TECHNICAL SPECIFICATION

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

Part 9: Traffic event compact (TPEG1-TEC)

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 9: Événement trafic compact (TPEG1-TEC)

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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.

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 normative 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order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn.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 18234-9 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Road transport and traffic telematics,* in collaboration with ISO Technical Committee ISO/TC 204, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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 (TPEG1-SSF)*

— *Part 3: Service and network information(TPEG1-SNI)*

— *Part 4: Road Traffic Message application (TPEG1-RTM)*

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

— *Part 6: Location referencing applications*

— *Part 7: Parking information (TPEG1-PK1)*

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

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

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

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

Introduction

TPEG technology

TPEG technology uses a byte-oriented data 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 used to transfer information from the database of a service provider to an end-user's equipment.

The brief history of TPEG technology development dates back to the European Broadcasting Union (EBU) Broadcast Management Committee establishing 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. 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 EBU specifications. Two Technical Specifications were released. ISO/TS 18234-2, described the Syntax, Semantics and Framing Structure, which is used for all TPEG applications. ISO/TS 18234-4 (TPEG-RTM) described the first application, for Road Traffic Messages.

Subsequently, CEN/TC 278/WG 4, in conjunction with ISO/TC 204, 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 were 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 should be used by all service implementations to ensure appropriate referencing from one service source to another. ISO/TS 18234-1 (TPEG-INV), completes the series, by describing the other parts and their relationship; it also contains the application IDs used within the other parts. Additionally ISO/TS 18234-5 the Public Transport Information Application (TPEG-PTI) and ISO/TS 18234-6 (TPEG-LRC), were developed.

This Technical Specification adds another powerful application for the ISO 18234 series allowing detailed road event information to be encoded and transmitted to the user. It was developed specifically to satisfy messaging for Navigation System clients and designed to provide cause and effect in the Road Traffic events information domain. This Technical Specification includes new advanced message management and new datatypes as specified in the annexes.

TPEG applications are developed using UML modelling and a software tool is used to automatically select content which then populates this Technical Specification. Diagrammatic extracts from the model are used to show the capability of the binary coding in place of lengthy text descriptions; the diagrams do not necessarily include all relevant content possible.

This Technical Specification describes the binary data format of the on-air interface of the Traffic Event Compact application, (TPEG-TEC) with the technical version number TPEG-TEC_3.0/001.

TEC Model

The basic concept behind the TEC model is that a traffic situation is described by a primary information structure describing the most important information to present to a driver and secondary descriptions of the causes and/or more details. This model enables a traffic editor to describe complex events in a modular way allowing TEC-based system and mobile terminals to present the message as it was intended by the editor. This can be either graphical, textual, voice or a combination of those.

Next to the above mentioned requirement, it is very important to design an efficient coding scheme:

— there will be terminal devices with limited resources;

— to be able to extract those elements early that are relevant to the driver's route, it is key to use the available bandwidth efficiently.

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

Part 9:
Traffic event compact (TPEG1-TEC)

1 Scope

This Technical Specification defines the TPEG application Traffic Event Compact (TEC). It has been specifically designed to support information about traffic events, e.g. road works, traffic jams. A specific form of traffic event are local hazard warnings, which as safety-related messages, are sent with high priority to assist a driver in encountering dangerous situations (e.g. black-ice, accident behind curves, obstacles on road) unexpectedly.

Generally, TEC focuses on the following requirements:

— ensuring travel safety for the driver;

— enabling the calculation of alternative routes;

— avoiding delays (e.g. traffic jams);

— warning the driver of obstructions on route;

— informing the driver of infrastructural problems (e.g. closed petrol stations, non-functioning emergency phones).

2 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, *Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format — Part 2: Syntax, semantics and framing structure (SSF)*

ISO/TS 18234-11, *Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format — Part 11: Location Referencing Container (TPEG1-LRC)*

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

3.2
location referencing container
concept applied to the grouping of all 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 The content of a location reference allows the location to be presented in a plain-language manner to the end-user (e.g. text, speech or icons), and also to be used for navigational purposes, for example, for map-based systems.

