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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

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).

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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*.

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.

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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

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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.

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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)

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)*

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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]

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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.

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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.

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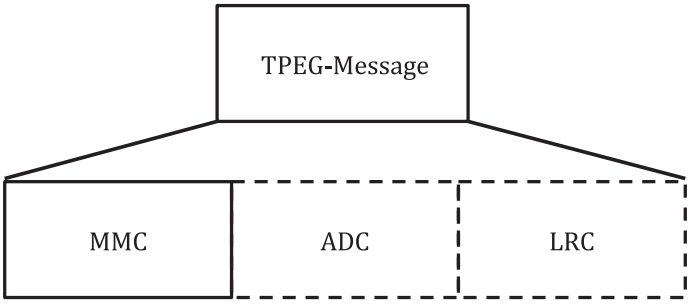

Figure 1 — Composition of TPEG messages

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.

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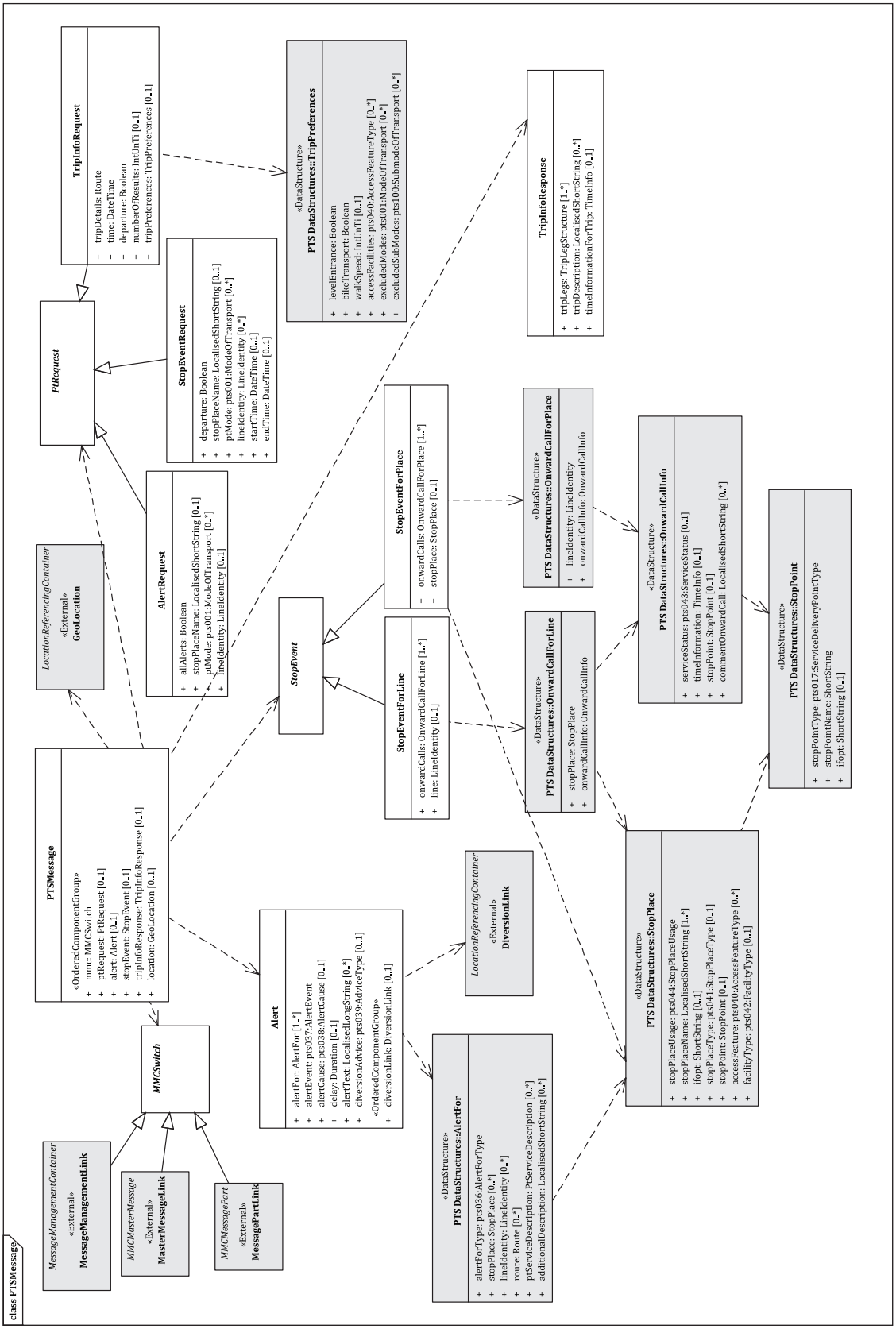

Figure 2 — PTS message structure

The structure of the TripLegStructure is shown in Figure 3.

