TECHNICAL SPECIFICATION

ISO/TS 21219-1

First edition
2016-05-01

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

Part 1: Introduction, numbering and versions (TPEG2-INV)

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

Partie 1: Introduction, numerotage et versions (TPEG2-INV)

Reference number
ISO/TS 21219-1:2016(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*, in cooperation with the Traveller Information Services Association (TISA), TPEG Applications Working Group through Category A Liaison status.

ISO/TS 21219 consists of the following parts, under the general title *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2):*

— *Part 1: Introduction, numbering and versions*

— *Part 2: UML modelling rules*

— *Part 3: UML to binary conversion rules*

— *Part 4: UML to XML conversion rules*

— *Part 5: Service framework*

— *Part 6: Message management container*

— *Part 10: Conditional access information*

— *Part 18: Traffic flow and prediction application*

— *Part 19: Weather information application*

The following parts are under preparation:

— *Part 9: Service and network information*

— *Part 14: Parking information application*

— *Part 15: Traffic event compact*

— *Part 16: Fuel price information application*

The following parts are planned:

— *Part 7: Location referencing container*

— *Part 11: Universal location reference*

— *Part 21: Geographic location referencing*

— *Part 22: OpenLR location referencing*

— *Part 23: Road and multimodal routes application*

— *Part 24: Light encryption*

— *Part 25: Electromobility information*

Introduction

History

TPEG technology was originally proposed by the European Broadcasting Union (EBU) Broadcast Management Committee, who established the B/TPEG project group in the autumn of 1997 with a brief to develop, as soon as possible, a new protocol for broadcasting traffic and travel-related information in the multimedia environment. TPEG technology, its applications and service features were designed to enable travel-related messages to be coded, decoded, filtered and understood by humans (visually and/or audibly in the user's language) and by agent systems. Originally, a byte-oriented data stream format, which may be carried on almost any digital bearer with an appropriate adaptation layer, was developed. Hierarchically structured TPEG messages from service providers to end-users were designed to transfer information from the service provider database to an end-user's equipment.

One year later in December 1998, the B/TPEG group produced its first EBU specifications. Two documents were released. Part 2 (TPEG-SSF, which became ISO/TS 18234-2) described the Syntax, Semantics and Framing structure, which was used for all TPEG applications. Meanwhile, Part 4 (TPEG-RTM, which became ISO/TS 18234-4) described the first application, for Road Traffic Messages.

Subsequently, in March 1999, CEN TC 278/WG 4, in conjunction with ISO/TC 204/WG 10, established a group comprising members of the former EBU B/TPEG and this working group continued development work. Further parts were developed to make the initial set of four parts, enabling the implementation of a consistent service. Part 3 (TPEG-SNI, ISO/TS 18234-3) described the Service and Network Information Application, used by all service implementations to ensure appropriate referencing from one service source to another.

Part 1 (TPEG-INV, ISO/TS 18234-1) completed the series by describing the other parts and their relationship; it also contained the application IDs used within the other parts. Additionally, Part 5, the Public Transport Information Application (TPEG-PTI, ISO/TS 18234-5), was developed. The so-called TPEG-LOC location referencing method, which enabled both map-based TPEG-decoders and non-map-based ones to deliver either map-based location referencing or human readable text information, was issued as ISO/TS 18234-6 to be used in association with the other applications parts of the ISO/TS 18234 series to provide location referencing.

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

TPEG Generation 2

When the Traveller Information Services Association (TISA), derived from former Forums, was inaugurated in December 2007, TPEG development was taken over by TISA and continued in the TPEG Applications Working Group.

It was about this time that the (then) new Unified Modeling Language (UML) was seen as having major advantages for the development of new TPEG Applications in communities who would not necessarily have binary physical format skills required to extend the original TPEG TS work. It was also realized that the XML format for TPEG described within the ISO/TS 24530 series (now superseded) had a greater significance than previously foreseen; especially in the content-generation segment and that keeping two physical formats in synchronism, in different standards series, would be rather difficult.

As a result, TISA set about the development of a new TPEG structure that would be UML-based; this has subsequently become known as TPEG Generation 2.

TPEG2 is embodied in the ISO/TS 21219 series and it comprises many parts that cover introduction, rules, toolkit and application components. TPEG2 is built around UML modelling and has a core of rules that contain the modelling strategy covered in Parts 2, 3, 4 and the conversion to two current physical formats: binary and XML; others could be added in the future. TISA uses an automated tool to convert from the agreed UML model XMI file directly into an MS Word document file, to minimize drafting errors, that forms the Annex for each physical format.

