TECHNICAL SPECIFICATION

ISO/TS 21219-15

First edition

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

## Part 15: Traffic event compact (TPEG2-TEC)

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

*Partie 15: Événement trafic compact (TPEG2-TEC)*

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Reference number
ISO/TS 21219-15:2016(E)

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# Foreword

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The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

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 (TPEG2-INV) [Technical Specification]*

— *Part 2: UML modelling rules [Technical Specification]*

— *Part 3: UML to binary conversion rules [Technical Specification]*

— *Part 4: UML to XML conversion rules [Technical Specification]*

— *Part 5: Service framework (TPEG2-SFW) [Technical Specification]*

— *Part 6: Message management container (TPEG2-MMC) [Technical Specification]*

— *Part 9: Service and network information (TPEG2-SNI) [Technical Specification]*

— *Part 10: Conditional access information (TPEG2-CAI) [Technical Specification]*

— *Part 14: Parking information application (TPEG2-PKI) [Technical Specification]*

— *Part 15: Traffic event compact [Technical Specification]*

— *Part 18: Traffic flow and prediction application (TPEG2-TFP) [Technical Specification]*

— *Part 19: Weather information (TPEG2-WEA) [Technical Specification]*

The following parts are under preparation:

— *Part 16: Fuel price information and availability application (TPEG2-FPI) [Technical Specification]*

— *Part 23: Road and multi-modal routes application (TPEG2-RMR) [Technical Specification]*

— *Part 24: Light encryption (TPEG2-LTE) [Technical Specification]*

— *Part 25: Electromobility information (TPEG2-EMI) [Technical Specification]*

The following parts are planned:

— *Part 7: Location referencing container [Technical Specification]*

— *Part 11: Universal location reference [Technical Specification]*

— *Part 21: Geographic location referencing [Technical Specification]*

— *Part 22: OpenLR location referencing [Technical Specification]*

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# Introduction

**History**

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

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

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

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

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

**TPEG Generation 2**

When the Traveller Information Services Association (TISA), derived from former forums, was inaugurated in December 2007, TPEG development was taken over by TISA and continued in the TPEG applications working group.

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

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

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

TPEG2 has a three container conceptual structure: Message Management (ISO/TS 21219-6), Application (many Parts) and Location Referencing (ISO/TS 21219-7). This structure has flexible capability and can accommodate many differing use cases that have been proposed within the TTI sector and wider for hierarchical message content.

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

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

— Toolkit parts: TPEG2-INV (ISO/TS 21219-1), TPEG2-UML (ISO/TS 21219-2), TPEG2-UBCR (ISO/TS 21219-3), TPEG2-UXCR (ISO/TS 21219-4), TPEG2-SFW (ISO/TS 21219-5), TPEG2-MMC (ISO/TS 21219-6), TPEG2-LRC (ISO/TS 21219-7), TPEG2-LTE (ISO/TS 21219-24);

— Special applications: TPEG2-SNI (ISO/TS 21219-9), TPEG2-CAI (ISO/TS 21219-10);

— Location referencing: TPEG2-ULR (ISO/TS 21219-11), TPEG2-GLR (ISO/TS 21219-21), TPEG2-OLR (ISO/TS 21219-22);

— Applications: TPEG2-PKI (ISO/TS 21219-14), TPEG2-TEC (ISO/TS 21219-15), TPEG2-FPI (ISO/TS 21219-16), TPEG2-TFP (ISO/TS 21219-18), TPEG2-WEA (ISO/TS 21219-19), TPEG2-RMR (ISO/TS 21219-23), TPEG2-EMI (ISO/TS 21219-25).

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

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

SP13001/3.2/002

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

## Part 15:
## Traffic event compact (TPEG2-TEC)

## 1 Scope

This part of ISO/TS 21219 specifies the TPEG application: Traffic Event Compact (TEC). The TEC application has been specifically designed to support information about traffic events (e.g. road works, traffic jams). A specific form of traffic events are local hazard warnings which, being safety-related messages, are sent with high priority to warn a driver that may encounter dangerous situations (e.g. black-ice, accident beyond curves, obstacles on road, etc.) unexpectedly.

Generally, the Traffic Event Compact application is designed to allow receivers to

— ensure travel safety for the driver,

— enable the calculation of alternative routes,

— avoid delays (e.g. traffic jams),

— warn the driver of obstructions on route, and

— provide the driver with information on infrastructural problems (e.g. closed petrol stations, non-functioning emergency telephones).

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TS 21219-4, *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 4: UML to XML conversion rules*

ISO/TS 21219-6, *Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 2(TPEG2) — Part 6: Message management container (TPEG2-MMC)*

ISO/TS 21219-7[1]), *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 7: Location referencing container (TPEG2-LOC)*

## 3 Terms and definitions

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

**3.1**
**local hazard warning**
specific form of traffic events which, being safety-related messages, are sent with high priority to assist a driver from encountering dangerous situations

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1) Planned.

