



**International  
Standard**

**ISO 21219-25**

**Intelligent transport systems —  
Traffic and travel information (TTI)  
via transport protocol experts  
group, generation 2 (TPEG2) —**

**Part 25:  
Electromobility charging  
infrastructure (TPEG2-EMI)**

*Systèmes intelligents de transport — Informations sur le trafic  
et le tourisme via le groupe expert du protocole de transport,  
génération 2 (TPEG2) —*

*Partie 25: Infrastructure pour l'alimentation en électromobilité  
(TPEG2-EMI)*

**First edition  
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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition cancels and replaces the first edition (ISO/TS 21219-25:2017), which has been technically revised.

The main changes are as follows:

- the document has been changed from a Technical Specification to an International Standard.

A list of all parts in the ISO 21219 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

### 0.1 History

TPEG technology was originally proposed by the European Broadcasting Union (EBU) Broadcast Management Committee, who established the B/TPEG project group in the autumn of 1997 with a brief to develop, as soon as possible, a new protocol for broadcasting traffic and travel-related information in the multimedia environment. TPEG technology, its applications and service features were designed to enable travel-related messages to be coded, decoded, filtered and understood by humans (visually and/or audibly in the user's language) and by agent systems. Originally, a byte-oriented data stream format, which can be carried on almost any digital bearer with an appropriate adaptation layer, was developed. Hierarchically structured TPEG messages from service providers to end-users were designed to transfer information from the service provider database to an end-user's equipment.

One year later, in December 1998, the B/TPEG group produced its first EBU specifications. Two documents were released. Part 2 (TPEG-SSF, which became ISO/TS 18234-2) described the syntax, semantics and framing structure which was used for all TPEG applications. Meanwhile, Part 4 (TPEG-RTM, which became ISO/TS 18234-4) described the first application for road traffic messages.

Subsequently, in March 1999, CEN/TC 278, in conjunction with ISO/TC 204, established a group comprising members of the former EBU B/TPEG and this working group continued development work. Further parts were developed to make the initial set of four parts, enabling the implementation of a consistent service. Part 3 (TPEG-SNI, ISO/TS 18234-3) described the service and network information application used by all service implementations to ensure appropriate referencing from one service source to another.

Part 1 (TPEG-INV, later ISO/TS 18234-1) completed the series by describing the other parts and their relationship; it also contained the application IDs used within the other parts. Additionally, Part 5, the public transport information application (TPEG-PTI, later ISO/TS 18234-5), was developed. The so-called TPEG-LOC location referencing method, which enabled both map-based TPEG-decoders and non-map-based ones to deliver either map-based location referencing or human readable text information, was issued as ISO/TS 18234-6 to be used in association with the other applications of parts of the ISO 18234 series to provide location referencing.

The ISO 18234 series has become known as TPEG Generation 1.

### 0.2 TPEG Generation 2

When the Traveller Information Services Association (TISA), derived from former forums, was inaugurated in December 2007, TPEG development was taken over by TISA and continued in the TPEG applications working group.

It was about this time that the (then) new Unified Modelling Language (UML) was seen as having major advantages for the development of new TPEG applications in communities who would not necessarily have binary physical format skills required to extend the original TPEG TS work. It was also realized that the XML format for TPEG described within the ISO 24530 series (now superseded) had a greater significance than previously foreseen, especially in the content-generation segment, and that keeping two physical formats in synchronism, in different standards series, would be rather difficult.

As a result, TISA set about the development of a new TPEG structure that would be UML-based. This has subsequently become known as TPEG Generation 2.

TPEG2 is embodied in the ISO 21219 series and it comprises many parts that cover introduction, rules, toolkit and application components. TPEG2 is built around UML modelling and has a core of rules that contain the modelling strategy covered in ISO 21219-2, ISO 21219-3 and ISO 21219-4 and the conversion to two current physical formats: binary (see [Annex A](#)) and XML (see [Annex B](#)); others could be added in the future. TISA uses an automated tool to convert from the agreed UML model XMI file directly into an MS Word document file, to minimize drafting errors; this file forms the annex for each physical format.

TPEG2 has a three-container conceptual structure: message management (ISO 21219-6), application (several parts) and location referencing (ISO/TS 21219-7). This structure has flexible capability and can

accommodate many differing use cases that have been proposed within the TTI sector and wider for hierarchical message content.

TPEG2 also has many location referencing options as required by the service provider community, any of which may be delivered by vectoring data included in the location referencing container.

The following classification provides a helpful grouping of the different TPEG2 parts according to their intended purpose. Note that the list below is potentially incomplete, as there is the possibility that new TPEG2 parts will be introduced after the publication of this document.

- Toolkit parts: TPEG2-INV (ISO 21219-1), TPEG2-UML (ISO 21219-2), TPEG2-UBCR (ISO 21219-3), TPEG2-UXCR (ISO 21219-4), TPEG2-SFW (ISO 21219-5), TPEG2-MMC (ISO 21219-6), TPEG2-LRC (ISO/TS 21219-7).
- Special applications: TPEG2-SNI (ISO 21219-9), TPEG2-CAI (ISO 21219-10), TPEG2-LTE (ISO/TS 21219-24).
- Location referencing: TPEG2-OLR (ISO/TS 21219-22), TPEG2-GLR (ISO/TS 21219-21), TPEG2-TLR (ISO 17572-2), TPEG2-DLR (ISO 17572-3).
- Applications: TPEG2-PKI (ISO 21219-14), TPEG2-TEC (ISO 21219-15), TPEG2-FPI (ISO 21219-16), TPEG2-SPI (ISO 21219-17), TPEG2-TFP (ISO 21219-18), TPEG2-WEA (ISO 21219-19), TPEG2-RMR (ISO/TS 21219-23), TPEG2-EMI (ISO 21219-25 – this document), TPEG2-VLI (ISO/TS 21219-26).

TPEG2 has been developed to be broadly (but not totally) backward compatible with TPEG1 to assist in transitions from earlier implementations, while not hindering the TPEG2 innovative approach and being able to support many new features, such as dealing with applications with both long-term, unchanging content and highly dynamic content, such as parking information.

This document is based on the TISA specification technical/editorial version reference:

SP22004\_2.0\_001

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# Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) —

## Part 25:

## Electromobility charging infrastructure (TPEG2-EMI)

### 1 Scope

This document specifies the "electromobility information" (EMI) TPEG application. The EMI application has been specifically designed to support information about charging infrastructure for electric vehicles (not just cars), the location of e-charging points and their suitability for the respective vehicle (e.g. connector type, charging modality). As electric vehicles will occupy a "charging space" for longer a time than other vehicles, information on availability/waiting time and reservation options are accounted for, as they are highly relevant for enabling a user of an electric vehicle to optimally plan their route/trip.

The standardized delivery, via TPEG technology, of electromobility information has the following benefits to an end user of this TPEG service:

- a) identification of suitable charging units for vehicles, thus preventing unnecessary travel to find a fitting unit (also has environmental benefits);
- b) verification of the real-time availability of charging units;
- c) possibility of planning ahead and reserving a spot in a charging park, thus optimizing trip planning;
- d) possibility of selecting a financially attractive charging point in a charging park where the operator has billing agreements with the user's electromobility provider.

In addition to these end-user benefits, electromobility providers and charging park operators also benefit from a standardized TPEG format as it facilitates harmonization of the electromobility information with the data formats used for the exchange of information between management systems of electromobility providers and charge park operators and related specifications (e.g. Open Charge Alliance,<sup>[1]</sup> eMobility ICT Interoperability Innovation (eMI<sup>3</sup>),<sup>[2]</sup> etc.).

The EMI application, as an add-on service component next to traffic information, for example, is laid out to support large numbers of charge parks with only modest bandwidth requirements.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21219-1, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 1: Introduction, numbering and versions (TPEG2-INV)*

ISO 21219-9, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 9: Service and network information (TPEG2-SNI)*

ISO 21219-14, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 14: Parking information (TPEG2-PKI)*

ISO 21219-15, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 15: Traffic event compact (TPEG2-TEC)*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1

##### **electric vehicle**

##### **EV**

vehicle that is (partly) electrically powered and operated

Note 1 to entry: With respect to the TPEG requirements, electric vehicles such as e-bikes are considered in addition to electric cars.

Note 2 to entry: Electric vehicle (EV) batteries can typically be charged at any regular power socket. If fast charging is required (e.g. during longer journeys), higher demands on the technical infrastructure are made. Specific sockets and high-power connector cables have been developed to allow a simple and secure usage of boost charging stations. It is necessary for the end user to know which options are supported by a charging station. EVs can have an “identity” for electronic readout, e.g. by means of a certificate. Other information which can be communicated by an EV to the infrastructure can also be relevant for the execution and planning of charging orders. The current battery charge condition, the power requirements during the charging procedure and the cruising range are parameters that can be relevant for the planning of charging orders. The vehicle and charging station can communicate via the connector cable, but other mechanisms are also possible, e.g. using the back-end system of the EV-manufacturer to which an EV is connected (via mobile data connection).

Note 3 to entry: Electromobility information (EMI) also covers the requirements for hybrid (partly electrically powered) vehicles.

#### 3.2

##### **charging park**

grouping of multiple physical charging stations which technically and/or logically belong together and are being operated together

Note 1 to entry: A commercially operated car park or in a city district where publicly operated charging stations are grouped together.

Note 2 to entry: Charging parks are being operated by charging park operators.

#### 3.3

##### **charging station**

physical unit (typically a column or cabinet-like structure) containing and managing one or more charging points offering the end user the possibility to authorize (typically by means of a card reader) and activate one of the charging points at the charging station, hook up the vehicle, and start the charging procedure

#### 3.4

##### **charging point**

unit in a charging station at which an electric vehicle can be supplied with power

Note 1 to entry: A charging station may provide multiple charging points, which again may contain multiple sockets to support more than one charging connector type. In general, as soon as one socket at a charging point is in use, the charging point is occupied. Typically, a parking space is provided for each charging point at the charging station.

**3.5**

**energy provider**

business partner supplying energy to charging parks and their operators

Note 1 to entry: This includes all relevant energy suppliers, i.e. local solar power generators as well as traditional major companies in the power industry sector.

**3.6**

**electromobility provider**

**EM provider**

business partner for end users who charge their electric vehicles

Note 1 to entry: Typically, an end user has a contract with an electromobility provider (EM provider), the details of which are connected to an (RF) ID-card [having an (internationally) unique card number] that is used for authorization and billing. The EM provider ensures that their customers can charge their vehicles in as many charging parks as possible and bills the customer according to the respective contract.

**3.7**

**charging park operator**

entity which manages one or more charging parks

Note 1 to entry: The charging park operator maintains the charging site(s) and is a business partner to the energy provider and the electromobility provider (EM provider). Typically, a charging park operator bills the end user based on “roaming agreements” with multiple EM providers.

**3.8**

**EVSE ID**

**electric vehicle supply equipment identity**

globally unique identifier which identifies a specific charging point

Note 1 to entry: If a charging station has multiple charging points, multiple EVSE IDs are used. See also DIN SPEC 91286.<sup>[16]</sup>

**3.9**

**Reference-English “word”**

word which enables information to be transmitted as a concept, thereby letting the receiver device choose the best possible representation of the given concept in the context of the other parts of the message

Note 1 to entry: This approach means that devices can present concepts in any language or even as graphical icons, for example. For further explanation, see ISO 21219-2.

Note 2 to entry: [SOURCE: ISO 21219-9:2023, 3.10]

**4 Abbreviated terms**

For the purposes of this document, the abbreviated terms in ISO 21219-1, ISO 21219-9, ISO 21219-14, ISO 21219-15, and the following shall apply.

ADC	application data container
EM provider	electromobility provider
EV	electric vehicle
EVSE ID	electric vehicle supply equipment identity
MMC	message management container
RF	radio frequency

## 5 Application specific constraints

### 5.1 Application identification

The word "application" is used in the TPEG specifications to describe specific subsets of the TPEG structure. An application defines a limited vocabulary for a certain type of messages, for example, parking information or road traffic information. Each TPEG application is assigned a unique number, called the application identity (AID). An AID is defined in ISO 21219-1 whenever a new application is developed.

The AID number is used within the TPEG2-SNI application (ISO 21219-9) to indicate how to process TPEG content. It facilitates the routing of information to the appropriate application decoder.

### 5.2 Version number signalling

Version numbering is used to track the separate versions of an application through its development and deployment. The differences between these versions could have an impact on client devices.

The version numbering principle is defined in ISO 21219-1.

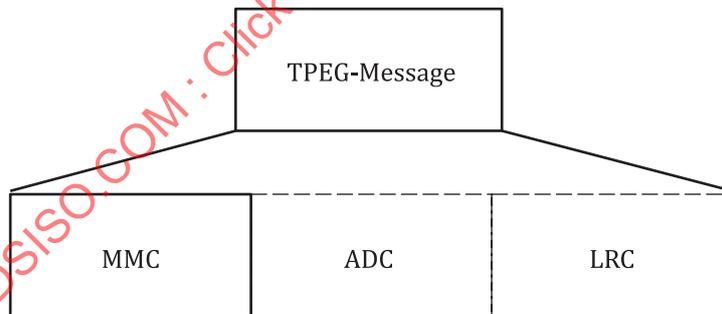
[Table 1](#) shows the current version numbers for signalling EMI within the SNI application.

**Table 1 — Current version numbers for signalling of EMI**

Major version number	2
Minor version number	0

### 5.3 Ordered components

TPEG2-EMI requires a fixed order of TPEG components. The order for the EMI message component is shown in [Figure 1](#). The first component shall be the message management container (MMC). This shall be the only component if the message is a cancellation message. Otherwise, the MMC component shall be followed by one or more application data container (ADC) component(s) which includes the application-specific information.



**Figure 1 — Composition of TPEG messages**

### 5.4 Extension

Although it is necessary to maintain a fixed component order, this does not prevent the extension of a TPEG2-EMI message generally. In case of future extensions, new components may be inserted, or existing components may be replaced by new ones without losing backward compatibility. This requires that a TEC decoder shall be able to detect and skip unknown components.

### 5.5 TPEG service component frame

TPEG2-EMI (this document) makes use of the "service component frame with dataCRC and messageCount" according to ISO 21219-5.

## 6 EMI structure

### 6.1 Introduction

This clause specifies the main structure of EMI and its capabilities.

