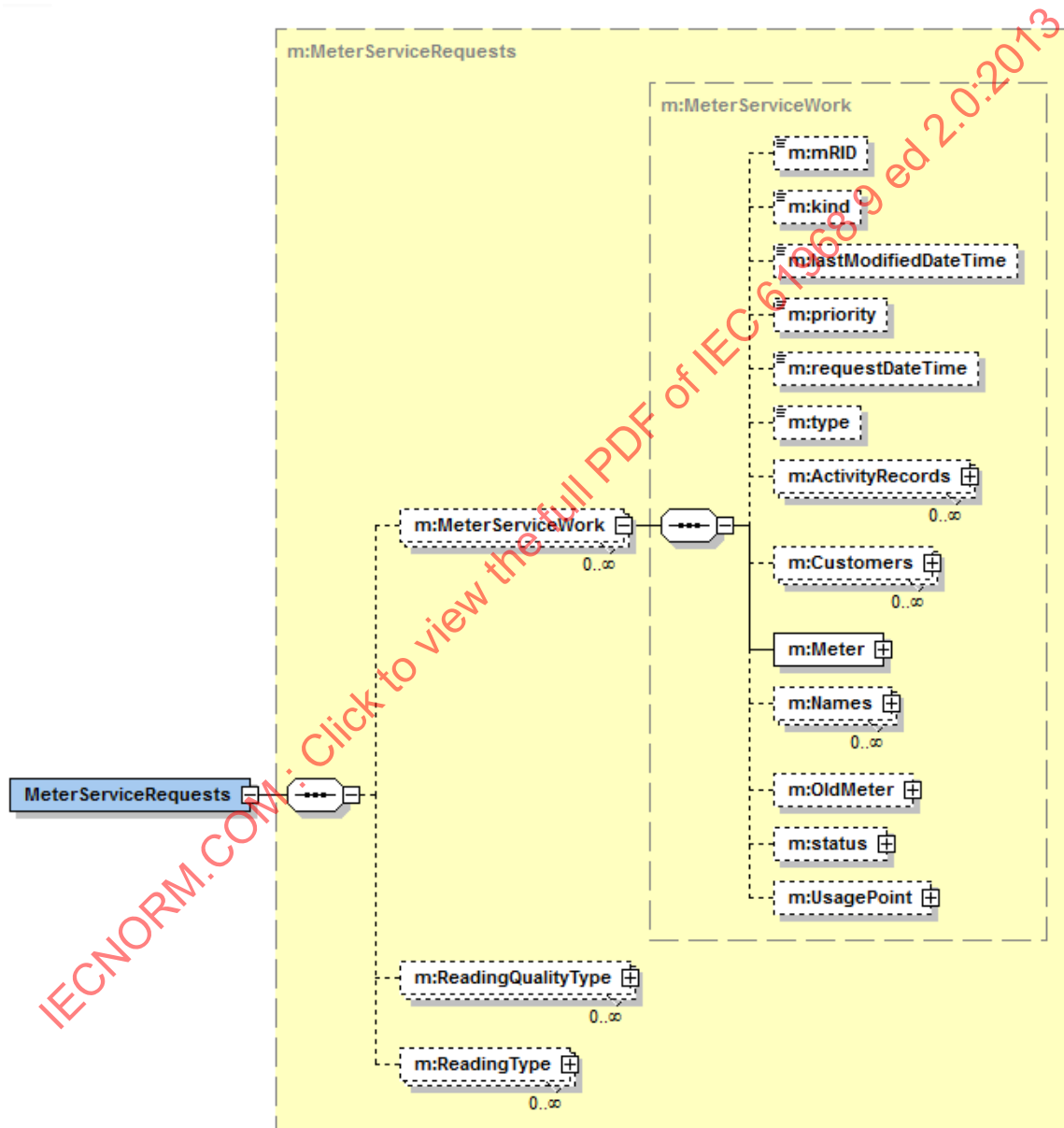


Figure 41 – Format de message de demandes de service de compteur

Le message peut inclure plus d'un élément MeterServiceWork. Chaque élément peut se référer à deux compteurs au maximum pour fournir le moyen de remplacer un compteur. Des relevés de compteur peuvent être obtenus comme partie du travail. Dans le cas du remplacement d'un compteur, des relevés de l'ancien compteur peuvent être obtenus ainsi que des relevés initiaux pour le nouveau compteur. Les références des emplacements peuvent être fournies comme partie des données client ou pour le bien compteur, selon le travail en cours. Le schéma XML annoté détaillé est défini à l'Annexe I.

5.6 Événements relatifs au système de comptage

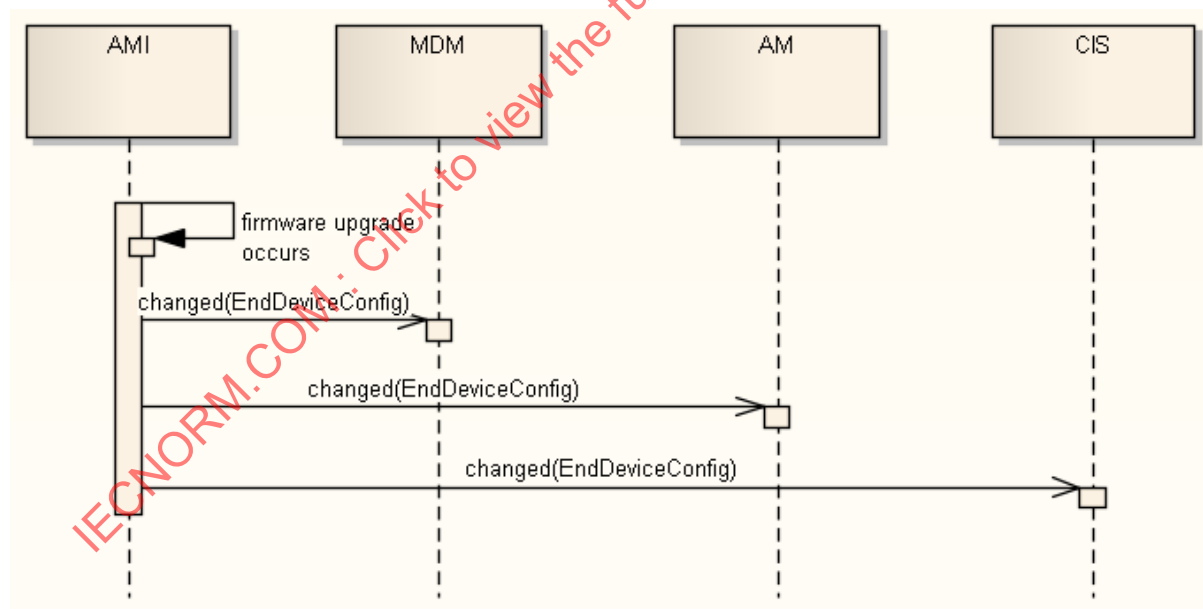
5.6.1 Généralités

Il y existe des niveaux différents de besoin dans un système pour des différentes sortes de messages.

Le système de comptage (*en soi*) peut présenter des problèmes au sein de son infrastructure qui nécessitent un ordre d'exécution pour être réglés. Les exigences relatives aux données pour communiquer cet événement sont similaires aux exigences d'EndDeviceEvent comme décrit en 5.2. Avec un EndDeviceEvent, un simple code d'erreur peut être utilisé pour rapporter un problème. Ce mécanisme fonctionne lorsque le destinataire est capable de consulter et interpréter la signification du code. Cependant, lorsqu'une description plus détaillée du problème est à fournir, un schéma plus élaboré doit être utilisé. Dans certains cas, le destinataire est un être humain et exige une description lisible par l'homme du problème et de la pièce particulière d'équipement impliquée. Lors de l'identification du bien, il sera probablement nécessaire d'utiliser une terminologie spécifique au fournisseur pour décrire le matériel.

5.6.2 Applications – Mise à niveau du firmware (microprogramme)

Pour un système de comptage automatisé capable de communication bidirectionnelle, il peut être possible de mettre à niveau le firmware de l'infrastructure de MS sur le terrain ou, dans certains systèmes, les biens de communication dans les dispositifs terminaux. Les modifications apportées au système de comptage qui altèrent matériellement son fonctionnement doivent être communiquées à toutes les parties prenantes concernées. Un exemple de ladite publication obtenue à l'aide d'un message EndDeviceConfig est illustré à la Figure 42.



Légende

Anglais	Français
firmware upgrade occurs	mise à niveau du firmware (microprogramme)

Figure 42 – Exemple d'échange de message de mise à niveau du firmware

La mise à niveau du firmware peut amener l'EndDevice ou le CommEquipmentAsset à changer de plusieurs façons, y compris les caractéristiques fonctionnelles de l'appareil, la version du firmware et le numéro de révision, ou la configuration (exprimée comme un programId).

5.6.3 Format des messages

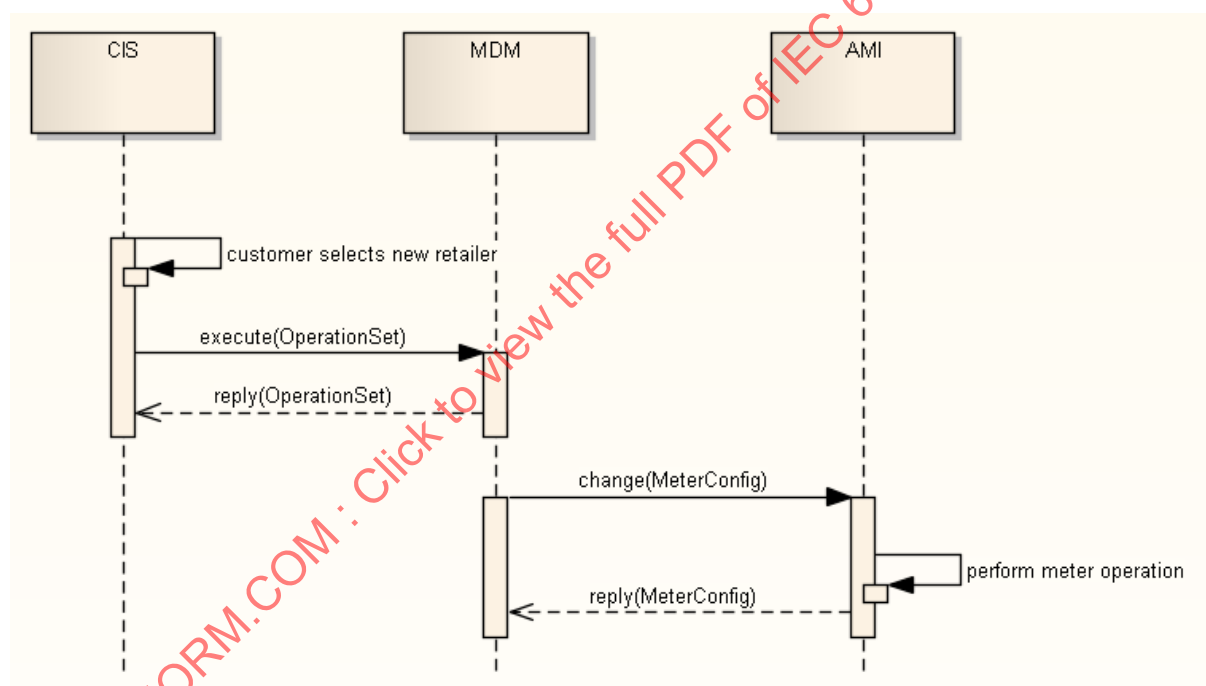
Se reporter au format des messages EndDeviceConfig décrit en 5.10.3.

5.7 Commutation clientèle

5.7.1 Généralités

Un client dans un marché ouvert de vente au détail peut commuter entre des fournisseurs d'énergie. Cela peut exiger une reconfiguration et/ou une réinstallation du compteur. La reconfiguration ou le remplacement du compteur peut être une conséquence du fait qu'un client change de programmes d'énergie au moment du changement de fournisseur d'énergie. Ce processus impliquerait vraisemblablement un relevé sur demande selon les besoins à des fins de facturation finale. Un exemple d'échange de message est donné ci-dessous à la Figure 43.

Les étapes OperationSet sont incluses pour synchroniser les Master Data révisées (les données de configuration des revendeurs neufs et anciens et les changements d'association avec Customer, CustomerAccount et CustomerAgreement) avec le système MDM et le système de comptage. Voir 5.10 et les Annexes K et L pour obtenir des informations complémentaires relatives à la gestion de données de référence.



Légende

Anglais	Français
perform meter operation	exécuter l'opération sur le compteur
customer selects new retailer	le client sélectionne un nouveau revendeur

Figure 43 – Exemple d'échange de message de commutation clientèle

5.7.2 Format des messages

La structure d'une MeterServiceRequest a été décrite par la Figure 41. La structure d'un message MeterReading a été décrite par la Figure 19.

5.8 Messages de service de comptage de paiement

5.8.1 Généralités

Les services de comptage de paiement impliquent typiquement des compteurs de prépaiement installés dans les locaux du client et des systèmes de vente de jetons situés en des emplacements commodes pour servir les besoins des clients. Pour les besoins de la présente norme, les systèmes de vente sont considérés comme une partie intégrante du système de comptage. Ces systèmes de vente exigent typiquement des informations concernant le compteur, le client, l'emplacement du service, le point d'usage, le tarif, le compte client, l'accord client et le fournisseur du service qui reçoit la recette collectée par les systèmes de vente.

Les informations requises par les systèmes de vente ont leur origine dans le CIS et dans le système de facturation et sont ensuite transférées vers les systèmes de vente au moyen des messages donnés en 5.8.3.

Les informations de transaction et d'acquit d'autre part ont leur origine dans les systèmes de vente lorsque le client effectue un paiement sur un compte ou achète un jeton prépayé à un point de vente. Il est nécessaire de transférer périodiquement ces informations vers le CIS et le système de facturation en vue d'un traitement ultérieur et les messages en 5.8.4 sont fournis à cet effet.

Dans la CEI 61968-9:2009, plusieurs profils étaient développés comme élément des efforts de prise en charge du comptage de paiement, dont certains étaient de nature plus générale. Dans la présente édition, ces profils sont conservés dans la présent paragraphe 5.8 et sont précédés du préfixe "PrePay". On espère que ceux-ci seront complètement harmonisés dans les futures éditions de la CEI 61968-9.

5.8.2 Accords auxiliaires

Les informations relatives à la dette client pour collecte peuvent être configurées dans le MS au moyen de la charge utile de message AuxiliaryAgreementConfig.

Un exemple d'un échange de message est donné à la Figure 44 et le format de message est donné à la Figure 65.

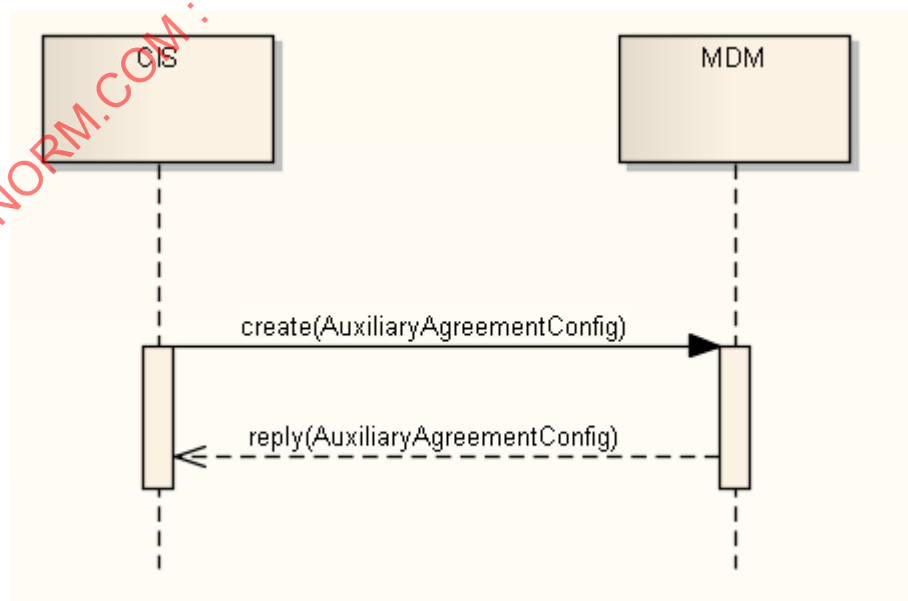


Figure 44 – Echange de messages pour transférer des informations relatives aux accords auxiliaires

5.8.3 Applications

5.8.3.1 Généralités

Lorsqu'un client achète un jeton prépayé à un point de vente ou effectue un paiement sur un compte facturé, des informations financières sont créées dans le MS en rapport avec cette transaction. Typiquement, ces informations sont transférées périodiquement au CIS et au système de facturation en vue d'un traitement ultérieur.

Les messages définis en 5.8.4 constituent une disposition permettant de transférer ces informations vers le CIS et le système de facturation.

5.8.3.2 Acquits

Lorsque le MS reçoit un paiement, un acquit est généré et les informations pertinentes concernant le paiement sont typiquement enregistrées comme enregistrement d'acquit. Ces informations peuvent être accessibles au moyen de la charge utile de message ReceiptRecord.

Lorsqu'une plage spécifiée (par date ou mRID) de la charge utile de message est à spécifier dans une implémentation contextuelle particulière, cela peut être réalisé par l'utilisation des éléments facultatifs dans l'en-tête de message (voir Figure B.2).

Un exemple d'un échange de message est donné à la Figure 45 et le format de message est donné à la Figure 48.

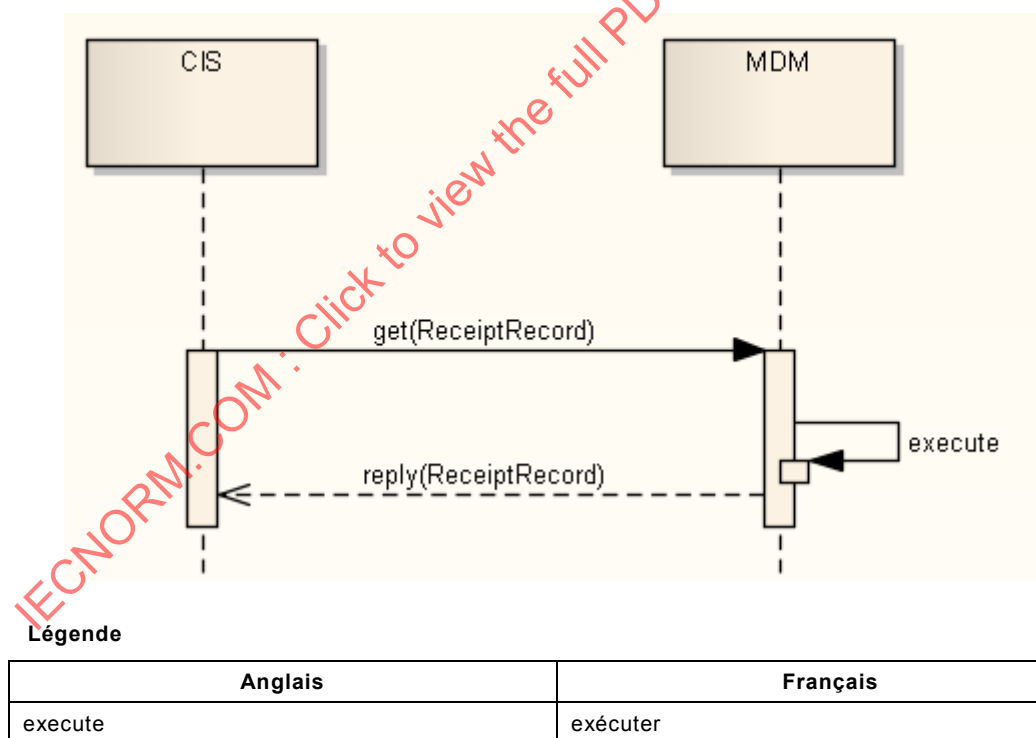
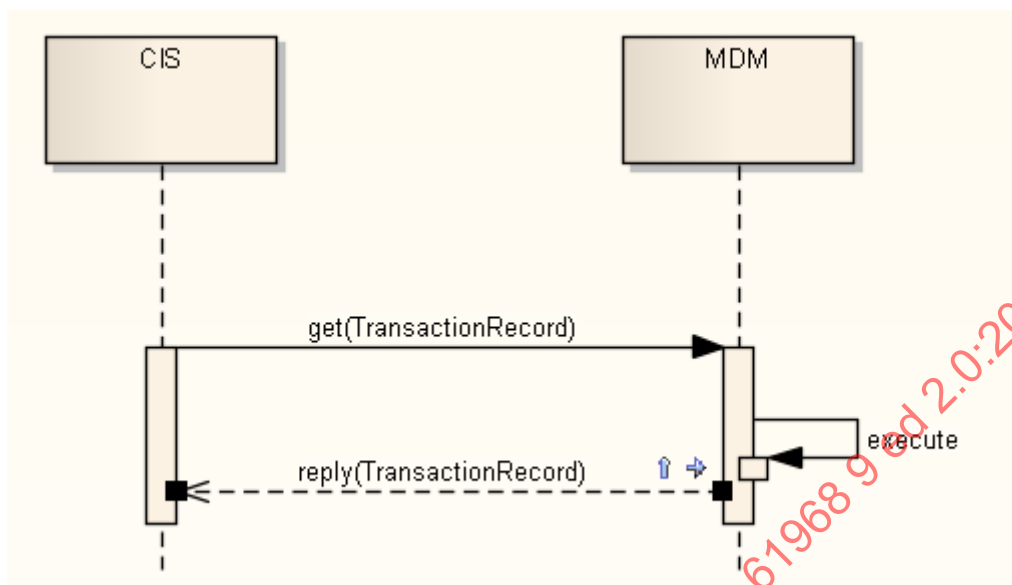


Figure 45 – Echange de messages pour transférer des informations d'acquit

5.8.3.3 Transactions

Les informations relatives à la vente d'un jeton prépayé ou à l'acquit d'un paiement de compte sont typiquement également enregistrées par le MS sous la forme d'un enregistrement de transactions financières saisissant les détails pertinents relatifs à la transaction particulière. Ces informations peuvent être accessibles au moyen de la charge utile de message TransactionRecord.

Un exemple d'un échange de message est donné à la Figure 46 et le format de message est donné à la Figure 49.



Légende

Anglais	Français
execute	exécuter

Figure 46 – Echange de messages pour transférer des informations de transaction

5.8.4 Format des messages

Le diagramme de la Figure 47 décrit la structure des messages utilisée pour configurer les accords auxiliaires.

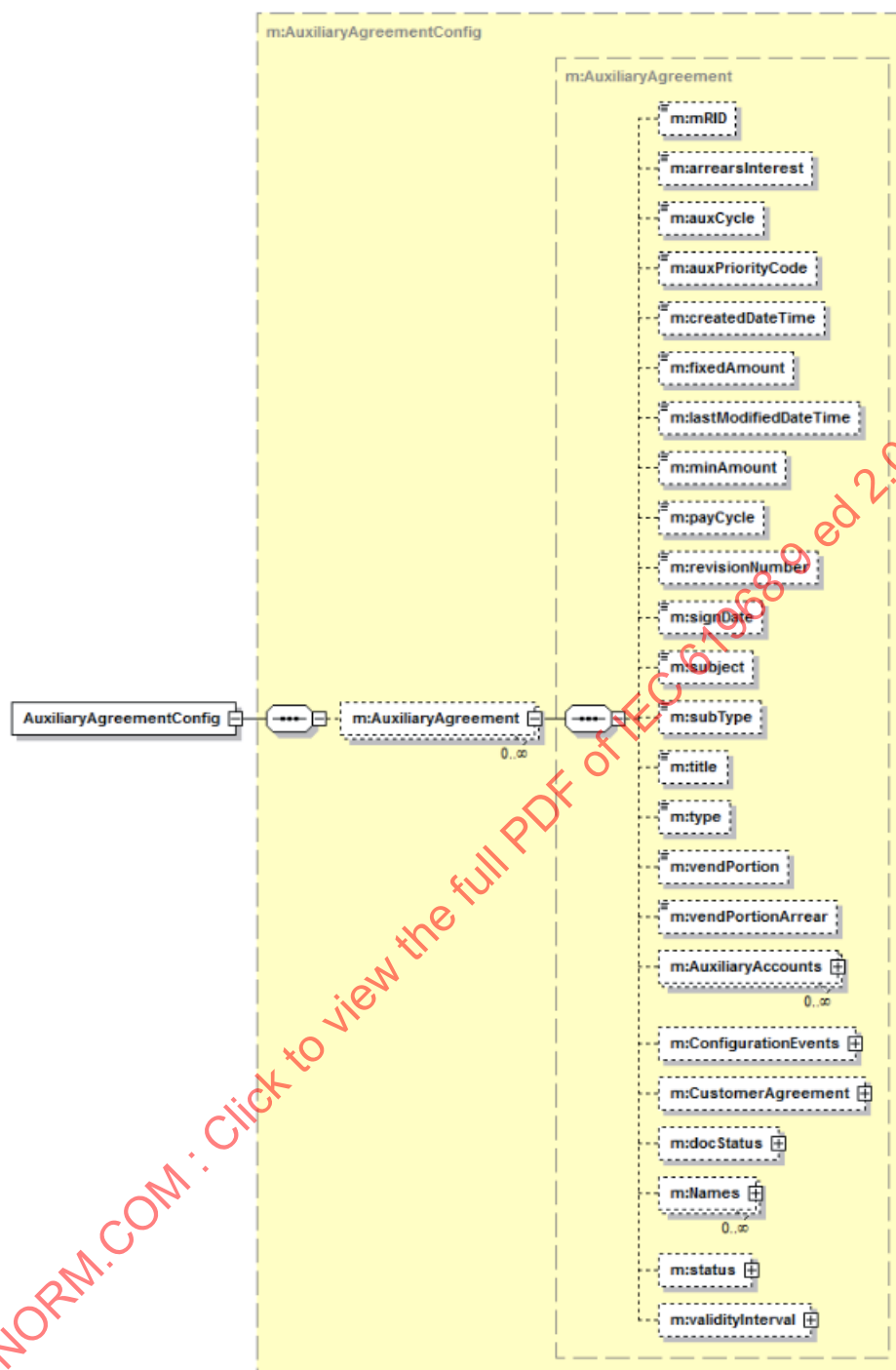


Figure 47 – Format de message de configuration des accords auxiliaires

La structure de message de la Figure 48 est utilisée pour enregistrer les acquits.

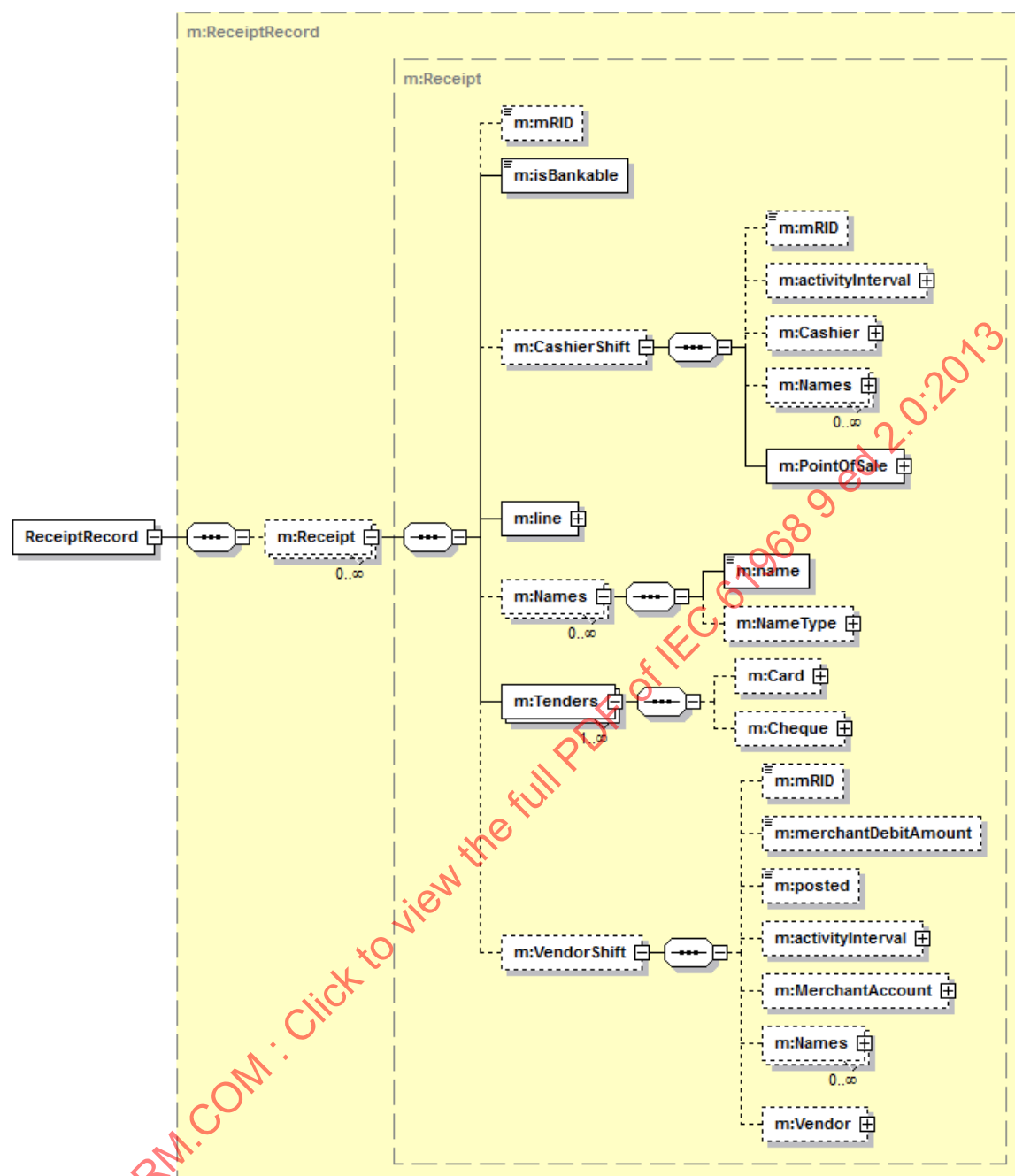


Figure 48 – Format de message ReceiptRecord

La structure de message dans la Figure 49 est utilisée pour enregistrer les transactions.

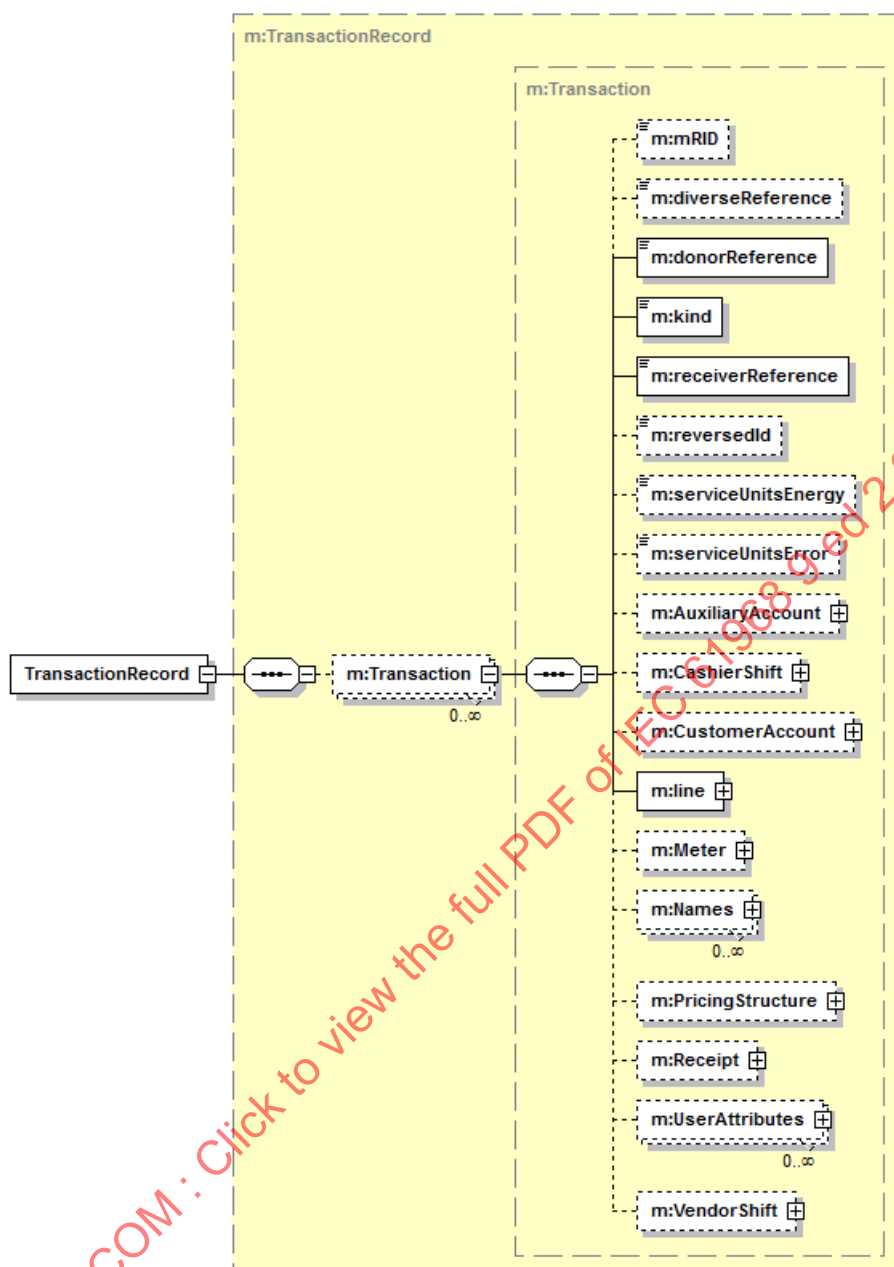


Figure 49 – Format de message TransactionRecord

5.9 Réseaux dans un local (Premise area networks)

5.9.1 Généralités

Le système de comptage a été étendu afin d'inclure les appareils qui ont été déployés dans les foyers et les entreprises gérées par l'infrastructure de comptage. Dans la CEI 61968-9, ces appareils existent au sein d'un réseau dans un local (PAN). Cela comprend le terme fréquemment utilisé de réseau domestique (HAN). Les appareils PAN/HAN eux-mêmes sont un type spécial d'EndDevice.

Compte tenu de la nature évolutive des appareils sous-jacents et des protocoles de communication, la CEI 61968-9 tente d'adopter une vision qui peut être mise en correspondance selon les besoins avec diverses normes relatives aux appareils.

5.9.2 Applications

5.9.2.1 Généralités

Les applications des appareils PAN incluent principalement la tarification dynamique, la réponse à la demande et l'apport d'informations aux clients. Il existe plusieurs types d'appareils PAN, notamment les thermostats intelligents, les affichages domestiques, les relais, etc.

5.9.2.2 Pairage et suppression du pairage d'un appareil PAN

Le pairage d'un appareil PAN avec un compteur est à effectuer avant que le système de comptage ne puisse envoyer des commandes à l'appareil PAN.

Le pairage de l'appareil PAN (et la suppression du pairage) est réalisé avec un message EndDeviceControls comme le montre l'exemple dans la Figure 50. Les conventions spéciales ci-après relatives au message EndDeviceControl s'appliquent au pairage d'un appareil PAN avec un compteur:

- Il convient de sélectionner le code EndDeviceControlType approprié dans le cadre du pairage d'un appareil PAN à l'Annexe F.
- Deux (et seulement deux) EndDevices sont identifiés par mRid ou la classe Names; l'un est le compteur et l'autre est l'appareil PAN. L'isPan booléen sera défini sur vrai pour l'appareil PAN; le code d'installation et electronicAddress.macAddress sont normalement également requis.
- Les résultats de réussite ou d'échec de l'opération de pairage sont rapportés à l'aide des messages EndDeviceEvents, avec les énumérations EndDeviceEventType appropriées disponibles dans le Tableau E.24 de l'Annexe E. Il est possible qu'un EndDeviceEvent ou plus soient rapportés suite à l'application de EndDeviceControl.

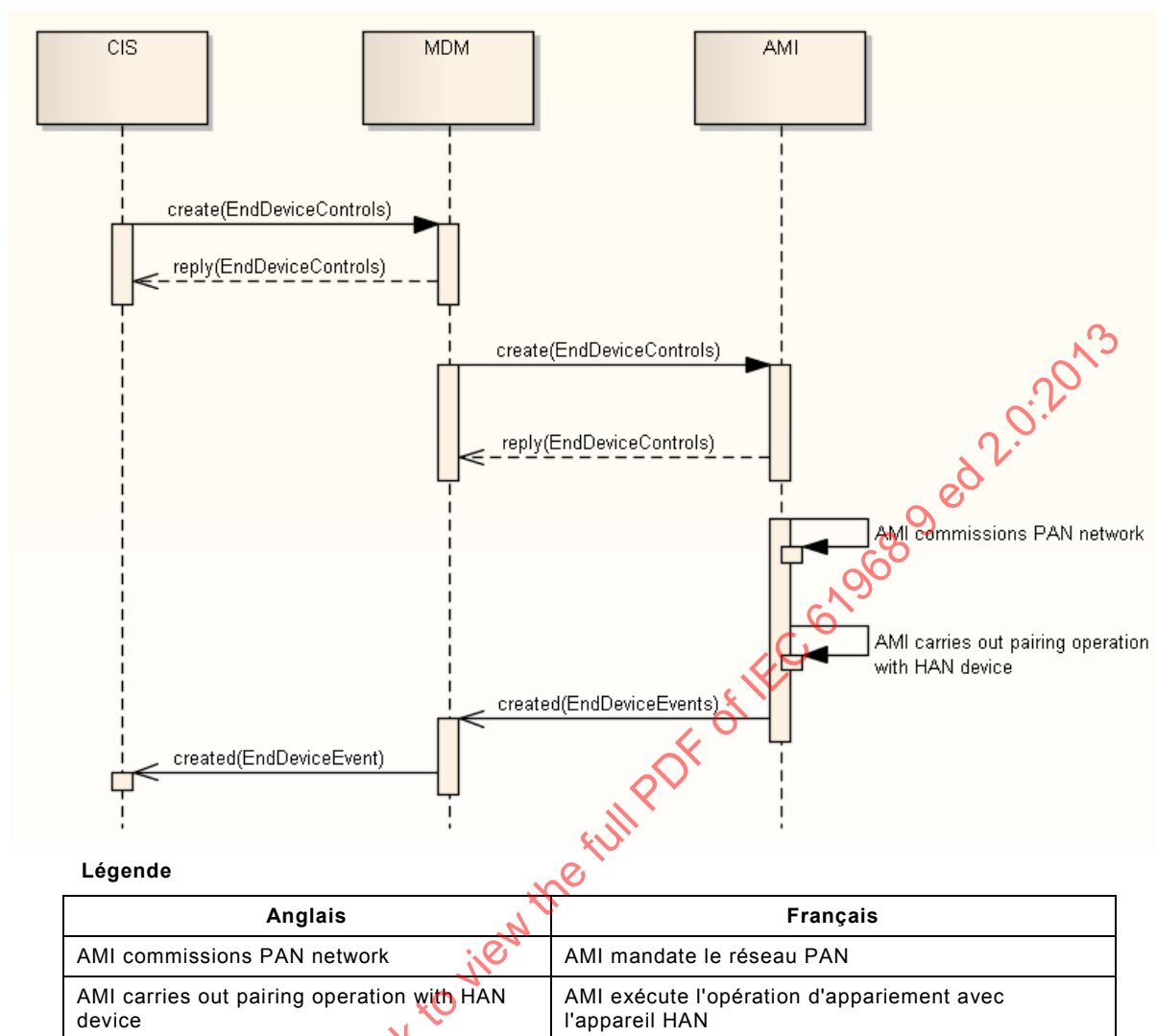
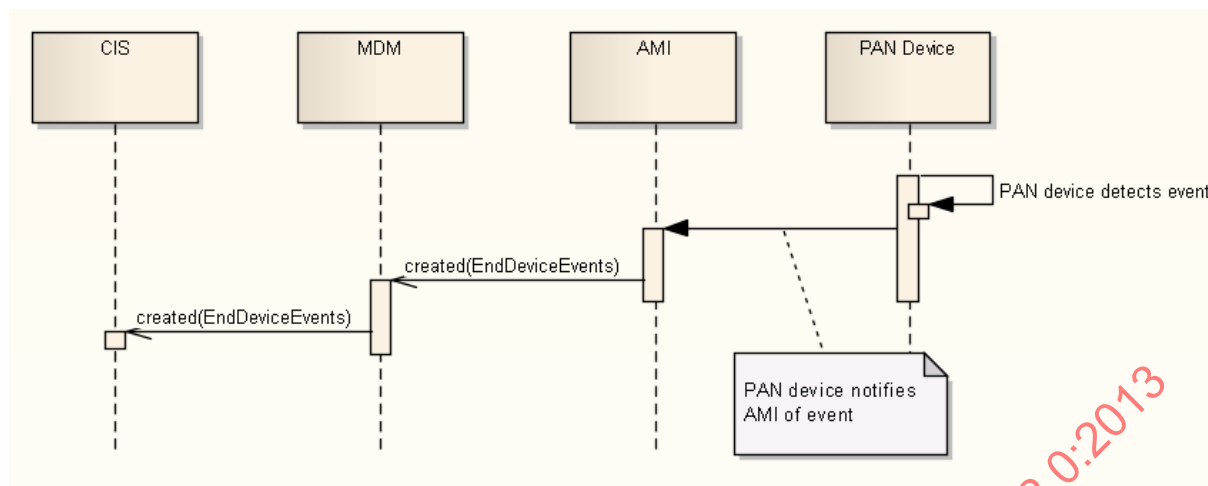


Figure 50 – Pairage d'un appareil PAN

5.9.2.3 Événements PAN

Les événements de l'appareil PAN sont générés par un appareil PAN et sont généralement communiqués par le biais d'un compteur ou d'une passerelle vers la tête de réseau du système de comptage. La tête de réseau du système de comptage publiera ensuite le message vers d'autres applications d'entreprise qui se sont abonnées. Ces événements sont transmis à l'aide du message EndDeviceEvents. Un exemple est donné par la Figure 51.



Légende

Anglais	Français
PAN device	appareil PAN
PAN device detects event	L'appareil PAN détecte l'événement
PAN device notifies AMI of event	L'appareil PAN prévient AMI de l'événement

Figure 51 – Événements de l'appareil PAN

5.9.2.4 Commandes PAN

Les commandes supplémentaires de l'appareil PAN à d'autres fins que le pairage peuvent être lancées par une application d'entreprise telle qu'un système de gestion de réponse à la demande vers une tête de réseau du système de comptage. Ces commandes ont également recours au message EndDeviceControls. Etant donné qu'il existe diverses manières d'adresser la commande, il peut y avoir plusieurs appareils PAN cible. Un exemple est donné par la Figure 52.

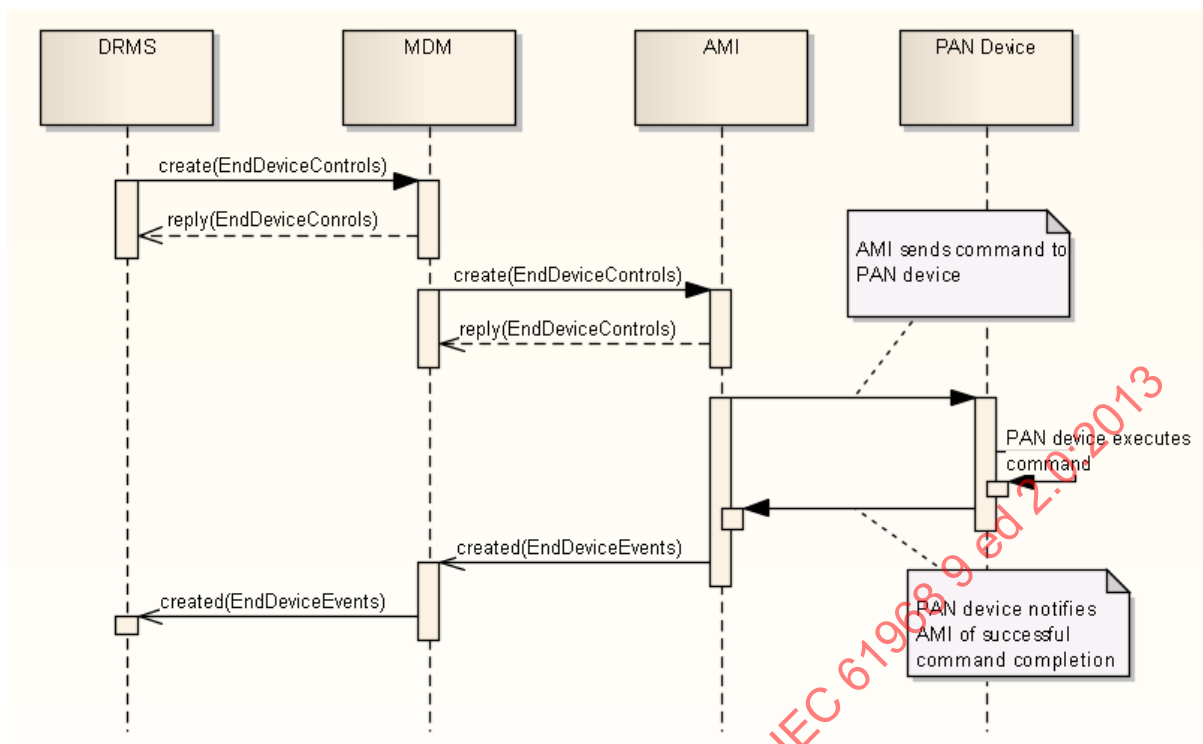
Les messages EndDeviceControls prévus pour les appareils PAN comprendront en général l'une des structures spéciales ci-après au sein du profil EndDeviceControl:

PanDemandResponse

PanDisplay

PanPricing

Les énumérations appropriées EndDeviceControlType et EndDeviceEventType desdites fonctions peuvent être trouvées dans les Tableaux E.24 et F.3.



Légende

Anglais	Français
PAN device	Appareil PAN
AMI sends command to PAN device	AMI envoie la commande à l'appareil PAN
PAN device executes command	L'appareil PAN exécute la commande
PAN device notifies AMI of successful command completion	L'appareil PAN prévient AMI de la réussite de la commande

Figure 52 – Commandes de l'appareil PAN

5.9.3 Formats des messages

Il n'existe aucun message unique défini spécifiquement pour les appareils PAN. Les appareils PAN sont simplement des types d'EndDevices.

5.10 Messages de gestion de données de référence

5.10.1 Généralités

Les systèmes d'entreprise qui échangent les messages dans le domaine Relevé de compteur et Commande requiert un moyen de gérer les données non-transactionnelles qui définissent les biens, d'autres objets CIM et les relations (ou les associations entre elles). La Gestion de données de référence (MDM) est le terme utilisé pour décrire la pratique de création, de changement et de suppression de ces objets et relations.

Aux fins de la CEI 61968-9, les classes CIM qui s'inscrivent dans le domaine d'application de la Gestion de données de référence et les profils de la CEI 61968-9 utilisés pour créer/changer/supprimer ces objets (et leur "configuration") sont compris dans le Tableau 5:

Tableau 5 – Profils de configuration de la CEI 61968-9

Objet CIM	Profil de la CEI 61968-9
ComModule	ComModuleConfig
Customer	CustomerConfig
CustomerAccount	CustomerAccountConfig
CustomerAgreement	CustomerAgreementConfig
EndDevice	EndDeviceConfig
EndDeviceGroup	EndDeviceGroups
Meter	MeterConfig
PricingStructure	PricingStructureConfig
ServiceCategory	ServiceCategoryConfig
ServiceLocation	ServiceLocationConfig
ServiceSupplier	ServiceSupplierConfig
TransformerTank	^a
UsagePoint	UsagePointConfig
UsagePointGroup	UsagePointGroups
UsagePointLocation	UsagePointLocationConfig
^a Aux fins de la CEI 61968-9, l'objet TransformerTank a une applicabilité pour les cas d'utilisation qui impliquent Outage Management. Le TransformerTank est techniquement hors du domaine d'application de la CEI 61968-9, et il n'existe aucun profil dans la CEI 61968-9 concernant la création, la modification ou la suppression d'un TransformerTank. Néanmoins, le TransformerTank peut être référencé dans le profil UsagePointConfig afin d'identifier le transformateur qui alimente l'UsagePoint.	

Les ConfigurationEvents surviennent dès qu'une opération de création, de changement ou de suppression est réalisée en utilisant toute opération "config" à l'aide des profils de la CEI 61968-9 dans le Tableau 5 ci-dessus et dès qu'une transaction MasterDataLinkageConfig est exécutée pour gérer les relations des objets MDM ou qu'une transaction ObjectNamesConfig transaction est exécutée pour ajouter, supprimer ou modifier les identificateurs de la classe Names de ces objets.

La classe ConfigurationEvent dans le CIM est associée à chaque classe CIM dans la première colonne du Tableau 5 et est intégrée dans chaque profil de la CEI 61968-9 dans la colonne 2 de ce tableau. Elle est également incluse dans les profils MasterDataLinkageConfig et ObjectNamesConfig. La fonction de la classe ConfigurationEvent est de fournir des détails commerciaux importants concernant chaque opération "config", y compris:

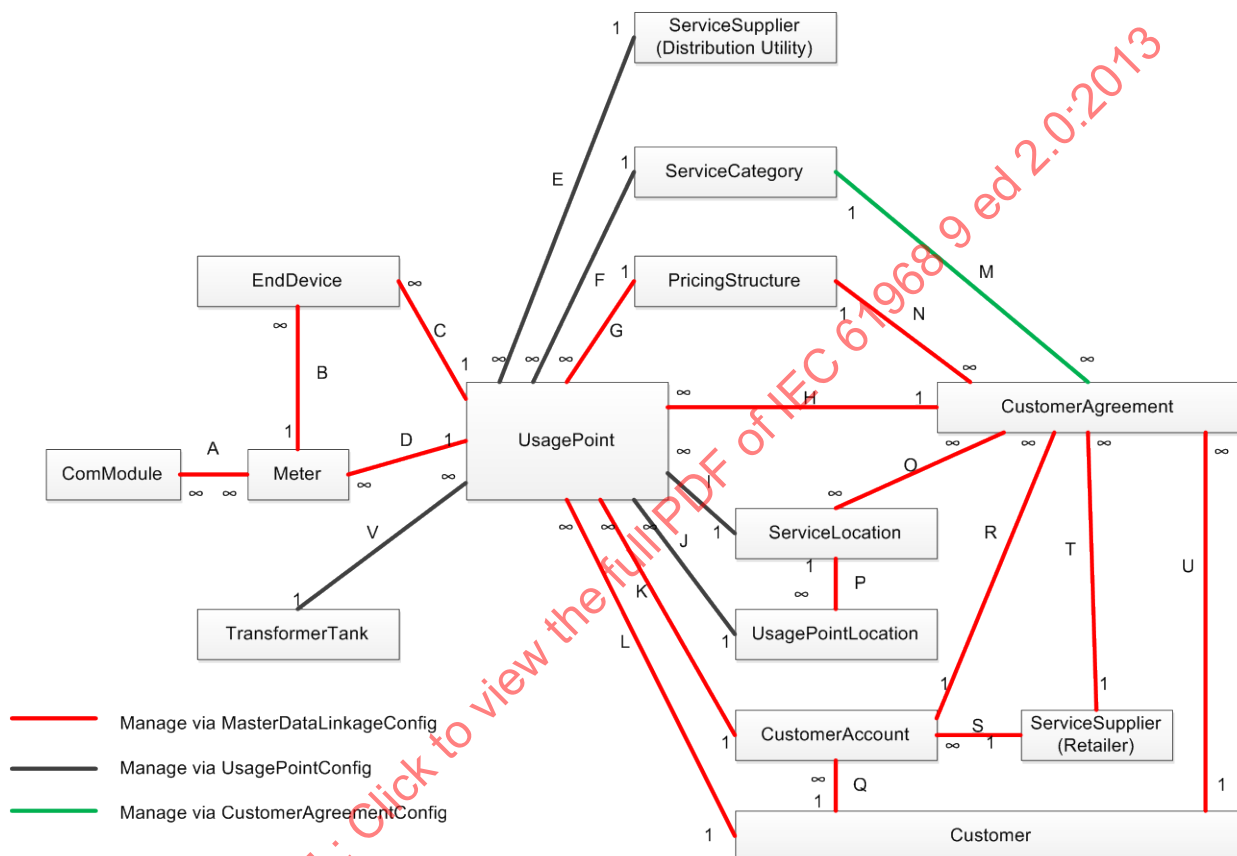
- la date et l'heure auxquelles la configuration ou le changement de configuration a pris effet ou va prendre effet;
- l'entité accomplissant l'opération de configuration, et
- les remarques sous forme libre fournissant des informations commerciales supplémentaires relatives à l'événement de configuration.

Se référer aux Annexes K et L pour obtenir les descriptions détaillées des cas d'utilisation de Gestion de données de référence et des exemples de messages XML qui illustrent l'utilisation prévue des messages de 5.10.

5.10.2 Applications

5.10.2.1 Généralités

Aux fins de la présente norme, deux méthodes sont utilisées pour gérer les relations entre les objets CIM identifiés en 5.10.1. Il s'agit du profil MasterDataLinkage (décrit en 5.10.1) et, pour un nombre limité d'objets CIM, les relations sont explicitement gérées à l'aide des profils identifiés en 5.10.1. Le diagramme suivant identifie les relations d'objets qui sont importantes à la Gestion de données de référence dans le domaine d'application de la présente norme et la méthode spécifique recommandée à utiliser pour gérer chaque relation.



Légende

Anglais	Français
(Distribution Utility)	(Entreprise de distribution)
Meter	Compteur
Manage via	Gérer via
Transformer Tank	Cuve de transformateur
(Retailer)	(Revendeur)
Customer	Client

Figure 53 – Liens de données de référence

Pour parfaitement comprendre la Figure 53, il faut comprendre que la CEI 61968-9 de la norme fournit des messages normatifs grâce auxquels les systèmes d'entreprise peuvent échanger des informations; cependant aucune exigence n'existe pour qu'un système donné mette en œuvre un modèle de données interne basé sur ou cohérent avec le CIM. Par conséquent, le diagramme ci-dessus présente la possibilité de refléter les relations de différentes manières. Par exemple, deux systèmes peuvent reconnaître les concepts de Customer, CustomerAccount et CustomerAgreement et choisir d'exprimer les relations entre

ces entités et un UsagePoint en reliant un Customer à un CustomerAccount (relation Q), puis en reliant le CustomerAccount au CustomerAgreement (relation R) et enfin en reliant le CustomerAgreement au UsagePoint (relation H). Dans le présent scénario, le besoin d'utiliser des relations K, L ou U peut ne jamais exister.

D'autre part, il peut y avoir deux systèmes d'entreprise qui ne matérialisent pas le concept d'un CustomerAgreement dans leurs modèles de données internes. Ces systèmes peuvent utiliser des messages qui relient un Customer à un CustomerAccount (relation Q), puis qui relient le CustomerAccount à l'UsagePoint (relation K). Le fait d'être prescriptif à propos des relations illustrées dans la Figure 53 admissibles ou préférentielles ne relève pas du domaine d'application de la CEI 61968-9 de la norme. Le profil MasterDataLinkageConfig peut être utilisé avec souplesse afin de prendre en charge les besoins de toute entreprise et des systèmes de son entreprise.

Il est recommandé que les relations E, F, I, J, M et V soient gérées par les profils "Config" indiqués dans la légende de la figure, plutôt que par le biais du profil MasterDataLinkageConfig; néanmoins, ce n'est pas une exigence et les entreprises peuvent également choisir d'utiliser le profil MasterDataLinkageConfig pour gérer lesdites relations. La recommandation concernant la gestion des relations spécifiques par les profils identifiés plutôt que par le profil MasterDataLinkageConfig a une double raison:

- ces relations spécifiques changent rarement, et
- ces relations spécifiques sont vues par presque tous les systèmes d'entreprise de manière cohérente.

L'inverse est également vrai. Les entreprises peuvent choisir de gérer les relations illustrées sous forme de lignes rouges comme si elles étaient illustrées sous forme de lignes noires sous réserve que la relation soit prise en charge par le CIM et reflétée dans le profil approprié de la CEI 61968-9.