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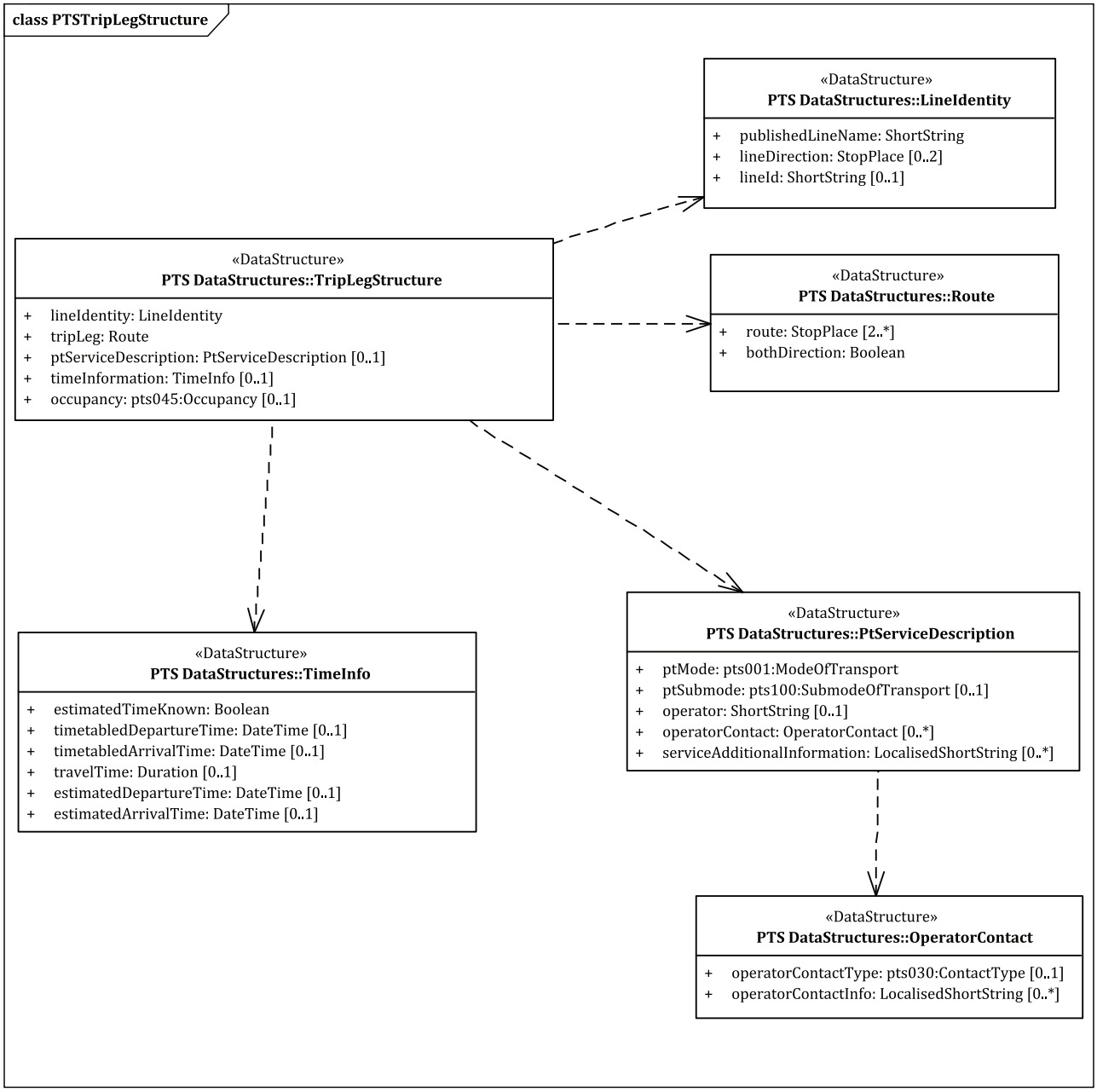

Figure 3 — TripLegStructure component structure

7 PTS message components

7.1 PTSMessage

Table 2 defines the PTSMessage component, i.e. the overall PTS message container.