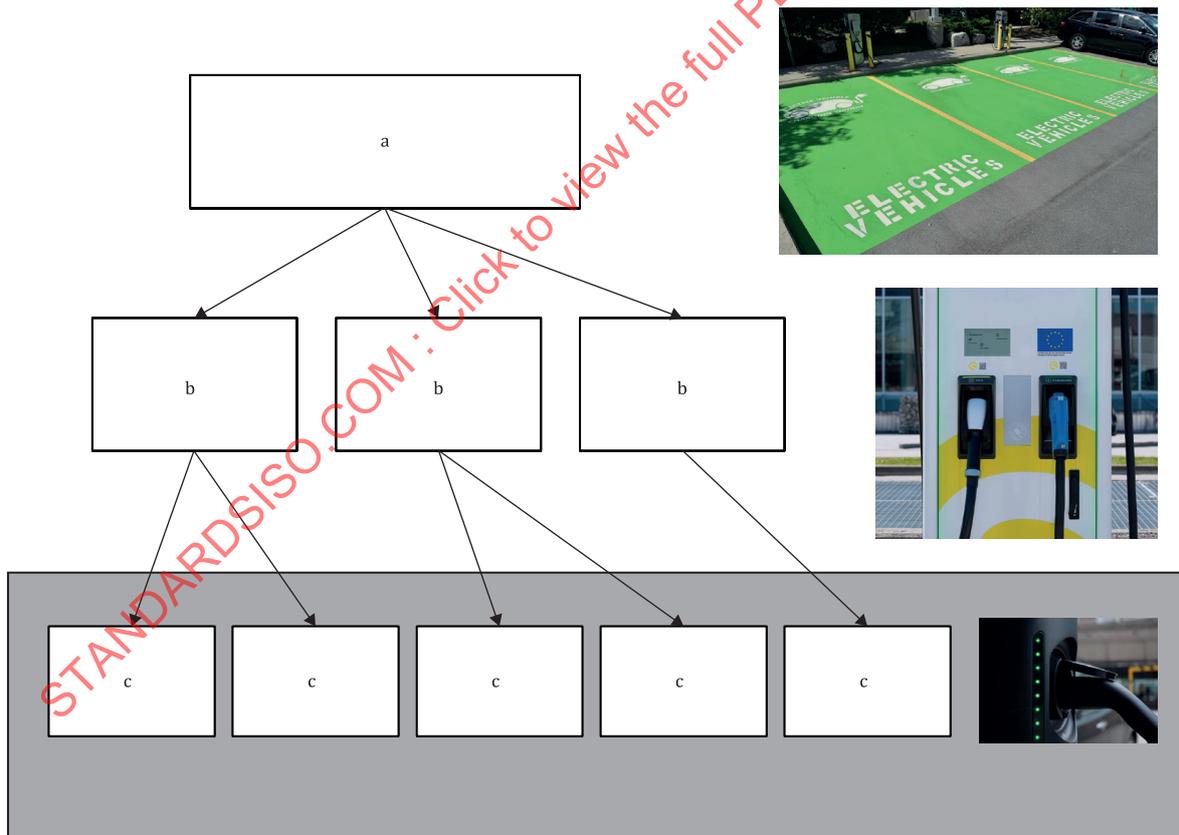
The EMI design is based on a distinction between information with a generally static reference-style nature with an expected low refresh rate and information of a more dynamic nature status with a high expected refresh rate. The binary format and XML format of the TPEG2-EMI application for use in transmission shall be in accordance with [Annexes A](#) and [B](#), respectively.

### 6.2 EMI structuring considerations

#### 6.2.1 Information aggregation level: charging parks, charging stations, charging points

EMI (see structure in [Figure 2](#)) is required to provide an end user with enough information to find a suitable and available charging point at which to charge their electric vehicle. The number of charging points within a TPEG service can become too high to transmit all descriptive data as part of the general service. Therefore, in EMI, information is aggregated either at charging park or charging station level. This approach supports efficient use of the transmission channel.

From an end user point of view, it is generally sufficient to obtain information at the level of a charging station: the physical location of a charging station is sufficient information to satisfy the user need. The user does not need to know which physical charging point at a charging station would be available, for example.



#### Key

- a Charging park.
- b Charging station.
- c Charging point.

Figure 2 — EMI structure

Detailed information on a specific charging point can become relevant to an end user wanting to make a reservation at a specific charging station. Therefore, in addition to the information provisioning on charging parks and charging stations, EMI supports a request and response session, to allow a reservation for a specific charging point at a given charging station or in a charging park (see 6.2.3).

6.2.2 Static vs. dynamic information: charging park information, charging park availability

An EMI service provider needs to be able to provide a TPEG client with a large amount of data at a relatively low transmission data rate. The typical TPEG concept, in which a single TPEG message equates with a single content item, cannot be applied for EMI, as it would take too much time to provide clients without any pre-existing information (e.g. transit users) with useable data. Some form of transmission at high repetition rates for minimum content, augmented with low repetition rate for additional detailed content is therefore required.

Moreover, EMI contains both information that is generally static (typically descriptive information on charging parks, see Figure 3) and information that is potentially updated frequently (such as the availability information, see Figure 4). EMI also needs to consider this information quality to support different repetition rates.

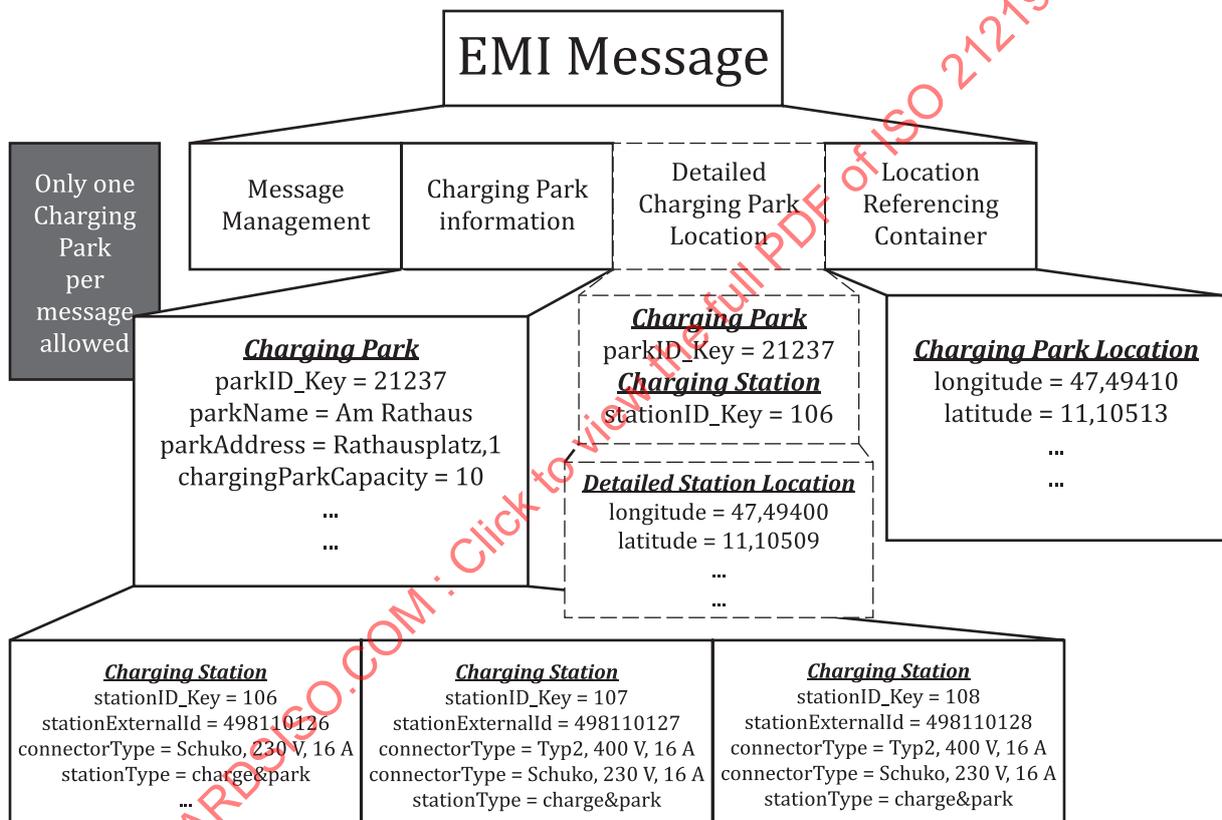


Figure 3 — Static information (example)

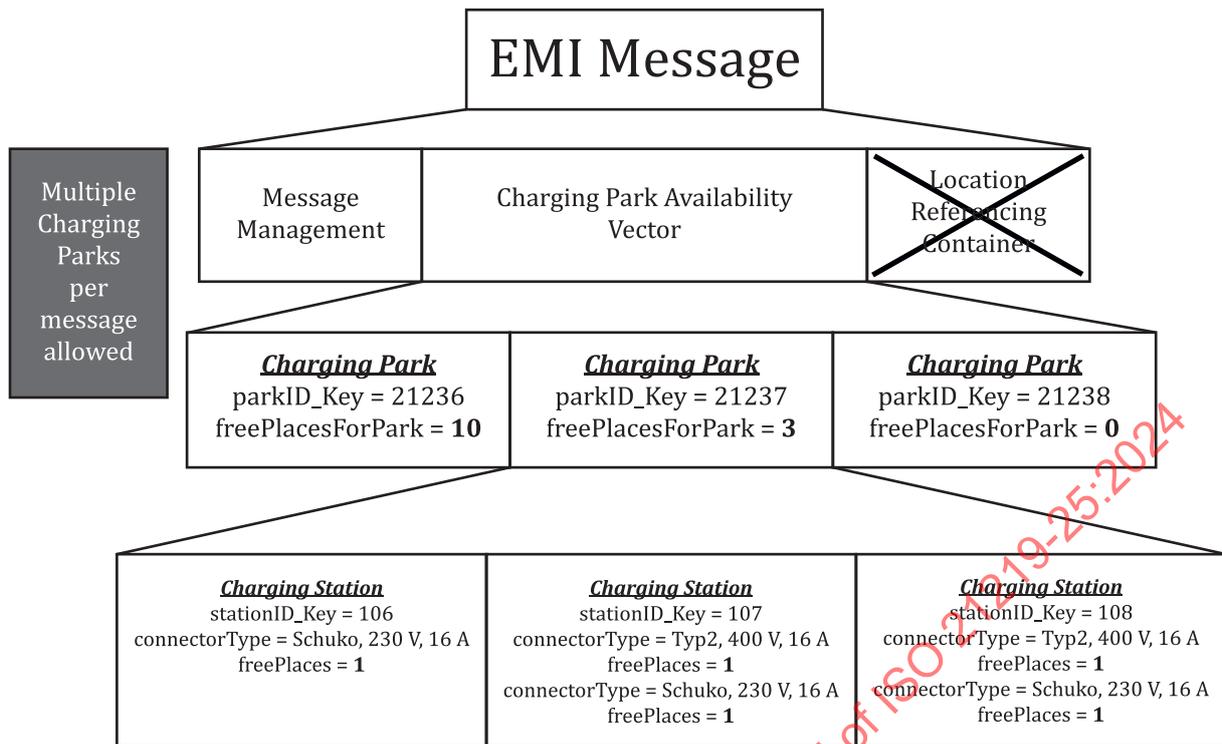


Figure 4 — Dynamic information (example)

EMI has been designed to allow service providers to arrange their transmissions flexibly, depending on the volume of data to be transmitted and the available data rate. A TPEG message may contain partial or complete content for a charging park or charging station. A service provider may choose to aggregate descriptive information at the level of a charging park in case only a limited data rate is available. This typically static information shall be combined with location information.

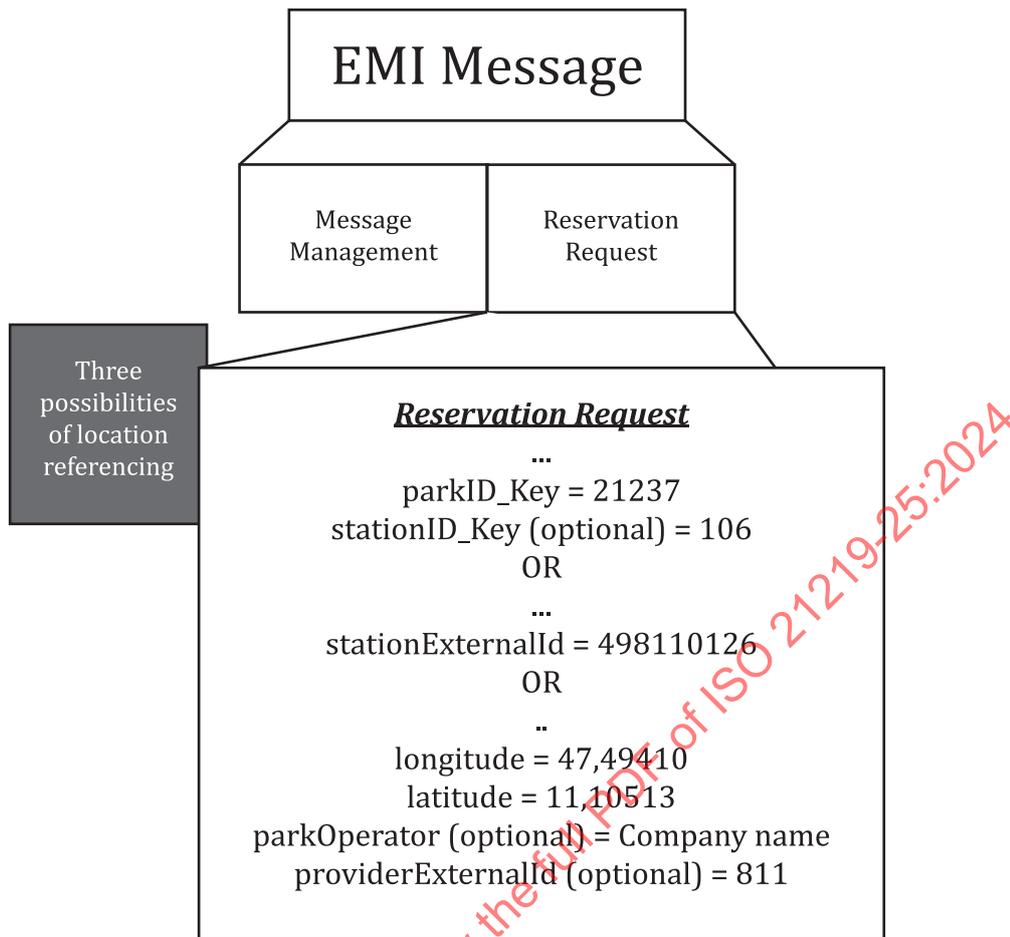
The availability information for charging parks or charging stations (typically highly dynamic information) is contained in separate data structures, which have been kept limited and compact to enable transmission with a higher refresh rate than the descriptive information. TPEG messages containing availability information shall not contain location information. Based on respective ID keys, the TPEG client can recombine the availability information with the other information for charging parks and charging stations.