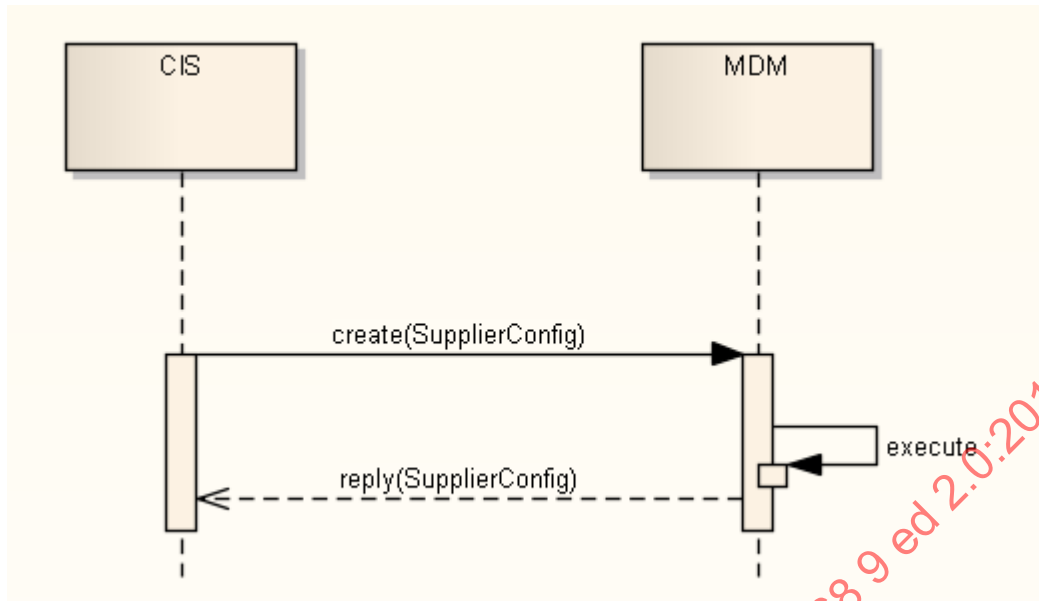
Il existe un profil supplémentaire dans la CEI 61968-9 appelé CustomerMeterDataSet. Ce profil est utilisé uniquement avec un verbe d'en-tête Get et la réponse en résultat fournit une représentation détaillée centrée sur le compteur de toutes les relations dans le diagramme ci-dessus.

La Figure 53 est informative. Les entités et les relations illustrées à la Figure 53 peuvent évoluer dans la durée à mesure que la CEI 61968-9 est étendue afin de prendre en charge les nouveaux cas d'usage professionnel, ainsi que les cas d'usage professionnel révisés.

5.10.2.2 Fournisseurs de service

Les informations concernant le fournisseur (revendeur ou entreprise de distribution par exemple) du service peuvent être configurées dans le MS au moyen de la charge utile de message SupplierConfig.

Un exemple d'un échange de message est donné à la Figure 54 et le format de message est donné en 5.10.3.3.



Légende

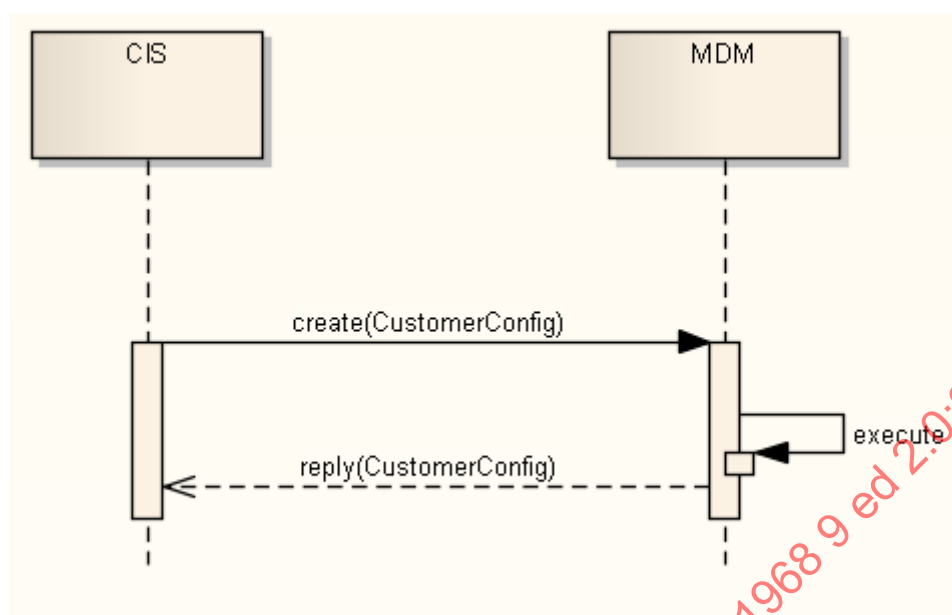
Anglais	Français
execute	exécuter

Figure 54 – Echange de messages pour transférer des informations de fournisseur

5.10.2.3 Clients

Les informations relatives aux clients du fournisseur du service peuvent être configurées dans le MS au moyen de la charge utile de message CustomerConfig.

Un exemple d'un échange de message est donné à la Figure 55 et le format de message est donné en 5.10.3.4.

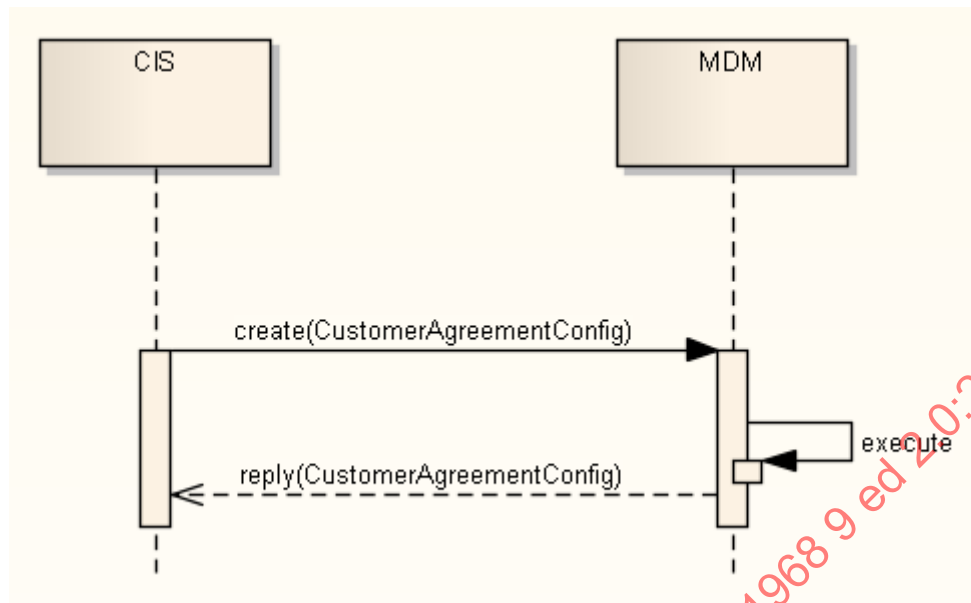
**Légende**

Anglais	Français
execute	exécuter

Figure 55 – Echange de messages pour transférer des informations client**5.10.2.4 Accords client**

Les informations relatives aux accords client peuvent être configurées dans le MS au moyen de la charge utile de message CustomerAgreementConfig.

Un exemple d'un échange de message est donné à la Figure 56 et le format de message est donné en 5.10.3.5.



Légende

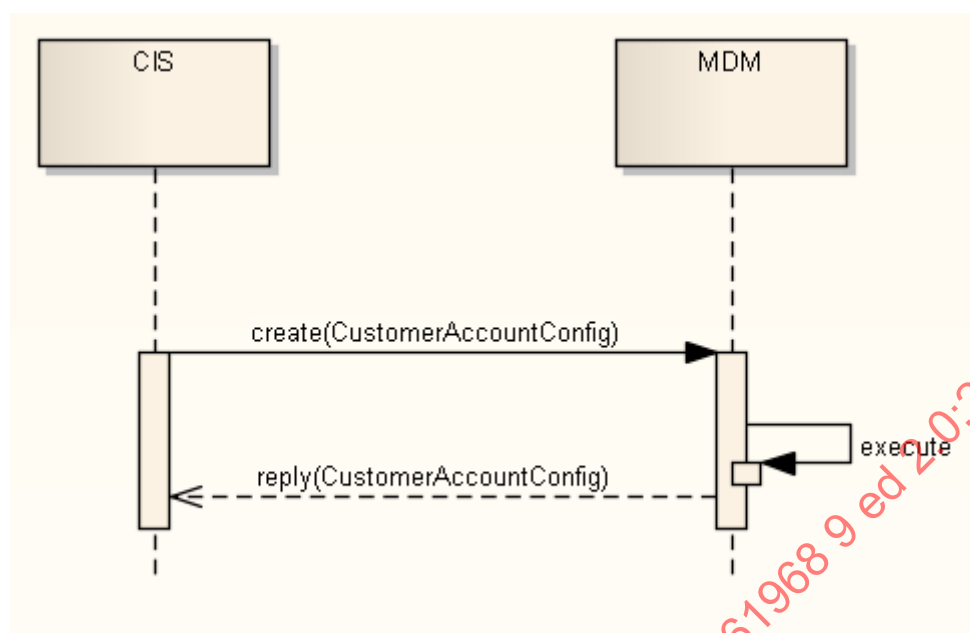
Anglais	Français
execute	exécuter

Figure 56 – Echange de messages pour transférer des informations d'accord client

5.10.2.5 Comptes client

Les informations relatives aux comptes client peuvent être configurées dans le MS au moyen de la charge utile de message CustomerAccountConfig.

Un exemple d'un échange de message est donné à la Figure 57 et le format de message est donné en 5.10.3.6.



Légende

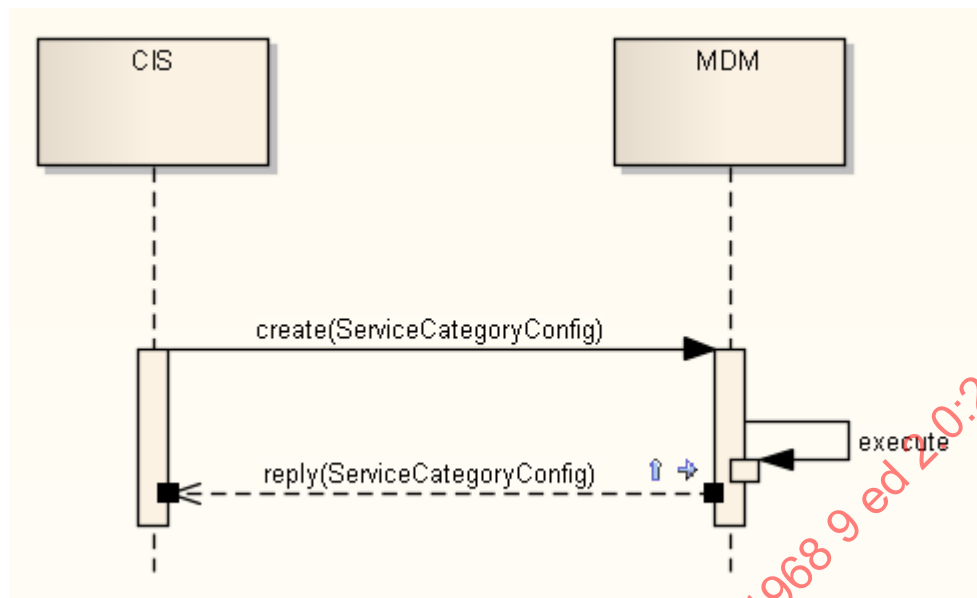
Anglais	Français
execute	exécuter

Figure 57 – Echange de messages pour transférer des informations de compte client

5.10.2.6 Catégories de services

Les informations concernant les catégories de services (électricité, eau, gaz par exemple) peuvent être configurées dans le MS au moyen de la charge utile de message ServiceCategoryConfig.

Un exemple d'un échange de message est donné à la Figure 58 et le format de message est donné en 5.10.3.7.



Légende

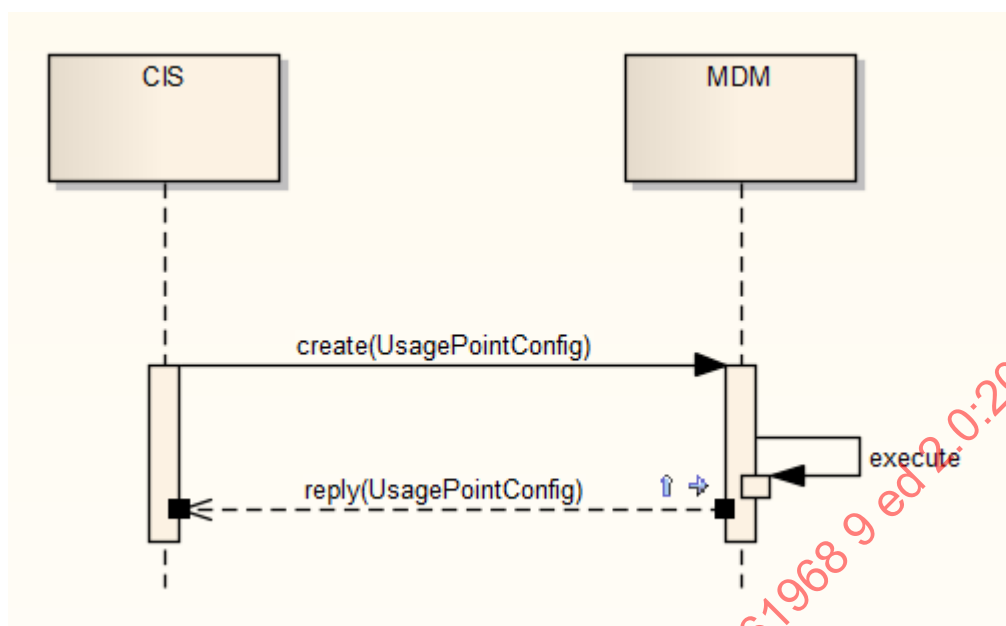
Anglais	Français
execute	exécuter

Figure 58 – Echange de messages pour transférer des informations de catégorie de service

5.10.2.7 Points d'usage

Les informations relatives aux points d'usage peuvent être configurées dans le MS au moyen de la charge utile de message UsagePointConfig.

Un exemple d'un échange de message est donné à la Figure 59 et le format de message est donné en 5.10.3.8.



Légende

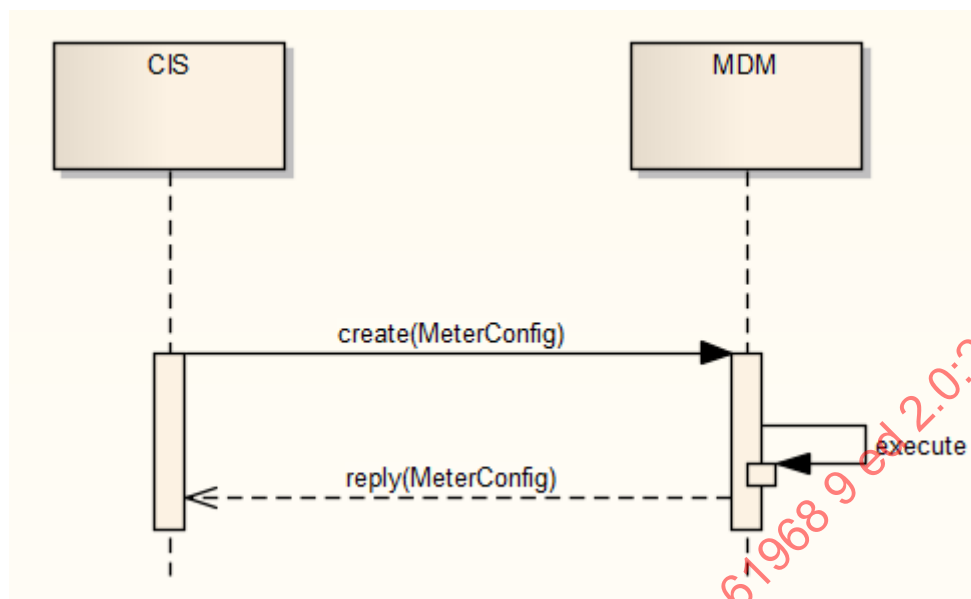
Anglais	Français
execute	exécuter

Figure 59 – Echange de messages pour transférer des informations de point d'usage

5.10.2.8 Compteurs

Les informations relatives aux compteurs en service peuvent être configurées dans le MS au moyen de la charge utile de message MeterConfig.

Un exemple d'un échange de message est donné à la Figure 60 et le format de message est donné à la section 5.10.3.11.



Légende

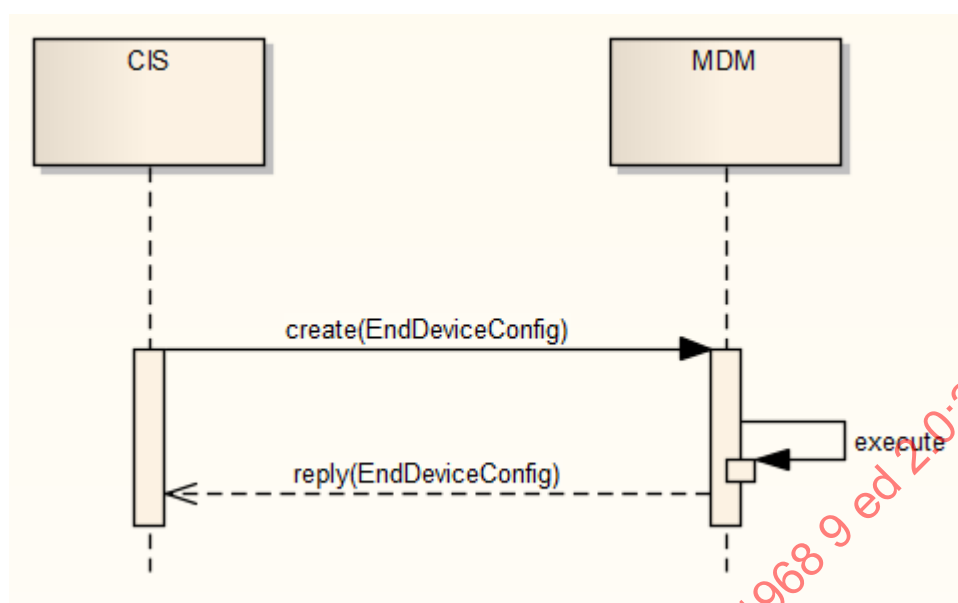
Anglais	Français
execute	exécuter

Figure 60 – Echange de messages pour transférer des informations de compteur

5.10.2.9 Dispositifs terminaux

Les informations relatives aux compteurs en service peuvent être configurées dans le MS au moyen de la charge utile de message EndDeviceConfig.

Un exemple d'un échange de message est donné à la Figure 61 et le format de message est donné en 5.10.3.10.

**Légende**

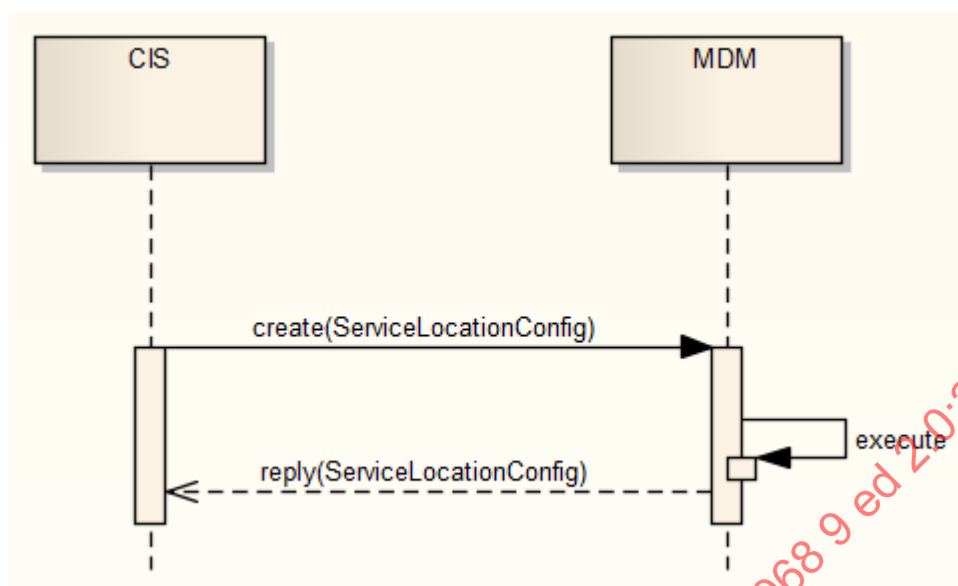
Anglais	Français
execute	exécuter

Figure 61 – Echange de messages pour transférer des informations de dispositif terminal

5.10.2.10 Emplacements des services

Les informations relatives aux emplacements de services peuvent être configurées dans le MS au moyen de la charge utile de message ServiceLocationConfig.

Un exemple d'un échange de message est donné à la Figure 62 et le format de message est donné en 5.10.2.10.



Légende

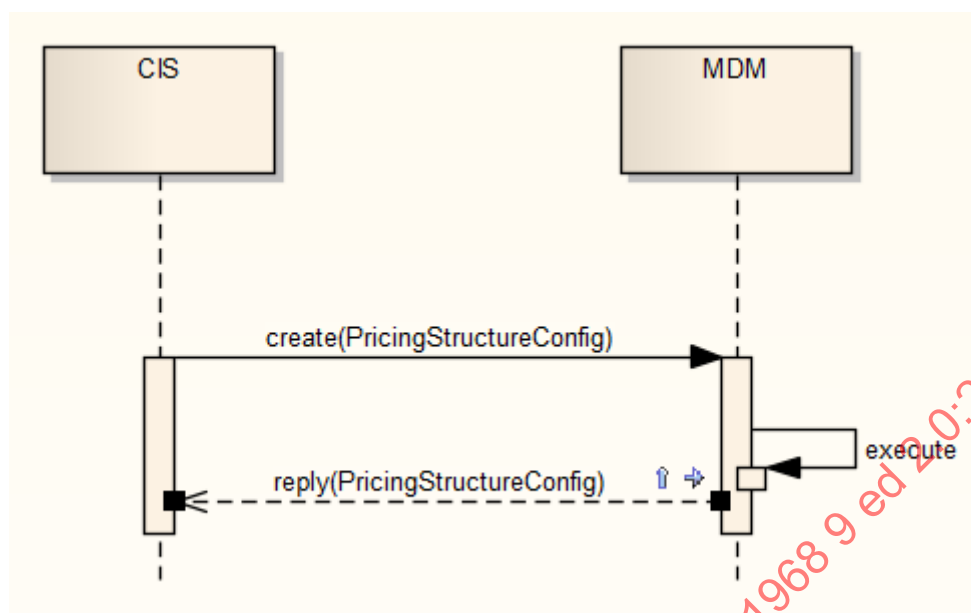
Anglais	Français
execute	exécuter

Figure 62 – Echange de messages pour transférer des informations d'emplacement de service

5.10.2.11 Structure de tarification et barèmes

Les informations relatives aux structures de tarification peuvent être configurées dans le MS au moyen de la charge utile de message PricingStructureConfig.

Un exemple d'un échange de message est donné à la Figure 63 et le format de message est donné en 5.10.3.14.



Légende

Anglais	Français
execute	exécuter

Figure 63 – Echange de messages pour transférer des structures tarifaires

5.10.3 Format des messages

5.10.3.1 Généralités

Ce paragraphe 5.10.3 décrit les formats des messages des messages MasterDataLinkageConfig et autres messages "config" Master Data Management. La spécification détaillée de chaque classe et attribut est disponible dans la CEI 61968-11 et la CEI 61970-301. Le schéma XML annoté détaillé est défini à l'Annexe H.

5.10.3.2 MasterDataLinkageConfig

La Figure 64 ci-après fournit la structure de haut niveau du message Master Data Linkage Config utilisé pour configurer les relations entre les objets.

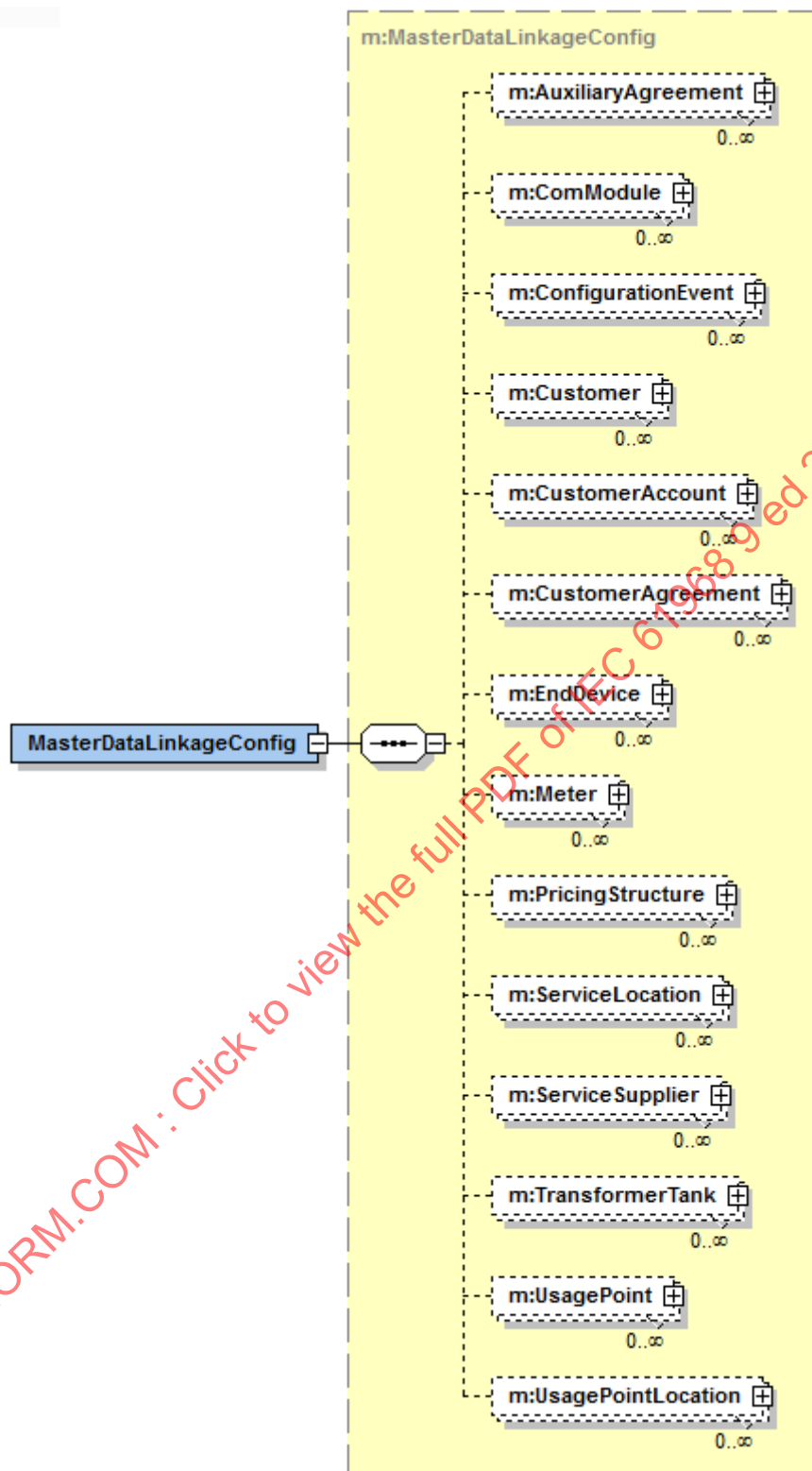


Figure 64 – Format de message MasterDataLinkageConfig

Un exemple de `MasterDataLinkageConfig` est montré ci-dessous. Ce message illustre la méthode "non-in-line" (pas aligné) d'établissement d'une association entre deux objets CIM; dans ce cas, entre le compteur et le `UsagePoint` qui sont associés à l'aide d'une commande `MasterDataLinkageConfig`. Il s'agit de la façon normative de représenter l'installation d'un compteur à un `UsagePoint`.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:MasterDataLinkageConfig
```

```

xsi:schemaLocation = "http://iec.ch/TC57/2011/MasterDataLinkageConfig#
MasterDataLinkageConfig.xsd"
xmlns:m = "http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
<m:ConfigurationEvent>
  <m:createdDateTime>2011-11-09T19:55:43.699Z</m:createdDateTime>
  <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
  <m:reason>MeterInstallation</m:reason>
</m:ConfigurationEvent>
<m:Meter>
  <m:Names>
    <m:name>1234LG</m:name>
  </m:Names>
</m:Meter>
<m:UsagePoint>
  <m:Names>
    <m:name>SDP1234E001001</m:name>
  </m:Names>
</m:UsagePoint>
</m:MasterDataLinkageConfig>

```

5.10.3.3 SupplierConfig

La structure de message dans la Figure 65 permet de configurer les fournisseurs de service, et se substitue au message SupplierConfig défini dans la CEI 61968-9 :2009.

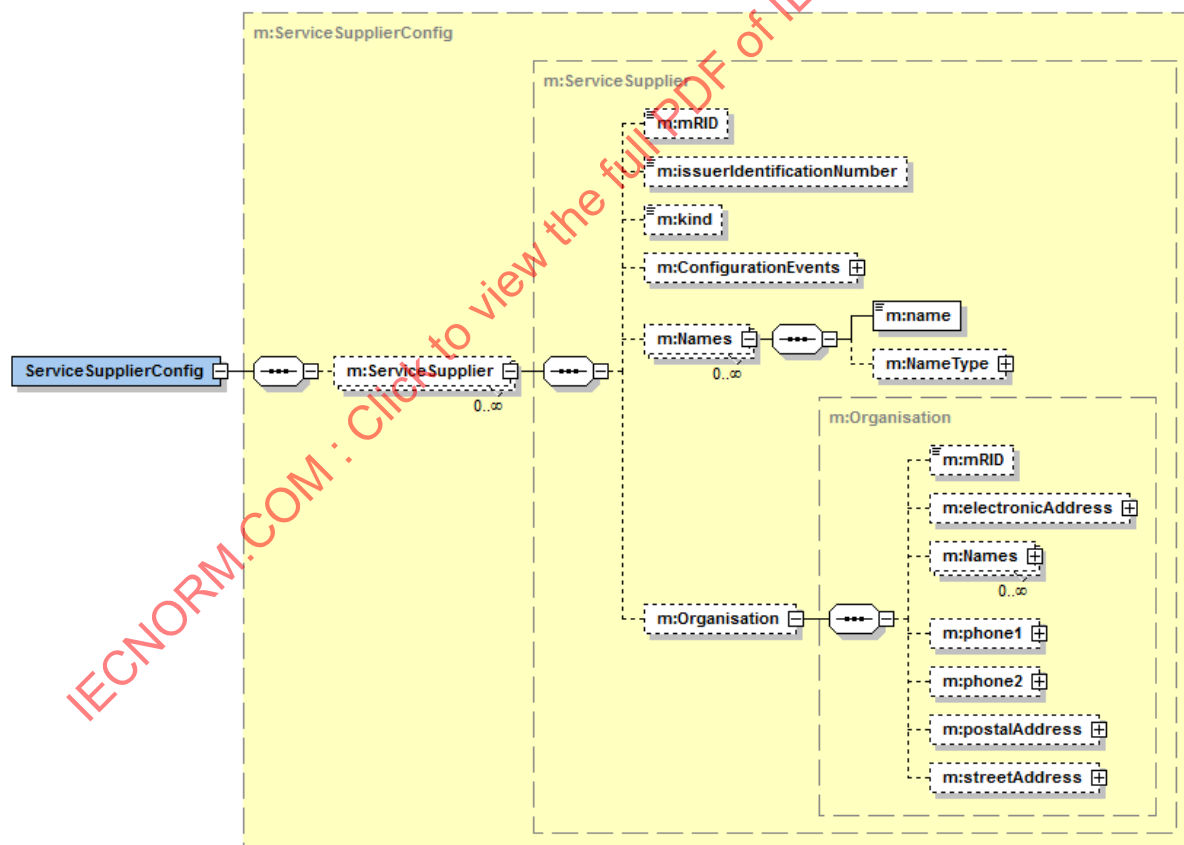


Figure 65 – Format de message de configuration des fournisseurs de service

5.10.3.4 CustomerConfig

La structure de message dans la Figure 66 ci-après est utilisée pour configurer les clients.

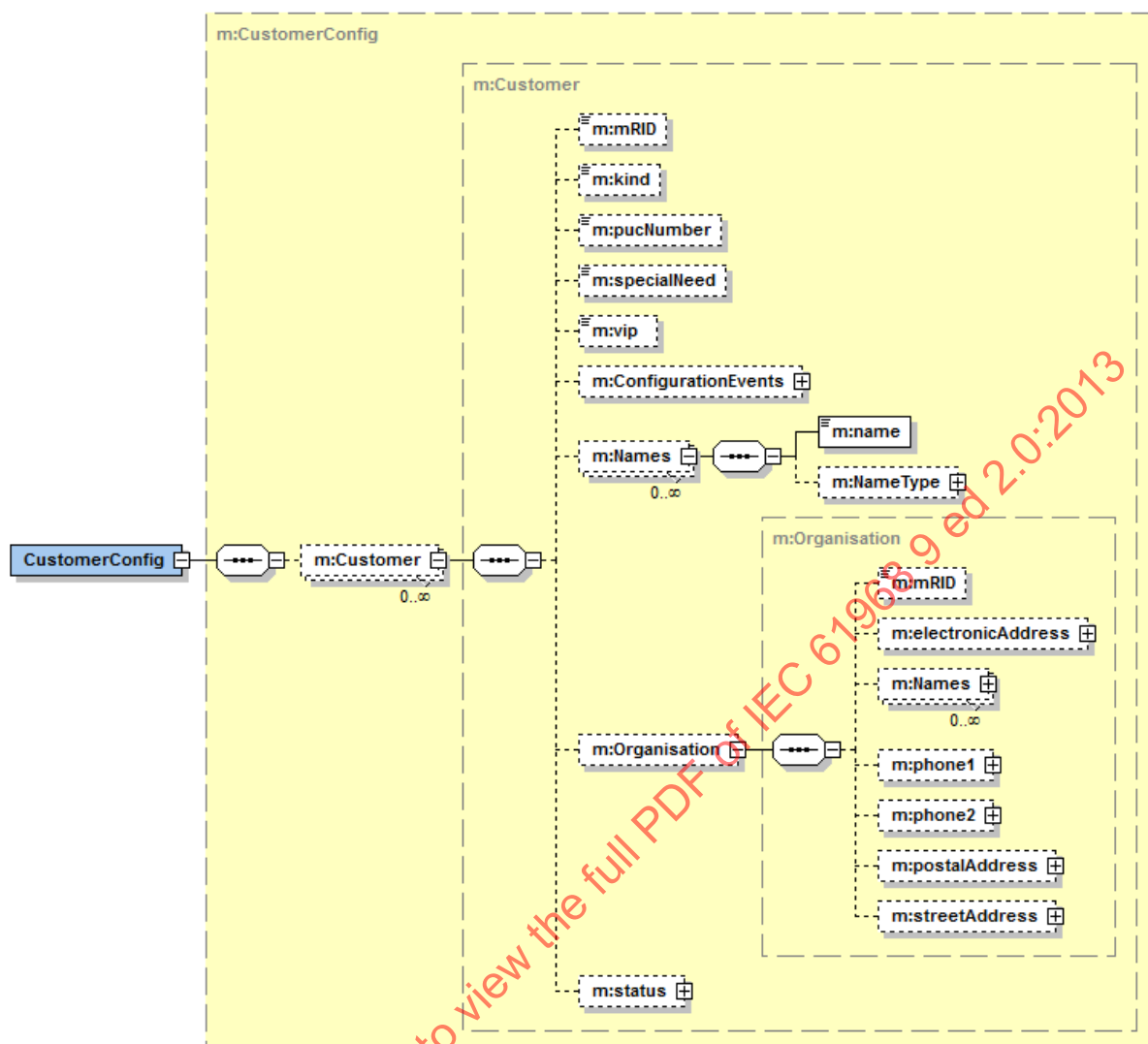


Figure 66 – Message de configuration client

5.10.3.5 CustomerAgreementConfig

La structure de message dans la Figure 67 ci-après est utilisée pour configurer les accords client.

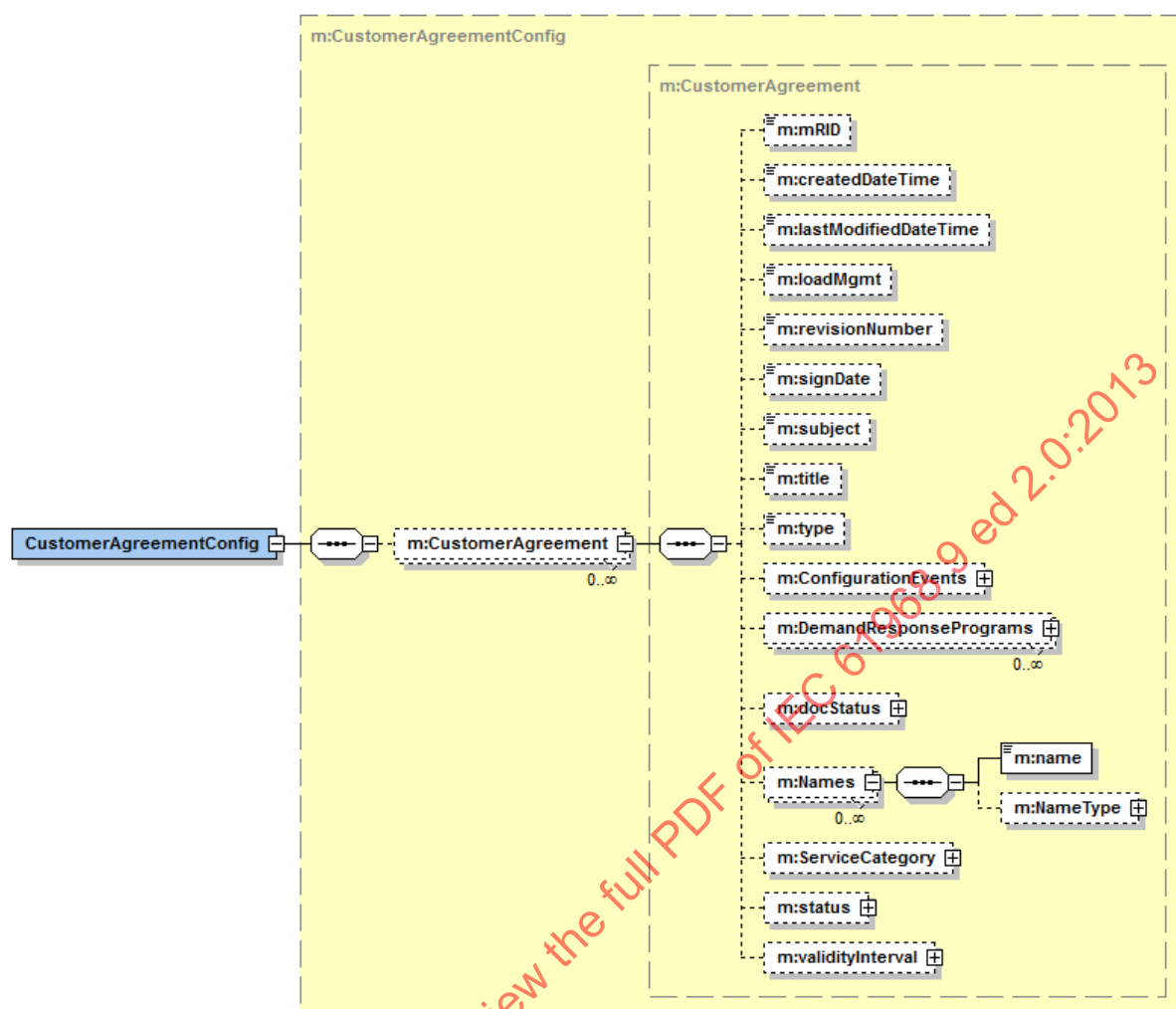
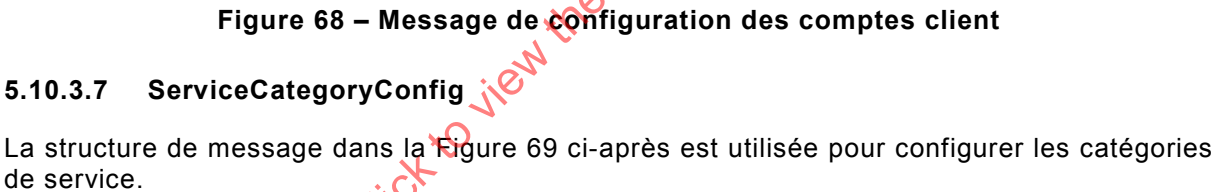


Figure 67 – Message de configuration des accords client

5.10.3.6 CustomerAccountConfig

La structure de message dans la Figure 68 ci-après est utilisée pour configurer les comptes client.



5.10.3.7 ServiceCategoryConfig

```

classDiagram
    class ServiceCategoryConfig
    class m_ServiceCategory["m:ServiceCategory"] {
        m:mRID
        m:kind
        m:ConfigurationEvents
        m:Names
    }
    class m_Names["m:Names"] {
        m:name
        m:NameType
    }
    ServiceCategoryConfig -- m_ServiceCategory
    m_ServiceCategory "0..∞" -- "0..∞" m_Names
    
```

5.10.3.8 UsagePointConfig

La structure de message dans la Figure 70 ci-après est utilisée pour configurer les points d'usage. Cela remplace le message des points de livraison de service défini dans la CEI 61968-9:2009.

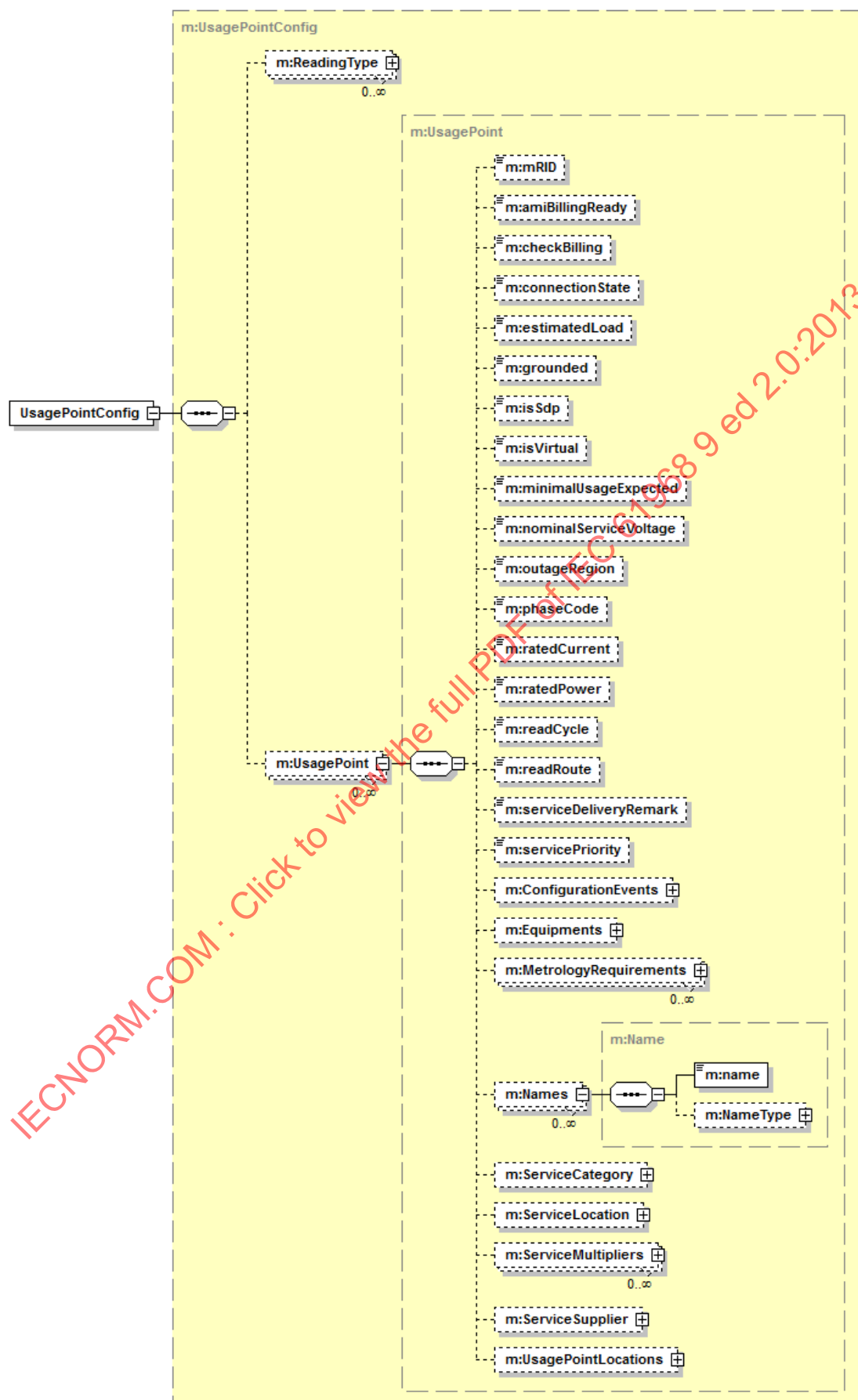


Figure 70 – Format de message UsagePointConfig

Un exemple de charge utile d'UsagePointConfig est montré ci-dessous.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:UsagePointConfig xsi:schemaLocation="http://iec.ch/TC57/2011/UsagePointConfig# UsagePointConfig.xsd"
  xmlns:m="http://iec.ch/TC57/2011/UsagePointConfig#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <m:UsagePoint>
    <m:isSdp>true</m:isSdp>
    <m:ConfigurationEvents>
      <m:createdDateTime>2011-11-09T10:58:03.616Z</m:createdDateTime>
      <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
    </m:ConfigurationEvents>
    <m:Names>
      <m:name>SDP1234E001001</m:name>
      <m:NameType>
        <m:name>PrimaryName</m:name>
      </m:NameType>
    </m:Names>
    <m:UsagePointLocation>
      <m:Names>
        <m:name>LOC1234</m:name>
        <m:NameType>
          <m:name>PrimaryName</m:name>
        </m:NameType>
      </m:Names>
    </m:UsagePointLocation>
  </m:UsagePoint>
</m:UsagePointConfig>
```

5.10.3.9 UsagePointLocation

Le diagramme dans la Figure 71 décrit la structure du message utilisée pour définir les UsagePointLocations.

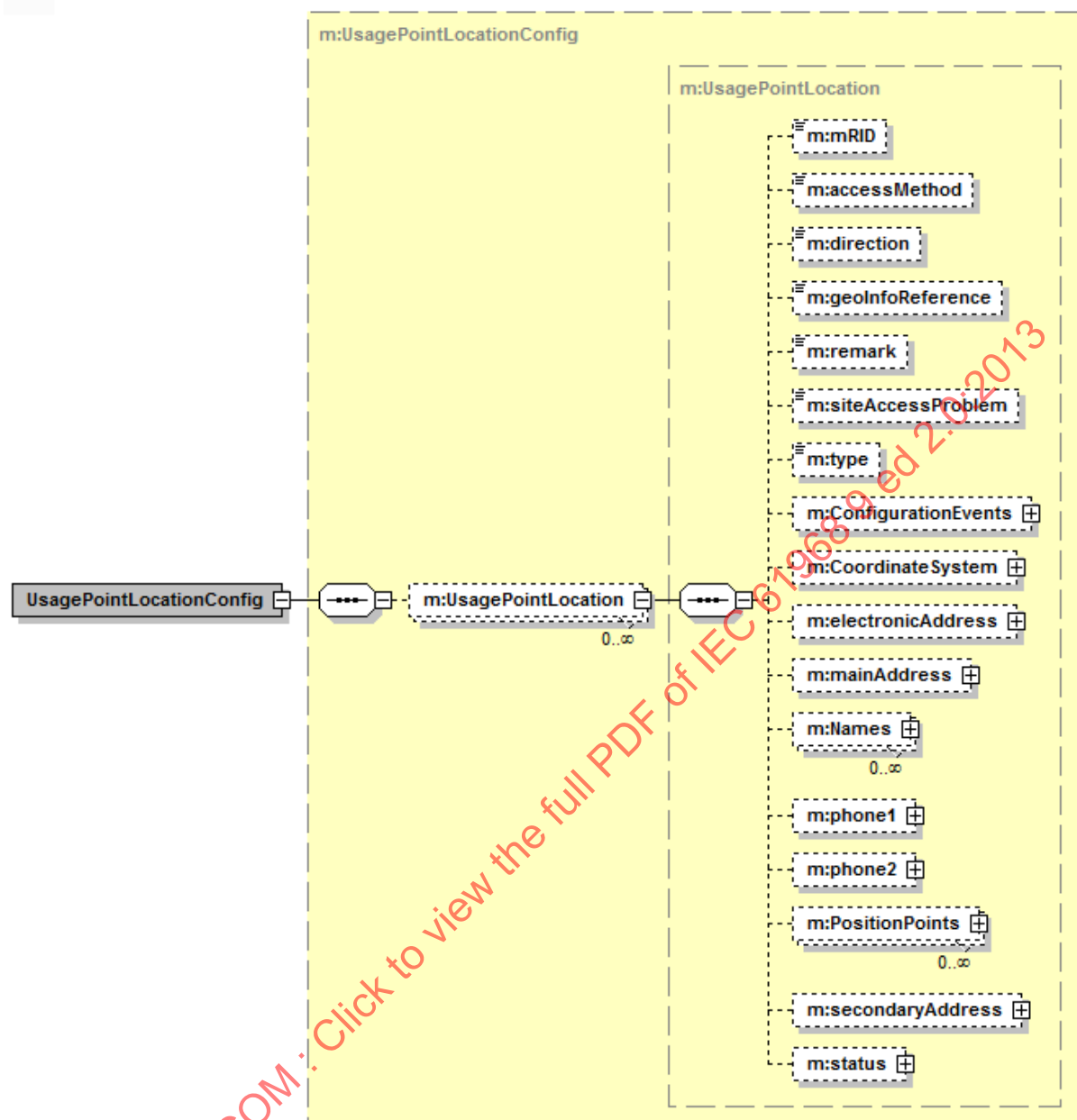


Figure 71 – Format de message UsagePointLocationConfig

Un exemple de charge utile d'UsagePointLocationConfig est montré ci-dessous.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:UsagePointLocationConfig
  xsi:schemaLocation = "http://iec.ch/TC57/2011/UsagePointLocationConfig#
UsagePointLocationConfig.xsd"
  xmlns:m = "http://iec.ch/TC57/2011/UsagePointLocationConfig#"
  xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
  <m:UsagePointLocation>
    <m:ConfigurationEvents>
      <m:createdDateTime>2011-11-09T10:57:02.583Z</m:createdDateTime>
      <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
    </m:ConfigurationEvents>
    <m:mainAddress>
      <m:streetDetail>
        <m:name>Main Street</m:name>
        <m:number>1234</m:number>
      </m:streetDetail>
      <m:townDetail>
        <m:country>US</m:country>
        <m:name>Austin</m:name>
      </m:townDetail>
    </m:mainAddress>
  </m:UsagePointLocation>
</m:UsagePointLocationConfig>
```



```

    <m:stateOrProvince>TX</m:stateOrProvince>
  </m:townDetail>
</m:mainAddress>
<m:Names>
  <m:name>LOC1234</m:name>
  <m:NameType>
    <m:name>PrimaryName</m:name>
  </m:NameType>
</m:Names>
</m:UsagePointLocation>
</m:UsagePointLocationConfig>

```

5.10.3.10 EndDeviceConfig

Le diagramme dans la Figure 72 décrit le haut niveau du message EndDeviceConfig qui est utilisé pour fournir une configuration basique des dispositifs terminaux.

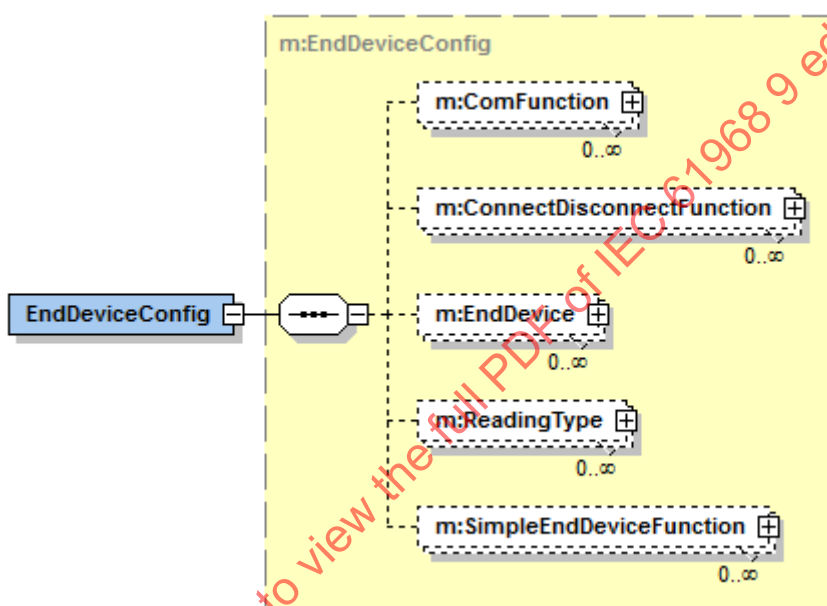


Figure 72 – Format des messages de configuration de dispositif terminal

5.10.3.11 MeterConfig

La structure de message dans la Figure 73 est utilisée pour configurer les compteurs, où il est possible de fournir des informations plus spécifiques aux compteurs.

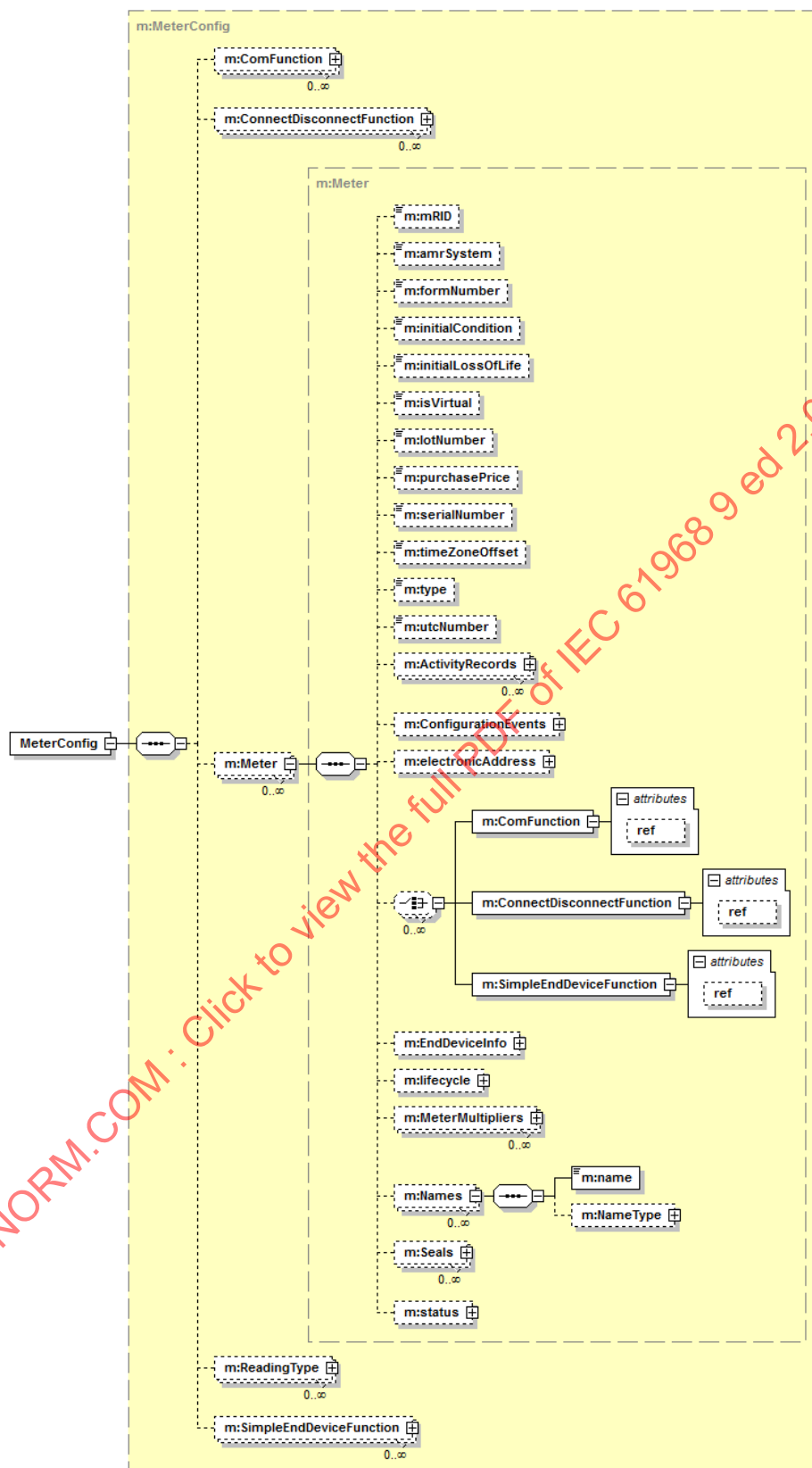


Figure 73 – Message de configuration du compteur

Un exemple de charge utile de MeterConfig est montré ci-dessous.

