PD ISO/TS 18234-8:2012

BSI Standards Publication

Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format

Part 8: Congestion and Travel Time application (TPEG1-CTT)

National foreword

This Published Document is the UK implementation of ISO/TS 18234-8:2012.

The UK participation in its preparation was entrusted to Technical Committee EPL/278, Road transport informatics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 76393 9

ICS 03.220.01; 35.240.60

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 April 2013.

Amendments issued since publication

Date	Text affected

PD ISO/TS 18234-8:2012

TECHNICAL SPECIFICATION

ISO/TS 18234-8

First edition
10-01-2012

Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format —

Part 8: **Congestion and Travel Time application (TPEG1-CTT)**

Systèmes intelligents de transport — Informations sur le trafic et le tourisme via les données de format binaire du groupe d'experts du protocole de transport, génération 1 (TPEG1) —

Partie 8: Application bouchons et temps de voyage (TPEG1-CTT)

Reference number
ISO/TS 18234-8:2012(E)

Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/TS 18234-8 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

ISO/TS 18234 consists of the following parts, under the general title *Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format*:

— *Part 1: Introduction, numbering and versions (TPEG1-INV)*

— *Part 2: Syntax, Semantics and Framing Structure (SSF)*

— *Part 3: Service and Network Information (SNI) application*

— *Part 4: Road Traffic Message (RTM) application*

— *Part 5: Public Transport Information (PTI) application*

— *Part 6: Location referencing applications*

— *Part 7: Parking Information (TPEG1-PKI)*[1]

— *Part 8: Congestion and travel time application (TPEG1-CTT)*

— *Part 9: Traffic event compact (TPEG1-TEC)*[2]

---

1) To be published.

2) To be published.

— *Part 10: Conditional access information (TPEG1-CAI)*[3)]

— *Part 11: Location Referencing Container (TPEG1-LRC)*[4)]

3) To be published.

4) To be published.

Introduction

TPEG technology uses a byte-oriented stream format, which may be carried on almost any digital bearer with an appropriate adaptation layer. TPEG-messages are delivered from service providers to end-users, and are used to transfer application data from the database of a service provider to a user's equipment.

This Technical Specification describes the Congestion and Travel Time application in detail.

TPEG1-CTT is one of several applications required to provide a fully comprehensive traffic and travel information service, for example a service is likely to need public transport information, parking information and weather information. These are or will be the subject of other TPEG-application specifications.

TPEG1-CTT has been derived from earlier work, named "idio" via the FM data broadcasting system, DARC. The "idio" is the TTI service which was officially launched starting in 2001 all over South Korea. The TPEG1-CTT has become the most popular service of the many applications of DMB, after being tested and proven via both the terrestrial and satellite DMB (Digital Multimedia Broadcasting) networks.

The Broadcast Management Committee of the European Broadcast Union (EBU) established the B/TPEG project group in autumn 1997 with the mandate to develop, as soon as possible, a new protocol for broadcasting traffic and travel-related information in the multimedia environment. The TPEG technology, its applications and service features are 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.

One year later in December 1998, the B/TPEG group produced its first public specifications. Two documents were released. ISO/TS 18234-2,TPEG-SSF, describes the syntax, semantics and framing structure which are used for all TPEG applications. ISO/TS 18234-4, TPEG-RTM describes the *first* application for Road Traffic Messages.

ISO/TC 204/WG 10, established a project group comprising the members of B/TPEG and they have continued the work concurrently since March 1999. Since then two further parts have been developed to make the initial complete set of four parts, enabling the implementation of a consistent service. ISO/TS 18234-3, TPEG-SNI describes the Service and Network Information Application, which is likely to be used by all service implementations to ensure appropriate referencing from one service source to another. ISO/TS 18234-1, TPEG-INV, completed the work, by describing the other parts and their relationships; it also contains the application IDs used within the other parts.

In April 2000, the B/TPEG group released revised Parts 1 to 4, which had all been reviewed and updated in light of the initial implementation results. Thus, a consistent suite of specifications, ready for wide-scale implementation, was submitted to the ISO commenting process.

In November 2001, after extensive response to the comments received and from many internally suggested improvements, all four parts were completed for the next stage: the Parallel Formal Vote. But a major step forward has been to develop the so-called TPEG-Loc location referencing method, which enables both map-based TPEG-decoders and non map-based ones to deliver either map-based location referencing or human readable information. ISO/TS 18234-6, TPEG-Loc, is now a separate specification and is used in association with the other parts of ISO/TS 18234 to provide comprehensive location referencing. Additionally, ISO/TS 18234-5, the Public Transport Information Application (TPEG-PTI) has been developed and been through the commenting process.

This Technical Specification provides a full specification for the Congestion and Travel Time application.

Today, traffic congestion has become a serious problem in urban areas. Some traffic congestion is considered to be caused by drivers who do not have access to traffic information. Therefore, timely provision of congestion and travel time messages to these drivers could decrease traffic congestion.