### 6.2.3 Request and response

EMI supports a request and response session, to request the reservation of a charging point that matches the end user's requirements and the vehicle's attributes and to convey the required parameters to a reservation service (typically offered by an EM provider).

A sample EMI request message is shown in Figure 5. In the EMI request, either the charging station needs to be referenced directly or, alternatively, a location needs to be referenced where an available charging station can be found nearby. One of three options for this location referencing shall be included in the request message:

- internal TPEG reference (parkID\_Key and optionally stationID\_Key); or
- external reference (stationExternalID, e.g. EVSE ID); or
- coordinates of a point (longitude, latitude) and optionally parkOperator and/or providerExternalID.



**Figure 5 — Reservation request (example)**

A sample EMI response message is shown in [Figure 6](#). Use of the reservationConfirmed attribute indicates whether or not the reservation request is confirmed. In the case where the request is not confirmed, the reservationFreeText can be used to give additional information. In the case where the request is confirmed it is recommended to use venueExternalID (to address either a charging station or a charging point) and reservationID to unambiguously identify the reservation.

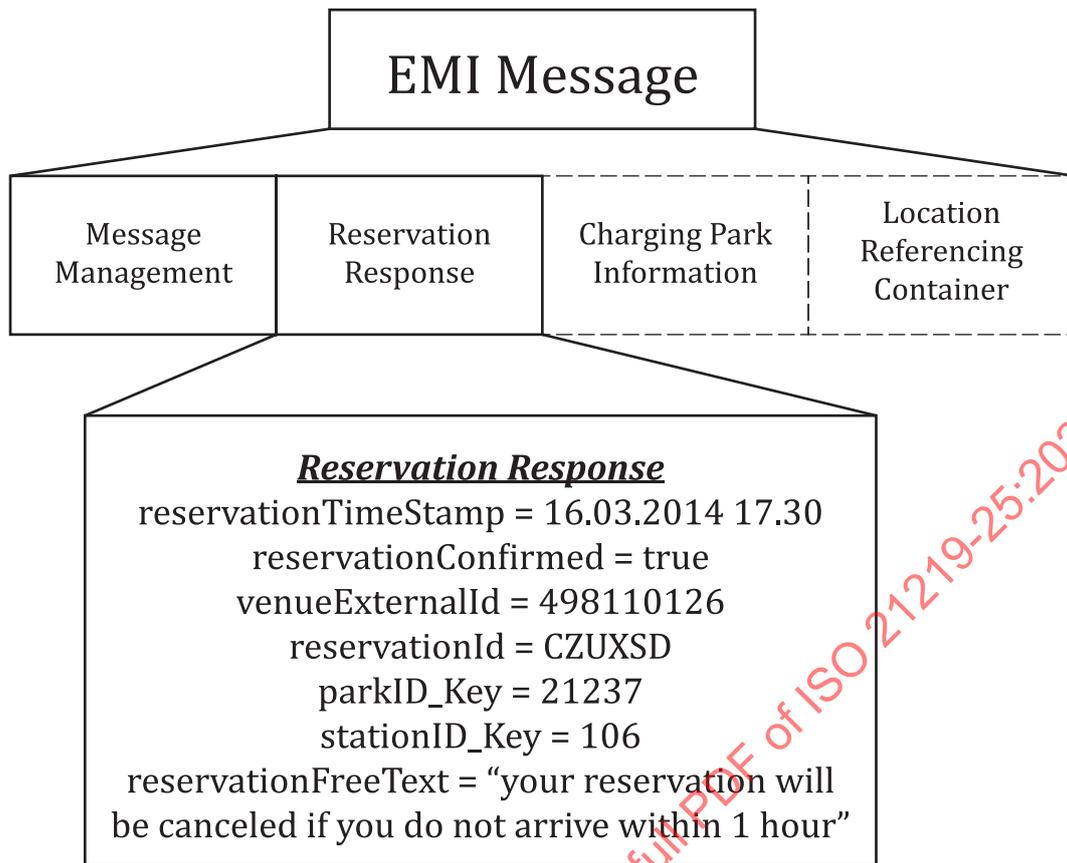


Figure 6 — Reservation response (example)

### 6.3 Pricing information

The pricing and billing models in the current electromobility market place are very different from fuel pricing/billing and currently also differ very much from one to the other. This is mainly caused by the multiple business actors in the domain, and is related to charging procedures, their relationships and business models.

The end user typically has a business relationship with an EM provider, by means of a contract, based on which the end user is billed. This contract is somewhat comparable to a mobile phone contract and can take many different forms, e.g. prepaid (possibly differentiating rates based on vehicle type or amount of power used, etc.), flat rate or other.

The charging park operator or infrastructure provider in such cases typically requires an end user to identify/authorize themselves by means of the customer card issued by their EM provider. The charging park operator does not bill the end user, but rather gets paid by the EM provider based on "roaming agreements" (such "roaming" allows end users to make use of the charging infrastructure regardless of the actual provider on-site). The infrastructure and power provider have business relationships with the EM provider (typically more than one), in which wholesale prices (rather than end user prices) are set. The wholesale agreements on pricing are transparent to the end user, but for the user, only the contract with the respective EM provider counts.

Hence, for the end user, the most important thing is to know is that with the customer card from their EM provider, they can identify and authorize themselves at a charging station, they can use that charging station, and they can be billed.

Moreover, the charging park operator is oblivious to the agreements an end user made with their EM provider and hence cannot make any reasonable assumption as to which costs will arise for an end user, as these can differ from one user to another. To make things even more complicated, at some charging parks

the charging park operator will offer charging possibilities independent of any EM provider and will bill these in other ways. For example, in such cases, the following billing models can occur (non-exhaustive list):

- billing based on usage (e.g. per hour, etc.);
- billing combined with parking fee;
- “buying costumers” can charge for free or obtain a price reduction;
- charging dependent on maximum current (“slow” vs. “fast” charging).

TPEG EMI should support all of the different billing models, which are flexible, but incompatible with one another. It is very difficult to support all of the different options in a single, fixed data structure. Moreover, doing so has a high risk that another, unforeseen billing model will be invented in the future by a provider, which cannot be covered by such a data structure.

Therefore, EMI only refers to a “Price”, to give end users an indication (e.g. of maximum or minimum price), to distinguish between normal and premium offers and to allow comparison of charging parks. Additional information (e.g. on special offers), can be given as free text.

#### 6.4 EMI message structure

The structure of the top-level EMI message is illustrated in [Figure 7](#), [Figure 8](#) and [Figure 9](#). [Annex A](#) and [Annex B](#) specify respectively the binary format and XML format of the TPEG2-EMI application for use in transmission.

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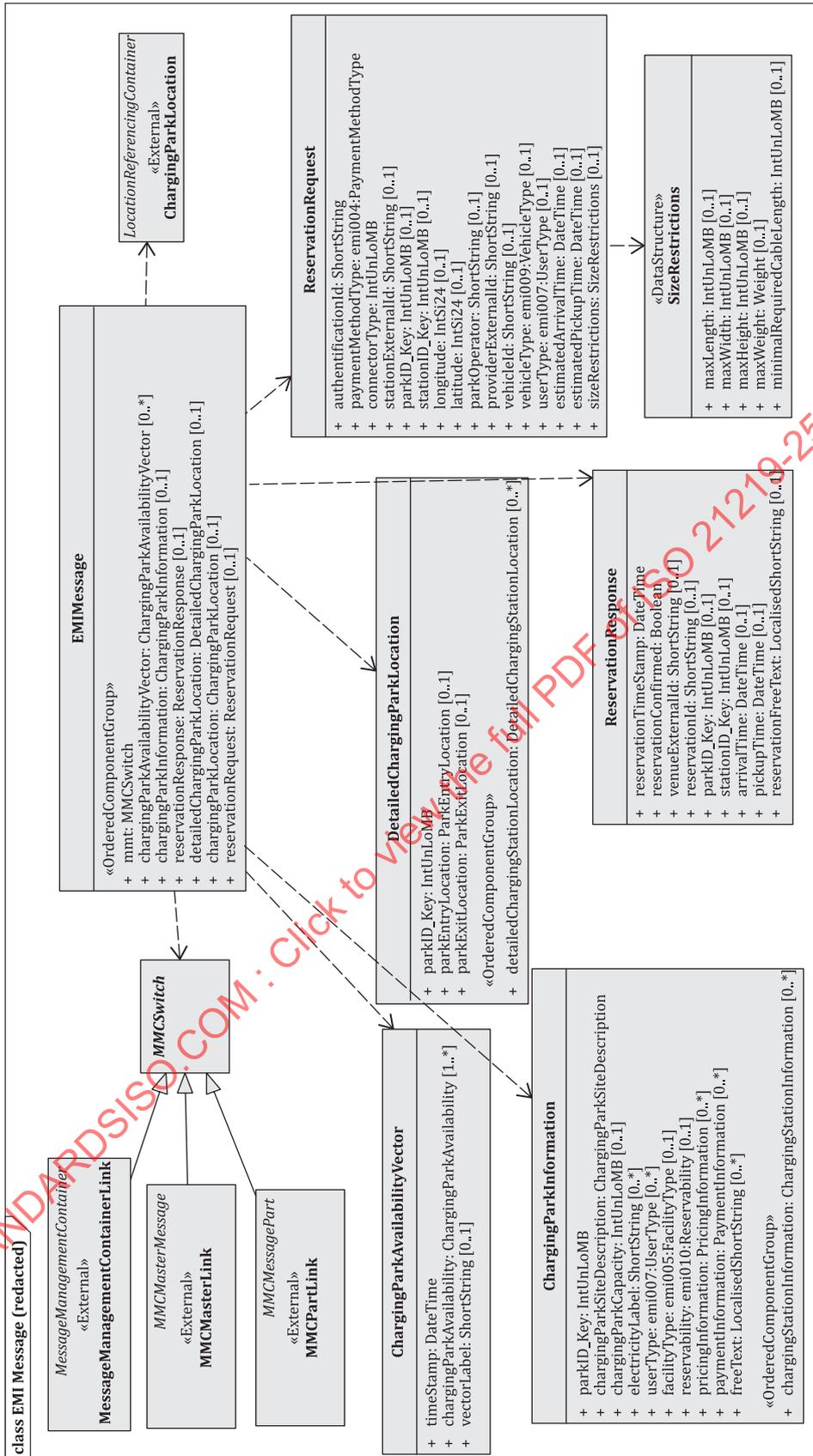