TPEG2 has a three container conceptual structure: Message Management (Part 6), Application (many Parts) and Location Referencing (Part 7). This structure has flexible capability and can accommodate many differing use cases that have been proposed within the TTI sector and wider for hierarchical message content.

TPEG2 also has many location referencing options as required by the service provider community, any of which may be delivered by vectoring data included in the Location Referencing Container.

The following classification provides a helpful grouping of the different TPEG2 parts according to their intended purpose:

Toolkit parts: TPEG2-INV (Part 1), TPEG2-UML (Part 2), TPEG2-UBCR (Part 3), TPEG2-UXCR (Part 4), TPEG2-SFW (Part 5), TPEG2-MMC (Part 6), TPEG2-LRC (Part 7);

Special applications: TPEG2-SNI (Part 9), TPEG2-CAI (Part 10);

Location referencing: TPEG2-ULR (Part 11), TPEG2-GLR (Part 21), TPEG2-OLR (Part 22);

Applications: TPEG2-PKI (Part 14), TPEG2-TEC (Part 15), TPEG2-FPI (Part 16), TPEG2-TFP (Part 18), TPEG2-WEA (Part 19), TPEG2-RMR (Part 23).

TPEG2 has been developed to be broadly (but not totally) backward compatible with TPEG1 to assist in transitions from earlier implementations, whilst not hindering the TPEG2 innovative approach and being able to support many new features, such as dealing with applications having both long-term, unchanging content and highly dynamic content, such as Parking Information.

This part of ISO/TS 21219 is based on the TISA specification technical/editorial version reference: SP13004.

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

Part 1:
Introduction, numbering and versions (TPEG2-INV)

1 Scope

This part of ISO/TS 21219 defines an index to the complete set of TPEG Generation 2 toolkit components and applications. New applications are enumerated with an Application Identification (AID) as they are added to the TPEG applications family.

This part of ISO/TS 21219 will be updated when such developments occur, to indicate the latest status and the inter-working of the various TPEG specifications. It will be issued as a new editorial version every time a new issue of any other specification is issued. Preliminary AIDs are allocated and managed by TISA and are listed on the TISA homepage www.tisa.org.

2 Terms and definitions

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

2.1
service
collection of different information streams (applications) logically bound together and delivered from a service provider to the end user

2.2
service component
information stream (application) that is part of a *service* (2.1)

Note 1 to entry: A TPEG stream is logically divided into parts known as service components. Each service component carries an application instance. A service component is effectively a “channel” within the multiplex of a TPEG stream. Each stream comprises a number of these “channels” which are identified by the component identifier in TPEG2-SFW and linked to the COID and AID in the TPEG2-SNI application.

3 Abbreviated terms

AID	Application Identification
ARIB	Association of Radio Industries and Businesses (Japan)
ATSC	Advanced Television Systems Committee, Inc. (USA)
B/TPEG	Broadcast/TPEG (the EBU project group name for the TPEG specification drafting group)
CAI	Conditional Access Information
CEN	Comité Européen de Normalisation

CTT	Congestion and Travel Time
DAB	Digital Audio Broadcasting
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union
FPI	Fuel Price Information
GLR	Geographic Location Referencing
INV	Introduction Versioning and Numbering (this Technical Specification)
ISO	International Organization for Standardization
LRC	Location Reference Container
MMC	Message Management Container
PKI	Parking Information
PTI	Public Transport Information
RDS-TMC	Radio Data System – Traffic Message Channel
RTM	Road Traffic Message
SFW	TPEG Service Framework: Modelling and Conversion Rules
SNI	Service and Network Information
TISA	Traveller Information Services Association
TEC	Traffic Event Compact
TFP	Traffic Flow and Prediction
TMC	Traffic Message Channel
TPEG	Transport Protocol Expert Group
TPEG1	Transport Protocol Expert Group – Generation 1 (ISO/TS 18234 and ISO/TS 24530 series)
TPEG2	Transport Protocol Expert Group – Generation 2 (ISO/TS 21219 series)
TTI	Traffic and Traveller Information
UML	Unified Modeling Language

4 Application identification

In order to allow service providers to test new applications within an existing service multiplex, a Test AID is allocated for every application. All client devices shall ignore content flagged by a Test AID. The Test AID is calculated by setting the most significant bit, resulting in an addition of hex 8 000 to the AID. Service components signalled with an AID above 8 000 have, thus, to be ignored by production level devices and shall be used for technical tests only.