```
<?xml version="1.0" encoding="UTF-8"?>
<m:MeterConfig
```

```

xsi:schemaLocation = "http://iec.ch/TC57/2011/MeterConfig# MeterConfig.xsd"
xmlns:m = "http://iec.ch/TC57/2011/MeterConfig#"
xmlns:xsi = "http://www.w3.org/2001/XMLSchema-instance">
<m:Meter>
  <m:amrSystem>CCTR</m:amrSystem>
  <m:serialNumber>82000001</m:serialNumber>
  <m:ConfigurationEvents>
    <m:createdDateTime>2011-11-09T13:55:02.776Z</m:createdDateTime>
    <m:effectiveDateTime>2011-11-09T00:00:00.000Z</m:effectiveDateTime>
    <m:reason>AssetCreation</m:reason>
  </m:ConfigurationEvents>
  <m:EndDeviceInfo>
    <m:AssetModel>
      <m:modelNumber>F60</m:modelNumber>
      <m:Manufacturer>
        <m:Names>
          <m:name>LG</m:name>
        </m:Names>
      </m:Manufacturer>
    </m:AssetModel>
  </m:EndDeviceInfo>
  <m:Names>
    <m:name>1234LG</m:name>
    <m:NameType>
      <m:name>PrimaryName</m:name>
    </m:NameType>
  </m:Names>
</m:Meter>
</m:MeterConfig>

```

5.10.3.12 ComModuleConfig

Le diagramme ci-après fournit la structure de haut niveau du message utilisé pour configurer les modules de communication.

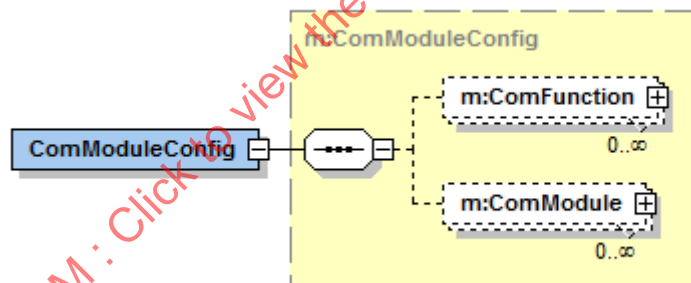


Figure 74 – Format de message ComModuleConfig

5.10.3.13 ServiceLocationConfig

La structure de message dans la Figure 75 ci-après est utilisée pour configurer les emplacements de service.

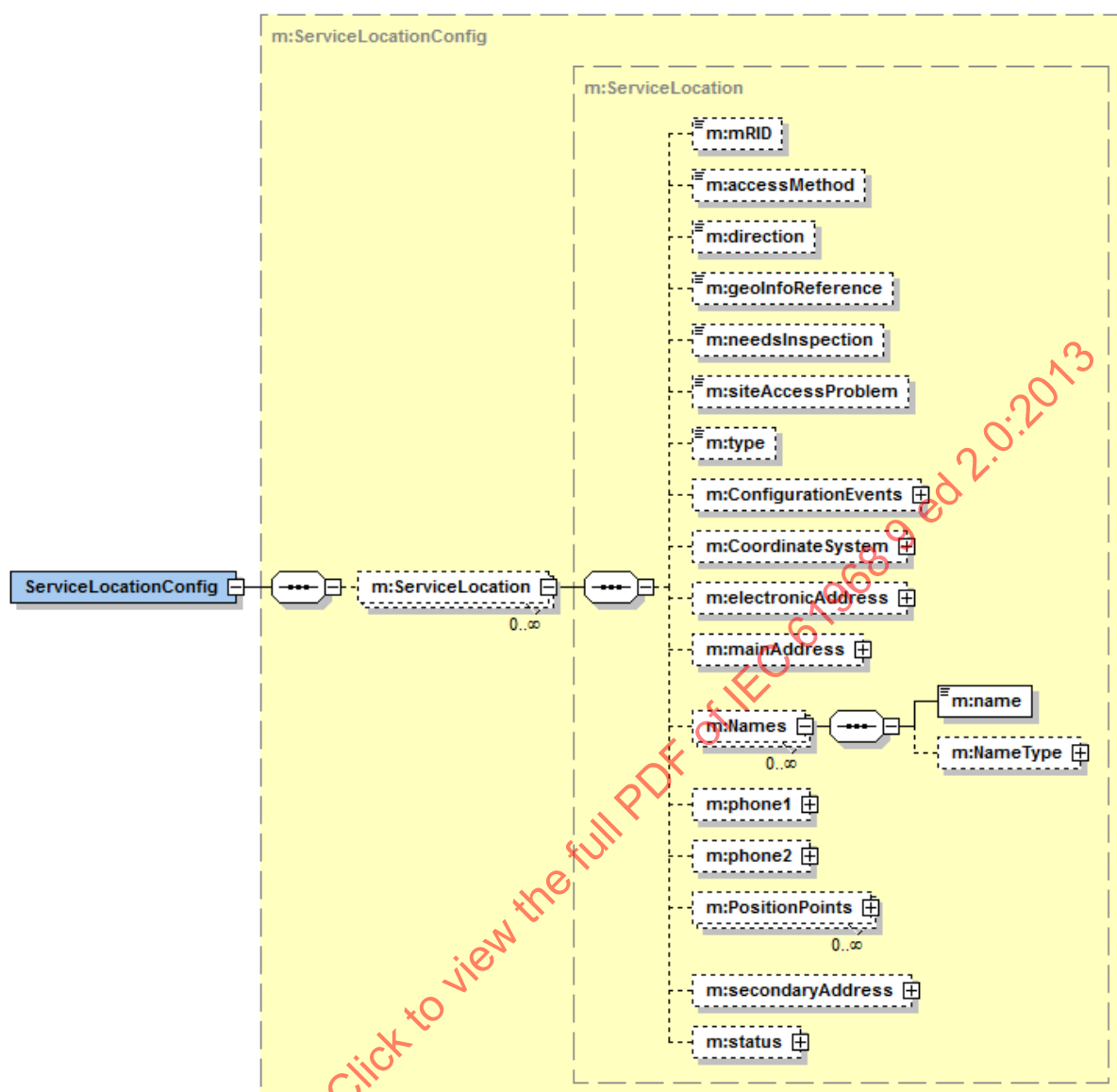


Figure 75 – Format de message ServiceLocationConfig

5.10.3.14 PricingStructureConfig

La structure de message dans la Figure 76 ci-après est utilisée pour configurer les structures de tarification.

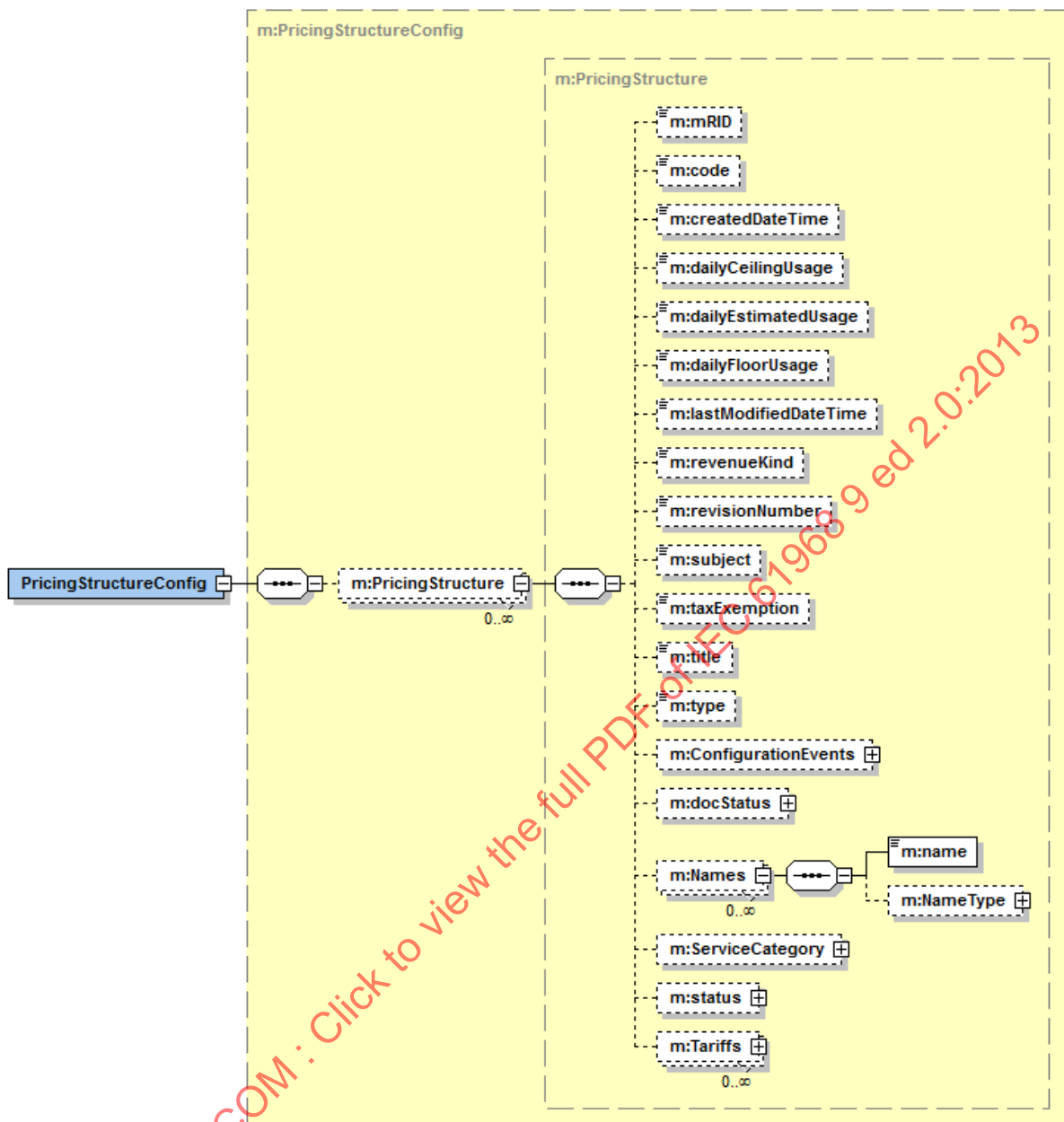


Figure 76 – Format de message PricingStructureConfig

6 Conventions du document

6.1 Diagrammes UML

Des diagrammes de séquences en UML contenus dans le présent document sont à considérer comme des exemples informatifs de la manière dont un échange de messages pourrait se produire.

L'une des forces du CIM est sa flexibilité. A mesure que la technologie progresse et que de nouveaux besoins apparaissent, de nouveaux messages peuvent être créés. Ces nouveaux messages pourraient impliquer des systèmes supplémentaires (non illustrés). Les nouveaux messages peuvent exercer un effet de levier sur des options différentes de celles décrites dans l'exemple.

Les diagrammes de communication en UML et les diagrammes de flots de messages contenus dans le présent document sont à considérer comme étant informatifs.

Tous les diagrammes de classes en UML contenus dans le présent document sont à considérer comme étant informatifs. Le lecteur est invité à se référer à la CEI 61968-1 pour localiser le document qui contient les définitions normatives des classes utilisées dans le CIM.

6.2 Définitions des messages

6.2.1 Généralités

Les diagrammes de formats de message contenus dans le corps du présent document sont à considérer comme étant normatifs, les schémas XML normatifs sont fournis dans l'Annexe H et les schémas XML informatifs sont fournis à l'Annexe I.

Les cas d'utilisation et les diagrammes de séquences sont présentés dans le présent document à titre informatif seulement et représentent des exemples d'utilisation pour les définitions de message normatives.

6.2.2 Obligatoire par opposition à optionnel

Les messages décrits dans la présente norme ont été dérivés de cas d'utilisation qui satisfont au besoin métier sous-jacent d'un échange d'informations spécifiques. Chaque cas d'utilisation fournit un contexte déterminé pour l'utilisation du CIM. Les diagrammes de format de message décrivent les éléments qui sont passés. Les éléments illustrés dans des cadres en traits tiretés sont à considérer comme étant facultatifs dans un contexte donné. Les éléments illustrés dans des cadres en traits pleins sont à considérer comme étant obligatoires dans un contexte donné. S'il convient qu'un diagramme décrive une classe entière comme obligatoire ou facultative, il convient que le lecteur interprète cela comme signifiant que l'utilisation de la classe est soit obligatoire, soit facultative, mais pas que chaque élément de la classe est maintenant obligatoire ou facultatif. Le lecteur doit se référer à la définition normative de la classe pour le déterminer.

6.2.3 Temps des verbes (Verbs)

Les verbes CIM de certains diagrammes de séquence au sein de la présente norme sont affichés en MAJUSCULE; néanmoins, il est nécessaire que les verbes des en-têtes de tous les messages CIM de la CEI 61968-9 soient en minuscules.

6.3 Messages synchrones par opposition à asynchrones

L'utilisation de messages synchrones ou asynchrones dans les diagrammes de séquence dans le présent document sert à titre d'illustration uniquement et n'est pas normative.

6.4 Représentation des messages simples d'accusé de réception

Dans les mises en œuvre des services Web, il y a toujours un accusé de réception synchrone des messages de demande même si le modèle d'échange global est asynchrone. Cet accusé de réception synchrone est réalisé à l'aide d'un simple message stéréotype de réponse de la CEI 61968-9 qui comprend:

Un en-tête de la CEI 61968-100

Une structure de réponse de la CEI 61968-100 avec:

Reply.Result = "OK"

Reply.Error.code = "0.3" (se référer à l'Annexe B).

Dans le cadre de l'utilisation de la messagerie JMS, cet accusé de réception simple est également compris dans le modèle de messagerie si l'AckRequired booléen est défini sur

"vrai" dans l'en-tête 61968 Partie 100 du message de demande. Cependant, cet accusé de réception simple est supprimé si l'AckRequired booléen est défini sur "faux".

La représentation ou l'absence de représentation de ces simples messages d'accusé de réception dans les diagrammes de séquence au sein du présent document est volontairement incohérente puisque les diagrammes de séquence sont informatifs et aucune hypothèse n'est effectuée quant à savoir si les services JMS ou Web sont en cours d'utilisation ou si l'AckRequired booléen est défini sur "vrai". Se reporter à la CEI 61968-100 pour de plus amples informations sur ce sujet.

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Annexe A (normative)

Description des verbes de types de messages

Le Tableau A.1 est copié ici depuis l'Annexe B de la CEI 61968-100:2013 pour des raisons de commodité uniquement.

Tableau A.1 – Verbes généralement utilisés

Verbes	Signification	Structure du message
create	Le verbe "create" (créer) sert à éditer une demande auprès du système de référence pour créer un nouvel objet. Le système de référence peut à son tour éditer le nouvel objet comme un événement en utilisant le verbe "created" (créé). Le système de référence peut aussi utiliser le verbe "reply" (répondre) pour répondre à une demande "create", indiquant si la demande a été traitée avec succès ou non.	Le message de demande inclura les structures HeaderType et Payload.
change	Le verbe "change" (changer) sert à éditer une demande auprès du système de référence pour apporter un changement à un objet en fonction de l'information contenue dans le message. Le système de référence peut à son tour éditer l'objet changé comme un événement en utilisant le verbe "changed" (changé) pour signaler que l'objet a été modifié depuis sa dernière édition. Le système de référence peut aussi utiliser le verbe "reply" (répondre) pour répondre à une demande "change", indiquant si la demande a été traitée avec succès ou non.	Le message de demande inclura les structures HeaderType et RequestType ainsi que, facultativement, la structure Payload. La structure requestType identifiera potentiellement les ID d'objets spécifiques.
cancel	Le verbe "cancel" (annuler) sert à éditer une demande auprès du système de référence pour annuler un objet, le plus souvent dans les cas où l'objet représente un document commercial. Le système de référence peut à son tour éditer le message annulé comme un événement en utilisant le verbe "canceled" (annulé) pour signaler que le document a été annulé depuis sa dernière édition. Le système de référence peut aussi utiliser le verbe "reply" (répondre) pour répondre à une demande "cancel", indiquant si la demande a été traitée avec succès ou non. Le verbe "cancel" est utilisé lorsque le contenu commercial du document n'est plus valide en raison d'une ou plusieurs erreurs.	Le message de demande inclura les structures HeaderType et RequestType ainsi que, facultativement, la structure Payload. La structure requestType identifiera potentiellement les ID d'objets spécifiques.
close	Le verbe "close" (fermer) sert à éditer une demande auprès du système de référence pour fermer un objet, le plus souvent dans les cas où l'objet représente un document commercial. Le système de référence peut à son tour éditer le message fermé comme un événement en utilisant le verbe "closed" (fermé) pour signaler que le document a été fermé depuis sa dernière édition. Le système de référence peut aussi utiliser le verbe "reply" (répondre) pour répondre à une demande "close", indiquant si la demande a été traitée avec succès ou non. Le verbe "close" (fermer) est utilisé lorsque le document commercial atteint la fin de son cycle de vie en raison de l'achèvement réussi d'un processus commercial.	Le message de demande inclura les structures HeaderType et RequestType ainsi que, facultativement, la structure Payload. La structure requestType identifiera potentiellement les ID d'objets spécifiques.
delete	Le verbe "delete" (supprimer) est utilisé pour éditer une demande auprès du système de référence pour supprimer un ou plusieurs objets. Le système de référence peut à son tour éditer le message fermé comme un événement en utilisant le verbe "deleted" (supprimé) pour signaler que l'objet a été supprimé depuis sa dernière édition. Le système de référence peut aussi utiliser le verbe "reply" (répondre) pour répondre à une demande "delete", indiquant si la demande a été traitée avec succès ou non. Le verbe "delete" est utilisé lorsqu'il convient de ne plus conserver l'objet commercial dans les systèmes intégrés soit en raison d'une ou plusieurs erreurs, soit pour des raisons d'archivage. Cependant, le système de référence conservera très vraisemblablement un enregistrement historique de l'objet après sa suppression.	Le message de demande inclura les structures HeaderType et RequestType ainsi que, facultativement, la structure Payload. La structure requestType identifiera potentiellement les ID d'objets spécifiques.
execute	Cela est utilisé lorsque le message transmet une transaction qui implique plusieurs opérations de création, suppression et/ou changement. Voir les Annexes K et L.	Voir OperationSet dans Message.xsd.
get	Le verbe "get" (récupérer) est utilisé pour émettre une demande	Le message de demande

Verbes	Signification	Structure du message
	d'interrogation à un système de référence pour retourner un ensemble d'un nombre zéro ou supérieur d'objets qui satisfont à un critère spécifié. Le système de référence peut à son tour retourner un nombre zéro ou supérieur d'objets en utilisant le verbe "reply" (répondre) dans un message de réponse.	inclura les structures HeaderType et RequestType. La structure requestType identifiera potentiellement les paramètres spécifiques pour qualifier la demande, tels que les ID d'objets.
created	Le verbe "created" (créé) est utilisé pour éditer un événement qui est une notification de la création d'un objet suite à une demande externe ou à une action interne au système de référence de l'objet en question. Ce type de message fait habituellement l'objet d'un abonnement de la part des systèmes intéressés et pourrait être utilisé pour des mises à jour en masse. Il n'est pas indispensable de répondre à ce type de message.	Le message d'événement inclura les structures HeaderType et Payload.
changed	Le verbe "changed" (changé) est utilisé pour éditer un événement qui est une notification du changement d'un objet suite à une demande externe ou à une action interne au système de référence de l'objet en question. Il pourrait s'agir d'un changement générique du contenu de l'objet ou d'un changement de statut spécifique tel que "approved" (approuvé), "issued" (émis) etc. Ce type de message fait habituellement l'objet d'un abonnement de la part des systèmes intéressés et pourrait être utilisé pour des mises à jour en masse. Il n'est pas indispensable de répondre à ce type de message.	Le message d'événement inclura les structures HeaderType et Payload.
closed	Le verbe "closed" (fermé) est utilisé pour éditer un événement qui est une notification de la fermeture normale d'un objet suite à une demande externe ou à une action interne au système de référence de l'objet en question. Ce type de message fait habituellement l'objet d'un abonnement de la part des systèmes intéressés et pourrait être utilisé pour des mises à jour en masse. Il n'est pas indispensable de répondre à ce type de message.	Le message d'événement inclura les structures HeaderType et Payload.
canceled	Le verbe "canceled" (annulé) est utilisé pour éditer un événement qui est une notification de l'annulation d'un objet suite à une demande externe ou à une action interne au système de référence de l'objet en question. Ce type de message fait habituellement l'objet d'un abonnement de la part des systèmes intéressés et pourrait être utilisé pour des mises à jour en masse. Il n'est pas indispensable de répondre à ce type de message.	Le message d'événement inclura les structures HeaderType et Payload.
deleted	Le verbe "deleted" (supprimé) est utilisé pour éditer un événement qui est une notification de la suppression d'un objet suite à une demande externe ou à une action interne au système de référence de l'objet en question. Ce type de message fait habituellement l'objet d'un abonnement de la part des systèmes intéressés et pourrait être utilisé pour des mises à jour en masse. Il n'est pas indispensable de répondre à ce type de message.	Le message d'événement inclura les structures HeaderType et Payload.
executed	Cela fournit un événement qui indique l'exécution d'une transaction.	Voir OperationSet dans Message.xsd.
reply	Il existe deux principales utilisations du verbe "reply" (répondre). Toutefois, dans les deux cas, il est seulement utilisé en réponse à des messages de demande, et ce, que le modèle utilisé soit synchrone ou asynchrone. La première utilisation est d'indiquer le succès, le succès partiel ou l'échec d'une demande transactionnelle au système de référence de créer, changer, supprimer, annuler ou fermer un document. La seconde utilisation est en réponse à une demande "get", lorsque les objets d'intérêt peuvent être retournés dans la réponse.	Utilisé uniquement pour les messages de réponse. Pour les réponses à des demandes transactionnelles, le message contiendra les structures HeaderType et ReplyType. Pour les réponses à des demandes "get", le message contiendra les structures HeaderType et ReplyType et, potentiellement, la structure Payload.

NOTE 1 Les verbes tels qu'énumérés dans cette norme le sont pour des raisons de commodité et reflètent aussi les changements qui peuvent se refléter dans les futures versions de la CEI 61968-1.

NOTE 2 Dans la présente norme (par exemple, sur les diagrammes de séquence), les verbes sont insensibles à la casse. Cependant, dans le message standard, ils DOIVENT être en minuscule. Le verbe SUBSCRIBE (souscrire) a été déconseillé. Toute utilisation de SUBSCRIBE indique que les messages au niveau transport (par exemple, JMS) peuvent être transmis entre les parties, mais il ne s'agit pas de messages de la CEI 61968-9.

Annexe B (informative)

Codes d'erreur de réponse

B.1 Présentation

La structure des messages pour transporter les Codes d'erreur de réponse est définie dans la CEI 61968-1. Des détails supplémentaires peuvent être donnés dans les documents d'aide tels que la CEI 61968-100. Les parties individuelles fournissent les codes propres aux applications. Les codes de réponse propres à l'application de la CEI 61968-9 sont définis ici.

Les codes de réponse normatifs sont définis par la CEI 61968-100.

B.2 Catégories de code de réponse

Les ReplyCodes peuvent être répartis en des familles telles que décrites au Tableau B.1:

Tableau B.1 – Catégories ReplyCode

Catégorie ReplyCode		Erreur	Statut normatif
0		Exempte d'erreur	N
1		Élément erroné ou absent	N
2		Paramètre non valide	N
3		Valeurs trop nombreuses	N
4		Demande abandonnée	N
5		Erreur d'application	N
6		Violation des règles métier	N
7		Problème de sécurité	N
N	Normative		
I	Informative		
D	Déconseillée		

B.3 Construction de code

Ces catégories peuvent servir comme base d'un plan de numérotation pour former des codes tels que ceux décrits par la formule ci-après.

ReplyCode ::= <ReplyCode Category> "." <ReplyCode Index>

B.4 Index de code

Les index de chaque catégorie sont décrits dans les Tableaux B.2 à B.9 ci-dessous.

Tableau B.2 – Enumérations exemptes d'erreur

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
0	0	Réussite / Pas d'erreur	N
0	1	Résultat partiel (résultats supplémentaires transmis dans des messages séparés)	N
0	2	Résultat partiel (aucun autre résultat à suivre)	N
0	3	Accusé de réception simple	N

Tableau B.3 – Enumérations des éléments absents

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
1	1	Elément(s) Noun introuvable(s) dans le message	N
1	2	Elément Revision introuvable dans le message	N
1	3	Elément(s) Verb introuvable(s) dans le message	N
1	5	Eléments Header obligatoires absents	N
1	6	Eléments Request obligatoires absents	N
1	7	Eléments Payload obligatoires absents	N
1	8	Le format de la demande n'est pas validé par rapport au schéma	N
1	9	Révision non prise en charge dans le message d'en-tête	N

Tableau B.4 – Enumérations des mauvaises valeurs

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
2	1	Discordance compteur/commutateur RCD	N ^a
2	2	Départ(s) non valide(s)	I
2	3	Discordance départ/poste	I ^a
2	4	Meter(s) non valide(s)	N
2	5	Noun non valide	N
2	6	ReadingType(s) non valide(s)	N
2	7	Poste(s) non valide(s)	I
2	8	Discordance commutateur/poste	I ^a
2	9	Verb non valide	N
2	10	Reading Type(s) non pris en charge	N
2	11	Discordance de charge utile	I
2	12	UsagePoint(s) non valide(s)	N
2	13	Discordance Meter/UsagePoint	N ^a
2	14	Source non valide	N
2	15	Request ID(s) non valide(s)	N

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
2	16	ServiceLocation(s) non valide(s)	N
2	17	Discordance Meter/ServiceLocation*	N
2	18	Discordance ComModule/Meter*	N ^a
2	19	CustomerAccount(s) non valide(s)	N
2	20	ServiceSupplier(s) non valide(s)	N
2	21	Discordance CustomerAccount/ServiceSupplier	N ^a
2	22	Customer(s) non valide(s)	N
2	23	Discordance Customer/CustomerAccount	N ^a
2	24	CustomerAgreement(s) non valide(s)	N
2	25	Discordance CustomerAccount/CustomerAgreement	N ^a
2	26	Discordance CustomerAgreement/UsagePoint	N ^a
2	27	Discordance CustomerAccount/UsagePoint	N ^a
2	28	Discordance ServiceSupplier/UsagePoint	N ^a
2	29	Discordance de la relation d'objets	N
2	30	ComModule(s) non valide(s)	N
2	31	Catégorie(s) de service non valide(s)	N
2	32	UsagePointLocation(s) non valide(s)	N
2	33	PricingStructure(s) non valide(s)	N

^a Conservé pour la rétrocompatibilité. Destiné à la dépréciation dans la future édition de la CEI 61968- 9; 2,29 sera utilisé à la place.

Tableau B.5 – Enumérations des valeurs trop nombreuses

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
3	1	Elements trop nombreux dans la demande	N
3	2	Demandes en attente trop nombreuses	N
3	3	ReadingTypes trop nombreux dans la demande	I

Tableau B.6 – Enumérations des délais de demande expirés

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
4	1	Délai de demande expiré	N
4	2	Service indisponible	I
4	3	Erreur locale lors du traitement	I

Tableau B.7 – Enumérations des erreurs d'application

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
5	1	Incapable de traiter la demande – niveau élevé d'activité du système	N
5	2	Incapable de traiter la demande – transaction non tentée	N

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
5	3	Incapable de traiter la demande – transaction tentée et échouée	N
5	4	Incapable de traiter la demande – plusieurs types d'erreur rencontrés	N
5	5	Tout ou Partie des types de relevé demandés ne sont pas disponibles dans le MDMS	N
5	6	Tout ou Partie des types de relevé demandés ne sont pas disponibles dans l'AMI	N
5	7	Tout ou Partie des données demandées ne sont pas disponibles	N
5	8	Incapable de traiter la demande – champ(s) obligatoire(s) absent(s)	N
5	9	Transaction abandonnée pour maintenir l'intégrité transactionnelle	N
5	10	Incapable de traiter la demande – fonctionnalité non prise en charge	N
5	11	Echec dû à la sécurité	N

Tableau B.8 – Enumérations des violations de règles métier

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
6	1	Demande annulée par règle métier	N
6	2	Demande mise en attente par règle métier	N
6	3	Demande libérée de l'emprise de la règle métier	N
6	4	Demande reprogrammée par règle métier	N
6	5	Demande annulée par l'utilisateur	N

Tableau B.9 – Enumérations des problèmes de sécurité

Catégorie ReplyCode	Index ReplyCode	Erreur	Statut normatif
7	1	Echec d'authentification temporaire	I
7	2	Authentification requise	I
7	3	Mécanisme d'authentification insuffisant	I
7	4	Echec de l'authentification	I
7	5	Action non autorisée pour l'utilisateur	I
7	6	Le mécanisme d'authentification nécessite un cryptage	I
7	7	violation du régime de sécurité (Policy)	I

B.5 Exemples de Reply.Error.code

Les codes de réponse sont construits selon une formule qui crée une notation avec point exprimée sous forme de chaîne. Les exemples de Reply.Error.codes sont donnés dans le Tableau B.10.

Tableau B.10 – Enumérations communes

Code de réponse	Description
0.0	Réussite / Pas d'erreur
0.1	Résultat partiel (résultats supplémentaires transmis dans des messages séparés)
0.2	Résultat partiel (aucun autre résultat à suivre)
0.3	Accusé de réception simple
1.5	Eléments Header obligatoires absents
1.6	Eléments Request obligatoires absents
1.7	Eléments Payload obligatoires absents
1.8	Le format de la demande n'est pas validé par rapport au schéma
1.9	Révision de message non prise en charge dans l'en-tête
2.4	Meter(s) non valide(s)
2.5	Noun non valide
2.6	ReadingType(s) non valide(s)
2.9	Verb non valide
2.10	ReadingType(s) non pris en charge
2.12	UsagePoint(s) non valide(s)
2.13	Discordance Meter/UsagePoint
2.14	Source non valide
2.15	Request ID(s) non valide(s)
2.16	ServiceLocation(s) non valide(s)
2.17	Discordance Meter/ServiceLocation*
2.18	Discordance ComModule/Meter*
2.19	CustomerAccount(s) non valide(s)
2.20	ServiceSupplier(s) non valide(s)
2.21	Discordance CustomerAccount/ServiceSupplier
2.22	Customer(s) non valide(s)
2.23	Discordance Customer/CustomerAccount
2.24	CustomerAgreement(s) non valide(s)
2.25	Discordance CustomerAccount/CustomerAgreement
2.26	Discordance CustomerAgreement/UsagePoint
2.27	Discordance CustomerAccount/UsagePoint
2.28	Discordance ServiceSupplier/UsagePoint
2.29	Discordance de la relation d'objets
2.30	ComModule(s) non valide(s)
2.31	ServiceCategory(ies) non valide(s)
2.32	UsagePointLocation(s) non valide(s)
2.33	PricingStructure(s) non valide(s)
3.1	Eléments trop nombreux dans la demande
3.2	Demandes en attente trop nombreuses
4.1	Délai de demande expiré
5.1	Incapable de traiter la demande – niveau élevé d'activité du système
5.2	Incapable de traiter la demande – transaction non tentée

Code de réponse	Description
5.3	Incapable de traiter la demande – transaction tentée et échouée
5.4	Incapable de traiter la demande – plusieurs types d'erreur rencontrés
5.5	Tout ou Partie des ReadingTypes demandés ne sont pas disponibles dans le MDMS
5.6	Tout ou Partie des ReadingTypes demandés ne sont pas disponibles dans l'AMI
5.7	Tout ou Partie des données demandées ne sont pas disponibles
5.8	Incapable de traiter la demande – champ(s) obligatoire(s) absent(s)
5.9	Transaction abandonnée pour maintenir l'intégrité transactionnelle
6.1	Demande annulée par règle métier
6.2	Demande mise en attente par règle métier
6.3	Demande libérée de l'emprise de la règle métier
6.4	Demande reprogrammée par règle métier
6.5	Demande annulée par l'utilisateur
7.1	Echec d'authentification temporaire
7.2	Authentification requise
7.3	Mécanisme d'authentification insuffisant
7.4	Echec de l'authentification
7.5	Action non autorisée pour l'utilisateur
7.6	Le mécanisme d'authentification nécessite un cryptage
7.7	violation du régime de sécurité (Policy)

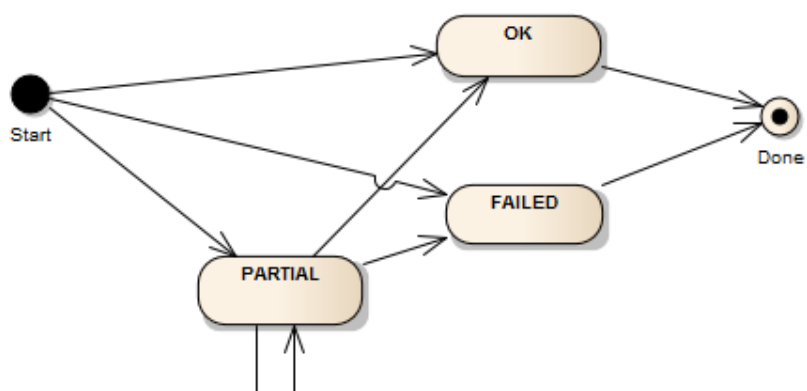
L'enveloppe du message standard a également une seule valeur Reply.Result. Il convient qu'elle soit remplie de la manière suivante:

"OK" s'il n'y a aucune erreur et si tous les résultats ont été renvoyés. Il n'y a aucune exigence indiquant qu'un enregistrement Reply.Error avec le code "0.0" est à être présent.

"PARTIAL" si seul un ensemble partiel des résultats a été renvoyé, avec ou sans erreurs. Un enregistrement Reply.Error avec le code "0.1" peut être présent, ainsi que des enregistrements qui indiquent des erreurs.

"ERROR" si tout enregistrement Error avec un code autre que "0,*" est renvoyé, indiquant des erreurs réelles.

Cela est représenté par le diagramme de transition d'état dans la Figure B.1.

**Légende**

Anglais	Français
Start	Démarrer
PARTIAL	PARTIEL
FAILED	ECHEC
Done	Terminé

Figure B.1 – Etats des messages de réponse

Annexe C (normative)

Procédure pour la création d'un nom de ReadingType

C.1 Généralités

L'énumération ReadingType est un identificateur important dans les messages MeterReading. La présente norme spécifie un profil qui sera considéré comme étant normatif. La CEI 61968-9 a été développée en ayant plusieurs principes de conception à l'esprit:

Il convient que les messages soient simples et à objectif général.

Il convient qu'un message "Readings" puisse transporter tout type de valeur potentiellement présent dans un compteur, par exemple, la puissance, l'énergie, les comptes de manœuvre relais, les informations de statut et la devise. Il convient que Readings.ReadingType puisse réaliser la description, quelle que soit la valeur Readings.value.

Il est plus simple pour un client de données d'écarter les informations disponibles mais non nécessaires, que de recréer les informations nécessaires mais non disponibles.

Ce troisième principe implique qu'il convient d'avoir des producteurs de données aussi explicites que possible lors de la publication des données. Par conséquent, il convient que les données soient totalement auto-descriptives afin que d'autres clients accédant aux données (peut-être lorsqu'elles résident dans un entrepôt de données) puissent déterminer par eux-mêmes la compatibilité de l'utilisation des données. Ainsi, le client de données n'aura pas besoin d'essayer de reconstruire tout accord tacite en place au moment de la publication.

Il est admis qu'il y aura des cas où un client de données (faisant une demande d'informations) pourrait ne pas connaître tous les détails spécifiques concernant la demande. Par exemple, un demandeur peut souhaiter obtenir la "tension" à un emplacement donné. Il peut ne pas savoir si le service est monophasé ou polyphasé. Il convient de pouvoir effectuer sa demande selon les connaissances dont il dispose et le producteur de données essaye d'y répondre et de fournir des détails supplémentaires dans la réponse appropriée. Cela peut donner un (des) ReadingType(s) utilisé(s) dans la réponse légèrement différents du ReadingType utilisé dans la demande.

C.2 Comprendre les attributs importants d'un nom d'élément de données

C.2.1 Généralités

Les éléments de données peuvent être décrits en termes de 18 attributs clés (dont plusieurs sont des attributs composés (compound)). Chaque attribut comprend la caractéristique qu'une valeur égale à zéro ("0") signifie qu'il n'est pas applicable à la description. Les attributs composés constituent la seule exception à cette règle. Dans ce cas, deux zéros signifient que l'attribut n'est pas applicable.

C.2.2 Attribut n° 1, macroPeriod

La macroPeriod décrit un aspect des données qui reflète la manière dont elles sont vues ou saisies au cours d'une longue période. Celles-ci sont énumérées dans le Tableau C.1.

Tableau C.1 – Enumérations des périodes intéressantes

Code	Enumération	Commentaires	Statut normatif
0	none	Non applicable	N
8	billingPeriod	Capturé pendant la période de facturation débutant à minuit au premier jour de la période de facturation (tel que défini par le jour du cycle de facturation). Si cela survient pendant la période de facturation actuelle, il indique une période depuis le début de la période de facturation actuelle jusqu'à "maintenant".	N
11	daily	Période quotidienne commençant à minuit. Si cela survient pendant la journée en cours, il indique la période à partir de minuit jusqu'à "maintenant".	N
13	monthly	Période mensuelle commençant à minuit le premier jour du mois. Si cela survient pendant le mois en cours, il indique la période à partir du début du mois jusqu'à "maintenant".	N
22	seasonal	Une saison qui s'étend sur plusieurs mois. Par exemple: un cycle basé sur l'"été", le "printemps", l'"automne" et l'"hiver". Si cela survient pendant la saison en cours, il indique la période à partir du début de la saison actuelle jusqu'à "maintenant".	N
24	weekly	Période hebdomadaire commençant à minuit le premier jour de la semaine et se terminant l'instant avant minuit le dernier jour de la semaine. Si cela survient pendant la semaine en cours, il indique la période à partir du début de la semaine jusqu'à "maintenant".	N
32	specifiedPeriod	Pour la période définie par le début et la fin de l'élément TimePeriod dans le message.	N

C.2.3 Attribut n° 2, agrégat

C.2.3.1 Généralités

La méthode d'observation d'un relevé dans l'agrégat (par comparaison avec d'autres) sert de second attribut. Les énumérations possibles comprennent celles décrites dans le Tableau C.2. Cet attribut peut être utilisé pour définir une opération mathématique réalisée sur la période intéressante définie par l'attribut n° 1.

Tableau C.2 – Enumérations des qualificateurs de données

Code	Enumération	Commentaires	Statut normatif
0	none	Non applicable	N
2	average		N
4	excess	La valeur représente une quantité au-dessus de laquelle un seuil a été dépassé.	I
5	highThreshold	La valeur représente un seuil programmé.	I
7	lowThreshold	La valeur représente un seuil programmé.	I
8	maximum	Valeur la plus élevée observée	N
9	minimum	Valeur la plus petite observée	N
11	nominal		I
12	normal		I
16	secondMaximum	Deuxième valeur la plus élevée observée	N
17	secondMinimum	Deuxième valeur la plus petite observée	N
23	thirdMaximum	Troisième valeur la plus élevée observée	N
24	fourthMaximum	Quatrième valeur la plus élevée observée	N
25	fifthMaximum	Cinquième valeur la plus élevée observée	N

Code	Enumération	Commentaires	Statut normatif
26	sum	La somme accumulée	N
27	high	Généralement utilisé pour identifier le port du flux volumique élevé d'un compteur d'eau composé.	I
28	low	Généralement utilisé pour identifier le port du flux volumique faible d'un compteur d'eau composé.	I
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

C.2.3.2 Modifications apportées par cette édition

Dans la CEI 61968-9:2009, il était suggéré que "TestData" puisse être utilisé en tant qu'énumération pour indiquer qu'une valeur n'était pas une valeur réelle de facturation. Dans cette édition de la CEI 61968-9, on encourageait plutôt l'utilisation des codes ReadingQuality afin d'identifier les données d'essai. De la même manière, il convient d'identifier les données "absentes" ou "instables" par le biais d'un code ReadingQuality adapté. Les informations portant sur les codes ReadingQuality peuvent être consultées à l'Annexe D.

Dans cette édition de la CEI 61968-9, l'attribut n° 2 est strictement utilisé pour les qualificatifs de plage. Les termes comme "absolu" qui peuvent être utilisés pour qualifier un relevé de pression ou des données d'intervalle sont traités ailleurs. Des unités de mesure séparées ont été créées afin de distinguer la pression manométrique de la pression absolue. En outre, la distinction entre "intervalData absolu" et "intervalData différentiel" est désormais traitée par le schéma de message. Les relevés individuels (de nature "bulkQuantity" ou "indicating") sont simplement présentés en tant que relevés ayant l'attribut "absolu" qui est implicite. L'attribut "Incremental intervalData" est désormais décrit par le terme "DeltaData" et par une présentation des données dans la Partie "intervalReadings" du message.

C.2.4 Attribut n° 3, measuringPeriod

C.2.4.1 Généralités

La measuringPeriod fournit un "adjectif" pour décrire les aspects d'une "période" en relation avec la mesure. Cet attribut décrit un "attribut temps" intrinsèque ou fondamental à la valeur de relevé. L'attribut fait référence à la manière dont la valeur a initialement été mesurée et non à la fréquence à laquelle elle est consignée ou présentée. (Par exemple, un intervalle horaire de données de consommation aurait un attribut de valeur "hourly". Cependant, dans le cas d'une valeur de tension échantillonnée sur une base horaire, le schéma meterReadings porterait les informations de taille d'intervalle "hourly".) Les valeurs énumérées comprennent les valeurs décrites au Tableau C.3. Par comparaison avec l'attribut #1, la measuringPeriod est un intervalle de temps de courte durée caractéristique de la méthode de saisie du relevé, tandis que la macroPeriod est un intervalle de temps de longue durée relatif à la méthode de rapport de ce même relevé. Ces attributs sont appelés uniquement si la description des données le nécessite. Pour de nombreux relevés par cadran, il est nécessaire que seul l'horodatage d'accompagnement soit significatif.

Tableau C.3 – Enumérations de measuringPeriod

Code	Enumération	Commentaires	Statut normatif
0	none	Non applicable	N
1	tenMinute	10 min	N
2	fifteenMinute	15 min	N
3	oneMinute	1 min	N
4	twentyfourHour	24 h	N
5	thirtyMinute	30 min	N
6	fiveMinute	5 min	N
7	sixtyMinute	60 min	N
10	twoMinute	2 min	N
14	threeMinute	3 min	N
15	present	Dans la période présente	I
16	previous	Dans le cycle et le jeu de données mensuels précédents	I
31	twentyMinute	Intervalle de 20 min	N
50	fixedBlock60Min	Bloc fixe de 60 min	N
51	fixedBlock30Min	Bloc fixe de 30 min	N
52	fixedBlock20Min	Bloc fixe de 20 min	N
53	fixedBlock15Min	Bloc fixe de 15 min	N
54	fixedBlock10Min	Bloc fixe de 10 min	N
55	fixedBlock5Min	Bloc fixe de 5 min	N
56	fixedBlock1Min	Bloc fixe de 1 min	N
57	rollingBlock60MinIntvl30MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 30 min	N
58	rollingBlock60MinIntvl20MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 20 min	N
59	rollingBlock60MinIntvl15MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 15 min	N
60	rollingBlock60MinIntvl12MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 12 min	N
61	rollingBlock60MinIntvl10MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 10 min	N
62	rollingBlock60MinIntvl6MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 6 min	N
63	rollingBlock60MinIntvl5MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 5 min	N
64	rollingBlock60MinIntvl4MinSubIntvl	bloc roulant de 60 min avec des sous-intervalles de 4 min	N
65	rollingBlock30MinIntvl15MinSubIntvl	bloc roulant de 30 min avec des sous-intervalles de 15 min	N
66	rollingBlock30MinIntvl10MinSubIntvl	bloc roulant de 30 min avec des sous-intervalles de 10 min	N
67	rollingBlock30MinIntvl6MinSubIntvl	bloc roulant de 30 min avec des sous-intervalles de 6 min	N
68	rollingBlock30MinIntvl5MinSubIntvl	bloc roulant de 30 min avec des sous-intervalles de 5 min	N
69	rollingBlock30MinIntvl3MinSubIntvl	bloc roulant de 30 min avec des sous-intervalles de 3 min	N
70	rollingBlock30MinIntvl2MinSubIntvl	bloc roulant de 30 min avec des sous-intervalles de 2 min	N

Code	Enumération	Commentaires	Statut normatif
		2 min	
71	rollingBlock15MinIntvl5MinSubIntvl	bloc roulant de 15 min avec des sous-intervalles de 5 min	N
72	rollingBlock15MinIntvl3MinSubIntvl	bloc roulant de 15 min avec des sous-intervalles de 3 min	N
73	rollingBlock15MinIntvl1MinSubIntvl	bloc roulant de 15 min avec des sous-intervalles de 1 min	N
74	rollingBlock10MinIntvl5MinSubIntvl	bloc roulant de 10 min avec des sous-intervalles de 5 min	N
75	rollingBlock10MinIntvl2MinSubIntvl	bloc roulant de 10 min avec des sous-intervalles de 2 min	N
76	rollingBlock10MinIntvl1MinSubIntvl	bloc roulant de 10 min avec des sous-intervalles de 1 min	N
77	rollingBlock5MinIntvl1MinSubIntvl	bloc roulant de 5 min avec des sous-intervalles de 1 min	N
78	twelveMinute	12 min	N
79	twoHour	2 h	N
80	fourHour	4 h	N
81	sixHour	6 h	N
82	twelveHour	12 h	N
83	threeHour	3 h	
100	specifiedInterval	La durée de l'intervalle est décrite dans l'attribut n° 10 en secondes. Il convient que l'attribut n° 11 soit "1" pour les secondes entières.	N
101	specifiedFixedBlock	La durée du bloc fixe est décrite dans l'attribut n° 10 en secondes. Il convient que l'attribut n° 11 soit "1" pour les secondes entières.	N
102	specifiedRollingBlock	La taille du bloc roulant est décrite par l'attribut n° 10 en secondes et la taille du sous-intervalle par l'attribut n° 11 en secondes.	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

En général, les compteurs consignent la demande sous une forme qui est mesurée au cours d'une fraction d'une heure. Pour leur part cependant, les applications d'entreprise supposent généralement que la demande (qui a une unité de mesure en "kW" ou "kVAr") est normée à 1 h. Le système de comptage doit réaliser cette transformation avant la publication et l'utilisation par les autres systèmes. Le scalaire utilisé est choisi sur la base de la taille du bloc (et non d'une quelconque taille de sous-intervalle). Lesdits scalaires sont répertoriés dans le Tableau C.4

Tableau C.4 – Scalaires de normalisation de la demande

Dimension du bloc de demande	Scalaire de normalisation
1 h	1
30 min	2
20 min	3
15 min	4
10 min	6
1 min	60

Par exemple, avant la normalisation, il peut être indiqué que les données "15minuteFixedBlock" disposent d'unités de "kilo quart-watt-heure" (kWh). Après la normalisation, l'unité de mesure deviendrait "kilo-watt-heure". Puisque "kilo quart-watt-heure" n'est pas une unité de mesure utilisable, il convient que les systèmes souhaitant communiquer les données brutes sous cette forme utilisent une unité de mesure telle que "compte" et l'élément PendingCalculation qui transporte le scalaire (ou multiplicateur) requis et l'unité de mesure résultante lorsqu'elle est appliquée.

C.2.4.2 Utilisations courantes (informative)

Les données d'intervalles sont généralement trouvées dans les tailles "60 min", "30 min" et "15 min". Des tailles plus grandes telles que "24 h" et plus petites allant jusqu'à "1 min" sont également possibles mais moins courantes. Il convient que les utilisateurs de la norme exploitent les énumérations d'intervalles existants quand elles existent, mais si la taille d'intervalle requise n'existe pas, un "specifiedInterval" peut être utilisé. Cela permet à l'énumération elle-même d'intégrer la taille de l'intervalle dans l'énumération. De la même manière, les tailles de blocs fixes et roulants non courantes peuvent être indiquées.

La CEI 61968-9:2009 proposait d'utiliser les termes "Décalé", "Présent" et "Précédent" en tant qu'adjectifs afin de décrire l'état du compteur. Bien que cela fonctionne correctement pour publier les données à partir d'un système de comptage, ils peuvent être difficiles à utiliser entre d'autres applications d'entreprise. Il semble que si "present" et "previous" sont des attributs importants de données quand ils sont au niveau du compteur; plus l'un s'éloigne du compteur, moins ces attributs deviennent importants. Avec la cette édition de la CEI 61968-9, on propose de se reposer sur la durée pendant laquelle les données sont enregistrées pour déterminer si une valeur appartient à la période de facturation "present" ou "previous" plutôt qu'aux énumérations "present" ou "previous". En outre, les règles utilisées pour calculer la demande sont assez importantes. Une seule demande "Daily" n'est généralement pas adaptée pour calculer la facture d'un client. Un ensemble complet de demandes "Daily" ou une seule demande de "Billing" sont généralement requis. Il convient de faire une distinction entre les périodes d'observation Daily/Billing/Seasonal dans le ReadingType. Dans tous les cas, l'horodatage associé à la demande maximale pourrait être utilisé pour savoir à quel(le) jour, mois ou saison correspond une demande "daily", "billing" ou "seasonal".

Dans une entreprise de distribution où plusieurs techniques de saisie de la demande existent, il devient important de communiquer entre les systèmes la définition selon laquelle les données de demande sont saisies. Les énumérations sont fournies dans la présente seconde édition, ce qui permet au producteur de données d'être aussi précis que possible lors de la description du type de données de demande transmises.

C.2.5 Attribut n° 4, accumulation

C.2.5.1 Généralités

L'attribut "accumulation" indique comment la valeur est représentée aux fins d'accumulation au fil du temps. Les valeurs énumérées comprennent celles décrites dans le Tableau C.5.

Un avantage que présente le fait de déclarer explicitement le comportement d'accumulation comme partie du readingType dans un échange entre un MS et une MDM est d'aider la MDM à assurer que les règles de validation appropriées sont appliquées aux données fournies par le MS.

Tableau C.5 – Enumérations des comportements d'accumulation

Code	Enumération	Commentaires	Statut normatif
0	none	Non Applicable ou donné implicitement par l'unité de mesure.	N
1	bulkQuantity	Une valeur issue d'un registre qui représente la quantité en gros d'une marchandise. Cette quantité est calculée comme étant l'intégrale du taux d'utilisation de la marchandise. En général, cette valeur est utilisée comme base du relevé au cadran sur le compteur et, de ce fait, se réinitialisera après avoir atteint une valeur de cadran maximale. NOTE 1 Avec le système de comptage, le comportement d'addition implique un comportement de soustraction afin que la valeur présentée soit toujours une valeur positive (par exemple, un entier non signé ou un décimal positif). Dans le cadre de la communication de données entre les applications d'entreprise, une valeur négative peut néanmoins survenir dans un cas tel que le comptage de réseau. NOTE 2 Un BulkQuantity fait principalement référence au relevé au cadran et non à la consommation au cours d'une période spécifique.	N
2	continuousCumulative	La somme des valeurs dans la période de facturation précédente et de la valeur dans la présente période. Note: "ContinuousCumulative" est généralement utilisé conjointement à "demand". Le "ContinuousCumulative Demand" serait la somme cumulée des valeurs de demande maximale de la période de facturation précédente (qui survient à chaque réinitialisation de la demande) ajouté à la valeur de demande maximale de la période présente (qui n'a pas encore été réinitialisée).	N
3	cumulative	La somme des valeurs dans les périodes de facturation antérieures. Note: "Cumulative" est généralement utilisé conjointement à "demand". Chaque réinitialisation de la demande fait que la valeur de demande maximale pour la période de facturation présente (depuis la dernière réinitialisation de la demande) s'ajoute en tant que total cumulé de toutes les demandes maximales. Donc au lieu de "remettre à zéro" le registre de demande, une réinitialisation de la demande provoque l'ajout de la demande maximale présente à ce total cumulé.	N
4	deltaData	La différence entre la valeur à la fin de l'intervalle spécifié et au début de l'intervalle. Cela est utilisé pour les données d'intervalles différentielles. NOTE 3 Une application commune viserait les données de profil de charge, une autre utilisation pourrait être de rapporter le nombre d'événements au sein d'un intervalle (tel que le nombre d'excitations de l'équipement pendant la période spécifiée).	N
6	indicating	Comme si une aiguille pointait sur le compteur sur une valeur pour indiquer la valeur courante. Note: une valeur "indicating", généralement mesurée sur des centaines de millisecondes ou plus, peut impliquer un mécanisme "poussant" pour saisir une valeur. Comparer cela à "instantaneous" qui est mesuré sur une plus courte durée).	N
9	summation	Une forme d'accumulation qui est sélective par rapport au temps. NOTE 4 La "Somme" pourrait être considérée comme une spécialisation de "BulkQuantity" conformément aux règles d'héritage où la "Somme" cumule de manière sélective les impulsions au cours d'un modèle temporel et où "BulkQuantity" cumule les impulsions tout le temps.	I
10	timeDelay	Une forme de calcul qui introduit une caractéristique de retard temporel dans la valeur de la donnée	I
12	instantaneous	Généralement mesuré sur la période la plus rapide autorisée par la définition de la mesure (habituellement des millisecondes ou des dizaines de millisecondes). Note: "Instantaneous" a été déplacé vers l'attribut n° 3 de la 61968-9 Ed2 depuis l'attribut	N

Code	Enumération	Commentaires	Statut normatif
		n° 1 dans la 61968-9:2009).	
13	latchingQuantity	Lorsque cette description est appliquée à une valeur mesurée, cela signifie que la valeur est une quantité cumulée indépendante du temps plus un BulkQuantity, hormis qu'il s'insère dans la valeur maximale lorsqu'il atteint cette valeur. Toute accumulation supplémentaire (positive ou négative) est ignorée jusqu'à la survenue d'une réinitialisation. NOTE 5 Un LatchingQuantity peut également survenir dans la direction descendante, lorsqu'il atteint une valeur minimale. Les termes "maximal" ou "minimal" seront généralement compris en tant qu'attribut quand ce type de comportement d'accumulation est présent. Lorsque cette description est appliquée à une valeur encodée (unité de mesure = "Code"), cela signifie que la valeur à un ou plusieurs bits verrouillés. La condition qui a défini le bit peut être évaporée depuis longtemps. Dans tous les cas, le marqueur temporel qui accompagne la valeur peut ne pas coïncider avec le moment de configuration initiale de la valeur. Dans les deux cas, un système devra réaliser une opération pour effacer la valeur verrouillée.	N
14	boundedQuantity	Une quantité cumulée indépendante du temps plus un BulkQuantity ou un LatchingQuantity, sauf que l'accumulation s'arrête aux valeurs maximale ou minimale. Lorsque le maximum est atteint, toute accumulation positive supplémentaire est ignorée, mais toute accumulation négative peut être acceptée (diminuant ainsi le compteur). De la même manière, lorsque la limite négative est atteinte, toute accumulation négative supplémentaire est ignorée, mais toute accumulation positive est acceptée (augmentant ainsi le compteur).	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

C.2.5.2 Types d'IntervalReadings

Dans la CEI 61968-9:2009, il était dit que les IntervalReadings pouvaient être exprimés dans plusieurs styles qualifiés par l'attribut #2 (soit "Incremental", "Relative" ou "Absolute".) La première édition décrivait également "RecordedData" et "DeltaData".

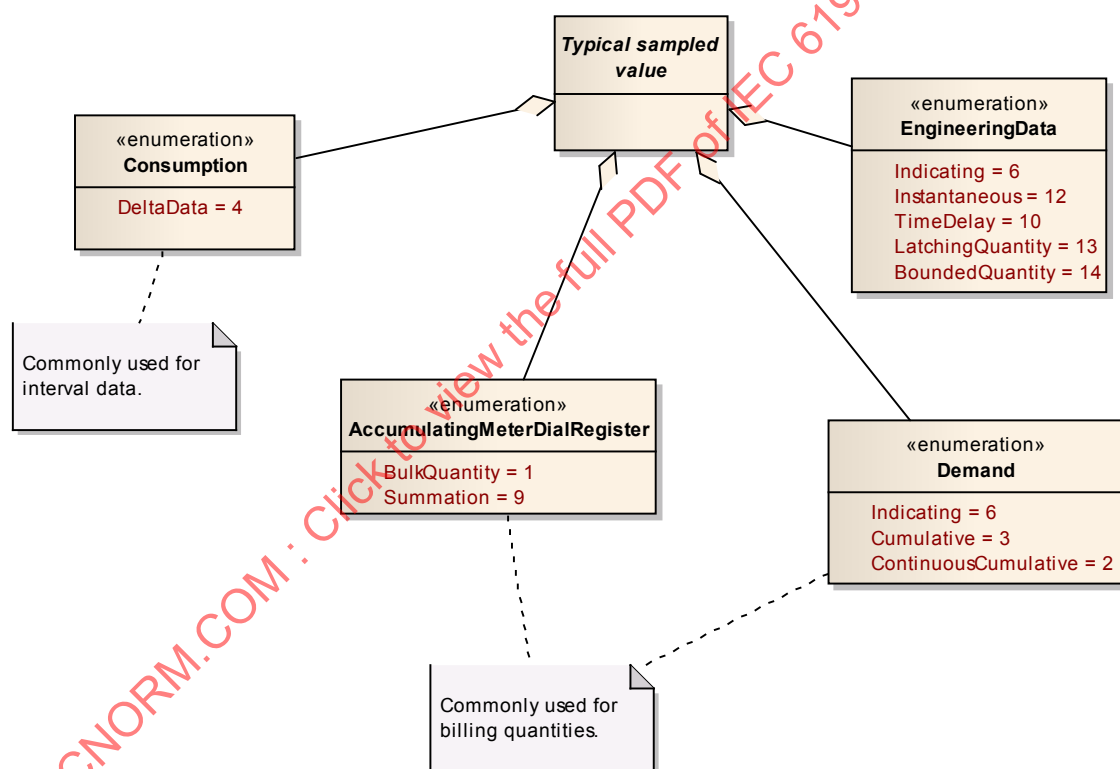
Dans cette édition de la CEI 61968-9, un effort a été fait pour simplifier la présentation des données. Une valeur échantillonnée appelée relevé d'"absolute interval" dans la première édition peut être présentée sans le mot "absolute". Effectivement, lesdits relevés peuvent être publiés dans la Partie MeterReading.Readings du message en tant que relevés ordinaires plutôt que dans la Partie MeterReading.IntervalBlock.IntervalReadings du message. Le concept de "Relative IntervalData" ne se trouve plus dans les énumérations car le concept est pris en charge dans le schéma de message en tant que forme de scalaires de données "pending » (en attente).

C.2.5.3 Utilisations courantes

Les attributs décrits dans le Tableau C.5 sont couramment utilisés de manières particulières pour décrire les valeurs d'énergie et de la demande. Ces habitudes sont décrites dans le Tableau C.6.

Tableau C.6 – Enumérations des comportements habituels d'accumulation

Type de données de métrologie	Utilisations communes
Energie (mesurée par le simple comptage et affichée pour l'utilisateur sur l'avant du compteur).	BulkQuantity
Demande (généralement mesurée en intégrant une valeur de puissance sur une période spécifique).	Indicating, Cumulative, ContinuousCumulative
Puissance (généralement mesurée en temps réel dans les compteurs à semi-conducteurs).	Instantaneous, TimeDelay
Données d'énergie selon le temps d'utilisation (TOU) (mesurées en accumulant les valeurs dans les registres assortis selon l'heure du jour et le jour de la semaine).	Summation
Données de demande selon le temps d'utilisation (TOU) (dérivées en intégrant les valeurs d'énergie sur un intervalle de demande spécifié, avec des dépendances supplémentaires sur le calendrier TOU).	Indicating, Cumulative ou ContinuousCumulative
Compteurs	BulkQuantity, LatchingQuantity



Légende

Anglais	Français
Commonly used for interval data.	Fréquemment utilisé pour les données d'intervalle.
Typical sampled value	Valeur échantillonnée typique
Commonly used for billing quantities.	Fréquemment utilisé pour les quantités de facturation.

Figure C.1 – Enumérations typiques des comportements d'accumulationAttribut n° 5, flowDirection

C.2.6.1 Généralités

Tout ce qui implique le courant est susceptible d'avoir un sens d'écoulement. Le sens d'écoulement est très important, mais lorsqu'il est inconnu, il convient de le laisser non précisé. Les énumérations possibles comprennent celles décrites dans le Tableau C.7.

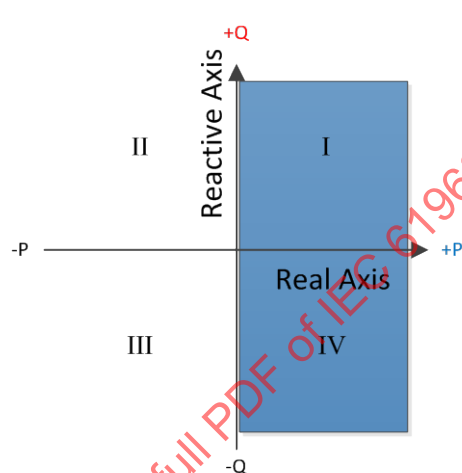
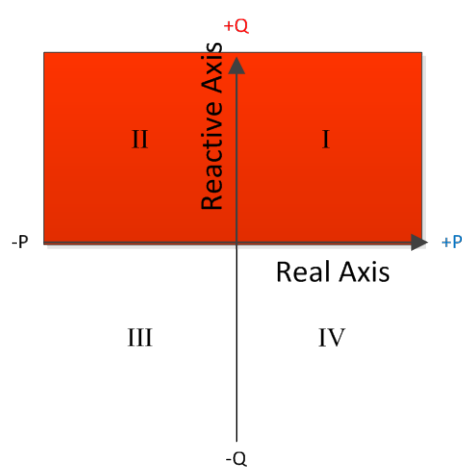
Le "sens d'écoulement" englobe le concept électrique de comptage à quatre quadrants ainsi que la nécessité pour les différents tarifs régionaux de décrire le mode de facturation.

Il convient d'admettre que les pratiques tarifaires dans différentes parties du monde reposent sur différents cadres de référence. La plupart des régions définissent la fourniture d'énergie selon un cadre de référence établi par les producteurs. L'énergie générée par l'entreprise électrique est transmise par le réseau de l'entreprise électrique, le compteur et dans le câblage du client. Le compteur capture l'énergie vendue au client. Cependant, certaines régions considèrent le point de vue du client. Un cadre de référence du client signifie que l'énergie peut être achetée par un client à partir du réseau. Tout flux direct passant par le compteur régit l'énergie achetée par le client.

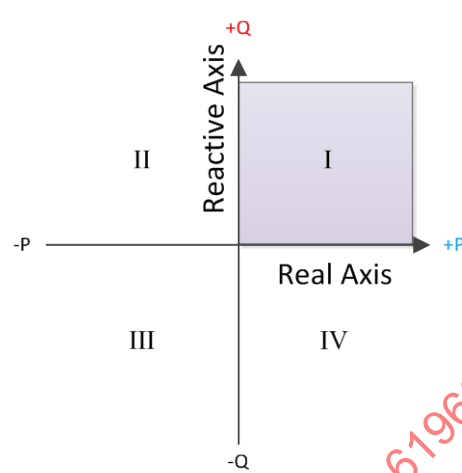
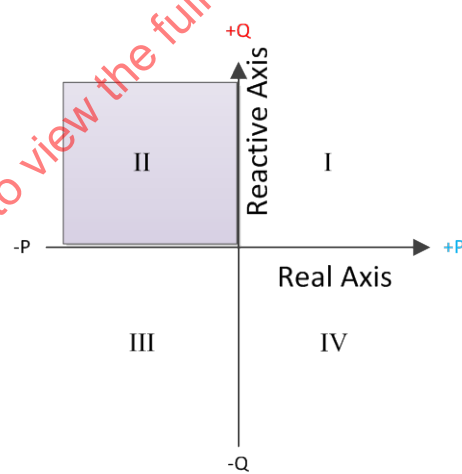
La présente norme tente d'appréhender l'ensemble de la question du cadre de référence en admettant que ces deux points de vue sont équivalents. L'énergie achetée est l'énergie vendue. Le flux "direct" depuis le côté "source" du compteur au côté "charge" du compteur (ou en termes équivalents "V+" et "V-") crée une mesure qui peut être utilisée pour toute définition du tarif. La présente norme envisage le code numérique pour un concept sémantique donné comme "normatif" tandis que le texte utilisé pour désigner le concept est considéré comme "informatif".

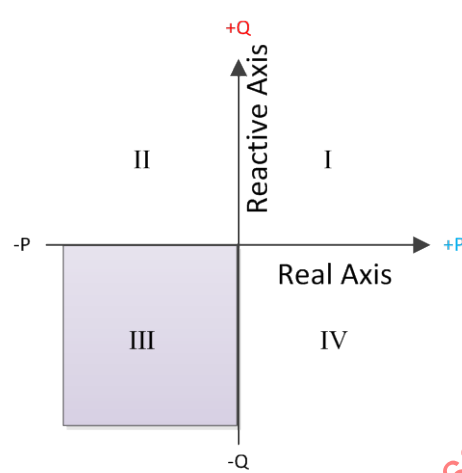
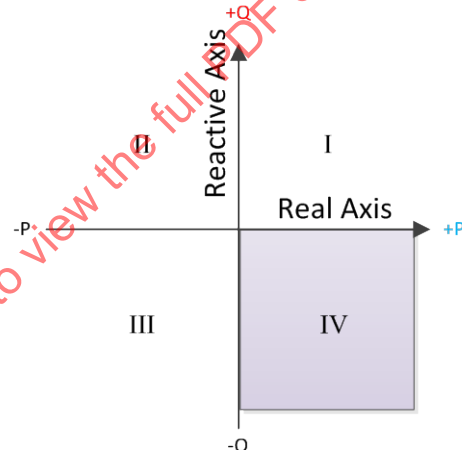
Les différences linguistiques parmi les différents pays participants de la CEI justifient en second lieu le fait de conserver le caractère informatif des descriptions textuelles.

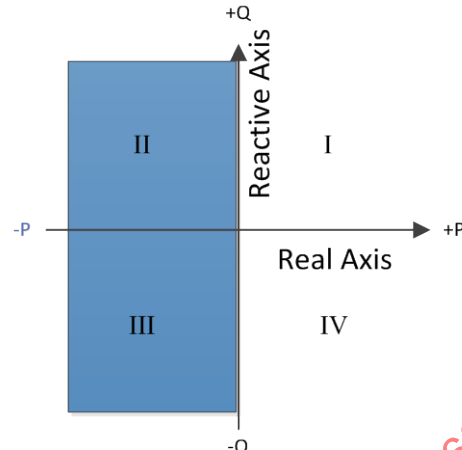
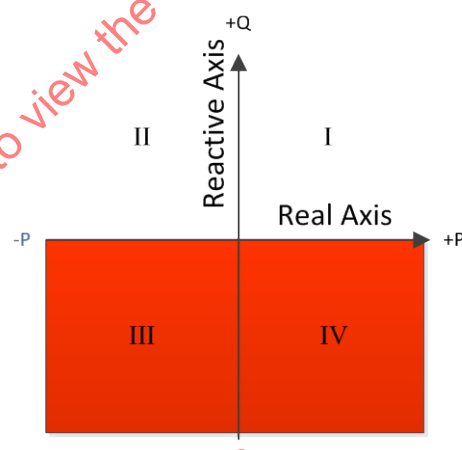
Tableau C.7 – Énumération des sens d'écoulement

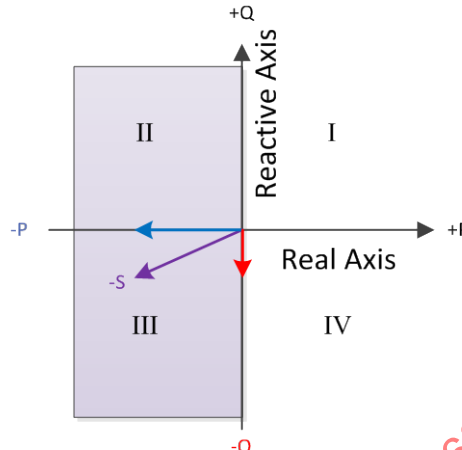
Code	Nom d'énumération (informatif)	Commentaires	Statut normatif de code
0	none	Non applicable (N/A)	N
1	forward	Connu aussi cimme "Remis" ou "importé" tel que défini dans la 61968-2. L'énergie active directe est une valeur positive en kWh que l'on peut s'attendre à trouver naturellement lorsque l'énergie est fournie par l'entreprise de distribution et consommée au niveau du service. L'énergie active directe est cumulée dans un service monophasé en observant le débit de puissance (+P) dans les quadrants I et IV.  Légende Axe réactif - Axe réel L'énergie réactive directe est une valeur positive en VARh que l'on peut s'attendre à trouver naturellement en présence de charges inductives. L'énergie réactive directe est cumulée dans un service monophasé en observant le débit de puissance (+Q) dans les quadrants I et II.  Légende Axe réactif - Axe réel L'énergie apparente directe est une valeur positive en VAh tout comme l'énergie active directe. Elle est cumulée dans un service monophasé en observant le débit de puissance ($S = P + jQ$) dans les quadrants I et IV.	N

Code	Nom d'énumération (informatif)	Commentaires	Statut normatif de code
		Légende Axe réactif - Axe réel Dans le comptage polyphasé, le registre d'énergie directe est incrémenté lorsque la somme des énergies phasées est supérieure à zéro: $Energy_A + Energy_B + Energy_C > 0$	
2	lagging	Typiquement utilisé pour décrire qu'un facteur de puissance est en retard par rapport à la valeur de référence (ou dire que le courant est en retard par rapport à la tension).. NOTE 1 Lorsqu'il est utilisé pour décrire le facteur de puissance, le terme "lagging" implique que le FP est négatif. Dans ce cas, le terme "lagging" prend la place du signe négatif. Si une valeur FP signée est à transmettre par le producteur de données, il convient alors d'utiliser zéro énumération des sens d'écoulement (none aucune) afin d'éviter la création potentielle d'une expression employant un double négatif. Il convient que le client de données puisse dire à partir du signe des données si le FP est en avance ou en retard. Ce principe est analogue au concept disant que l'énergie "inverse" est une valeur négative implicite et publier une valeur inverse négative serait ambigu. NOTE 2 Des facteurs de puissance en retard indiquent généralement des charges inductives.	N
3	leading	Typiquement utilisé pour décrire qu'un facteur de puissance est en avance par rapport à la valeur de référence ou que le courant est en avance par rapport à la tension). NOTE 3 Des facteurs de puissance en avance indiquent généralement des charges capacitives.	N
4	net	Forward – Reverse (c'est-à-dire: direct – inverse), voir la 61968-2. NOTE 4 Dans certains systèmes, la valeur passée comme valeur "nette" pourrait devenir négative. Dans d'autres systèmes, la valeur passée comme valeur "net", toujours un nombre positif, ajoute et soustrait selon les besoins.	N
5	q1plusQ2	Quadrants positifs réactifs.	I
7	q1plusQ3	Quadrants 1 et 3	I
8	q1plusQ4	Les quadrants 1 et 4 représentent habituellement l'énergie active directe	I
9	q1minusQ4	Q1 moins Q4	I
10	q2plusQ3	Les quadrants 2 et 3 représentent habituellement l'énergie active inverse	I
11	q2plusQ4	Quadrants 2 et 4	I
12	q2minusQ3	Q2 moins Q3	I
13	q3plusQ4	Quadrants négatifs réactifs.	I
14	q3minusQ2	Q3 moins Q2	I

Code	Nom d'énumération (informatif)	Commentaires	Statut normatif de code
15	quadrant1	Q1 uniquement  Légende Axe réactif - Axe réel	I
16	quadrant2	Q2 uniquement  Légende Axe réactif - Axe réel	I
17	quadrant3	Q3 uniquement	I

Code	Nom d'énumération (informatif)	Commentaires	Statut normatif de code
		 Légende Axe réactif - Axe réel	
18	quadrant4	Q4 uniquement  Légende Axe réactif - Axe réel	I
19	reverse	L'énergie active inverse est équivalente à "reçu" ou "exporté" tel que défini dans la 61968-2. L'énergie active inverse est une valeur positive en kWh que l'on peut s'attendre à trouver lorsque l'énergie est réalimentée par le service sur le réseau de l'entreprise de distribution. L'énergie active inverse est cumulée dans un service monophasé en observant le débit de puissance (-P) dans les quadrants II et III.	N

Code	Nom d'énumération (informatif)	Commentaires	Statut normatif de code
		 Légende Axe réactif - Axe réel L'énergie réactive inverse est une valeur positive en VARh que l'on peut s'attendre à trouver en présence de charges capacitives et d'un facteur de puissance en avance. L'énergie réactive inverse est cumulée dans un service monophasé en observant le débit de puissance (-Q) dans les quadrants III et IV.  Légende Axe réactif - Axe réel L'énergie apparente inverse est une valeur positive en VAh tout comme l'énergie active inverse. Elle est cumulée dans un service monophasé en observant le débit de puissance ($S = P + jQ$) dans les quadrants II et III.	

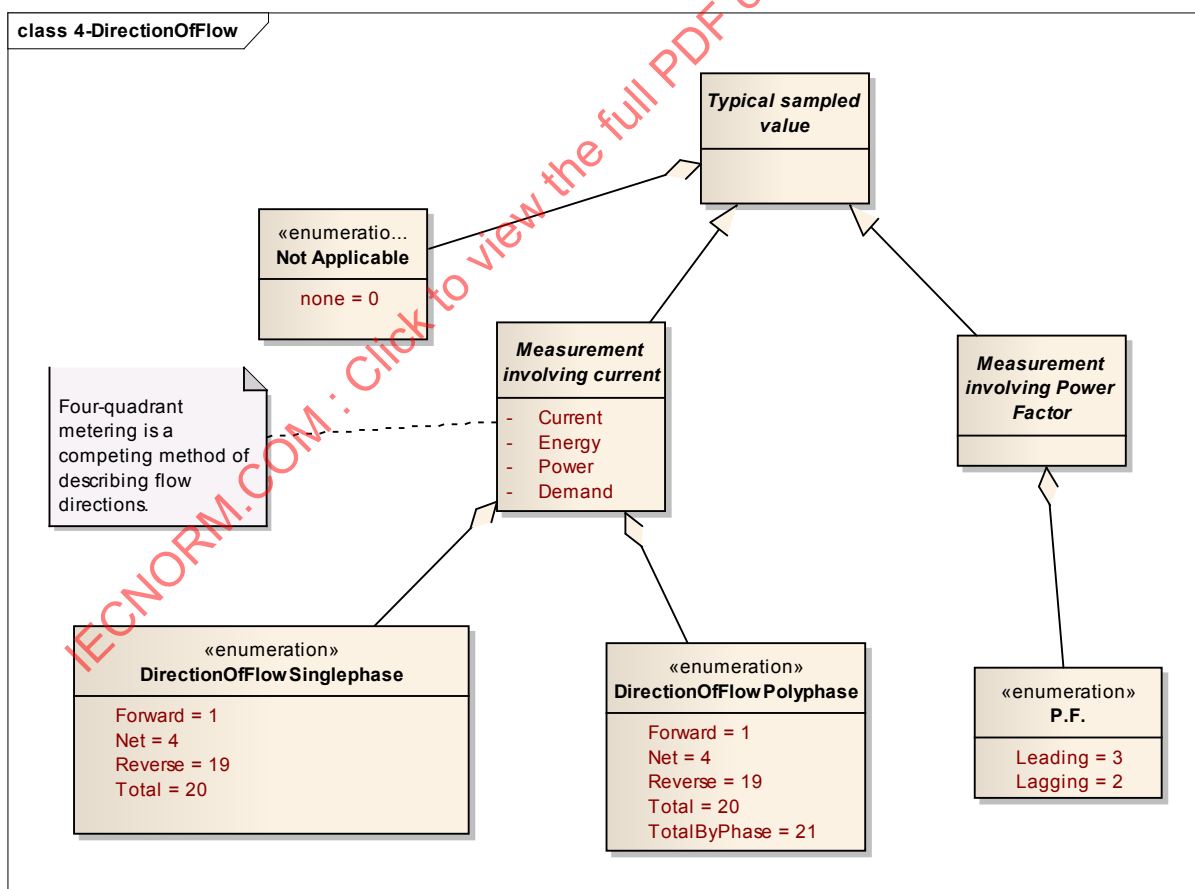
Code	Nom d'énumération (informatif)	Commentaires	Statut normatif de code
		 Légende Axe réactif - Axe réel Dans le comptage polyphasé, le registre d'énergie inverse est incrémenté lorsque la somme des énergiesphasées est inférieure à zéro: $Energy_A + Energy_B + Energy_C < 0$ NOTE 5 La valeur passée en tant que valeur inverse est toujours une valeur positive. Il est compris avec l'étiquette "inverse" qui représente l'écoulement négatif.	N