Figure 7 — Main structure of an EMI message

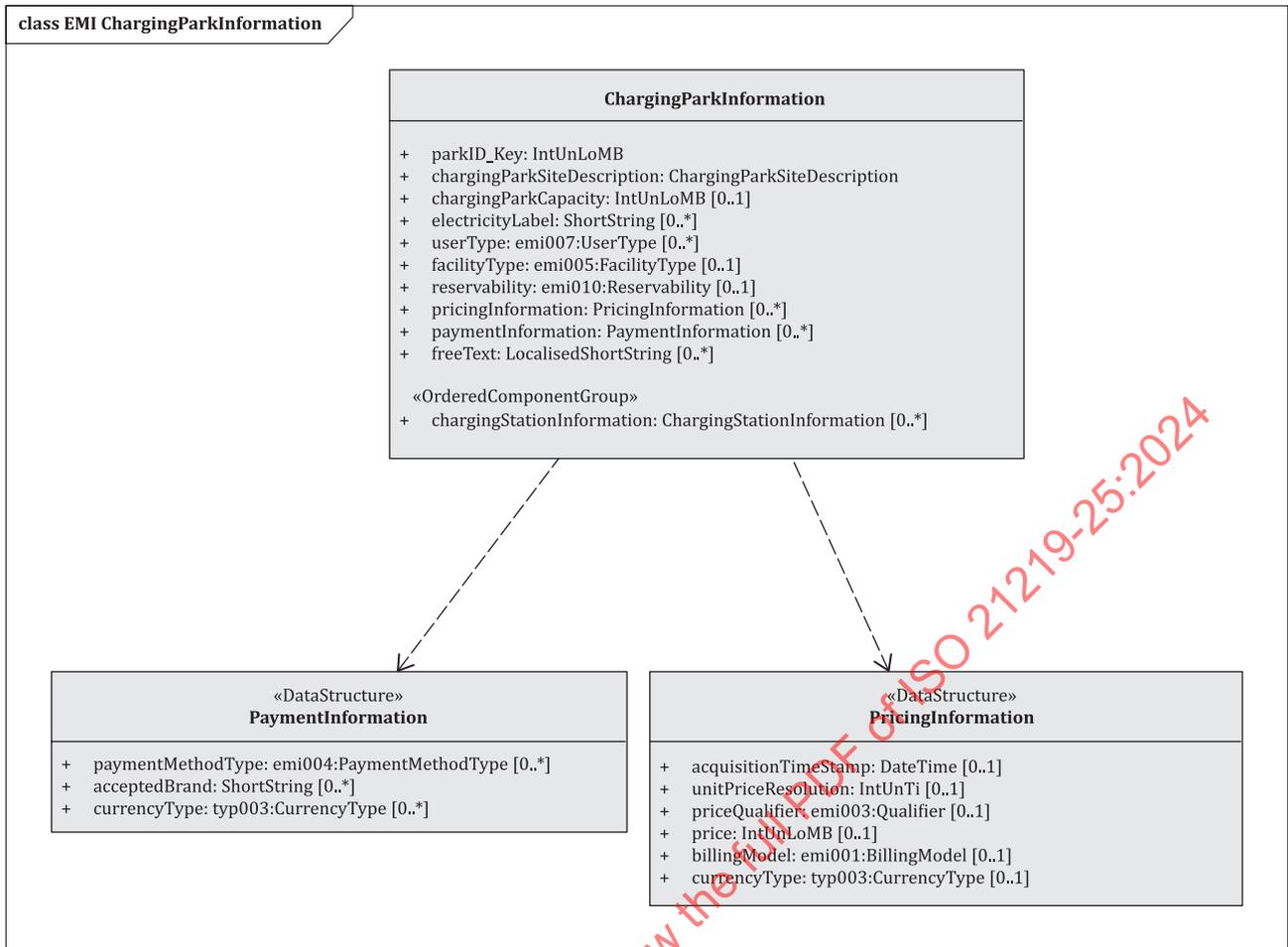


Figure 8 — Structure of ChargingParkInformation

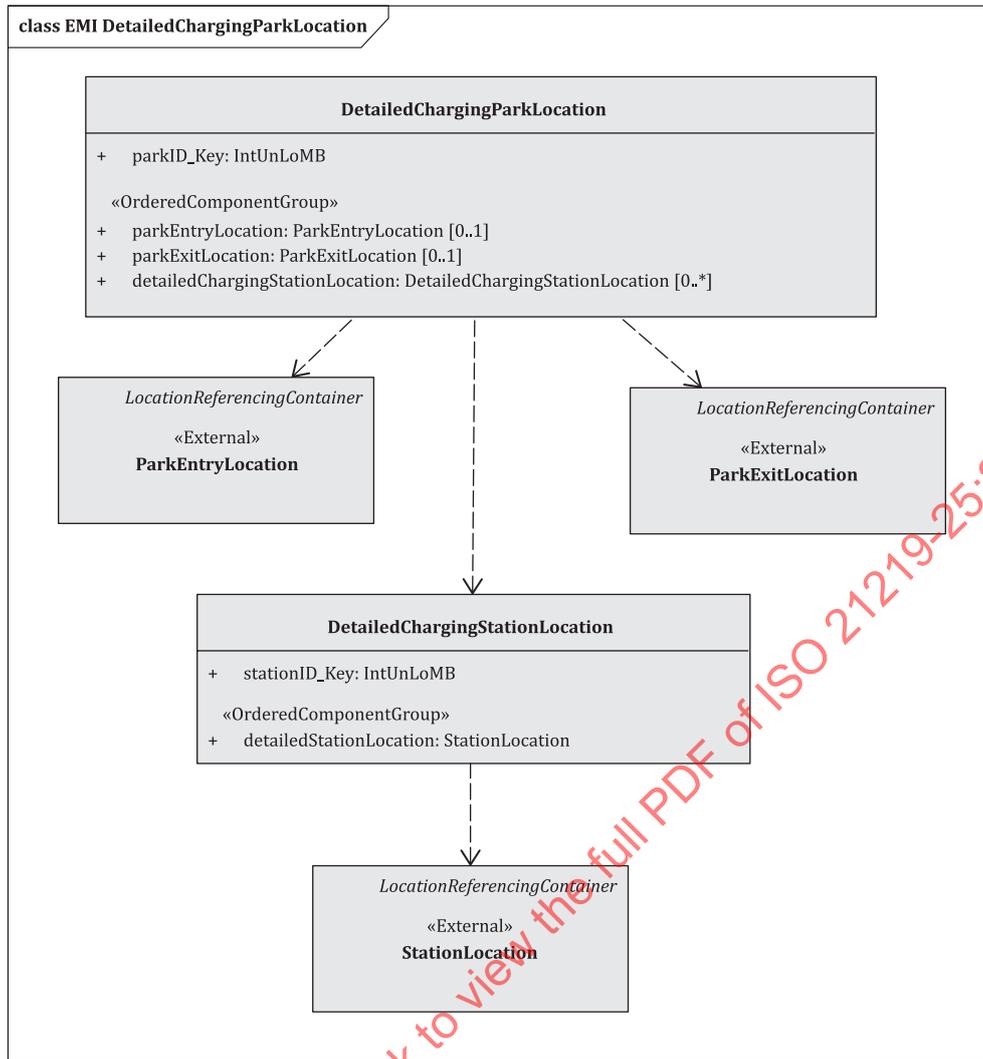


Figure 9 — Structure of DetailedChargingParkLocation

An EMI message is designed to either contain descriptive (largely static) information or availability (largely dynamic) information for a charging park and/or charging station.

The following types of information can be transmitted in an EMI message:

- information on a charging park (typically: capacity, site description, etc.); pricing/billing information can be included;
- information on charging stations belonging to the charging park (typically: available connector types, supported vehicle types, vehicle size restrictions);
- availability information for a charging park (number of free places);
- availability information for a charging station (e.g. the number of free places per connector type);
- location information on a charging park (in addition to the obligatory coordinates in the LocationReferencingContainer), optionally enhanced by location information for charging stations.

Typically, charging park information should be transmitted in an EMI message with a long expiry time as this type of information is very stable for a given service. EMI messages containing availability information can refer to this via a cross-reference by the parkID\_Key and the stationID\_Key. Thus, EMI supports the transmission of full or partial descriptive information for charging parks and charging stations, which may

be recombined in the TPEG receiver. This allows a service provider to fit the amount of information and repetition rate for EMI messages to the available data rate for their service.

The minimal information needed for a TPEG client to present useful information to its user is:

- 1) ChargingParkInformation containing the parkID\_Key and a minimal ChargingParkSiteDescription (parkName and the name of the parkOperator); ideally complemented by the:
- 2) ChargingParkAvailabilityVector containing a timestamp and minimal information on the ChargingParkAvailability (parkID\_Key and overall number of freePlacesForPark).

The attributes of the ChargingParkInformation may be used by the end user to select an appropriate charging park and/or by the TPEG client to (automatically) filter out those charging parks not matching the end user's requirements.

The data structure ChargingParkSiteDescription extends the ChargingParkInformation with more detailed descriptive information on the ChargingPark; see [Figure 10](#).

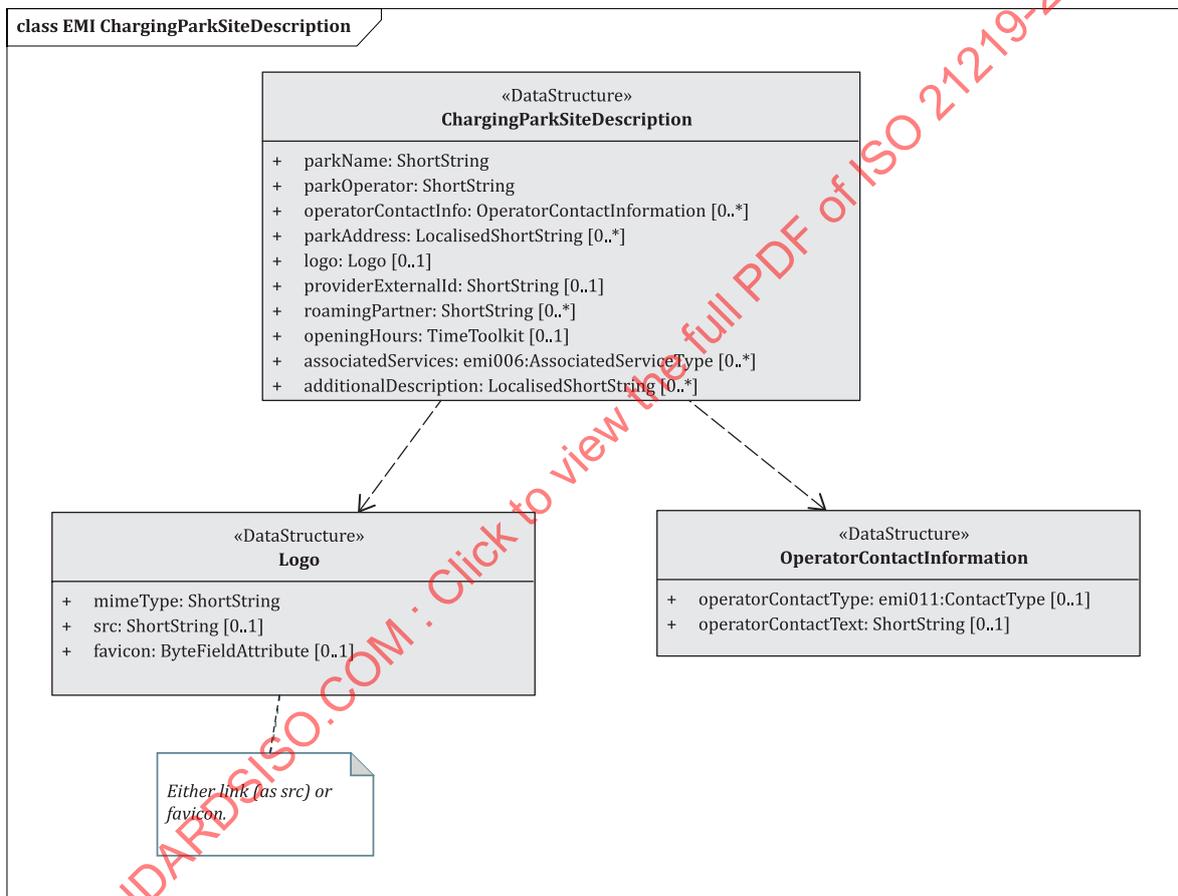


Figure 10 — Structure of EMI ChargingParkSiteDescription

[Figure 11](#) shows the structure of component ChargingStationInformation holding all information related to a single charging station.

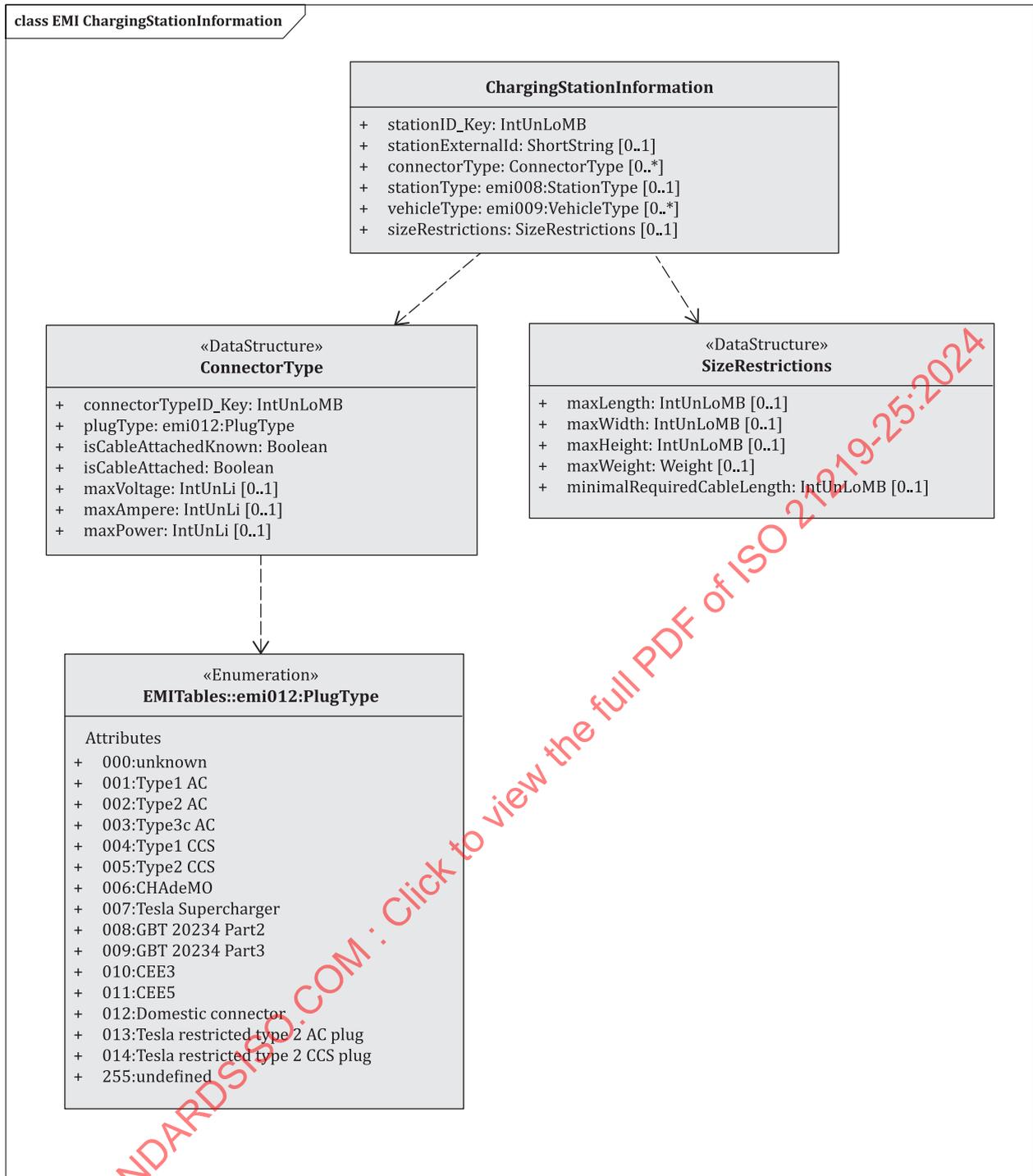


Figure 11 — Structure of EMI ChargingStationInformation

A service provider can choose to provide availability information aggregated at the level of charging parks or to provide it at the level of charging stations; see [Figure 12](#). When the service provider chooses to aggregate the availability information for each charging park, the total number of free charging places in this charging park shall be indicated.