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Table 2 — PTSMessage

Name	Type	Multiplicity	Description
Ordered components			
mmc	MMCSwitch	1	n.a.
ptRequest	PtRequest	0..1	Component to transmit a request for public transport information.
alert	Alert	0..1	Component to transmit alert information.
stopEvent	StopEvent	0..1	Component to transmit information for a departure/ arrival events (timetable) at a stopPlace or for a Line.
tripInfoResponse	TripInfoResponse	0..1	Component to transmit the response to a TripInfoRequest.
location	GeoLocation	0..1	Map-related location referencing information for this PTS message.

7.2 MMCSwitch

The MMCSwitch component is an abstract component, allowing the flexible use of monolithic or multi-part message management.

7.3 MessageManagementLink

The MessageManagementLink is a placeholder for the MessageManagementContainer as defined by ISO 21219-6. It assigns the PTS application-specific local component ID for the MMC container (see Annex A).

7.4 MasterMessageLink

The MMCMasterLink is a placeholder for the Master-Message MMC for multi-part message management, as defined by ISO 21219-6. It assigns the PTS application-specific local component ID for the MMC container (see Annex A).

7.5 MessagePartLink

The MMCPartLink is a placeholder for the external partial-Message MMC (MMCMessagePart) for multi-part message management, as defined by ISO 21219-6. It assigns the PTS application-specific local component ID for the MMC container (see Annex A).

7.6 GeoLocation

The GeoLocation component is a placeholder for the LocationReferencingContainer (LRC). It assigns the PTS application-specific local component ID for the LRC container. All component IDs within the LRC container shall be taken from the LRC toolkit specified by ISO 21219-7.

The LocationReferenceLink component is a placeholder for the LocationReferencingContainer (LRC). It assigns the PTS application-specific local component ID for the LRC container. All component IDs within the LRC container shall be taken from the LRC toolkit specified by ISO 21219-7.

The GeoLocation describes the location for which the information is intended. e.g. airport, railway station, area, city, line.

7.7 PtRequest

Component to transmit a request for public transport information. This component can contain one of the following: AlertRequest, StopEventRequest or TripInfoRequest.

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7.8 AlertRequest

Table 3 defines the AlertRequest component, i.e. the component to transmit a request for one or more alerts.

Table 3 — AlertRequest

Name	Type	Multiplicity	Description
allAlerts	Boolean	1	True if an AlertRequest is issued for all available alerts; false otherwise. If false, the remaining attributes specify the AlertRequest.
stopPlaceName	LocalisedShortString	0..1	Well-known name of the StopPlace for which an AlertRequest is issued.
ptMode	pts001:ModeOfTransport	0..*	List of the public transportation modes for which an AlertRequest is issued.
lineIdentity	LineIdentity	0..1	Description of the Line for which an AlertRequest is issued.

7.9 StopEventRequest

The StopEventRequest component is used to transmit a request for stop-centric arrivals/departures (a timetable or departure board):

— either for one or more Lines at a stopPlace, or

— for all StopPlaces on a Line.

Table 4 defines the StopEventRequest component.

Table 4 — StopEventRequest

Name	Type	Multiplicity	Description
departure	Boolean	1	True if a StopEventRequest is issued for departures; false if a StopEventRequest is issued for arrivals.
stopPlaceName	LocalisedShortString	0..1	In the case of a StopEventRequest for a StopPlace, describes the well-known name of the StopPlace.
ptMode	pts001:ModeOfTransport	0..*	In the case of a StopEventRequest for a StopPlace, lists the modes of transport to be considered for the request.
lineIdentity	LineIdentity	0..*	In the case of a StopEventRequest for a Line, description of the Line to be considered for the request.
startTime	DateTime	0..1	Start of the timeframe for which the request is issued.
endTime	DateTime	0..1	Stop of the timeframe for which the request is issued.

7.10 TripInfoRequest

Table 5 defines the TripInfoRequest component, i.e. the component to transmit a request for trip information.

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Table 5 — TripInfoRequest

Name	Type	Multiplicity	Description
tripDetails	Route	1	Description of the origin and destination of a trip with potentially one or more vias.
time	DateTime	1	Contains either Departure time at origin or Arrival time at destination.
departure	Boolean	1	True to indicate that time attribute contains Departure time at origin, false to indicate that time attribute contains Arrival time at destination.
numberOfResults	IntUnTi	0..1	Attribute to control the number of trip results before/after a point in time. May not be used when departure time at origin AND arrival time at destination are set.
tripPreferences	TripPreferences	0..1	User preferences to be considered in trip calculation.

