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BSI Standards Publication

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

Part 9: Service and network information (TPEG2-SNI)

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National foreword

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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.

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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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

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 9: Service and network information*

— *Part 10: Conditional access information*

— *Part 14: Parking information application*

— *Part 15: Traffic event compact*

— *Part 18: Traffic flow and prediction application*

— *Part 19: Weather information*

The following parts are under preparation:

— *Part 16: Fuel price information and availability application*

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The following parts are planned:

— *Part 7: Location referencing container*

— *Part 20: Extended TMC location referencing*

— *Part 21: Geographic location referencing*

— *Part 22: OpenLR location referencing*

— *Part 23: Roads and multi-modal routes application*

— *Part 24: Light encryption*

— *Part 25: Electromobility information*

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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 can 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 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.

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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-ETL (part 20), 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, 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 Technical Specification is based on the TISA specification technical/editorial version reference:

SP13006/3.2/001

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

Part 9:
Service and network information (TPEG2-SNI)

1 Scope

This part of ISO/TS 21219 establishes the method of delivering service and network information within a TPEG service. The TPEG-SNI application is designed to allow the efficient and language independent delivery of information about the availability of the same service on another bearer channel or similar service data from another service provider, directly from service provider to end-users.

NOTE A number of tables of information are described, which provide comprehensive options for describing services, their timing, content, geographical coverage, etc. In all TPEG streams, it is mandatory to deliver to so-called GST. Additionally, it is possible to signal linkage of content between different bearers and services.

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 21219-3, *Intelligent transport systems - Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) — Part 3: UML to binary conversion rules*

ETSI EN 300 401, *Radio broadcasting systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers*

ETSI/TS 101 759, *Digital Audio Broadcasting (DAB); Data Broadcasting — Transparent Data Channel*

IETF RFC 1738, Uniform Resource Locators (URL)[1)]

3 Terms and definitions

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

3.1
guide to the service tables
GST
basic *service* (3.10) information such as service structure, service timing and *content description* (3.4), etc.

3.2
fast tuning GST
FT-GST
directory of the *applications* (3.11) and *content* (3.12) of the *service* (3.10) that indicates in which components the relevant information can be found

Note 1 to entry: This contains the minimum set of information required for the acquisition of application data.

1) RFC 1738 can be found at http://www.ietf.org/rfc/rfc1738.txt

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3.3
time schedule GST
TS-GST
indicates the operation times of selected *service components* (3.16)

3.4
content description GST
CD-GST
optional table that gives the textual descriptions of selected *service components* (3.16)

3.5
geographical coverage GST
GC-GST
optional table that defines the spatial range of selected *service components* (3.16)

3.6
service component reset GST
SCR-GST
optional table that is used by the *service provider* (3.14) to delete application-specific data older than a certain moment

3.7
conditional access information reference GST
CAI-GST
optional table that is used by the *service provider* (3.14) to indicate which *service component* (3.16) carries the CAI application data required to decode encrypted service components

3.8
versioning of TPEG applications GST
VER-GST
mandatory table that is used by the *service provider* (3.14) to indicate which version of the application specification the *service component* (3.16) complies to

3.9
number of messages within a TPEG service component
NOM-SIT
optional table that is used to transmit the number of messages currently available for each *service component* (3.16)

3.10
service
collection of different information streams [*applications* (3.11)] logically bound together and delivered from a *service provider* (3.14) to the end user

3.11
application
stream of information that by itself provides a benefit to (i.e. can be “applied by”) the end user

3.12
content
information inside an *application* (3.11)

Note 1 to entry: A *service* (3.10) may contain several instances of the same application type, each containing different content. Within an application, different content is labelled with a unique content ID (COID) specified by the originator of the content.

3.13
application instance
actual data stream containing *content* (3.12) as defined by an *application* (3.11)

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3.14
service provider
organization that provides information a [*service* (3.10)] to end users and manages the *content* (3.12) of its service and decides whether a service is encrypted or not

Note 1 to entry: A service provider that generates the content of a service is called a service originator. A service provider that carries content generated by another originator is called the carrier. There is only one service originator of content, but there may be more than one service carrier.