TPEG Congestion and Travel Time Messages are designed to provide information to various kinds of receivers using digital broadcasting and Internet technologies. A Congestion and Travel Time Message may be presented to the user in many different ways, including text, audio, or graphically using standard formats application which is designed to allow the efficient and language independent delivery of road information directly from service provider to end-users. The information provided relates to event and some status information on the road network and on associated infrastructure affecting a road journey. For example, limited information about abnormal operation of links in the network may be included, e.g. ferries, lifting-bridges.

The term "application" is used in TPEG specifications to describe specific applications, such as in this case the Congestion and Travel Time application, which comprises three information containers: the Message Management Container, the Application Event Container and the TPEG-Location Container. The first two Containers are fully described herein and the TPEG-Location Container is described in ISO/TS 18234-6.

Each TPEG application (e.g. TPEG1-CTT) is assigned a unique number, called the Application Identification (AID). An AID is defined whenever a new application is developed. The AID is used within the TPEG-Service and Network Information Application (ISO/TS 18234-3 to indicate how to process TPEG content and allows routing of data to an appropriate application decoder.

AID = 0004 is assigned to the TPEG-Congestion Travel Time Message application described in this Technical Specification.

A hierarchical methodology has been developed to allow the creation of messages from a set of TPEG1-CTT tables, which are essentially word oriented and cover most needs.

Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format —

Part 8:
Congestion and Travel Time application (TPEG1-CTT)

1 Scope

This Technical Specification establishes a method for delivering Congestion and Travel Time Messages within a TPEG service.

2 Conformance

The TPEG1-CTT has been tested and proven via both terrestrial and satellite Digital Multimedia Broadcasting (DMB) networks since 2006 in Korea.

3 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/TS 18234-2, *Traffic and Travel Information (TTI) — TTI via Transport Protocol Expert Group (TPEG) data-streams — Part 2: Syntax, Semantics and Framing Structure (SSF)*

ISO/TS 18234-3, *Traffic and Travel Information (TTI) — TTI via Transport Protocol Expert Group (TPEG) data-streams — Part 3: Service and Network Information (SNI) application*

4 Terms and definitions

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

NOTE Definitions in this Technical Specification are in some cases derived from definitions found in the DATEX Data Dictionary (ENV 13106). TPEG-RTM is completely focused on delivering messages to end-users. For this key operational reason some definitions have a different meaning from that found in the DATEX Data Dictionary. These differences are noted in a note to the term.

4.1
cross reference information
CRI
pointer to one or more messages in the same, or another TPEG service

4.2
event description
EVE
part of a message describing an event, unplanned or planned, affecting the road or transport network, or status information, including qualifiers and quantifiers

NOTE This definition varies from the DATEX Data Dictionary definition (ENV 13106).

EXAMPLE The transport network in the case of a ferry carrying vehicles between parts of the road network.

4.3
location referencing
method for referencing locations to facilitate the exchange of location related information between different systems

NOTE See ISO/TS 18234-6 for full details of the location referencing container explanations.

4.4
message
collection of coherent information sent through an information channel which describes an event or a collection of related events, or status information and including message management information

NOTE The latter is contained in the message header.

4.5
message expiry time
MET
date and time in accordance with ISO 8601 when the message should be deleted from all TPEG-decoders

NOTE Used for message management purposes.

4.6
message generation time
MGT
date and time stamp in accordance with ISO 8601 originated at the actual time and point of message generation

NOTE Used for message management purposes.

4.7
message identifier
MID
unique identifier for a sequence of versions of one message relating to a particular event of a particular service component

4.8
position
where an event has taken place in relation to the road

NOTE The driving lanes are numbered according to the usual local practice, i.e. driving lane 1 is the lane nearest to the hard shoulder. In countries which drive on the left, driving lanes are hence numbered from left-to-right, and in countries driving on the right, from right-to-left.

EXAMPLE Driving lane 1, hard shoulder, central reservation.

4.9
severity factor
SEV
amount of disruption to traffic likely to be caused by a particular event

NOTE This definition varies from the DATEX Data Dictionary definition (ENV 13106).

4.10
start time
STA
date and time in accordance with ISO 8601 at which an event, or status information, began or is scheduled to begin

NOTE 1 Used for presentation to the end-user.

NOTE 2 This definition varies from the DATEX Data Dictionary definition (ENV 13106).

4.11
status
characteristic of an element of the transport system for which a value can be established at all times

NOTE 1 This relates to an information stream.

NOTE 2 Values can be normal or deviating from normal.

4.12
stop time
STO
date and time in accordance with ISO 8601 at which an event, or status information, ended or is scheduled to end

NOTE 1 Used for presentation to the end-user.

NOTE 2 This definition varies from the DATEX Data Dictionary definition (ENV 13106).