7.11 Alert

Table 6 defines the Alert component, i.e. the component to transmit alert information, typically to be used for the use case where major alerts are being sent by broadcast.

Table 6 — Alert

Name	Type	Multiplicity	Description
alertFor	AlertFor	1..*	Describes the StopPlace, Line, Route, Area, etc. for which the alert is issued.
alertEvent	pts037:AlertEvent	1	Information on the actual event (e.g. closure of a line, long delays of a line, cancellation of a stop).
alertCause	pts038:AlertCause	0..1	Information on the cause of the event.
delay	Duration	0..1	In the case of a delay, this component can be used to inform about its duration (in min).
alertText	LocalisedLongString	0..*	Free text option to provide additional description of the alert.
diversionAdvice	pts039:AdviceType	0..1	Information on a potential diversion, e.g. to use an alternative route.
Ordered components			
diversionLink	DiversionLink	0..1	Map-related location referencing information for a potential diversion.

7.12 DiversionLink

The DiversionLink component contains map-related location referencing information for a potential diversion.

7.13 StopEvent

The StopEvent component is used to transmit information for departure/arrival events (departure board or timetable):

— either for one or more Lines at a stopPlace, or

— for one or more StopPlaces on a Line.

7.14 StopEventForPlace

Table 7 defines the StopEventForPlace component, i.e. the component to transmit information for departure/arrival events departure board or timetable, for one or more Lines at a StopPlace.

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Table 7 — StopEventForPlace

Name	Type	Multiplicity	Description
callAtStops	CallAtStopForPlace	1..*	Provides information on departure/arrival events for each relevant Line (a stop timetable).
stopPlace	StopPlace	0..1	Describes a place comprising 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.

7.15 StopEventForLine

Table 8 defines the StopEventForLine component, i.e. the component to transmit information for departure/arrival events (departure board or timetable) for a Line or VehicleJourney.

Table 8 — StopEventForLine

Name	Type	Multiplicity	Description
callAtStops	CallAtStopForLine	1..*	Provides information on departure/arrival events for each relevant StopPlace (along the Line).
line	LineIdentity	0..1	Description of a Line.

7.16 TripInfoResponse

Table 9 defines the TripInfoResponse component, i.e. the component to transmit a response to a TripInfoRequest.

Table 9 — TripInfoResponse

Name	Type	Multiplicity	Description
tripLegs	TripLegStructure	1..*	Describes one or more TripLegs for the trip. A TripLeg being a single stage of a Trip that is made without change of ModeOfTransport or Line (i.e. between each Transfer).
tripDescription	LocalisedShortString	0..*	Descriptive text for a Trip.
timeInformationForTrip	TimeInfo	0..1	Describes scheduled and/or actual departure and/or arrival times for a Trip.

8 PTS Datatypes

8.1 AlertFor

Table 10 defines the AlertFor datatype that describes the entity (StopPlace, Line, Route, PT service, Area etc.) for which the alert is issued (one such entity per Alert message).

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Table 10 — AlertFor

Name	Type	Multiplicity	Description
alertForType	pts036:AlertForType	1	Information on the type of entity for which the alert is issued.
stopPlace	StopPlace	0..*	Describes a place comprising 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.
lineIdentity	LineIdentity	0..*	Description of a Line.
route	Route	0..*	An ordered list of located StopPlaces defining one single path through the road or rail network.
ptServiceDescription	PtServiceDescription	0..*	Information on a public transport service.
additionalDescription	LocalisedShortString	0..*	Textual description of an area.

8.2 LineIdentity

Table 11 defines the LineIdentity datatype that contains the description of a Line.

Table 11 — LineIdentity

Name	Type	Multiplicity	Description
publishedLineName	ShortString	1	Line name or service description as known to the public.
lineDirection	StopPlace	0..2	StartPoint and Endpoint of a Line.
lineId	ShortString	0..1	Identifier of a Line.

8.3 CallAtStopForLine

Table 12 defines the CallAtStopForLine datatype.

Table 12 — CallAtStopForLine

Name	Type	Multiplicity	Description
stopPlace	StopPlace	1	Describes a place comprising 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.
callAtStopInfo	CallAtStopInfo	1	Provides information on departure/arrival events for one certain StopPlace.