3.15
content originator
original provider of an *application instance* (3.13)

Note 1 to entry: The content originator may distribute the *application* (3.11) data to different *service providers* (3.14). In some cases, the service provider generates its own application data and is therefore also the content originator.

3.16
service component
information stream [*application* (3.11)] that is part of a *service* (3.10)

Note 1 to entry: A TPEG stream is logically divided into parts known as service components. Each service component carries an *application instance* (3.13). 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.

3.17
service identification
worldwide unique identifier for a *service* (3.10)

Note 1 to entry: It consists of three elements called SID A, SID-B, SID-C (cf. subclause 0). These are allocated as described in ISO/TS 18234-2.

3.18
content identification
COID
identifier that is unique within a given *application* (3.11) and used to specify its *content* (3.12)

Note 1 to entry: The COID is defined by the originator of the content and is unique within a specific application. It is used for labelling the content of a component.

3.19
application and content identification
ACID
worldwide unique identifier that defines the *content* (3.12) of a *service* (3.10)

Note 1 to entry: The ACID is composed of the originator *service identification* (SID-A, SID-B, SID-C) (3.17), the *content identification (COID)* (3.18) and the *application identification (AID)* (3.20).

3.20
application identification
AID
identifier that specifies how to process TPEG *content* (3.12) and route information to the appropriate application decoder

Note 1 to entry: Each TPEG application has a unique number, which identifies the *application* (3.11) according to Clause 5. The application identification is part of the TPEG specification and is defined as and when new applications are developed.

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3.21
service component identification
SCID
unique identifier that defines a service component within a *service* (3.10)

Note 1 to entry: The SCID is chosen by the carrier service provider and identifies a component, which itself has an ACID comprising originator SID, COID and AID. The same number may be used in a different service or, in the same service at a later time to identify a completely different combination of originator SID, COID and AID.

3.22
service table
table containing basic service information, such as service structure, service timing and *content description* (3.4), etc.

4 Abbreviated terms

AID	Application Identification
ACID	Application and Content Identifier
ADC	Application Data Container
CAI	Conditional Access Information
CEN	Comité Européen de Normalization
COID	Content Identification
DAB	Digital Audio Broadcasting
DARC	Data Radio Channel - an FM sub-carrier system for data transmission
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union
ETSI	European Telecommunications Standards Institute
GST	Guide to Service Tables
INV	Introduction, Numbering and Versions (see TPEG2-INV - ISO/TS 21219-1)
IPR	Intellectual Property Right(s)
ISO	International Organization for Standardization
LHW	Local Hazard Warning
LRC	Location Reference Container
MMC	Message Management Container
OSI	Open Systems Interconnection
PTI	TPEG1-PTI Public Transport Information (see ISO 18234-5)
RTM	TPEG1-RTM Road Traffic Message application (see ISO 18234-4)
SCID	Service Component Identification
SFW	TPEG Service Framework: Modelling and Conversion Rules
SID	Service Identification
SIT	Service Information Table
SNI	Service and Network Information application (this Technical Specification)
STI	Status and Travel-time Information (proposed TPEG application)
tba	to be announced
TEC	Traffic Event Compact
TISA	Traveller Information Services Association
TPEG	Transport Protocol Expert Group
TTI	Traffic and Traveller Information

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UML	Unified Modelling Language
UTC	Coordinated Universal Time
WEA	Weather Information Application

5 Application specific constraints

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 TPEG2-INV.

The application identification number is used within 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 TPEG2-SNI.

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

Table 1 — Current version numbers for signalling of SNI

Major version number	3
Minor version number	2

5.3 TPEG 1 binary compatibility of SNI

The UML model for this application has been modelled according to TPEG2-UBR. The XML physical format complies with the UXCR Specification TPEG2-UXCR and is hence fully TPEG2 compliant. For the binary physical format, the TPEG1 compliance was mandatory, to allow coexistence of TPEG1 and TPEG2 level applications within a single service. So it was not possible to completely follow the binary conversion rules specified in TPEG2-UBCR. Details are stated in Annex A.

