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Part 6: Message management container (TPEG2-MMC)

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

Partie 6: Conteneur de gestion de message (TPEG2-MMC)

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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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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.

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

This first edition cancels and replaces ISO/TS 21219-6:2015, which has been technically revised.

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.

Introduction

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 may 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, 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, 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/TS 18234 series to provide location referencing.

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

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/TS 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/TS 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 and XML; 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, that 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 may be incomplete, e.g. new TPEG2 parts may be introduced after publication of this document.

— Toolkit parts: TPEG2-INV (ISO/TS 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/TS 21219-9), TPEG2-CAI (ISO/TS 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/TS 21219-14), TPEG2-TEC (ISO/TS 21219-15), TPEG2-FPI (ISO/TS 21219-16), TPEG2-TFP (ISO 21219-18), TPEG2-WEA (ISO/TS 21219-19), TPEG2-RMR (ISO/TS 21219-23), TPEG2-EMI (ISO/TS 21219-25), 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 having 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: SP10035.

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

Part 6:
Message management container (TPEG2-MMC)

1 Scope

This document adds a basic toolkit definition to the ISO 21219 series specifying the Message Management Container (MMC) which is used by all TPEG applications to provide information about the handling of messages on the TPEG client side. The MMC holds administrative information allowing a decoder to handle the message appropriately. This information is not aimed at the end user. The MMC is a toolkit and not a stand-alone application but is included by TPEG applications.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
Message
unit of information that is controlled under a message ID and contains a MessageManagementContainer, MMCMasterMessage or MMCMessagePart component

3.1.2
Monolithic Message Management
message management that allows versioning of messages by updating complete messages only

Note 1 to entry: See 4.1.3.

3.1.3
Multipart Message Management
message management that allows parts of messages being transmitted in packets independently

Note 1 to entry: See 4.1.4.

3.1.4
top level container
any component that is on the same level as the message management container

3.1.5
TPEG Server
device or entity on the sending side of the TPEG transmission chain

Note 1 to entry: May consist, e.g. of a TPEG encoder, a stream encoder, a network transmission unit.

3.1.6
TPEG Client
device or entity on the receiving side of the TPEG transmission chain

Note 1 to entry: May consist, e.g. of a broadcast receiver, a TPEG decoder unit.

3.2 Abbreviated terms

MMC Message Management Container

LRC Location Referencing Container

ADC Application Data Container

4 MMC components and capabilities

4.1 Overview

4.1.1 Structure

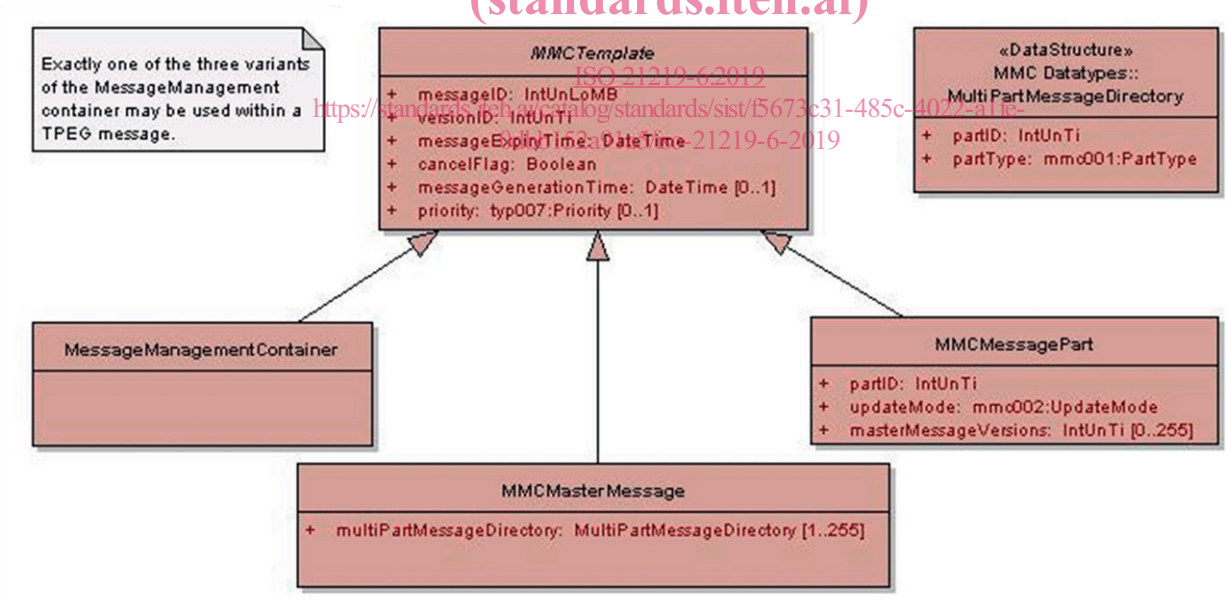

Figure 1 — Structure of the Message Management Container

4.1.2 Capabilities

Any TPEG message typically consists of the following top level containers (see also Figure 2 below):