**3.2**
**location referencing container**
concept applied to the grouping of all of the location referencing elements of a TPEG-Message

**3.3**
**location referencing**
method to provide information which allows a system to accurately identify a location

Note 1 to entry: The content of a location reference allows the location to be presented in a plain-language manner to the end-user (i.e. text, speech or icons) and also to be used for navigational purposes, for example, for map-based systems.

# 4    Abbreviated terms

| | |
|---|---|
| ACID | Application and Content Identifier |
| ADC | Application Data Container |
| LRC | Location Reference Container |
| MMC | Message Management Container |
| RF | Radio Frequency |
| SFW | TPEG Service Framework: Modelling and Conversion Rules |
| TEC | Traffic Event Compact |
| TISA | Traveller Information Services Association |
| TPEG | Transport Protocol Expert Group |
| TTI | Traffic and Traveller Information |
| UML | Unified Modelling Language |

# 5    Application specific constraints

## 5.1    Application identification

The word "application" is used in this part of ISO/TS 21219 to describe specific subsets of the TPEG structure. An application defines a limited vocabulary for a certain type of messages, for example, parking information or road traffic information. Each TPEG application is assigned a unique number called the Application IDentification (AID). An AID is defined whenever a new application is developed and these are all listed in the TPEG2-INV specification.

The application identification number is used in the TPEG2-SNI application to indicate how to process TPEG content and 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 may have an impact on client devices.

The version numbering principle is defined in the TPEG2-INV specification.

Table 1 shows the current version numbers for signalling TEC within the SNI application.

**Table 1 — Current version numbers for signalling of TEC**

| Major version number | 3 |
|---|---|
| Minor version number | 2 |

## 5.3 Ordered components

TPEG-TEC requires a fixed order of TPEG components. The order for the TEC message component is shown in Figure 1. The first component shall be the *Message Management Container.* 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* and this, in turn, is followed by the *Location Referencing Container*.
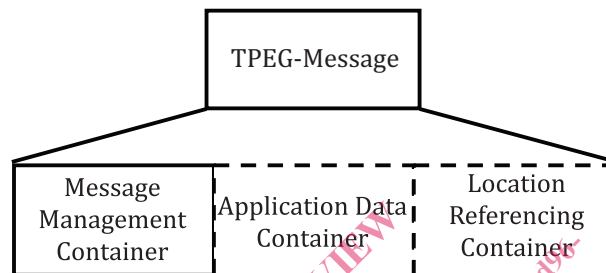
Figure 1 — Composition of TPEG messages

Within the *Event* component, one or more *Cause* components shall come first followed by one or more *Advice* components and so on. Components of the same type shall immediately follow each other.
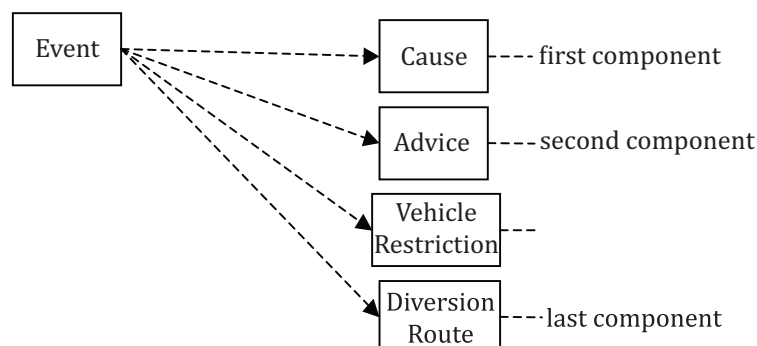
## 5.4 Extension

Although there is a requirement to maintain a fixed component order, this does not prevent the extension of a TEC message generally. In case of future extensions, new components may be inserted or existing components may be replaced by new ones without losing backward compatibility. This requires that a TEC decoder shall be able to detect and skip unknown components.

Components of the same type shall be included sequentially without the interleaving of other forms of component.

Example (allowed)

The *Advice* component is replaced by *BetterAdvice* having its own component id. A *WeatherSituation* component is inserted after *Advice* component as shown in Figures 2 and 3.

**Figure 2 — Example for extension; original component model (before addition of additional components)**

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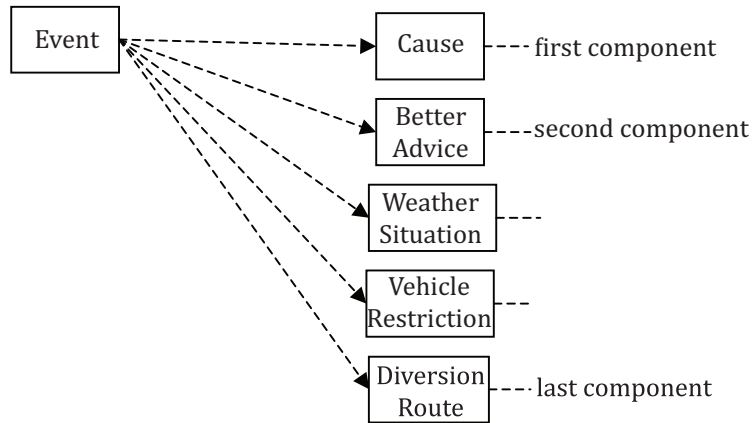
**Figure 3 — Example for extension;** *Advice* **replaced by** *BetterAdvice* **and** *WeatherSituation* **added**

## 5.5 TPEG Service Component Frame

TEC makes use of the "Service component frame with dataCRC, groupPriority and messageCount".