8.4 CallAtStopForPlace

Table 13 defines the CallAtStopForPlace datatype.

Table 13 — CallAtStopForPlace

Name	Type	Multiplicity	Description
lineIdentity	LineIdentity	1	Describes a Line.
callAtStopInfo	CallAtStopInfo	1	Provides information on departure/arrival events for one certain Line.

8.5 CallAtStopInfo

Table 14 defines the CallAtStopInfo datatype.

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Table 14 — CallAtStopInfo

Name	Type	Multiplicity	Description
serviceStatus	pts043:ServiceStatus	0..1	Describes the status of the service.
timeInformation	TimeInfo	0..1	Describes scheduled or estimated departure times or both and the same applies for arrival times.
stopPoint	StopPoint	0..1	Describes a physical area within a StopPlace (e.g. a platform).
commentCallAtStop	LocalisedShortString	0..*	Additional descriptive text.

8.6 OperatorContact

Table 15 defines the OperatorContact datatype.

Table 15 — OperatorContact

Name	Type	Multiplicity	Description
operatorContactType	pts030:ContactType	0..1	Information on the type of possibility to contact the operator.
operatorContactInfo	LocalisedShortString	0..*	Describes the contact information for the operator.

8.7 PtServiceDescription

Table 16 defines the PtServiceDescription datatype that contains the description of a public transport service.

Table 16 — PtServiceDescription

Name	Type	Multiplicity	Description
ptMode	pts001:ModeOfTransport	1	Defines the public transport mode.
ptSubmode	pts100:SubmodeOfTransport	0..1	Defines the public transport submode.
operator	ShortString	0..1	Operator name as known to the public.
operatorContact	OperatorContact	0..*	Describes a contact for the operator.
serviceAdditionalInformation	LocalisedShortString	0..*	Additional descriptive information about the public transport service.

8.8 Route

Table 17 defines the Route datatype that describes an ordered list of located StopPlaces defining one single path through the road or rail network.

Table 17 — Route

Name	Type	Multiplicity	Description
route	StopPlace	2..*	Array containing the StopPlaces on the Route.
bothDirection	Boolean	1	Only relevant for Alert: true when an Alert is issued for both directions of the route.

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8.9 StopPlace

Table 18 defines the StopPlace datatype that describes a place comprising 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.

Table 18 — StopPlace

Name	Type	Multiplicity	Description
stopPlaceUsage	pts044:StopPlaceUsage	1	Identifies the "role" a StopPlace has: — in a Trip (e.g. origin, destination, intermediate); or — for an Alert (e.g. temporarily non-stopping); or — on a Line (e.g. temporary stop place, first route point).
stopPlaceName	LocalisedShortString	1..*	Well-known name of the StopPlace.
stopPlaceRef	ShortString	0..1	Reference key for the StopPlace.
stopPlaceType	pts041:StopPlaceType	0..1	Information on the type of StopPlace (e.g. railway station, bus station).
stopPoint	StopPoint	0..1	Describes a physical area within a StopPlace (e.g. a platform).
accessFeature	pts040:AccessFeatureType	0..*	Describes accessibility features associated with this StopPlace.
facilityType	pts042:FacilityType	0..1	Named amenity available to the public at this StopPlace.

8.10 StopPoint

Table 19 defines the StopPoint datatype that describes a location with identifier and name where passengers can board or alight from vehicles, e.g. platform, gate.

Table 19 — StopPoint

Name	Type	Multiplicity	Description
stopPointType	pts017:ServiceDeliveryPointType	1	Information on the type of StopPoint (e.g. gate, platform).
stopPointName	ShortString	1	Well-known name of the StopPoint.
stopPointRef	ShortString	0..1	Reference key for the StopPoint.

8.11 TimeInfo

Table 20 defines the TimeInfo datatype that contains the description of scheduled or actual departure time or both and the same applies to arrival times and to travel times for various purposes.

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Table 20 — TimeInfo

Name	Type	Multiplicity	Description
estimatedTimeKnown	Boolean	1	True if an expected/estimated time is known; false otherwise.
timetabledDepartureTime	DateTime	0..1	Departure time according to planned timetable.
timetabledArrivalTime	DateTime	0..1	Arrival time according to planned timetable.
travelTime	Duration	0..1	Travel time for a trip (in case of TripInfo); travel time for a TripLeg (in case of TripLegStructure).
estimatedDepartureTime	DateTime	0..1	Expected/estimated departure time at the StopPoint.
estimatedArrivalTime	DateTime	0..1	Expected/estimated arrival time at the StopPoint.