— Exactly one Message Management Container (MMC);

— Optionally one or several Application Data Container(s) (ADC);

— Optionally one Location Reference Container (LRC).

The MMC contains no data dedicated for the user but only administrative information for the TPEG decoder to handle the message appropriately.

While the ADC part is defined specifically by the related TPEG application specification, the TPEG MMC toolkit is specified by this document for all TPEG applications. The general capabilities and features of the MMC toolkit may be restricted or further detailed by the particular TPEG applications.

The MMC is always stereotyped as an ordered component and shall be the first component in the TPEG Message. The other parts of the message may as well be stereotyped as “UnorderedComponent”.

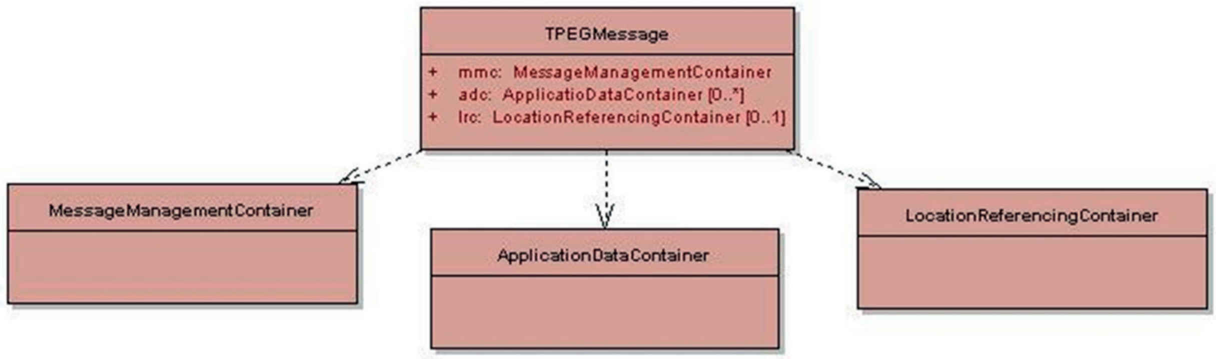

Figure 2 — General structure of a TPEG message

The MMC toolkit includes two basic mechanisms for message management, the Monolithic Message Management and Multipart Message Management, which are described in the following sub-clauses.

Both mechanisms exclude each other, i.e. for a given time there shall either be a message delivered by Monolithic or by Multipart Message Management. Therefore, if a TPEG-Client receives a monolithic message and already has a multipart-combined message with the same messageID in its repository it shall remove this message from its repository and shall replace it by the received monolithic message. Conversely, a monolithic message shall be replaced by a new multipart-message as well.

4.1.3 Monolithic Message Management

The usage of monolithic message management enables the replacement of a complete TPEG message by a more recent version of the same message. Thus, this message management method is suitable for TPEG services where most parts of the message are changing during the message updates.

The monolithic message management applies the class ‘MessageManagementContainer’ only which inherits all attributes from the parent class ‘MMCTemplate’ and adds no further ones. The replacement process described above is signalled by using the same value of the attribute ‘messageID’ and an increased value of the attribute ‘versionID’ (see Figure 3 below).