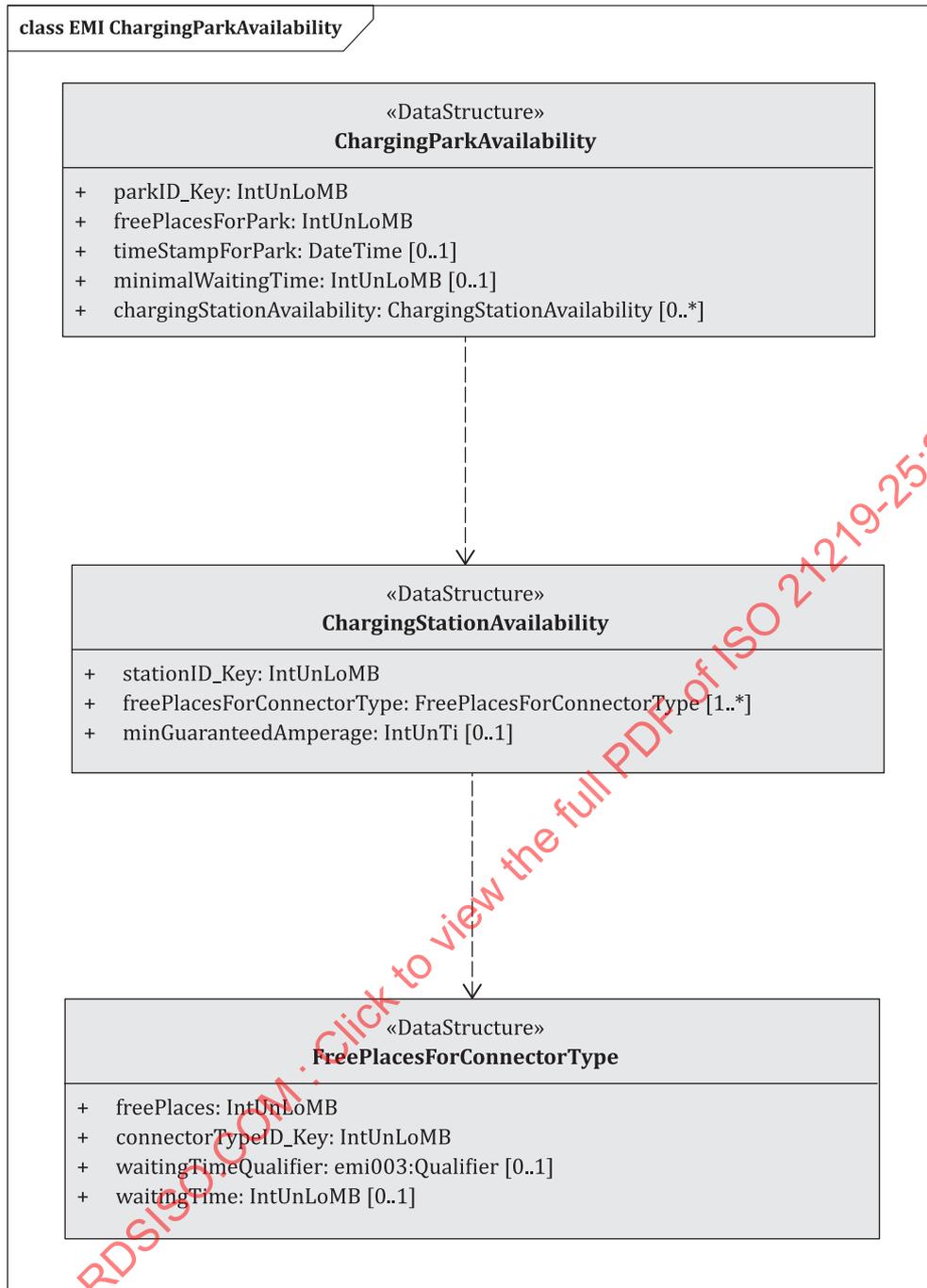


Figure 12 — Structure of EMI ChargingParkAvailability

In the case where the availability information is provided for charging stations, the service provider shall specify, for each charging station, how many charging places are available for each connector type (i.e. aggregated over the charging points at the respective charging station). The connector type is identified by its unique key.

As each charging point at a charging station can potentially contain several connectors of different types, the sum of all freePlacesForConnectorType (see Table 12) over all charging stations can be much higher than the freePlacesForPark (see Table 11). The service provider should take care to accurately calculate these figures aggregated at the different levels.

The UML class structure of the ReservationRequest message is shown in Figure 13.

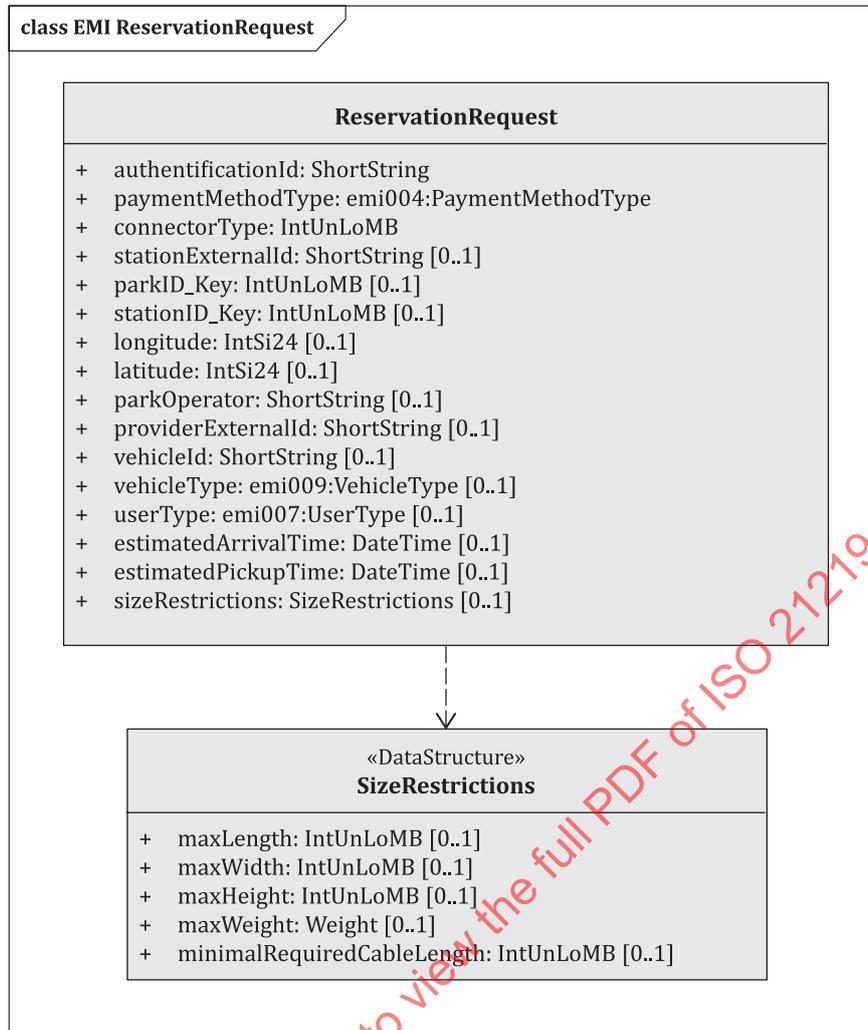


Figure 13 – Structure of ReservationRequest

## 7 EMI message components

### 7.1 EMIMessage

The overall EMI message container is defined in [Table 2](#).

Table 2 — EMIMessage

Name	Type	Multiplicity	Description
Ordered components			
mmt	MMCSwitch	1	This component is specified in the MMC specification. It contains all and only information related to message management. The sender side, especially the instance generating the transmission data shall ensure that the message management information allows unambiguous interpretation over time and in appropriate scenarios with disturbed reception specific to the transmission channel.
chargingParkAvailabilityVector	ChargingParkAvailabilityVector	0..*	This component groups information on the availability of charging stations in one or more charging parks. This may be highly dynamic information.
chargingParkInformation	ChargingParkInformation	0..1	Component to transmit static information on a charging park. This component may be sent with a low repetition rate.
reservationResponse	ReservationResponse	0..1	Component to transmit the response to a reservation request.
detailedChargingParkLocation	DetailedChargingParkLocation	0..1	Detailed geolocation referencing information for charging park entry, charging park exit or single charging stations.
chargingParkLocation	ChargingParkLocation	0..1	Geographic coverage location reference for a charging park. Not applicable for ChargingParkAvailabilityVector.
reservationRequest	ReservationRequest	0..1	Component to transmit a reservation request.

## 7.2 MMCSwitch

MMCSwitch is an abstract container to allow the usage of the different message management options.

## 7.3 MMCMasterLink

MMCMasterLink serves as a link to the message management container.

## 7.4 MMCPartLink

MMCPartLink serves as a link to the message management container.

## 7.5 MessageManagementContainerLink

MessageManagementContainerLink is a MessageManagementContainer from the TPEG-MMC toolkit in ISO 21219-6.

## 7.6 ChargingParkLocation

ChargingParkLocation is a geographic coverage location reference, Location Referencing Container from the TPEG2-LRC toolkit in ISO/TS 21219-7.

## 7.7 ChargingParkAvailabilityVector

Table 3 shows the component that groups information on the availability of charging stations within one or more charging parks. This can be highly dynamic information.

**Table 3 — ChargingParkAvailabilityVector**

Name	Type	Multiplicity	Description
timeStamp	DateTime	1	Provides timing information for the latest valid information on the availability of charging places at a charging park
chargingParkAvailability	ChargingParkAvailability	1..*	Information on the availability of charging places at a specific charging park. Optionally, the availability information can be broken down to the level of charging stations.
vectorLabel	ShortString	0..1	Description of charging parks belonging to this vector (e.g. all charging parks in a given town).

## 7.8 ChargingParkInformation

Table 4 shows the component to transmit largely static information on a charging park. This component can be sent with a low repetition rate.

**Table 4 — ChargingParkInformation**

Name	Type	Multiplicity	Description
parkID_Key	IntUnLoMB	1	EMI internal identifier for a charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
chargingParkSiteDescription	ChargingParkSiteDescription	1	Further background information on this charging park.
chargingParkCapacity	IntUnLoMB	0..1	Total number of available charging places at this charging park.
electricityLabel	ShortString	0..*	Identifier for the electricity provided at this charging park [e.g. by which (renewable) energy source the electricity is generated.]
userType	emi007:UserType	0..*	Information on types of users that are permitted to make use of this charging park (e.g. all users, customers, etc.).
facilityType	emi005:FacilityType	0..1	Type of charging park (e.g. private or public).
reservability	emi010:Reservability	0..1	Information as to whether reservation of a charging place is possible at this charging park.

Table 4 (continued)

Name	Type	Multiplicity	Description
pricingInformation	PricingInformation	0..*	Information on pricing and billing models at this charging park. EMI supports many different, flexible billing models.
paymentInformation	PaymentInformation	0..*	Payment methods supported at this charging park.
freeText	LocalisedShortString	0..*	May contain additional information, for example, regarding the billing options (such as promotional offers) at this charging park.
Ordered components			
chargingStationInformation	ChargingStationInformation	0..*	Static information on a charging station.

### 7.9 ChargingStationInformation

Table 5 shows the component to transmit static information on a charging station. This component may be sent with a low repetition rate.

Table 5 — ChargingStationInformation

Name	Type	Multiplicity	Description
stationID_Key	IntUnLoMB	1	EMI internal identifier for a charging station. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and charging station availability data and optionally the reservation response.
stationExternalId	ShortString	0..1	External identifier for the charging station, if applicable (e.g. based on the EVSE ID).
connectorType	ConnectorType	0..*	Information on the Connector Type(s) supported at this charging station.
stationType	emi008:StationType	0..1	Information on the Station Type for this charging station.
vehicleType	emi009:VehicleType	0..*	Information on the Vehicle Type(s) that are supported for using this charging station.
sizeRestrictions	SizeRestrictions	0..1	Applicable size restrictions on vehicles permitted to park and charge at this charging station.

### 7.10 DetailedChargingParkLocation

Table 6 shows the detailed geolocation referencing information for charging park entry, charging park exit or single charging stations.

**Table 6 — DetailedChargingParkLocation**

Name	Type	Multiplicity	Description
parkID_Key	IntUnLoMB	1	EMI internal identifier for a charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
Ordered components			
parkEntryLocation	ParkEntryLocation	0..1	Additional information on the location of the entry roads of the charging park.
parkExitLocation	ParkExitLocation	0..1	Additional information on the location of the exit roads of the charging park.
detailedChargingStationLocation	DetailedChargingStationLocation	0..*	Container component holding detailed location information for a list of charging stations.

### 7.11 ParkEntryLocation

ParkEntryLocation is a component to encode a charging park entrance road/ramp as a location reference container from the TPEG-LRC toolkit in ISO/TS 18234-11.

### 7.12 ParkExitLocation

ParkExitLocation is a component to encode a charging park exit road/ramp as a location reference container from the TPEG-LRC toolkit in ISO/TS 18234-11.

### 7.13 DetailedChargingStationLocation

[Table 7](#) shows the location reference information for the location of the charging station.

**Table 7 — DetailedChargingStationLocation**

Name	Type	Multiplicity	Description
stationID_Key	IntUnLoMB	1	EMI internal identifier for a charging station. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and charging station availability data and optionally the reservation response.
Ordered components			
detailedStationLocation	StationLocation	1	Location reference for the charging station.

### 7.14 StationLocation

StationLocation is a component to encode a charging station location as a location reference container from the TPEG-LRC toolkit in ISO/TS 18234-11.

7.15 ReservationRequest

Table 8 defines the component to transmit a reservation request.

Table 8 — ReservationRequest

Name	Type	Multiplicity	Description
authenticationId	ShortString	1	An ID that authenticates the user that initiates the reservation request. The authentication can be handled by means of the customer card issued by the EM provider, for example.
paymentMethodType	emi004:PaymentMethodType	1	Payment method(s) that the requesting user can support. These should be matched against the payment methods supported by the charging park. This information is used to ensure the billing of the reservation.
connectorType	IntUnLoMB	1	Information on the connector type(s) supported by the electric vehicle for which the reservation request is carried out. Reference to the connectorTypeID_Key.
stationExternalId	ShortString	0..1	External identifier for the charging station, if known (e.g. based on the EVSE ID), for which a reservation is requested. No further geographical identification information is needed for the request.
parkID_Key	IntUnLoMB	0..1	EMI internal identifier for a charging park for which a reservation is requested. Typically, the reservation request will also use the stationID_Key to identify the charging station within the charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
stationID_Key	IntUnLoMB	0..1	EMI internal identifier for a charging station for which a reservation is requested. When this identifier is used in a request, also the parkID_Key shall be specified. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and charging station availability data and optionally the reservation response.
longitude	IntSi24	0..1	Longitude of a location at which a reservation is requested. Shall only be used in a request in combination with latitude. Together, the longitude and latitude coordinates identify a location at or near which a charging point should be reserved.

Table 8 (continued)

Name	Type	Multiplicity	Description
latitude	IntSi24	0..1	Latitude of a location at which a reservation is requested. Shall only be used in a request in combination with longitude. Together, the longitude and latitude coordinates identify a location at or near which a charging point should be reserved.
parkOperator	ShortString	0..1	Identification of the charging park operator. May be used in combination with longitude/latitude, in the case where the reservation request is done for a charging point operated by a specific operator.
providerExternalId	ShortString	0..1	External identifier for the electromobility provider, if applicable (e.g. based on the EVSE ID).
vehicleId	ShortString	0..1	Identifier for the vehicle, if applicable (e.g. based on the car number plate).
vehicleType	emi009:VehicleType	0..1	Information on the vehicle type for which the reservation request is performed.
userType	emi007:UserType	0..1	Information on type(s) of user that is carrying out the reservation request.
estimatedArrivalTime	DateTime	0..1	Estimated time of arrival at the location at which a reservation is requested.
estimatedPickupTime	DateTime	0..1	Estimated time at which the vehicle will be retrieved from the location at which a reservation is requested.
sizeRestrictions	SizeRestrictions	0..1	Dimensions of the vehicle for which a reservation is requested.