8.12 TripLegStructure

Table 21 defines the TripLegStructure datatype that describes a TripLeg.

Table 21 — TripLegStructure

Name	Type	Multiplicity	Description
lineIdentity	LineIdentity	1	Description of a Line.
tripLeg	Route	1	A single stage of a Trip that is made without change of ModeOfTransport or Line (i.e. between each Transfer).
ptServiceDescription	PtServiceDescription	0..1	Description of a public transport service.
timeInformation	TimeInfo	0..1	Description of scheduled or actual departure times or both at the starting point of the TripLeg and the same applies to the arrival times at the ending point of the TripLeg, as well as to the travel time.
occupancy	pts045:Occupancy	0..1	How full the vehicle is. If omitted, not known.

8.13 TripPreferences

Table 22 defines the TripPreferences datatype that provides information on user preferences to be considered in trip calculation.

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Table 22 — TripPreferences

Name	Type	Multiplicity	Description
levelEntrance	Boolean	1	If set to true, the user needs vehicles with a level entrance between platform and vehicle, e.g. for wheelchair access. Lift-equipped vehicles or stationary lifts at the platform can be sufficient. Default is false.
bikeTransport	Boolean	1	If set to true, the user wants to carry a bike on public transport. Default is false.
walkSpeed	IntUnTi	0..1	Deviation from average walk speed in percent. 100 % percent means average speed. Values less than 100 % mean slower, greater than 100 % faster. Default is 100 %.
accessFacilities	pts040:AccessFeatureType	0..*	Specific accessibility/mobility requirements set to access paths and connection paths (with respect to the physical restrictions that apply to them).
excludedModes	pts001:ModeOfTransport	0..*	Public transport modes to be excluded in trip calculation.
excludedSubModes	pts100:SubmodeOfTransport	0..*	Public transport submodes to be excluded in trip calculation.

By using accessFacilities within the structure "TripPreferences" the TripInfoRequest can be restricted to a certain degree of accessibility. Thus the TripInfoResponse shall include or exclude facilities corresponding to the requested AccessFeature according to Table 23.

Table 23 — AccessFeatures

Request	**Response**								
	unknown	**single step**	**stairs**	**escalator**	**moving walkway**	**elevator**	**wheelchair ramp**	**mind the gap**	**undefined access feature type**
unknown	n/a	✓	✓	✓	✓	✓	✓	✓	✓
single step	×	n/a	×	×	✓	✓	✓	✓	×
stairs	✓	✓	n/a	✓	✓	✓	✓	✓	✓
escalator	×	✓	×	n/a	✓	✓	✓	✓	×
moving walkway	×	×	×	×	n/a	✓	✓	×	×
elevator	×	×	×	×	✓	n/a	✓	×	×
wheelchair ramp	×	×	×	×	✓	✓	n/a	×	×
mind the gap	×	×	×	×	✓	✓	✓	n/a	✓
undefined access feature type	✓	✓	✓	✓	✓	✓	✓	✓	n/a
Key ✓ include × exclude									

9 PTS Tables

9.1 pts001: ModeOfTransport

Table 24 enumerates the possible values for type pts001: ModeOfTransport.

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Table 24 — pts001: ModeOfTransport

Code	Reference-English "word"	Comment	Example
0	unknown		
1	air service		
2	gondola cable car service		
3	chairlift service		
4	elevator service		
5	railway service		
6	urban railway service		
7	light railway service		
8	rack rail service		
9	funicular service		
10	bus service		
11	trolleybus service		
12	coach service		
13	taxi service		
14	rental vehicle		
15	water transport service		
16	cable drawn boat service		
255	undefined public transport service		

9.2 pts017: ServiceDeliveryPointType

Table 25 enumerates the possible values for type pts017: ServiceDeliveryPointType.

Table 25 — pts017: ServiceDeliveryPointType

Code	Reference-English "word"	Comment	Example
0	unknown		
1	platform number		
2	terminal gate		
3	ferry berth		
4	harbour pier		
5	landing stage		
6	bus stop		
255	undefined service delivery point		

9.3 pts030: ContactType

Table 26 enumerates the possible values for type pts030: ContactType.

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