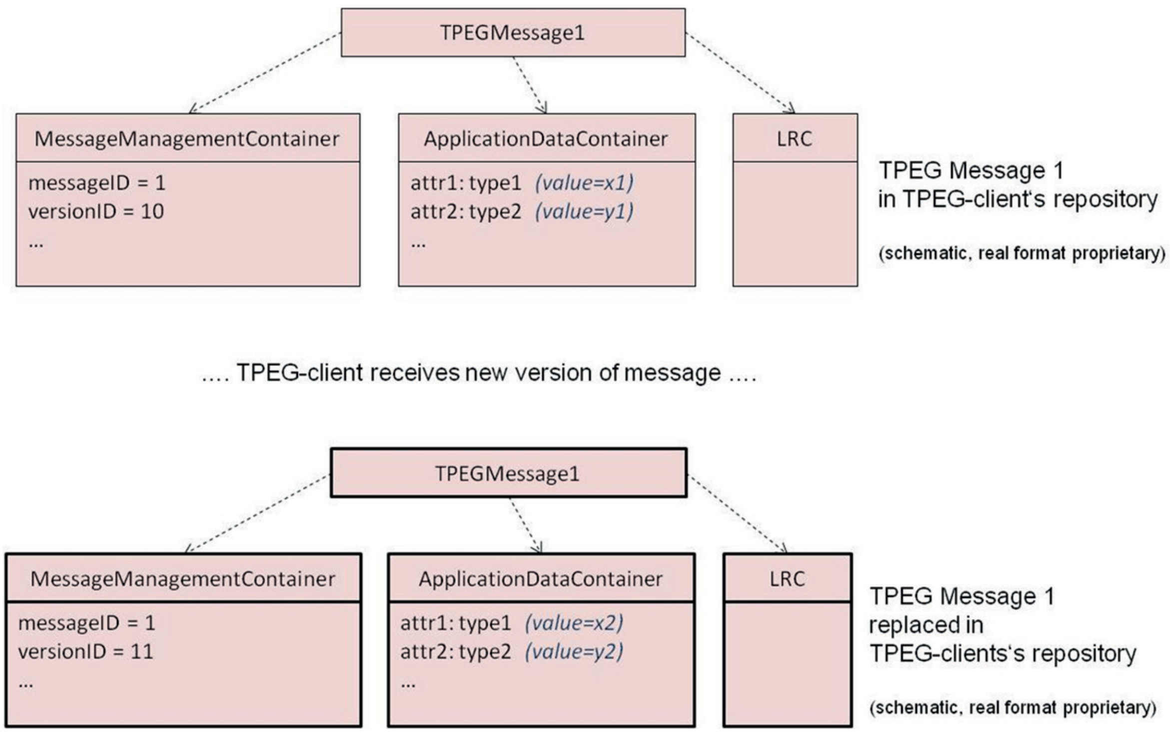

Figure 3 — Replacement of an overall message by Monolithic Message Management

In case of a cancellation, the messageID contained in the MMC indicates the previously received message with the same messageID to be cancelled. If the messageID and versionID is identical to a previously transmitted message this signals that all attached application content (i.e. all ADC and LRC components transmitted in the message) is identical with the previously sent content. In that case a receiver does not need to do a byte-by-byte content comparison of the ADC and LRC content, but nevertheless needs to check the MMC content as that may differ (e.g. a different expiration time).

4.1.4 Multipart Message Management

Multipart Message Management enables the partial update of messages, i.e. it may be used to replace dedicated parts of a message version by version, while other parts remain unchanged. Thus, this method is suitable in particular for TPEG applications where large parts of the message content are static or quasi-static (see also 4.5 and 4.6).

The Multipart Message Management applies the classes 'MMCMasterMessage' and 'MMCMessagePart' (see 4.1.1). Additional to the attributes inherited from the parent class 'MMCTemplate', the 'MMCMasterMessage' container includes a list with the partial messages (attribute 'multiPartMessageDirectory') which shall list all partial messages of the overall/combined message. The master-message shall contain the 'MMCMasterMessage' container only and no ADC or LRC information. The latter containers shall be included in the corresponding partial messages, which are indicated by the 'MMCMessagePart' type MMC.

The master message and each of the related partial messages shall have the same 'messageID' but shall have an independent versioning, i.e. all parts can have a different 'versionID' and the value of this attribute refers to the related message part. Therefore, the TPEG Client has to store the 'versionID' of the most recently received version of each partial message to manage the partial updates of the messages. In particular, the stored combined message shall be updated by a received partial message only if the 'versionID' of the partial message is more recent than the stored 'versionID' of the same partial message.

If the content of the multiPartMessageDirectory has been modified, i.e. the version ID of the 'MMCMasterMessage' is changed, all related partial messages sent before are not valid anymore. A TPEG Client shall then rebuild the message completely by receiving the up-to-date partial messages.

Currently, there is one update feature ('replaceTopLevel') defined for partial messages which is signalled by the 'updateMode' attribute of the 'MMCMessagePart' component. Other update modes may be added in future versions.