4.13
time schedule information
TSI
information about the time schedule for repetitive events within the start and stop time

4.14
unverified information
UNV
information indicating that a message includes information from an unverified source

4.15
version number
VER
serial number to distinguish successive messages having a particular message identifier

NOTE Version numbers are used incrementally, allowing the progress of an event to be tracked from first notification (VER = 0), through updates, to eventual cancellation (VER = 255).

5 Abbreviated terms

For the purposes of this Technical Specification, the following abbreviated terms apply.

AID	Application Identification
BPN	Broadcast, Production and Networks (an EBU document publishing number system)
B/TPEG	Broadcast/TPEG (the EBU project group name for the specification drafting group)
CEN	Comité Européen de Normalisation
CRI	Cross Reference Information
DAB	Digital Audio Broadcasting
DMB	Digital Multimedia Broadcasting
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union
ETSI	European Telecommunications Standards Institute
EVE	Event Description
ILOC	Intersection location
INV	Introduction, Numbering and Versions (see ISO/TS 18234-1)
IPR	Intellectual Property Right(s)
ISO	International Organization for Standardization
MET	Message Expiry Time
MGT	Message Generation Time
MID	Message Identifier
OSI	Open Systems Interconnection
PTI	Public Transport Information (see ISO/TS 18234-5)
RDS-TMC	Radio Data System – Traffic Message Channel
RFU	Reserved for future use (not necessarily abbreviated)
RTM	Road Traffic Message application
SEV	Severity Factor
SNI	Service and Network Information application (see ISO/TS 18234-3)
SSF	Syntax, Semantics and Framing Structure (see ISO/TS 18234-2)
STA	Start Time
STO	Stop Time
TPEG	Transport Protocol Experts Group
TSI	Time Schedule Information
TTI	Traffic and Travel Information
UAV	Unassigned value

6 Definitions

6.1 General

Definitions in this Technical Specification are in some cases derived from definitions found in the DATEX Data Dictionary.

6.1.1 Message

A collection of coherent information sent through an information channel.

Describes an event or a collection of related events, or status information and including message management information. The latter is contained in the message header.

6.1.2 Status

Characteristics of an element of the transport system for which at all times a value can be established. Status relates to an information stream. Values can be normal or deviating from normal.

6.2 Message Management

6.2.1 Message Identification – Abbreviation: MID

Message Identification (MID) is one of the message identifiers in relation to each event of service components.

A unique identifier for a sequence of versions of one message relates to a particular event of a particular service component.

6.2.2 Version Number - Abbreviation: VER

Version number (VER) means the sequential numbers to identify consecutive messages with the same MID. When an event occurs, VER is used in such a manner that is to be increased sequentially from the initial MID of 0 in accordance with updates of information.

Serial number is used to distinguish successive messages having a particular Message Identifier. Version numbers are used incrementally allowing the progress of an event to be tracked from first notification (VER = 0), through updates, to eventual cancellation (VER = 255).

This definition varies from the DATEX Data Dictionary definition.

6.2.3 Message generation data and time – Abbreviation: MGT

The stamp of message generation data and time (MGT) is made to the reference of the real time when the message is generated and used for the purpose of message management.

Date and Time stamp originated at the actual time and point of message generation (used for message management purposes).

6.3 Locations - Abbreviation: Loc

Locations (Loc) mean the coordinates or ID of the road or network of the event or status information.

See TPEG-LOC for full details of the Location Referencing container explanations.

7 CTT Application Overview

7.1 Introduction

The TPEG-Congestion and Travel Time application allows for a wide range of TPEG-decoder types and presentation possibilities to be supported. It may support simultaneously a wide range of TPEG-decoder types, from sophisticated agent TPEG-decoders serving navigation systems, through to simple TPEG decoders only able to decode 'top-level' information. Some of the possibilities include digital map-based TPEG-decoders, GPS TPEG-decoders without digital map, and in-vehicle, fixed or portable TPEG-decoders without either GPS or digital map. Congestion and Travel Time messages may be presented to the user in many different ways, including by text, by synthesized speech, graphically, or in route calculation.

Each Congestion and Travel Time message will need to include at least some of the following elements to satisfy the user requirements:

— Target user information;

— The geographical location to which the information relates;

— The position on the roadway, or adjacent area affected;

— Whether the information has been verified;

— The time period for which the message remains valid;

— The expected travel time;

— Further associated information.

NOTE 1 Part of each TPEG-message has a proper location reference. TPEG-CTT uses a location referencing system known as TPEG1-LOC (ISO/TS 18234-6) and Intelligent Transport Systems (ITS) Location referencing for geographic databases for pre-coded profile (ISO 17572-2).

Different road users may have disparate needs and interests in various road traffic messages. Some may be useful to many users while others may be relevant to only a few users, e.g. drivers of heavy goods vehicles. Structure in the coding of messages provides for each to be suitably client-filtered. Filtering can be based on many elements, including phrases, attributes, location, times, and the severity of the message on the journey. No additional coding structure is needed.