## 7.16 ReservationResponse

[Table 9](#) shows the component to transmit the response to a reservation request. The component shall contain all relevant information on a charging station for which a reservation request can be confirmed.

Table 9 — ReservationResponse

Name	Type	Multiplicity	Description
reservationTimeStamp	DateTime	1	Time at which the reservation response is given.
reservationConfirmed	Boolean	1	True if reservation is confirmed, false otherwise.
venueExternalId	ShortString	0..1	External identifier for charging point or charging station (e.g. based on the EVSE ID), for which the reservation response is given. Usage of this attribute is recommended in case of a positive reservation response.
reservationId	ShortString	0..1	Unique identifier for the reservation response. Usage of this attribute is recommended in the case of a positive reservation response.
parkID_Key	IntUnLoMB	0..1	EMI internal identifier for the charging park for which the reservation is confirmed. Typically, the reservation response will also use the stationID_Key to identify the charging station within the charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
stationID_Key	IntUnLoMB	0..1	EMI internal identifier for the charging station for which the reservation is confirmed. When this identifier is used, also the parkID_Key shall be specified. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and ChargingStationAvailability data and optionally the reservation response.
arrivalTime	DateTime	0..1	Earliest time at which the charging point, for which the reservation is confirmed, will be available.
pickupTime	DateTime	0..1	Latest time at which the vehicle shall be removed from the charging point for which the reservation is confirmed.
reservationFreeText	LocalisedShortString	0..1	Any additional information regarding the reservation, which is confirmed, e.g. on cancellation upon non-arrival, billing of the time the charging point is kept available but not currently occupied, etc.

## 8 EMI Datatypes

### 8.1 ConnectorType

[Table 10](#) defines the ConnectorType datatype.

Table 10 — ConnectorType

Name	Type	Multiplicity	Description
connectorTypeID_Key	IntUnLoMB	1	EMI internal identifier for a connector type. Within a charging station (identified by the combination of parkID_Key and stationID_Key) the connectorTypeID_Key uniquely identifies a connector type with its attributes. The identifier is also used in the ChargingStationAvailability.
plugType	emi012:PlugType	1	n.a.
isCableAttachedKnown	Boolean	1	If set to false, it is not known if a cable is attached or not. If set to true, please check the isCableAttached attribute.
isCableAttached	Boolean	1	This attribute is used if and only if isCableAttachedKnown is set to true. Information on a cable attached to the connector. If set to true, then a cable is attached. If set to false, then there is no cable attached.
maxVoltage	IntUnLi	0..1	Maximum voltage for this connector type.
maxAmpere	IntUnLi	0..1	Maximum ampere for this connector type.
maxPower	IntUnLi	0..1	Maximum power for this connector type.

## 8.2 ChargingParkAvailability

[Table 11](#) shows the component to transmit information on the availability of charging places at a specific charging park. This may be highly dynamic information. Optionally, the availability information may be broken down to the level of charging stations and charging points.

Table 11 — ChargingParkAvailability

Name	Type	Multiplicity	Description
parkID_Key	IntUnLoMB	1	EMI internal identifier for a charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
freePlacesForPark	IntUnLoMB	1	Current information on the overall number of free charging places within this charging park. This may be highly dynamic information.  NOTE This number does not have to be the sum of freePlacesForConnectorType (see subcomponent ChargingStationAvailability) because a single charging station can have multiple connectors per parking spot.
timeStampForPark	DateTime	0..1	Provides timestamp giving the date, hour and minute at which the latest valid information on charging park availability was provided.
minimalWaitingTime	IntUnLoMB	0..1	Minimal estimated time in minutes an end user will have to wait if there are no available charging places in this charging park.
chargingStationAvailability	ChargingStationAvailability	0..*	For each charging station of this charging park, optionally specifies the availability information. A charging park may contain multiple charging stations.

### 8.3 ChargingStationAvailability

[Table 12](#) shows the component to transmit information on the availability of a charging station at a specific charging park.

Table 12 — ChargingStationAvailability

Name	Type	Multiplicity	Description
stationID_Key	IntUnLoMB	1	EMI internal identifier for a charging station. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and charging station availability data and optionally the reservation response.
freePlacesForConnectorType	FreePlacesForConnectorType	1..*	Current information giving the number of free charging places for each ConnectorType at this charging station. This may be highly dynamic information.
minGuaranteedAmperage	IntUnTi	0..1	The minimal amount of current in ampere which is currently guaranteed by the charging park operator. This information can be used by an end user or end user device to estimate charging time.

#### 8.4 FreePlacesForConnectorType

Table 13 shows the component to transmit dynamic information on a charging station specifying the number of available charging places per connectorType at this charging station.

Table 13 — FreePlacesForConnectorType

Name	Type	Multiplicity	Description
freePlaces	IntUnLoMB	1	Current information giving the number of free charging places for this ConnectorType.
connectorType	IntUnLoMB	1	EMI internal identifier for a connector type. Within a charging station (identified by the combination of parkID_Key and stationID_Key) the connectorTypeID_Key uniquely identifies a connector type with its attributes.
waitingTimeQualifier	emi003:Qualifier	0..1	For usage with waiting time only. Qualifies the given waitingTime.
waitingTime	IntUnLoMB	0..1	Estimated time in minutes an end user will have to wait if there are no available free charging places at this charging station. Can be quantified by means of the waitingTimeQuantifier.

#### 8.5 ChargingParkSiteDescription

Table 14 shows the component to transmit further background information on a charging park.

**Table 14 — ChargingParkSiteDescription**

Name	Type	Multiplicity	Description
parkName	ShortString	1	Name of individual charging park.
parkOperator	ShortString	1	Name of operator of charging park.
operatorContactInfo	OperatorContactInformation	0..*	Contact information for the operator of the charging park.
parkAddress	LocalisedShortString	0..*	Street address of the charging park in the relevant local language(s).
logo	Logo	0..1	Logo of the operator of the charging park.
providerExternalId	ShortString	0..1	External identifier for the electromobility provider, if applicable (e.g. based on the EVSE ID).
roamingPartner	ShortString	0..*	Information on electromobility providers which have roaming agreements with the operator of this charging park. Based on this information, an end user can verify if charging at this charging park is interesting from a financial point of view. In the case where the electromobility provider which the user has a contract with is not in the list of roamingPartner, use of this charging park might not be attractive.
openingHours	TimeToolkit	0..1	Opening hours of the charging park.
associatedServices	emi006:AssociatedServiceType	0..*	Lists available services which the charging park offers in addition to charging facility (e.g. Park and Ride, access to public transportation, etc.).
additionalDescription	LocalisedShortString	0..*	Additional descriptive information on this charging park.

## 8.6 Logo

[Table 15](#) shows the component to transmit the operator logo either as a link or as a favicon.

**Table 15 — Logo**

Name	Type	Multiplicity	Description
contentType	ShortString	1	Mime type.
src	ShortString	0..1	Link (URL) to the logo.
faviconLength	IntUnLoMB	0..1	Length of favicon, max. 1 024.
favicon	LongString	0..1	contents of favicon, <i>N</i> bytes, max 1 024 bytes.

## 8.7 OperatorContactInformation

[Table 16](#) shows the general information (e.g. phone, fax, email, website) for contacting the operator of this charging park.

**Table 16 — OperatorContactInformation**

Name	Type	Multiplicity	Description
operatorContactType	emi011:ContactType	0..1	Contact type.
operatorContactText	ShortString	0..1	Text containing phone number, for example.

## 8.8 SizeRestrictions

Table 17 shows the applicable size restrictions on vehicles allowed to park and charge at this charging station.

Table 17 — SizeRestrictions

Name	Type	Multiplicity	Description
maxLength	IntUnLoMB	0..1	Maximum length of the vehicle in centimetres.
maxWidth	IntUnLoMB	0..1	Maximum width of the vehicle in centimetres.
maxHeight	IntUnLoMB	0..1	Maximum height of the vehicle in centimetres.
maxWeight	Weight	0..1	Maximum weight of the vehicle in kilograms.
minimalRequiredCableLength	IntUnLoMB	0..1	Minimal required length of charging cable in centimetres.

## 8.9 PricingInformation

Table 18 shows the information on pricing and billing models at this charging park. EMI supports many different, flexible billing models.

Table 18 — PricingInformation

Name	Type	Multiplicity	Description
acquisitionTimeStamp	DateTime	0..1	Time at which the last valid pricing information was published.
unitPriceResolution	IntUnTi	0..1	Resolution of unit price (decimal points).
priceQualifier	emi003:Qualifier	0..1	Qualification of the price information.
price	IntUnLoMB	0..1	Price per delivery unit. May be qualified by means of the qualifier.
billingModel	emi001:BillingModel	0..1	The unit for which unit prices are given.
currencyType	typ003:CurrencyType	0..1	Supported currency type(s) for payment at this charging park.

## 8.10 PaymentInformation

Table 19 defines the PaymentInformation datatype.

Table 19 — PaymentInformation

Name	Type	Multiplicity	Description
paymentMethodType	emi004:PaymentMethodType	0..*	The payment method which is accepted in this charging park.
acceptedBrand	ShortString	0..*	The payment brand which is accepted in this charging park.
currencyType	typ003:CurrencyType	0..*	The currency in which it is allowed to pay in this charging park.

## 9 EMI tables

### 9.1 emi001:BillingModel

Table 20 enumerates the types of billing models offered at this facility.

Table 20 — emi001:BillingModel

Code	Reference-English "word"	Comment	Example
000	unknown		
001	price per KWh	KilowattHour. Unit KWh.	
002	price per hour		
003	price per minute		
004	flatrate		
005	free		
006	according to contract		
255	undefined		

## 9.2 emi003:Qualifier

Table 21 enumerates a list of qualifiers.

Table 21 — emi003:Qualifier

Code	Reference-English "word"	Comment	Example
000	unknown		
001	maximum		
002	minimum		
003	approximately		
004	exactly		
255	undefined		

## 9.3 emi004:PaymentMethodType

Table 22 enumerates the applicable methods of payment accepted at this facility.

Table 22 — emi004:PaymentMethodType

Code	Reference-English "word"	Comment	Example
000	unknown		
001	cash		
002	credit card		
003	bank card		
004	bank card		
006	debit card		
007	RFID		
008	prepaid card		
009	mobile phone		
010	smartcard		
011	customer loyalty card	In the UK, also known as "agency card"; in North America as "reward card" or "club card".	
255	undefined		

#### 9.4 emi005:FacilityType

[Table 23](#) enumerates a list of facility types.

**Table 23 — emi005:FacilityType**

Code	Reference-English "word"	Comment	Example
000	unknown		
001	public (on the street)		
002	public (parking)		
003	private		
004	semi-public		
005	commercial		
255	undefined		

#### 9.5 emi006:AssociatedServiceType

[Table 24](#) enumerates a list of applicable associated services which may be offered by a charging park.

**Table 24 — emi006:AssociatedServiceType**

Code	Reference-English "word"	Comment	Example
000	unknown		
001	public toilets		
002	mini-market		
003	carwash		
004	restaurant		
005	hotel		
006	vehicle repair shop		
007	internet hotspot		
008	parking		
009	park&drive		
010	park&ride		
011	airport		
012	railway station		
013	tourist centre		
255	undefined		

#### 9.6 emi007:UserType

[Table 25](#) enumerates a list of user types.

Table 25 — emi007:UserType

Code	Reference-English "word"	Comment	Example
000	unknown		
001	all users		
002	provider customers		
003	provider and roaming customers		
004	shoppers		
005	hotel guests		
006	staff		
007	employees		
008	visitors		
009	members		
255	undefined		

### 9.7 emi008:StationType

Table 26 enumerates a list of station types.

Table 26 — emi008:StationType

Code	Reference-English "word"	Comment	Example
000	unknown		
001	splash water-proof		
002	covered		
003	charge&park		
255	undefined		

### 9.8 emi009:VehicleType

Table 27 enumerates a list of vehicle types.

Table 27 — emi009:VehicleType

Code	Reference-English "word"	Comment	Example
000	unknown		
001	car		
002	bicycle		
003	tricycle		
004	scooter		
005	bus		
006	boat		
007	paddleboat		
008	personal transporter		
009	airplane		
255	undefined		

## 9.9 emi010:Reservability

Table 28 enumerates a list of reservation types.

Table 28 — emi010:Reservability

Code	Reference-English "word"	Comment	Example
000	unknown		
001	reservation required		
002	reservation recommended		
003	not reservable		
255	undefined		

## 9.10 emi011:ContactType

Table 29 enumerates a list of contact types.

Table 29 — emi011:ContactType

Code	Reference-English "word"	Comment	Example
000	unknown		
001	telephone		
002	fax		
003	e-mail		
004	internet address		
005	priority telephone		
006	main office telephone		
255	undefined		

## 9.11 emi012:PlugType

Table 30 enumerates the possible values for type emi012:PlugType.

Table 30 — emi012:PlugType

Code	Reference-English "word"	Comment	Example
000	unknown		
001	Type1 AC		
002	Type2 AC		
003	Type3c AC		
004	Type1 CCS		
005	Type2 CCS		
006	CHAdEMO		
007	Tesla Supercharger		
008	GBT 20234 Part 2		
009	GBT 20234 Part 3		
010	CEE3		
011	CEE5		

Table 30 (continued)

Code	Reference-English "word"	Comment	Example
012	Domestic connector		
013	Tesla restricted type 2 AC plug		
014	Tesla restricted type 2 CCS plug		
255	undefined		

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## Annex A (normative)

### TPEG application, TPEG-Binary Representation

#### A.1 General

This annex specifies the binary format of the TPEG2-EMI application for use in transmission.

#### A.2 Message components

##### A.2.1 List of generic component IDs

[Table A.1](#) lists the generic component IDs.

**Table A.1 — List of generic component IDs**

Name	ID
EMIMessage	0
MessageManagementContainerLink	1
ChargingParkLocation	4
ChargingParkAvailabilityVector	5
ChargingParkInformation	6
ChargingStationInformation	7
DetailedChargingParkLocation	8
ParkEntryLocation	9
ParkExitLocation	10
DetailedChargingStationLocation	11
StationLocation	12
ReservationRequest	16
ReservationResponse	17
MMCMasterLink	18
MMCPartLink	19

##### A.2.2 EMIMessage

[Table A.2](#) shows the binary representation of the EMIMessage structure.