20	total	$Forward + Reverse$ (c'est-à-dire: direct – inverse), voir la 61968-2. La somme des produits dans tous les quadrants $Q1+Q2+Q3+Q4$. Dans le comptage polyphasé, le registre d'énergie totale est incrémenté lorsque la valeur absolue de la somme des énergiesphasées est supérieure à zéro: $Energy_A + Energy_B + Energy_C < 0$	N
21	totalByPhase	Dans le comptage polyphasé, le total par registre d'énergiephasée est incrémenté lorsque la somme des valeurs absolues des énergiesphasées est supérieure à zéro: $Energy_A + Energy_B + Energy_C < 0$ Dans le cadre du comptage monophasé, les formules pour "Total" et "Total par phase" sont réduites à la même expression. Néanmoins, aux fins de la communication, il convient d'utiliser l'énumération "Total" avec des données du compteur monophasé.	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

C.2.6.2 Utilisations courantes

La terminologie utilisée pour indiquer le sens d'écoulement de l'énergie réactive et de la puissance réactive varie considérablement selon le fournisseur. Le Tableau C.8 décrit différents sens d'écoulement équivalents par type de puissance (ou d'énergie) et donne des recommandations concernant une énumération préférentielle des sens d'écoulement aux fins de la communication.

Tableau C.8 – Equivalences des énumérations de sens d'écoulement

Type d'énergie ou de puissance	Unité de mesure	Sens d'écoulement équivalents couramment utilisés dans le secteur	Sens d'écoulement préférentiel pour la messagerie
Actif ou réel	W ou Wh	Forward (Direct), Delivered (remis), Positive (positif), Q1+Q4	Forward
		Reverse((Inverse), Received (reçu), Negative (négatif), Q2+Q3	Reverse
		Net, Q1+Q4-(Q2+Q3)	Net
		Total, Q1+Q2+Q3+Q4	Total
Réactif	VAr ou VArh	Forward (Direct), Delivered (remis), Positive (positif), , Lagging (retard), Q1+Q2	Forward
		Reverse((Inverse), Received (reçu), Negative (négatif), Leading (avance), Q3+Q4	Reverse
		Net, Q1+Q2-(Q3+Q4)	Net
		Total, Q1+Q2+Q3+Q4	Total
Apparent	VA ou VAh	Forward (Direct), Delivered (remis)	Forward
		Reverse((Inverse), Received (reçu),	Reverse
		Net	Net
		Total	Total



Légende

Anglais	Français
Typical sampled value	Valeur échantillonnée typique
Four-quadrant metering is a competing method of	La mesure à quatre cadrans permet de décrire

Anglais	Français
describing flow directions.	efficacement les directions de flux.
Measurement involving current	Mesure qui implique un courant
Measurement involving Power Factor	Mesure qui implique le facteur de puissance

Figure C.2 – Enumérations typiques des sens d'écoulement**C.2.7 Attribut n° 6, produit**

Dans la cette norme, le produit qui est mesuré a été isolé pour devenir un attribut par lui-même. Il est énuméré dans le Tableau C.9.

Tableau C.9 – Produit

Code	Enumération	Commentaires	Statut normatif
0	none	Non applicable	N
1	electricity SecondaryMetered	Tous les types de quantités mesurées. Ce type de relevé vient du compteur et représente une valeur mesurée "secondaire".	N
2	electricity PrimaryMetered	Un compteur peut être équipé d'un VT et/ou d'un CT externe. Le compteur peut ne pas être informé de la présence de ces appareils et l'affichage ne compense pas cela. En dernier ressort, lorsque ces scalaires sont appliqués, la valeur qui représente la valeur de service est appelée valeur "primary metered" (primaire mesurée). L'"index" dans la sous-catégorie 3 reflète ceux de la sous-catégorie 0.	N
3	communication	Une mesure de l'infrastructure de communication elle-même.	N
4	air		N
5	insulativeGas	(SF ₆ est trouvé séparément ci-après).	N
6	insulativeOil		N
7	naturalGas		N
8	propane		N
9	potableWater	Eau potable	N
10	steam	Eau sous forme de vapeur, utilisée habituellement pour le chauffage.	N
11	wasteWater	(Assainissement)	N
12	heatingFluid	Ce fluide est susceptible d'être sous forme liquide. Ce n'est pas obligatoirement de l'eau ou à base d'eau. Le liquide chaud revient plus froid que lorsqu'il a été envoyé. La chaleur transmise peut être mesurée.	N
13	coolingFluid	Le liquide froid revient plus chaud que lorsqu'il a été envoyé. La chaleur transmise peut être mesurée.	N
14	nonpotableWater	Eau récupérée: potentiellement utilisée pour l'irrigation mais pas suffisamment traitée pour être jugée salubre pour la boisson. Humidité dans l'huile	N
15	nox	Protoxydes d'azote, NO _x	N
16	so2	Dioxyde de soufre, SO ₂	N
17	ch4	Méthane, CH ₄	N
18	co2	Dioxyde de carbone, CO ₂	N
19	carbone	C	I
20	hch	Hexachlorocyclohexane, HCH	N
21	pfc	Hydrocarbures perfluorés, PFC	N
22	sf6	Hexafluorure de soufre, SF ₆	N

Code	Énumération	Commentaires	Statut normatif
23	tvLicence	Télévision	N
24	internet	Service Internet	N
25	refuse	Supprimer	N
26	h2	Hydrogène, H ₂	N
27	c2h2	Acétylène, C ₂ H ₂	N
28	c2h4	Ethylène, C ₂ H ₄	N
29	c2h6	Ethane, C ₂ H ₆	N
30	co	Monoxyde de carbone, CO	N
31	o2	Oxygène, O ₂	N
32	dissolvedCombustibleGas	Gaz combustible dissous (une combinaison de gaz combustibles tels que H ₂ , CH ₄ , C ₂ H ₂ , C ₂ H ₄ , C ₂ H ₆ , et/ou CO dans certains mélanges).	N
33	co2e	Equivalent du dioxyde de carbone, CO ₂	N
34	lead	Plomb, Pb	N
35	mercure	Mercure, Hg	N
36	ozone	Ozone, O ₃	N
37	pm10	Matière particulaire dont la taille maximale est 10 µm.	N
38	pm25	Matière particulaire dont la taille maximale est 2,5 µm.	N
39	sox	Oxydes de soufre, SO _x	N
40	Weather	Conditions climatiques ou météorologiques	
41	Device	Etat du compteur ou du dispositif terminal proprement dit. Par exemple, cette énumération pourrait être utilisée en association avec une énumération relative à la température pour représenter la température interne d'un compteur.	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

C.2.8 Attribut n° 7, measurementKind

La "measurementKind" permet d'identifier "ce qui" est mesuré. Cela détaille davantage le produit afin de fournir une catégorie de relevé. Cet attribut travaille conjointement avec l'attribut "unités" de manière créative afin d'apporter des détails à l'unité de mesure. Par exemple, "Energy" avec une unité de mesure de "kWh" indique à l'utilisateur que l'énergie active est en cours de mesure, tandis qu'avec "kVAh" ou "kVArh", cela indique l'énergie apparente et l'énergie réactive respectivement. "Power" peut être combiné de manière similaire à différentes unités de mesure de puissance. La puissance de distorsion ("DistortionVoltAmperes") avec "kVA" est différente de "Power" avec "kVA". Plus d'informations peuvent être consultées en étudiant les exemples à la fin de la présente annexe. Les natures de mesure sont énumérées dans le Tableau C.10.

Tableau C.10 – Index measurementKind

Code	Énumération	Commentaires	Statut normatif
0	none	Non applicable	N
2	apparentPowerFactor		N
3	currency	fonds	N
4	current		N

Code	Énumération	Commentaires	Statut normatif
5	currentAngle		N
6	currentImbalance		N
7	date		N
8	demand		N
9	distance		N
10	distortionVoltAmperes		N
11	excitation		N
12	énergie		N
13	energizationLoadSide		N
14	fan		N
15	frequency		N
16	Funds	Doublon avec "currency"	D
17	ieee1366ASAI		N
18	ieee1366ASIDI		N
19	ieee1366ASIFI		N
20	ieee1366CAIDI		N
21	ieee1366CAIFI		N
22	ieee1366CEMIn		N
23	ieee1366CEMSMin		N
24	ieee1366CTAIDI		N
25	ieee1366MAIFI		N
26	ieee1366MAIFle		N
27	ieee1366SAIDI		N
28	ieee1366SAIFI		N
31	lineLosses		N
32	losses		N
33	negativeSequence		N
34	phasorPowerFactor		N
35	phasorReactivePower		N
36	positiveSequence		N
37	power		N
38	powerFactor		N
40	quantityPower		N
41	sag	ou creux de tension	N
42	gonflement		N
43	switchPosition		N
44	tapPosition		I
45	tariffRate		N
46	temperature		N
47	totalHarmonicDistortion		N
48	transformerLosses		N
49	unipedeVoltageDip10to15		N
50	unipedeVoltageDip15to30		N

Code	Énumération	Commentaires	Statut normatif
51	unipedeVoltageDip30to60		N
52	unipedeVoltageDip60to90		N
53	unipedeVoltageDip90to100		N
54	Voltage (rms)		N
55	voltageAngle		N
56	voltageExcursion		N
57	voltageImbalance		N
58	volume	Clarifié par rapport à la CEI 61968-9:2009 pour indiquer le volume de liquide	N
59	zeroFlowDuration		N
60	zeroSequence		N
64	distortionPowerFactor		N
81	frequencyExcursion	Habituellement exprimé en tant que "count"	N
90	applicationContext		I
91	apTitle		I
92	assetNumber		I
93	bandwidth		I
94	batteryVoltage		N
95	broadcastAddress		I
96	deviceAddressType1		I
97	deviceAddressType2		I
98	deviceAddressType3		I
99	deviceAddressType4		I
100	deviceClass		I
101	electronicSerialNumber		I
102	endDeviceID		I
103	groupAddressType1		I
104	groupAddressType2		I
105	groupAddressType3		I
106	groupAddressType4		I
107	ipAddress		I
108	macAddress		I
109	mfgAssignedConfigurationID		I
110	mfgAssignedPhysicalSerialNumber		I
111	mfgAssignedProductNumber		I
112	mfgAssignedUniqueCommunicationAddress		I
113	multiCastAddress		I
114	oneWayAddress		I
115	signalStrength		I
116	twoWayAddress		I
117	signaltoNoiseRatio	Déplacé ici depuis l'unité de mesure de l'attribut n° 9	I
118	alarm		I
119	batteryCarryover		I

Code	Énumération	Commentaires	Statut normatif
120	dataOverflowAlarm		I
121	demandLimit		N
122	demandReset	Habituellement exprimé en tant que compte faisant partie d'un cycle de facturation	N
123	diagnostic		I
124	emergencyLimit		I
125	encoderTamper		I
126	ieee1366MomentaryInterruption		N
127	ieee1366MomentaryInterruptionEvent		N
128	ieee1366SustainedInterruption		N
129	interruptionBehaviour		I
130	inversionTamper		I
131	loadInterrupt		I
132	loadShed		I
133	maintenance		I
134	physicalTamper		I
135	powerLossTamper		I
136	powerOutage		I
137	powerQuality		I
138	powerRestoration		I
139	programmed		I
140	pushbutton		N
141	relayActivation		N
142	relayCycle	Habituellement exprimé sous forme de compte	N
143	removalTamper		I
144	reprogrammingTamper		I
145	reverseRotationTamper		I
146	switchArmed		I
147	switchDisabled		I
148	falsification		I
149	watchdogTimeout		I
150	billLastPeriod	Facture du client pour la période de facturation précédente (Devise)	N
151	billToDate	Facture du client, telle que connue jusqu'ici dans la période de facturation présente (Devise)	N
152	billCarryover	Facture du client, partie d'une obligation précédente reportée d'une période de facturation précédente. (Devise)	N
153	connectionFee	Frais mensuels de connexion au produit.	I
154	audibleVolume	Son	I
155	volumetricFlow		I
156	relativeHumidity	Utilisation la plus courante consistant à exprimer des conditions climatiques ou météorologiques	N
157	skyCover	Degré de nébulosité. Utilisé pour exprimer des conditions climatiques ou	N

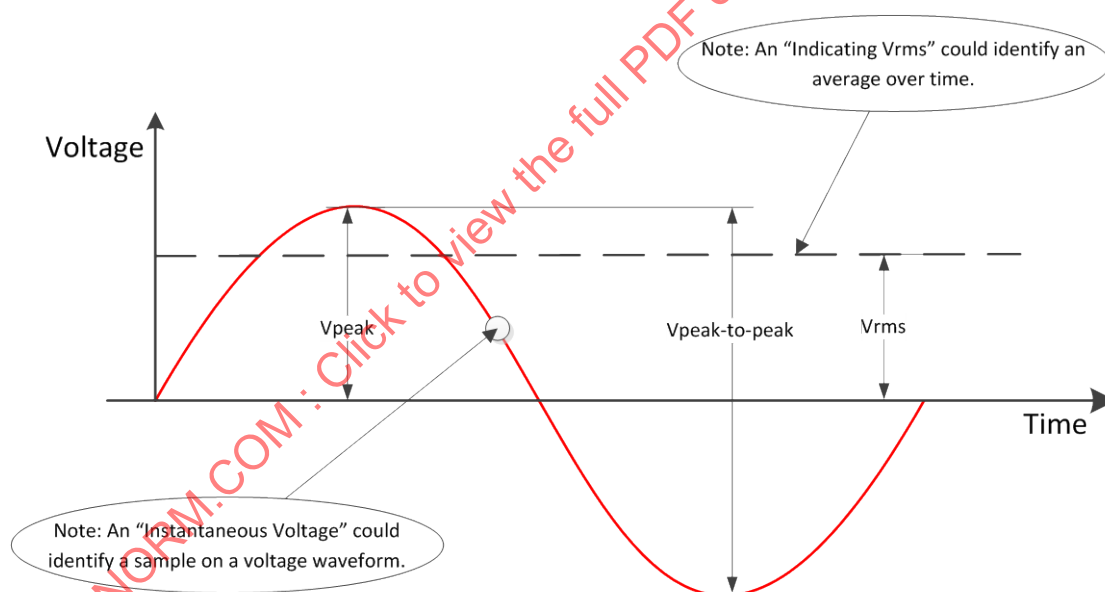
Code	Énumération	Commentaires	Statut normatif
		météorologiques	
158	Voltage	Non spécifié	I
159	dcVoltage		I
160	acVoltagePeak	$V_p = \sqrt{2} \times V_{eff}$	I
161	acVoltagePeakToPeak	$V_{pp} = 2 \times V_p$	I

N = Normative

I = Informative

D = Déconseillé depuis la dernière édition

NOTE Cette deuxième édition de la CEI 61968-9 fait une distinction supplémentaire concernant le cadre de référence relatif à la tension. L'énumération initiale pour "voltage" (tension) est désormais utilisée de manière explicite pour identifier V_{RMS} (V_{eff}). Ceci est justifié par le fait que le type le plus courant de mesure réalisé entre les systèmes est une valeur en V_{RMS} (V_{eff}). Cependant, il ne s'agit pas du seul moyen de mesure de la tension. De nouvelles énumérations ont été créées afin de pouvoir également identifier les Volts-peak (Volts-crête), les Volts-peak-to-peak (Volts-crête-à-crête), les Volts DC (Volts CC) et les formes d'onde de tension non spécifiées. La Figure C.3 définit un certain nombre de mesures de la tension. En combinaison avec l'attribut d'accumulation, il est possible de représenter une valeur de "indicating V_{RMS} " (V_{eff} d'indication) qui est mesurée sur de nombreux cycles, une valeur de "instantaneous V_{RMS} " (V_{eff} instantanée) qui est mesurée sur un seul cycle, ou une valeur de "instantaneous voltage" (tension instantanée) qui représente un échantillon ponctuel unique sur la forme d'onde prélevé à un instant donné.



Légende

Anglais	Français
Note: An "indicating Vrms" could identify an average over time	Note: Une valeur « Veff d'indication » peut identifier une moyenne sur le temps
Voltage	Tension
Vpeak	Vcrête
Vpeak-to-peak	Vcrête-à-crête
Vrms	Veff
Time	Temps
Note: An "instantaneous voltage" could identify a sample on a voltage waveform	Note: Une "tension instantanée" pourrait identifier un échantillon sur une forme d'onde de tension

Figure C.3 – Mesures de tension

C.2.9 Attribut n° 8 interharmonicNumerator

Voir C.2.10.

C.2.10 Attribut n° 9, interharmonicDenominator

Les interharmoniques sont représentés sous forme de nombre rationnel avec un numérateur et un dénominateur. Les harmoniques sont représentés en utilisant le même mécanisme et identifiés en ayant un dénominateur de "1".

Ils sont représentés au moyen d'une formule qui est:

$$\text{Interharmonic} = \frac{\text{InterharmonicNumerator}}{\text{InterharmonicDenominator}}$$

et

$$\text{Harmonic} = \text{InterharmonicNumerator}$$

où le InterharmonicDenominator est égal à "1".

L'énumération des harmoniques ou interharmoniques est définie par un élément composé:

<interharmonic>::= <interharmonicNumerator> <interharmonicDenominator>

Le numérateur et les dénominateurs interharmoniques normatifs sont définis dans le Tableau C.11. Les valeurs supplémentaires peuvent être créées librement à l'aide de cette approche et seraient considérées en tant que valeurs "informatives" plutôt que "normatives".

Tableau C.11 – Enumérations des harmoniques et interharmoniques

Numérateur interharmonique	Dénominateur interharmonique	Enumération	Commentaires	Statut normatif
0	0	none	Non applicable	N
1	2	interharmonic1/2	Interharmonique de ½	N
1	1	fondamental	fondamental	N
2	1	harmonic2	deuxième harmonique	N
3	1	harmonic3	troisième harmonique	N
4	1	harmonic4	quatrième harmonique	N
5	1	harmonic5	cinquième harmonique	N
6	1	harmonic6	sixième harmonique	N
7	1	harmonic7	septième harmonique	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition				

C.2.11 Attribut n° 10 argumentNumerator

Voir C.2.12.

C.2.12 Attribut n° 11, argumentDenominator

Les éléments d'argument sont utilisés pour introduire des nombres dans la description de l'unité de mesure où ils sont nécessaires. La définition prend en charge un nombre rationnel

avec un numérateur et un dénominateur. Cependant, la plupart des arguments utilisés dans la pratique seront des entiers. Les entiers auront tous "1" comme dénominateur.

$$\text{argument} = \frac{\text{numerator}}{\text{denominator}}$$

L'énumération des arguments est définie par un élément composé:

<argument> ::= <numerator> <denominator>

Le numérateur et les dénominateurs normatifs sont définis dans le Tableau C.12. Les valeurs supplémentaires peuvent être créées librement à l'aide de cette approche. Aux fins d'essai, les valeurs non présentées dans le tableau seraient considérées comme étant des valeurs "informatives" plutôt que "normatives".

Tableau C.12 – Enumérations des arguments

Numérateur	Dénominateur	Enumération	Commentaires	Statut normatif
0	0	none	Non applicable	N
1	2	n½	Moitié	I
0	1	n0	"Zéro" (pour les systèmes qui utilisent des plans de numérotation basés sur zéro)	N
1	1	n1	"Un" lorsque la mesure requiert un argument tel que CEMI(n=1)	N
2	1	n2	"Deux" lorsque la mesure requiert un argument tel que CEMI(n=2)	N
3	1	n3	"Trois" lorsque la mesure requiert un argument tel que CEMI(n=3)	N
4	1	n4	"Quatre" lorsque la mesure requiert un argument tel que CEMI(n=4)	N
5	1	n5	"Cinq" lorsque la mesure requiert un argument	N
6	1	n6	Six	N
7	1	n7	Sept	N
8	1	n8	Huit	N
9	1	n9	Neuf	N
10	1	n10	Dix	N
15		n15	Quinze	N
30	1	n30	Trente	N
45	1	n45	Quarante cinq	N
60	1	n60	Soixante	N
120	1	n120	2 × 60 = 120	N
155	1	n155	Cent cinquante-cinq	N
240	1	n240	4 × 60 = 240	N
305	1	n305	Trois cent cinq.	N
360	1	n360	6 × 60 = 360	N
480	1	n480	8 × 60 = 480	N
720	1	n720	12 × 60 = 720	N
720	60	n720/60	12 × 60 / 1 × 60	N
720	120	n720/120	12 × 60 / 2 × 60	N
720	180	n720/180	12 × 60 / 3 × 60	N

Numérateur	Dénominateur	Enumération	Commentaires	Statut normatif
720	240	n720/240	12 × 60 / 4 × 60	N
720	360	n720/360	12 × 60 / 6 × 60	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition				

C.2.13 Attribut n° 12, tou

L'élément Temps d'utilisation (TOU) est utilisé pour décrire toute attribution de la valeur à une case TOU spécifique. Les énumérations TOU sont définies dans le Tableau C.13.

Tableau C.13 – Enumérations de temps d'utilisation

Code	Enumération	Commentaires	Statut normatif
0	aucun	Non applicable	N
1	touA	Utilisation dans la première case TOU définie	N
2	touB	Utilisation dans la deuxième case TOU définie	N
3	touC	Utilisation dans la troisième case TOU définie	N
4	touD	Utilisation dans la quatrième case TOU définie	N
5	touE	Utilisation dans la cinquième case TOU définie	N
6	touF	Utilisation dans la sixième case TOU définie	N
7	touG	Etc.	I
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

C.2.14 Attribut n° 13, cpp

L'élément Tarification pour période critique (CPP) est utilisé pour décrire toute attribution de la valeur à une case CPP spécifique. Bien que l'élément CPP soit généralement considéré comme étant une forme spécialisée de l'élément TOU, il est séparé des énumérations TOU afin de faciliter la modélisation. Les énumérations CPP sont définies dans le Tableau C.14.

Tableau C.14 – Enumérations des tarifications pour période critique

Code	Enumération	Commentaires	Statut normatif
0	none	Non applicable	N
1	cppA	Consommation associée à la tarification pour période critique A	N
2	cppB	Consommation associée à la tarification pour période critique B	N
3	cppC	Consommation associée à la tarification pour période critique C	N
4	cppD	Consommation associée à la tarification pour période critique D	N
5	cppE	Consommation associée à la tarification pour période critique E	N
6	cppF	Consommation associée à la tarification pour période critique F	N
7	cppG	Etc.	I
N = Normative			

Code	Enumération	Commentaires	Statut normatif
I = Informative			
D = Déconseillé depuis la dernière édition			

C.2.15 Attribut n° 14, consumptionTier

La tarification de niveau de consommation fait référence à la méthode de facturation par laquelle un certain "block" d'énergie est acheté (ou vendu) à un prix donné, puis le bloc d'énergie suivant est acheté à un autre prix, etc., sur toute une période définie. Au début de la période définie, la consommation est à l'origine égale à zéro et toute utilisation est mesurée en fonction du ConsumptionTier1 (premier niveau de consommation). Si ce bloc d'énergie est consommé avant la fin de la période, la consommation d'énergie est alors recombinaison en fonction du ConsumptionTier2 (deuxième niveau de consommation). Si ce bloc d'énergie est consommé avant la fin de la période, la consommation d'énergie est alors recombinaison en fonction du ConsumptionTier3 (troisième niveau de consommation), et ainsi de suite. A la fin de la période définie, l'accumulateur de consommation est réinitialisé et l'utilisation au sein du ConsumptionTier1 redémarre.

Ceci s'oppose au "forfait" usuel pour la puissance, pour laquelle tous les achats sont effectués à un prix fixé. Lorsque la tarification forfaitaire est utilisée, il convient de préciser un consumptionTier "non applicable".

Les énumérations des niveaux de consommation sont définies dans le Tableau C.15.

Tableau C.15 – Enumérations des niveaux de consommation

Code	Enumération	Commentaires	Statut normatif
0	aucun	Non applicable	N
1	consumptionTier1	Utilisation dans la première case de consommation définie	N
2	consumptionTier2	Utilisation dans la deuxième case de consommation définie	N
3	consumptionTier3	Utilisation dans la troisième case de consommation définie	N
4	consumptionTier4	Utilisation dans la quatrième case de consommation définie	N
5	consumptionTier5	Utilisation dans la cinquième case de consommation définie	N
6	consumptionTier6	Utilisation dans la sixième case de consommation définie	N
7	consumptionTier7	Des niveaux de consommation supplémentaires peuvent être créés le cas échéant.	I
N = Normative			
I = Informative			
D = Déconseillé depuis la dernière édition			

La tarification TOU ou CPP peut être utilisée conjointement à la tarification des niveaux de consommation. Les exemples fournis dans le Tableau C.16 peuvent être utiles:

Tableau C.16 – Exemples de combinaison des énumérations de TOU et de niveaux de consommation

Code TOU	Code de niveau de consommation	Commentaires
1	0	Période A de TOU avec tarification forfaitaire
1	1	Période A de TOU avec niveau de consommation 1
1	2	Période A de TOU avec niveau de consommation 2

Code TOU	Code de niveau de consommation	Commentaires
1	3	Période A de TOU avec niveau de consommation 3
2	1	Période B de TOU avec niveau de consommation 1
2	2	Période B de TOU avec niveau de consommation 2
2	3	Période B de TOU avec niveau de consommation 3
3	1	Période C de TOU avec niveau de consommation 1
3	2	Période C de TOU avec niveau de consommation 2
3	3	Période C de TOU avec niveau de consommation 3

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C.2.16 Attribut n° 15, phases

Les énumérations de phases de comptage sont décrites dans le Tableau C.17.

Tableau C.17 – Enumérations de phases

Position																			
Code	Énumération	Commentaires	En réseau	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Statut normatif
0	none	Non Applicable à une phase quelconque	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N
16	phaseN	Neutre	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	N
17	phaseNtoGnd	Neutre vers le sol	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	N
32	phaseC	Phase C	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	N
33	phaseCtoN	Phase C à neutre	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	N
40	phaseCtoAv	Courant ou tension de phase C par rapport à la tension de phase A	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	N
41	phaseCAtoN	CA à neutre	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	N
64	phaseB	Phase B	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	N
65	phaseBtoN	Phase B à neutre	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	N
66	phaseBtoC	Phase B à C	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	N
72	phaseBtoAv	Courant ou tension de phase B par rapport à la tension de phase A	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	N
97	phaseBCtoN	BC à neutre	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	N
128	phaseA	Phase A	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	N
129	phaseAtoN	Phase A à neutre	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	N
132	phaseAtoB	Phase A à B	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	N
136	phaseAtoAv	Courant de phase A par rapport à la tension de phase A	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	N
193	phaseABtoN	AB à neutre	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	N

Position		14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Statut normatif
Code	Enumération	En réseau	Ouvert	Branche haute	Delta	Wye	S ₁	S ₂	A ₁	B ₁	C ₁	N ₁	A ₂	B ₂	C ₂	N ₂	
224	phasesABC	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	N
225	phaseABCtoN	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	N
256	s2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	N
257	s2N	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	N
512	s1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	N
513	s1N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	N
768	s12	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	N
769	s12N	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	N
1248	threeWireWye	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	N
1249	fourWireWye	0	0	0	0	1	0	0	1	1	1	0	0	0	0	1	N
2272	threeWireDelta	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	N
2273	fourWireDelta	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	N
6369	fourWireHLDelta	0	0	1	1	0	0	0	1	1	1	0	0	0	0	1	N
10465	fourWireOpenDelta	0	1	0	1	0	0	0	1	1	1	0	0	0	0	1	N
17153	networked	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	N

NOTE 1 Les valeurs des codes ont été calculées par:

Code = Networked × 2¹⁴ + Open × 2¹³ + HighLeg × 2¹² + Delta × 2¹¹ + Wye × 2¹⁰ + S₁ × 2⁹ + S₂ × 2⁸ + A₁ × 2⁷ + B₁ × 2⁶ + C₁ × 2⁵ + N₁ × 2⁴ + A₂ × 2³ + B₂ × 2² + C₂ × 2¹ + N₂

NOTE 2 Les vecteurs directionnels (tels que V_{AB} vs. V_{BA}) sont créés dans le code de phase en invoquant la phase impliquée (de gauche à droite dans la matrice) dans l'ordre dans lequel ils sont décrits dans l'énumération (de gauche à droite à la lecture).

NOTE 1 Les valeurs des codes ont été calculées par:

Code = Networked $\times 2^{14}$ + Open $\times 2^{13}$ + HighLeg $\times 2^{12}$ + Delta $\times 2^{11}$ + Wye $\times 2^{10}$ + S₁ $\times 2^9$ + S₂ $\times 2^8$ + A₁ $\times 2^7$ + B₁ $\times 2^6$ + C₁ $\times 2^5$ + N₁ $\times 2^4$ + A₂ $\times 2^3$ + B₂ $\times 2^2$ + C₁ $\times 2^1$ + N₂

NOTE 2 Les vecteurs directionnels (tels que V_{AB} vs. V_{BA}) sont créés dans le code de phase en invoquant la phase impliquée (de gauche à droite dans la matrice) dans l'ordre dans lequel ils sont décrits dans l'énumération (de gauche à droite à la lecture).

Lorsque le courant est mesuré, il est souvent simplement indiqué un conducteur monophasé tel que:

- A
- B
- C
- N

La "phase" dite du neutre vers le sol peut être utilisée pour décrire le courant circulant à partir du fil neutre vers le sol. Dans ce cas, sélectionner N_1 et N_2 . Quand seul le neutre est sélectionné, choisir N_1 . Dans tous les autres cas, lorsqu'il est fait référence au neutre, sélectionner N_2 . Le principal objectif est la lisibilité. Il convient que lesdites règles donnent la lisibilité nécessaire.

Lorsque la tension est mesurée, elle peut contenir une simple description du conducteur de phase ou, si elle est mesurée par rapport à quelque chose, une indication de la mesure comme étant "ligne à neutre" (c'est-à-dire entre phase et neutre) ou "ligne à ligne" (c'est-à-dire entre phases). Les mesures de tension communes comprennent:

- A
- B
- C
- AN
- BN
- CN
- AB
- BC
- CA
- ABC

Lorsque des angles de phase sont mesurés, le résultat est habituellement rapporté à une référence fixe telle que la phase de tension A. Le mot "angle" a déjà été décrit dans un champ précédent. Ce champ peut donc contenir une désignation d'angle telle que:

- $A_{\text{courant}} A_{\text{volts}}$
- $B_{\text{courant}} A_{\text{volts}}$
- $C_{\text{courant}} A_{\text{volts}}$

Où il est admis que la première phase énumérée décrit la phase de courant ou de tension en cours de mesure et que la seconde phase (la lettre "A") décrit par rapport à quoi elle est mesurée (phase de tension A). Sachant que le fait que la mesure soit un angle peut être déterminé à partir du contexte (fourni par l'unité de mesure) et que le point de référence est toujours la seconde phase, il n'est pas nécessaire de fournir d'autres indications dans le libellé littéral de la phase. Cela permet d'utiliser souvent le même code (tel que "Phase-CA") comme un descripteur de tension entre phases, un descripteur d'angle de phase de tension ainsi qu'un descripteur d'angle de phase de courant.

Les tensions résidentielles ou autres tensions biphases secondaires peuvent être identifiées par "S1" ou "S2". Ces étiquettes peuvent être utilisées lorsque les noms "ABC" des phases qui alimentent le service sont inconnus ou non importants.

Les différents câblages du réseau polyphasé peuvent être identifiés en tant que :

- Wye
- Delta
- Triangle à branche haute
- Triangle ouvert
- En réseau

L'utilisation de 3 ou 4 fils peut être déterminée en comptant simplement le nombre de phases (y compris neutre) impliquées dans le service.

C.2.17 Attribut n° 16, multiplicateur

Le codage du ReadingType propose un champ pour décrire un multiplicateur de puissance de dix en fonction de la valeur des données. Ce n'est pas tout à fait identique au préfixe SI habituel, bien que le résultat soit le même dans de nombreux cas. L'utilisateur devra décider quel symbole affichable approprié est basé sur les dimensions de l'unité de mesure. Les énumérations de multiplicateurs sont décrites dans le Tableau concernant les unités de mesure à une seule dimension (par exemple, "V" et non "V²"). La valeur d'index représente la puissance de dix.

Tableau C.18 – Enumérations de puissances de dix

Code	Symbole affichable pour les unités de mesure à une seule dimension	Commentaires	Statut normatif
-24	y	yocto = $\times 10^{-24}$	N
-21	z	zepto = $\times 10^{-21}$	N
-18	a	atto = $\times 10^{-18}$	N
-15	f	femto = $\times 10^{-15}$	N
-12	p	pico = $\times 10^{-12}$	N
-9	n	nano = $\times 10^{-9}$	N
-6	μ	micro = $\times 10^{-6}$	N
-3	m	milli = $\times 10^{-3}$	N
-2	c	centi = $\times 10^{-2}$	N
-1	d	deci = $\times 10^{-1}$	N
0		Non applicable ou " $\times 1$ "	N
1	da	deca = $\times 10^1$	N
2	h	hecto = $\times 10^2$	N
3	k	kilo = $\times 10^3$	N
6	M	Mega = $\times 10^6$	N
9	G	Giga = $\times 10^9$	N
12	T	Tera = $\times 10^{12}$	N
15	P	Peta = $\times 10^{15}$	N
18	E	Exa = $\times 10^{18}$	N
21	Z	Zetta = $\times 10^{21}$	N
24	Y	Yotta = $\times 10^{24}$	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

Il convient de rappeler que ce multiplicateur de puissance de dix ne fonctionne pas de la même manière que le préfixe SI. Le préfixe SI est considéré comme faisant partie de l'unité de mesure. Un multiplicateur de puissance de dix ne fait pas partie de l'unité de mesure. Lorsqu'un préfixe SI est utilisé, il est compris que " 10^{-3} " est représenté par "milli" et qu'un mm^3 est identique à $(\text{mm})^3$, ce qui est la même chose que $(0,001 \text{ m})^3$ ou 10^{-9} m^3 . Ce n'est pas le même résultat que $0,001 \times \text{m}^3$ (ce que donne un multiplicateur de puissance de dix).

Les règles d'utilisation des préfixes SI peuvent être consultées dans la CEI 60050-112:2010, 02-03.

Lorsque l'unité de mesure décrite est un rapport rendu sous la forme d'une quantité sans dimension (comme une concentration), il arrive parfois d'afficher un symbole autre que le symbole avec préfixe de mesure standard. Cependant, la convention moderne consiste à utiliser les symboles à préfixe SI devant le rapport sans dimension décrit. Par exemple, il convient de décrire une concentration ppm par volume ("ppmv") plutôt avec l'expression " $\mu\text{L/L}$ ". Quelques scalaires historiques sans dimension sont fournis dans le Tableau C.19 pour référence.

Tableau C.19 – Enumérations de multiplicateurs de concentration historiques

Code	Symbole affichable	Commentaires	Statut normatif
0	PU	Par unité = $\times 1 = 10^0$.	I
-2	%	pourcentage = $\times 0,01 = \times 10^{-2}$	I
-3	‰	Pour mille = $\times 0,001 = \times 10^{-3}$	I
-6	ppm	parts par million, $\times 0,000\,001 = \times 10^{-6}$	I
-9	ppb	parts par milliard, $\times 0,000\,000\,001 = \times 10^{-9}$	I
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

C.2.18 Attribut n° 17, unité

Dans la 61968-9:2009, une unité de mesure "ppm" était prise en charge. Dans cette édition, cela a été déplacé de l'attribut d'unité de mesure à l'attribut de multiplicateur de puissance de dix et certaines unités de mesure de "concentration" ont été introduites.

Les Tableaux C.20 à C.27 décrivent les énumérations d'unités de mesure. Elles sont organisées en fonction de leurs relations avec les unités de mesure SI. Les unités SI sont les unités de mesure préférentielles, mais en tant que norme internationale, il est compris que d'autres unités de mesure doivent également être prises en charge dans certaines régions.

Dans ces tableaux, la colonne "code" est une valeur unique. Le "statut normatif" indique si le "code" est normatif ou informatif. La colonne "grandeur" indique la catégorie de mesure. Le "nom d'unité" donne le nom officiel de l'unité, ainsi que des commentaires potentiels concernant son utilisation ou sa relation vis-à-vis des autres unités. La colonne "symbole" indique dans la majorité des cas le symbole affichable officiel de l'unité. Lorsqu'il y a eu des cas de conflit causés par la combinaison de différents systèmes de mesure, la préférence est donnée à l'unité de mesure SI. (Cela est arrivé dans le cas de rad (rd) et rod (rd)). La colonne "énumération" crée une chaîne unique qui pourrait être utilisée par les modélisateurs CIM afin de saisir une valeur de chaîne pour l'unité. L'énumération a été créée selon les règles suivantes:

- Une transformation inférieure dite "camel-case" de la colonne de symbole est tentée. Tous les espaces sont supprimés du symbole pour créer l'énumération.
- Le symbole défini est limité aux caractères alphanumériques.
- Les symboles "-", "(", et ")" sont supprimés.
- Le symbole "/" est remplacé par la chaîne "Par".
- Le symbole "°" est remplacé par la chaîne "Deg".
- D'autres symboles spéciaux tels que "α", "μ", et "h" sont remplacés par d'autres chaînes textuelles alphas.
- Les chiffres ne sont pas autorisés en tant que premier caractère de l'énumération.
- Le texte à indice ou à exposant est utilisé comme texte normal dans l'énumération (si les conflits sont évitables).
- Si deux symboles différents donnent la même énumération (à cause des règles de capitalisation), alors l'une d'elles est modifiée (en donnant la préférence aux unités SI de base). Des exceptions ont été créées pour les symboles "A", "B", "G", "H", "h", "M", "m", "S" et "T".

Tableau C.20 – Unités de mesure SI de base

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
2	Longueur	mètre	m	m	N
3	Masse	gramme	g	g	N
5	Courant	ampère	A	a	N
6	Température	Kelvin	K	degK	I
7	Quantité de substance	mole	mol	mol	I
8	Intensité lumineuse	candela	cd	cd	I
27	Durée	seconde	s	s	N
N = Normative					
I = Informative					
D = Déconseillé depuis la dernière édition					
NOTE L'orthographe britannique "metre" et l'orthographe américaine "meter" sont équivalentes.					

Tableau C.21 – Unités de mesure SI dérivées ayant des noms spéciaux

Code	Grandeur	Nom d'unité (et commentaires)	Symbole affichable	Énumération	Statut normatif
10	Angle plan	Radian (m/m)	rad	rad	N
11	Angle solide	Stéradian (m ² /m ²)	sr	sr	I
21	Dose absorbée	Gray (J/kg)	Gy	gy	I
22	Radioactivité	Becquerel (1/s)	Bq	bq	I
23	Température	Degrés Celsius	°C	degC	N
24	Equivalent de dose	Sievert (J/kg)	Sv	sv	I
25	Capacité électrique	Farad (C/V)	F	f	N
26	Charge électrique	Coulomb (A seconde)	C	c	I
28	Inductance électrique	Henry (Wb/A)	H	h	N

Code	Grandeur	Nom d'unité (et commentaires)	Symbole affichable	Énumération	Statut normatif
29	Potentiel électrique	Volt (W/A)	V	v	N
30	Résistance électrique	Ohm (V/A)	Ω	ohm	N
31	Joule d'énergie	(N·m = C·V = W·s)	J	j	N
32	Force newton	(kg m/s ²)	N	n	N
33	Fréquence	Cycles par seconde ou (1/s)	Hz	hz	N
34	Puissance lumineuse	(lm/m ²)	lx	lx	I
35	Flux lumineux	lumen (cd sr)	lm	lm	I
36	Flux magnétique	Weber (V s)	Wb	wb	I
37	Densité du flux magnétique	Tesla (Wb/m ²)	T	t	I
38	Puissance réelle	Watt. Par définition, un Watt est égal à une Joule par seconde. La puissance électrique peut être constituée de composants réels et réactifs. La partie réelle de la puissance électrique (I^2R). Viscosité est exprimée en Watts. (Voir également la puissance apparente et la puissance réactive).	W	w	N
39	Pression	Pascal (N/m ²) NOTE La mesure de la pression absolue ou relative est implicite avec cette entrée. Voir ci-après pour des formes plus explicites.	Pa	pa	N
53	Conductance électrique	Siemens ($A / V = 1 / \Omega$)	S	siemens	N
155	Pression	Pascal, pression absolue	PaA	paA	N
140	Pression	Pascal, pression manométrique	PaG	paG	N
158	Activité catalytique	katal = mol / s	kat	kat	I

N = Normative

I = Informative

D = Déconseillé depuis la dernière édition

NOTE L'orthographe britannique "litre" et l'orthographe américaine "liter" sont équivalentes.

Tableau C.22 – Unités de mesure SI dérivées sans nom spécial

Code	Grandeur	Nom d'unité (et commentaires)	Symbole affichable	Énumération	Statut normatif
4	Vitesse rotationnelle	tours par seconde (Note: comparer aux cycles par seconde, Hz)	rev/s	revPerS	I
41	Surface	mètre carré	m ²	m2	N
42	Volume	mètre cube	m ³	m3	N
43	Vélocité	mètre par seconde (m/s)	m/s	mPerS	N
44	Accélération	mètre par seconde carré	m/s ²	mPerS2	I
45	Débit volumétrique	mètre cube par seconde	m ³ /s	m3PerS	N
46	Efficacité énergétique	mètre/mètre cube	m/m ³	mPerM3	I
47	Moment de masse	kilogramme mètre (kg·m) (premier moment statique) NOTE 1 Les utilisateurs doivent fournir le préfixe "k" pour obtenir "kg m".	g m	gM	I
48	Densité	gramme/mètre cube NOTE 2 Les utilisateurs doivent fournir le multiplicateur de préfixe "k" pour former kg/ m ³	g/m ³	gPerM3	I
49	Viscosité	mètre carré/seconde	m ² /s	m2PerS	I
50	Conductivité thermique	Watt/mètre Kelvin	W/(m K)	wPerMK	I
51	Capacité calorimétrique	Joule/Kelvin	J/K	jPerK	I
54	Vélocité angulaire	radians par seconde	rad/s	radPerS	I
61	Puissance apparente	Voltampère (voir également puissance réelle et puissance réactive).	VA	vA	N

Code	Grandeur	Nom d'unité (et commentaires)	Symbole affichable	Énumération	Statut normatif
63	Puissance réactive	Volampère réactive. Le composant "réactif" ou "imaginaire" de la puissance électrique ($V I \sin \theta$). (Voir également la puissance réelle et la puissance apparente). NOTE 3 Différents modèles de compteur utilisent différentes méthodes pour obtenir leurs résultats. Certains compteurs peuvent calculer la puissance réactive comme une valeur arithmétique, alors que d'autres la calculent de manière vectorielle. Il convient que le client de données détermine la méthode d'utilisation et le caractère approprié de la mesure pour les besoins prévus.	VAR	vAr	N
66	Volt secondes	Volt seconds (Ws/A)	Vs	vS	N
67	Volts carrés	Volt carré (W^2/A^2)	V ²	v2	N
68	A secondes	A secondes	As	aS	N
69	A au carré	Ampère carré	A ²	A2	N
70	Durée A au carré	Ampère carré seconde	A ² s	a2S	I
71	Énergie apparente	Volt Ampère Heures	VAh	vAH	N
72	Énergie réelle	Watt Heures	Wh	wH	N
73	Énergie réactive	Volt Ampère Heures réactif	VARh	vArH	N
74	Flux magnétique	Volt par Hertz	V/Hz	vPerHz	I
75	Taux de changement de la fréquence	Hertz par seconde	Hz/s	hzPerS	I
78	Moment de masse	$kg\ m^2$ (Deuxième moment statique, communément appelé le moment d'inertie) NOTE 4 Les utilisateurs doivent fournir le préfixe "k" pour obtenir "$kg\ m^2$".	gm ²	gM2	I
81	Taux de rampe	Watts par seconde	W/s	wPerS	I
82	Débit volumétrique	Litre par seconde	L/s	lPerS	I
100	Quantité de puissance	Q	Q	q	I
101	Quantité d'énergie	Qh	Qh	qh	I
102	résistivité	Ohm mètre, ρ (rho)	Ωm	ohmM	I
103	A/m	intensité du champ magnétique, Ampère par mètre	A/m	aPerM	I

Code	Grandeur	Nom d'unité (et commentaires)	Symbole affichable	Énumération	Statut normatif
104	volt-heure carrée	Volt-heures-carrées	V ² h	v2H	I
105	ampère-heure carrée	Ampère-heure carrée	A ² h	a2H	I
106	Ampère-heures	Ampère-heures	Ah	aH	I
107	Wh/m ³	energy per volume	Wh/m ³	wHPerM3	I
108	Horodatage	heure et date au format ISO 8601	timeStamp	timeStamp	N
115	Kh-WWh	constante de mesure d'énergie active	Wh/rev	wHPerRev	N
116	Kh-VArh	constante de mesure d'énergie réactive	VARh/rev	vArHPerRev	N
117	Kh-Vah	constante de mesure d'énergie apparente	VAh/rev	vArHPerRev	N
125	Débit volumétrique	mètre cube par heure	m ³ /h	m3PerH	N
126	Débit volumétrique	mètre cube compensé par heure	m ³ _{(compensé)/h}	m3CompensatedPerH	N
127	Débit volumétrique	mètre cube non compensé par heure	m ³ _{(non compensé)/h}	m3UncompensatedPerH	N
137	Débit volumétrique	litre par heure	L/h	lPerH	N
139	Débit volumétrique	litre (non compensé) par heure	L _{(non compensé)/h}	LUncompensatedPerH	N
138	Débit volumétrique	litre (compensé) par heure	L _{(compensé)/h}	LCompensatedPerH	N
161	Quantité de puissance	Q mesuré à 45°	Q ₄₅	q45	I
162	Quantité de puissance	Q mesuré à 60°	Q ₆₀	q60	I
163	Quantité d'énergie	Qh mesuré à 45°	Q ₄₅ h	q45H	I
164	Quantité d'énergie	Qh mesuré à 60°	Q ₆₀ h	q60H	I
165	Energie spécifique	Joule / kg	J/kg	jPerKg	I
166	Volume	mètre cube, avec la valeur non compensée correspondant aux effets climatiques.	m ³ _(non compensé)	m3Uncompensated	N
167	Volume	mètre cube, avec la valeur compensée correspondant aux effets climatiques.	m ³ _(compensé)	m3Compensated	N
173	Numéro d'onde	mètre réciproque, (1/m)	m ⁻¹	m1	I
174	Volume spécifique	mètre cube par kilogramme, v	m ³ /kg	m3PerKg	I
175	Viscosité dynamique	Pascal seconde	Pa s	paS	I
176	Moment de force	Newton mètre	N m	nM	I
177	Tension superficielle	Newton par mètre	N/m	nPerM	I

Code	Grandeur	Nom d'unité (et commentaires)	Symbole affichable	Énumération	Statut normatif
178	Accélération angulaire	radian par seconde carrée	rad/s ²	radPerS2	I
179	Densité de flux thermique, éclairement énergétique	Watt par mètre carré	W/m ²	wPerM2	I
180	Capacité thermique spécifique, entropie spécifique	Joule par kilogramme kelvin	J/(kg K)	jPerKgK	I
181	densité d'énergie	Joule par mètre cube	J/m ³	jPerM3	I
182	intensité du champ électrique	Volt par mètre	V/m	vPerM	I
183	densité de la charge électrique	Coulomb par mètre cube	C/m ³	cPerM3	I
184	densité de la charge superficielle	Coulomb par mètre carré	C/m ²	cPerM2	I
185	permittivité	Farad par mètre	F/m	fPerM	I
186	perméabilité	Henry par mètre	H/m	hPerM	I
187	énergie molaire	Joule par mole	J/mol	jPerMol	I
188	entropie molaire, capacité thermique molaire	Joule par mole kelvin	J/(mol K)	jPerMolK	I
189	exposition (rayons x)	Coulomb par kilogramme	C/kg	cPerKg	I
190	débit de dose absorbée	Gray par seconde	Gy/s	gyPerS	I
191	intensité radiante	Watt par stéradian	W/sr	wPerSr	I
192	luminance	Watt par mètre carré stéradian	W/(m ² sr)	wPerM2Sr	I
193	concentration d'activité catalytique	katal par mètre cube	kat/m ³	katPerM3	I
280	Volt-heure	Volt-heures	Vh	VH	N
N = Normative I = Informative D = Déconseillé depuis la dernière édition					

Tableau C.23 – Unités de mesure non SI acceptées à utiliser avec le système d'unités international

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
159	Durée	minute = 60 s	min	min	I
160	Durée	heure = 60 min = 3 600 s	h	hr	I
195	Durée	jour = 24 h = 86 400 s	d	d	I
9	Angle plan	degré	°	deg	N
196	Angle plan	minute	'	angleMin	I
197	Angle plan	seconde	"	angleSec	I
198	Surface	hectare	ha	ha	I
134	Volume	litre = dm ³ = m ³ /1000	L	l	N
199	masse	"tonne" ou "tonne métrique" (1 000 kg = 1 Mg)	t	tonne	I
N = Normative					
I = Informative					
D = Déconseillé depuis la dernière édition					
NOTE L'orthographe britannique "litre" et l'orthographe américaine "liter" sont équivalentes.					

Tableau C.24 – Unités de mesure sans dimension et de concentration

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
0	N/A	aucun (non applicable)		aucun	N
65	Facteur de puissance	sans dimension $\cos \theta = \frac{P}{ S }$ NOTE 1 Cette définition du facteur de puissance ne s'applique qu'aux systèmes équilibrés. Voir l'autre définition au code 153. NOTE 2 Tenir compte des différentes conventions de signe appliquées entre la CEI et l'IEE. Il est supposé que le consommateur des données comprend le type de compteur utilisé et la convention de signe appliquée par l'entreprise de distribution.	$\cos \theta$	$\cos \theta$	N
79	Ecart logarithmique	Bel NOTE 3 Les utilisateurs doivent combiner cette unité au préfixe de multiplicateur "d" pour former décibels (dB)	B	bel	I
109	Etat	statut, où: "1" = "vrai", "sous tension", "on", "élevé", "configuré", "0" = "faux", "hors tension", "off", "faible", "supprimé" NOTE 4 Une valeur booléenne est préférentielle mais d'autres valeurs peuvent être prises en charge	status	status	N
111	Quantité de substance	Valeur de compteur	nombre	nombre	N
113	Ecart logarithmique de la puissance de signal	Bel-mW, normalisé en 1 mW. NOTE Pour former "dBm", combiner "Bm" au multiplicateur "d".	Bm	bm	N
114	Valeur d'application	Valeur codée	code	code	N
118	EndDeviceEvent	Valeur à interpréter comme EndDeviceEventCode	meCode	meCode	N
143	Concentration	Le rapport du volume d'un soluté divisé par le volume de la solution. NOTE 5 Les utilisateurs peuvent avoir besoin d'utiliser un préfixe tel que "µ" pour exprimer une grandeur telle que "µL/L")	L/L	IPerL	N

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
144	Concentration	Le rapport de la masse d'un soluté divisée par la masse de la solution. NOTE 6 Les utilisateurs peuvent avoir besoin d'utiliser un préfixe tel que "µ" pour exprimer une grandeur telle que "µg/g")	g/g	gPerG	N
145	Concentration	La quantité de concentration de la substance, (c), la quantité de solvant en moles divisée par le volume de la solution en m ³ .	mol/m ³	molPerM3	I
146	Concentration	Fraction molaire (X), le rapport de la quantité molaire d'un soluté divisée par la quantité molaire de la solution.	mol/mol	molPerMol	I
147	Concentration	Molalité, la quantité de soluté en moles et la quantité de solvant en kilogrammes.	mol/kg	molPerKg	I
148	Longueur	Taux de longueur	m/m	mPerM	I
149	Durée	Rapport de temps NOTE 7 Les utilisateurs peuvent avoir besoin de fournir un préfixe tel que "µ" pour afficher des taux tels que "µs/s"	s/s	sPerS	N
150	Fréquence	Dérivée de fréquence NOTE 8 Les utilisateurs peuvent avoir besoin de fournir un préfixe tel que "m" pour afficher des taux tels que "mHz/Hz"	Hz/Hz	hzPerHz	N
151	Tension	Rapport de tensions NOTE 9 Les utilisateurs peuvent avoir besoin de fournir un préfixe tel que "m" pour afficher des taux tels que "mV/V"	V/V	vPerV	N
152	Courant	Rapport d'ampérages NOTE 10 Les utilisateurs peuvent avoir besoin de fournir un préfixe tel que "m" pour afficher des taux tels que "mA/A"	A/A	aPerA	I
153	Facteur de puissance	PF, le rapport de la puissance active à la puissance apparente. NOTE 11 La convention de signe utilisée pour le facteur de puissance diffère entre les compteurs CEI et les compteurs EEI (ANSI). Il est supposé que les consommateurs des données comprennent le type de compteur utilisé et conviennent de la convention de signe appliquée dans une entreprise de distribution donnée.	W/VA	wPerVA	I
154	Quantité de rotation	Tours	rev	rev	I

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
168	Puissance du signal	Rapport de puissance NOTE 12 Les utilisateurs peuvent avoir besoin de fournir un préfixe tel que "m" pour afficher des taux tels que "mW/W"	W/W	wPerW	I
170	Index de réfraction	n	n	refractiveIndexN	I
171	Perméabilité relative	μ_r	μ_r	relativePermeabilityMm	I
172	Ecart logarithmique	néper	Np	np	I
281	Humidité	Humidité relative exprimée comme le rapport de la pression partielle de la vapeur d'eau dans le mélange air-eau à la pression de vapeur saturée de l'eau à la température spécifiée.	ϕ	RelativeHumidity	N
282	Nébulosité	Rapport entre la partie du ciel couverte et l'ensemble de la voûte céleste	SkyCover	SkyCover	N
N = Normative					
I = Informative					
D = Déconseillé depuis la dernière édition					

Tableau C.25 – Unités non SI dont les valeurs dans les unités SI doivent être obtenues expérimentalement

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
200	énergie	électronvolt ($1 \text{ eV} = 1,602\,176 \times 10^{-19} \text{ J}$)	eV	eV	I
201	masse	dalton ($1 \text{ Da} = 1,660\,538 \times 10^{-27} \text{ kg}$)	Da	da	I
202	masse	unité unifiée de masse atomique ($1 \text{ u} = 1 \text{ Da}$)	u	u	I
203	longueur	unité astronomique ($1 \text{ ua} = 1,495\,978 \times 10^{11} \text{ m}$)	ua	ua	I
204	vitesse	unité naturelle de vitesse (vitesse de la lumière dans le vide) $= 299\,792\,458 \text{ m/s}$	c_0	c_0	I
205	action	unité naturelle d'action (constante réduite de Planck) $= 1,054\,571 \times 10^{-34} \text{ J s}$	$\hbar$	nuH	I
206	masse	unité naturelle de masse (masse de l'électron) $= 9,109\,382 \times 10^{-31} \text{ kg}$	m_e	nuMe	I
207	durée	unité naturelle de temps	$\hbar/(m_e c_0^2)$	nuHPerNuMeC02	I
208	charge	unités atomiques de charge (charge élémentaire) $= 1,602\,176 \times 10^{-19} \text{ C}$	e	auE	I
209	masse	unités atomiques de masse (masse de l'électron) $= 9,109\,382 \times 10^{-31} \text{ kg}$	m_e	auMe	I
210	action	unité atomique d'action (constante réduite de Planck) $= 1,054\,571 \times 10^{-34} \text{ J s}$	$\hbar$	auH	I
211	longueur	unité atomique de longueur, bohr (rayon de Bohr) $= 0,529\,177 \times 10^{-10} \text{ m}$	a_0	auA0	I
212	énergie	unité atomique d'énergie, hartree $= 4,359\,744$	E_h	auEh	I
213	durée	unité atomique de temps	$\hbar/E_h$	auHPerAuEh	I
Légende:					
N = Normative					
I = Informative					
D = Déconseillé depuis la dernière édition					

Tableau C.26 – Autres unités de mesure non SI

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
76	Nombre de caractères	caractères	char	char	N
77	Débit de données	caractères par seconde	char/s	charPerSec	I
80	Unité monétaire	Argent en général Note: les unités monétaires spécifiques sont identifiées par la classe de devise.	¤	argent	I
119	Volume	pied cube	ft ³	ft3	N
120	Volume	pied cube compensé à cause des effets climatiques	ft ³ (compensé)	ft3Compensated	N
121	Volume	pied cube non compensé à cause des effets climatiques	ft ³ (non compensé)	ft3Uncompensated	N
122	Débit volumétrique	pied cube par heure	ft ³ /h	ft3PerH	N
123	Débit volumétrique	pied cube compensé par heure	ft ³ (compensé)/h	ft3CompensatedPerH	N
124	Débit volumétrique	pied cube non compensé par heure	ft ³ (non compensé)/h	ft3UncompensatedPerH	N
128	Volume	Gallon US (1 gal = 231 in ³ = 128 fl oz).	US gal	uSGal	N
129	Débit volumétrique	Gallon US par heure	US gal/h	uSGalPerH	N
130	Volume	Gallon impérial	imp gal	impGal	N
131	Débit volumétrique	Gallon impérial par heure	imp gal/h	impGalPerH	N
132	énergie	Unité thermique britannique	BTU	btu	N
133	Puissance	BTU par heure	BTU/h	btuPerH	N
141	Pression	Livre par pouce carré, absolu	psiA	psiA	I
142	Pression	Livre par pouce carré, manométrique	psiG	psiG	I
156	Volume	Litre, avec la valeur non compensée correspondant aux effets climatiques.	L _(non compensé)	IUncompensated	N

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
157	Volume	Litre, avec la valeur compensée correspondant aux effets climatiques.	$L_{(compense)}$	lCompensated	N
169	énergie	Thermique	therm	therm	N
214	Pression	bar (1 bar = 100 kPa)	bar	bar	I
215	Pression	millimètre de mercure (1 mmHg $\approx$ 133,3 Pa)	mmHg	mmHg	I
216	Longueur	ångström (1 Å = 10^{-10} m)	Å	angstrom	I
217	Longueur	mille nautique (1 M = 1 852 m)	M	nmi	I
218	Surface	barn (1 b = $100 \text{ fm}^2 = 10^{-28} \text{ m}^2$)	b	barn	I
219	Vitesse	nœud (1 kn = 1 852/3 600) m/s	kn	kn	I
220	Activité	curie (1 Ci = $3,7 \times 10^{10}$ Bq)	Ci	ci	I
221	exposition	roentgen (1 R = $2,58 \times 10^{-4} \text{ C/kg}$)	R	r	I
222	dose absorbée	rad (1 rd = 1 cGy)	rd	doseRad	I
223	équivalent de dose	rem (1 rem = 10^{-2} Sv)	rem	rem	I
224	longueur	pouce	in	in	I
225	longueur	pied (1 ft = 12 in)	ft	ft	I
226	longueur	rod (1 rod = 16,5 ft)	rod	rod	I
227	longueur	furlong (1 fur = 660 ft)	fur	fur	I
228	longueur	mille (1 mille terrestre = 8 fur = 80 chaînes = 320 rods = 5 280 pieds)	mi	mi	I
229	surface	pied carré (1 ft ² = 144 in ²)	ft ²	ft2	I
230	surface	yard carré (1 yd ² = 9 ft ²)	yd ²	yd2	I
231	surface	rod carré (1 rod ² = 272,25 ft ²)	rod ²	rod2	I
232	surface	acre (1 acre = 160 rd ² = 43 560 ft ²)	acre	acre	I

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
233	surface	mille carré (1 mi ² = 640 acres)	mi ²	mi ²	I
234	surface	section de terrain (1 mi ² = 1 section de terrain)	section de terrain	sectionOfLand	I
235	surface	canton (1 canton = 6 milles carrés)	canton	canton	I
237	Volume	yard cube (1 yd ³ = 27 ft ³)	yd ³	yd3	I
238	longueur	chaînon (1 li = 0,66 ft)	li	li	I
239	longueur	chaîne (1 ch = 100 chaînons = 4 rods = 66 ft)	ch	ch	I
240	Volume	Pinte liquide US (1 pt = 28,875 in ³ = 128 fl dr)	US liq pt	uSLiqPt	I
241	Volume	Quart liquide US (1 qt = 2 pt)	US liq qt	uSLiqQt	I
242	Volume	Drachme liquide des systèmes de mesure de pharmacie	fl dr ap	flDrAp	I
243	Volume	Once liquide des systèmes de mesure de pharmacie (1 fl oz ap = 8 fl dr ap)	fl oz ap	flOzAp	I
244	Volume	Pinte sèche US (1 pt = 67,2 in ³)	US dry pt	usDryPt	I
245	Volume	Quart sec US (1 qt = 2 pintes)	US dry qt	usDryQt	I
246	Volume	US peck (1 pk = 8 qt)	US pk	usPk	I
247	Volume	Hectolitre US (1 bu = 4 pk)	US bu	usBu	I
248	Masse	grain (1 grain = 1/7 000 avdp lb) NOTE Le "grain" est identique dans les unités de masse des systèmes avoirdupois, troy et de pharmacie.	gr	gr	I

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
249	Masse	Drachme avoirdupois (1 Avdp dr = 27-11/32 gr) NOTE L'abréviation "dr" peut être utilisée s'il n'y a aucune possibilité que la drachme avoirdupois ne soit confondu avec la drachme des systèmes troy ou de pharmacie.	avdp dr	avdpDr	I
250	Masse	Once avoirdupois (1 Avdp oz = 16 Avdp dr) NOTE L'abréviation "oz" peut être utilisée s'il n'y a aucune possibilité que l'once avoirdupois ne soit confondu avec l'once des systèmes troy ou de pharmacie.	avdp oz	avdpOz	I
251	Masse	Livre avoirdupois (1 lb = 16 oz) NOTE Bien que le terme "livre" soit couramment utilisé dans plusieurs pays simplement en tant que "livre (lb)", le terme historique "avoirdupois" est ajouté pour apporter du contexte et le distinguer dans cette définition des systèmes de mesure troy et de pharmacie qui utilisent les mêmes noms. L'abréviation "lb" peut être utilisée à la place de "avdp lb" si aucune confusion n'est possible avec la livre nommée dans lesdits autres systèmes.	avdp lb	avdpLb	I
252	Masse	Quintal avoirdupois (1 cwt = 100 lbs)	short cwt	shortCwt	I
253	Masse	Tonne avoirdupois (1 tonne courte = 2 000 lbs)	tonne courte	shortTon	I

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
254	Masse	Quintal brut ou long avoirdupois (1 cwt long = 112 lbs)	cwt long	longCwt	I
255	Masse	Tonne brute ou longue avoirdupois (1 long ton = 20 long cwt)	tonne longue	longTon	I
256	Masse	Pennyweight troy (1 dwt = 24 grains)	dwt	dwt	I
257	Masse	Once troy (1 oz t = 20 dwt)	oz t	ozT	I
258	Masse	Livre troy (1 lb t = 12 oz t)	lb t	lbT	I
259	Masse	Scrupule des systèmes de mesure de pharmacie (1 s ap = 20 grains)	s ap	sAp	I
260	Masse	Drachme des systèmes de mesure de pharmacie (1 dr ap = 3 s ap)	dr ap	drAp	I
261	Masse	Once des systèmes de mesure de pharmacie (1 oz ap = 8 dr ap)	oz ap	ozAp	I
262	Masse	Livre des systèmes de mesure de pharmacie (1 lp ap = 12 oz ap)	lb ap	lbAp	I
263	Consommation de carburant	mille par gallon impérial	mpg (Imp)	mpgImp	I
264	Consommation de carburant	mille par gallon US	mpg (US)	mpgUS	I
265	Consommation de carburant	équivalent du mille par gallon US	MPGe (US)	mPGeUS	I
266	Consommation de carburant	litre par 100 km	l/(100 km)	lPer100km	I
267	Consommation de carburant	kilowattheure par mille (note: les utilisateurs doivent fournir le préfixe "k" pour créer "kWh/mi")	Wh/mi	wHPerMi	I

Code	Grandeur	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
268	Consommation de carburant	kilowattheure par 100 mille (note: les utilisateurs doivent fournir le préfixe "k" pour créer "kWh/(100 mi)")	Wh/(100 mi)	wHPer100Mi	I
279	Température	degrés Fahrenheit	°F	degF	I
N = Normative					
I = Informative					
D = Déconseillé depuis la dernière édition					

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Tableau C.27 – Unités non SI associées au système d'unités CGS et CGS gaussien

Code	Quantité	Nom d'unité (et commentaires)	Symbole	Énumération	Statut normatif
269	énergie	erg (1 erg = 10^{-7} J)	erg	erg	I
270	Force	dyne (1 dyn = 10^{-5} N)	dyn	dyn	I
271	Viscosité dynamique	poise (1 P = 0,1 Pa s)	P	p	I
272	Viscosité cinématique	stokes (1 St = $1 \text{ cm}^2/\text{s}$)	St	st	I
273	Luminance	stilb (1 sb = $10^4 \text{ cd}/\text{m}^2$)	sb	sb	I
274	Illumination	phot (1 ph = 10^4 lx)	ph	ph	I
275	Accélération	gal (1 Gal = 10^{-2} m s^{-2}) NOTE Le présent "Gal" est une abréviation de "Galileo" et non de "gallon"	Gal	gal	I
276	Flux magnétique	Maxwell (1 Mx = 10^{-8} Wb)	Mx	mx	I
277	Densité du flux magnétique	Gauss (1 G = 10^{-4} T)	G	gauss	I
278	Champ magnétique	Oersted (1 Oe = $(10^3/4\pi) \text{ A/m}$)	Oe	oe	I
N = Normative					
I = Informative					
D = Déconseillé depuis la dernière édition					

C.2.19 Attribut n° 18, devise

Les codes de devise sont définis dans l'ISO 4217. Certains codes ont été répétés dans le Tableau C.28 pour référence. Les codes de devise supplémentaires peuvent être extraits librement de l'ISO 4217.

Tableau C.28 – Unités de mesure des devises (issues de l'ISO 4217)

Code	Symbole affichable	Nom d'unité	Statut normatif
0		Aucun	N
36	AUD	Dollar australien	I
124	CAD	Dollar canadien	I
156	CNY	Yuan renminbi chinois	I
208	DKK	Couronne danoise	I
356	INR	Roupie indienne	I
392	JPY	Yen japonais	I
578	NOK	Couronne norvégienne	I
643	RUB	Rouble russe	I
710	ZAR	Rand d'Afrique du Sud	I
752	SEK	Couronne suédoise	I
756	CHF	Franc suisse	I
826	GBP	Livre britannique	I
840	USD	US Dollar	I
978	EUR	Euro	I
N = Normative I = Informative D = Déconseillé depuis la dernière édition			

C.3 Utilisation d'attributs d'éléments de données pour définir le nom de ReadingType – Formule de construction avec des exemples de codes ReadingType

Un "ReadingType" peut être généré automatiquement en remplissant judicieusement chacun des attributs et en les présentant dans un ordre côte à côte. Il est recommandé que les attributs soient les plus explicites possibles pour identifier un élément de donnée, mais sans devenir si explicites qu'ils spécifient outre mesure l'élément de données.

Un nom de ReadingType peut être généré en présentant la forme numérique de chaque attribut côte à côte séparée par des points.

