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Financial services — UNIversal Financial Industry message scheme —

Part 6: Message Transport Characteristics

Services financiers — Schéma universel de messages pour l'industrie financière —

Partie 6: Caractéristiques du transport de message

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 20022-6 was prepared by Technical Committee ISO/TC 68, *Financial services*.

ISO 20022 consists of the following parts, under the general title *Financial services — UNIversal Financial Industry message scheme*:

— *Part 1: Overall methodology and format specifications for inputs to and outputs from the ISO 20022 Repository*

— *Part 2: Roles and responsibilities of the registration bodies*

— *Part 3: ISO 20022 modelling guidelines* [Technical Specification]

— *Part 4: ISO 20022 XML design rules* [Technical Specification]

— *Part 5: ISO 20022 reverse engineering* [Technical Specification]

— *Part 6: Message Transport Characteristics*

Financial services — UNIversal Financial Industry message scheme —

Part 6: Message Transport Characteristics

1 Scope

This part of ISO 20022 specifies the characteristics of the Message Transport System required for an ISO 20022 Business Transaction and Message Definition. Changes to the value of the Message Transport Characteristics can affect the Business Transaction and Message Definition.

Each Business Transaction in the ISO 20022 Repository is associated with a Message Transport Mode. The Message Transport Mode specifies the values for the Message Transport Characteristics.

This part of ISO 20022 specifically does not define the wire-level interoperability of message transports. The overall structure is of a layered specification, in order that ISO 20022 can be implemented over many message transports. This part of ISO 20022 defines only those characteristics required for interoperability at the business process and message level.

2 Normative references

The following referenced documents are indispensable for the application 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 20022-1, *Financial services — UNIversal Financial Industry message scheme — Part 1: Overall methodology and format specifications for inputs to and outputs from the ISO 20022 Repository*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20022-1 and the following apply.

3.1
Address
element that identifies and efficiently resolves the location of a **Messaging Endpoint** (3.11)

NOTE The purpose of an Address is to efficiently resolve a location. This is what distinguishes an Address from any other identifier, which merely identifies.

3.2
Broadcast List
set of references to **Messaging Endpoints** (3.11), identified by their **Address** (3.1), which is used for Message Broadcasting

NOTE 1 The Broadcast List is managed by the **Message Transport System** (3.10), which provides a mechanism to maintain the Broadcast List.

NOTE 2 “Set” means the list of Addresses is unordered and each Address is only present once.

3.3
Business Layer
higher or upper layer of the protocol hierarchy that is used to exchange ISO 20022 messages

NOTE Two layers are defined:

— a **Message Transport Layer** (3.13), and

— a Business Layer.

The Business Layer is concerned with the business process, independent of the mechanics of messaging (i.e. independent of technology). The Message Transport Layer is concerned with the mechanics of messaging (i.e. independent of the Business Process).

3.4
Business Message
document appearing in the **Business Layer** (3.3) that is an instance of an ISO 20022 Syntax Message Scheme

NOTE A Business Message is valid against the related Message Definition in the ISO 20022 Repository. Validity includes Syntax Message Scheme validity, as well as validity against the Message Rules, Rules and Market Practices that are registered for this Message Definition.

3.5
Conversation
context, defined in the **Message Choreography** (3.7), in which messages are correlated

NOTE The concept is analogous to the concept of a Session in pi-calculus and similar process models.

3.6
Messaging Application Layer
layer immediately beneath the bottom layer of ISO 20022

NOTE This is the Open System Interconnection (OSI) Layer 7 application that delivers messages (see also 4.1).

EXAMPLE Examples of applications at the Messaging Application Layer: AMQP, ftp, http and SOAP, WebsphereMQ, or SonicMQ.

3.7
Message Choreography
precise and complete description of a **Business Message** (3.4) exchange, describing the sequence and correlation of messages within a **Conversation** (3.5), including the constraints on interaction

NOTE 1 Every Business Transaction contains its own Message Choreography.

NOTE 2 A Business Transaction describes all aspects of a particular solution that meets the requirements of a Business Process. This includes, amongst other things, the Message Choreography, describing the structure of Business Message exchange.