3.4
startTime
beginning time of a traffic event

3.5
stopTime
end time of a traffic event

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

CEN Comité Européen de Normalisation

EBU European Broadcasting Union

LRC Location Referencing Container

OSI Open Systems Interconnection

RTM Road Traffic Message (see ISO/TS 18234-4)

TLV Tag length value; a coding method

TPEG Transport Protocol Expert Group

WGS 84 World Geodetic System 1984

5 Application framing and signalling

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, 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 CEN ISO/TS 18234-1.

The application identification number is used within the TPEG-SNI application (ISO/TS 18234-3:2006) to indicate how to process TPEG content and facilitates the routing of information to the appropriate application decoder.

For TPEG TEC, AID has the value five (5).

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 CEN ISO/TS 18234-1.

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

major version number	3
minor version number	0

Figure 1 — Current version numbers for signalling of TEC

5.3 Application framing

TEC makes use of the "Service component frame with severity and message count" according to Annex A, section A.3.2.6.2.4. For explanatory purpose this is repeated here.

< **ServCompFramePrioritisedCountedProtected**>:=	: CRC protected service component frame with group priority and message count
<**ServCompFrameHeader**>(header),	: Component frame header as defined in A.3.2.6.
<**typ007:Priority**>(groupPriority),	: group priority applicable to all messages in the ApplicationContent
<**IntUnTi**>(messageCount),	: count of messages in this ApplicationContent
external <**ApplicationContent**>(content),	: actual payload of the application
<**CRC**>(dataCRC);	: CRC starting with first byte after the header

Within the service component frame, the ApplicationContent is defined as follows:

<**ApplicationContent**>:=	: application content
messageCount * <**TECMessage**>(msg);	: Any number of any TEC message components

5.4 Application specific constraints

TPEG-TEC requires the use of a fixed order of components, unlike other TPEG applications. The order is shown in Figure 2; the first component is *MessageManagement.* If the message is not a cancel message then the *MessageManagement* component shall be followed by the *Event* component and this is followed by the *LocationReferencing* component.

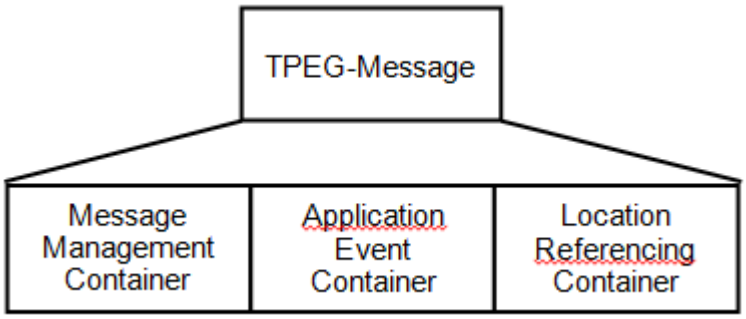

Figure 2 — Every TPEG message is constructed of three containers

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, i.e. they shall not be spread over a TECMessage.

Extendibility

The requirement of a fixed component order does not forbid the extension of TEC generally. In case of future extensions, new components may be inserted or existing components may be replaced by new ones without loosing backward compatibility. That means, a TEC decoder must be able to detect and skip unknown components. But, it is not allowed that multiple components of the same type which belong to same upper component are spread over the message.

Example
The *Advice* component is replaced by *BetterAdvice* having an own component id. A *WeatherSituation* component is inserted after *Advice* component.