**Table A.2 — Binary representation of EMIMessage structure**

<EMIMessage(0)>:=	
<IntUnTi>(0),	ID of this component
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and lengthComp indicator
<IntUnLoMB>(lengthAttr),	number of bytes in attributes
ordered {	

Table A.2 (continued)

<MMCSwitch>(mmt),	this component is specified in the MMC specification. It contains all and only information related to message management. the sender side, especially the instance generating the transmission data shall ensure that the message management information allows unambiguous interpretation over time and in appropriate scenarios with disturbed reception specific to the transmission channel.
n *<ChargingParkAvailabilityVector>(chargingParkAvailabilityVector),	this component groups information on the availability of charging stations in one or more charging parks. This may be highly dynamic information.
n *<ChargingParkInformation>(chargingParkInformation)[0..1],	component to transmit static information on a charging park. This component may be sent with a low repetition rate.
n *<ReservationResponse>(reservationResponse)[0..1],	component to transmit the response to a reservation request.
n *<DetailedChargingParkLocation>(detailedChargingParkLocation)[0..1],	detailed geolocation referencing information for charging park entry, charging park exit or single charging stations.
n *<ChargingParkLocation>(chargingParkLocation)[0..1]	geographic coverage location reference for a charging park. Not applicable for chargingParkAvailabilityVector.
n *<ReservationRequest>(reservationRequest)[0..1],	component to transmit a reservation request.
};	

### A.2.3 MMCSwitch

Table A.3 shows the binary representation of the MMCSwitch structure.

Table A.3 — Binary representation of MMCSwitch structure

<MMCSwitch(x)>:=	
<IntUnTi>(x),	ID of this component.
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and lengthComp indicator.
<IntUnLoMB>(lengthAttr);	number of bytes in attributes.

### A.2.4 MMCMasterLink

Table A.4 shows the binary representation of the MMCMasterLink structure.

Table A.4 — Binary representation of MMCMasterLink structure

<MMCMasterLink(18)<MMCSwitch()>>:=	
External<MMCMasterMessage(18)>;	see MMCMasterMessage specification.

### A.2.5 MMCPartLink

[Table A.5](#) shows the binary representation of the MMCPartLink structure.

**Table A.5 — Binary representation of MMCPartLink structure**

<MMCPartLink(19)<MMCSwitch()>>:=	
External<MMCMesagePart(19)>;	see MMCMesagePart specification.

### A.2.6 MessageManagementContainerLink

[Table A.6](#) shows the binary representation of the MessageManagementContainerLink structure.

**Table A.6 — Binary representation of MessageManagementContainerLink structure**

<MessageManagementContainerLink(1)>:=	
External<MessageManagementContainer(1)>;	see MessageManagementContainer specification.

### A.2.7 ChargingParkLocation

[Table A.7](#) shows the binary representation of the ChargingParkLocation structure.

**Table A.7 — Binary representation of ChargingParkLocation structure**

<ChargingParkLocation(4)>:=	
External<LocationReferencingContainer(4)>;	see LocationReferencingContainer specification.

### A.2.8 ChargingParkAvailabilityVector

[Table A.8](#) shows the binary representation of the ChargingParkAvailabilityVector structure.

**Table A.8 — Binary representation of ChargingParkAvailabilityVector structure**

<ChargingParkAvailabilityVector(5)>:=	
<IntUnTi>(5),	ID of this component.
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and lengthComp indicator.
<IntUnLoMB>(lengthAttr),	number of bytes in attributes.
<DateTime>(timeStamp),	provides timing information for the latest valid information on the availability of charging places at a charging park.
<IntUnLoMB>(n),	
n *<ChargingParkAvailability>(chargingParkAvailability),	information on the availability of charging places at a specific charging park. Optionally, the availability information can be broken down to the level of charging stations.
BitArray(selector),	
if (bit 0 of selector is set)	
<ShortString>(vectorLabel);	description of charging parks belonging to this vector (e.g. all charging parks in a given town).

### A.2.9 ChargingParkInformation

[Table A.9](#) shows the binary representation of the ChargingParkInformation structure.

Table A.9 — Binary representation of ChargingParkInformation structure

<ChargingParkInformation(6)>:=	
<IntUnTi>(6),	ID of this component.
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and lengthComp indicator.
<IntUnLoMB>(lengthAttr),	number of bytes in attributes.
<IntUnLoMB>(parkID_Key),	EMI internal identifier for a charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
<ChargingParkSiteDescription>(chargingParkSiteDescription),	further background information on this charging park.
BitArray(selector),	
if (bit 0 of selector is set)	
<IntUnLoMB>(chargingParkCapacity),	total number of available charging places at this charging park.
if (bit 1 of selector is set)	
{	
<IntUnLoMB>(n),	
n * <ShortString>(electricityLabel),	identifier for the electricity provided at this charging park, e.g. by which (renewable) energy source the electricity is generated.
}	
if (bit 2 of selector is set)	
{	
<IntUnLoMB>(n),	
n * <emi007:UserType>(userType),	information on types of users that are permitted to make use of this charging park (e.g. all users, customers, etc).
}	
if (bit 3 of selector is set)	
<emi005:FacilityType>(facilityType),	type of charging park (e.g. private or public).
if (bit 4 of selector is set)	
<emi010:Reservability>(reservability),	information as to whether reservation of a charging place is possible at this charging park.
if (bit 5 of selector is set)	
{	
<IntUnLoMB>(n),	
n * <PricingInformation>(pricingInformation),	information on pricing and billing models at this charging park. EMI supports many different, flexible billing models.
}	
if (bit 6 of selector is set)	
{	
<IntUnLoMB>(n),	

Table A.9 (continued)

n *<PaymentInformation>(paymentInformation),	payment methods supported at this charging park.
}	
if (bit 7 of selector is set)	
{	
<IntUnLoMB>(n),	
n *<LocalisedShortString>(freeText),	may contain additional information, for example, regarding the billing options (such as promotional offers) at this charging park.
}	
ordered {	
n *<ChargingStationInformation>(chargingStationInformation)	static information on a charging station.
};	

### A.2.10 ChargingStationInformation

Table A.10 shows the binary representation of the ChargingStationInformation structure.

Table A.10 — Binary representation of ChargingStationInformation structure

<ChargingStationInformation(7)>:=	
<IntUnTi>(7),	ID of this component
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and lengthComp indicator.
<IntUnLoMB>(lengthAttr),	number of bytes in attributes.
<IntUnLoMB>(stationID_Key),	EMI internal identifier for a charging station. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and charging station availability data and optionally the reservation response.
BitArray(selector),	
if (bit 0 of selector is set)	
<ShortString>(stationExternalId),	External identifier for the charging station, if applicable (e.g. based on the EVSE ID).
if (bit 1 of selector is set)	
{	
<IntUnLoMB>(n),	
n *<ConnectorType>(connectorType),	Information on the connector type(s) supported at this charging station.
}	
if (bit 2 of selector is set)	
<emi008:StationType>(stationType),	Information on the station type for this charging station.
if (bit 3 of selector is set)	
{	
<IntUnLoMB>(n),	
n *<emi009:VehicleType>(vehicleType),	Information on the vehicle type(s) that are supported for using this charging station.

Table A.10 (continued)

}	
if (bit 4 of selector is set)	
<SizeRestrictions>(sizeRestrictions);	Applicable size restrictions on vehicles permitted to park and charge at this charging station.

### A.2.11 DetailedChargingParkLocation

Table A.11 shows the binary representation of the DetailedChargingParkLocation structure.

Table A.11 — Binary representation of DetailedChargingParkLocation structure

<DetailedChargingParkLocation(8)>:=	
<IntUnTi>(8),	ID of this component.
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and lengthComp indicator.
<IntUnLoMB>(lengthAttr),	number of bytes in attributes.
<IntUnLoMB>(parkID_Key),	EMU internal identifier for a charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
ordered {	
n *<ParkEntryLocation>(parkEntryLocation)[0..1],	additional information on the location of the entry roads of the charging park.
n *<ParkExitLocation>(parkExitLocation)[0..1],	additional information on the location of the exit roads of the charging park.
n *<DetailedChargingStationLocation>(detailedChargingStationLocation)	container component holding detailed location information for a list of charging stations.
};	

### A.2.12 ParkEntryLocation

Table A.12 shows the binary representation of the ParkEntryLocation structure.

Table A.12 — Binary representation of ParkEntryLocation structure

<ParkEntryLocation(9)>:=	
External<LocationReferencingContainer(9)>;	see LocationReferencingContainer specification.

### A.2.13 ParkExitLocation

Table A.13 shows the binary representation of the ParkExitLocation structure.

Table A.13 — Binary representation of ParkExitLocation structure

<ParkExitLocation(10)>:=	
External<LocationReferencingContainer(10)>;	see LocationReferencingContainer specification.

### A.2.14 DetailedChargingStationLocation

Table A.14 shows the binary representation of the DetailedChargingStationLocation structure.

**Table A.14 — Binary representation of DetailedChargingStationLocation structure**

<DetailedChargingStationLocation(11)>:=	
<IntUnTi>(11),	ID of this component.
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and length-Comp indicator.
<IntUnLoMB>(lengthAttr),	number of bytes in attributes.
<IntUnLoMB>(stationID_Key),	EMI internal identifier for a charging station. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and ChargingStationAvailability data and optionally the reservation response.
ordered {	
<StationLocation>(detailedStationLocation)	Location reference for the charging station.
};	

### A.2.15 StationLocation

Table A.15 shows the binary representation of the StationLocation structure.

**Table A.15 — Binary representation of StationLocation structure**

<StationLocation(12)>:=	
External<LocationReferencingContainer(12)>;	see LocationReferencingContainer specification.

### A.2.16 ReservationRequest

Table A.16 shows the binary representation of the ReservationRequest structure.

**Table A.16 — Binary representation of ReservationRequest structure**

<ReservationRequest(16)>:=	
<IntUnTi>(16),	ID of this component.
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and lengthComp indicator.
<IntUnLoMB>(lengthAttr),	number of bytes in attributes.
<ShortString>(authenticationId),	an ID that authenticates the user that initiates the reservation request. The authentication can be handled by means of the customer card issued by the EM provider, for example.
<emi004:PaymentMethodType>(paymentMethodType),	payment method(s) that the requesting user can support. These should be matched against the payment methods supported by the charging park. This information is used to ensure the billing of the reservation.
<IntUnLoMB>(connectorType),	information on the connector type(s) supported by the electric vehicle for which the reservation request is carried out. Reference to the connectorTypeID_Key.
BitArray(selector),	

Table A.16 (continued)

if (bit 0 of selector is set)	
<ShortString>(stationExternalId),	external identifier for the charging station, if known (e.g. based on the EVSE ID), for which a reservation is requested. No further geographical identification information is needed for the request.
if (bit 1 of selector is set)	
<IntUnLoMB>(parkID_Key),	EMI internal identifier for a charging park for which a reservation is requested. Typically, the reservation request will also use the stationID_Key to identify the charging station within the charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
if (bit 2 of selector is set)	
<IntUnLoMB>(stationID_Key),	EMI internal identifier for a charging station for which a reservation is requested. When this identifier is used in a request also the parkID_Key shall be specified. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and charging station availability data and optionally the reservation response.
if (bit 3 of selector is set)	
<IntSi24>(longitude),	longitude of a location at which a reservation is requested. Shall only be used in a request in combination with latitude. Together, the longitude and latitude coordinates identify a location at or near which a charging point should be reserved.
if (bit 4 of selector is set)	
<IntSi24>(latitude),	latitude of a location at which a reservation is requested. Shall only be used in a request in combination with longitude. Together, the longitude and latitude coordinates identify a location at or near which a charging point should be reserved.
if (bit 5 of selector is set)	
<ShortString>(parkOperator),	identification of the charging park operator. May be used in combination with longitude/latitude, in the case where the reservation request is done for a charging point operated by a specific operator.
if (bit 6 of selector is set)	
<ShortString>(providerExternalId),	external identifier for the electromobility provider, if applicable (e.g. based on the EVSE ID).
if (bit 7 of selector is set)	
<ShortString>(vehicleId),	identifier for the vehicle, if applicable (e.g. based on the car number plate).
if (bit 8 of selector is set)	
<emi009:VehicleType>(vehicleType),	information on the vehicle type for which the reservation request is performed.
if (bit 9 of selector is set)	

Table A.16 (continued)

<emi007:UserType>(userType),	information on type(s) of user that is carrying out the reservation request.
if (bit 10 of selector is set)	
<DateTime>(estimatedArrivalTime),	estimated time of arrival at the location at which a reservation is requested.
if (bit 11 of selector is set)	
<DateTime>(estimatedPickupTime),	estimated time at which the vehicle will be retrieved from the location at which a reservation is requested.
if (bit 12 of selector is set)	
<SizeRestrictions>(sizeRestrictions);	dimensions of the vehicle for which a reservation is requested.

### A.2.17 ReservationResponse

Table A.17 shows the binary representation of the ReservationResponse structure.

Table A.17 — Binary representation of ReservationResponse structure

<ReservationResponse(17)>:=	
<IntUni>(17),	ID of this component
<IntUnLoMB>(lengthComp),	number of bytes in component, excluding the ID and length-Comp indicator
<IntUnLoMB>(lengthAttr),	number of bytes in attributes.
<DateTime>(reservationTimeStamp),	time at which the reservation response is given.
BitArray(selector),	
if (bit 0 of selector is set)	
<Boolean>(reservationConfirmed),	true if reservation is confirmed, false otherwise.
if (bit 1 of selector is set)	
<ShortString>(venueExternalId),	external identifier for charging point or charging station (e.g. based on the EVSE ID), for which the reservation response is given. Usage of this attribute is recommended in case of a positive reservation response.
if (bit 2 of selector is set)	
<ShortString>(reservationId),	unique identifier for the reservation response. Usage of this attribute is recommended in the case of a positive reservation response.
if (bit 3 of selector is set)	
<IntUnLoMB>(parkID_Key),	EMI internal identifier for the charging park for which the reservation is confirmed. Typically, the reservation response will also use the stationID_Key to identify the charging station within the charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
if (bit 4 of selector is set)	

Table A.17 (continued)

<IntUnLoMB>(stationID_Key),	EMI internal identifier for the charging station for which the reservation is confirmed. When this identifier is used, also the parkID_Key shall be specified. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and ChargingStationAvailability data and optionally the reservation response.
if (bit 5 of selector is set)	
<DateTime>(arrivalTime),	earliest time at which the charging point, for which the reservation is confirmed, will be available.
if (bit 6 of selector is set)	
<DateTime>(pickupTime),	latest time at which the vehicle shall be removed from the charging point for which the reservation is confirmed.
if (bit 7 of selector is set)	
<LocalisedShortString>(reservationFreeText);	any additional information regarding the reservation, which is confirmed, e.g. on cancellation upon non-arrival, billing of the time the charging point is kept available but not currently occupied, etc.