4.1.4.1 Update mode 'replaceTopLevel'

This feature may be used to replace or add components in the combined message by the components transmitted by the partial message. The components included by the partial message shall be a sub-tree of the overall message structure, starting with one of the ADC or LDC components as root component. This means that the partial message will update the Application Data or Location Referencing Containers and its related sub-components. Therefore, this feature is an enhancement of the monolithic message management where only an overall message can be replaced/added.

If one or several of the components contained in the partial message are present in the so far stored combined message, these components shall be replaced. If one or several of the components contained in the partial message are not yet present in the so far stored combined message these components shall be added to the combined message.

As only complete components are added/replaced, each of the components contained in the partial message shall include all attributes which are intended to be part of the combined message.

If a combined message contains more than one component of the same component type at a given position within the message structure, all these components shall be replaced by the one(s) contained in the partial message. In particular an array of components (multiplicity [0..*] or [1..*]) shall be replaced completely by the updating message.

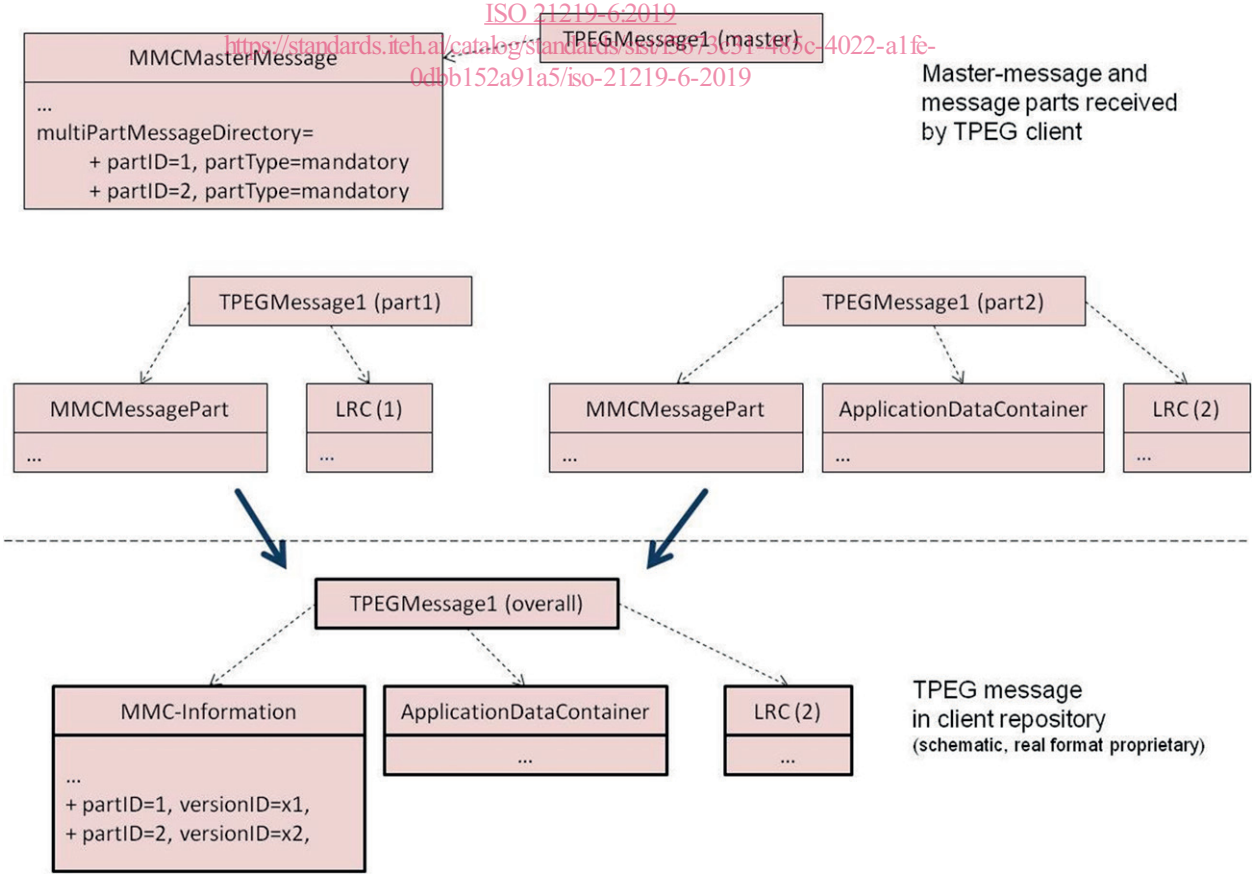

Figure 4 — Example addition/replacement of top level containers by partial messages