5.4 TPEG Service Component Frame

SNI makes use of the "Service Component Frame with dataCRC and messageCount" according to TPEG2-SNI.

Each SNI component should appear only at most once in the SNI component frame.

5.5 Conceptual model — Multiplexed applications and services

Figure 1 illustrates the conceptual model of the SNI application.

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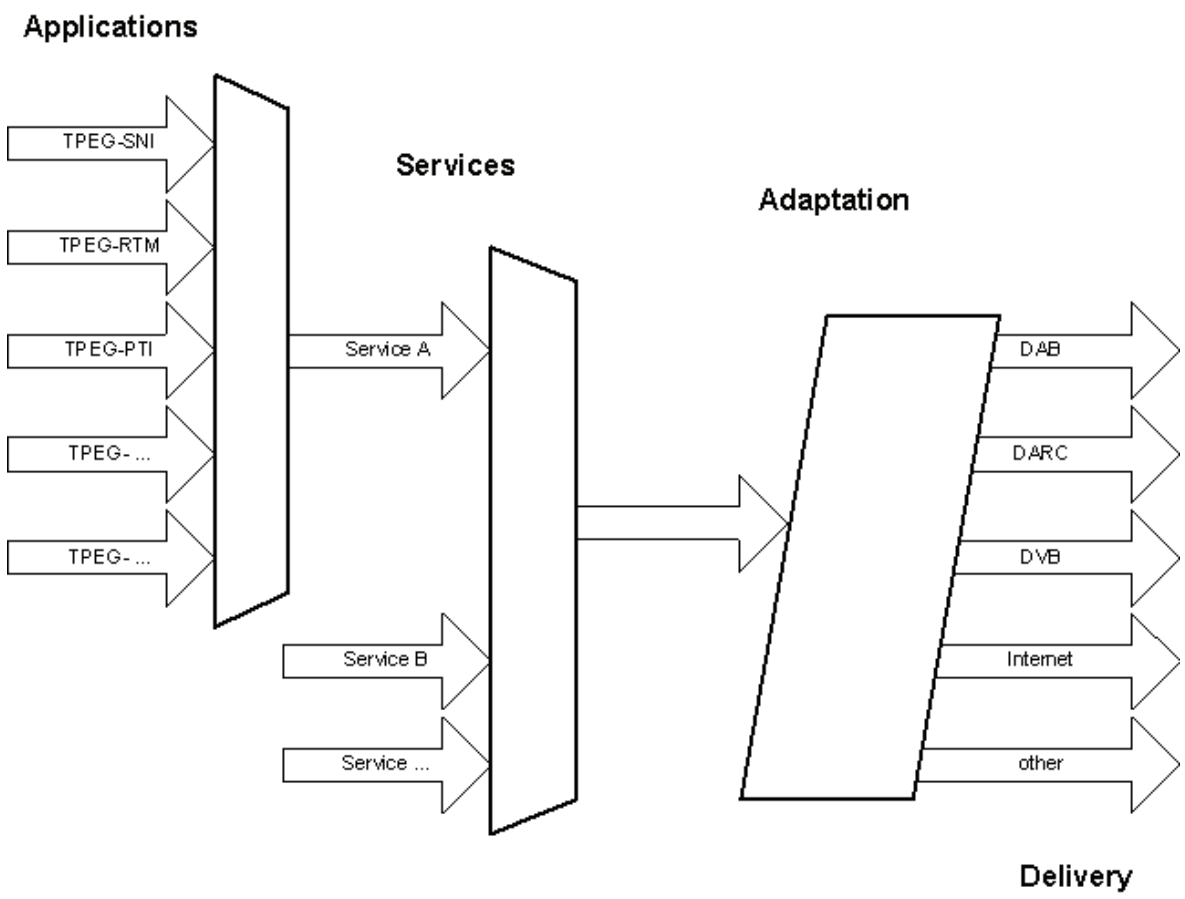

Figure 1 — Multiplexed applications and services

6 Design principle

6.1 Variable content referencing

Figure 2 contains a diagrammatic representation of the use of SCIDs in related services.