3.8
Message Transport Characteristics
properties of the **Message Transport Layer** (3.13) that are defined in this part of ISO 20022

3.9
Message Transport Mode
group of settings for the values for the **Message Transport Characteristics** (3.8) properties

NOTE 1 A Message Transport Mode is named and is registered in the ISO 20022 Repository. Each Message Transport Characteristic is given a value.

NOTE 2 A Message Transport Mode can be associated with many Business Transactions. The Message Transport Mode is used to organize commonly used combinations of Message Transport Characteristic settings.

3.10
Message Transport System
mechanism that receives **Transport Messages** (3.14) from the sending **Messaging Endpoint** (3.11), transports them, and delivers them to the receiving Messaging Endpoint

NOTE 1 The Message Transport System is responsible for delivering Transport Messages to each Addressee.

NOTE 2 The purpose of the Message Transport System is to provide a clear delineation of the responsibility of the Messaging Endpoints and any Message Transport System service providers. The role can be fulfilled by the sending Messaging Endpoint or by a separate service provider who provides a Message Transport System. Message Transport Systems can be chained together into a single Message Transport System.

3.11
Messaging Endpoint
addressable node on the **Message Transport System** (3.10) which is capable of sending and receiving **Transport Messages** (3.14)

NOTE A Messaging Endpoint has an **Address** (3.1).

3.12
Name
identifier of something

NOTE 1 A Name is “pure”, i.e. it is used for no purpose other than to identify something.

NOTE 2 Business logic is not based on anything about a Name other than its identity.

3.13
Message Transport Layer
lower or bottom layer of the protocol that is used to exchange ISO 20022 messages

NOTE Two layers are defined:

— a Message Transport Layer, and

— a **Business Layer** (3.3).

The Business Layer is concerned with the business process, independent of the mechanics of messaging (i.e. independent of technology). The Message Transport Layer is concerned with the mechanics of messaging (i.e. independent of the Business Process).

3.14
Transport Message
document that is an instance of the **Message Transport System** (3.10) message schema

NOTE 1 The Transport Message appears in the **Message Transport Layer** (3.13). The **Business Message** (3.4) is contained within the body of a Transport Message.

NOTE 2 ISO 20022 does not define the Message Transport System message schema because it is a layered specification that supports multiple Message Transport Systems.

4 Exchange of messages in ISO 20022

4.1 Layered protocol

The protocol that is used for exchanging ISO 20022 messages is defined as being in two layers sitting directly above the seven layers of the Open System Interconnection (OSI) model.

NOTE ISO/IEC 7498-1 is referred to as “OSI” throughout this part of ISO 20022.

— The higher or upper layer is named the Business Layer and deals with Business Messages. The exchange of Business Messages is fully described in the Message Choreography and the structure of the Business Messages is fully described by the Message Definitions and related Message Rules, Rules and Market Practices. All of these shall be registered in the ISO 20022 Repository. The Business Layer is equivalent to adding a Layer 9 to the OSI model.

— The lower or bottom layer is named the Message Transport Layer and deals with Transport Messages. The implementation of the Message Transport Layer may vary and is therefore outside the scope of ISO 20022. The behaviour and structure of the Transport Messages shall therefore not be registered in the ISO 20022 Repository. The Transport Characteristics apply to the Message Transport Layer. The Message Transport Layer is equivalent to adding a Layer 8 to the OSI model.

— The layer immediately beneath and therefore outside the ISO 20022 Protocol is the Application Layer. This is the Messaging Application layer. ISO 20022 allows any Messaging Application that will support the requirements of the Message Transport Layer. The Messaging Application Layer is Layer 7 of the OSI model.

4.2 Layering principles

A single new Business Message is created – by the sending business application – for each business event; that is each interaction in a Business Transaction. A Business Message adheres to the following principles:

— A Business Message shall not contain information about the Message Transport System or the mechanics or mechanism of message sending, transportation, Address, or receipt.

— A Business Message shall be comprehensible outside of the context of the Transport Message. That is the Business Message shall not require knowledge of the Transport Message to be understood.

— A Business Message may contain headers, footers and envelopes that are meaningful for the business. When present, they are treated as any other message content, which means that they are considered part of the Message Definition of the Business Message and as such will be part of the ISO 20022 Repository.

— A Business Message refers to Business Actors by their Name. Each instance of a Business Actor has one Name. The instance of the Business Actor shall not be referred to in the Message Transport Layer.

