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

Part 13: Public transport information service (TPEG2-PTS)

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

Partie 13: Service d'informations sur les transports publics (TPEG2-PTS)

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Foreword

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

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

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 (SNI) 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 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 the 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 sychronized, 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 the 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 (Annex A) and XML (Annex B); others can 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 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 21219-7). This structure has flexible capability and can accommodate

many differing use cases that have been proposed within the TTI sector and more broadly 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, as it is possible 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 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 21219-21), TPEG2-TLR (ISO 17572-2), TPEG2-DLR (ISO 17572-3).

— Applications: TPEG2-PTS (ISO 21219-13 – this document), 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), 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:

SP19008/1.0/001.

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

Part 13:
Public transport information service (TPEG2-PTS)

1 Scope

This document describes the "public transport information service" (PTS) application, which is intended to cover all modes of public (i.e. collective) transport, both for inter-urban and intra-urban travel. The PTS application is designed to allow the efficient and language-independent delivery of public transport information directly from a service provider to end-users.

The PTS application design is based on three main use cases.

— Provision of alert information: an alert is a warning that indicates an emergency situation. This case is specifically relevant for broadcast/push mode, for major deviations or disruptions which are relevant for a large number of travellers. A dedicated alert request is also defined and can be used if a backchannel is available.

— Timetable information, both scheduled and real time: this information is in some cases relevant for broadcast, e.g. in case of large events for the transport modalities to/from the event site. A dedicated timetable request is also defined and can be used if a backchannel is available.

— Individual requests for trip information (backchannel is required).

The PTS application focuses on providing core information regarding public transport in order to ensure the compactness of the TPEG application. Specific information as provided in typical public transport apps (e.g. fare information) is not in the scope of this document.

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 21219-7, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 7: Location referencing container (TPEG2-LRC)*

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
AccessFeature
facility providing access to a StopPlace, StopPoint or vehicle

EXAMPLE Elevator, stairs, ramp.

Note 1 to entry: This description is close to the Open API for Distributed Journey Planning term "AccessFeatureType", specified in CEN/TS 17118:2017, Table 119. The meaning is similar, but harmonized to the PTS (public transport information service) application context.

3.2
Destination
place to where the user is heading

Note 1 to entry: In the PTS (public transport information service) application context, this can be StopPlaces or StopPoints only. PTS additionally uses Destination to describe the End of a VehicleJourney as specified by CEN/TS 17118:2017, Table 92.

3.3
Line
aggregation of similar VehicleJourneys which are published under the same name

EXAMPLE Bus line 100, or airport shuttle.

Note 1 to entry: This PTS description is close to the Open API for Distributed Journey Planning term "Line", specified by CEN/TS 17118. The meaning is similar, but harmonized to the PTS application context.

3.4
ModeOfTransport
type of a VehicleJourney or Line

EXAMPLE Bus service, railway service, air service.

Note 1 to entry: This PTS description is close to the Open API for Distributed Journey Planning term "Mode", specified by CEN/TS 17118. The meaning is similar, but harmonized to the PTS application context.

3.5
CallAtStop
meeting of a VehicleJourney with a specific scheduled StopPoint

[SOURCE: CEN/TS 17118:2017, 3.1.123]

3.6
operator
company providing public transport services

[SOURCE: CEN/TS 17118:2017, 3.1.71]

3.7
Origin
Place from where the user wants to start

Note 1 to entry: In the PTS (public transport information service) application context, this can be StopPlaces or StopPoints only. PTS additionally uses Origin to describe the Start of a VehicleJourney, as specified by CEN/TS 17118:2017, Table 92.

3.8
PublishedLineName
name which is used for a Line in public

EXAMPLE Bus line 100, or airport shuttle.

Note 1 to entry: This PTS description is close to the Open API for Distributed Journey Planning term "PublishedLineName", specified by CEN/TS 17118:2017. The meaning is similar, but harmonized to the PTS application context.

3.9
Route
ordered list of located points defining one single path through the road (or rail) network

[SOURCE: EN 12896-1:2016]

3.10
StopEvent
departure or arrival event or both

[SOURCE: CEN/TS 11718:2017, 3.1.115]

3.11
StopPlace
one or more locations where vehicles may stop and where passengers may board or leave vehicles or prepare their trip, and which will usually have one or more well-known names

EXAMPLE Station, airport, harbour.

Note 1 to entry: This PTS description is close to the Open API for Distributed Journey Planning term "StopPlace", specified by CEN/TS 17118. The meaning is similar, but harmonized to the PTS application context.

3.12
StopPoint
location with an identifier and name where passengers can board or alight from vehicles

EXAMPLE Platform, gate.

Note 1 to entry: This PTS description is close to the Open API for Distributed Journey Planning term "StopPoint", specified by CEN/TS 17118. The meaning is similar, but harmonized to the PTS application context.

3.13
Trip
whole journey from a passengers Origin to passenger Destination in one or more TripLegs

Note 1 to entry: This PTS description is close to the Open API for Distributed Journey Planning term "Trip", specified by CEN/TS 17118. The meaning is similar, but harmonized to the PTS application context.

3.14
TripLeg
single stage of a Trip that is made without change of ModeOfTransport or VehicleJourney

Note 1 to entry: This PTS description is close to the Open API for Distributed Journey Planning term "TripLeg", specified by CEN/TS 17118. The meaning is similar, but harmonized to the PTS application context.

3.15
VehicleJourney
description of a journey of a vehicle from its Origin to its Destination

Note 1 to entry: This PTS description is close to the OJP term VehicleJourney specified by CEN/TS 17118. The meaning is similar, but harmonized to the PTS application context.

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 apply.

OJP Open API for distributed Journey Planning

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, e.g. parking information or road traffic information. Each TPEG application is assigned a unique number, called the 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[3] to indicate how to process TPEG content. It also 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 PTS within the SNI application.