```
<ReadingType.Name.name> ::= <macroPeriod> "." <aggregate> "." <measuringPeriod> "."
<accumulation> "." <flowDirection> "." <commodity> "." <measurementKind> "."
<interharmonicNumerator> "." <interharmonicDenominator> "." <argumentNumerator> "."
<argumentDenominator> "." <tou> "." <cpp> "." <consumptionTier> "." <phases> "."
<multiplier> "." <unit> "." <currency>
```

Ces champs peuvent être convertis en un nom prononçable régionalisé (localisé) en utilisant la forme textuelle régionale (locale) pour chacun des attributs non égal à zéro et en les présentant dans l'ordre, côte à côte, séparés par des espaces et autres symboles tel qu'approprié. Pour la plupart des applications, cela apporte généralement plus d'informations

qui seront dites (verbalement) que nécessaire concernant les données. Supprimer les adjectifs descriptifs qui sont mutuellement compris par le contexte de communication est une pratique acceptée dans le langage courant. Le Tableau C.29 donne des exemples de ces conversions en anglais. Il sera noté que dans la formule EBNF ci-après, les symboles tels que "(" et ")" sont intégrés pour améliorer la lisibilité. A des fins identiques, les espaces autour de l'unité de mesure sont également omis.

```
<Name.description>::= [<macroPeriod> " "] [<aggregate> " "] [<measuringPeriod> " "]
[<accumulation> " "] [<flowDirection> " "] [<commodity> " "] [<measurementKind> " "]
[<interharmonicNumerator> " "] [<interharmonicDenominator> " "] [<argumentNumerator> " "]
[<argumentDenominator> " "] [<to> " "] [<cpp> " "] [<consumptionTier> " "] [<phases> " "] "("
[<multiplier>] [<unit>] [<currency>] ")"
```

Alors qu'une bonne interface éliminera toute ambiguïté et n'éditera pas de données "anonymes", une bonne interface n'ira pas non plus à l'autre extrême pour spécifier outre mesure les données qu'elle édite. Le concept est similaire à la pratique consistant à éditer un nombre approprié de chiffres de résolution pour une valeur numérique. Un système peut connaître (par exemple) la phase sur laquelle une tension a été mesurée et la fournir comme attribut de la mesure. Un autre système pourrait ne pas connaître la phase avec une bonne autorité et éditer simplement la tension mesurée au niveau d'un compteur. Les ReadingTypeID utilisés dans une réponse peuvent (par conséquent) différer légèrement des ReadingTypeID utilisés dans une demande. Il convient que les codes ReadingType utilisés par un éditeur de données soient appropriés pour les données fournies.

Les exemples donnés ci-après ne constituent nullement une liste exhaustive de ce qui peut être construit avec les valeurs d'énumération répertoriées ci-dessus. Après avoir parcouru les exemples (ci-dessous) et les listes d'énumérations (ci-dessous) sans avoir trouvé l'énumération requise, des énumérations personnalisées peuvent être réalisées. Certains des champs (comme le "numérateur") sont naturellement un champ entier. Si l'énumération nécessaire n'est qu'un entier, il convient alors que l'utilisateur fournisse l'entier requis. Néanmoins, si le champ est une énumération de type liste, il convient d'être prudent. Au lieu d'utiliser simplement le prochain nombre disponible sur la liste, les énumérations personnalisées par l'utilisateur devraient être créées, numérotées 9 000 ou plus.

Tableau C.29 – Exemples de Reading Type

Code de Reading Type ID	Description	Statut normatif
8.0.0.0.0.1.152.0.0.0.0.0.0.0.0.0.0.0.840	billingPeriod electricitySecondaryMetered billCarryover (USD)	N
8.0.0.0.0.1.150.0.0.0.0.0.0.0.0.0.0.0.840	billingPeriod electricitySecondaryMetered billLastPeriod (USD)	N
8.8.0.3.1.1.8.0.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum cumulative forward electricitySecondaryMetered demand (kW)	N
8.8.53.6.1.1.8.0.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum fixedBlock15Min indicating forward electricitySecondaryMetered demand (kW)	N
8.8.0.6.1.1.8.0.0.0.0.0.0.0.0.3.63.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand (kVAh)	N
8.8.0.6.1.1.8.0.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand (kW)	N
8.8.0.6.1.1.8.0.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touA (kW)	N
8.8.0.6.1.1.8.0.0.0.0.2.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touB (kW)	N
8.8.0.6.1.1.8.0.0.0.0.3.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touC (kW)	N
8.8.0.6.1.1.8.0.0.0.0.4.0.0.0.3.38.0	billingPeriod maximum indicating forward electricitySecondaryMetered demand touD (kW)	N
8.8.0.6.19.1.8.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum indicating reverse electricitySecondaryMetered demand (kW)	N
8.8.71.6.1.1.8.0.0.0.0.0.0.0.0.3.38.0	billingPeriod maximum rollingBlock15MinIntvl5MinSubIntvl indicating forward electricitySecondaryMetered demand (kW)	N
8.8.101.6.1.1.8.0.0.0.720.1.0.0.0.0.3.38.0	billingPeriod maximum specifiedFixedBlock indicating forward electricitySecondaryMetered demand n720 (kW)	N
8.8.102.6.1.1.8.0.0.0.720.240.0.0.0.0.3.38.0	billingPeriod maximum specifiedRollingBlock indicating forward electricitySecondaryMetered demand n720/240 (kW)	N
8.0.0.9.1.1.12.0.0.0.0.1.0.0.0.3.72.0	billingPeriod summation forward electricitySecondaryMetered energy touA (kWh)	N
8.0.0.9.1.1.12.0.0.0.0.2.0.0.0.3.72.0	billingPeriod summation forward electricitySecondaryMetered energy touB (kWh)	N
8.0.0.9.1.1.12.0.0.0.0.3.0.0.0.3.72.0	billingPeriod summation forward electricitySecondaryMetered energy touC (kWh)	N
0.0.0.1.0.1.122.0.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered demandReset (count)	N
0.0.0.1.0.1.11.0.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered energization (count)	N
0.0.0.1.0.1.131.0.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered loadInterrupt (count)	N
0.0.0.1.0.1.141.0.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered relayActivation (count)	N
0.0.0.1.0.1.142.0.0.0.0.0.0.0.0.0.111.0	bulkQuantity electricitySecondaryMetered relayCycle (count)	N
0.0.0.1.1.1.12.0.0.0.0.0.0.0.0.3.73.0	bulkQuantity forward electricitySecondaryMetered energy (kVAh)	N
0.0.0.1.1.1.12.0.0.0.0.0.0.0.0.3.72.0	bulkQuantity forward electricitySecondaryMetered energy (kWh)	N
0.0.0.1.1.7.58.0.0.0.0.0.0.0.0.2.120.0	bulkQuantity forward naturalGas volume (hft ³ (compensated))	N
0.0.0.1.1.7.58.0.0.0.0.0.0.0.0.2.121.0	bulkQuantity forward naturalGas volume (hft ³ (uncompensated))	N

Code de ReadingType ID	Description	Statut normatif
0.0.0.1.1.7.58.0.0.0.0.0.0.3.120.0	bulkQuantity forward naturalGas volume (kft ³ (compensated))	N
0.0.0.1.1.7.58.0.0.0.0.0.0.3.121.0	bulkQuantity forward naturalGas volume (kft ³ (uncompensated))	N
0.0.0.1.4.1.12.0.0.0.0.0.0.3.73.0	bulkQuantity net electricitySecondaryMetered energy (kVArh)	N
0.0.0.1.4.1.12.0.0.0.0.0.0.3.72.0	bulkQuantity net electricitySecondaryMetered energy (kWh)	N
0.0.0.1.19.1.12.0.0.0.0.0.0.3.73.0	bulkQuantity reverse electricitySecondaryMetered energy (kVArh)	N
0.0.0.1.19.1.12.0.0.0.0.0.0.3.72.0	bulkQuantity reverse electricitySecondaryMetered energy (kWh)	N
0.0.0.1.20.1.12.0.0.0.0.0.0.3.73.0	bulkQuantity total electricitySecondaryMetered energy (kVArh)	N
0.0.0.1.20.1.12.0.0.0.0.0.0.3.72.0	bulkQuantity total electricitySecondaryMetered energy (kWh)	N
0.0.0.0.3.97.0.0.0.1.0.0.0.0.0.114.0	communication deviceAddressType2 n0 (code)	N
0.0.0.0.3.123.0.0.0.0.0.0.0.0.114.0	communication diagnostic (code)	N
0.0.0.0.3.104.0.0.0.1.0.0.0.0.0.114.0	communication groupAddressType2 n0 (code)	N
0.0.0.0.3.133.0.0.0.0.0.0.0.0.114.0	communication maintenance (code)	N
0.0.0.0.3.114.0.0.0.1.0.0.0.0.0.114.0	communication oneWayAddress n0 (code)	N
0.0.0.0.3.114.0.0.0.1.0.0.0.0.0.114.0	communication oneWayAddress n1 (code)	N
11.0.0.1.4.1.12.0.0.0.0.0.0.3.72.0	daily bulkQuantity net electricitySecondaryMetered energy (kWh)	N
11.0.0.4.0.1.126.0.0.0.0.0.0.0.0.111.0	daily deltaData electricitySecondaryMetered ieee1366MomentaryInterruption (count)	N
11.0.0.4.0.1.127.0.0.0.0.0.0.0.0.111.0	daily deltaData electricitySecondaryMetered ieee1366MomentaryInterruptionEvent (count)	N
11.0.0.4.0.1.128.0.0.0.0.0.0.0.0.111.0	daily deltaData electricitySecondaryMetered ieee1366SustainedInterruption (count)	N
11.0.0.4.0.1.128.0.0.0.0.0.0.0.0.27.0	daily deltaData electricitySecondaryMetered ieee1366SustainedInterruption (s)	N
11.8.0.6.1.1.8.0.0.0.0.0.0.0.3.38.0	daily maximum indicating forward electricitySecondaryMetered demand (kW)	N
11.0.0.9.4.1.12.0.0.0.0.1.0.0.0.3.72.0	daily summation net electricitySecondaryMetered energy touA (kWh)	N
0.0.0.4.1.1.12.0.0.0.0.0.0.3.73.0	deltaData forward electricitySecondaryMetered energy (kVArh)	N
0.0.0.4.1.1.12.0.0.0.0.0.0.3.72.0	deltaData forward electricitySecondaryMetered energy (kWh)	N
0.0.0.4.1.1.12.0.0.0.0.0.0.3.73.0	deltaData net electricitySecondaryMetered energy (kVArh)	N
0.0.0.4.1.1.12.0.0.0.0.0.0.3.72.0	deltaData net electricitySecondaryMetered energy (kWh)	N
0.0.0.4.19.1.12.0.0.0.0.0.0.3.73.0	deltaData reverse electricitySecondaryMetered energy (kVArh)	N
0.0.0.4.19.1.12.0.0.0.0.0.0.3.72.0	deltaData reverse electricitySecondaryMetered energy (kWh)	N
0.0.0.4.20.1.12.0.0.0.0.0.0.3.73.0	deltaData total electricitySecondaryMetered energy (kVArh)	N

Code de ReadingType ID	Description	Statut normatif
0.0.0.4.20.1.12.0.0.0.0.0.0.0.3.72.0	deltaData total electricitySecondaryMetered energy (kWh)	N
0.0.0.0.0.1.5.0.0.0.0.0.0.0.0.111.0	electricitySecondaryMetered currentAngle (count)	N
0.0.0.0.0.1.6.0.0.0.0.0.0.0.0.111.0	electricitySecondaryMetered currentImbalance (count)	N
0.0.0.0.0.1.11.0.0.0.0.0.0.0.0.109.0	electricitySecondaryMetered energization (status)	N
0.0.0.0.0.1.13.0.0.0.0.0.0.0.0.109.0	electricitySecondaryMetered energizationLoadSide (status)	N
0.0.0.0.0.1.43.0.0.0.0.0.0.0.0.109.0	electricitySecondaryMetered switchPosition (status)	N
0.0.0.0.0.1.57.0.0.0.0.0.0.0.0.111.0	electricitySecondaryMetered voltageImbalance (count)	N
0.0.0.0.0.1.59.0.0.0.0.0.0.0.0.111.0	electricitySecondaryMetered zeroFlowDuration (count)	N
0.4.0.0.0.1.55.0.0.0.0.0.0.0.0.111.0	excess electricitySecondaryMetered voltageAngle (count)	N
0.0.2.4.1.1.12.0.0.0.0.0.0.0.0.3.72.0	fifteenMinute deltaData forward electricitySecondaryMetered energy (kWh)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.0.0.0.5.0	indicating electricitySecondaryMetered current (A)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.0.128.0.5.0	indicating electricitySecondaryMetered current phaseA (A)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.0.64.0.5.0	indicating electricitySecondaryMetered current phaseB (A)	N
0.0.0.6.0.1.4.0.0.0.0.0.0.0.32.0.5.0	indicating electricitySecondaryMetered current phaseC (A)	N
0.0.0.6.0.1.5.0.0.0.0.0.0.0.136.0.9.0	indicating electricitySecondaryMetered currentAngle phaseAtoAv (deg)	N
0.0.0.6.0.1.5.0.0.0.0.0.0.0.72.0.9.0	indicating electricitySecondaryMetered currentAngle phaseBtoAv (deg)	N
0.0.0.6.0.1.5.0.0.0.0.0.0.0.40.0.9.0	indicating electricitySecondaryMetered currentAngle phaseCtoAv (deg)	N
0.0.0.6.0.1.15.0.0.0.0.0.0.0.0.0.33.0	indicating electricitySecondaryMetered frequency (Hz)	N
0.0.0.6.0.1.38.0.0.0.0.0.0.0.0.0.65.0	indicating electricitySecondaryMetered powerFactor (cosθ)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.0.0.29.0	indicating electricitySecondaryMetered voltage (V)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.128.0.29.0	indicating electricitySecondaryMetered voltage phaseA (V)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.64.0.29.0	indicating electricitySecondaryMetered voltage phaseB (V)	N
0.0.0.6.0.1.54.0.0.0.0.0.0.0.32.0.29.0	indicating electricitySecondaryMetered voltage phaseC (V)	N
0.0.0.6.0.1.55.0.0.0.0.0.0.0.72.0.9.0	indicating electricitySecondaryMetered voltageAngle phaseBtoAv (deg)	N
0.0.0.6.0.1.55.0.0.0.0.0.0.0.40.0.9.0	indicating electricitySecondaryMetered voltageAngle phaseCtoAv (deg)	N
0.0.0.6.19.1.8.0.0.0.0.0.0.0.3.38.0	indicating reverse electricitySecondaryMetered demand (kW)	N
0.0.0.12.1.1.37.0.0.0.0.0.0.0.3.63.0	instantaneous forward electricitySecondaryMetered power (kWAr)	N
0.0.0.12.1.1.37.0.0.0.0.0.0.0.3.38.0	instantaneous forward electricitySecondaryMetered power (kW)	N
0.0.0.12.20.1.37.0.0.0.0.0.0.0.3.38.0	instantaneous total electricitySecondaryMetered power (kW)	N

Code de ReadingType ID	Description	Statut normatif
0.0.0.13.0.1.140.0.0.0.0.0.0.0.0.108.0	latchingQuantity electricitySecondaryMetered pushbutton (timeStamp)	N
0.8.0.6.1.1.8.0.0.0.0.0.0.0.0.3.38.0	maximum indicating forward electricitySecondaryMetered demand (kW)	N
0.9.0.6.0.1.38.0.0.0.0.0.0.0.0.0.65.0	minimum indicating electricitySecondaryMetered powerFactor (cosθ)	N
0.0.0.0.19.1.4.0.0.0.0.0.0.0.0.0.111.0	reverse electricitySecondaryMetered current (count)	N
22.0.0.1.1.1.12.0.0.0.0.0.0.0.0.3.73.0	seasonal bulkQuantity forward electricitySecondaryMetered energy (kVArh)	N
22.8.0.6.1.1.8.0.0.0.0.1.0.0.0.3.38.0	seasonal maximum indicating forward electricitySecondaryMetered demand touA (kW)	N
22.8.0.6.1.1.8.0.0.0.0.2.0.0.0.3.38.0	seasonal maximum indicating forward electricitySecondaryMetered demand touB (kW)	N
22.8.0.6.1.1.8.0.0.0.0.3.0.0.0.3.38.0	seasonal maximum indicating forward electricitySecondaryMetered demand touC (kW)	N
22.0.0.9.1.1.12.0.0.0.0.1.0.0.0.3.72.0	seasonal summation forward electricitySecondaryMetered energy touA (kWh)	N
22.0.0.9.1.1.12.0.0.0.0.2.0.0.0.3.72.0	seasonal summation forward electricitySecondaryMetered energy touB (kWh)	N
22.0.0.9.1.1.12.0.0.0.0.3.0.0.0.3.72.0	seasonal summation forward electricitySecondaryMetered energy touC (kWh)	N
0.0.7.4.1.1.12.0.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData forward electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.1.1.12.0.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData forward electricitySecondaryMetered energy (kWh)	N
0.0.7.4.1.1.12.0.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData net electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.1.1.12.0.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData net electricitySecondaryMetered energy (kWh)	N
0.0.7.4.19.1.12.0.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData reverse electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.19.1.12.0.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData reverse electricitySecondaryMetered energy (kWh)	N
0.0.7.4.20.1.12.0.0.0.0.0.0.0.0.3.73.0	sixtyMinute deltaData total electricitySecondaryMetered energy (kVArh)	N
0.0.7.4.20.1.12.0.0.0.0.0.0.0.0.3.72.0	sixtyMinute deltaData total electricitySecondaryMetered energy (kWh)	N
0.0.100.4.1.1.12.0.0.30.1.0.0.0.0.3.72.0	specifiedInterval deltaData forward electricitySecondaryMetered energy n30 (kWh)	N
32.0.0.4.0.1.12.0.0.0.0.0.0.0.0.3.72.0	specifiedPeriod deltaData electricitySecondaryMetered energy (kWh)	N
32.0.0.0.0.1.151.0.0.0.0.0.0.0.0.0.840	specifiedPeriod electricitySecondaryMetered billToDate (USD)	N
0.0.0.9.20.1.12.0.0.0.0.1.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touA (kWh)	N
0.0.0.9.20.1.12.0.0.0.0.2.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touB (kWh)	N
0.0.0.9.20.1.12.0.0.0.0.3.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touC (kWh)	N
0.0.0.9.20.1.12.0.0.0.0.4.0.0.0.3.72.0	summation total electricitySecondaryMetered energy touD (kWh)	N

N = Normative
I = Informative
D = Déconseillé depuis la dernière édition

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Annexe D (normative)

Enumérations de codes de qualité

D.1 Généralités

Les codes de qualité peuvent être retournés avec une `Reading.value` pour indiquer que les données ont quelque chose de remarquable. La présente Annexe décrit un profil nord-américain d'énumérations proposé pour les codes de qualité à utiliser dans ce contexte.

La présence d'un code de qualité est facultative. Un élément manquant implique que le producteur de données n'affirme pas que les données soient adéquates. L'approche de certains systèmes (de type MS, par exemple) peut être basée sur le principe "pas de nouvelles, bonnes nouvelles", ce qui signifie que des codes de qualité ne sont ajoutés que si des problèmes sont détectés. Cela permet de conserver un volume minimal de données. D'autres systèmes (tels qu'un MDM) ajouteront de la valeur aux données en les validant. A ce stade, des codes de qualité peuvent être ajoutés aux données pour déclarer explicitement que les données sont "valides" ou qu'elles ont réussi les essais formels de "validation".

Les valeurs de code de qualité définies par la présente Annexe D sont acheminées dans un message en utilisant un élément `ReadingQuality.quality`.

D.2 Identification du système proposant un commentaire sur les données

Il est concevable que toute pièce d'équipement qui touche aux données soit susceptible d'introduire une erreur ou de présenter des remarques relatives à la véracité des données. Par exemple, un compteur pourrait enregistrer des données d'intervalles et proposer ces données au système de collecte de données, mais, ce faisant, indiquer qu'il s'est produit quelque chose de remarquable (comme une panne d'alimentation en énergie ou un réajustement d'horloge par exemple) au cours de certains des intervalles. Un système de collecte de données de compteur pourrait obtenir des relevés sur le terrain, mais réaliser un contrôle de bon sens sur les valeurs pour découvrir que certaines de celles-ci ne sont pas raisonnables. Un système de gestion de données de compteur, armé de la connaissance de l'historique du compte et des profils d'utilisation, pourrait examiner minutieusement les données pour découvrir que certaines valeurs sont suspectes ou suggérer éventuellement qu'une altération a pu avoir lieu. Tous ces systèmes ont besoin d'une occasion de commenter les données sans (nécessairement) les modifier. Lorsqu'un système change effectivement les données, cela aussi peut être noté dans les codes de qualité.

D.3 Construction

Le profil nord-américain définit le code `ReadingQuality.quality` à générer à partir d'un champ en trois parties:

`ReadingQuality.quality::= <System Identifier> "." <Categorization> "." <Index>`

Cela crée un nom à 3 champs. Les mappages de CIM `ReadingQualityType` sont définis par la norme CEI 61968-11 comme suit:

System Identifier = `ReadingQualityType.systemId`

Categorization = `ReadingQualityType.category`

Index = `ReadingQualityType.subCategory`

D.4 Identificateur système de code de qualité

Le premier des trois champs fournit une identification du système qui a déclaré le problème des données. Cela est décrit au Tableau D.1. D'autres systèmes, en dehors d'un sous-système CEI 61968-9, peuvent également identifier des problèmes de données.

Tableau D.1 – Identificateur système (System Identifier)

Code d'identificateur système	Description	Statut normatif
0	Non applicable	N
1	Dispositif terminal	N
2	Réseau (de collecte de données) de système de comptage	N
3	Système de gestion de données de compteur	N
4	Autre système (non répertorié).	N
5	Spécifié de façon externe (voir données d'accompagnement)	I
I = Informative N = Normative D = Déconseillée		

D.5 Catégorisation des codes de qualité

Le second des trois champs du code de qualité identifie une catégorie pour le problème. Ceux-ci sont décrits individuellement dans le Tableau D.2.

Tableau D.2 – Exemples de catégories de codes de qualité

Catégorie	Description	Commentaire	Statut normatif
0	Valide	Validité des données	N
1	Relatifs au diagnostic	L'équipement qui produit ou gère les données a identifié un problème de diagnostic qui peut avoir un effet sur cette valeur.	N
2	Problèmes relatifs à la qualité de l'énergie au niveau du point de collecte des données	L'équipement qui produit les données a identifié des problèmes relatifs à la qualité de l'énergie qui peuvent avoir un effet sur la véracité des données.	N
3	Relatif à la protection des Recettes / contre la falsification	Système qui identifie que les données sont douteuses pour des raisons relatives à la falsification ou à la protection des recettes.	N
4	Relatifs à la collecte de données	Une condition ou un événement significatif (qui n'est pas associé à une falsification, à la qualité de l'alimentation électrique ou aux diagnostics) s'est produit et peut affecter la véracité des données.	N
5	Ayant échoué aux essais de bon sens	A première vue, les données semblent incorrectes.	N
6	Ayant échoué aux essais de validation	Les données font échouer une ou plusieurs règles de validation.	N
7	Edité	Remplacé ou approuvé par un individu.	N
8	Estimé	Remplacé par une valeur calculée par une machine à partir d'une analyse de données d'historique utilisant le même type de mesure.	N

Catégorie	Description	Commentaire	Statut normatif
9	Battant	Cette catégorie semble être couverte par d'autres catégories de cette norme.	D
10	Douteux	La véracité de ces données est douteuse pour une raison autre que celles décrites par les catégories 1 à 6.	N
11	Dérivé	La valeur a été calculée (à l'aide d'opérations logiques ou mathématiques) à partir d'un ou de plusieurs relevés du compteur ou de l'appareil auquel la valeur est attribuée et/ou à partir des relevés de compteurs ou d'appareils autres que le compteur ou l'appareil auquel la valeur est attribuée.	N
12	Prévu	Valeur prévue.	N
I = Informative N = Normative D = Déconseillée			

D.6 Index de codes de qualité

Chaque catégorie fournit le contexte permettant de comprendre un index particulier.

Le Tableau D.3 s'appuie sur la "catégorie 0" définie dans le Tableau D.2.

Tableau D.3 – Codes relatifs à la validité

Catégorie	Index	Description	Définition	Statut normatif
0	0	Data Valid	Aucun problème de qualité des données n'a été détecté; toutefois, les données n'ont pas été traitées par un processus VEE (Validation, Edition et Estimation).	N
0	1	Validated	La lecture a passé avec succès la partie validation d'un processus VEE (Validation, Edition et Estimation) et elle n'a pas été éditée ou estimée ultérieurement.	N
I = Informative N = Normative D = Déconseillée				

Le Tableau D.4 s'appuie sur la "catégorie 1" définie dans le Tableau D.2.

Tableau D.4 – Codes relatifs aux diagnostics

Catégorie	Index	Description	Commentaires	Statut normatif
1	0	DiagnosticsFlag	Un ou plusieurs diagnostics ont été générés à partir du matériel d'origine.	N
1	1	BatteryLow		N
1	3	SensorFailure		N
1	4	WatchdogFlag	Une expiration du délai du temporisateur chien de garde ou autre défaillance de la fonction chien de garde s'est produite dans le matériel d'origine.	N
1	5	ParityError	Une erreur de parité a été générée depuis le matériel d'origine	N
1	6	CRCErrors	Une erreur de contrôle de redondance cyclique a été générée depuis le matériel d'origine	N
1	7	RAMChecksumError	Une erreur de somme de contrôle a été détectée dans la mémoire RAM du matériel.	N
1	8	ROMChecksumError	Une erreur de somme de contrôle a été détectée dans la mémoire ROM du matériel.	N
1	9	ClockError	Une défaillance ou anomalie a été détectée avec l'horloge dans le matériel.	N
I = Informative N = Normative D = Déconseillée NOTE Les codes relatifs aux diagnostics peuvent produire des EndDeviceEvents correspondants à générer.				

Le Tableau D.5 s'appuie sur la "catégorie 2" définie dans le Tableau D.2.

Tableau D.5 – Codes relatifs à la qualité de l'énergie

Catégorie	Index	Description	Commentaires	Statut normatif
2	0	PowerQualityFlag	Rechercher le(s) MeterEvent connexe(s)	N
2	1	ExcessiveOutageCount	Valeur dépassée pour le seuil du compte total de pannes d'alimentation en énergie	N
2	2	PqCounter	Valeur dépassée pour le seuil du compte total de qualité d'énergie	N
2	3	ServiceDisconnectSwitching	Opération de déconnexion du service pendant l'intervalle de collecte des données	N
2	32	PowerFail	Une panne d'alimentation s'est produite pendant ou au début de cet intervalle. ANSI C12.19. Si l'alimentation est arrêtée pendant tout l'intervalle, il convient de définir la valeur de données présentée sur zéro.	N
I = Informative N = Normative D = Déconseillée				

Le Tableau D.6 s'appuie sur la "catégorie 3" définie dans le Tableau D.2.

Tableau D.6 – Codes relatifs à la protection des Recettes / contre la falsification

Catégorie	Index	Description	Commentaires	Statut normatif
3	0	RevenueProtection	Générique	N
3	1	CoverOpened	Le compteur indique qu'un couvercle étanche a été ouvert.	N
3	2	LogicalDisconnect	La valeur provient d'un compteur dont il convient qu'il (théoriquement) n'ait aucun débit ou un débit très minime.	N
3	3	RevenueProtectionSuspect		N
3	4	ReverseRotation	Un flux inverse du produit mesuré a été détecté. Cela peut indiquer une falsification sur les sites qui n'ont pas été identifiés comme étant capables de génération côté client.	N
3	5	StaticDataFlag	Le compteur affiche une utilisation historique très faible (le cas échéant).	N
I = Informative N = Normative D = Déconseillée				

Le Tableau D.7 s'appuie sur la "catégorie 4" définie dans le Tableau D.2.

Tableau D.7 – Codes relatifs à la collecte de données

Catégorie	Index	Description	Commentaires	Statut normatif
4	0	AlarmFlag	Alarme générique	N
4	1	OverflowConditionDetected	Un état de débordement numérique pour une valeur de relevé ou compteur d'impulsion a été détecté.	N
4	2	PartialInterval	Intervalle partiel (court) en raison d'un changement d'horloge, d'une panne d'alimentation en énergie ou d'un événement similaire.	N
4	3	LongInterval	Long intervalle enregistré en raison d'un changement d'horloge ou d'un événement similaire.	N
4	4	SkippedInterval	Intervalle sauté par le compteur en raison d'un changement d'horloge ou événement similaire	N
4	5	TestData	Valeur de donnée obtenue alors que l'appareil était en mode d'essai	N
4	6	ConfigurationChanged	Configuration modifiée qui peut affecter la valeur de relevé ou son interprétation	N
4	7	NotRecording	Arrêt de l'enregistrement de profil de charge	N

Catégorie	Index	Description	Commentaires	Statut normatif
4	8	ResetOccurred	Réinitialisation qui peut affecter la valeur de relevé ou son interprétation	N
4	9	ClockChanged	Une modification de l'heure de l'horloge est intervenue	N
4	10	LoadControlOccurred	Valeur de donnée obtenue au moment de la présence d'une régulation de charge	N
4	16	DstInEffect	Heure d'été/hiver d'économie d'énergie en vigueur au cours ou au début de cet intervalle	N
4	64	ClockSetForward	Horloge réglée dans le sens de l'avance au cours ou au début de cet intervalle. L'intervalle peut être court.	N
4	128	ClockSetBackward	Horloge réglée dans le sens du retard au cours ou au début de cet intervalle. L'intervalle peut être long.	N
4	129	FailedProbeAttempt	Une défaillance ayant empêché la lecture par relevé manuel est arrivée.	N
4	130	CustomerRead	La valeur de relevé a été fournie par un client	N
4	131	ManualRead	La valeur de relevé provient d'un agent de l'entreprise de distribution ayant réalisé un relevé manuel.	N
4	259	DstChangeOccurred	Des données ont été défavorablement affectées par un changement d'heure d'été/hiver d'économie d'énergie. Des horodatages et/ou des valeurs de données peuvent être incorrect(e)s. NOTE En comparaison à l'approche ANSI C12.19 dans laquelle l'indicateur DST est mis pour tout l'été, cet indicateur n'est mis pour les données altérées que si le changement d'heure d'été/hiver se produit au printemps et en automne.	N
I = Informative N = Normative D = Déconseillée				

Le Tableau D.8 s'appuie sur la "catégorie 5" définie dans le Tableau D.2.

Tableau D.8 – Codes relatifs à Ayant échoué aux essais de bon sens

Catégorie	Index	Description	Commentaires	Statut normatif
5	256	DataOutsideExpectedRange	Les données présentées ont été identifiées comme non valides par le système émetteur.	N
5	257	ErrorCode	Les données ont été identifiées comme non valides par le système émetteur et ont été remplacées par une valeur codée spéciale pour indiquer une erreur.	N
5	258	Suspect	Il convient que les données soient examinées méticuleusement et considérées suspectes.	N
5	259	KnownMissingRead	NOTE 1 Il convient que l'élément "value" soit vide lorsque le code de qualité indique qu'il est (bien entendu) manquant. NOTE 2 Si une raison est connue, elle peut être fournie par l'élément MeterReadings.Reason	N
I = Informative N = Normative D = Déconseillée				

Le Tableau D.9 s'appuie sur la "catégorie 6" définie dans le Tableau D.2.

Tableau D.9 – Codes relatifs à Ayant échoué aux essais de validation

Catégorie	Index	Enumeration	Commentaires	Statut normatif
6	0	Failed validation -- Generic	Échec de lecture à un ou plusieurs contrôles de validation non spécifiés. Il s'agit d'un code générique qui peut être utilisé si un code plus spécifique n'est pas disponible dans ce tableau.	N
6	1	Failed validation -- ZeroUsageOn ActiveMeter	Échec de validation de la lecture dû à l'usage de zéro sur un compteur actif.	N
6	2	Failed validation -- UsageOn InactiveMeter	Échec de validation de la lecture dû au non usage de zéro sur un compteur inactif.	N
6	3	Failed validation -- UsageAbove Maximum	Échec de validation de la lecture car il s'agit d'une valeur d'usage supérieure au maximum absolu admis.	N
6	4	Failed validation -- UsageBelow Minimum	Échec de validation de la lecture car il s'agit d'une valeur d'usage inférieure au minimum absolu requis.	N
6	5	Failed validation -- UsageAbove MaximumPct	Échec de validation de la lecture car il s'agit d'une valeur d'usage supérieure au pourcentage maximum admis.	N

Catégorie	Index	Énumération	Commentaires	Statut normatif
6	6	Failed validation – UsageBelow MinimumPct	Échec de validation de la lecture car il s'agit d'une valeur d'usage inférieure au pourcentage minimum requis.	N
6	9	Failed Validation – TOU SumCheck Failure	Échec de validation de la lecture car la somme des valeurs d'intervalle n'est pas comparable à la différence correspondante dans les relevés de registre.	N
6	y	Failed Validation Rule Y	Echec de lecture à un ou plusieurs contrôles de validation définis. "y" est à remplacer par un entier positif indiquant la règle de validation ayant échoué. Il est recommandé que les valeurs pour y commencent à 1001 pour permettre de constituer dans la durée la liste des énumérations normatives dans la norme CEI jusqu'à 1000. Il n'existe aucune limite quant à l'importance de la valeur du nombre qui peut être utilisé pour "y"; cependant, les parties participant à l'échange de ce code doivent avoir une compréhension commune de la signification de chaque règle de validation #.	I
I = Informative N = Normative D = Déconseillée				

Les déploiements individuels s'abonneront à des ensembles particuliers de règles de validation formelle. Bien qu'il n'existe pas de norme internationale sur les règles de validation, la présente norme fournit un espace réservé où la première règle peut être définie en tant que "règle n° 1" pour un déploiement donné, la deuxième règle en tant que "règle n° 2", et ainsi de suite, selon les besoins, jusqu'à ce que toutes les règles soient numérotées. Chaque système, s'exécutant alors en tant qu'utilitaire donné sous un ensemble donné de règles, sera soumis au même ensemble de règles qui ont été officiellement répertoriées et numérotées.

Le Tableau D.10 décrit la "catégorie 7" définie dans le Tableau D.2.

Tableau D.10 – Codes relatifs à l'édition

Catégorie	Index	Description	Commentaires	Statut normatif
7	0	Manually Edited – Generic	La valeur de relevé a été éditée par une personne utilisant une méthode d'estimation manuelle non spécifiée. Il s'agit d'un code générique qui peut être utilisé si un code plus spécifique n'est pas disponible dans ce tableau.	N
7	1	Manually Added	Une valeur de relevé a été ajoutée par une personne.	N
7	3	Manually Rejected	Une valeur a été proposée par le système ou n'a pas satisfait à un niveau donné de contrôle de la qualité. La valeur a été examinée et rejetée par un être humain	N
7	Y	Manually Edited – Method Y	La valeur de relevé a été éditée par une personne utilisant une méthode d'estimation manuelle définie. "y" est à remplacer par un entier positif indiquant la méthode d'estimation manuelle qui a été utilisée. Il est recommandé que les valeurs pour y commencent à 1001 pour permettre de constituer dans la durée la liste des énumérations normatives dans la norme CEI jusqu'à 1000. Il n'existe aucune limite quant à l'importance de la valeur du nombre qui peut être utilisé pour "y"; cependant, les parties participant à l'échange de ce code doivent avoir une compréhension commune de la signification de chaque méthode d'édition manuelle #y.	I
I = Informative N = Normative D = Déconseillée				

Le concept d'"edited" signifie qu'un être humain a participé à la création de la valeur. Il peut faire l'objet d'une saisie clavier dans le système. Il peut être suggéré par le système à l'aide de l'une des nombreuses approches, mais finalement approuvé par un être humain. Valeurs qui sont générées par l'ordinateur et ne sont jamais approuvées par un être humain dans la catégorie "estimé". Valeurs émanant d'un compteur, identifiées comme suspectes, mais néanmoins acceptées par un être humain pour une utilisation en tant que valeurs de la catégorie "douteux".

Les systèmes peuvent trouver différentes façons d'aider l'utilisateur à créer une nouvelle valeur. Le schéma de numérotation permet de répertorier les différentes façons et les identifier formellement pour un déploiement donné.

Le Tableau D.11 décrit la "catégorie 8" définie dans le Tableau D.2.

Tableau D.11 – Codes relatifs à l'estimation

Catégorie	Index	Énumération	Commentaires	Statut normatif
8	0	Estimated -- Generic	La valeur de relevé a été estimée par une machine avec un algorithme de calcul utilisant une méthode d'estimation non spécifiée. Il s'agit d'un code générique qui peut être utilisé si un code plus spécifique n'est pas disponible dans ce tableau.	N
8	Y	Machine Estimated – Method Y	La valeur de relevé a été estimée par une machine avec un algorithme de calcul utilisant une méthode d'estimation définie. “y” est à remplacer par un entier positif indiquant la méthode d'estimation qui a été utilisée. Il est recommandé que les valeurs pour y commencent à 1001 pour permettre de constituer dans la durée la liste des énumérations normatives dans la norme CEI jusqu'à 1 000. Il n'existe aucune limite quant à l'importance de la valeur du nombre qui peut être utilisé pour “y”; cependant, les parties participant à l'échange de ce code doivent avoir une compréhension commune de la signification de chaque méthode d'estimation #y.	I
I = Informative N = Normative D = Déconseillée				

Les estimations peuvent être générées de nombreuses manières. Par exemple, une estimation peut être fondée sur une combinaison d'utilisation historique, d'analyse de tendance et de conditions météorologiques. Une autre approche serait de créer une valeur pour un compteur en s'appuyant sur une mesure d'informations équivalentes d'un autre compteur. (Par exemple, il peut exister plusieurs sources de mesure de la tension d'alimentation disponibles. En cas d'échec de la source préférentielle, une autre source pourrait être utilisée avec un résultat équivalent.) Certaines techniques utilisées peuvent avoir un caractère propriétaire. D'autres techniques d'estimation peuvent être couramment utilisées et peuvent être requises d'un point de vue légal par certains régulateurs dans certains lieux. Le schéma de numérotation "approche n°1", "approche n°2", et ainsi de suite, est un emplacement réservé dans lequel les approches utilisées peuvent être officiellement répertoriées pour un déploiement donné et identifiées en tant que technique spécifique.

Le Tableau D.12 décrit la "catégorie 10" définie dans le Tableau D.2.

Tableau D.12 – Codes relatifs à Douteux

Catégorie	Index	Description	Commentaires	Statut normatif
10	0	Indeterminate	La qualité est inconnue ou ne peut pas être déterminée. NOTE 1 Similaire au cas où aucun code qualité n'est fourni mais dans lequel d'autres codes peuvent être présents, ce qui jette le doute sur la véracité des données, ou une situation, qui peut être apparue, empêche toute sorte d'analyse sur les données ou sur le matériel qui a fourni les données.	N

Catégorie	Index	Description	Commentaires	Statut normatif
			NOTE 2 Lorsqu'elle est utilisée en réponse à une demande Power (Energization) Status ou Switch Position, une qualité "Indeterminate" (indéterminé) signifie que l'état d'alimentation en énergie ou la position de l'interrupteur est inconnu(e) ou ne peut pas être déterminé(e). Lorsqu'il est utilisé en réponse à une demande pour d'autres types de lecture, "indeterminate" signifie que la qualité de la valeur fournie est explicitement inconnue.	
10	1	Manually accepted	Indique que la valeur n'a pas un certain niveau de contrôle de la qualité, mais que la panne a été modifiée par un utilisateur humain.	N
I = Informative N = Normative D = Déconseillée				

Le Tableau D.13 décrit la "catégorie 11" définie dans le Tableau D.2.

Tableau D.13 – Codes relatifs à Dérivé

Catégorie	Index	Enumération	Commentaires	Statut normatif
11	0	Derived – Deterministic	"Derived "(Dérivé) indique que la valeur a été calculée (à l'aide d'opérations logiques ou mathématiques) en fonction d'une ou de plusieurs relevés du compteur ou de l'appareil auquel la valeur est attribuée et/ou des relevés des compteurs ou des appareils autre que le compteur ou que l'appareil auquel la valeur est attribuée. "Deterministic"(Déterministe) (à la différence de "Derived" – voir article suivant) est utilisé lorsqu'un degré significatif d'incertitude n'existe pas dans la valeur résultante. Par exemple, la qualité de "x.11.0" ou "Derived – Deterministic" peut être utilisée quand une valeur d'un compteur virtuel est calculée en tant que somme des valeurs de deux compteurs ou plus.	N
11	1	Derived – Infered	"Derived" indique que la valeur a été calculée (à l'aide d'opérations logiques ou mathématiques) en fonction d'une ou de plusieurs relevés du compteur ou de l'appareil auquel la valeur est attribuée et/ou des relevés des compteurs ou des appareils autre que le compteur ou que l'appareil auquel la valeur est attribuée. "Infered "(Dédut) (à la différence de "Deterministic" – voir article précédent) est utilisé lorsqu'un degré significatif d'incertitude peut exister dans la valeur résultante.	N

Catégorie	Index	Énumération	Commentaires	Statut normatif
			Lorsqu'il est utilisé en réponse à Power (Energization) Status Checks, "x.11.1" ou "Dérivé – Dédit" est synonyme de "Dédit". Par exemple, un UsagePoint peut être déterminé pour une valeur "De-energized" et une Qualité de lecture "Derived- Inferred" s'il est déduit comme étant hors tension, car un ou plusieurs autres UsagePoint sont confirmés comme étant "hors tension" sur le même transformateur de distribution. Dans ce cas, il y a très peu de risques que la déduction soit incorrecte.	
I = Informative N = Normative D = Déconseillée				

Le Tableau D.14 décrit la "catégorie 12" définie dans le Tableau D.2.

Tableau D.14 – Codes relatifs à la projection

Catégorie	Index	Énumération	Commentaires	Statut normatif
12	0	Projected -- Generic	La valeur de relevé a été projetée (prévision) avec un algorithme de calcul utilisant une méthode de projection (prévision) non spécifiée. Il s'agit d'un code générique qui peut être utilisé si un code plus spécifique n'est pas disponible dans ce tableau.	N
12	Y	Projected – Method Y	La valeur de relevé a été projetée (prévision) avec un algorithme de calcul utilisant une méthode de projection (prévision) définie. "y" est à remplacer par un entier positif indiquant la méthode de projection (prévision) qui a été utilisée. Il est recommandé que les valeurs pour y commencent à 1001 pour permettre de constituer dans la durée la liste des énumérations normatives dans la norme CEI jusqu'à 1000. Il n'existe aucune limite quant à l'importance de la valeur du nombre qui peut être utilisé pour "y"; cependant, les parties participant à l'échange de ce code doivent avoir une compréhension commune de la signification de chaque méthode de projection #y.	I
I = Informative N = Normative D = Déconseillée				

De la même façon que "estimated" crée une valeur générée par l'ordinateur à partir d'une vue historique des données d'un événement qui s'est produit dans le passé, "projected" crée une valeur générée par l'ordinateur, prévue dans l'avenir. Le schéma de numérotation "approche n°1", "approche n°2", et ainsi de suite, est un emplacement réservé dans lequel les approches utilisées peuvent être officiellement répertoriées pour un déploiement donné et identifiées en tant que technique spécifique.

D.7 Exemples de codes de qualité

Certains des codes décrits dans le Tableau D.15 sont utilisés dans des systèmes depuis la publication de la CEI 61968-9:2009.

Tableau D.15 – Exemples de codes de qualité

Code de qualité	Origine (du tableau D.1)		Catégorie (du tableau D.2)		Index (des tableaux D.3 à D.15)		Statut normatif
Non fourni	Non fourni		Non fourni		AssumedValid	aucun	N
1.0.0	Dispositif terminal	1	0	Validité	DataValid	0	N
1.1.4	Dispositif terminal	1	1	Diagnostic	WatchdogFlag	4	N
1.4.1	Dispositif terminal	1	4	Collecte de données	OverflowConditionDetected	1	N
1.4.16	Dispositif terminal	1	4	Collecte de données	DstInEffect	16	N
1.4.2	Dispositif terminal	1	4	Collecte de données	PartialInterval	2	N
1.4.3	Dispositif terminal	1	4	Collecte de données	LongInterval	3	N
1.4.4	Dispositif terminal	1	4	Collecte de données	SkippedInterval	4	N
1.4.5	Dispositif terminal	1	4	Collecte de données	TestData	5	N
1.5.257	Dispositif terminal	1	5	Raisonnabilité	ErrorCode	257	N
2.0.0	Réseau Ms	2	0	Validité	DataValid	0	N
2.3.4	Réseau Ms	2	3	Falsification	ReverseRotation	4	N
2.3.5	Réseau Ms	2	3	Falsification	StaticDataFlag	5	N
2.4.259	Réseau Ms	2	4	Collecte de données	DstChangeOccurred	259	N
2.5.256	Réseau Ms	2	5	Raisonnabilité	DataOutsideExpectedRange	256	N
2.5.257	Réseau Ms	2	5	Raisonnabilité	ErrorCode	257	N
3.0.0	MDM	3	0	Validité	DataValid	0	N
3.10.0	MDM	3	10	Douteux	Indéterminé	0	N
3.10.1	MDM	3	7	Edité	Accepté manuellement	1	N
3.11.0	MDM	3	11	Dérivé	Dérivé – générique	0	N
3.11.1	MDM	3	11	Dérivé	Dérivé – Dédit	1	N
3.3.3	MDM	3	3	Falsification	RevenueProtectionSuspect	3	N
3.3.5	MDM	3	3	Falsification	StaticDataFlag	5	N
3.5.259	MDM	3	5	Raisonnabilité	Lecture manquante connue	259	N
3.6.0	MDM	3	6	Validation	Echec de la validation - Générique	0	N
3.7.0	MDM	3	7	Edité	Edité manuellement - Générique	0	N
3.8.0	MDM	3	8	Estimé	Estimé - Générique	0	N

Annexe E (normative)

Enumérations EndDeviceEventType

E.1 Généralités

Les systèmes de comptage non seulement collectent des relevés des compteurs mais rapportent aussi des exceptions. La présente Annexe décrit les codes recommandés à utiliser pour l'identification des événements CEI 61968.

Les codes d'EndDeviceEventTypes sont classés d'une manière qui divise le code énuméré en 4 parties:

EndDeviceEventType:=

<EndDeviceType>.<EndDeviceDomain>.<EndDeviceSubdomain>.<EndDeviceEventOrAction>

où

<EndDeviceType> EndDeviceType)	= valeur numérique de l'énumération EndDeviceType (voir la section
<EndDeviceDomain> EndDeviceDomain)	= valeur numérique de l'énumération EndDeviceDomain (voir la section
<EndDeviceSubdomain> section EndDeviceSubdomain)	= valeur numérique de l'énumération EndDeviSubdDomain (voir la
<EndDeviceEventOrAction> section EndDeviceEventOrAction)	= valeur numérique de l'énumération EndDeviceEventOrAction (voir la

E.2 Conditions d'alarme

E.2.1 Généralités

Alors que l'EndDeviceEventType définit l'événement qui s'est produit, il est également nécessaire d'indiquer la gravité d'un événement (Alarm, Advisory, Normal, etc.). Il convient de définir ces valeurs dans le champ EndDeviceEvent.severity. Cela permet à chaque système mettant en œuvre des événements CIM de classer la gravité de ses événements en fonction de ses intentions, sans devoir effectuer un classement selon une définition rigide figurant dans la CEI 61968-9.

E.2.2 Suppression de conditions d'alarme et communication des changements d'état/de condition

Dans certains cas, le changement d'état d'un paramètre particulier doit être communiqué à un système externe. Dans le petit nombre de cas qui a été découvert, on a simplement ajouté un EndDeviceEventOrAction concis pour le décrire. Les événements suivants prennent en charge cette méthode de communication.

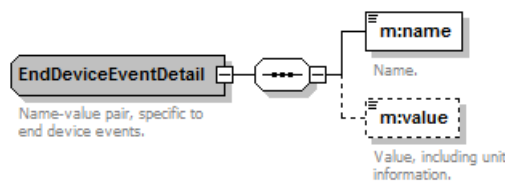
Description de l'événement ou de la commande	EndDeviceEvent Catégorie (utilisant des mnémoniques d'énumération)
Diagnostic 8 Condition Fort courant neutre effacée	*.Power.NeutralCurrent. MaxLimitReachedCleared
Energie réactive avance effacée Attention 040000 Condition Energie réactive avance	*.Power.PowerFactor.OutofRangeCleared

Description de l'événement ou de la commande	EndDeviceEvent Catégorie (utilisant des mnémoniques d'énumération)
effacée	
Forte distorsion éliminée Diagnostic 5 Forte distorsion éliminée	*.Power.PowerQuality.HighDistortionCleared
Déséquilibre de tension éliminé Diagnostic 2 Déséquilibre de tension éliminé	*.Power.Voltage.ImbalanceCleared
Alerte phase effacée, condition d'alerte d'angle de phase éliminée	*.Power.PhaseAngle.OutofRangeCleared
Phase croisée éliminée Diagnostic 1 Polarité de condition, Phase croisée, Flux de l'énergie Rv effacé	*.Power.Phase.CrossPhaseCleared
Phase inactive effacée Diagnostic 3 Condition de phase inactive effacée	*.Power.Phase.InactiveCleared
Bosse de tension commencée (Phase A)	*.Power.PhaseAVoltage.SwellStarted
Bosse de tension commencée (Phase B)	*.Power.PhaseBVoltage.SwellStarted
Bosse de tension commencée (Phase C)	*.Power.PhaseCVoltage.SwellStarted
Bosse de tension éliminée Attention 004000 Condition de surcharge de la demande effacée	*.Power.Voltage.SwellStopped
Bosse de tension arrêtée (Phase A) Diagnostic 7 Condition de surtension, Phase A éliminée	*.Power.PhaseAVoltage.SwellStopped
Bosse de tension arrêtée (Phase B)	*.Power.PhaseBVoltage.SwellStopped
Bosse de tension arrêtée (Phase C)	*.Power.PhaseCVoltage.SwellStopped
Baisse soudaine de tension commencée (Phase A)	*.Power.PhaseAVoltage.SagStarted
Baisse soudaine de tension commencée (Phase B)	*.Power.PhaseBVoltage.SagStarted
Baisse soudaine de tension commencée (Phase C)	*.Power.PhaseCVoltage.SagStarted
Baisse soudaine de tension éliminée Attention 000400 Condition de sous-tension éliminée	*.Power.Voltage.SagStopped
Baisse soudaine de tension arrêtée (Phase A); Diagnostic 6 Condition de sous-tension, Phase A éliminée	*.Power.PhaseAVoltage.SagStopped
Baisse soudaine de tension arrêtée (Phase B)	*.Power.PhaseBVoltage.SagStopped
Baisse soudaine de tension arrêtée (Phase C)	*.Power.PhaseCVoltage.SagStopped

E.3 Données d'événement

Certains événements nécessitent ou contiennent plus de détails qu'une description et une catégorie. Par exemple, la spécification d'un numéro de canal, numéro d'alarme, numéro de relais, numéro de port, numéro de formule, numéro de version, etc. Il convient de les régler sur l'élément identifié par la paire nom/valeur EndDeviceEvent.EventDetails.

Il convient toutefois de ne pas trop utiliser cette construction ou de l'utiliser à mauvais escient. Cette construction a pour but unique de capturer des données auxiliaires relatives à l'événement. Il convient de ne pas l'utiliser à la place de l'envoi d'un ensemble complet d'informations EndDevice, par exemple (voir la Figure E.1).



Légende

Anglais	Français
Name-value pair, specific to end device events	Paire Name-value spécifique aux événements de dispositif terminal
Value, including unit information	Valeur, comprenant des informations d'unité

Figure E.1 – Données d'événement

Voici quelques exemples de son utilisation:

Un événement d'appariement PAN terminé [PAN Pairing Completed] peut également fournir les données suivantes.

```
<m:EndDeviceEvent>
:
  <m:EndDeviceEventDetails>
    <m:name>InstallDate</m:dateTime>
    <m:value>2001-12-17</m:value>
  </m:EndDeviceEventDetails>
  <m:EndDeviceEventDetails>
    <m:name>ShortId</m:dateTime>
    <m:value>1002</m:value>
  </m:EndDeviceEventDetails>
:
</m:EndDeviceEvent>
```

Un événement de téléchargement de microprogramme [Firmware Downloaded] peut également fournir les données suivantes.

```
<m:EndDeviceEvent>
:
  <m:EndDeviceEventDetails>
    <m:name>FirmwareVersion</m:dateTime>
    <m:value>1.2345</m:value>
  </m:EndDeviceEventDetails>
:
</m:EndDeviceEvent>
```

Un événement d'exception de tension [Voltage Exception] peut également fournir les données suivantes.