A new Transport Message is created for each time a Business Message is published by a sending Messaging Endpoint. A Transport Message adheres to the following principles:

a) A Transport Message will have a body which only contains the Business Message.

b) A Transport Message may contain headers, footers and envelopes that are meaningful for the transport and shall not contain information about the business process. As these headers, footers and envelopes are implementation specific, they shall not be registered in the ISO 20022 Repository.

c) A Transport Message is published by one Messaging Endpoint and received at nought to many Messaging Endpoints. Each Messaging Endpoint is identified by one Address. The Messaging Endpoint is referred to in the Message Transport Layer by its Address. The Messaging Endpoint shall not be referred to in the Business Layer.

A Business Actor shall be able to change its association with Messaging Endpoints during a Business Transaction.

4.3 Receiving Messaging Endpoint Idempotent Behaviour

A Messaging Endpoint may republish a Business Message. This will create a new Transport Message containing the same Business Message. The receiving Messaging Endpoint shall behave as if it had only received the Business Message once. This property is named “Business Message Republication Idempotency”.

The Message Transport System may republish a Transport Message. This creates a new copy of the original Transport Message (containing a copy of the original Business Message). The receiving Messaging Endpoint shall behave as if it had only received the Transport Message once. This property is named “Transport Message Republication Idempotency”.

4.4 Bandwidth Assumption

The bandwidth provided for Transport Messages at a Messaging Endpoint and for the Message Transport System is assumed to be unconstrained. There is no limit defined for messaging bandwidth.

Unconstrained bandwidth for Layer 8 Transport Messages will hold for all higher layers, such as Layer 9 Business Messages, because they are transported within Layer 8.

Unconstrained bandwidth for Layer 8 Transport Messages makes no requirement for lower layers, such as Layers 1 to 7.

NOTE It is acknowledged that in practice bandwidth both of the Message Transport System and at a Messaging Endpoint is finite. The purpose of the Bandwidth Assumption is to be clear that it is the obligation of the Message Transport System and Messaging Endpoint to meet the bandwidth requirements, and not the obligation of the Message Choreography, Message Definition or any other part of the Standard to constrain those requirements.

4.5 Security Assumption

It is assumed the Transport Messages are delivered securely by all the Message Transport Systems involved in delivery. This is defined as:

— The Transport Message is sent from the Messaging Endpoint named as the sender in the Transport Message.

— The Transport Message has not been modified since sending, except by Message Transport Systems.

— The Transport Message is private to the Sender, the Message Transport Systems it flows through, and the Destinations.

— The Message Transport System is not required to be capable of verifying to a third party that a sender sent a message or a destination received a message.

NOTE The purpose of the Security Assumption is to be clear; basic security does not need to be recreated inside the Message Transport Layer or Business Layer.

5 Message Transport Characteristics

5.1 General

This section defines the Message Transport Characteristics. These are important because their values may have an impact on Message Choreography and Message Definition.

Each characteristic is defined, and then the set of possible values is defined. The list of values is complete. The values are exclusive choices unless defined otherwise.

The Message Transport Characteristics apply to the Message Transport Layer, not the Business Layer. The behaviour of the Business Layer is defined by the Message Choreography.

5.2 Delivery Assurance

5.2.1 Purpose

Delivery Assurance specifies the degree to which the sending Messaging Endpoint is assured that a Transport Message will be delivered.

5.2.2 Possible values

Possible values are as listed below.

— At Least Once – The receiving Messaging Endpoint receives the Transport Message at least once. The delivery of the Transport Message is highly assured. If the Transport Message cannot be delivered, then the sending Messaging Endpoint shall receive notification of an error.

— Exactly Once – The receiving Messaging Endpoint receives the Transport Message exactly once. If the Transport Message cannot be delivered, then the sending Messaging Endpoint shall receive notification of an error.

— At Most Once – The receiving Messaging Endpoint receives the Transport Message at most once. There is no assurance a Transport Message will be delivered. The Message Transport System does not deliver notification errors for non-delivery. If the Transport Message cannot be delivered, then the sending Messaging Endpoint shall not receive notification of an error.

NOTE The Message Transport System is responsible for implementing this characteristic and may therefore decide to achieve this by republishing Transport Messages. The Idempotent Behaviours apply.