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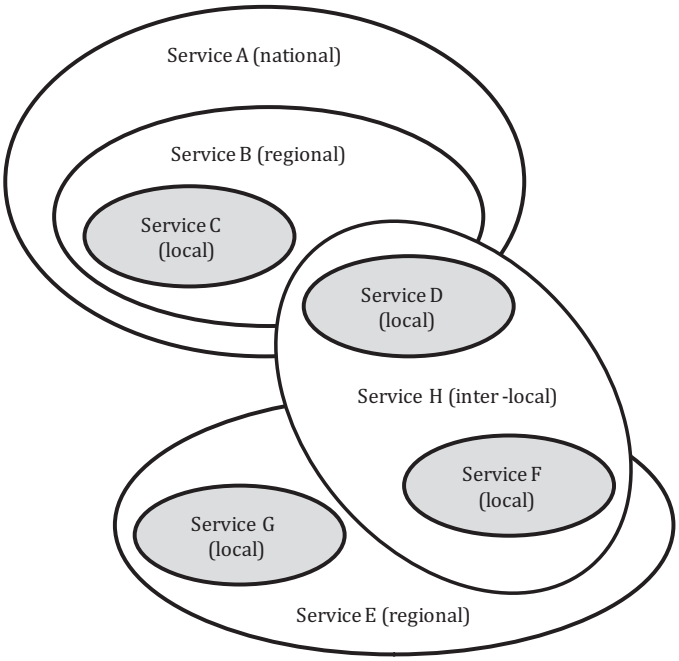

Key

Service A (national):	SCID: 02, 03, 04, 05	Bearer: ii and iii
Service B (regional):	SCID: 02, 03, 04	Bearer: iii
Service C (local):	SCID: 02	Bearer: i
Service D (local):	SCID: 03	Bearer: i
Service E (regional):	SCID: 06, 07, 08	Bearer: ii
Service F (local):	SCID: 06	Bearer: i
Service G (local):	SCID: 07	Bearer: i
Service H (inter-local):	SCID: 03, 06	Bearer: ii

Figure 2 — Diagrammatic representation of the use of SCIDs in related services

6.2 Example of the TPEG-SNI application in a TPEG data-stream

Figure 3 gives an example of the TPEG-SNI application in a TPEG data-stream.

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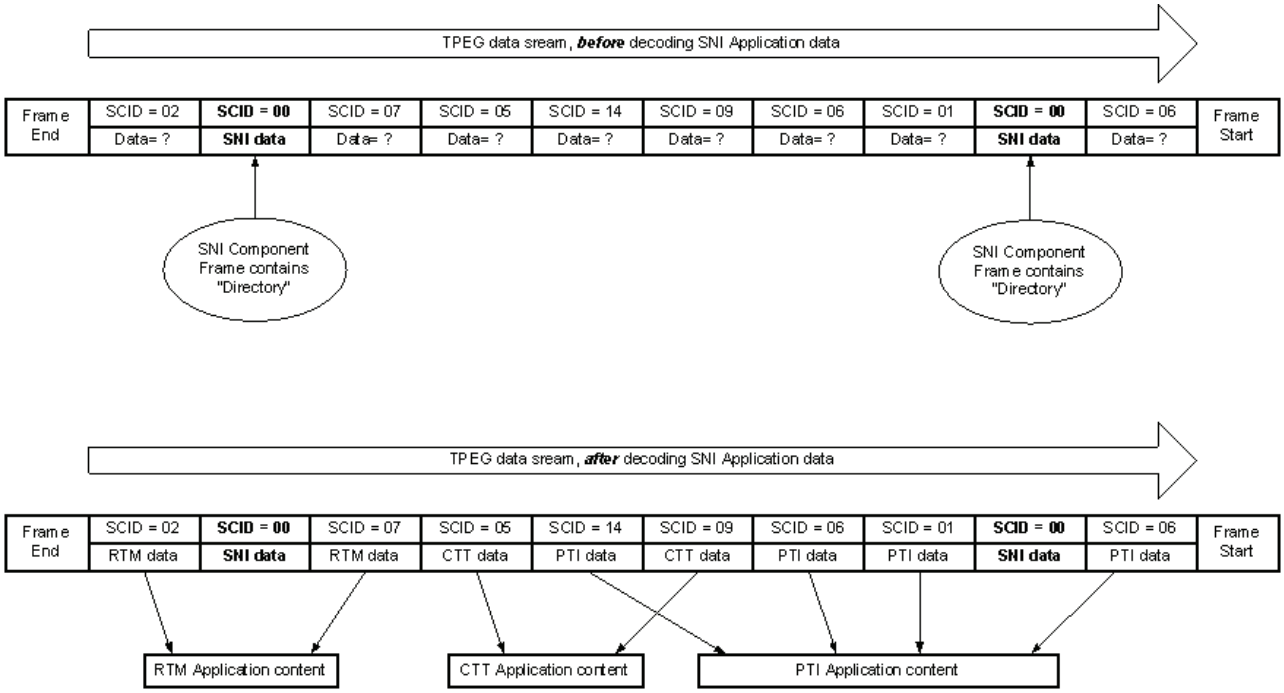