```
<m:EndDeviceEvent>
:
  <m:EndDeviceEventDetails>
    <m:name>VoltageThreshold</m:dateTime>
    <m:value>3</m:value>
  </m:EndDeviceEventDetails>
:
</m:EndDeviceEvent>
```

E.4 Identificateur en 4 parties: EndDeviceEventType

Les Articles E.5 à E.8 décrivent chaque partie de l'énumération EndDeviceEventType:

- <EndDeviceType>
- <EndDeviceDomain>
- <EndDeviceSubdomain>
- <EndDeviceEventOrAction>

E.5 EndDeviceType

Au niveau le plus élevé, il est utile d'identifier le type d'appareil à partir duquel l'événement a été créé. Il convient que chacun de ces éléments représente un appareil physique, bien que la valeur zéro (0) puisse être utilisée dans des cas particuliers. Les codes EndDeviceType sont énumérés et décrits dans le Tableau E.1.

Tableau E.1 – Codes EndDeviceType

Enumération EndDeviceType		
Mnémonique	Valeur	Description
n/a	0	Non applicable. Utiliser ce type d'appareil lorsqu'un type d'appareil n'est pas connu.
Collector	10	Appareil qui agit comme un point central de communication entre HES et les appareils sur site.
ComDevice	26	Appareil de communication
DAPDevice	1	Appareil de point d'agrégation de données
DERDevice	2	Appareil de réponse à la demande
DSPDevice	6	Appareil de traitement de signaux numériques
ElectricMeter	3	Appareil situé sur les lieux de mesure de l'utilisation d'électricité.
ElectricVehicle	58	(ou véhicule électrique rechargeable) véhicule qui peut être branché sur le réseau électrique.
EnergyRouter	23	Un routeur d'énergie, analogue au routeur de données et de communications bien connu, détecte automatiquement la demande d'électricité et délivre l'électricité sous la forme requise (CA ou CC) à la tension et à la fréquence correctes sur un système d'alimentation électrique.
Feeder	13	Les lignes ("feeders") transportent du courant triphasé et tendent à suivre les chemins principaux près du poste.
GasMeter	4	Appareil situé sur les lieux pour mesurer l'utilisation du gaz.
Passerelle	5	Appareil de passerelle.
Generator	14	Il s'agit généralement d'un générateur électrique rotatif. Quelque chose doit faire tourner le générateur: par exemple, une roue à aubes dans un barrage hydroélectrique, un gros moteur diesel ou une turbine à gaz.
InPremisesDisplay(IPD/IHD)	15	L'affichage IPD/IHD (In-Premises/In-Home Display) permet aux clients de suivre leur consommation d'énergie sous une forme de tableau ou de graphique en fonction des kWh utilisés.
LoadControlDevice	16	Appareil utilisé pour mettre en place des services "différables", communément appelés "heures creuses".
NetworkRouter	11	Un routeur distribue des données informatiques numériques contenues dans un paquet de données sur un réseau.
PANDevice	12	Appareil réseau PAN ("premises area network") qui ne fait l'objet de détails supplémentaires.
PANGateway	7	Une passerelle PAN relie un réseau de communication externe à des appareils de gestion de l'énergie dans les locaux.

Enumération EndDeviceType		
Mnémonique	Valeur	Description
PANMeter	17	Appareil réseau PAN ("premises area network") dont la fonction est d'effectuer des mesures (de consommation électrique, par exemple).
PrepaymentTerminal	18	Appareil qui permet au client d'effectuer un paiement anticipé avant de pouvoir utiliser l'énergie.
ProgCtlThermostat(PCT)	19	Appareil thermostat dont les paramètres peuvent être contrôlés par l'intermédiaire d'une API (c'est-à-dire sans intervention humaine).
RangeExtender	20	Appareil d'extension de portée hertzienne ou répéteur hertzien qui peut étendre la portée d'un réseau sans fil existant.
Regulator	21	Un régulateur de tension est un régulateur électrique conçu pour maintenir automatiquement un niveau de tension constant.
Substation	22	Un poste ("substation") électrique est une station secondaire d'un système de génération, de transport et de distribution de l'électricité dans lequel la tension est diminuée ou augmentée à l'aide de transformateurs.
Transformer	8	Appareil qui convertit la tension (de l'ordre de milliers de volts) d'un générateur en un courant à très haute tension pour le transport longue distance sur le réseau de transport.
WasteWaterMeter	25	Appareil de mesure de l'utilisation des eaux usées.
WaterMeter	24	Appareil de mesure de l'utilisation de l'eau.

E.6 EndDeviceDomain

Une fois le type d'appareil connu, il convient de classer l'événement par un code EndDeviceDomain. Ce code fournit une indication sur le caractère de haut niveau de l'événement. Une attention particulière doit être accordée à EndDeviceDomain dans lequel un événement est classé; grâce à une classification appropriée des événements par un petit ensemble de codes EndDeviceDomain, un système peut exécuter plus facilement les rapports sur la base des types d'événements qui se sont produits ou qui ont été reçus. Les codes EndDeviceDomain sont énumérés et décrits dans le Tableau E.2.

Tableau E.2 – Codes EndDeviceDomain

Enumération EndDeviceDomain		
Mnémonique	Valeur	Description
n/a	0	Non applicable. Utilisé lorsqu'un domaine n'est pas requis. Il convient de ne l'utiliser que rarement.
AssociatedDevice	39	Appareil (un relais, par exemple) qui peut être associé à un dispositif terminal.
Battery	2	Tous les événements ou les commandes relatif(ve)s à une batterie d'appareil.
Billing	20	Événements ou commandes relatif(ve)s au coût de l'énergie (y compris les prix, tarifs, TOU, etc.).
Cartridge	3	Événements ou commandes relatif(ve)s aux fusibles de cartouche.
Clock	36	Événements ou commandes relatif(ve)s à une horloge interne d'appareil.
Communication	1	Événements ou commandes purement relatif(ve)s aux problèmes de communication. Envisager d'autres domaines avant d'utiliser celui-ci.
Configuration	7	Événements ou commandes relatif(ve)s à la configuration de l'appareil.
Demand	8	Événements ou commandes relatif(ve)s à la demande (c'est-à-dire kW) et paramètres de la demande (par opposition à la consommation, c'est-à-dire kWh).
Firmware	11	Événements ou commandes relatif(ve)s au microprogramme (firmware) de l'appareil.
GasSupply	4	Événements ou commandes relatif(ve)s à la fourniture de gaz naturel ou

Enumération EndDeviceDomain		
Mnémonique	Valeur	Description
		de propane.
Installation	6	Événements ou commandes relatif(ve)s à l'installation de l'appareil.
KYZPulseCounter	38	Fonction de comptage d'impulsions à l'intérieur d'un compteur ou d'un autre dispositif terminal.
LoadControl	15	Événements ou commandes liés à la restriction ou au contrôle automatique de la consommation d'énergie d'un client.
LoadProfile	16	Événements ou commandes relatif(ve)s à la consommation d'énergie (c'est-à-dire la "charge") au fil du temps sur un appareil.
Logs	17	Événements ou commandes relatif(ve)s aux journaux internes d'un appareil.
Memory	18	Événements ou commandes relatif(ve)s à la mémoire de l'appareil.
Metrology	21	Événements ou commandes relatif(ve)s à tout type de mesure réalisé par un appareil.
MobileSecurity	14	Événements ou commandes relatif(ve)s à la sécurité des appareils lorsque l'appareil est accessible par le biais d'un outil ou appareil mobile.
Modem	19	Événements ou commandes relatif(ve)s relatifs au modem d'un appareil.
ModuleFirmware	9	Événements ou commandes relatif(ve)s au microprogramme d'un module contenu dans un appareil.
Network	23	Événements ou commandes relatif(ve)s au statut d'un appareil sur le réseau. Egalement utilisé pour les événements réseau généraux, tels que la mise en service d'un réseau PAN.
Pairing	10	Événements ou commandes relatif(ve)s à la liaison d'appareils entre eux (par exemple, PANDevice avec Meter, ComDevice avec Meter, etc.).
Power	26	Événements ou commandes relatif(ve)s au statut d'alimentation d'un appareil.
Pressure	29	Événements ou commandes relatif(ve)s aux seuils de pression d'un appareil.
RCDSwitch	31	Événements ou commandes relatif(ve)s aux activités de connexion / déconnexion à distance de l'appareil.
Recoder	41	Appareil de codage
Security	12	Événements ou commandes relatif(ve)s à la sécurité des appareils (par exemple, SecurityKey, HMAC, Parity, Rotation, TamperDetection, etc.).
Temperature	35	Événements ou commandes relatif(ve)s à un appareil
VideoDisplay	13	Événements ou commandes relatif(ve)s à l'affichage/l'écran CRT d'un appareil.
Volume	40	Quantité d'un espace tridimensionnel délimité; espace occupé par un liquide ou un gaz.
Watchdog	37	Fonction matérielle ou logicielle déclenchée à l'expiration d'un délai de temporisateur.
WaterSupply	5	Événements ou commandes relatif(ve)s à la fourniture en eau.

E.7 EndDeviceSubDomain

EndDeviceDomain peut être subdivisé en codes EndDeviceSubdomain. Les codes EndDeviceSubdomain sont énumérés et décrits dans le Tableau E.3.

Tableau E.3 – Codes EndDeviceSubdomain

Enumération EndDeviceSubdomain		
Mnémonique	Valeur	Description
n/a	0	Non applicable. Utilisé lorsqu'un sous-domaine n'est pas requis. Il convient de ne l'utiliser que rarement

Enumération EndDeviceSubdomain		
Mnémonique	Valeur	Description
Access	1	Relatif à la sécurité physique (c'est-à-dire, l'accessibilité) ou relatif à l'autorisation électronique de lecture/écriture sur un support numérique
Activation	283	Ouverture d'une fonction
AlarmTable	285	Tableau interne d'un appareil pour le suivi des alarmes
ADConverter	142	Relatif à la conversion analogique-numérique
AllEvents	148	Relatif à un ensemble d'événements (généralement utilisé dans un scénario d'annulation de tous les événements d'un contrôle de charge)
ApparentPower	290	Magnitude de la puissance complexe mesurée en volts-ampères
Allocation	2	Relatif à la désignation ou à l'affectation; généralement relatif à la mémoire (RAM/ROM)
Association	74	Relatif à la liaison/l'appariement d'un appareil/objet à un autre appareil/objet
AUTDProcess	3	Relatif aux processus Always Up To Date (AUTD), watchdog ou keep-alive
AutoRegistration	5	Relatif au processus d'enregistrement automatique
AutoTime	7	Relatif au réglage automatique de l'heure
BTU	13	Relatif aux British Thermal Units (BTU)
Buffer	14	Relatif au stockage temporaire de données
Cable	15	Relatif à un câble physique
Calculation	16	Relatif au calcul mathématique
Calibrage	18	Relatif à un ensemble de graduations affichant des positions ou des valeurs
Certificate	21	Relatif à un document attestant l'authenticité de quelque chose; généralement, un certificat de sécurité
Charge	22	relatif aux frais de facturation (billing charge, en anglais)
Checksum	284	Donnée de taille fixe calculée à partir d'un bloc arbitraire de données numériques dans le cadre de la détection d'erreurs accidentelles
Concentration	39	Relatif à la densité ou à la composition d'une chose
Constants	23	Relatif à des valeurs définies de manière statique
ControlPoint	26	Relatif aux paramètres de contrôle de charge
Cover	29	Relatif à quelque chose qui constitue un couvercle ou qui fournit une couverture
CRC	30	Relatif au contrôle de redondance cyclique
Credit	8	Relatif à la partie droite d'un compte; facturation
Current	6	Relatif à la puissance électrique mesurée en ampères
Data	31	Relatif aux informations factuelles
DataLog	33	Relatif à un enregistrement (c'est-à-dire un journal) d'informations factuelles
Date	34	Relatif au temps calendaire
Day	35	Relatif à la partie jour du temps calendaire
DaylightSavingsTime	56	Relatif à la pratique consistant à avancer l'horloge d'une heure au printemps.
DayLimit	299	Limite établie pour une période quotidienne
Decryption	36	Relatif à la conversion de données cryptées en données lisibles
Display	143	Relatif à un écran CRT, à un écran LED ou à toute autre forme d'appareil vidéo
Door	128	Relatif à une barrière mobile utilisée pour couvrir une ouverture; par exemple, une porte d'accès à un compteur ou à un collecteur
EmergencySupplyCapacityLimit	138	Relatif aux limites de capacité de fourniture d'urgence

Enumération EndDeviceSubdomain		
Mnémonique	Valeur	Description
Encoder	40	Relatif à l'objet qui convertit les informations d'un format à un autre
EncoderRegister	41	Relatif au registre de l'encodeur (c'est-à-dire sur un compteur)
EPROM	42	Relatif à la mémoire en lecture seule programmable et effaçable
Event	43	Relatif à quelque chose qui s'est passé; il convient d'utiliser des sous-domaines plus spécifiques avec celui-ci
EventLog	44	Relatif à un enregistrement (c'est-à-dire un journal) de données d'événement
EWM	45	Relatif à un module sans fil externe
Feature	46	Relatif à une caractéristique non spécifique
FirmwareReset	47	Relatif à la restauration du microprogramme à son état d'origine
Flow	48	Relatif au mouvement d'une substance (électricité, gaz, eau, etc.)
FPV	49	Relatif à une forme de compressibilité élevée
Frames	50	Relatif à des blocs de taille fixe; comme en mémoire
Frequency	4	Relatif au nombre de cycles par unité de temps
GCAnalyzer	51	Relatif à l'analyseur chromatographique de gaz qui est utilisé pour mesurer le mélange composant du gaz naturel fourni à un site
HeadEndSystem	52	Relatif au système de comptabilisation/AMI
HistoryLog	53	Relatif à un enregistrement (c'est-à-dire un journal) de données historiques
HMAC	54	Relatif au code d'authentification du message haché; méthode spécifique de calcul d'un MAC
Holiday	97	Relatif aux jours réservés ayant une signification spéciale
Identity	10	Relatif à un identificateur unique
Initialisation	298	Fonction de démarrage
Input	55	Relatif aux données entrées dans le système
InstallDate	57	Relatif à la date de préparation de l'utilisation
IntelligentRegister	58	Relatif à un registre spécifique sur un appareil
Interval	59	Relatif aux données d'énergie d'intervalle; durée entre deux événements
IO	60	Relatif aux entrées/sorties générales
IPAddress	127	Relatif à une adresse IP (Internet Protocol Address)
LANAddress	61	Relatif à une identification unique d'un appareil sur un réseau d'appareils
LastRead	62	Relatif à la lecture finale d'un compteur
List	63	Relatif à une liste interne [contenue en mémoire ou dans le microprogramme]
ListPointers	64	Relatif à un ensemble spécifique de valeurs conservé par un compteur
Login	65	Relatif au processus par lequel on peut accéder à un appareil, un ordinateur ou un système
LowSpeedBus	145	Relatif à un circuit qui relie le processeur à d'autres appareils; transmission bas débit
MagneticSwitch	66	Relatif à n'importe quel type d'interrupteur magnétique
MaintMode	11	Relatif à un mode de fonctionnement spécifique dans lequel un appareil peut être défini ou réglé
Measurement	67	Relatif à l'ampleur de la grandeur
MeasurementType	286	Code définissant le type de données de mesure
Mesh	68	Généralement relatif au type de compteur réseau
MeterBus	147	Relatif à un circuit qui connecte un appareil ou un module à un compteur
MeteringMode	12	Relatif à un mode de fonctionnement spécifique dans lequel un appareil

Enumération EndDeviceSubdomain		
Mnémonique	Valeur	Description
		peut être défini ou réglé
Mobile	69	Relatif aux appareils qui ne sont pas confinés à un seul endroit
MOL%	70	Relatif au pourcentage de moles
NetworkId	71	Relatif à une identification unique d'un appareil sur un réseau d'appareils
NeutralCurrent	137	Relatif à la partie essentielle de l'unification électrofaible
NVRAM	72	Relatif à la mémoire vive non volatile
OptionBoard	146	Relatif à un type de module dans un compteur
Parameter	75	Relatif à une variable transmise à une fonction
ParentDevice	76	Relatif à un propriétaire d'appareil
Parity	77	Généralement relatif à un état pair/impair ou marche/arrêt; propriété de symétrie
Password	24	Relatif à un mot de passe utilisé pour l'authentification
Phase	25	Généralement relatif à un moyen de distribuer le courant alternatif; lorsque la phase spécifique n'est pas pertinente, il convient de l'utiliser en tant que EndDeviceSubdomain
PhaseAngle	130	Relatif à la composante angulaire des coordonnées polaires
PhaseA	126	Relatif à la phase A d'un circuit multi-phase
PhaseAApparentPower	291	Puissance apparente de la phase A d'un circuit multi-phase
PhaseACurrent	287	Relatif au courant de la première phase d'une alimentation triphasée
PhaseAReactivePower	295	Puissance réactive de la phase A d'un circuit multi-phase
PhaseAVoltage	131	Relatif à la tension de la première phase d'une alimentation triphasée
PhaseAVoltagePotential	126	Relatif au potentiel de tension de la première phase d'une alimentation triphasée
PhaseB	134	Relatif à la phase B d'un circuit multi-phase
PhaseBApparentPower	292	Puissance apparente de la phase B d'un circuit multi-phase
PhaseBCurrent	288	Relatif au courant de la seconde phase d'une alimentation triphasée
PhaseBReactivePower	296	Puissance réactive de la phase B d'un circuit multi-phase
PhaseBVoltage	132	Relatif à la tension de la seconde phase d'une alimentation triphasée
PhaseBVoltagePotential	134	Relatif au potentiel de tension de la seconde phase d'une alimentation triphasée
PhaseC	135	Relatif à la phase C d'un circuit multi-phase
PhaseCApparentPower	293	Puissance apparente de la phase C d'un circuit multi-phase
PhaseCCurrent	289	Relatif au courant de la troisième phase d'une alimentation triphasée
PhaseCReactivePower	297	Puissance réactive de la phase C d'un circuit multi-phase
PhaseCVoltage	133	Relatif à la tension de la troisième phase d'une alimentation triphasée
PhaseCVoltagePotential	135	Relatif au potentiel de tension de la troisième phase d'une alimentation triphasée
PhaseSequence	78	Relatif à l'ordre des phases d'une alimentation triphasée
PhaseVoltage	79	Dans une phase simple ou dans les situations où la phase spécifique n'est pas pertinente, est relatif à la tension dans la phase
PowerFactor	27	Relatif au rapport de la puissance réelle découlant de la charge à la puissance apparente dans le circuit
PowerQuality	28	Relatif à l'ensemble des limites de propriétés électriques qui permet aux systèmes électriques de façon attendue sans perte significative de performances
PowerQualityRecording	80	Relatif à la capture et au stockage de données de qualité électrique
PrepaymentCredit	81	Relatif à la partie droite d'un compte; facturation de comptes de prépaiement

Enumération EndDeviceSubdomain		
Mnémonique	Valeur	Description
Pricing	9	Relatif à la facturation
Processor	82	Relatif à une unité centrale de traitement, généralement
Program	83	Relatif à un ensemble prédéfini d'instructions
Pulse	84	Relatif à un moyen par lequel l'énergie est mesurée
Queue	197	Relatif à une zone de stockage relativement temporaire utilisée pour conserver les demandes ou les tâches jusqu'à ce qu'elles puissent être traitées
Radio	136	Relatif à un appareil physique qui traite les signaux radio
RAM	85	Relatif à la mémoire vive
Rate	86	Relatif à la vitesse
ReadAccess	202	Relatif au niveau d'autorisation détenu: lecture, écriture, mise à jour, par exemple
Readings	87	Relatif à la collecte de données de consommation, de diagnostic et de statut auprès d'un compteur
ReactivePower	294	Puissance qui n'effectue pas le travail mesuré en VA réactifs (VAr)
Recoder	300	Appareil de codage
Recovery	88	Relatif à un processus de restauration à partir d'un état de rupture
Register	89	Relatif à un emplacement réservé à des informations
Registration	90	Relatif à un processus par lequel un appareil est reconnu ou ajouté
Relay	91	Relatif à un interrupteur à fonctionnement électrique
RemoteAccess	211	Relatif à la sécurité physique (c'est-à-dire l'accessibilité) ou à l'autorisation électronique de lecture/écriture sur support numérique à partir d'un appareil mobile ou à partir d'un endroit autre que celui où se trouve l'objet accédé
ROM	92	Relatif à la mémoire en lecture seule
Rotation	93	Relatif au déplacement d'un objet dans un mouvement circulaire
RTP	94	Relatif à la tarification en temps réel (Real-Time Pricing)
Schedule	95	Relatif à un calendrier ou un planning d'événements futurs
Season	228	Relatif à la division d'une année qui a été marquée par des changements atmosphériques; généralement l'hiver, le printemps, l'été et l'automne
SecondaryCredit	96	Relatif à un montant de crédit autre que principal
SecuredRegister	98	Relatif à un registre spécifique sur un appareil
SecuredTable	99	Relatif à un tableau qui requiert une autorisation pour être accessible
SecurityKey	32	Relatif à un élément d'information qui détermine la sortie opérationnelle d'un chiffrement cryptographique
SecurityKeyLength	119	Relatif à la longueur d'une clé de sécurité
SecurityKeyVersion	120	Relatif à la version d'une clé de sécurité
SelfRead	231	Relatif à un processus dans lequel un appareil se lira lui-même
SelfTest	100	Relatif à un processus où un appareil exécutera un essai interne sur lui-même
Sensor	144	Relatif à un appareil mécanique qui transmet un signal à un appareil de mesure
Session	129	Relatif à une session de communication, généralement
SetPoint	101	Relatif au seuil au-delà duquel une fonctionnalité est engagée; généralement relatif au mode de commande de charge
SigmaticMessage	102	Relatif aux messages stigmatiques
Signature	103	Relatif à la sécurité électronique et à la signature de messages
SignatureLength	104	Relatif à la longueur d'une signature de sécurité

Énumération EndDeviceSubdomain		
Mnémonique	Valeur	Description
SignatureTimestamp	105	Relatif à la durée de validité d'une signature de sécurité
SignatureUsage	106	Relatif à la façon dont une signature est utilisée
SpecificGravity	240	Relatif au rapport de la densité de la substance à la densité de l'eau
StandardTime	107	Relatif à l'heure standard, par opposition à l'heure d'été
StandbyMode	108	Relatif à un mode de fonctionnement spécifique dans lequel un appareil peut être défini ou réglé
Status	17	Relatif à l'état actuel de quelque chose
Storage	109	Relatif au support sur lequel l'information est maintenue; également relatif à l'acte de stockage des informations
SupplyCapacityLimit	139	Relatif aux limites de capacité de fourniture
Table	110	Relatif à une structure contenant des lignes et des colonnes
Tariff	140	Terme de facturation relatif au coût ou au montant facturé
Test	111	Relatif à une classification désignant une action hors production
TestMode	19	Relatif à un mode de fonctionnement spécifique dans lequel un appareil peut être défini ou réglé
TextMessage	112	Relatif à un message ou à un ensemble de caractères qui sont envoyés à un appareil
Threshold	261	Relatif à un niveau ou un point auquel il se produira quelque chose
Tier	113	Relatif à un niveau
Time	114	Relatif à l'heure du jour sous la forme heures:minutes:secondes:millisecondes
Timeout	125	Relatif à un seuil spécifique précisant quand rendre la main automatiquement en l'absence de réponse
TimeReset	115	Relatif à la réinitialisation de l'heure de la journée
TimeSync	116	Relatif au processus de réglage de la valeur de l'heure du jour sur un appareil afin de le faire correspondre à celle d'une source de confiance pour l'heure du jour
TimeVariance	117	Relatif à la différence acceptable de l'heure du jour d'un appareil par rapport à une source de confiance pour l'heure du jour
TimeZone	118	Relatif aux régions horaires autour de la terre définies par les méridiens
TOU	121	Relatif au temps d'utilisation
Tranceiver	122	Relatif à un appareil qui possède à la fois un transmetteur et un récepteur
Usage	123	Relatif à la façon dont quelque chose est utilisé
Version	124	Relatif à une itération ou une traduction spécifique
Voltage	38	Relatif à la force électrique qui pourrait conduire un courant électrique entre deux points
Window	73	Relatif à une période pendant laquelle un appareil peut être associé à/couplé à un compteur ou à un autre appareil
WriteAccess	282	Relatif au niveau d'autorisation détenu: lecture, écriture, mise à jour, par exemple

E.8 EndDeviceEventOrAction

La partie la plus spécifique de l'EndDeviceEventType est sa valeur EndDeviceEventOrAction. Cette partie de l'énumération EndDeviceEventType se présente généralement sous la forme d'un verbe qui définit l'action pour l'événement venant de se produire.

Les codes EndDeviceEventOrAction sont énumérés et décrits dans le Tableau E.4.

Tableau E.4 – Codes EndDeviceEventorAction

Enumération EndDeviceEventorAction		
Mnémonique	Valeur	Description
n/a	0	Non applicable. Utilisé lorsqu'un EndDeviceOrAction n'est pas requis. Il convient de ne l'utiliser que rarement.
Aborted	1	Événement qui se produit quand une intervention provoque l'arrêt de l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain).
Accessed	2	En général, il s'agit d'un événement de sécurité qui survient lorsque l'accès physique ou l'accès aux données a été établi (qu'il soit autorisé ou non).
Acknowledged	3	Événement qui indique la réception de l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain).
Activated	4	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est à présent actif alors qu'il était inactif.
AlmostFull	283	Événement qui indique qu'une ressource a quasiment atteint sa capacité maximale
ArmedForClosure	11	Événement qui indique qu'une demande ArmForClosure a été effectuée avec succès.
ArmedForOpen	12	Événement qui indique qu'une demande ArmForOpen a été effectuée avec succès.
ArmForClosure	5	Commande utilisée pour indiquer une demande d'armement d'un interrupteur pour la fermeture.
ArmForClosureFailed	226	Événement qui indique qu'une demande ArmForClosure a échoué.
ArmForOpen	6	Commande utilisée pour indiquer une demande d'armement d'un interrupteur pour l'ouverture.
ArmForOpenFailed	222	Événement qui indique qu'une demande ArmForOpen a échoué.
Attempted	7	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain), basé sur la combinaison d'EndDeviceDomain et d'EndDeviceSubdomain, a été tenté.
Calculated	21	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain), basé sur la combinaison d'EndDeviceDomain et d'EndDeviceSubdomain, a été calculé.
Cancel	8	Commande utilisée pour indiquer une demande de fin d'une commande précédemment émise.
CancelFailed	86	Événement qui indique qu'une annulation (Cancel) a échoué.
Cancelled	10	Événement qui indique qu'une commande ou un ensemble de commandes ayant été émis précédemment s'est terminé avec succès.
Change	13	Commande pour indiquer une demande de modifications.
Changed	24	Événement qui indique qu'une demande Change connexe a été effectuée avec succès.
ChangedOut	284	Événement qui indique qu'un actif a été remplacé
ChangeOutRequired	27	Commande utilisée pour demander le remplacement d'un appareil par un appareil du même type.
ChangePending	14	Événement qui indique qu'une mise à jour n'a pas encore été réalisée.
Charged	15	Événement qui peut indiquer un état relatif à la facturation ou actuellement soumis à une charge électrique.
Cleared	28	Événement qui peut indiquer que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) sur l'appareil a été résolu ou vidé.
Close	299	Une commande pour l'élément décrit par EndDeviceDomain/EndDeviceSubdomain, NOTE Cette commande pourrait être utilisé pour fermer une fenêtre en liaison. Elle ne doit pas être utilisée pour fermer un interrupteur. A la place, la commande 'Connect' doit être utilisée .

Enumération EndDeviceEventorAction		
Mnémonique	Valeur	Description
Closed	16	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) sur l'appareil ayant été ouvert n'est plus ouvert.
ColdStarted	31	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été démarré alors qu'il se trouvait à l'état arrêté (différent d'un WarmStart qui implique le démarrage de l'élément alors que celui-ci se trouvait déjà à l'état démarré).
Confirmed	17	Événement qui indique la réception et l'acceptation de l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain).
Connect	18	Commande de demande de mise en service d'un appareil. NOTE Cela doit effectivement 'fermer' un interrupteur électrique ou « ouvrir » une vanne d'eau.
Connected	42	Événement qui indique qu'un appareil a été mis en service.
ConnectFailed	67	Événement qui indique qu'une demande Connect a échoué.
Corrupted	43	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est passé de l'état correct à l'état incorrect.
CorruptionCleared	281	Événement qui indique qu'une condition d'endommagement a été éliminée.
Create	82	Commande de demande de création de quelque chose.
Created	83	Événement qui indique qu'une demande Create a réussi.
CreateFailed	297	Événement qui indique qu'une demande Create a échoué.
CrossPhaseCleared	70	Événement qui indique que l'instabilité due à la modulation croisée de phases a été corrigée.
CrossPhaseDetected	45	Événement qui indique une instabilité due à la modulation croisée.
Deactivated	19	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) sur l'appareil qui se trouvait précédemment à l'état actif n'est plus actif.
Decreased	57	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) possède une valeur ou une magnitude inférieure.
Delayed	20	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est plus lent que prévu ou se terminera plus tard que prévu.
Disable	22	Commande de demande de rendre l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) inopérant (interdit)
Disabled	66	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été rendu inopérant (interdit).
DisableFailed	220	Événement qui indique qu'une demande Disable a échoué.
Disallowed	161	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) n'était pas autorisé.
Disconnect	23	Commande qui demande qu'un appareil soit mis hors service; peut également signifier une demande de connexion serveur à l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain). Note: Cela doit effectivement « ouvrir » un interrupteur électrique ou « fermer » une vanne d'eau.
Disconnected	68	Événement qui indique qu'un appareil a été mis hors service avec succès; peut également signifier que la connexion à l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été coupée ou a pris fin.
DisconnectFailed	84	Événement qui indique qu'une demande Disconnect a échoué.
Display	77	Commande de demande d'affichage de quelque chose (comme dans un TextMessage).

Enumération EndDeviceEventorAction		
Mnémonique	Valeur	Description
Displayed	78	Événement qui indique qu'une demande Display connexe a été effectuée avec succès.
DisplayFailed	87	Événement qui indique qu'une demande Display a échoué.
Distorted	91	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve dans un état différent de l'état attendu.
Downloaded	25	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été transmis du réseau à l'appareil.
Enable	26	Commande de demande de rendre opérant (permettre) l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain).
Enabled	76	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été rendu opérant.(permis)
EnableFailed	221	Événement qui indique qu'une demande Enable a échoué.
Error	79	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) ne s'est pas achevé avec succès.
ErrorCleared	279	Événement qui indique qu'une condition d'erreur a été éliminée.
Established	29	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été reconnu.
EventStarted	287	Événement qui indique qu'un événement (identifié par EndDeviceDomain/EndDeviceSubdomain) a commencé.
EventStopped	288	Événement qui indique qu'un événement (identifié par EndDeviceDomain/EndDeviceSubdomain) a été stoppé.
Exceeded	139	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a dépassé la valeur attendue.
Execute	30	Commande de demande d'exécution de l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain).
Expired	64	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a atteint une fin, généralement déterminée par une date ou une heure.
Failed	85	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) n'a pas réussi.
Frozen	88	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve à l'état statique.
Full	32	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est complet.
HighDistortion	69	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a présenté un changement non souhaité de la forme d'onde d'un signal.
HighDistortionCleared	71	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est revenu à la normale après avoir été à l'état HighDistortion.
ImbalanceCleared	75	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est revenu à l'état d'équilibre après avoir été à l'état de déséquilibre.
Imbalanced	98	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) n'est pas équilibré.
Inactive	100	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve à l'état inactif.
InactiveCleared	72	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est revenu à l'état actif après avoir été à l'état inactif.
Increased	102	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a crû.

Enumération EndDeviceEventorAction		
Mnémonique	Valeur	Description
Initialized	33	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été réglé sur des valeurs de départ.
InProgress	34	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se dirige actuellement vers un objectif ou une fin.
Installed	105	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été préparé pour utilisation.
Invalid	35	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve dans un état défaillant.
LimitChanged	296	Événement qui indique que le point de définition d'une limite a changé
LimitReached	286	Événement qui indique qu'une limite supérieure ou inférieure a été franchie.
Loaded	36	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est à présent engagé.
LossDetected	47	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve dans un état de déficience. Généralement utilisé en relation avec la puissance, la tension ou le courant électrique.
MaxLimitChanged	295	Événement qui indique que le point de définition d'une limite maximum a changé
MaxLimitCleared	293	Événement qui indique qu'un événement MaxLimitReached a été éliminé
MaxLimitReached	93	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a atteint une valeur maximale acceptable.
MaxLimitReachedCleared	73	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est revenu à un état acceptable après s'être trouvé à l'état MaxLimitReached.
MinLimitChanged	294	Événement qui indique que le point de définition d'une limite minimum a changé
MinLimitCleared	292	Événement qui indique qu'un événement MinLimitReached précédent a été éliminé
MinLimitReached	150	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a atteint une valeur minimale acceptable.
Mismatched	159	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) n'est pas compatible avec lui-même ou avec quelque chose dans son environnement.
Missing	285	Événement qui indique qu'une entité (par exemple, EndDeviceDomain/EndDeviceSubdomain) est manquante
Normal	37	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve dans un état (ou une norme) typique.
NotArmed	290	Événement qui indique qu'un appareil n'est plus dans un état armé.
NotAuthorized	38	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a fait l'objet d'un accès sans autorisation.
NotFound	160	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est perdu ou manquant.
Open	298	Une commande pour l'élément décrit par EndDeviceDomain/EndDeviceSubdomain NOTE Cette commande pourrait être utilisée pour ouvrir une fenêtre en liaison. Elle ne devrait pas être utilisée pour ouvrir un interrupteur. La commande «'Disconnect'» devrait être utilisée à la place
Opened	39	Événement qui indique que l'élément (identifié par

Enumération EndDeviceEventorAction		
Mnémonique	Valeur	Description
		EndDeviceDomain/EndDeviceSubdomain) est accessible.
Opted-In	80	Événement qui indique qu'un client a accepté de se joindre à un programme.
Opted-out	81	Événement qui indique qu'un client ne souhaite pas se joindre à un programme.
OutofRange	40	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) s'est trouvé en dehors des valeurs acceptables.
OutofRangeCleared	74	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) est revenu à des valeurs acceptables.
Overflow	177	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a dépassé sa taille ou son volume.
Preempted	41	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été remplacé par un autre qui a priorité sur lui.
Processed	44	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a passé avec succès toutes les étapes d'une procédure prescrite.
Read	46	Il peut s'agir d'un événement (si le terme est considéré comme participe passé du verbe "Read", "lu" en français) ou d'une commande (si le terme est considéré comme le verbe "Read" à l'infinitif, "lire" en français).
Ready	48	Événement qui indique qu'une condition "prêt" a été atteinte sur un appareil.
ReadyForActivation	280	Événement qui indique qu'un appareil a été préparé
Re-established	49	Événement qui indique qu'une condition, généralement une connexion, a été établie après avoir été perdue.
Registered	50	Événement qui indique qu'un appareil ou qu'une condition d'un appareil a été enregistré.
Released	51	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été libéré.
Removed	212	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été mis hors service.
Replaced	52	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été remplacé par un nouvel élément, généralement parce qu'il était obsolète ou usé.
Reprogrammed	213	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a changé de directions ou de programme.
Reset	214	Commande pour demander qu'il convient de réinitialiser l'élément à un état zéro ou un état original (élément identifié par EndDeviceDomain/EndDeviceSubdomain).
ResetFailed	65	Événement qui indique qu'une demande Reset a échoué.
ResetOccurred	215	Événement qui indique qu'une demande Reset connexe a été effectuée avec succès.
Restarted	53	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a redémarré généralement à partir d'un état déjà démarré.
Restored	216	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été replacé à son état antérieur.
Reversed	219	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été placé à l'opposé de son état normal. Généralement utilisé pour une rotation.
SagStarted	223	Événement qui indique que l'élément (identifié par

Enumération EndDeviceEventorAction		
Mnémonique	Valeur	Description
		EndDeviceDomain/EndDeviceSubdomain) a été glissé dans un état différent de l'état attendu.
SagStopped	224	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a cessé de fléchir. Généralement utilisé avec l'événement SagStarted.
Schedule	300	Une commande pour demander qu'un élément (identifié par EndDeviceDomain/EndDeviceSubdomain) soit positionné pour une exécution à une date ultérieure.
Scheduled	225	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été réglé pour s'exécuter à une date future.
ScheduledFailed		Un événement pour indiquer que la commande à un élément (identifié par EndDeviceDomain/EndDeviceSubdomain) pour une exécution à une date ultérieure a échoué.
Sealed	227	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve dans un boîtier étanche ou auquel on ne peut pas accéder directement.
Start	54	Commande de demande de déclenchement ou de démarrage de l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain).
Started	242	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a démarré.
StartFailed	217	Événement qui indique qu'une demande Start a échoué.
Stop	55	Commande de demande d'arrêt normal de l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain).
StopFailed	218	Événement qui indique qu'une demande Stop a échoué.
Stopped	243	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) s'est arrêté. Lorsque cela est le résultat d'une commande Stop, il est supposé que les choses se sont arrêtées normalement (c.-à-d. Sans erreurs).
Substituted	56	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été remplacé par un autre.
Succeeded	58	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) s'est accompli.
SwellStarted	248	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) s'est développé à partir de son état attendu.
SwellStopped	249	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a cessé de gonfler. Généralement utilisé avec l'événement SwellStarted.
SwitchPositionChanged	289	Événement qui indique qu'une position de commutateur a changé.
TamperCleared	291	Événement qui indique qu'une alarme de fraude a été éliminée.
TamperDetected	257	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été modifié ou altéré secrètement. Ces événements sont généralement associés à la sécurité ou à la facturation.
Terminate	303	Une commande pour demander qu'un élément (identifié par le EndDeviceDomain/EndDeviceSubdomain) arrête immédiatement et brusquement.
Terminated	59	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) s'est terminé de façon subite.
TerminateFailed		Un événement pour indiquer que la tentative d'arrêt d'un élément (identifié par le EndDeviceDomain/EndDeviceSubdomain) a échoué.
Tilted	263	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été penché ou incliné.
Uninitialized	61	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) possède toutes ses valeurs à leur état de départ.

Enumération EndDeviceEventOrAction		
Mnémonique	Valeur	Description
Unlocked	62	Événement qui indique que le verrou, physique ou logiciel, de l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été libéré.
Unsealed	269	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) n'est pas scellé.
Unsecure	63	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve dans un état non protégé.
Unstable	270	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) se trouve dans un état irrégulier.
Uploaded	60	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été transmis de l'appareil au réseau.
WarmStarted	278	Événement qui indique que l'élément (identifié par EndDeviceDomain/EndDeviceSubdomain) a été démarré alors qu'il se trouvait dans l'état déjà démarré (différent d'un ColdStart qui implique qu'il a été démarré à partir de l'état démarré).
WriteFailed	282	Événement qui indique qu'une opération d'écriture a échoué.

E.9 EndDeviceEventTypes normatifs

Les champs EndDeviceType, EndDeviceDomain, EndDeviceSubdomain et EndDeviceEventOrAction sont combinés et présentés sous la forme d'une chaîne unique. Les événements normatifs sont répertoriés dans les tableaux suivants E.5 à E.31, regroupés par EndDeviceDomain.

Tableau E.5 – Événements de Battery (batterie)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Condition de batterie faible détectée Batterie faible détectée pour le module Batterie faible Batterie faible détectée pour le module	*.2.22.150	*	Battery	Charge	MinLimitReached
Batterie OK Batterie OK	*.2.22.37	*	Battery	Charge	Normal
Batterie défaillante	*.2.0.85	*	Battery	n/a	Failed
Batterie installée	*.2.0.105	*	Battery	n/a	Installed
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.6 – Événements de Billing (facturation)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Ajusté le crédit restant	*.20.8.24	*	Billing	Credit	Changed
Soustrait du crédit restant	*.20.8.57	*	Billing	Credit	Decreased

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Ajouté au crédit restant	*.20.8.102	*	Billing	Credit	Increased
Crédit d'urgence de prépaiement	*.20.81.102	*	Billing	PrepaymentCredit	Increased
Programme de tarification modifié	*.20.83.24	*	Billing	Program	Changed
Activation de RTP	*.20.94.4	*	Billing	RTP	Activated
Désactivation de RTP	*.20.94.19	*	Billing	RTP	Deactivated
Activation de programme spécial	*.20.95.4	*	Billing	Schedule	Activated
Crédit d'urgence secondaire	*.20.96.102	*	Billing	SecondaryCredit	Increased
Tarif quotidien changé Tarif hebdomadaire changé Changement de tarif	*.20.140.24	*	Billing	Tariff	Changed
Réinitialisation de la facturation déprogrammée Réinitialisation de la facturation	*.20.140.214	*	Billing	Tariff	Reset
Etage changé	*.20.113.24	*	Billing	Tier	Changed
Discordance de débuts de TOU Discordance de TOU Discordance d'années de TOU	*.20.121.159	*	Billing	TOU	Mismatched

Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.

Tableau E.7 – Événements de Cartridge (cartouche)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Erreur de cartouche	*.3.17.79	*	Cartridge	Status	Error
Cartouche gelée	*.3.17.88	*	Cartridge	Status	Frozen
Cartouche installée	*.3.17.105	*	Cartridge	Status	Installed
Aucune cartouche insérée	*.3.17.160	*	Cartridge	Status	NotFound
Cartouche retirée	*.3.17.212	*	Cartridge	Status	Removed
Cartouche changée Cartouche bouton-poussoir changée Cartouche de terminal mobile Mode de changement de cartouche, lecture impossible	*.3.17.52	*	Cartridge	Status	Replaced

Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.

Tableau E.8 – Événements de Clock (horloge)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Réglage automatique de l'heure effectué	*.36.7.58	*	Clock	AutoTime	Succeeded
Réglage de date changé	*.36.34.24	*	Clock	Date	Changed
Date et heure d'exécution non valides Plage de dates et heures complète non valide	*.36.34.35	*	Clock	Date	Invalid
Erreur de changement de jour	*.36.35.79	*	Clock	Day	Error
Jour de longueur incorrecte	*.36.35.35	*	Clock	Day	Invalid
Passe de l'heure DST à la nouvelle heure	*.36.56.24	*	Clock	DaylightSavingsTime	Changed
Erreur de variation de l'heure standard ou de l'heure d'économie d'énergie	*.36.56.40	*	Clock	DaylightSavingsTime	OutOfRange
Passage de l'heure DST à l'heure précédente	*.36.56.214	*	Clock	DaylightSavingsTime	Reset
Passer à l'heure d'économie d'énergie au printemps	*.36.56.242	*	Clock	DaylightSavingsTime	Started
Congé changé Congés changés	*.36.97.24	*	Clock	Holiday	Changed
Date d'installation non valide	*.36.57.35	*	Clock	InstallDate	Invalid
Problème temporaire de clock	*.36.0.79	*	Clock	n/a	Error
Dysfonctionnement d'horloge Echec d'horloge électronique	*.36.0.85	*	Clock	n/a	Failed
Saison changée	*.36.228.24	*	Clock	Season	Changed
Passer à l'heure d'automne standard	*.36.107.242	*	Clock	StandardTime	Started
Valeur de réglage de l'heure mise à la nouvelle heure Temps de travail du registre réglé sur une nouvelle heure Valeur de réglage de l'heure changée (ancienne heure) Valeur de réglage de l'heure changée Collector Radio Set TimeKeeper Réglage de l'heure du compteur	*.36.114.24	*	Clock	Time	Changed

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Variation du temps > 10 secondes	*.36.114.40	*	Clock	Time	OutofRange