NOTE 2 Part of each TPEG-message is a location reference. TPEG technology uses one location referencing system across all applications known as TPEG-Loc (ISO/TS 18234-6). This has the potential of enabling messages from different TPEG streams to be linked by their common location. Each message is about a particular location. The location may be quite specific, a single point on the road network, a road segment between two given points, or it may be a more general area, often with vaguer boundaries. The way in which the location is coded is important as it allows information to be filtered by TPEG-decoders and integrated with route planning and navigation systems.

The descriptive phrase and attribute part of the message about an incident allows a user to make a judgement about the likely progress of a journey, and may either directly or indirectly provide advice allowing travel plans to be revised. To allow appropriate decisions to be made, various data about the incident may be required. If for example, an accident occurs, in general the effect the incident causes will change over time. Immediately following an accident, there will be some disruption to traffic flow, the disruption will increase as traffic builds up behind the incident, then begin to lessen as the accident is cleared, and eventually traffic flow will return to normal.

Each incident has a unique reference number (MID), and the changing progress of an incident is tracked by including a VER with each message. The service provider will allocate a new MID and VER = 0 for a new message, subsequent updates to the same event are indicated by allocation of the next higher VER. A MID and version number 255 has the effect of cancelling all earlier versions of the same message.

There are a few particular things to note about MID and VER. The first is that VER do NOT "wrap around" from version 255 to version 0. In the unlikely event that more than 254 updates to a specific incident is required, service providers must generate a 'new' message, using a new MID (and VER = 0), and cancel the earlier message using Version number = 255. A road traffic message uses two mandatory elements: MID and VER = 255, which, used in combination, cancels earlier sent messages with the same message ID.

The shortest non-cancellation message contains MID, VER, LOC and EVE; it should be noted that once a location reference is used, one or more corresponding event descriptions must be included.

The second thing to note is that a message identification number, once used, and then cancelled, must not be re-used until as long a time-period as possible has elapsed. Ideally, a service provider should use all 65 535 possible message identification numbers before re-using a previously used MID.

This use of message identification numbers and version numbers will ensure that TPEG-decoders can unambiguously identify the latest versions of each road traffic message, even if messages are received by the TPEG-decoder 'out of sequence', when for example an earlier version of a message arrives after a subsequent version, which updates the information that was originally transmitted.

Message identifier and version are the two elements that are mandatory for every message. They are used for message management purposes in the user's TPEG-decoder, and are not intended for direct display to the user.

All other elements of a message are optional and used when appropriate. These include elements relating to time, the specific or general location to which the message relates, and which particular driving lanes or carriageway are affected. The service provider is also able to make a judgement on the severity of the effect the incident may have upon journey times, and whether an authoritative reporter has verified the information. As a result of a particular message, a user may wish to access more information, perhaps a suggested diversion route, or even to study alternative modes of transport. An easy means of accessing additional information, for example public transport timetables, within a different TPEG application is provided with the cross-referencing information.

7.2 TPEG-Message Concept

TPEG Applications follow an overall concept, which is indicated by the diagrams in this subclause to give a quick and easily understood human concept, before a more technical description is given.

TPEG event messages may be seen as being built from three different parts, or containers, each with its own clear task: a message management container, an application event container (in this application, the CTT Container) and a location Container, as shown in Figure 1. Location referencing details are described in TPEG-Loc (ISO/TS 18234-6).

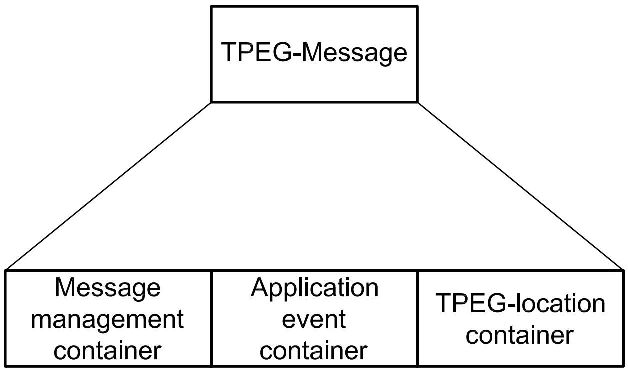

Figure 1 — The three containers

The message management container handles all the elements that allow message tracking, quick identification, validity and other "administrative" tasks. The elements in the application event container are used to describe, with the end-user in mind, the reason for the message, what has happened, and what an end-user may wish to know. The location container describes the location, route or an area for which the event message is applicable.

Regardless of delivery method, it is assumed that a TPEG decoder will "see" a number of TPEG-Messages, one after the other, where they may be messages which are defined by one or more Applications. Figure 2 shows this concept where TPEG-CTT messages are streamed together.