5.3 Sender Asynchronicity

5.3.1 Purpose

Sender Asynchronicity indicates whether a sending Messaging Endpoint blocks after sending a Transport Message to the Message Transport System while waiting for a response from a Messaging Endpoint.

5.3.2 Possible values

Possible values are as listed below.

— Endpoint Synchronous – The sending Messaging Endpoint blocks the sending and receipt of other Transport Messages while waiting for a response to the sent Transport Message.

— Conversation Synchronous – The sending Messaging Endpoint blocks the sending and receipt of other Transport Messages within the Conversation in which the Transport Message was sent, while waiting for a response to this sent Transport Message.

— Asynchronous – The sending Messaging Endpoint shall not block the sending or receipt of other Transport Messages while waiting for a response to the sent Transport Message.

5.4 Receiver Asynchronicity

5.4.1 Purpose

Receiver Asynchronicity indicates whether a receiving Messaging Endpoint blocks the sending and receipt of other Transport Messages until it sends a response to this Transport Message.

5.4.2 Possible values

Possible values are as listed below.

— Endpoint Synchronous – The receiving Messaging Endpoint blocks the receipt and processing of other Transport Messages while processing the current Transport Message.

— Conversation Synchronous – The receiving Messaging Endpoint blocks the receipt and processing of other Transport Messages within the Conversation in which the Transport Message was sent, while processing the current Transport Message.

— Asynchronous – The receiving Messaging Endpoint shall not block the receipt or processing of other Transport Messages while processing the current Transport Message.

5.5 Bounded Communication Delay

5.5.1 Purpose

Bounded Communication Delay specifies the maximum duration of time within which a Transport Message shall be delivered.

5.5.2 Possible values

Possible values are any positive ISO 8601 duration greater than zero.

A Transport Message that is not delivered within the Bounded Communication Delay shall not be delivered. A receiving Messaging Endpoint may ignore a Transport Message that is delivered outside of the Bounded Communication Delay. Whether a notification of an error occurs when the Bounded Communication Delay is exceeded is determined by the Delivery Assurance setting.

5.6 Message Delivery Order

5.6.1 Purpose

Message Delivery Order indicates to what extent Transport Messages from a sending Messaging Endpoint arrive in the order in which they were sent at the receiving Messaging Endpoints.

The sending order is defined as the order in which the messages arrive at the Message Transport System.

5.6.2 Possible values

Possible values are as listed below.

— Expected Causal Order – The receipt order of Transport Messages at all receivers is preserved across all sending Messaging Endpoints.

— FIFO Ordered – At every receiver, the order of receipt of Transport Messages is preserved for each sending Messaging Endpoint but not across sending Messaging Endpoints.

— Unordered – Transport Messages may arrive in any order at the receiving Messaging Endpoints. The only limitation is the Bounded Communication Delay.

NOTE The time at which a Transport Message is sent from a Messaging Endpoint to the Message Transport System is the same time as when the Transport Message arrives at the Message Transport System.

5.7 Message Delivery Window

5.7.1 Purpose

The Message Delivery Order is relaxed by a rolling window of time in which the Transport Messages may be delivered out of order. For each Transport Message delivered, the window defines the maximum duration of time within which it may be out of sequence.

5.7.2 Possible values

Possible values are any positive ISO 8601 duration greater than or equal to zero.

NOTE 1 A relaxation of the Message Delivery Order has no effect on a Message Delivery Order of Unordered because the order cannot be relaxed further.

NOTE 2 A Message Delivery Window of zero duration is equivalent to no window, that is, a strict ordering of delivery.

NOTE 3 The purpose of this is to enable implementers of a Message Transport System to implement a windowing mechanism to reorder messages slightly out of order.

NOTE 4 This is a relaxation of ordering of delivery at the Message Transport Layer.

5.8 Message Sending Window

5.8.1 Purpose

The Message Choreography is relaxed by a rolling window of time in which the Business Messages may be sent out of order. For each Business Message sent, the window defines the maximum duration of time within which it may be out of sequence.

5.8.2 Possible values

Possible values are any positive ISO 8601 duration greater than or equal to zero.

NOTE 1 It is not possible to send messages unordered. This would contradict the Message Choreography.

NOTE 2 The purpose of the Message Sending Window is to prevent bottlenecks on sending messages by reducing the need to coordinate sending.