Valeur de réglage de l'heure remise à l'heure précédente Heure de registre de travail mise à l'heure précédente Heure réinitialisée	*.36.114.214	*	Clock	Time	Reset
Incapable de réinitialiser l'heure	*.36.115.85	*	Clock	TimeReset	Failed
Erreur de clock du temps	*.36.116.79	*	Clock	TimeSync	Error
Echec de synchro: Echec de synchro ou E/S de compteur (38)	*.36.116.85	*	Clock	TimeSync	Failed
Erreur de clock de l'enregistreur	*.36.116.58	*	Clock	TimeSync	Succeeded
La variation du temps a dépassé les limites, même après que le module a essayé de la corriger. La variation du temps a dépassé les limites sans tentative de correction automatique.	*.36.117.139	*	Clock	TimeVariance	Exceeded
ID de fuseau horaire non valide	*.36.118.35	*	Clock	TimeZone	Invalid
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.9 – Événements de Communication

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Défaillance de chien de garde ou d'entretien détectée	*.1.3.85	*	Communication	AUTDProcess	Failed
Câble coupé	*.1.15.85	*	Communication	Cable	Failed
Défaillance de communication de registre de codeur	*.1.41.85	*	Communication	EncoderRegister	Failed
Comm HES RF établie	*.1.52.29	*	Communication	HeadEndSystem	Established
Comm Rf sans HES	*.1.52.85	*	Communication	HeadEndSystem	Failed
Défaillance de communication de registre intelligent	*.1.58.85	*	Communication	IntelligentRegister	Failed
Communications perdues entre les modules au sein d'un compteur	*.1.60.85	*	Communication	IO	Failed
Discordance de définition du tableau E/S	*.1.60.159	*	Communication	IO	Mismatched
Comm Rf sans maillage	*.1.68.85	*	Communication	Mesh	Failed
Echec d'appel téléphonique entrant Echec des communications	*.1.0.85	*	Communication	n/a	Failed
Communications rétablies	*.1.0.49	*	Communication	n/a	Re-established
Communication terminée normalement	*.1.0.59	*	Communication	n/a	Terminated
Alarme file d'attente	*.1.197.85	*	Communication	Queue	Failed
Retard de communication du collecteur	*.1.17.20	*	Communication	Status	Delayed
Réinitialisation de l'émetteur-récepteur Rf	*.1.122.214	*	Communication	Tranceiver	Reset
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.10 – Événements de Configuration

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Constantes changées Constante primaire changée Constante secondaire changée Constante de sortie changée	*.7.23.24	*	Configuration	Constants	Changed
ID du matériel du compteur modifié	*.7.10.24	*	Configuration	Identity	Changed
ID de passerelle non valide ID de transformateur non valide	*.7.10.35	*	Configuration	Identity	Invalid
Nœud manquant	*.7.10.160	*	Configuration	Identity	NotFound
Liste IP groupe radio collecteur	*.7.127.24	*	Configuration	IPAddress	Changed
Mode maintenance Mode atelier de compteur lancé	*.7.11.242	*	Configuration	MaintMode	Started
Mode atelier de compteur arrêté	*.7.11.243	*	Configuration	MaintMode	Stopped
Commencer les lectures du compteur d'enregistrement Commencer le mode veille	*.7.12.242	*	Configuration	MeteringMode	Started
Mode de comptage arrêté	*.7.12.243	*	Configuration	MeteringMode	Stopped
Demander la configuration client	*.7.0.13	*	Configuration	n/a	Change
Paramètres réseau groupe radio collecteur	*.7.0.24	*	Configuration	n/a	Changed
Erreur de configuration détectée	*.7.0.79	*	Configuration	n/a	Error
Configuration Initialized	*.7.0.33	*	Configuration	n/a	Initialized
Passerelle reprogrammée	*.7.0.213	*	Configuration	n/a	Reprogrammed

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Définition de somme changée Type de somme changé Synchro de valeurs de compteur Synchro de valeurs de somme Lien de sortie changé Format d'énergie changé Format électrique changé	*.7.75.24	*	Configuration	Parameter	Changed
Changement de programme de compteur effectué	*.7.83.24	*	Configuration	Program	Changed
Vitesse changée	*.7.86.24	*	Configuration	Rate	Changed
Point de consigne dépassé, canal n°	*.7.101.139	*	Configuration	SetPoint	Exceeded
Mode "standby" lancé	*.7.108.242	*	Configuration	StandbyMode	Started
Support de stockage changé	*.7.109.24	*	Configuration	Status	Changed
Bouton d'essai enfoncé	*.7.19.76	*	Configuration	TestMode	Enabled
Mode d'essai lancé	*.7.19.242	*	Configuration	TestMode	Started
Mode essai arrêté	*.7.19.243	*	Configuration	TestMode	Stopped
Date et heure d'expiration de délai non valides	*.7.125.35	*	Configuration	Timeout	Invalid
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.11 – Événements de Demand (demande)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Incapable de réinitialiser la demande	*.8.0.65	*	Demand	n/a	ResetFailed
Réinitialisation de demande détectée	*.8.0.215	*	Demand	n/a	ResetOccurred
Discordance des définitions de demande	*.8.0.159	*	Demand	n/a	Mismatched
Seuil de surcharge de la demande	*.8.261.139	*	Demand	Threshold	Exceeded

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Mise en garde relative au seuil de demande	*.8.261.93	*	Demand	Threshold	MaxLimitReached
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.12 – Événements de Firmware (microprogramme)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Erreur de convertisseur analogique / numérique	*.11.142.79	*	Firmware	ADConverter	Error
Constantes non valides	*.11.23.35	*	Firmware	Constants	Invalid
Inconnu dans l'analyse Marqueur de diagnostic	*.11.31.79	*	Firmware	Data	Error
Code d'événement d'enregistrement non reconnu Message inintelligible reçu	*.11.31.35	*	Firmware	Data	Invalid
Ecran d'erreur figé	*.11.143.88	*	Firmware	Display	Frozen
Alarme acquittée, alarme n°	*.11.43.3	*	Firmware	Event	Acknowledged
Alarme activée, alarme n° Alarme de zone	*.11.46.4	*	Firmware	Feature	Activated
Alarme désarmée, alarme n° Installation à distance désarmée Synch à distance désarmée	*.11.46.66	*	Firmware	Feature	Disabled
Alarme permise, alarme n° Installation à distance permise Synch à distance armée Valeur d'alarme fixée, alarme n°	*.11.46.76	*	Firmware	Feature	Enabled
Défaillance de commande différée	*.11.46.85	*	Firmware	Feature	Failed
Commande illégale	*.11.46.35	*	Firmware	Feature	Invalid
Incapable de réinitialiser	*.11.47.85	*	Firmware	FirmwareReset	Failed
Discordance d'ID d'appareil interne	*.11.10.159	*	Firmware	Identity	Mismatched
Entrée instable, entrée n°	*.11.55.270	*	Firmware	Input	Unstable
Lire l'erreur de liste d'articles	*.11.63.79	*	Firmware	List	Error

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Aucune liste de protocole, type introuvable Aucun élément de lecture dans la liste	*.11.63.160	*	Firmware	List	NotFound
Erreur de bus basse vitesse	*.11.145.79	*	Firmware	LowSpeedBus	Error
Alarme bus de compteur	*.11.147.79	*	Firmware	MeterBus	Error
Démarrage à froid	*.11.0.31	*	Firmware	n/a	ColdStarted
Image de firmware corrompue	*.11.0.43	*	Firmware	n/a	Corrupted
Configuration perdue	*.11.0.79	*	Firmware	n/a	Error
DCW charge radio du collecteur	*.11.0.85	*	Firmware	n/a	Failed
Reprogrammation de compteur Dispositif terminal programmé Configuration écrite/changée Reprogrammé Compteur reconfiguré L'appareil a été synchronisé	*.11.0.213	*	Firmware	n/a	Reprogrammed
Dernière réinitialisation par chien de garde Réinitialisation de l'équipement de comptage	*.11.0.214	*	Firmware	n/a	Reset
Redémarrage imprévu	*.11.0.53	*	Firmware	n/a	Restarted
Compteur non programmé	*.11.0.61	*	Firmware	n/a	Uninitialized
Démarrage à chaud	*.11.0.278	*	Firmware	n/a	WarmStarted
Erreur de tableau d'options	*.11.146.79	*	Firmware	OptionBoard	Error
Erreur de paramètre Erreur de configuration	*.11.75.79	*	Firmware	Parameter	Error
Données de reprogrammation non valides Type d'appareil non valide, par exemple pas TOU	*.11.75.35	*	Firmware	Parameter	Invalid
Discordance de configuration diverse	*.11.75.159	*	Firmware	Parameter	Mismatched
Numéro de téléphone alternatif utilisé	*.11.75.56	*	Firmware	Parameter	Substituted
Echec du processeur de registre	*.11.82.85	*	Firmware	Processor	Failed
Etat illégal de commandes	*.11.82.35	*	Firmware	Processor	Invalid

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Réinitialisation de processeur	*.11.82.214	*	Firmware	Processor	Reset
Mise en garde non programmée	*.11.83.79	*	Firmware	Program	Error
Dysfonctionnement de programme	*.11.83.85	*	Firmware	Program	Failed
Erreur d'autocontrôle Défaillance de diagnostic	*.11.100.79	*	Firmware	SelfTest	Error
Echec de l'auto-essai	*.11.100.85	*	Firmware	SelfTest	Failed
Dysfonctionnement de capteur	*.11.144.85	*	Firmware	Sensor	Failed
Commande "Alter option" exécutée (changer option)	*.11.17.24	*	Firmware	Status	Changed
Mise à niveau du firmware en attente	*.11.17.14	*	Firmware	Status	ChangePending
Microprogramme téléchargé	*.11.17.25	*	Firmware	Status	Downloaded
Statut de téléchargement aval de firmware Santé du compteur vérifiée	*.11.17.37	*	Firmware	Status	Normal
Microprogramme remplacé Changement de microprogramme Zigbee terminé	*.11.17.52	*	Firmware	Status	Replaced
Réinitialisation d'appareil achevée	*.11.17.214	*	Firmware	Status	Reset
Fin du tableau d'événements de données atteinte	*.11.110.79	*	Firmware	Table	Error
Affichage des différences de tableau	*.11.110.159	*	Firmware	Table	Mismatched
Appel téléphonique entrant d'essai	*.11.111.58	*	Firmware	Test	Succeeded
Différences d'affichage du mode essai	*.11.19.159	*	Firmware	TestMode	Mismatched
Limite basse non valide	*.11.261.35	*	Firmware	Threshold	Invalid
Facteur de correction de calcul > max.	*.11.261.40	*	Firmware	Threshold	OutofRange
Version non valide du logiciel de compteur	*.11.124.35	*	Firmware	Version	Invalid
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.13 – Evénements GasSupply

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Perte totale de l'approvisionnement en gaz	*.4.0.85	*	GasSupply	n/a	Failed
Approvisionnement en gaz rétabli	*.4.0.216	*	GasSupply	n/a	Restored
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.14 – Evénements d'Installation

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Statut d'enregistrement automatique	*.6.5.34	*	Installation	AutoRegistration	InProgress
Confirmation d'enregistrement automatique	*.6.5.58	*	Installation	AutoRegistration	Succeeded
Remplacement de compteur	*.6.0.27	*	Installation	n/a	ChangeOut
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.15 – Evénements LoadControl

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Point de contrôle changé par la condition Point de régulation changé par la commande Point de régulation changé en raison du prépaiement Point de régulation changé par programme	*.15.26.24	*	Loadcontrol	ControlPoint	Changed
Commande "Abort" exécutée	*.15.0.1	*	Loadcontrol	n/a	Aborted
Sélection utilisateur de la régulation de la charge	*.15.83.4	*	LoadControl	Program	Activated

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Fermeture momentanée du relais de contrôle de la charge, relais n° Relais de commande de sortie basculé, relais n°	*.15.91.24	*	Loadcontrol	Relay	Changed
Programme de commutation abandonné	*.15.95.1	*	Loadcontrol	Schedule	Aborted
Programme chargé	*.15.95.36	*	Loadcontrol	Schedule	Loaded
Restaurer la régulation de la charge	*.15.17.216	*	Loadcontrol	Status	Restored
Régulation de la charge lancée Relais de régulation de la charge fermé Fermeture permanente du relais de régulation de la charge, relais n° Modèle de régulation de la charge démarré	*.15.17.242	*	Loadcontrol	Status	Started
Relais de régulation de la charge ouvert Relais de régulation de la charge ouvert, relais n°	*.15.17.243	*	Loadcontrol	Status	Stopped
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.16 – Evénements LoadProfile

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Pointeurs de liste réinitialisés	*.16.64.214	*	Loadprofile	ListPointers	Reset
Echec des lectures de surveillance de la charge	*.16.87.85	*	Loadprofile	Readings	Failed
Données de profil de charge corrompues	*.16.109.43	*	Loadprofile	Status	Corrupted
Zone des données de profils de charges presque pleine	*.16.109.32	*	Loadprofile	Status	Full
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.17 – Événements de Logs (journaux)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Journal de données téléchargé	*.17.33.60	*	Logs	DataLog	Transmitted
Dernier article lu du journal d'événements mis à jour	*.17.44.24	*	Logs	EventLog	Changed
Journal d'événements vidé	*.17.44.28	*	Logs	EventLog	Cleared
Erreur de journal d'événements	*.17.44.79	*	Logs	EventLog	Error
Journal d'événements plein	*.17.44.32	*	Logs	EventLog	Full
Journal d'événements téléchargé Appel d'événement	*.17.44.60	*	Logs	EventLog	Transmitted
Dernier article lu du journal d'historique mis à jour	*.17.53.24	*	Logs	HistoryLog	Changed
Journal d'historique effacé	*.17.53.28	*	Logs	HistoryLog	Cleared
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.18 – Événements de Memory (mémoire)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Erreur d'allocation de la mémoire	*.18.2.79	*	Memory	Allocation	Error
Erreur d'engorgement/d e dépassement de capacité de tampon	*.18.14.177	*	Memory	Buffer	Overflow
Mémoire EPROM lue	*.18.42.2	*	Memory	EPROM	Accessed
Mémoire EPROM écrite	*.18.42.24	*	Memory	EPROM	Changed
Défaillance d'EPROM	*.18.42.85	*	Memory	EPROM	Failed
Erreur de tramage	*.18.50.79	*	Memory	Frames	Error
Dépassement d'intervalle – pulsations > 65 535	*.18.59.177	*	Memory	Interval	Overflow

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Détection de corruption de données	*.18.0.43	*	Memory	n/a	Corrupted
Discordance de mémoire de masse	*.18.0.159	*	Memory	n/a	Mismatched
Défaillance de NVRAM	*.18.72.85	*	Memory	NVRAM	Failed
Discordance des définitions de famille	*.18.75.159	*	Memory	Parameter	Mismatched
Erreur de surveillance de pulsations redondante	*.18.84.79	*	Memory	Pulse	Error
Erreur de RAM	*.18.85.79	*	Memory	RAM	Error
Défaillance de RAM	*.18.85.85	*	Memory	RAM	Failed
Mémoire RAM pleine	*.18.85.32	*	Memory	RAM	Full
Erreur de récupération de données	*.18.88.85	*	Memory	Recovery	Failed
Erreur de ROM	*.18.92.79	*	Memory	ROM	Error
Défaillance de ROM	*.18.92.85	*	Memory	ROM	Failed
Disque presque plein	*.18.109.32	*	Memory	Status	Full
Tableau de données plein	*.18.110.32	*	Memory	Table	Full
Dépassement de connecteur de tableau	*.18.110.177	*	Memory	Table	Overflow
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.19 – Evénements de Metrology (métrologie)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
BTU alarme BTU hors intervalle	*.21.13.40	*	Metrology	BTU	OutofRange
Erreur de calcul de volume corrigé	*.21.16.79	*	Metrology	Calculation	Error
Modification de l'étalonnage Valeur d'étalonnage établie, n°	*.21.18.24	*	Metrology	Calibrage	Changed
Déviation excessive de l'étalonnage, n°	*.21.18.40	*	Metrology	Calibrage	OutofRange

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Calibrage arrivé à expiration	*.21.18.64	*	Metrology	Calibrage	Expired
Alarme concentration	*.21.39.40	*	Metrology	Concentration	OutofRange
Journal d'événements vidé	*.21.44.28	*	Metrology	EventLog	Cleared
Défaillance potentielle de l'EWM	*.21.45.85	*	Metrology	EWM	Failed
FPV calculé de manière déraisonnable	*.21.49.40	*	Metrology	FPV	OutofRange
Défaillance d'analyseur de GC	*.21.51.85	*	Metrology	GCAnalyzer	Failed
Journal d'historique effacé	*.21.53.28	*	Metrology	HistoryLog	Cleared
Erreur de forme C, entrée n°	*.21.55.79	*	Metrology	Input	Error
Valeur non valide, canal n°	*.21.55.35	*	Metrology	Input	Invalid
Lecture d'intervalle réussie	*.21.59.58	*	Metrology	Interval	Succeeded
Dernier article lu mis à jour	*.21.62.24	*	Metrology	LastRead	Changed
Mettre à jour les pointeurs de liste	*.21.63.24	*	Metrology	List	Changed
Liste effacée	*.21.63.28	*	Metrology	List	Cleared
Réinitialiser les pointeurs de liste	*.21.63.214	*	Metrology	List	Reset
Erreur de mesure détectée	*.21.67.79	*	Metrology	Measurement	Error
Mesure échouée	*.21.67.85	*	Metrology	Measurement	Failed
MOL % total hors plage	*.21.70.40	*	Metrology	MOL%	OutofRange
Erreur de mesure détectée	*.21.0.79	*	Metrology	n/a	Error
Retour du compteur dans les limites, voie n°	*.21.0.37	*	Metrology	n/a	Normal
Compteur reprogrammé Dispositif terminal programmé	*.21.0.213	*	Metrology	n/a	Reprogrammed
Défaillance de mémoire non volatile détectée	*.21.72.85	*	Metrology	NVRAM	Failed
Erreur d'impulsion de turbine	*.21.84.79	*	Metrology	Pulse	Error
Générateur d'impulsion	*.21.84.85	*	Metrology	Pulse	Failed

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Surremplissage d'impulsions, voie n°	*.21.84.177	*	Metrology	Pulse	Overflow
Echec de relevés de compteur	*.21.87.85	*	Metrology	Readings	Failed
kWh reçus – alarme effacée	*.21.87.37	*	Metrology	Readings	Normal
Lecture attendue manquante	*.21.87.160	*	Metrology	Readings	NotFound
Appel téléphonique entrant programmé	*.21.87.225	*	Metrology	Readings	Scheduled
Erreur de registre	*.21.89.79	*	Metrology	Register	Error
kW précédent > capacité du registre	*.21.89.139	*	Metrology	Register	Exceeded
Registre plein	*.21.89.32	*	Metrology	Register	Full
Discordance des définitions de registre	*.21.89.159	*	Metrology	Register	Mismatched
Lecture du registre réussie	*.21.89.58	*	Metrology	Register	Succeeded
autorelevé du compteur	*.21.231.58	*	Metrology	SelfRead	Succeeded
Message sigmatique non valide	*.21.102.35	*	Metrology	SigmaticMessage	Invalid
Alarme relative à la masse volumique	*.21.240.40	*	Metrology	SpecificGravity	OutOfRange
Erreur d'autocontrôle détectée	*.21.17.79	*	Metrology	Status	Error
Activation de tableau en attente	*.21.110.4	*	Metrology	Table	Activated
Tableau écrit	*.21.110.24	*	Metrology	Table	Changed
Tableau en attente d'effacement	*.21.110.28	*	Metrology	Table	Cleared
Seuil supérieur/supérieur du compteur, canal n° Seuil supérieur du compteur, canal n° Seuil supérieur de la vitesse delta, canal n°	*.21.261.139	*	Metrology	Threshold	Exceeded
Alarme communiquée relative à la limite	*.21.261.93	*	Metrology	Threshold	MaxLimitReached

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Seuil inférieur du compteur, canal n° Seuil de dépassement inférieur/inférieur, canal n° Alarme de limite inférieure	*.21.261.150	*	Metrology	Threshold	MinLimitReached
Seuil supérieur / inférieur du compteur dépassé	*.21.261.40	*	Metrology	Threshold	OutOfRange
Limite haute quotidienne dépassée pour le gaz	*.21.123.139	*	Metrology	Usage	Exceeded
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.20 – Événements MobileSecurity

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Erreur de données aléatoires de jeton MAT ou erreur LAN cible	*.14.31.79	*	MobileSecurity	Data	Error
Bloc d'adresses LAN non valide pour le jeton MAT	*.14.61.35	*	MobileSecurity	LANAddress	Invalid
ID réseau non valide du jeton MAT	*.14.71.35	*	MobileSecurity	NetworkId	Invalid
Erreur de génération de message du jeton MAT	*.14.32.79	*	MobileSecurity	SecurityKey	Error
Jeton MAT expiré Jeton MAT expiré, délai keep-alive dépassé	*.14.32.64	*	MobileSecurity	SecurityKey	Expired
Options non valides du jeton MAT	*.14.32.35	*	MobileSecurity	SecurityKey	Invalid
Jeton MAT préempté	*.14.32.41	*	MobileSecurity	SecurityKey	Preempted
Jeton MAT traité	*.14.32.44	*	MobileSecurity	SecurityKey	Processed
Jeton MAT libéré	*.14.32.51	*	MobileSecurity	SecurityKey	Released
Longueur non valide du jeton MAT	*.14.119.35	*	MobileSecurity	SecurityKeyLength	Invalid
Version non valide du jeton MAT	*.14.120.35	*	MobileSecurity	SecurityKeyVersion	Invalid

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Session précédente déjà établie	*.14.129.161	*	MobileSecurity	Session	Disallowed
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.21 – Événements de modem

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Interruption d'alimentation électrique, batterie modem faible	*.19.22.150	*	Modem	Charge	MinLimitReached
Défaillance de modem détectée	*.19.17.85	*	Modem	Status	Failed
Modem initialisé	*.19.17.33	*	Modem	Status	Initialized
Remplacement de modem	*.19.17.105	*	Modem	Status	Installed
Aucun modem	*.19.17.160	*	Modem	Status	NotFound
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.22 – Événements ModuleFirmware

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Microprogramme du module remplacé	*.9.17.52	*	ModuleFirmware	Status	Replaced
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.23 – Événements Network (réseau)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Défaillance d'association de réseau	*.23.74.85	*	Network	Association	Failed
Première connexion du collecteur	*.23.52.42	*	Network	HeadEndSystem	Connecté
Appareil parent non opérant	*.23.76.66	*	Network	ParentDevice	Disabled
Défauts de la radio	*.23.136.85	*	Network	Radio	Failed

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Données d'enregistrement radio du collecteur	*.23.136.50	*	Network	Radio	Enregistré
Fermeture d'entrée facultative, générateur	*.23.17.42	*	Network	Status	Connecté
Appareil non opérant Passerelle non opérante	*.23.17.66	*	Network	Status	Disabled
Ouverture d'entrée facultative, générateur Appareil déconnecté	*.23.17.68	*	Network	Status	Disconnected
Erreur de DAP Erreur de DSP	*.23.17.79	*	Network	Status	Error
Défaillance de nœud Défaillance de liaison de nœud	*.23.17.85	*	Network	Status	Failed
Compteur installé Passerelle installée	*.23.17.105	*	Network	Status	Installed
Dispositif terminal scellé	*.23.17.227	*	Network	Status	Sealed
Dispositif terminal non scellé	*.23.17.269	*	Network	Status	Unsealed
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.24 – Événements PAN / HAN

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Fenêtre d'appariement PAN fermée	*.10.73.16	*	Pairing	Window	Closed
Fenêtre d'appariement PAN ouverte (Ready To Pair)	*.10.73.39	*	Pairing	Window	Opened
Appariement PAN réussi	*.10.0.58	*	Pairing	n/a	Succeeded
Echec de l'appariement PAN	*.10.0.85	*	Pairing	n/a	Failed
Message texte PAN annulé	*.13.112.10	*	VideoDisplay	TextMessage	Canceled
Message texte PAN affiché	*.13.112.78	*	VideoDisplay	TextMessage	Affiché

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Tarification PAN réussie	*.20.9.58	*	Billing	Pricing	Succeeded
Echec de la tarification PAN	*.20.9.85	*	Billing	Pricing	Failed
Echec de l'annulation de tous les événements de contrôle de régulation PAN	*.15.148.86	*	LoadControl	AllEvents	CancelFailed
Annulation de tous les événements de contrôle de régulation PAN	*.15.148.10	*	LoadControl	AllEvents	Canceled
Echec de l'annulation de l'événement de contrôle de régulation PAN	*.15.43.86	*	LoadControl	Event	CancelFailed
Annulation de l'événement de contrôle de régulation PAN	*.15.43.10	*	LoadControl	Event	Canceled
Événement de contrôle de régulation PAN programmé	*.15.43.225	*	LoadControl	Event	Scheduled
Inclusion de l'événement de contrôle de régulation PAN	*.15.43.80	*	LoadControl	Event	Opt-In
Exclusion de l'événement de contrôle de régulation PAN	*.15.43.81	*	LoadControl	Event	Refuser
Appareil PAN supprimé Appareil de contrôle de régulation PAN supprimé Passerelle PAN supprimée	*.0.0.212	*	n/a	n/a	Removed
Réseau PAN rendu opérant	*.23.0.76	*	Network	n/a	Enabled
Network PAN rendu non opérant	*.23.0.66	*	Network	n/a	Disabled
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.25 – Evénements de Power (puissance)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Limite basse du courant dépassée	*.26.6.150	*	Power	Current	MinLimitReached
Fréquence de ligne instable	*.26.4.270	*	Power	Frequency	Unstable
Fort courant neutre	*.26.137.93	*	Power	NeutralCurrent	MaxLimitReached
Fort courant neutre éliminé	*.26.137.y3	*	Power	NeutralCurrent	MaxLimitReachedCleared
Condition de phase croisée	*.26.25.45	*	Power	Phase	CrossPhaseDetected
Condition de phase croisée effacée	*.26.25.70	*	Power	Phase	CrossPhaseCleared
Perte de phase, Désexcitation de phase	*.26.25.85	*	Power	Phase	Failed
Condition de phase inactive (tension présente, courant absent)	*.26.25.100	*	Power	Phase	Inactive
Condition de phase inactive effacée	*.26.25.72	*	Power	Phase	InactiveCleared
Alerte phase effacée	*.26.25.37	*	Power	Phase	Normal
Seuil de phase	*.26.25.40	*	Power	Phase	OutofRange
Rétablissement de phase	*.26.25.216	*	Power	Phase	Restored
Seuil au-dessus/au-dessous de la limite de l'angle de phase	*.26.130.40	*	Power	PhaseAngle	OutofRange
Seuil au-dessus/au-dessous de la limite de l'angle de phase effacé	*.26.130.74	*	Power	PhaseAngle	OutofRangeCleared
Limite dépassée pour l'angle de phase	*.26.130.139	*	Power	PhaseAngle	Exceeded
Baisse soudaine de tension commencée (Phase A)	*.26.131.223	*	Power	PhaseAVoltage	SagStarted
Baisse soudaine de tension arrêtée (Phase A)	*.26.131.224	*	Power	PhaseAVoltage	SagStopped
Bosse soudaine de tension commencée (Phase A)	*.26.131.248	*	Power	PhaseAVoltage	SwellStarted

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Bosse de tension arrêtée (Phase A)	*.26.131.249	*	Power	PhaseAVoltage	SwellStopped
Phase A inactive	*.26.126.100	*	Power	PhaseA	Inactive
Baisse soudaine de tension commencée (Phase B)	*.26.132.223	*	Power	PhaseBVoltage	SagStarted
Baisse soudaine de tension arrêtée (Phase B)	*.26.132.224	*	Power	PhaseBVoltage	SagStopped
Bosse soudaine de tension commencée (Phase B)	*.26.132.248	*	Power	PhaseBVoltage	SwellStarted
Bosse de tension arrêtée (Phase B)	*.26.132.249	*	Power	PhaseBVoltage	SwellStopped
Phase B inactive	*.26.134.100	*	Power	PhaseB	Inactive
Baisse soudaine de tension commencée (Phase C)	*.26.133.223	*	Power	PhaseCVoltage	SagStarted
Baisse soudaine de tension arrêtée (Phase C)	*.26.133.224	*	Power	PhaseCVoltage	SagStopped
Bosse soudaine de tension commencée (Phase C)	*.26.133.248	*	Power	PhaseCVoltage	SwellStarted
Bosse de tension arrêtée (Phase C)	*.26.133.249	*	Power	PhaseCVoltage	SwellStopped
Phase C inactive	*.26.135.100	*	Power	PhaseC	Inactive
Erreur de séquence de phase	*.26.78.79	*	Power	PhaseSequence	Error
Perte de transducteur de tension sur une phase Perte de tension par phase	*.26.79.47	*	Power	PhaseVoltage	LossDetected
Le facteur de puissance dépasse les limites.	*.26.27.139	*	Power	PowerFactor	Exceeded
Energie réactive avance effacée Condition d'énergie réactive en avance effacée	*.26.27.24	*	Power	PowerFactor	OutofRangeCleared

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Mise en garde relative à l'énergie réactive en avance Condition d'énergie réactive en avance	*.26.27.40	*	Power	PowerFactor	OutofRange
Forte distorsion détectée	*.26.28.69	*	Power	PowerQuality	HighDistortion
Forte distorsion éliminée	*.26.28.71	*	Power	PowerQuality	HighDistortionCleared
Événement de qualité d'énergie générique	*.26.28.40	*	Power	PowerQuality	OutofRange
Enregistrement rendu non opérant	*.26.80.66	*	Power	PowerQualityRecording	Disabled
Enregistrement rendu opérant	*.26.80.76	*	Power	PowerQualityRecording	Enabled
Vérifier l'alimentation électrique de la section Vérifier l'alimentation électrique du compteur Vérifier l'alimentation électrique du départ Vérifier l'alimentation électrique du transformateur	*.26.17.68	*	Power	Status	Disconnected
Panne d'alimentation en énergie du collecteur Rf Panne d'alimentation en énergie Mise hors tension Panne d'alimentation en énergie non détectée Dernière alarme de panne de souffle Interruption de service du Transformateur	*.26.0.85	*	Power	n/a	Failed
Perte de puissance ou de tension de la phase A	*.26.126.85	*	Power	PhaseA	Failed
Perte de puissance ou de tension de la phase B	*.26.134.85	*	Power	PhaseB	Failed

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Perte de puissance ou de tension de la phase C	*.26.135.85	*	Power	PhaseC	Failed
Rétablissement du compteur Mise sous tension / Alimentation restaurée Rétablissement du transformateur	*.26.0.216	*	Power	n/a	Restored
Restauration de la puissance ou de la tension de la phase A	*.26.126.216	*	Power	PhaseA	Restored
Restauration de la puissance ou de la tension de la phase B	*.26.134.216	*	Power	PhaseB	Restored
Restauration de la puissance ou de la tension de la phase C	*.26.135.216	*	Power	PhaseC	Restored
Exception de tension	*.26.38.139	*	Power	Voltage	Exceeded
Condition de déséquilibre de tension	*.26.38.98	*	Power	Voltage	Imbalanced
Condition de déséquilibre de tension effacée	*.26.38.75	*	Power	Voltage	ImbalanceCleared
Perte de transducteur de tension VT Faible potentiel de perte détecté	*.26.38.47	*	Power	Voltage	LossDetected
Haute tension	*.26.38.93	*	Power	Voltage	MaxLimitReached
Basse tension	*.26.38.150	*	Power	Voltage	MinLimitReached
Déséquilibre de tension éliminé	*.26.38.37	*	Power	Voltage	Normal
Bosse de tension éliminée	*.26.38.37	*	Power	Voltage	Normal
Baisse soudaine de tension	*.26.38.223	*	Power	Voltage	SagStarted
Baisse soudaine de tension éliminée	*.26.38.224	*	Power	Voltage	SagStopped
Condition de sur tension	*.26.38.248	*	Power	Voltage	SwellStarted
Bosse de tension éliminée	*.26.38.249	*	Power	Voltage	SwellStopped
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.26 – Événements de Pressure (pression)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
La pression captée est égale à P max.	*.29.261.93	*	Pressure	Threshold	MaxLimitReached
La pression captée est égale à P min.	*.29.261.150	*	Pressure	Threshold	MinLimitReached
La pression est hors plage.	*.29.261.40	*	Pressure	Threshold	OutofRange
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.27 – Événements RCDSwitch

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Mise en marche du service Clôture d'entrée de statut, n° Compteur branché Branchement exécuté	*.31.0.42	*	RCDswitch	n/a	Connecté
Echec de connexion	*.31.0.67	*	RCDSwitch	n/a	ConnectFailed
Arrêt du service Ouverture d'entrée de statut, n° Compteur débranché Fonctionnement du disjoncteur Débranchement exécuté	*.31.0.68	*	RCDswitch	n/a	Disconnected
Echec de connexion Echec de la connexion	*.31.0.84	*	RCDswitch	n/a	DisconnectFailed
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.28 – Événements de Security (sécurité)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
tentative d'accès non autorisé	*.12.1.38	*	Security	Access	NotAuthorized
Unité accédée Unité accessible au lecteur Unité accédée par l'enregistreur	*.12.1.58	*	Security	Access	Succeeded

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Alerte expiration de certificat Expiration de certificat	*.12.21.64	*	Security	Certificate	Expired
Retrait de couvercle détecté	*.12.29.212	*	Security	Cover	Removed
Erreur CRC	*.12.30.79	*	Security	CRC	Error
Erreur de déchiffrement de texte en clair	*.12.31.63	*	Security	Data	Unsecure
Erreur générale de déchiffrement	*.12.36.79	*	Security	Decryption	Error
Echec de décryptage	*.12.36.85	*	Security	Decryption	Failed
Événement de capot du collecteur	*.12.128.2	*	Security	Door	Accessed
Porte fermée	*.12.141.16	*	Security	Envelope	Closed
Porte ouverte	*.12.141.39	*	Security	Envelope	Opened
Falsification de codeur	*.12.40.257	*	Security	Encoder	TamperDetected
Echec d'initialisation du cryptage	*.12.46.85	*	Security	Feature	Failed
Ecoulement inverse détecté	*.12.48.219	*	Security	Flow	Reversed
Erreur de décryptage, échec HMAC	*.12.54.85	*	Security	HMAC	Failed
Echec d'ouverture de session utilisateur Echec d'ouverture de session passerelle	*.12.65.85	*	Security	Login	Failed
Alarme commutateur magnétique	*.12.66.257	*	Security	MagneticSwitch	TamperDetected
Falsification physique Indication de fraude Tentative de fraude détectée	*.12.0.257	*	Security	n/a	TamperDetected
Inclinaison détectée	*.12.0.263	*	Security	n/a	Tilted
ID réseau non valide du jeton de configuration	*.12.71.35	*	Security	NetworkId	Invalid
Erreur de parité	*.12.77.79	*	Security	Parity	Error
Mot de passe changé	*.12.24.24	*	Security	Password	Changed
Mot de passe non valide	*.12.24.35	*	Security	Password	Invalid
Unité accédée à distance	*.12.211.58	*	Security	RemoteAccess	Succeeded
Compteur inversé ou rotation inverse détectée Rotation inverse détectée	*.12.93.219	*	Security	Rotation	Reversed

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Registre sécurisé lu Tableau sécurisé lu	*.12.98.2	*	Security	SecuredRegister	Accessed
Clé locale désactivée	*.12.32.66	*	Security	SecurityKey	Deactivated
Clé locale activée	*.12.32.76	*	Security	SecurityKey	Activated
Erreur de génération de message du jeton de configuration	*.12.32.79	*	Security	SecurityKey	Error
Clé de sécurité non valide	*.12.32.35	*	Security	SecurityKey	Invalid
Options non valides du jeton de configuration	*.12.32.35	*	Security	SecurityKey	Invalid
Clé précédente utilisée	*.12.32.41	*	Security	SecurityKey	Preempted
Jeton de configuration traité	*.12.32.44	*	Security	SecurityKey	Processed
Clé locale débloquée	*.12.32.62	*	Security	SecurityKey	Unlocked
Longueur non valide pour le jeton de configuration	*.12.119.35	*	Security	SecurityKeyLength	Invalid
Version non valide du jeton de configuration	*.12.120.35	*	Security	SecurityKeyVersion	Invalid
Erreur générale de signature	*.12.103.79	*	Security	Signature	Error
Erreur d'algorithme de signature Echec de vérification de signature Erreur de vérification de signature Echec de vérification de signature Erreur d'algorithme de signature Echec de vérification de signature	*.12.103.85	*	Security	Signature	Failed
Clé de signature non valide spécifiée Erreur de vérification de signature Clé de signature non valide spécifiée Erreur de vérification de signature Clé de signature non valide spécifiée Erreur de vérification de signature	*.12.103.35	*	Security	Signature	Invalid
Signature manquante	*.12.103.160	*	Security	Signature	NotFound
Longueur non valide	*.12.104.35	*	Security	SignatureLength	Invalid
Marqueur temporel de signature non valide	*.12.105.35	*	Security	SignatureTimestamp	Invalid
Erreur d'utilisation de signature	*.12.106.79	*	Security	SignatureUsage	Error

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Dispositif terminal accessible en écriture	*.12.282.58	*	Security	WriteAccess	Succeeded
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.29 – Evénements de Temperature (température)

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
La température retourne dans la plage.	*.35.0.37	*	Temperature	n/a	Normal
La température est hors plage.	*.35.0.40	*	Temperature	n/a	OutofRange
La température captée est égale à T max.	*.35.261.93	*	Temperature	Threshold	MaxLimitReached
La température captée est égale à T min.	*.35.261.150	*	Temperature	Threshold	MinLimitReached
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.30 – Evénements VideoDisplay

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Défaillance d'affichage	*.13.17.85	*	VideoDisplay	Status	Failed
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau E.31 – Evénements WaterSupply

Description de l'événement ou de la commande	EndDeviceEvent Type	EndDevice Type	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Perte totale de l'approvisionnement en eau	*.5.0.47	*	WaterSupply	n/a	Failed
Approvisionnement en eau rétabli	*.5.0.270	*	WaterSupply	n/a	Restored
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Annexe F (normative)

Enumérations EndDeviceControlType

F.1 Généralités

De nombreux systèmes de comptage ont la capacité d'émettre une commande à l'équipement de terrain qui entreprend une action. L'action pourrait être une réinitialisation de demande, une ouverture ou une fermeture d'un interrupteur ou un certain nombre d'autres activités. La présente Annexe F décrit des exemples de codes qui peuvent être utilisés pour de telles applications.

Les énumérations EndDeviceControlType sont classées de la même manière que les énumérations EndDeviceEventType décrites à l'Annexe E. Le code est divisé en 4 parties:

EndDeviceControl.type:=

<EndDeviceType>.<EndDeviceDomain>.<EndDeviceSubdomain>.<EndDeviceEventOrAction>

où

<EndDeviceType>	valeur numérique de l'énumération EndDeviceType (voir EndDeviceType à l'Annexe E)
<EndDeviceDomain>	valeur numérique de l'énumération EndDeviceDomain (voir EndDeviceDomain à l'Annexe E)
<EndDeviceSubdomain>	valeur numérique de l'énumération EndDeviSubdDomain (voir EndDeviceSubdomain à l'Annexe E)
<EndDeviceEventOrAction>	valeur numérique de l'énumération EndDeviceEventOrAction (voir EndDeviceEventorAction à l'Annexe E)

Ces types de commandes comprennent les types de commandes utilisés pour les commandes d'appareil PAN. Les commandes peuvent entraîner la génération d'un événement par le dispositif terminal, opération qui serait ensuite rapportée par un message EndDeviceEvents.

F.2 Enumérations normatives EndDeviceControlType

Les champs EndDeviceType, EndDeviceDomain, EndDeviceSubdomain et EndDeviceEventOrAction sont combinés et présentés sous la forme d'une chaîne unique. Les événements normatifs sont répertoriés dans les tableaux suivants F.1 à F.4, regroupés par EndDeviceDomain.

Tableau F.1 – Commandes de demande

Description de l'événement ou de la commande	EndDeviceControl Type	Evénements attendus	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Réinitialiser la demande	*.8.0.214	*.8.0.215 *.8.0.65	Demand	n/a	Reset
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau F.2 – Commandes LoadControl

Description de l'événement ou de la commande	EndDeviceControl Type	Evénements attendus	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Lancer régulation de la charge, port 0	*.15.0.54	*.15.17.242 *.15.17.217	LoadControl	n/a	Start
Arrêter/terminer la régulation de la charge, port 1	*.15.0.55	*.15.17.216 *.15.17.218	LoadControl	n/a	Stop
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau F.3 – Commandes PAN/HAN

Description de l'événement ou de la commande	EndDeviceControl Type	Evénements attendus	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Fenêtre d'appariement PAN ouverte	*.10.73.298	*.10.73.39	Pairing	Window	Open
Fenêtre d'appariement PAN ouverte	*.10.73.299	*.10.73.16	Pairing	Window	Close
Message texte PAN affiché	*.13.112.77	*.13.112.78	VideoDisplay	TextMessage	Display
Annulation du message texte PAN	*.13.112.8	*.13.112.10	VideoDisplay	TextMessage	Cancel
Créer un signal de prix PAN	*.20.9.82	*.20.9.58	Billing	Pricing	Créer
Annulation de tous les événements de contrôle de régulation PAN	*.15.148.8	*.15.148.10	LoadControl	AllEvents	Cancel
Annulation de l'événement de contrôle de régulation PAN	*.15.43.8	*.15.43.10	LoadControl	Event	Cancel
Programmation de l'événement de contrôle de régulation PAN	*.15.43.300	*.15.43.225	LoadControl	Event	Programme
Activation du réseau PAN	*.23.0.26	*.23.0.76	Network	n/a	Activer
Désactivation du réseau PAN	*.23.0.22	*.23.0.66	Network	n/a	Désactiver
Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.					

Tableau F.4 – Commandes RCDSwitch

Description de l'événement ou de la commande	EndDeviceControl Type	Evénements attendus	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Désactiver la limite de capacité de fourniture d'urgence RCD	*.31.138.22	*.31.138.66 *.31.138.220	RCDSwitch	EmergencySupplyCapacityLimit	Disable
Activer la limite de capacité de fourniture d'urgence RCD	*.31.138.26	*.31.138.76 *.31.138.221	RCDSwitch	EmergencySupplyCapacityLimit	Enable
Armer le commutateur de branchement/débranchement à distance en vue de la fermeture	*.31.0.5	*.31.0.11 *.31.0.226	RCDSwitch	n/a	ArmForClosure

Description de l'événement ou de la commande	EndDeviceControl Type	Evénements attendus	EndDevice Domain	EndDevice SubDomain	EndDevice EventOrAction
Armer le commutateur de branchement/débranchement à distance en vue de l'ouverture	*.31.0.6	*.31.0.12 *.31.0.222	RCDSwitch	n/a	ArmForOpen
Fermer le commutateur de branchement/débranchement à distance	*.31.0.18	*.31.0.42 *.31.0.67	RCDSwitch	n/a	Connect
Désactiver la formule n°1 de limitation de demande pour le commutateur RCD Désactiver le commutateur RCD	*.31.0.22	*.31.0.66 *.31.0.220	RCDSwitch	n/a	Disable
Ouvrir le commutateur de branchement/débranchement à distance	*.31.0.23	*.31.0.68 *.31.0.84	RCDSwitch	n/a	Disconnect
Activer la formule n°2 de limitation de demande pour le commutateur RCD Activer le commutateur RCD	*.31.0.26	*.31.0.76 *.31.0.221	RCDSwitch	n/a	Enable
Désactiver la limite de capacité de fourniture RCD	*.31.139.22	*.31.139.66 *.31.139.220	RCDSwitch	SupplyCapacityLimit	Disable
Activer la limite de capacité de fourniture RCD	*.31.139.26	*.31.139.76 *.31.139.221	RCDSwitch	SupplyCapacityLimit	Enable

Un astérisque (*) désigne n'importe quelle valeur EndDeviceType. Il est supposé que la valeur utilisée dans le cadre de n'importe quelle utilisation de production de ces événements sera pertinente pour l'appareil qui envoie réellement cet événement.

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Annexe G (normative)

Conventions de désignation et d'identification des objets

G.1 Généralités

Cette Annexe décrit un exemple d'utilisation d'identificateurs d'objet requis par les messages CEI 61968 pour maintenir la synchronisation et la corrélation des informations entre les systèmes.

G.2 Identificateurs d'objet

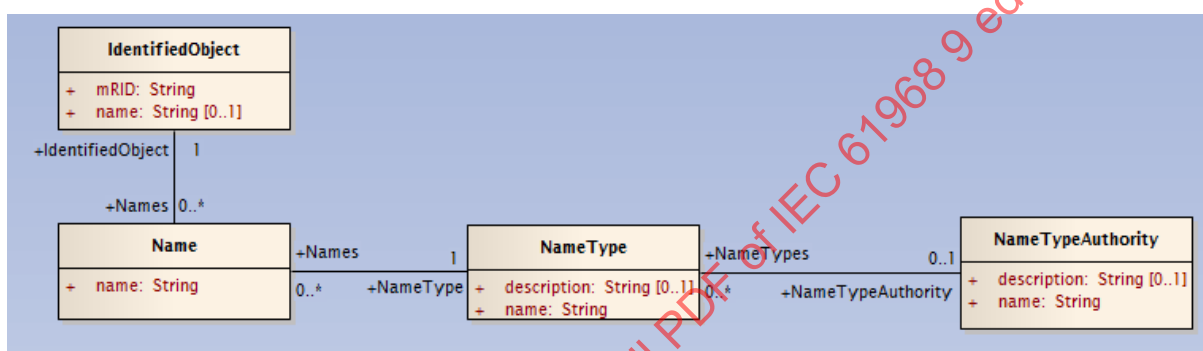


Figure G.1 – Désignation CIM

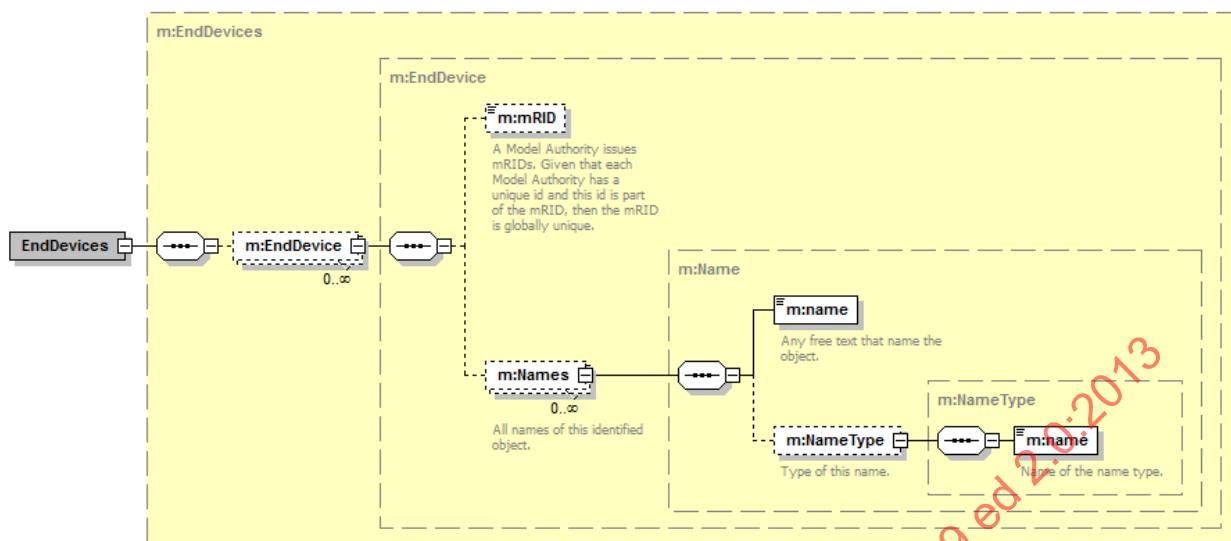
CIM reconnaît qu'un objet peut être connu sous de nombreux noms. Il convient que les objets reçoivent un "nom" donné par le système d'enregistrement en utilisant l'un des éléments de désignation. Il convient que la valeur de mRID soit un identificateur global unique avec un GUID mais il est vrai que les valeurs de nom sont généralement plus conviviales et évocatrices. La contrainte d'unicité peut également être assouplie, comme défini pour les règles d'un type de nom donné. Les règles d'unicité peuvent se répartir comme suit:

- unique de façon globale
- unique de façon globale pour un type de nom et l'autorité de type de nom associée
- unique à l'intérieur d'un appareil (par exemple, un compteur)
- emplacement physique (par exemple, un poste)
- sans contrainte d'unicité.

Dans tous les cas, les applications consommatrices nécessitent d'être conscientes des limites d'unicité pour un type de nom donné s'il en existe un.

G.3 Identificateurs d'objet dans les messages

La Figure G.1 représente les modèles CIM utilisés pour les noms. Dans la Figure G.2, le modèle est visible du point de vue d'une structure XML exemple qui serait réalisée dans un profil de message.



Légende

Anglais	Français
A Model Authority issues mRIDs. Given that each Model Authority has a unique id and this is part of the mRID, then the mRID is globally unique.	Un Modeling Authority (c'est-à-dire une autorité de modélisation) émet des mRID. Sachant que chaque Modeling Authority a un identificateur unique et que cet identificateur fait partie du mRID, le mRID est unique au niveau global.
Any free text that name the object.	Tout texte libre qui désigne l'objet.
All names of this identified object.	Tous les noms de cet objet identifié.
Type of this name.	Type de ce nom.
Description of the name type.	Description du type de nom.
Name of the name type.	Nom du type de nom.
Authority responsible for managing names of this type.	Autorité en charge de la gestion des noms de ce type.

Figure G.2 – Structure XML exemple pour les noms

En utilisant l'exemple ci-dessus comme référence, les règles importantes suivantes doivent être suivies:

Un objet peut être identifié à l'aide d'un mRID unique de façon globale

Un objet peut être identifié par une ou plusieurs valeurs Name.name

Les valeurs de mRID et Name.name peuvent être fournies

Si plusieurs valeurs Name.name sont fournies, il convient que chaque Name (nom) identifie une valeur NameType.name correspondante

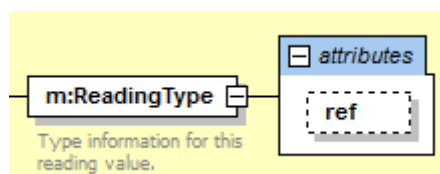
Alors que la valeur d'IdentifiedObject.name est définie au sein de la CIM, elle ne l'est pas dans les profils CEI 61968-9 afin d'éviter les ambiguïtés, car un producteur pourrait choisir d'utiliser IdentifiedObject.name et un consommateur s'attendre à rencontrer IdentifiedObject.Name.name. C'est pourquoi l'utilisation d'IdentifiedObject.name est déconseillée du point de vue de la norme CEI 61968-9.

Les producteurs et les consommateurs doivent convenir de l'utilisation des valeurs de mRID ou de Name.name dans le cadre de la corrélation d'objets. Cela peut varier pour une mise en œuvre donnée, mais l'utilisation des valeurs de Name.name est vivement recommandée.

Dans les cas de mises en œuvre où plusieurs consommateurs peuvent exister, un producteur peut avoir à fournir plusieurs valeurs de Name.name, chacune avec un NameType.name différent afin de répondre aux besoins spécifiques de chaque consommateur.

G.4 Références d'objet dans les messages

Dans les profils de messages, il est possible de se référer à un objet "par référence" ainsi que "par valeur" (méthode courante imbriquée). Ces références peuvent être établies à l'aide de valeurs de mRID ou de Name.name. Un exemple courant d'utilisation des références, applicable dans le cadre de la norme CEI 61968-9, est disponible pour les ReadingTypes (voir la Figure G.3).



Légende

Anglais	Français
Type information for this reading value.	Informations relatives au type pour cette valeur de relevé.

Figure G.3 – Utilisation de noms comme références

Dans un message XML, l'attribut "ref " identifierait alors un ReadingType spécifique utilisant une valeur de Name.name pour le type de lecture. Cette approche présente de nombreux avantages, tels que la réduction de la taille du message XML et l'utilisation d'alias d'objet, dans laquelle un objet peut être identifié par plusieurs noms.

Les références sont aussi utilisées pour identifier les types spécifiques d'EndDeviceControls ou d'EndDeviceEvents; dans ce cas, des références à un EndDeviceControlType ou à un EndDeviceEventType sont utilisées, le cas échéant.

Annexe H (normative)

Schémas XML pour les charges utiles de message

H.1 Généralités

La présente Annexe H a pour objet de fournir des schémas XML pour les charges utiles de message afin d'augmenter les descriptions données plus haut dans le présent document. Ces schémas XML ont été définis à l'aide des définitions de profils au sein de CIMTool. Ces schémas peuvent être étendus selon les besoins à des fins de mises en œuvre spécifiques. Cette Annexe H est complétée par les schémas XML informatifs fournis à l'Annexe I.

H.2 CustomerAccountConfig

