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

**Part 7:
Parking information (TPEG1-PKI)**

*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 7: Informations relatives aux parcs de stationnement
(TPEG1-PKI)*

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Published in Switzerland

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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order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn.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 18234-7 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)*

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Introduction

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 are used to transfer information from the database of a service provider to a 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 (TPEG-SSF) 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 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 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 to the ISO 18234-series allowing detailed parking information to be encoded and transmitted to the user. This Technical Specification includes new advanced message management and new datatypes, as specified in the annexes.

Today, traffic congestion has become a serious problem in urban areas. Some traffic congestion is attributed to drivers searching for parking spaces. Therefore, timely provision of parking information could help ease traffic congestion. Furthermore, parking information would be valuable for the visitor, particularly when it could be used to signal where a temporary parking facility is established for a special occasion.

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 Parking Information application, (TPEG-PKI) with the technical version number TPEG-PKI_1.0/001.

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

Part 7: Parking information (TPEG1-PKI)

1 Scope

This Technical Specification specifies the TPEG Parking Information Application (PKI) which is designed to deliver parking information to a variety of receivers using a number of different channels, foremost digital broadcasting and internet technologies. Parking information may be presented to the user in many different ways including textually, voiced and graphically using standard formats.

2 Normative references

The following referenced documents are indispensable for the application of this Technical Specification. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 639-1:2002, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

ISO 3166-1:2006, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO 4217:2001, *Codes for the representation of currencies and funds*

ISO/TS 18234-1, *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)*

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 18234-3, *Intelligent transport systems — Traffic and travel information via transport protocol experts group, generation 1 (TPEG1) binary data format — Part 3: Service and network information (TPEG1-SNI)*

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)*

IEC 60559:1989, *Binary floating-point arithmetic for microprocessor systems*

3 Terms and definitions

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

3.1 application identification AID

application that indicates how to process TPEG content and routes information to the appropriate application decoder

NOTE Each TPEG application has a unique number, which identifies the application according to Clause 5 of this Technical Specification. The application identification is part of the TPEG specification and is defined as and when new applications are developed.

4 Abbreviated terms

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

AID	Application Identification
B/TPEG	Broadcast/TPEG (the EBU project group name for the specification drafting group)
CEN	Comité Européen de Normalisation
EBU	European Broadcasting Union
IPR	Intellectual Property Right(s)
MMC	Message Management Container Toolkit
PKI	Parking Information Application
PTI	Public Transport Information
RTM	Road Traffic Message
TEC	Traffic Event Compact application
TPEG	Transport Protocol Expert Group
TTI	Traffic and Travel Information

5 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 to indicate how to process TPEG content and facilitates the routing of information to the appropriate application decoder.

TPEG-PKI is assigned the AID = 0003 hex.

6 Service Component Frame

PKI makes use of the "Service component frame with dataCRC, groupPriority, and messageCount" according to Annex A, Clause 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

The main frame of PKI defines ApplicationContent as follows:

<ApplicationContent>:=	: Service component frame template
messageCount * <ParkingMessage> (msg);	: derived header from [SSF], AID = 3
	: Any number of any PKI message components

7 Message Components

7.1 List of Generic Component Ids

Name	Id
Parking Message	0
MessageManagementContainer	1
MMCMasterMessage	2
MMCMessagPart	3
ParkingLocation	4
ParkingSiteDescription	5
CurrentCapacity	6
CurrentCapacityFor	7
ExpectedCapacity	8
ExpectedCapacityFor	9
InformationFor	10
SizeRestrictions	11
ParkingInfo	12
ParkingSpecification	13
Logo	14
Contact	16
OpeningHours	17
GateInfo	18
PricingPayment	19
PaymentDetails	20

Facilities	21
ToSite	23
Advice	24
AssociatedService	25
ParkingForEvent	26

7.2 Parking Message

A parking message shall contain a MessageManagement component and should have ParkingLocation, ParkingSiteDescription and Advice components as well as one CurrentCapacity and several ExpectedCapacity components, as shown in Figure 1.