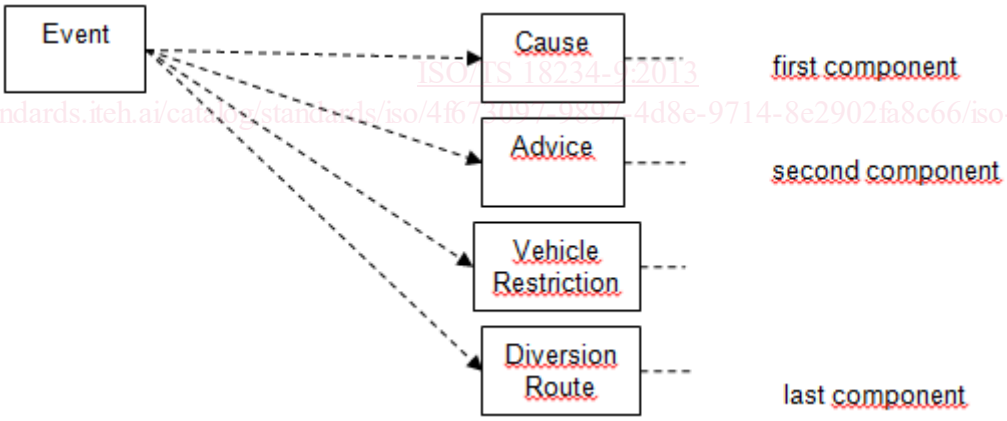

Figure 3 — Example for extension; original component model

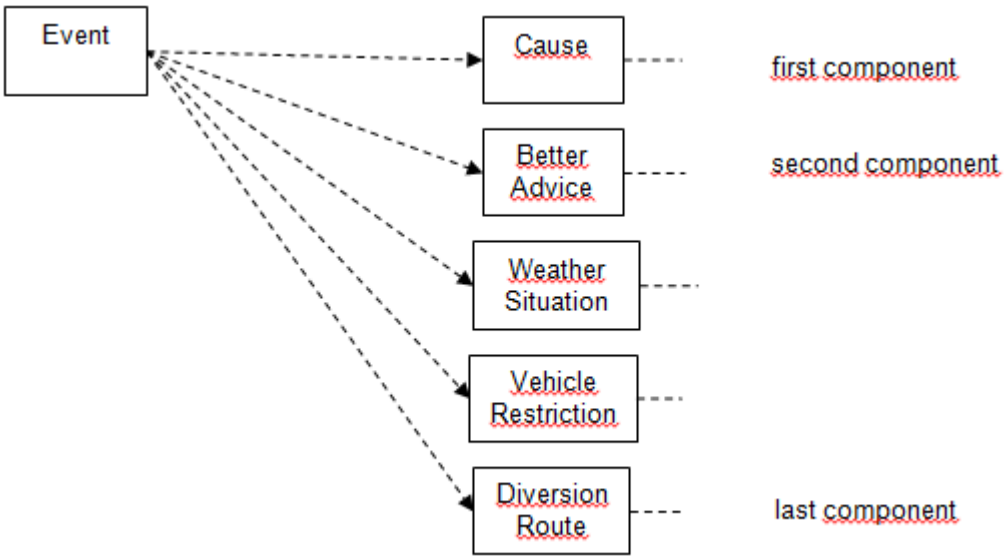

Figure 4 — Example for extension; *Advice* replaced by *BetterAdvice* and *WeatherSituation* added

In any case multiple components of the same type which belong to same upper component shall not be spread over the message.

Example (not allowed)
An *Event* component has two *Cause* components. The first one is followed by an *Advice* component and the last one related to the same *Event* component is a *Cause* component again. This is forbidden.

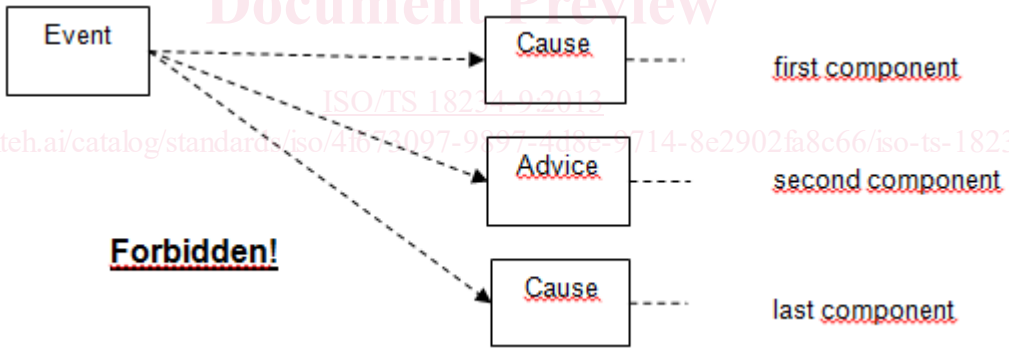

Figure 5 — Forbidden ordering of same components

Note: If general TPEG Toolkit definitions (e.g. ISO 18234 Part 2) deviate from the definition in this Part, the definition given herein takes precedence.