In TPEG2, the same application IDs are used, as within TPEG1, but not all applications that are existing as TPEG1 specifications are available as TPEG2 level specifications and vice versa. If there are

specifications for applications within both series, the version numbers indicate which specification is applicable. For example, for TPEG-TEC version 3.0, ISO/TS 18234 series version applies, but starting with version 3.2, ISO/TS 21219-15 is applicable (see Annex A).

Table 1 shows Application Identification Numbers currently allocated.

Table 1 — Currently allocated Application Identification Numbers

AID number (hex)	Application	Abbreviation	Defined in TPEG 2 series
0000	Service and Network Information application	SNI	yes
0001	Road Traffic Message application	RTM	no
0003	Parking Information application	PKI	yes
0004	Congestion and Travel Time application	CTT	no
0005	Traffic Event Compact application	TEC	yes
0006	Conditional Access Information application	CAI	yes
0007	Traffic Flow and Prediction	TFP	yes
0008	Fuel Price Information and availability	FPI	yes
0009	Road and Multimodal Routes	RMR	yes
0010	Weather Information	WEA	yes
AID number (hex)	**Test application**	Not used	
8001	TEST: RTM application	Not used	
8002	TEST: PTI application	Not used	
8003	TEST: PKI application	Not used	
8004	TEST: CTT application	Not used	
8005	TEST: TEC application	Not used	
8006	TEST: CAI application	Not used	
8007	TEST: TFP application	Not used	
8008	TEST: FPI application	Not used	
NOTE Preliminary AIDs are allocated and managed by TISA and are listed on the TISA homepage.			

5 Applications and bearers

The work item for the development of TPEG technology reflected the knowledge at that time about data bearer potential. As a result, the term “high data rate bearers” was used, but no specific definition was placed upon the words “high data rate”. Although by comparison with RDS-TMC running at approximately 80 bits/sec, TPEG technology was indeed aimed at much higher data rate bearers (say around 8 kbits/s or higher). The “position” of TPEG technology in relation to data bearers is now better understood. Adaptation Layer requirements for both Digital Radio (DAB) and the Internet were described and successfully implemented for technical tests. The current development of TPEG technology will be excellently matched both technically and economically to Digital Radio (DAB), Digital Multimedia Broadcasting (DMB), HD Radio and Internet bearers.

Other bearers such as ARIB, ATSC and DVB may be able to offer much higher data rates with economic and technical utility. However, these bearers are highly structured (layered) in their ability to handle transparent data services and they include mechanisms suitable for carousel delivery, which may require a different TPEG data structure before real transparency could be achieved.

6 Other numbers and identifiers

Within TPEG data streams, some other identifying codes are used. These codes like service identifiers and encryption indicators are allocated and maintained by TISA.

TPEG Service Identifiers (**SID**) are used to uniquely identify TPEG services on a worldwide basis.

Encryption Indicators are used to signal compression and encryption algorithms applied to TPEG data.

See TPEG2-SFW and TPEG2-SNI for further details.

Annex A
(informative)

Overview of parts, naming and versions

A.1 General

TPEG2 is partitioned into a number of parts to allow the development, over time, of a wide range of Applications. These parts are given descriptive titles appropriate to their application and usually reduced to a three-letter acronym.

EXAMPLE 1 The TPEG Traffic Event Compact application would be abbreviated to TPEG2-TEC.

Each part has a technical-version number that is allocated to published documents, to allow full management of versions as they are developed and validated. This is indicated by "_v.v", following the technical-version acronym.

Each technical version is allocated an editorial-version number, which is allocated to published documents to allow full management of versions as they are issued. This is indicated by "/nnn", following the title, comprising the title acronym and technical-version number; it is incremented from 001 upwards.

EXAMPLE 2 The second editorial version of the first Traffic Event Compact Application was published as TPEG2-TEC_1.0/002.

In the above context, a new technical version is issued when a technology change is made (e.g. a new feature is added), whereas a new editorial version is issued *only* when simple typing, word or diagram formatting or text descriptions are changed.

Within the TPEG2 SNI application, this technical version number is included, for the used applications, so that devices can select the most appropriate decoder version.

The following section details the complete set of *current* technical-versions and editorial-versions of ISO/TS 21219.

A.2 TPEG document types

A.2.1 Categories

TPEG specifications of the TPEG2 series can be grouped into several categories, depending on their content, purpose (see Table A.1) and form.

— modelling and conversion rules (M);

— service framework (F);

— applications (A);

— toolkits (T);

— profiles (P).