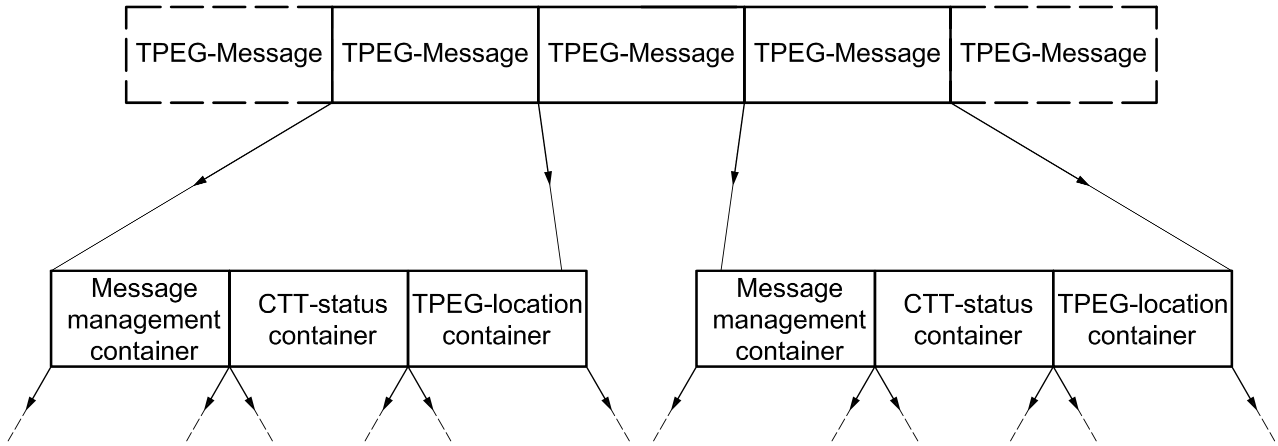

Figure 2 — TPEG-Messages showing Message Management, Event and Location Containers

A TPEG-Message carries Traffic and Travel Information. Figure 2 also shows that it comprises three "Containers": for message management content, event content and location content (both machine and human readable data).

7.3 Elements of TPEG Congestion and Travel Time

TPEG Message Container is composed of Congestion and Travel Time Information including Message Management Container, Event Container and Location Container.

Figure 3 shows a TPEG-CTT message structure, which has three containers.

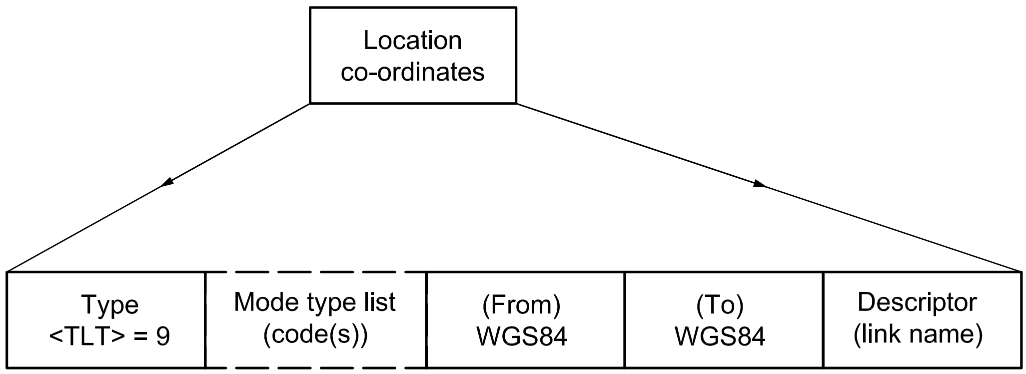

Figure 3 — Location referencing using On-the-fly Link ID (TLT9)

7.4 Message Management

7.4.1 Date and Time

The composition elements delivered by Message Container of TPEG-Congestion and Travel Time Information are used to manage the information received in a TPEG-Decoder. Referring to the Date and Time among composition elements of Message Management Container, TPEG-Congestion and Travel Time Application, however, doesn't contain the start and stop time, message removal time nor schedule information, differently from the other applications of TPEG (i.e. Road Traffic Message and Public Transportation Information). It is why the transmission of current traffic information of each location is essential for the Congestion and Travel Time Information Application differently from the other TPEG

Applications including Road Traffic Message Application in which the unexpected incidents and/or the planned event should be transmitted under the control of messages in accordance with the changing status from time to time at all times.

7.4.1.1 Message Generation Time

A Message Generation Time may also be included with each message. This is not intended to display for the end user, as its primary purpose is to enable a service provider to track a message through the distribution and broadcast infrastructure from end-to-end.

If a service provider intends to make use of the service Component Reset feature provided by the Service and Network Information (TPEG-SNI) Application [5], the inclusion of the Message Generation Time with every non-cancellation (MID and VER = 255) message is mandatory.

7.5 Status Description

The description of status (event) information shall be made in a layered structure and such a layered structure is to secure the compatibility of terminal according to the extension of standards and the addition of components.