6 Message components

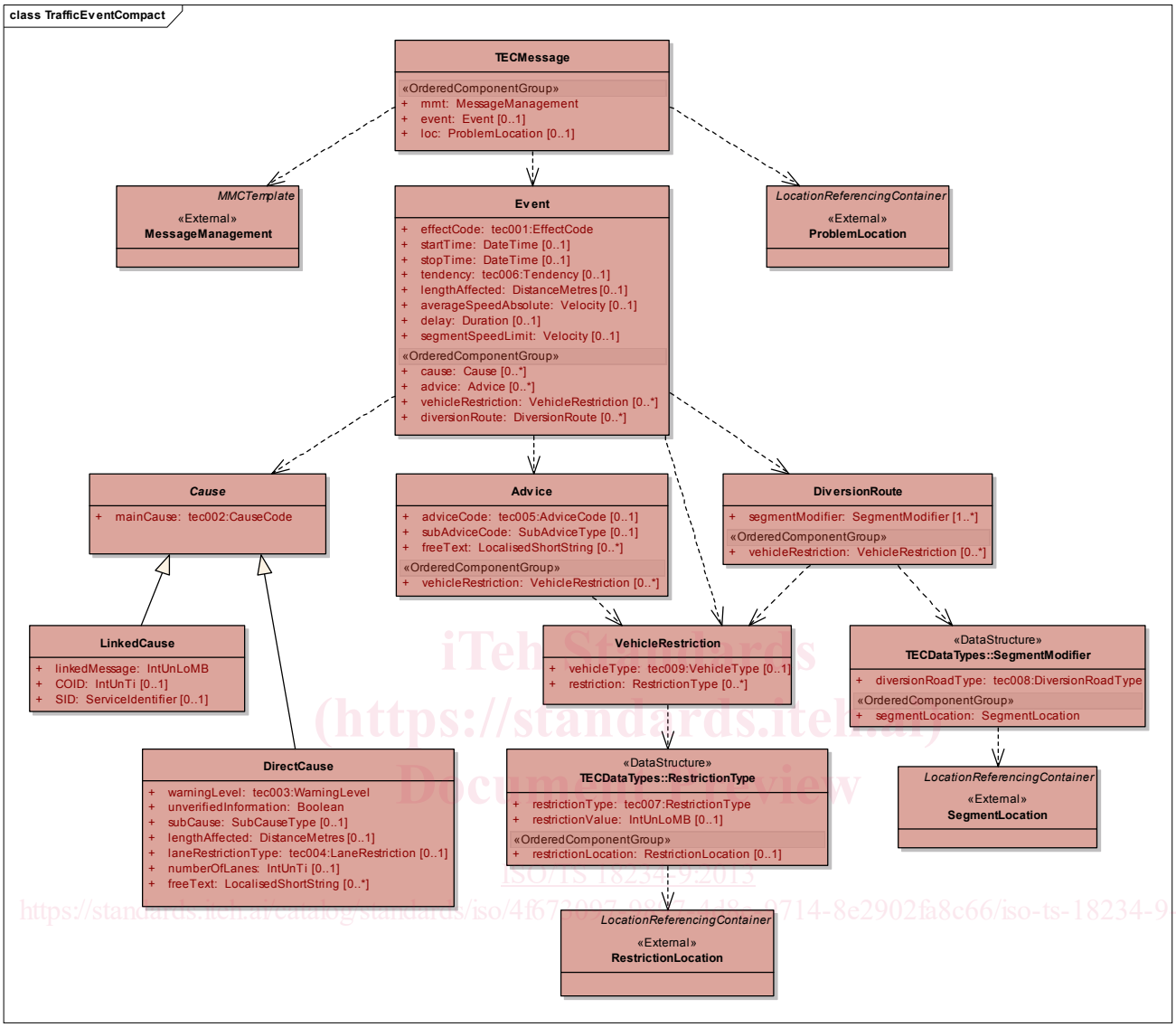

Figure 6 — UML Model of TPEG-TEC