Table A.1 — TPEG2 document type table

ISO designation	Specification document	Document type	Technical version
ISO/TS 21219-1	Introduction, numbering and versions	—	TPEG2-INV_0.6/001
ISO/TS 21219-2	UML modelling rules	M	TPEG2-UMR_1.1/001
ISO/TS 21219-3	UML to binary conversion rules	M	TPEG2-UBCR_1.1/001
ISO/TS 21219-4	UML to XML conversion rules	M	TPEG2-UXCR_2.0/001
ISO/TS 21219-5	TPEG Service Framework	F	TPEG2-SFW_1.1/001
ISO/TS 21219-6	Message Management Container	T	TPEG2-MMC_1.1/001
ISO/TS 21219-7	Location Referencing Container	T	TPEG2-LRC_2.1/001
ISO/TS 21219-9	Service and Network Information	A	TPEG2-SNI_3.2/001
ISO/TS 21219-10	Conditional Access Information	A	TPEG2-CAI_1.1/001
ISO/TS 21219-11	TPEG Universal Location Referencing	T	TPEG2-ULR_1.0/001
ISO/TS 21219-14	Parking Information	A	TPEG2-PKI_1.1/001
ISO/TS 21219-15	Traffic Event Compact	A	TPEG2-TEC_3.2/001
ISO/TS 21219-16	Fuel Price Information and availability	A	TPEG2-FPI_1.0/001
ISO/TS 21219-18	Traffic Flow and Prediction	A	TPEG2-TFP_1.0/003
ISO/TS 21219-19	Weather Information	A	TPEG2-WEA_1.0/001
ISO/TS 21219-21	Geographic Location Referencing	T	TPEG2-GLR_1.0/001
ISO/TS 21219-22	OpenLR Location Referencing	T	TPEG2-OLR_1.0/001
ISO/TS 21219-23	Road and Multimodal Routes	A	TPEG2-RMR_1.0/001

A.2.2 Modelling and conversion rules

These documents define how TPEG applications and toolkits are modelled and what the resulting specifications will contain.

The UML Modeling Rules (TPEG2-UMR) define how TPEG2 applications and toolkits are designed by using a subset of UML and provide all available generic TPEG2 data types in a physical format independent way.

For each supported physical format, a dedicated conversion rules document is available, that maps the UML modelled types and structures into the actual physical format notation. Initially, a binary (TPEG2-UBCR) and XML (TPEG2-XCR) format is defined. For each physical format, an annex that is created according to these conversion rules is added to every TPEG2 application or toolkit specification document.

This procedure ensures 100% mapping of abstract UML model and physical formats and allows to introduce further physical formats in the future without touching the content model at all.

A.2.3 Service framework

The service framework document (TPEG2-SFW) allows bundling of TPEG2 application content together with the necessary meta information. For each physical format, a suitable framing is provided here and as for applications and toolkits, further framings may be added in the future.

A.2.4 Applications

A.2.4.1 Context

TPEG2 application and toolkit specifications contain the mobility domain specific content model and are created according to the modelling and conversion rule specifications mentioned above.

An application specification consists of a physical format independent description of the content model in the main document and one Annex for each specific physical format definition.

A.2.4.2 Application specifications

TPEG2 application specifications contain the domain specific knowledge and are used to actually code this information in a standard way.

Each TPEG2 application is uniquely identified by an AID that is provided in this part of ISO/TS 21219.

A.2.4.3 Toolkit specifications

Toolkits specifications contain models that can be used consistent in several application specifications and are usually created for tasks that are likely to occur in several applications.

Typical toolkit specifications are the message management (TPEG2-MMC) and location referencing container (TPEG2-LRC), which occur in many TPEG applications.

TPEG2 toolkit documents do not need to have an AID assigned.

A.2.5 Profiles

A.2.5.1 Context

Profiles specify, how the features specified in the TPEG2 specification series are used on specific bearers and which features to use in certain industry domains. Usually, profile specifications are published with the same body as the bearer level specifications.

A.2.5.2 Adaptation layer

Adaptation layer profiles provide parameters specific to requirements of bearer channels.

EXAMPLE In DAB, the Packet Mode with Datagroups is used and hence, TPEG transport frames shall not be larger than 8 KByte for this bearer.

Adaptation layer profiles are often published together with the bearer specifications.

A.2.5.3 Service and client

TPEG2 is a very powerful and flexible protocol series. However, not all features are suitable for all service and client use cases. To allow better matching of industry specific requirements, service and client profiles are specified describing minimum service and client requirements on several levels.

EXAMPLE The TPEG automotive profile describes what to implement to match the automotive specific requirements on service and client side.

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1) Planned.

2) To be published.

3) Planned.

4) To be published.

5) To be published.

6) To be published.

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7) Planned.

8) Planned.

9) Planned.

10) Planned.

11) Planned.

ICS 35.240.60; 03.220.20

Price based on 9 pages