Table 1 — Current version numbers for signalling of PTS

Major version number	1
Minor version number	0

5.3 Ordered components

TPEG2-PTS requires a fixed order of TPEG components. The order for the PTS 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 the one or more Application Data Container component(s) which includes the application-specific information.

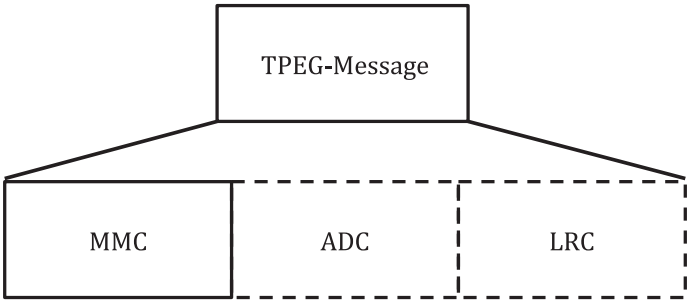

Figure 1 — Composition of TPEG messages

5.4 Extendibility

The requirement of a fixed component order does not affect the extension of TPEG2-PTS. Future application extensions may insert new components or may replace existing components by new ones without losing backward compatibility, i.e. a TPEG2-PTS decoder shall be able to detect and skip unknown components.

5.5 TPEG Service Component Frame

TPEG2-PTS shall make use of the "Service Component Frame with dataCRC and messageCount" according to ISO 21219-5.

6 PTS Structure

The structure of a PTS message is shown in Figure 2. This structure conforms to the UML modelling rules defined in ISO 21219-2. The binary format and XML format of the TPEG2-PTS application for use in transmission shall be in accordance with Annexes A and B, respectively. Examples of TPEG2-PTS use cases are shown in Annex C.

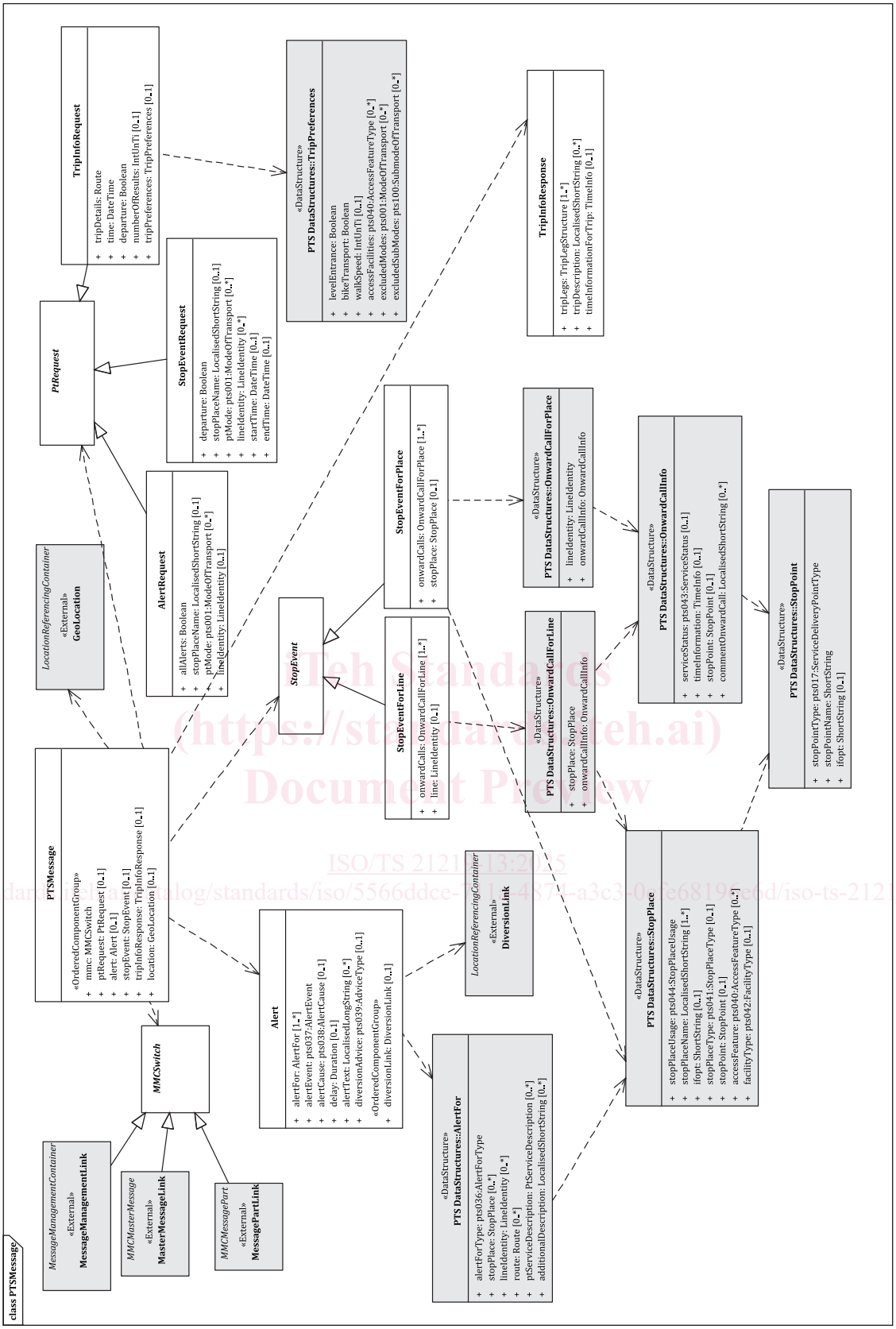

Figure 2 — PTS message structure

The structure of the TripLegStructure is shown in Figure 3.