```
<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns="http://langdale.com.au/2005/Message#"
  xmlns:a="http://langdale.com.au/2005/Message#"
  xmlns:m="http://iec.ch/TC57/2011/CustomerAccountConfig#"
  xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://iec.ch/TC57/2011/CustomerAccountConfig#"
  elementFormDefault="qualified" attributeFormDefault="unqualified">

  <xs:element name="CustomerAccountConfig" type="m:CustomerAccountConfig"/>
  <xs:complexType name="CustomerAccountConfig">
    <xs:sequence>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.modifiedBy"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="billingCycle" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.billingCycle"/>
      <xs:element name="budgetBill" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount.budgetBill"/>
    </xs:sequence>
  </xs:complexType>

```

```

<xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
<xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.lastModifiedDateTime"/>
<xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
<xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
<xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
<xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
<xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.ConfigurationEvents"/>
<xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
<xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
<xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
<xs:sequence>
<xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
<xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
<xs:sequence>
<xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
<xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
<xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
<xs:sequence>
<xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
<xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
<xs:sequence>
<xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
<xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
<xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
<xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
</xs:sequence>
</xs:complexType>
</xs:schema>

```

H.3 CustomerAgreementConfig

```
<?xml version="1.0" encoding="UTF-8"?>
```

```

<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/CustomerAgreementConfig#"
xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/CustomerAgreementConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="CustomerAgreementConfig" type="m:CustomerAgreementConfig"/>
  <xs:complexType name="CustomerAgreementConfig">
    <xs:sequence>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConfigurationEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.effectiveDateTime"/>
      <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.modifiedBy"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.createdDateTime"/>
      <xs:element name="lastModifiedDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Document.lastModifiedDateTime"/>
      <xs:element name="loadMgmt" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement.loadMgmt"/>
      <xs:element name="revisionNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.revisionNumber"/>
      <xs:element name="signDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Agreement.signDate"/>
    </xs:sequence>
  </xs:complexType>

```



```

    <xs:element name="subject" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.subject"/>
    <xs:element name="title" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.title"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.type"/>
    <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.ConfigurationEvents"/>
    <xs:element name="DemandResponsePrograms" type="m:DemandResponseProgram" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement.DemandResponsePrograms"/>
    <xs:element name="docStatus" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.docStatus"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerAgreement.ServiceCategory"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Document.status"/>
    <xs:element name="validityInterval" type="m:DateTimeInterval" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Agreement.validityInterval"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="DateTimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="DemandResponseProgram"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DemandResponseProgram">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceCategory">
  <xs:sequence>

```



```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="electricity"/>
        <xs:enumeration value="gas"/>
        <xs:enumeration value="heat"/>
        <xs:enumeration value="internet"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="rates"/>
        <xs:enumeration value="refuse"/>
        <xs:enumeration value="sewerage"/>
        <xs:enumeration value="time"/>
        <xs:enumeration value="tvLicence"/>
        <xs:enumeration value="water"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.4 CustomerConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/CustomerConfig#" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/CustomerConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="CustomerConfig" type="m:CustomerConfig"/>
    <xs:complexType name="CustomerConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ConfigurationEvent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.createdDateTime"/>
            <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.effectiveDateTime"/>
            <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.modifiedBy"/>
            <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
            <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
            <xs:element name="severity" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>

```

```

        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="pucNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.pucNumber"/>
        <xs:element name="specialNeed" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.specialNeed"/>
        <xs:element name="vip" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.vip"/>
        <xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.ConfigurationEvents"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="Organisation" type="m:Organisation" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#OrganisationRole.Organisation"/>
        <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.status"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ElectronicAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress">
    <xs:sequence>
        <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
        <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
        <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
        <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
        <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
        <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
        <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
        <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    </xs:sequence>
</xs:complexType>

```

```

    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Organisation" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.electronicAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="phone1" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone1"/>
    <xs:element name="phone2" type="m:TelephoneNumber" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.phone2"/>
    <xs:element name="postalAddress" type="m:PostalAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.postalAddress"/>
    <xs:element name="streetAddress" type="m:StreetAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Organisation.streetAddress"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PostalAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress">
  <xs:sequence>
    <xs:element name="poBox" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.poBox"/>
    <xs:element name="postalCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.postalCode"/>
    <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.streetDetail"/>
    <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PostalAddress.townDetail"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetAddress" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress">
  <xs:sequence>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.status"/>

```

```

    <xs:element name="streetDetail" type="m:StreetDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.streetDetail"/>
    <xs:element name="townDetail" type="m:TownDetail" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetAddress.townDetail"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="StreetDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#StreetDetail">
  <xs:sequence>
    <xs:element name="addressGeneral" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.addressGeneral"/>
    <xs:element name="buildingName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.buildingName"/>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.code"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.name"/>
    <xs:element name="number" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.number"/>
    <xs:element name="prefix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.prefix"/>
    <xs:element name="suffix" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suffix"/>
    <xs:element name="suiteNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.suiteNumber"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#StreetDetail.type"/>
    <xs:element name="withinTownLimits" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#StreetDetail.withinTownLimits"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TelephoneNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TelephoneNumber">
  <xs:sequence>
    <xs:element name="areaCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.areaCode"/>
    <xs:element name="cityCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.cityCode"/>
    <xs:element name="countryCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.countryCode"/>
    <xs:element name="extension" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.extension"/>
    <xs:element name="localNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TelephoneNumber.localNumber"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TownDetail" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TownDetail">
  <xs:sequence>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.code"/>
    <xs:element name="country" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.country"/>
    <xs:element name="name" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.name"/>
    <xs:element name="section" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.section"/>
    <xs:element name="stateOrProvince" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TownDetail.stateOrProvince"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.5 EndDeviceConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:a="http://langdale.com.au/2005/Message#" xmlns:m="http://iec.ch/TC57/2011/EndDeviceConfig#"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
targetNamespace="http://iec.ch/TC57/2011/EndDeviceConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="EndDeviceConfig" type="m:EndDeviceConfig"/>

```

```

<xs:complexType name="EndDeviceConfig">
  <xs:sequence>
    <xs:element name="ComFunction" type="m:ComFunction" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="ConnectDisconnectFunction" type="m:ConnectDisconnectFunction"
minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="SimpleEndDeviceFunction" type="m:SimpleEndDeviceFunction" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ActivityRecord" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ActivityRecord">
  <xs:sequence>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord.createdDateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
    <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="AssetModelUsageKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#AssetModelUsageKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="customerSubstation"/>
    <xs:enumeration value="distributionOverhead"/>
    <xs:enumeration value="distributionUnderground"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="streetlight"/>
    <xs:enumeration value="substation"/>
    <xs:enumeration value="transmission"/>
    <xs:enumeration value="unknown"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="Channel" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Channel">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Channel.isVirtual"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="ReadingType" type="m:ReadingType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Channel.ReadingType">
      <xs:complexType sawsdl:modelReference="">
        <xs:attribute name="ref" type="xs:string"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ComDirectionKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ComDirectionKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="biDirectional"/>
    <xs:enumeration value="fromDevice"/>
    <xs:enumeration value="toDevice"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ComFunction" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrAddress" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrAddress"/>
    <xs:element name="amrRouter" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.amrRouter"/>
    <xs:element name="configID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
  </xs:sequence>

```



```

    <xs:element name="direction" type="m:ComDirectionKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.direction"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
    <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="programID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
    <xs:element name="technology" type="m:ComTechnologyKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ComFunction.technology"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ComTechnologyKind" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ComTechnologyKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="cellular"/>
    <xs:enumeration value="ethernet"/>
    <xs:enumeration value="homePlug"/>
    <xs:enumeration value="pager"/>
    <xs:enumeration value="phone"/>
    <xs:enumeration value="plc"/>
    <xs:enumeration value="rf"/>
    <xs:enumeration value="rfMesh"/>
    <xs:enumeration value="zigbee"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ConfigurationEvent" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ConfigurationEvent">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="createdDateTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord.createdDateTime"/>
    <xs:element name="effectiveDateTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.effectiveDateTime"/>
    <xs:element name="modifiedBy" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConfigurationEvent.modifiedBy"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConfigurationEvent.remark"/>
    <xs:element name="severity" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
    <xs:element name="type" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.type"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="status" type="m:Status" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ConnectDisconnectFunction"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ConnectDisconnectFunction">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
    <xs:element name="eventCount" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.eventCount"/>
    <xs:element name="isConnected" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isConnected"/>
    <xs:element name="isDelayedDiscon" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isDelayedDiscon"/>

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    <xs:element name="isLocalAutoDisconOp" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isLocalAutoDisconOp"/>
    <xs:element name="isLocalAutoReconOp" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isLocalAutoReconOp"/>
    <xs:element name="isRemoteAutoDisconOp" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isRemoteAutoDisconOp"/>
    <xs:element name="isRemoteAutoReconOp" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.isRemoteAutoReconOp"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    <xs:element name="rcdInfo" type="m:RemoteConnectDisconnectInfo" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction.rcdInfo"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="CorporateStandardKind"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CorporateStandardKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="experimental"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="standard"/>
    <xs:enumeration value="underEvaluation"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ElectronicAddress" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ElectronicAddress">
  <xs:sequence>
    <xs:element name="email1" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
    <xs:element name="email2" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
    <xs:element name="lan" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
    <xs:element name="mac" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
    <xs:element name="radio" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
    <xs:element name="userID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
    <xs:element name="web" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
    <xs:element name="initialCondition" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialCondition"/>
    <xs:element name="initialLossOfLife" type="m:PerCent" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.initialLossOfLife"/>
    <xs:element name="installCode" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.installCode"/>
    <xs:element name="isPan" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isPan"/>
  </xs:sequence>

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<xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isVirtual"/>
<xs:element name="lotNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lotNumber"/>
<xs:element name="purchasePrice" type="m:Money" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.purchasePrice"/>
<xs:element name="serialNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.serialNumber"/>
<xs:element name="timeZoneOffset" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.timeZoneOffset"/>
<xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
<xs:element name="utcNumber" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.utcNumber"/>
<xs:element name="ActivityRecords" type="m:ActivityRecord" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Asset.ActivityRecords"/>
<xs:element name="ConfigurationEvents" type="m:ConfigurationEvent" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.ConfigurationEvents"/>
<xs:element name="electronicAddress" type="m:ElectronicAddress" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.electronicAddress"/>
<xs:choice minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceFunctions">
  <xs:element name="ComFunction" sawSDL:modelReference="">
    <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ComFunction">
      <xs:attribute name="ref" type="xs:string"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="ConnectDisconnectFunction" sawSDL:modelReference="">
    <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ConnectDisconnectFunction">
      <xs:attribute name="ref" type="xs:string"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="SimpleEndDeviceFunction" sawSDL:modelReference="">
    <xs:complexType sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#SimpleEndDeviceFunction">
      <xs:attribute name="ref" type="xs:string"/>
    </xs:complexType>
  </xs:element>
</xs:choice>
<xs:element name="EndDeviceInfo" type="m:EndDeviceInfo" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.EndDeviceInfo"/>
<xs:element name="lifecycle" type="m:LifecycleDate" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.lifecycle"/>
<xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
<xs:element name="Seals" type="m:Seal" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetContainer.Seals"/>
<xs:element name="status" type="m:Status" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.status"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceCapability"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceCapability">
  <xs:sequence>
    <xs:element name="autonomousDst" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.autonomousDst"/>
    <xs:element name="communication" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.communication"/>
    <xs:element name="connectDisconnect" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.connectDisconnect"/>
    <xs:element name="demandResponse" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.demandResponse"/>
    <xs:element name="electricMetering" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.electricMetering"/>
    <xs:element name="gasMetering" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.gasMetering"/>

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        <xs:element name="metrology" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.metrology"/>
        <xs:element name="onRequestRead" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.onRequestRead"/>
        <xs:element name="outageHistory" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.outageHistory"/>
        <xs:element name="pressureCompensation" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.pressureCompensation"/>
        <xs:element name="pricingInfo" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.pricingInfo"/>
        <xs:element name="pulseOutput" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.pulseOutput"/>
        <xs:element name="relaysProgramming" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.relaysProgramming"/>
        <xs:element name="reverseFlow" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.reverseFlow"/>
        <xs:element name="superCompressibilityCompensation" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.superCompressibilityCompensation"/>
        <xs:element name="temperatureCompensation" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.temperatureCompensation"/>
        <xs:element name="textMessage" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.textMessage"/>
        <xs:element name="waterMetering" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceCapability.waterMetering"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="EndDeviceFunctionKind"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunctionKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="autonomousDst"/>
        <xs:enumeration value="demandResponse"/>
        <xs:enumeration value="electricMetering"/>
        <xs:enumeration value="gasMetering"/>
        <xs:enumeration value="metrology"/>
        <xs:enumeration value="onRequestRead"/>
        <xs:enumeration value="outageHistory"/>
        <xs:enumeration value="relaysProgramming"/>
        <xs:enumeration value="reverseFlow"/>
        <xs:enumeration value="waterMetering"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDeviceInfo" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceInfo">
    <xs:sequence>
        <xs:element name="isSolidState" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.isSolidState"/>
        <xs:element name="phaseCount" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.phaseCount"/>
        <xs:element name="ratedCurrent" type="m:CurrentFlow" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedCurrent"/>
        <xs:element name="ratedVoltage" type="m:Voltage" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.ratedVoltage"/>
        <xs:element name="AssetModel" type="m:ProductAssetModel" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetInfo.AssetModel"/>
        <xs:element name="capability" type="m:EndDeviceCapability" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo.capability"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="LifecycleDate" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#LifecycleDate">
    <xs:sequence>
        <xs:element name="installationDate" type="xs:date" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#LifecycleDate.installationDate"/>

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    <xs:element name="manufacturedDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#LifecycleDate.manufacturedDate"/>
    <xs:element name="purchaseDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.purchaseDate"/>
    <xs:element name="receivedDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.receivedDate"/>
    <xs:element name="removalDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.removalDate"/>
    <xs:element name="retiredDate" type="xs:date" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#LifecycleDate.retiredDate"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Manufacturer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Manufacturer">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ProductAssetModel" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ProductAssetModel">
  <xs:sequence>
    <xs:element name="corporateStandardKind" type="m:CorporateStandardKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.corporateStandardKind"/>
    <xs:element name="modelName" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.modelNumber"/>
    <xs:element name="modelVersion" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.modelVersion"/>
    <xs:element name="usageKind" type="m:AssetModelUsageKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ProductAssetModel.usageKind"/>
    <xs:element name="Manufacturer" type="m:Manufacturer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ProductAssetModel.Manufacturer"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="RationalNumber" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#RationalNumber">
  <xs:sequence>
    <xs:element name="denominator" type="xs:integer"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.denominator"/>

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        <xs:element name="numerator" type="xs:integer"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RationalNumber.numerator"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingInterharmonic"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic">
    <xs:sequence>
        <xs:element name="denominator" type="xs:integer"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.denominator"/>
        <xs:element name="numerator" type="xs:integer"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingInterharmonic.numerator"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ReadingType" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="accumulation" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.accumulation"/>
        <xs:element name="aggregate" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.aggregate"/>
        <xs:element name="commodity" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.commodity"/>
        <xs:element name="consumptionTier" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.consumptionTier"/>
        <xs:element name="cpp" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.cpp"/>
        <xs:element name="currency" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.currency"/>
        <xs:element name="flowDirection" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.flowDirection"/>
        <xs:element name="macroPeriod" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.macroPeriod"/>
        <xs:element name="measurementKind" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measurementKind"/>
        <xs:element name="measuringPeriod" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.measuringPeriod"/>
        <xs:element name="multiplier" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.multiplier"/>
        <xs:element name="phases" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.phases"/>
        <xs:element name="tou" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.tou"/>
        <xs:element name="unit" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.unit"/>
        <xs:element name="argument" type="m:RationalNumber" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.argument"/>
        <xs:element name="interharmonic" type="m:ReadingInterharmonic" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ReadingType.interharmonic"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Register" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="isVirtual" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.isVirtual"/>
        <xs:element name="leftDigitCount" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.leftDigitCount"/>
        <xs:element name="rightDigitCount" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.rightDigitCount"/>
        <xs:element name="touTierName" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTierName"/>
        <xs:element name="Channels" type="m:Channel" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.Channels"/>
        <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
        <xs:element name="touTier" type="m:TimeInterval" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Register.touTier"/>
    </xs:sequence>

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</xs:complexType>
<xs:complexType name="RemoteConnectDisconnectInfo"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo">
  <xs:sequence>
    <xs:element name="armedTimeout" type="m:Seconds" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.armedTimeout"/>
    <xs:element name="customerVoltageLimit" type="m:Voltage" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.customerVoltageLimit"/>
    <xs:element name="energyLimit" type="m:RealEnergy" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyLimit"/>
    <xs:element name="energyUsageStartDateTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyUsageStartDateTime"/>
    <xs:element name="energyUsageWarning" type="m:RealEnergy" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.energyUsageWarning"/>
    <xs:element name="isArmConnect" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isArmConnect"/>
    <xs:element name="isArmDisconnect" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isArmDisconnect"/>
    <xs:element name="isEnergyLimiting" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.isEnergyLimiting"/>
    <xs:element name="needsPowerLimitCheck" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.needsPowerLimitCheck"/>
    <xs:element name="needsVoltageLimitCheck" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.needsVoltageLimitCheck"/>
    <xs:element name="powerLimit" type="m:ActivePower" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.powerLimit"/>
    <xs:element name="usePushbutton" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RemoteConnectDisconnectInfo.usePushbutton"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Seal" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal">
  <xs:sequence>
    <xs:element name="appliedDateTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.appliedDateTime"/>
    <xs:element name="condition" type="m:SealConditionKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.condition"/>
    <xs:element name="kind" type="m:SealKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.kind"/>
    <xs:element name="sealNumber" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Seal.sealNumber"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="SealConditionKind" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SealConditionKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="broken"/>
    <xs:enumeration value="locked"/>
    <xs:enumeration value="missing"/>
    <xs:enumeration value="open"/>
    <xs:enumeration value="other"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="SealKind" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SealKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="lead"/>
    <xs:enumeration value="lock"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="steel"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="SimpleEndDeviceFunction"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction">

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<xs:sequence>
  <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
  <xs:element name="configID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.configID"/>
  <xs:element name="enabled" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.enabled"/>
  <xs:element name="firmwareID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.firmwareID"/>
  <xs:element name="hardwareID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.hardwareID"/>
  <xs:element name="kind" type="m:EndDeviceFunctionKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#SimpleEndDeviceFunction.kind"/>
  <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.password"/>
  <xs:element name="programID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#AssetFunction.programID"/>
  <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  <xs:element name="Registers" type="m:Register" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceFunction.Registers"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
  <xs:sequence>
    <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
    <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
    <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeInterval" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:time" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.end"/>
    <xs:element name="start" type="xs:time" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="RealEnergy" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#RealEnergy">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Voltage" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Voltage">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="CurrentFlow" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CurrentFlow">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="ActivePower" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivePower">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Minutes" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Minutes">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Seconds" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Seconds">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="PerCent" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PerCent">
  <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="Money" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Money">
  <xs:restriction base="xs:decimal"/>

```



```
</xs:simpleType>
</xs:schema>
```

H.6 EndDeviceControls

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
  xmlns:a="http://langdale.com.au/2005/Message#"
  xmlns:m="http://iec.ch/TC57/2011/EndDeviceControls#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://iec.ch/TC57/2011/EndDeviceControls#" elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:element name="EndDeviceControls" type="m:EndDeviceControls"/>
  <xs:complexType name="EndDeviceControls">
    <xs:sequence>
      <xs:element name="EndDeviceControl" type="m:EndDeviceControl"
minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="EndDeviceControlType" type="m:EndDeviceControlType"
minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ControlledAppliance"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance">
    <xs:sequence>
      <xs:element name="isElectricVehicle" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isElectricVehicle"/>
      <xs:element name="isExteriorLighting" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isExteriorLighting"/>
      <xs:element name="isGenerationSystem" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isGenerationSystem"/>
      <xs:element name="isHvacCompressorOrFurnace" type="xs:boolean"
minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isHvacCompressorOrFurnace"/>
      <xs:element name="isInteriorLighting" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isInteriorLighting"/>
      <xs:element name="isIrrigationPump" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isIrrigationPump"/>
      <xs:element name="isManagedCommercialIndustrialLoad" type="xs:boolean"
minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isManagedCommercialIndustrialLoad"/>
      <xs:element name="isPoolPumpSpaJacuzzi" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isPoolPumpSpaJacuzzi"/>
      <xs:element name="isSimpleMiscLoad" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isSimpleMiscLoad"/>
      <xs:element name="isSmartAppliance" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isSmartAppliance"/>
      <xs:element name="isStripAndBaseboardHeater" type="xs:boolean"
minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isStripAndBaseboardHeater"/>
      <xs:element name="isWaterHeater" type="xs:boolean" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ControlledAppliance.isWaterHeater"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer">
    <xs:sequence/>
  </xs:complexType>
  <xs:complexType name="DateTimeInterval"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval">
    <xs:sequence>
      <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
      <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
```

```

</xs:complexType>
<xs:complexType name="ElectronicAddress"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress">
  <xs:sequence>
    <xs:element name="email1" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email1"/>
    <xs:element name="email2" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.email2"/>
    <xs:element name="lan" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.lan"/>
    <xs:element name="mac" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.mac"/>
    <xs:element name="password" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.password"/>
    <xs:element name="radio" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.radio"/>
    <xs:element name="userID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.userID"/>
    <xs:element name="web" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ElectronicAddress.web"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDevice" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDevice">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="installCode" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.installCode"/>
    <xs:element name="isPan" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isPan"/>
    <xs:element name="electronicAddress" type="m:ElectronicAddress"
minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Asset.electronicAddress"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceAction"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction">
  <xs:sequence>
    <xs:element name="command" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
    <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
    <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.durationIndefinite"/>
    <xs:element name="startDateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.startDateTime"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControl"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="drProgramLevel" type="xs:integer" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.drProgramLevel"/>
    <xs:element name="drProgramMandatory" type="xs:boolean" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.drProgramMandatory"/>
    <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.issuerID"/>
    <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.issuerTrackingID"/>
    <xs:element name="priceSignal" type="m:FloatQuantity" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.priceSignal"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.reason"/>
  </xs:sequence>
</xs:complexType>

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        <xs:choice minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.EndDeviceAction">
            <xs:element name="PanDemandResponse" type="m:PanDemandResponse"
sawsd1:modelReference=""/>
            <xs:element name="PanDisplay" type="m:PanDisplay"
sawsd1:modelReference=""/>
            <xs:element name="PanPricing" type="m:PanPricing"
sawsd1:modelReference=""/>
        </xs:choice>
        <xs:element name="EndDeviceControlType"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.EndDeviceControlType">
            <xs:complexType sawsd1:modelReference=""/>
            <xs:attribute name="ref" type="xs:string"/>
            </xs:complexType>
        </xs:element>
        <xs:element name="EndDeviceGroups" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.EndDeviceGroups"/>
        <xs:element name="EndDevices" type="m:EndDevice" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.EndDevices"/>
        <xs:element name="primaryDeviceTiming" type="m:EndDeviceTiming"
minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.primaryDeviceTiming"/>
        <xs:element name="secondaryDeviceTiming" type="m:EndDeviceTiming"
minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.secondaryDeviceTiming"/>
        <xs:element name="UsagePointGroups" type="m:UsagePointGroup"
minOccurs="0" maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.UsagePointGroups"/>
        <xs:element name="UsagePoints" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.UsagePoints"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControlType"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="domain" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType.domain"/>
        <xs:element name="eventOrAction" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControlType.eventOrAction"/>
        <xs:element name="subDomain" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControlType.subDomain"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType.type"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceInfo"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceInfo">
    <xs:sequence/>
</xs:complexType>
<xs:complexType name="EndDeviceTiming"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceTiming">
    <xs:sequence>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceTiming.duration"/>
    </xs:sequence>
</xs:complexType>

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        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceTiming.durationIndefinite"/>
        <xs:element name="randomisation" type="m:RandomisationKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceTiming.randomisation"/>
        <xs:element name="interval" type="m:DateTimeInterval" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceTiming.interval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanDemandResponse"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse">
    <xs:sequence>
        <xs:element name="avgLoadAdjustment" type="m:PerCent" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.avgLoadAdjustment"/>
        <xs:element name="cancelControlMode" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.cancelControlMode"/>
        <xs:element name="cancelDateTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.cancelDateTime"/>
        <xs:element name="cancelNow" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.cancelNow"/>
        <xs:element name="command" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
        <xs:element name="coolingOffset" type="m:Temperature" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.coolingOffset"/>
        <xs:element name="coolingSetpoint" type="m:Temperature" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.coolingSetpoint"/>
        <xs:element name="criticalityLevel" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.criticalityLevel"/>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.durationIndefinite"/>
        <xs:element name="dutyCycle" type="m:PerCent" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.dutyCycle"/>
        <xs:element name="enrollmentGroup" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.enrollmentGroup"/>

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        <xs:element name="heatingOffset" type="m:Temperature" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.heatingOffset"/>
        <xs:element name="heatingSetpoint" type="m:Temperature" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDemandResponse.heatingSetpoint"/>
        <xs:element name="startTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.startTime"/>
        <xs:element name="appliance" type="m:ControlledAppliance" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDemandResponse.appliance"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanDisplay" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PanDisplay">
    <xs:sequence>
        <xs:element name="command" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
        <xs:element name="confirmationRequired" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDisplay.confirmationRequired"/>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.durationIndefinite"/>
        <xs:element name="priority" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDisplay.priority"/>
        <xs:element name="startTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.startTime"/>
        <xs:element name="textMessage" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanDisplay.textMessage"/>
        <xs:element name="transmissionMode" type="m:TransmissionModeKind"
minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanDisplay.transmissionMode"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanPricing" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PanPricing">
    <xs:sequence>
        <xs:element name="command" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.command"/>
        <xs:element name="duration" type="m:Minutes" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceAction.duration"/>
        <xs:element name="durationIndefinite" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.durationIndefinite"/>
        <xs:element name="providerID" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricing.providerID"/>
        <xs:element name="startTime" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceAction.startTime"/>
        <xs:element name="PanPricingDetails" type="m:PanPricingDetail"
minOccurs="0" maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricing.PanPricingDetails"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="PanPricingDetail"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail">
    <xs:sequence>
        <xs:element name="alternateCostDelivered" type="xs:float" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricingDetail.alternateCostDelivered"/>
        <xs:element name="alternateCostUnit" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricingDetail.alternateCostUnit"/>
        <xs:element name="currentTimeDate" type="xs:dateTime" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricingDetail.currentTimeDate"/>
        <xs:element name="generationPrice" type="m:Money" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricingDetail.generationPrice"/>
        <xs:element name="generationPriceRatio" type="xs:float" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#PanPricingDetail.generationPriceRatio"/>
    </xs:sequence>
</xs:complexType>

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        <xs:element name="price" type="m:Money" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.price"/>
        <xs:element name="priceRatio" type="xs:float" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceRatio"/>
        <xs:element name="priceTier" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceTier"/>
        <xs:element name="priceTierCount" type="xs:integer" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceTierCount"/>
        <xs:element name="priceTierLabel" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.priceTierLabel"/>
        <xs:element name="rateLabel" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.rateLabel"/>
        <xs:element name="registerTier" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.registerTier"/>
        <xs:element name="unitOfMeasure" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PanPricingDetail.unitOfMeasure"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="RandomisationKind"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#RandomisationKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="default"/>
        <xs:enumeration value="end"/>
        <xs:enumeration value="none"/>
        <xs:enumeration value="start"/>
        <xs:enumeration value="startAndEnd"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation">
    <xs:sequence/>
</xs:complexType>
<xs:simpleType name="TransmissionModeKind"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#TransmissionModeKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="anonymous"/>
        <xs:enumeration value="both"/>
        <xs:enumeration value="normal"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="Minutes" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Minutes">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="FloatQuantity" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#FloatQuantity">
    <xs:restriction base="xs:float"/>
</xs:simpleType>
<xs:simpleType name="PerCent" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#PerCent">
    <xs:restriction base="xs:float"/>
</xs:simpleType>

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    <xs:simpleType name="Money" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Money">
      <xs:restriction base="xs:decimal"/>
    </xs:simpleType>
    <xs:simpleType name="Temperature" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Temperature">
      <xs:restriction base="xs:float"/>
    </xs:simpleType>
  </xs:schema>

```

H.7 EndDeviceEvents

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceEvents#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/EndDeviceEvents#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="EndDeviceEvents" type="m:EndDeviceEvents"/>
  <xs:complexType name="EndDeviceEvents">
    <xs:sequence>
      <xs:element name="EndDeviceEvent" type="m:EndDeviceEvent" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="EndDeviceEventType" type="m:EndDeviceEventType" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Asset" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Asset">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="EndDeviceEvent" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceEvent">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="createdDateTime" type="xs:dateTime"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#ActivityRecord.createdDateTime"/>
      <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerID"/>
      <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceEvent.issuerTrackingID"/>
      <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
      <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
      <xs:element name="userID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.userID"/>
      <xs:element name="Assets" type="m:Asset" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.Assets"/>
      <xs:element name="EndDeviceEventDetails" type="m:EndDeviceEventDetail" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceEvent.EndDeviceEventDetails"/>
      <xs:element name="EndDeviceEventType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceEvent.EndDeviceEventType">
        <xs:complexType sawsdl:modelReference="">
          <xs:attribute name="ref" type="xs:string"/>
        </xs:complexType>
      </xs:element>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
      <xs:element name="status" type="m:Status" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.status"/>

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        <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.UsagePoint"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEventDetail"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail.name"/>
        <xs:element name="value" type="m:StringQuantity" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventDetail.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEventType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDeviceEventType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="domain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.domain"/>
        <xs:element name="eventOrAction" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceEventType.eventOrAction"/>
        <xs:element name="subDomain" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.subDomain"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType.type"/>
        <xs:element name="Names" type="m:Name" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Status" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Status">
    <xs:sequence>
        <xs:element name="dateTime" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.dateTime"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.reason"/>
        <xs:element name="remark" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.remark"/>
        <xs:element name="value" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Status.value"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">

```

```

    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="StringQuantity" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#StringQuantity">
    <xs:restriction base="xs:string"/>
  </xs:simpleType>
</xs:schema>

```

H.8 GetCustomerAccountConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetCustomerAccountConfig#"
xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetCustomerAccountConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="GetCustomerAccountConfig" type="m:GetCustomerAccountConfig"/>
  <xs:complexType name="GetCustomerAccountConfig">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
      <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerKind">
    <xs:restriction base="xs:string">
      <xs:enumeration value="commercialIndustrial"/>
      <xs:enumeration value="energyServiceScheduler"/>
      <xs:enumeration value="energyServiceSupplier"/>
      <xs:enumeration value="internalUse"/>
      <xs:enumeration value="other"/>
      <xs:enumeration value="pumpingLoad"/>
      <xs:enumeration value="residential"/>
      <xs:enumeration value="residentialAndCommercial"/>
      <xs:enumeration value="residentialAndStreetlight"/>
      <xs:enumeration value="residentialFarmService"/>
      <xs:enumeration value="residentialStreetlightOthers"/>
      <xs:enumeration value="windMachine"/>
    </xs:restriction>
  </xs:simpleType>

```



```

<xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#SupplierKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="other"/>
    <xs:enumeration value="retailer"/>
    <xs:enumeration value="utility"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.9 GetCustomerAgreementConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetCustomerAgreementConfig#"
xmlns:sawsdl="http://www.w3.org/ns/sawsdl" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetCustomerAgreementConfig#"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:element name="GetCustomerAgreementConfig" type="m:GetCustomerAgreementConfig"/>
  <xs:complexType name="GetCustomerAgreementConfig">

```

```

        <xs:sequence>
          <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
          <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
          <xs:element name="CustomerAgreement" type="m:CustomerAgreement"
minOccurs="0" maxOccurs="unbounded"/>
          <xs:element name="PricingStructure" type="m:PricingStructure"
minOccurs="0" maxOccurs="unbounded"/>
          <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
          <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
          <xs:element name="ServiceSupplier" type="m:ServiceSupplier" minOccurs="0"
maxOccurs="unbounded"/>
          <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Customer">
        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
          <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="CustomerAccount" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount">
        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="CustomerAgreement" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement">
        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
      </xs:complexType>
      <xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerKind">
        <xs:restriction base="xs:string">
          <xs:enumeration value="commercialIndustrial"/>
          <xs:enumeration value="energyServiceScheduler"/>
          <xs:enumeration value="energyServiceSupplier"/>
          <xs:enumeration value="internalUse"/>
          <xs:enumeration value="other"/>
          <xs:enumeration value="pumpingLoad"/>
          <xs:enumeration value="residential"/>
          <xs:enumeration value="residentialAndCommercial"/>
          <xs:enumeration value="residentialAndStreetlight"/>
          <xs:enumeration value="residentialFarmService"/>
          <xs:enumeration value="residentialStreetlightOthers"/>
          <xs:enumeration value="windMachine"/>
        </xs:restriction>
      </xs:simpleType>
      <xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
        <xs:sequence>
          <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
          <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
        </xs:sequence>

```



```

</xs:complexType>
<xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="PricingStructure"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="code" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#PricingStructure.code"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceCategory"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="electricity"/>
    <xs:enumeration value="gas"/>
    <xs:enumeration value="heat"/>
    <xs:enumeration value="internet"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="rates"/>
    <xs:enumeration value="refuse"/>
    <xs:enumeration value="sewerage"/>
    <xs:enumeration value="time"/>
    <xs:enumeration value="tvLicence"/>
    <xs:enumeration value="water"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceSupplier"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier">
  <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:SupplierKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceSupplier.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="SupplierKind" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#SupplierKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="other"/>
        <xs:enumeration value="retailer"/>
        <xs:enumeration value="utility"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="UsagePoint" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.10 GetCustomerConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetCustomerConfig#" xmlns:sawsd1="http://www.w3.org/ns/sawsd1"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetCustomerConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetCustomerConfig" type="m:GetCustomerConfig"/>
    <xs:complexType name="GetCustomerConfig">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Customer.kind">
                <xs:simpleType sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#CustomerKind">
                    <xs:restriction base="xs:string">
                        <xs:enumeration value="commercialIndustrial"/>
                        <xs:enumeration value="energyServiceScheduler"/>
                        <xs:enumeration value="energyServiceSupplier"/>
                        <xs:enumeration value="internalUse"/>
                        <xs:enumeration value="other"/>
                        <xs:enumeration value="pumpingLoad"/>
                        <xs:enumeration value="residential"/>
                        <xs:enumeration value="residentialAndCommercial"/>
                        <xs:enumeration value="residentialAndStreetlight"/>
                        <xs:enumeration value="residentialFarmService"/>
                        <xs:enumeration value="residentialStreetlightOthers"/>
                        <xs:enumeration value="windMachine"/>
                    </xs:restriction>
                </xs:simpleType>
            </xs:element>

```

```

    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAccount">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
  <xs:sequence>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
    <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
    <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.NameTypeAuthority"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameTypeAuthority">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
    <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0" maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.11 GetEndDeviceConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetEndDeviceConfig#"
xmlns:sawSDL="http://www.w3.org/ns/sawSDL" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetEndDeviceConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetEndDeviceConfig" type="m:GetEndDeviceConfig"/>
  <xs:complexType name="GetEndDeviceConfig">

```

```

        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement"
minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="EndDevice" type="m:EndDevice" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="Meter" type="m:Meter" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Customer">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAccount"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="CustomerAgreement"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerKind">
        <xs:restriction base="xs:string">
            <xs:enumeration value="commercialIndustrial"/>
            <xs:enumeration value="energyServiceScheduler"/>
            <xs:enumeration value="energyServiceSupplier"/>
            <xs:enumeration value="internalUse"/>
            <xs:enumeration value="other"/>
            <xs:enumeration value="pumpingLoad"/>
            <xs:enumeration value="residential"/>
            <xs:enumeration value="residentialAndCommercial"/>
            <xs:enumeration value="residentialAndStreetlight"/>
            <xs:enumeration value="residentialFarmService"/>
            <xs:enumeration value="residentialStreetlightOthers"/>
            <xs:enumeration value="windMachine"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="EndDevice" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#EndDevice">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```

```

        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="isPan" type="xs:boolean" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.isPan"/>
        <xs:element name="type" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Asset.type"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
        <xs:element name="name" type="xs:string"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="ServiceLocation"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePoint">

```

```

        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="UsagePointGroup"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointGroup">
        <xs:sequence>
          <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
          <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
      </xs:complexType>
    </xs:schema>

```

H.12 GetEndDeviceControls

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetEndDeviceControls#"
xmlns:sawsd1="http://www.w3.org/ns/sawsd1" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetEndDeviceControls#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetEndDeviceControls" type="m:GetEndDeviceControls"/>
  <xs:complexType name="GetEndDeviceControls">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAgreement" type="m:CustomerAgreement"
minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="EndDeviceControl" type="m:EndDeviceControl"
minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="EndDeviceControlType" type="m:EndDeviceControlType"
minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="Meter" type="m:Meter" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Customer" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Customer">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
      <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
      <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="CustomerAccount"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount">
    <xs:sequence>
      <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```



```

        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval">
    <xs:sequence>
        <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
        <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControl"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.issuerID"/>
        <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceControl.issuerTrackingID"/>
        <xs:element name="reason" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControl.reason"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceControlType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceControlType">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceGroup"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>

```

```

        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Name" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
        <xs:sequence>
            <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
            <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameType" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
            <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
            <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameTypeAuthority"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
            <xs:element name="name" type="xs:string"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ServiceCategory"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceKind">
        <xs:restriction base="xs:string">
            <xs:enumeration value="electricity"/>
            <xs:enumeration value="gas"/>
            <xs:enumeration value="heat"/>
            <xs:enumeration value="internet"/>
            <xs:enumeration value="other"/>
            <xs:enumeration value="rates"/>
            <xs:enumeration value="refuse"/>
            <xs:enumeration value="sewerage"/>
            <xs:enumeration value="time"/>
            <xs:enumeration value="tvLicence"/>
            <xs:enumeration value="water"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="ServiceLocation"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>

```



```

        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeSchedule" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TimeSchedule">
    <xs:sequence>
        <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule.scheduleInterval"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePoint">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded"
sawsd1:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.13 GetEndDeviceEvents

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetEndDeviceEvents#"
xmlns:sawsd1="http://www.w3.org/ns/sawsdl" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetEndDeviceEvents#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <xs:element name="GetEndDeviceEvents" type="m:GetEndDeviceEvents"/>
    <xs:complexType name="GetEndDeviceEvents">
        <xs:sequence>
            <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="CustomerAgreement" type="m:CustomerAgreement"
minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="EndDeviceEvent" type="m:EndDeviceEvent" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="EndDeviceEventType" type="m:EndDeviceEventType"
minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="Meter" type="m:Meter" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceCategory" type="m:ServiceCategory" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="TimeSchedule" type="m:TimeSchedule" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
            <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>

```

```

</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Customer">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="commercialIndustrial"/>
    <xs:enumeration value="energyServiceScheduler"/>
    <xs:enumeration value="energyServiceSupplier"/>
    <xs:enumeration value="internalUse"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="pumpingLoad"/>
    <xs:enumeration value="residential"/>
    <xs:enumeration value="residentialAndCommercial"/>
    <xs:enumeration value="residentialAndStreetlight"/>
    <xs:enumeration value="residentialFarmService"/>
    <xs:enumeration value="residentialStreetlightOthers"/>
    <xs:enumeration value="windMachine"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="DateTimeInterval"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval">
  <xs:sequence>
    <xs:element name="end" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.end"/>
    <xs:element name="start" type="xs:dateTime" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#DateTimeInterval.start"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EndDeviceEvent"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="issuerID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEvent.issuerID"/>
    <xs:element name="issuerTrackingID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#EndDeviceEvent.issuerTrackingID"/>
    <xs:element name="reason" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.reason"/>
    <xs:element name="severity" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ActivityRecord.severity"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>

```

```

        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDeviceEventType"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceEventType">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="EndDeviceGroup"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceGroup">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Meter" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
        <xs:sequence>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
            <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
            <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="NameTypeAuthority"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
        <xs:sequence>
            <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
            <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ServiceCategory"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory">
        <xs:sequence>
            <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
            <xs:element name="kind" type="m:ServiceKind" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceCategory.kind"/>
            <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
        </xs:sequence>
    </xs:complexType>

```

```

<xs:simpleType name="ServiceKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#ServiceKind">
  <xs:restriction base="xs:string">
    <xs:enumeration value="electricity"/>
    <xs:enumeration value="gas"/>
    <xs:enumeration value="heat"/>
    <xs:enumeration value="internet"/>
    <xs:enumeration value="other"/>
    <xs:enumeration value="rates"/>
    <xs:enumeration value="refuse"/>
    <xs:enumeration value="sewerage"/>
    <xs:enumeration value="time"/>
    <xs:enumeration value="tvlicence"/>
    <xs:enumeration value="water"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ServiceLocation"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#ServiceLocation">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TimeSchedule" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#TimeSchedule">
  <xs:sequence>
    <xs:element name="scheduleInterval" type="m:DateTimeInterval"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#TimeSchedule.scheduleInterval"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePoint" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#UsagePoint">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#UsagePointGroup">
  <xs:sequence>
    <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
    <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
  </xs:sequence>
</xs:complexType>
</xs:schema>

```

H.14 GetMeterConfig

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns="http://langdale.com.au/2005/Message#"
xmlns:a="http://langdale.com.au/2005/Message#"
xmlns:m="http://iec.ch/TC57/2011/GetMeterConfig#" xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://iec.ch/TC57/2011/GetMeterConfig#" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <xs:element name="GetMeterConfig" type="m:GetMeterConfig"/>
  <xs:complexType name="GetMeterConfig">
    <xs:sequence>
      <xs:element name="Customer" type="m:Customer" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="CustomerAccount" type="m:CustomerAccount" minOccurs="0"
maxOccurs="unbounded"/>

```

```

        <xs:element name="CustomerAgreement" type="m:CustomerAgreement"
minOccurs="0" maxOccurs="unbounded"/>
        <xs:element name="EndDeviceGroup" type="m:EndDeviceGroup" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="Meter" type="m:Meter" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="ServiceLocation" type="m:ServiceLocation" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="UsagePoint" type="m:UsagePoint" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="UsagePointGroup" type="m:UsagePointGroup" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Customer" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#Customer">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="kind" type="m:CustomerKind" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Customer.kind"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAccount"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAccount">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="CustomerAgreement"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#CustomerAgreement">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="CustomerKind" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#CustomerKind">
    <xs:restriction base="xs:string">
        <xs:enumeration value="commercialIndustrial"/>
        <xs:enumeration value="energyServiceScheduler"/>
        <xs:enumeration value="energyServiceSupplier"/>
        <xs:enumeration value="internalUse"/>
        <xs:enumeration value="other"/>
        <xs:enumeration value="pumpingLoad"/>
        <xs:enumeration value="residential"/>
        <xs:enumeration value="residentialAndCommercial"/>
        <xs:enumeration value="residentialAndStreetlight"/>
        <xs:enumeration value="residentialFarmService"/>
        <xs:enumeration value="residentialStreetlightOthers"/>
        <xs:enumeration value="windMachine"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="EndDeviceGroup"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDeviceGroup">
    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Meter" sawsdl:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Meter">
    <xs:sequence>

```

```

        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="amrSystem" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#EndDevice.amrSystem"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Name" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#Name">
    <xs:sequence>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.name"/>
        <xs:element name="NameType" type="m:NameType" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#Name.NameType"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameType" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-
schema-cim15#NameType">
    <xs:sequence>
        <xs:element name="description" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.description"/>
        <xs:element name="name" type="xs:string"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameType.name"/>
        <xs:element name="NameTypeAuthority" type="m:NameTypeAuthority"
minOccurs="0" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameType.NameTypeAuthority"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="NameTypeAuthority"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority">
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sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#NameTypeAuthority.description"/>
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sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#NameTypeAuthority.name"/>
    </xs:sequence>
</xs:complexType>
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    <xs:sequence>
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sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
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schema-cim15#UsagePoint">
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sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
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maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="UsagePointGroup"
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    <xs:sequence>
        <xs:element name="mRID" type="xs:string" minOccurs="0"
sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-cim15#IdentifiedObject.mRID"/>
        <xs:element name="Names" type="m:Name" minOccurs="0"
maxOccurs="unbounded" sawSDL:modelReference="http://iec.ch/TC57/2010/CIM-schema-
cim15#IdentifiedObject.Names"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>

```