Key

SCID Service Component Identification

SNI Service and Network Information Application

RTM Road Traffic Message Application

PTI Public Transport Information Application

CTT Congestion and Travel Time Information Application (notional future Application)

Figure 3 — Example of the TPEG-SNI application in a TPEG data-stream

6.3 Concept of allocating services

Figure 4 shows the use of TPEG Application names and AIDs.

SNI = Service and Network Information Application	AID = 0000
RTM = Road Traffic Message Application	AID = 0001
PTI = Public Transport Information Application	AID = 0002
CTT = Congestion and Travel Time Application	AID = 0005 (notional future application code)
WEA = Weather Information Application	AID = 0033 (notional future application code)

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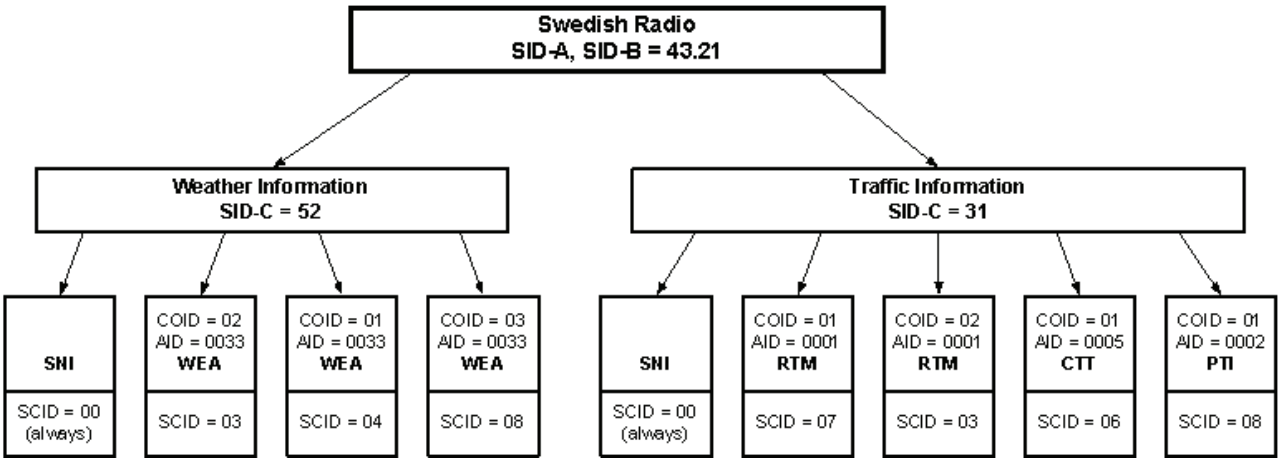

Key

SID Service Identification (with three parts: -A, -B, -C)

COID Content Identification

AID Application Service Component Identification Identification

SCID Service Component Identification

Figure 4 — Example of service allocation on a wideband bearer

Use of the Service ID.

There are two instances where Service Identification is used.

— Originator SID (SID-A, SID-B, SID-C): This is the service identification of the service provider who generates the content.

— Carrier SID (SID-A, SID-B, SID-C): This is the service identification of the service provider who is delivering the service at the service frame level (see TPEG2-SFW).