### A.3 EMI Datatypes

#### A.3.1 ConnectorType

Table A.18 shows the binary representation of the ConnectorType structure.

Table A.18 — Binary representation of ConnectorType structure

<ConnectorType>:=	
<IntUnLoMB>(connectorTypeID_Key),	EMI internal identifier for a connector type. Within a charging station (identified by the combination of parkID_Key and stationID_Key) the connectorTypeID_Key uniquely identifies a connector type with its attributes. The identifier is also used in the ChargingStationAvailability.
<emi012:PlugType>(plugType),	
BitArray(selector), if (bit 0 of selector is set)	
<Boolean>(isCableAttachedKnown),	if set to false, it is not known if a cable is attached or not. If set to true, please check the isCableAttached attribute.
if (bit 1 of selector is set)	
<Boolean>(isCableAttached),	this attribute is used if and only if isCableAttachedKnown is set to true. Information on a cable attached to the connector. If set to true, then a cable is attached. If set to false, then there is no cable attached.
if (bit 2 of selector is set)	
<IntUnLi>(maxVoltage),	maximum voltage for this connector type.
if (bit 3 of selector is set)	
<IntUnLi>(maxAmpere),	maximum ampere for this connector type.
if (bit 4 of selector is set)	
<IntUnLi>(maxPower);	maximum power for this connector type.

### A.3.2 ChargingParkAvailability

Table A.19 shows the binary representation of the ChargingParkAvailability structure.

Table A.19 — Binary representation of ChargingParkAvailability structure

<ChargingParkAvailability>:=	
<IntUnLoMB>(parkID_Key),	EMI internal identifier for a charging park. The parkID_Key shall be used by an end user device or application to combine charging park information, detailed charging park location and charging park availability data and optionally the reservation response.
<IntUnLoMB>(freePlacesForPark),	current information on the overall number of free charging places within this charging park. This may be highly dynamic information. NOTE This number does not have to be the sum of freePlacesForConnectorType (see subcomponent ChargingStationAvailability) because a single charging station can have multiple connectors per parking spot.
BitArray(selector),	
if (bit 0 of selector is set)	
<DateTime>(timeStampForPark),	provides timestamp giving the date, hour and minute at which the latest valid information on charging park availability was provided.
if (bit 1 of selector is set)	
<IntUnLoMB>(minimalWaitingTime),	minimal estimated time in minutes an end user will have to wait if there are no available charging places in this charging park.
if (bit 2 of selector is set)	
{	
<IntUnLoMB>(n),	
n *<ChargingStationAvailability>(chargingStationAvailability)	for each charging station of this charging park, optionally specifies the availability information. A charging park may contain multiple charging stations.
};	

### A.3.3 ChargingStationAvailability

Table A.20 shows the binary representation of the ChargingStationAvailability structure.

Table A.20 — Binary representation of ChargingStationAvailability structure

<ChargingStationAvailability>:=	
<IntUnLoMB>(stationID_Key),	EMI internal identifier for a charging station. Within a charging park (identified by its parkID_Key) the stationID_Key uniquely identifies a charging station. The stationID_Key shall be used by an end user device or application to combine charging station information, detailed charging station location and ChargingStationAvailability data and optionally the reservation response.
<IntUnLoMB>(n),	
n * <FreePlacesForConnectorType>(freePlacesForConnectorType),	current information giving the number of free charging places for each ConnectorType at this charging station. This may be highly dynamic information.
BitArray(selector),	
if (bit 0 of selector is set)	
<IntUnTi>(minGuaranteedAmperage);	the minimal amount of current in ampere which is currently guaranteed by the charging park operator. This information can be used by an end user or end user device to estimate charging time.

### A.3.4 FreePlacesForConnectorType

Table A.21 shows the binary representation of the FreePlacesForConnectorType structure.

Table A.21 — Binary representation of FreePlacesForConnectorType structure

<FreePlacesForConnectorType>:=	
<IntUnLoMB>(freePlaces),	current information giving the number of free charging places for this ConnectorType.
<IntUnLoMB>(connectorTypeID_Key),	EMI internal identifier for a connector type. Within a charging station (identified by the combination of parkID_Key and stationID_Key) the connectorTypeID_Key uniquely identifies a connector type with its attributes.
BitArray(selector),	
if (bit 0 of selector is set)	
<emi003:Qualifier>(waitingTimeQualifier),	for usage with waiting time only. Qualifies the given waitingTime.
if (bit 1 of selector is set)	
<IntUnLoMB>(waitingTime);	estimated time in minutes an end user will have to wait if there are no available free charging places at this charging station. Can be quantified by means of the waitingTimeQuantifier.

### A.3.5 ChargingParkSiteDescription

Table A.22 shows the binary representation of the ChargingParkSiteDescription structure.

Table A.22 — Binary representation of ChargingParkSiteDescription structure

<ChargingParkSiteDescription>:=	
<ShortString>(parkName),	name of individual charging park.
<ShortString>(parkOperator),	name of operator of charging park.
BitArray(selector),	
if (bit 0 of selector is set)	
{	
<IntUnLoMB>(n),	
n	
*<OperatorContactInformation>(operatorContactInfo),	contact information for the operator of the charging park.
}	
if (bit 1 of selector is set)	
{	
<IntUnLoMB>(n),	
n*<LocalisedShortString>(parkAddress),	street address of the charging park in the relevant local language(s).
}	
if (bit 2 of selector is set)	
<Logo>(logo),	logo of the operator of the charging park.
if (bit 3 of selector is set)	
<ShortString>(providerExternalId),	external identifier for the electromobility provider, if applicable (e.g. based on the EVSE ID).
if (bit 4 of selector is set)	
{	
<IntUnLoMB>(n),	
n*<ShortString>(roamingPartner),	Information on electromobility providers which have roaming agreements with the operator of this charging park. Based on this information, an end user can verify if charging at this charging park is interesting from a financial point of view. In the case where the electromobility provider which the user has a contract with is not in the list of roamingPartner, use of this charging park might not be attractive.
}	
if (bit 5 of selector is set)	
<TimeToolkit>(openingHours),	opening hours of the charging park.
if (bit 6 of selector is set)	
{	
<IntUnLoMB>(n),	
n	
*<emi006:AssociatedServiceType>(associatedServices),	lists available services which the charging park offers in addition to charging facility (e.g. Park and Ride, access to public transportation, etc.).
}	
if (bit 7 of selector is set)	
{	
<IntUnLoMB>(n),	
n*<LocalisedShortString>(additionalDescription)	additional descriptive information on this charging park.
};	

### A.3.6 Logo

Table A.23 shows the binary representation of the Logo structure.

Table A.23 — Binary representation of Logo structure

<Logo>:=	
<ShortString>(mimeType),	mime type.
BitArray(selector),	
if (bit 0 of selector is set)	
<ShortString>(src),	link (URL) to the logo.
if (bit 1 of selector is set)	
<ByteFieldAttribute>(favicon);	contents of favicon, <i>N</i> bytes, max 1 024 bytes.

### A.3.7 OperatorContactInformation

Table A.24 shows the binary representation of the OperatorContactInformation structure.

Table A.24 — Binary representation of OperatorContactInformation structure

<OperatorContactInformation>:=	
BitArray(selector),	
if (bit 0 of selector is set)	
<emi011:ContactType>(operatorContactType),	contact type.
if (bit 1 of selector is set)	
<ShortString>(operatorContactText);	text containing phone number, for example.

### A.3.8 SizeRestrictions

Table A.25 shows the binary representation of the SizeRestrictions structure.

Table A.25 — Binary representation of SizeRestrictions structure

<SizeRestrictions>:=	
BitArray(selector),	
if (bit 0 of selector is set)	
<IntUnLoMB>(maxLength),	maximum length of the vehicle in centimetres.
if (bit 1 of selector is set)	
<IntUnLoMB>(maxWidth),	maximum width of the vehicle in centimetres.
if (bit 2 of selector is set)	
<IntUnLoMB>(maxHeight),	maximum height of the vehicle in centimetres.
if (bit 3 of selector is set)	
<Weight>(maxWeight),	maximum weight of the vehicle in kilogrammes.
if (bit 4 of selector is set)	
<IntUnLoMB>(minimalRequiredCableLength);	minimal required length of charging cable in centimetres.

### A.3.9 PricingInformation

Table A.26 shows the binary representation of the PricingInformation structure.

Table A.26 — Binary representation of PricingInformation structure

<PricingInformation>:=	
BitArray(selector),	
if (bit 0 of selector is set)	
<DateTime>(acquisitionTimeStamp),	time at which the last valid pricing information was published.
if (bit 1 of selector is set)	
<IntUnTi>(unitPriceResolution),	resolution of unit price (decimal points).
if (bit 2 of selector is set)	
<emi003:Qualifier>(priceQualifier),	qualification of the price information.
if (bit 3 of selector is set)	
<IntUnLoMB>(price),	price per delivery unit. May be qualified by means of the qualifier.
if (bit 4 of selector is set)	
<emi001:BillingModel>(billingModel),	the unit for which unit prices are given.
if (bit 5 of selector is set)	
<typ003:CurrencyType>(currencyType);	supported currency type(s) for payment at this charging park.

### A.3.10 PaymentInformation

Table A.27 shows the binary representation of the PaymentInformation structure.

Table A.27 — Binary representation of PaymentInformation structure

<PaymentInformation>:=	
BitArray(selector),	
if (bit 0 of selector is set)	
{	
<IntUnLoMB>(n),	
n	
*<emi004:PaymentMethodType>(paymentMethodType),	the payment method which is accepted in this charging park.
}	
if (bit 1 of selector is set)	
{	
<IntUnLoMB>(n),	
n *<ShortString>(acceptedBrand),	the payment brand which is accepted in this charging park.
}	
if (bit 2 of selector is set)	
{	
<IntUnLoMB>(n),	
n *<typ003:CurrencyType>(currencyType)	the currency in which it is allowed to pay in this charging park.
};	

## Annex B (normative)

### TPEG application, tpegML representation

#### B.1 General

This annex specifies the XML format of the TPEG2-EMI application for use in transmission.

#### B.2 Message component

##### B.2.1 MMCSwitch

```
<xs:complexType name="MMCSwitch">
  <xs:sequence>
    <xs:choice minOccurs="1" maxOccurs="1">
      <xs:element name="optionMMCMasterLink" type="mmc:MMCMasterMessage" minOccurs="1" maxOccurs="1" />
      <xs:element name="optionMMCPartLink" type="mmc:MMCMMessagePart" minOccurs="1" maxOccurs="1"/>
      <xs:element name="optionMessageManagementContainerLink" type="mmc:MessageManagementContainer" minOccurs="1" maxOccurs="1"/>
    </xs:choice>
  </xs:sequence>
</xs:complexType>
```

##### B.2.2 EMIMessage

```
<xs:element name="EMIMessage" type="EMIMessage"/>
<xs:complexType name="EMIMessage">
  <xs:complexContent>
    <xs:extension base="tsf:ApplicationRootMessageML">
      <xs:sequence>
        <xs:element name="mmt" type="MMCSwitch"/>
        <xs:element name="chargingParkAvailabilityVector" type="ChargingParkAvailabilityVector" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element name="chargingParkInformation" type="ChargingParkInformation" minOccurs="0"/>
        <xs:element name="reservationResponse" type="ReservationResponse" minOccurs="0"/>
        <xs:element name="detailedChargingParkLocation" type="DetailedChargingParkLocation" minOccurs="0"/>
        <xs:element name="chargingParkLocation" type="lrc:LocationReferencingContainer" minOccurs="0"/>
        <xs:element name="reservationRequest" type="ReservationRequest" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

### B.2.3 ChargingParkAvailabilityVector

```
<xs:complexType name="ChargingParkAvailabilityVector">
<xs:sequence>
<xs:element name="timeStamp" type="tdt:DateTime"/>
<xs:element name="chargingParkAvailability" type="ChargingParkAvailability" maxOccurs="unbound
ed"/>
<xs:element name="vectorLabel" type="tdt:ShortString" minOccurs="0"/>
</xs:sequence>
</xs:complexType>
```

### B.2.4 ChargingParkInformation

```
<xs:complexType name="ChargingParkInformation">
<xs:sequence>
<xs:element name="parkID_Key" type="tdt:IntUnLoMB"/>
<xs:element name="chargingParkSiteDescription" type="ChargingParkSiteDescription"/>
<xs:element name="chargingParkCapacity" type="tdt:IntUnLoMB" minOccurs="0"/>
<xs:element name="electricityLabel" type="tdt:ShortString" minOccurs="0" maxOccurs="unbounded"
/>
<xs:element name="userType" type="emi007_UserType" minOccurs="0" maxOccurs="unbounded"/>
<xs:element name="facilityType" type="emi005_FacilityType" minOccurs="0"/>
<xs:element name="reservability" type="emi010_Reservability" minOccurs="0"/>
<xs:element name="pricingInformation" type="PricingInformation" minOccurs="0" maxOccurs="unbou
nded"/>
<xs:element name="paymentInformation" type="PaymentInformation" minOccurs="0" maxOccurs="unbou
nded"/>
<xs:element name="freeText" type="tdt:LocalisedShortString" minOccurs="0" maxOccurs="unbounded
"/>
<xs:element name="chargingStationInformation" type="ChargingStationInformation" minOccurs="0"
maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
```

### B.2.5 ChargingStationInformation

```
<xs:complexType name="ChargingStationInformation">
<xs:sequence>
<xs:element name="stationID_Key" type="tdt:IntUnLoMB"/>
<xs:element name="stationExternalId" type="tdt:ShortString" minOccurs="0"/>
<xs:element name="connectorType" type="ConnectorType" minOccurs="0" maxOccurs="unbounded"/>
<xs:element name="stationType" type="emi008_StationType" minOccurs="0"/>
<xs:element name="vehicleType" type="emi009_VehicleType" minOccurs="0" maxOccurs="unbounded"/>
<xs:element name="sizeRestrictions" type="SizeRestrictions" minOccurs="0"/>
</xs:sequence>
</xs:complexType>
```