Two types of the highest classes defined by event container are available in the current version of this Technical Standard and the addition of class and the extension of lower class are possibly accomplished only by adding identifiers.

7.5.1 Congestion and Travel Time

This class describes the congestion and travel time of the roads. The lower classes relating to the congestion and travel time are as follows:

- Average Speed;
- Travel Time;
- Link Delay;
- Congestion Type.

7.5.2 Prediction of Congestion and Travel Time

This class describes the prediction information of congestion and travel time. The lower classes relating to the Prediction of Congestion and Travel Time are as follows:

- Prediction of Average Speed;
- Prediction of Travel Time;
- Congestion tendency.

7.5.3 Additional Information

This class describes in text format not only the Congestion and Travel Time information and its relating additional information but also the supplementary information with reference to each message.

7.6 Location Referencing

Each Message should be related or matched to real-world objects that are called Locations. Each Message also is required to contain a description for the location, to which the message relates. Simple TPEG-decoders without navigational systems or digital maps will require the location to be expressed as character strings, using familiar place names and road numbers to be presented either as text or speech to the end user. Intelligent systems, such as digital mapped-based TPEG-decoders, require the location information to be expressed in a machine-readable coded form.

Within the “Location Co-ordinates” elements, TPEG-Loc combines both requirements in a way that permits machine interpretation while simultaneously ensuring human understandable. The specification for Location Referencing is fully described in TPEG1-LOC and ISO 17572-2.

8 CTT Container

8.1 Structure of CTT Message

The following indicates the structure of a TPEG-Congestion and Travel Time message in a hierarchical sense and an “internal hierarchical index” to the message content — message management, event description — structures and finally coding, for the message management and CTT-event containers, as shown in Figure 4.

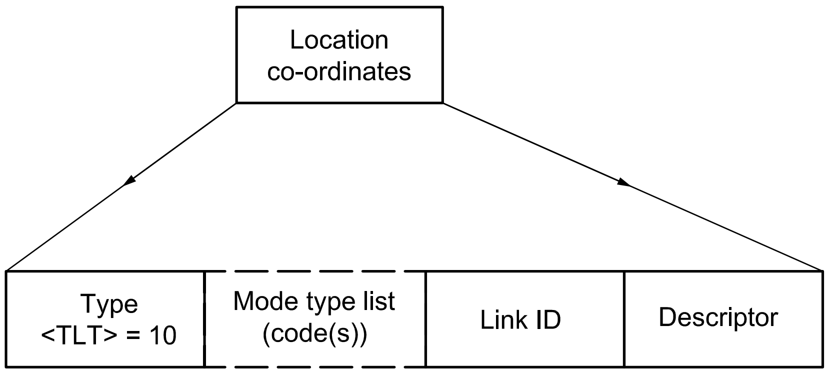

Figure 4 — Location referencing by Predefined Link ID (TLT 10)

MANDATORY ELEMENTS

congestion_traveltime_information (message_id, version_number):

DATE AND TIME ELEMENTS

message_generation_time

LOCATION ELEMENTS

CTT-Loc:

CONGESTION DESCRIPTIVE ELEMENTS

status([ ])

8.2 CTT Application Component Frame

8.2.1 Coding Syntax and Semantics

The Congestion and Travel Time Application is coded according to the syntax and semantics described in TPEG-SSF (ISO/TS 18234-2).

8.2.2 Component Frame

Subclause 8.2.3 defines the Congestion and Travel Time message application component frame. The service component id (scid) is allocated dynamically by the TPEG-SNI application, as described in TPEG-SNI (ISO/TS 18234-3).

Service Component Identifier(SCID) is dynamically allocated by TPEG-SNI Applications.

Each < congestion_traveltime_information_message > element should only occur at most once, in the component frame.

CRC of < congestion_traveltime_information_message > uses ITU polynomial $x^{16}+x^{12}+x^5+1$.

The calculation is made for all bytes except the “Number of Message” contained in < congestion_traveltime_information_message > . The CRC calculation method follows TPEG-SSF Annex C.

<component_frame(x)>:=	: Congestion and Travel Time Application
<intunti>(scid),	: Service Component Identifier(scid=x)
<intinli>,	: Length of application data in bytes
<crc>,	: Header CRC
	: Application Data
<intunti>(n),	: Number of message
n*<ctt_message>,	: Congestion and Travel Time messages
<crc>;	: CRC check of all messages

Figure 5 — Coding of CTT Application Component Frame

9 Message Management Container

9.1 Mandatory Elements

A CTT Message consists of at least two mandatory elements, the Message Identifier and Version Number.