Application names and AIDs:

SNI = Service and Network Information Application AID = 0000

RTM = Road Traffic Message Application AID = 0001

PTI = Public Transport Information Application AID = 0002

WEA = Weather Information Application AID = 0033 (notional future application code)

The following Figure 5 shows an example for the use of the SID and AID.

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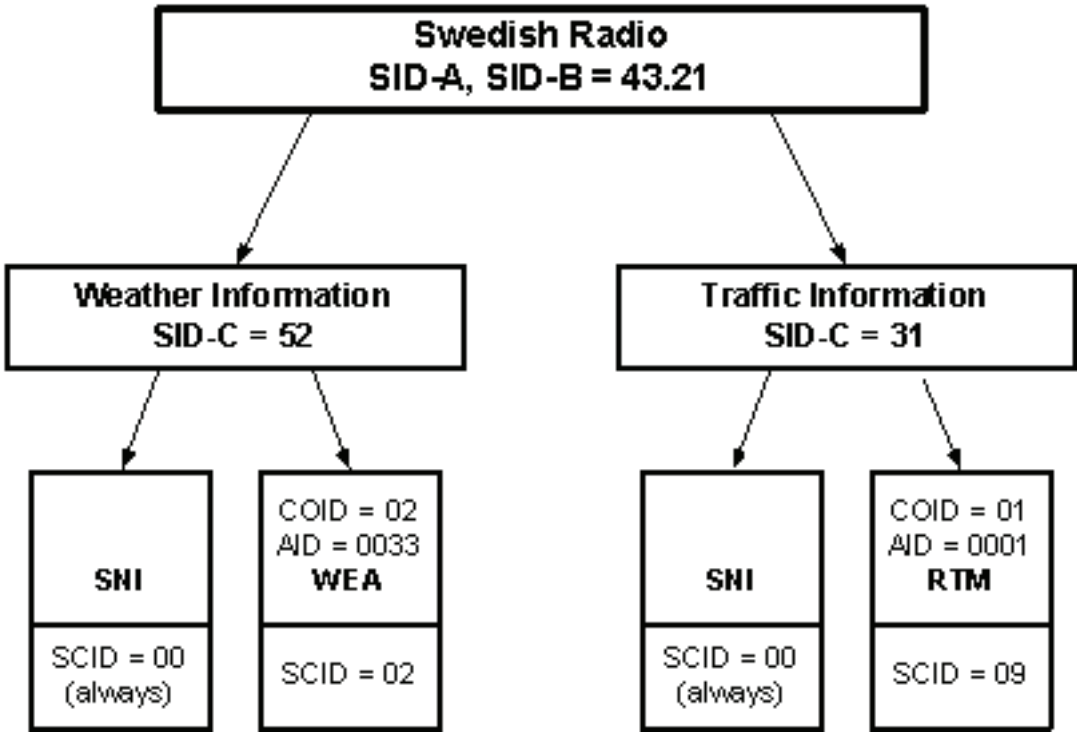

Key

SID Service Identification (with three parts: -A, -B, -C)

COID Content Identification

AID Application Service Component Identification Identification

SCID Service Component Identification

Figure 5 — Example of service allocation on a narrowband bearer

6.4 General rules for the TPEG-SNI application

The following rules for the allocation of services by the service provider on one single bearer are elaborated.

— For every service, the service and network Information is mandatory.

— The SNI application shall only occur once within a service and has the reserved SCID of 00.

— The fast tuning guide to the *Service Table* is mandatory within the SNI.

— The service component identifier (SCID) identifies the combination of an application and its content within a service.

— The application IDs are standardized by ISO/TS 18234-1.

— The content identification (COID) is used for specifying the content of a component within a service.

— The originator service identification (SID-A, SID-B, SID-C), content identification (COID) and application identification (AID) together form the application and content identification (ACID) which uniquely identifies the same content worldwide.

— The application and content identification (ACID) is associated with the service component identification (SCID) within a service.

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— Some instances of a service are equivalent, but not necessarily identical. For example, the same service may be distributed on different bearers with different service component identifications (SCIDs). In this case, the services do not have an identical "byte-stream", but carry equivalent data content.