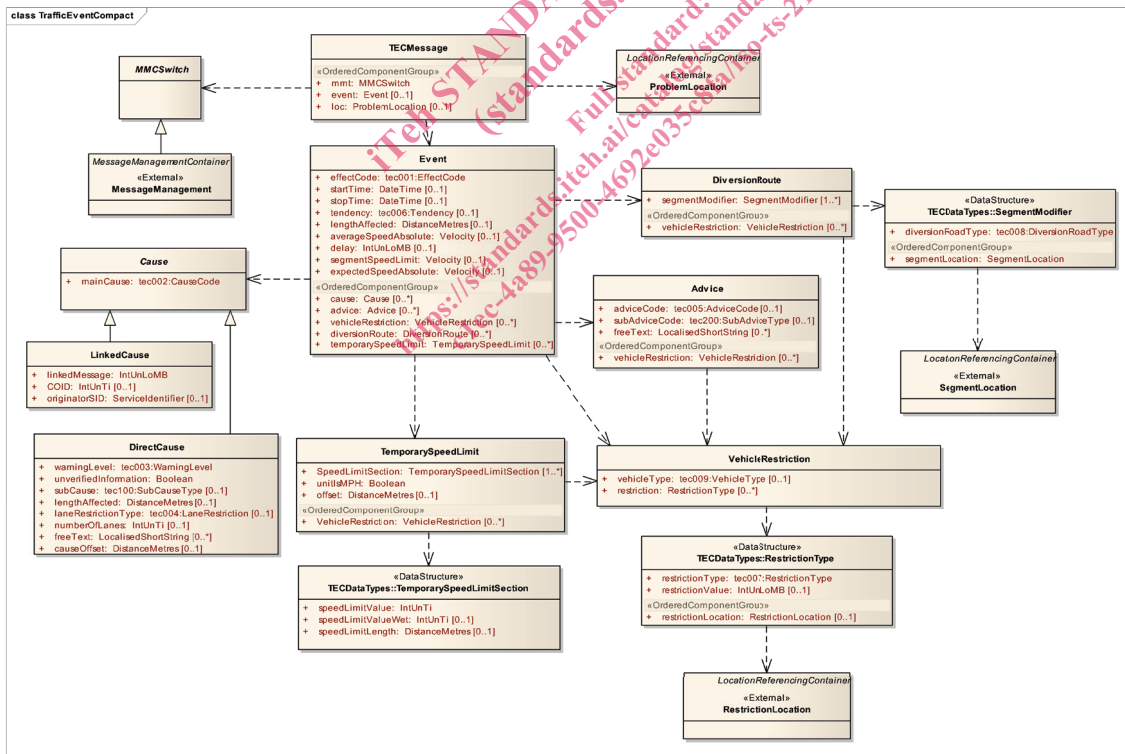## 6 TEC Structure

The TEC structurew is presented in Figure 4.



**Figure 4 — TEC message structure**

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## 7   TEC Message components

### 7.1   TECMessage

A TECMessage (see Table 2) is either a normal message or a cancellation message. A normal message (i.e. other than cancellation messages) shall include the following:

— one message management container with management information related to the overall message (ID and version, expiry time);

— one event container with one traffic flow effect and, optionally, one or more causes with additional information;

— one location referencing container with the location reference for the overall traffic message.

Cancellation messages (cancelFlag = true) shall not include an event nor a location referencing container, only the message management container.

**Table 2 — TECMessage**

| Name | Type | Multiplicity | Description |
|------|------|--------------|-------------|
| Ordered Components | | | |
| Mmt | MMCSwitch | 1 | Message Management Container |
| Event | Event | 0..1 | Describes the impact on the traffic flow and the related cause (always included except for cancellation of a message) |
| Loc | ProblemLocation | 0..1 | Location Referencing Container (always included except for cancellation of a message) |

### 7.2   MMCSwitch

The MMCSwitch is an abstract container included for formal reasons, to allow future extension of the MMC.

### 7.3   MessageManagement

The MessageManagement component is a placeholder for the MessageManagementContainer as specified in ISO/TS 21219-6. It assigns the traffic event compact (TEC) application specific local component ID for the MMC container. All component IDs within the MMC container are local to the MMC toolkit. The MMC contains all and only information related to message management.

Message generation systems shall ensure that the information given in the MMC promotes unambiguous interpretation over the whole time a message is valid. It is particularly important to recognize that client devices are likely to suffer from non-continuous reception as typically encountered in broadcast systems suffering intermittent Radio Frequency (RF) performance.

TEC shall only use the monolithic message management as specified in ISO/TS 21219-6. Multipart messages management shall not be used.

### 7.4   Event

The Event component (see Table 3) supports definition, in general, of the impact on the traffic flow and the related cause.

NOTE       For example, Stationary Traffic (due to) Narrow Lanes.