9.1.1 Message identifier(MID)

Message Identifier is described in 4.8.

message_id(number) {range: 0 .. 65535}

9.1.2 Version number(VER)

Version number is described in 4.16.

version_number(number) {range: 0 .. 255}

9.2 Date and Time Elements

Date and Time Elements are described in 4.6, 4.7, 4.11 and 4.13

9.2.1 Message Generation Time(MGT)

The message-element Message Generation Time is described in 4.7

message_generation_time(date&time) {resolution: seconds}

9.2.2 Start time (STA)

The message-element start time is described in 4.11.

start_time (date and time) {resolution: minutes}

9.2.3 Stop time (STO)

The message-element stop time is described in 4.13.

stop_time (date and time) {resolution: minutes}

9.2.4 Time schedule information (TSI)

The CTT-component time schedule information is described in 4.14

repetitive_time (time) {resolution: minutes}

non_repetitive_time (date and time) {resolution: seconds}

9.3 Coding of Message Management Container

<ctt_message>:=	
<intunli>(mid),	: MID
<intunti>(ver),	: VER
<intunli>	: Message length in Byte
<bitswitch>(selector),	: Message elements
if(selector=xxxxxxx1)<time_t>,	: MGT
if(selector=xxxxxx1x)<intunlo>,	: Not in use (Reserved for future use)
if(selector=xxxxx1xx)<intunlo>,	: Not in use (Reserved for future use)
if(selector=xxxx1xxx)<intunlo>,	: Not in use (Reserved for future use)
if(selector=xxx1xxxx)<intunlo>,	:Not in use (Reserved for future use)
if(selector=xx1xxxx)<intunlo>,	: Not in use (Reserved for future use)
if(selector=x1xxxxxx)<intunlo>,	:Not in use (Reserved for future use)
if(selector=1xxxxxxx)<ctt_components>;	:CTT message Component

Figure 6 — CTT Message

<ctt_components>:=	
<intunti>(n),	: Number of Component
n*<ctt_component()>;	: CTT Message Component

Figure 7 — CTT components template

<ctt_component(x)>:=	: CTT Message Component Template
<intunti>(id),	: Identifier(id)
<intunti>(n),	: Component Length in Byte(n)
n*<byte>;	: Component Data

Figure 8 — CTT component template

<ctt_component(x)>:=	: CTT-Loc
<intunti>(id),	: Identifier(id)
<intunli>(n),	: Component data length in byte(n)
<tpeg_loc_container>;	: TEPG-Location container

Figure 9 — CTT component — TPEG-Loc link

10 Status Container

10.1 Status Description

As described in 6.1, the Status Description uses a hierarchical approach to define status in a number of levels, which allows recursive coding. It is not only for the main purpose to maintain initial compatibility of terminal in relation to the addition and change of CTT service but also for the compatibility with other application.

10.1.1 Level One Classes and their Description

As described in Section 6.1, the Status Description uses a hierarchical approach to define status in a number of levels

Class	Description
CTT_Status	Description of CTT status on a transportation network and in any of road section
Prediction_CTT_Status	Description of predicted Congestion and Travel Time status on a transportation network and in any of road section
Additional Information	Description in text format of information additional to CTT status

10.2 Coding of CTT Information Container

<ctt_component(80)>:=	: Congestion and Travel Time Status
<intunti>(id),	: Identifier, id = 80 hex
<intunli>(n),	: Component Data Length in Byte(n)
m*<status_component()>;	: status component

Figure 10 — CTT Status

<status_component(x)>:=	: status component Template
<intunti>(id),	: identifier, id = x
<intunti>(n),	: component data length in byte (n)
n*<byte>;	: component data

Figure 11 — Status Component Template

<status_component(00)>:=	: average link speed
<intunti>(id),	: identifier, id = 00 hex
<intunti>(n),	: component data length in byte(n)
<intunti>;	: speed(km/h)

Figure 12 — Average link speed

<status_component(01)>:=	: travel time
<intunti>(id),	: identifier, id = 01 hex
<intunti>(n),	: component data length in byte(n)
<intunli>;	: time(second)

Figure 13 — Travel time

<status_component(02)>:=	: link delay
<intunti>(id),	: identifier, id = 02 hex
<intunti>(n),	: component data length in byte(n)
<intunli>;	: time(second)

Figure 14 — Link delay

<status_component(03)>:=	: congestion type
<intunti>(id),	: identifier, id = 03 hex
<intunti>(n),	: component data length in byte(n)
<ctt03>;	: congestion type

Figure 15 — Congestion type

<ctt_component(81)>:=	: Prediction of Congestion and Travel Time Status
<intunti>(id),	: identifier, id = 81 hex
<intunti>(n),	: component data length in byte(n)
m*<prediction_status_component()>;	: prediction status component

Figure 16 — Prediction CTT Status

<prediction_status_component(x)>:=	: prediction status component Template
<intunti>(id),	: identifier, id = x
<intunti>(n),	: component data length in byte(n)
n*<byte>;	: component data

Figure 17 — Prediction Status Component Template

<prediction_status_component(00)>:=	: Prediction average link speed
<intunti>(id),	: identifier, id = 00 hex
<intunti>(n),	: component data length in byte(n)
<intunti>,	: speed(km/h)
<intunlo>;	: prediction time(UTC)