— Each SNI component (e.g. GST time schedule, linkage table, etc.), shall never occur more than once in each SNI component frame.

7 SNI Structure

Figure 6 shows the structure of SNI components, while GST and SIT components are displayed as summary boxes.

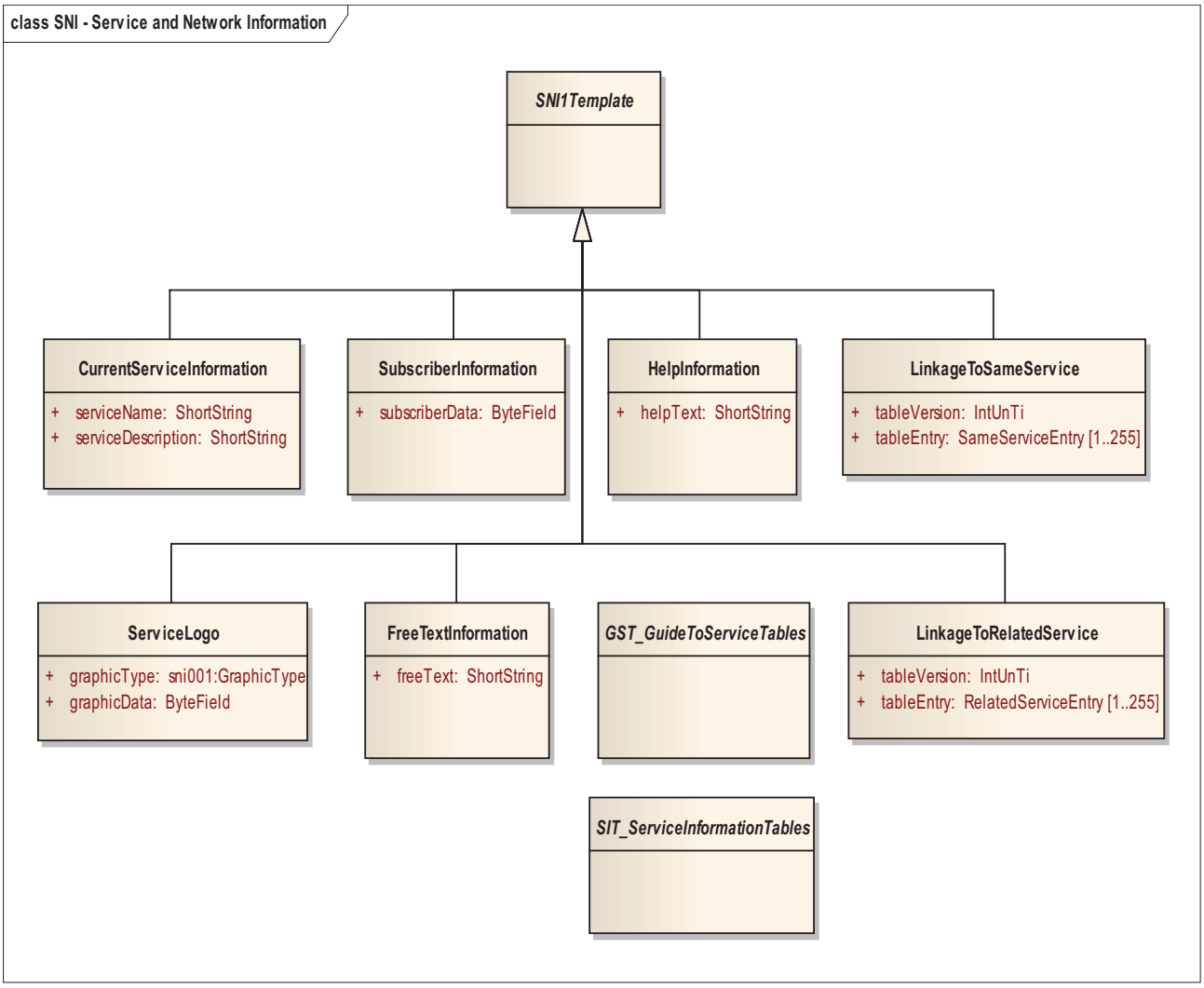

Figure 6 — SNI message structure

8 SNI Message components

8.1 SNI1Template

8.1.1 General

The service and network information application does not use the typical TPEG message management, but instead provides various components to necessary to decode a TPEG service. For compliance with

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the UML modelling rules (TPEG2-UMR), an abstract "SNI1Template" has been introduced to provide the anchor point for the framing.