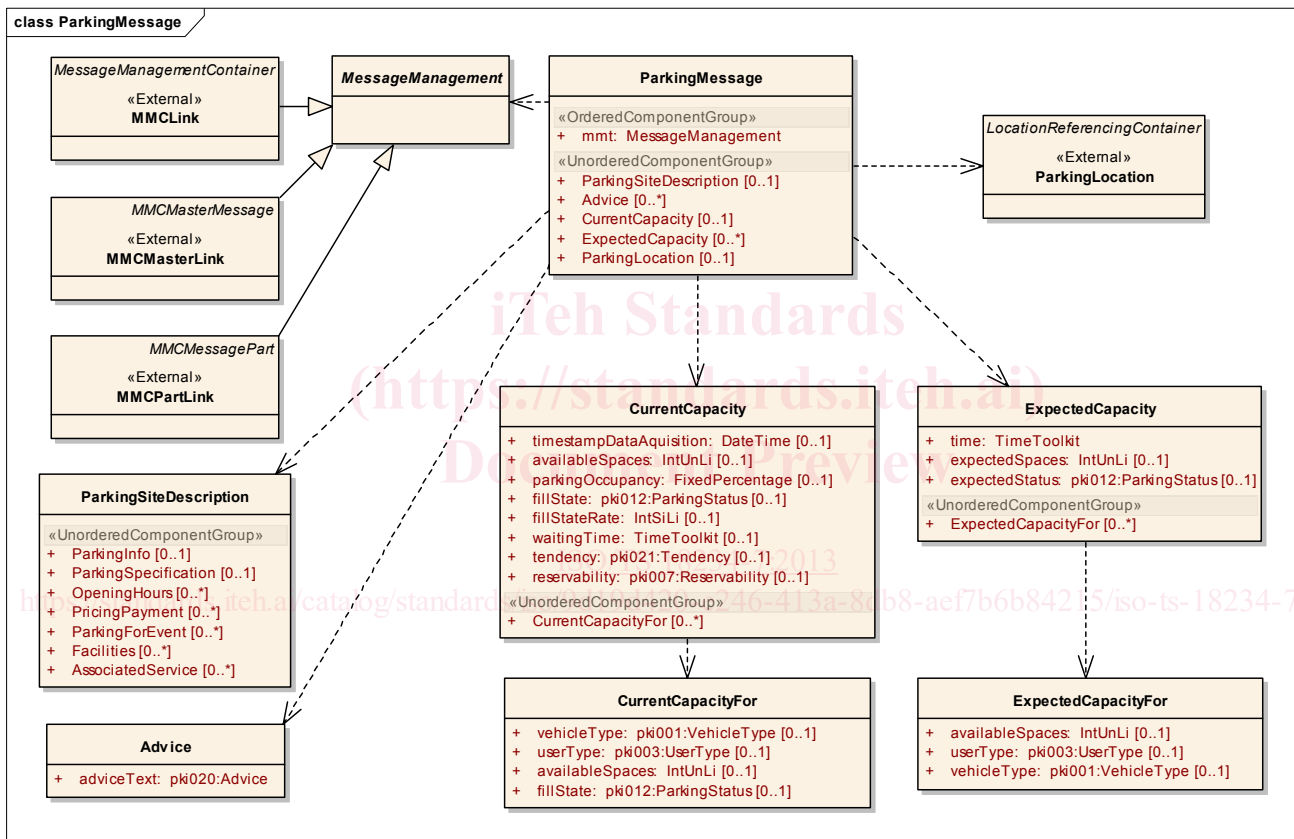


Figure 1 — Structure of a parking message component

Methods of the TPEG Message Management Container Annex B - Message Management Container can be used to transmit static data independent from the dynamic data. The components have been grouped to easily allow such dynamic updates.

For example the name and the location of a parking site do not change frequently and thus this information can be transmitted less frequently, unlike the number of available spaces. It is important none the less that the basic information required to display a sensible message to the user should be sent in suitable intervals to allow receivers just switched on to decode data within reasonable time.

Clients should decode messages with the same version number (and PartID in case of partial messages) only once.

```

<ParkingMessage<Component(0)>>:=
    <IntUnTi>(0),                : Identifier = 0
    <IntUnLoMB>(lengthComp),      : Length of component in bytes, excluding the id and length
                                  indicator
    <IntUnLoMB>(lengthAttr),      : Length of attributes, always 0 since this component has no
                                  attributes
    <MessageManagement>(mmt),    : Message Management Container
unordered {
    m * <ParkingLocation> [0..1],
    m * <ParkingSiteDescription> [0..1],
    m * <CurrentCapacity> [0..1],
    m * <ExpectedCapacity> [0..*],
    m * <Advice> [0..*]
};

```

7.2.1 MessageManagement

Serves as an optional link to the standard MessageManagementContainer. See Annex B - Message Management Container for content.

```

<MessageManagement(x)<Component(x)>>:=
    <IntUnTi>(x),                : Identifier, is defined by instance
    <IntUnLoMB>(lengthComp),      : Length of component in bytes, excluding the id and length
                                  indicator
    <IntUnLoMB>(lengthAttr);      : Length of attributes of this component in bytes

```

The purpose of the following definitions is to assign a unique identifier to the components.

<MMCLink<MessageManagement(1)>>:=

external <MessageManagementContainer(1)>; : Identifier = 1

<MMCMasterLink<MessageManagement(2)>>:=

external <MMCMasterMessage(2)>; : Identifier = 2

<MMCPartLink<MessageManagement(3)>>:=

external <MMCMessagesPart(3)>; : Identifier = 3

7.2.2 ParkingLocation

Serves as a link to the LocationReferencingContainer, described in ISO/TS 18234-11

The purpose of this component definition is to assign a unique identifier to the component.

<ParkingLocation<LocationReferencingContainer(4)>>:=

external <LocationReferencingContainer(4)>; : Identifier = 4

7.2.3 ParkingSiteDescription

The ParkingSiteDescription component is a wrapper for mostly static information about a parking facility. The information is grouped in the ParkingInfo, ParkingSpecification, OpeningHours, PricingPayment, Facilities, ParkingForEvent and AssociatedService components, as shown in Figure 2.