Figure 18 — Prediction average link speed

<prediction_status_component(01)>:=	: Prediction travel time
<intunti>(id),	: identifier, id = 01 hex
<intunti>(n),	: component data length in byte(n)
<intunli>,	: time(sec)
<intunlo>;	: prediction time(UTC)

Figure 19 — Prediction travel time

<prediction_status_component(02)>:=	: congestion type
<intunti>(id),	: identifier, id = 02 hex
<intunti>(n),	: component data length in byte(n)
<ctt04>;	: Congestion tendency

Figure 20 — Congestion tendency

<ctt_component(8A)>:=	: Additional Information
<intunti>(id),	: identifier, id = 8A hex
<intunli>(n),	: component data length in byte(n)
<loc41>	: Language Code
<short_string>	: Additional Information

Figure 21 — Additional information

11 TPEG CTT Tables

11.1 Congestion Type Table

TPEG Table CTT 01 (CTT 01): Congestion Type			
Code	**CEN-English 'Word'**	**Comments**	**Examples**
0	unknown		
1	Free flow Traffic		
2	Slow traffic		
3	Delayed traffic		
4	Congested traffic		
..	End of Ver 1.00		
..			
255			

11.2 Congestion Tendency Table

TPEG Table CTT 02 (CTT 02): Congestion Tendency			
Code	**CEN-English 'Word'**	**Comments**	**Examples**
0	unknown		
1	Increasing congestion		
2	Decreasing congestion		
3	Static congestion		
..	End of 1.00		

..			
255			

Annex A
(informative)

Conversion formulae

The road traffic message application carries information relating to distance and speed in units of metres and metres/second respectively. TPEG-decoders will present this information to users in appropriate or chosen units.

The following conversion formulae should be used by decoders. This will ensure that *all* decoders receiving a particular input will display the same result. It also permits a service provider to generate values which are deterministic (i.e. know that a particular input value will produce a given result in a decoder).

A.1 Distance

Decoders receive distance information in units of metres. Decoders shall convert to other units for display and/or control using the following conversion formulae:

y: = ROUND (m * 1,094)

s:= ROUND (m * 0,0006214)

n:= ROUND (m * 0,0005400)

where

m is the input value in metres;

y is the output value in yards;

s is the output value in miles;

n is the output value in nautical miles.

A.2 Speed

Decoders receive speed information in units of metres/second (m/s). Decoders shall convert to other units for display and/or control using the following conversion formulae:

k:= ROUND (m/0,2778)

s:= ROUND (m/0,4770)

t:= ROUND (m/0,5148)

where

m is the input value in metres/second;

k is the output value in km/hour;

s is the output value in miles/hour;

t is the output value in knots.

A.3 Length, height and width

Decoders receive length, height and width information in units of centimetres. Decoders shall convert centimetres to other units for display and/or control using the following conversion formulae:

i: = ROUND (c * 0,3938)

f:= ROUND (c*0,03282)

where

c is the input value in millimetres*10;

i is the output value in inches;

f is the output value in feet.

Bibliography

[1] ENV 13106, *Road transport and traffic telematics — DATEX traffic and travel data dictionary*

[2] EN 300-401 V1.3.3:2001-05, *Radio Broadcasting Systems: Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers*

[3] ISO 14819-2, *Traffic and Traveller Information (TTI) — TTI messages via traffic message coding — Part 2: Event and information codes for Radio Data System — Traffic Message Channel (RDS-TMC)*

[4] ISO/IEC 7498-1, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model*

[5] EVIDENCE. *Detailed ILOC Location Referencing Rules Specifications Version Nr 1.0*, dated 1999-06-28, (also logged as EBU B/TPEG PG 99/102)

[6] Recommendation ITU535-1 *Use of the term UTC*

[7] ISO/TS 18234-1, *Traffic and Travel Information (TTI) — TTI via Transport Protocol Expert Group (TPEG) data-streams — Part 1: Introduction, numbering and versions*

[8] ISO 18234-4, Traffic and Travel Information (TTI) — TTI via Transport Protocol Expert Group (TPEG) data-streams — Part 4: Road Traffic Message (RTM) application

[9] ISO/TS 18234-5, *Traffic and Travel Information (TTI) — TTI via Transport Protocol Expert Group (TPEG)* data-streams — Part 5: Public Transport Information (PTI) application

[10] ISO/TS 18234-6, Traffic and Travel Information (TTI) — TTI via Transport Protocol Expert Group (TPEG) data-streams — Part 6: Location referencing applications

[11] ISO 17572-2, *Intelligent transport systems (ITS) — Location referencing for geographic databases — Part 2: Pre-coded location references (pre-coded profile)*

[12] ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ICS 35.240.60, 03.220.01

Price based on 20 pages

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

bsi.

...making excellence a habit.™