The components can be grouped as Service Information, Component Information and Linkage Information.

Service Information

SNIMessages, that descibe the service, like CurrentServiceInformation or ServiceLogo.

Component Information

The guide to the *Service Table* (GST) consists of several parts that carry the basic service information being of different importance to the system and the user. Taking this into account, the repetition rate of these basic tables can be adjusted to the available channel capacity.

The service information table (SIT) delivers dynamic information about the current service, for example, the number of messages available for reception in a service component.

Linkage Information

TPEG services can be linked independent of the bearer system. These linking features are provided for the same service or other services.

8.1.2 Usage of the version number

There is only one version number within the SNI application. It is used to synchronize the various tables. If in any table, within the SNI, a version number exists, then the version number shall always be the same in all of the tables. If any of the tables will change, the version number in all tables shall be incremented.

Exception for Service Information tables: Due to the dynamic nature of SITs, the version number in the Service Information Table shall only be changed if the version number of the GST1 changes.

8.2 CurrentServiceInformation

Describes the service to a human being. This information is mandatory for TPEG services. Exactly one instance of CurrentServiceInformation is allowed in the SNI. The encoding of the CurrentServiceInformation is shown in Table 2.

Table 2 — Current service information

Name	Type	Multiplicity	Description
serviceName	ShortString	1	Identifies the service to a human being. Identifies the service by a label, comparable to PS in RDS. EXAMPLE "BBC 2 - TPEG Service".
serviceDescription	ShortString	1	Identifies the applications and scope thereof within a service. Describes in more detail the content of a service. EXAMPLE "Local and interurban road traffic information combined with public transport information for South-East England".

8.3 ServiceLogo

Graphical identification of the service or the service provider. Promotes the service or provider. The ServiceLogo is optional. Multiple logos may be referenced. The encoding of the ServiceLogo is shown in Table 3.

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Table 3 — Service logo

Name	Type	Multiplicity	Description
graphicType	sni001:GraphicType	1	n.a.
graphicData	ByteField	1	n.a.

8.4 SubscriberInformation

This subclause describes additional payment and encryption information delivered to the end-user. This information is not vital for the SNI application, but enhances information provided to the end-user. This mechanism will allow for tariffs to be announced to the end-user. The encoding of the SubscriberInformation is shown in Table 4. This information optionally occurs in any encrypted or potentially encrypted service.

Table 4 — SubscriberInformation

Name	Type	Multiplicity	Description
subscriberData	ByteField	1	Contents defined by the service provider. Gives information about payment and tariffs for restricted service components.

8.5 FreeTextInformation

In this subclause, more textual information for the end-user is defined. This information is not mandatory and the occurence in the stream is selected by the service provider. The encoding of the FreeTextInformation is shown in Table 5.

EXAMPLE Announcement of service disruption, disclaim information, legal advice.

Table 5 — FreeTextInformation

Name	Type	Multiplicity	Description
freeText	ShortString	1	Additional information, that is not coded and therefore language dependent.

8.6 HelpInformation

In this subclause, more textual information for the end-user is defined. This information is not mandatory, the occurence in the stream is selected by the service provider. The encoding of the HelpInformation is shown in Table 6.

EXAMPLE Internet address, Hotline number, Helpdesk.

Table 6 — HelpInformation

Name	Type	Multiplicity	Description
helpText	ShortString	1	Additional information that gives addresses to which the user can apply to. A link between the user and the service provider for feedback.

8.7 GST_GuideToServiceTables

The guide to the *Service Table* (GST) consists of seven parts that carry the basic service information being of different importance to the system and the user. Taking this into account, the repetition rate of these basic tables can be adjusted to the available channel capacity. The encoding of the GST_GuideToServiceTables is shown in Figure 7.

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