NOTE 3 This is a relaxation of ordering of sending at the Business Layer.

5.9 Message Casting

5.9.1 Purpose

Message Casting specifies how receiving Messaging Endpoints may be addressed in a Transport Message.

5.9.2 Possible values

Possible values are as listed below.

— Unicast – Transport Messages are addressed to a single receiving Messaging Endpoint.

— Multicast – Transport Messages are addressed to nought to many receiving Messaging Endpoints.

— Broadcast – Transport Messages are addressed to a single Broadcast List.

— Anycast – Transport Messages may be Multicast or Broadcast. The first Messaging Endpoint to consume the Transport Message causes it to be removed from all other Messaging Endpoints. At most only one Messaging Endpoint receives the message.

5.10 Message Validation On/Off

5.10.1 Purpose

Message Validation On/Off specifies whether the Message Transport System validates the Business Message with respect to Syntax Message Scheme, Message Rules, Rules, the Market Practices, and the Message Choreography. The validation shall occur before the Business Message is delivered to the receiving Messaging Endpoints.

5.10.2 Possible values

Possible values are as listed below.

— Validation On – All Business Messages are validated by the Message Transport System.

— Validation Off – Business Messages are not validated by the Message Transport System.

5.11 Message Validation Results

5.11.1 Purpose

Message Validation Results specifies how the Message Transport System acts upon the results of Message Validation. This characteristic only applies when a Message Validation characteristic has the value of Validation On. If the Message Validation is Validation Off, then there shall be no record of the Validation Results and this characteristic has no effect.

5.11.2 Possible values

Possible values are as listed below.

— Reject – Invalid messages cause a rejection Transport Message to be sent to the sending Messaging Endpoint, and the invalid Business Message is not delivered to any other Messaging Endpoint. Valid messages are delivered to their destinations and marked as valid in the Transport Message.

— Reject and Deliver – Invalid messages cause a rejection Transport Message to be sent to the sending Messaging Endpoint, and the invalid Business Message is marked as invalid in the Transport Message and delivered to its destination Messaging Endpoints. Valid messages are delivered to their destinations and marked as valid in the Transport Message.

— Deliver – Invalid messages do not cause a rejection Transport Message to be sent to the sending Messaging Endpoint. The invalid Business Message is delivered to its destination Messaging Endpoints. Valid messages are delivered to their destinations and marked as valid in the Transport Message.

5.12 Message Validation Level

5.12.1 Purpose

Message Validation Level specifies the level of validation to which the Message Transport System has tested the message.

5.12.2 Possible values

Possible values are as listed below.

— No Validation – The Business Message is not validated.

— Syntax Valid – The Business Message has its syntax validated.

EXAMPLE For XML messages this would mean testing the XML is well-formed.

— Schema Valid – The Business Message is Syntax Valid plus validated against the Syntax Message Scheme.

EXAMPLE For XML messages, this would mean testing the XML is well-formed and valid against the ISO 20022 XML Schema.

— Message Valid – The Business Message is Schema Valid plus validated against the Message Rules.

— Rule Valid – The Business Message is Message Valid plus validated against the Business Rules.

— Market Practice Valid – The Business Message is Message Valid plus validated against the Market Practices.

— Business Process Valid – The Business Message is Message Valid plus validated against the Message Choreography.

— Completely Valid – The Business Message is Message Valid plus validated against all Rules, Market Practices, and the Message Choreography.

5.13 Durability

5.13.1 Purpose

Durability specifies whether the Message Transport System safely retains a Transport Message until it has been received by the destination Messaging Endpoint.

5.13.2 Possible values

Possible values are as listed below.

— Durable – The Transport Message is kept available indefinitely until the message is delivered to the destination Messaging Endpoint. The Transport Message is only kept available if it is ready for delivery within the Bounded Communication Delay; otherwise it expires like every other non-durable message.

— Persistent – The Transport Message is kept available until it is delivered to the receiving Messaging Endpoint or until it expires because the Bounded Communication Delay is exceeded.

— Transient – The Transport Message is not kept available and will not be delivered if the receiving Messaging Endpoint is not available.

5.14 Maximum Message Size

5.14.1 Purpose

Maximum Message Size specifies the maximum size of a Message Transport Message in kilobytes.