TECHNICAL SPECIFICATION

ISO/TS 21219-9

First edition
2016-04-01

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

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

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

Partie 9: Information de service et de reseau (TPEG2-SNI)

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Reference number
ISO/TS 21219-9:2016(E)

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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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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

The International Organization for Standardization (ISO) (and/or) International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this Technical Specification may involve the use of a patent concerning "the HD Radio Bearer and Linkage Information" given in 10.5. ISO [and/or] IEC take[s] no position concerning the evidence, validity and scope of this patent right.

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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)

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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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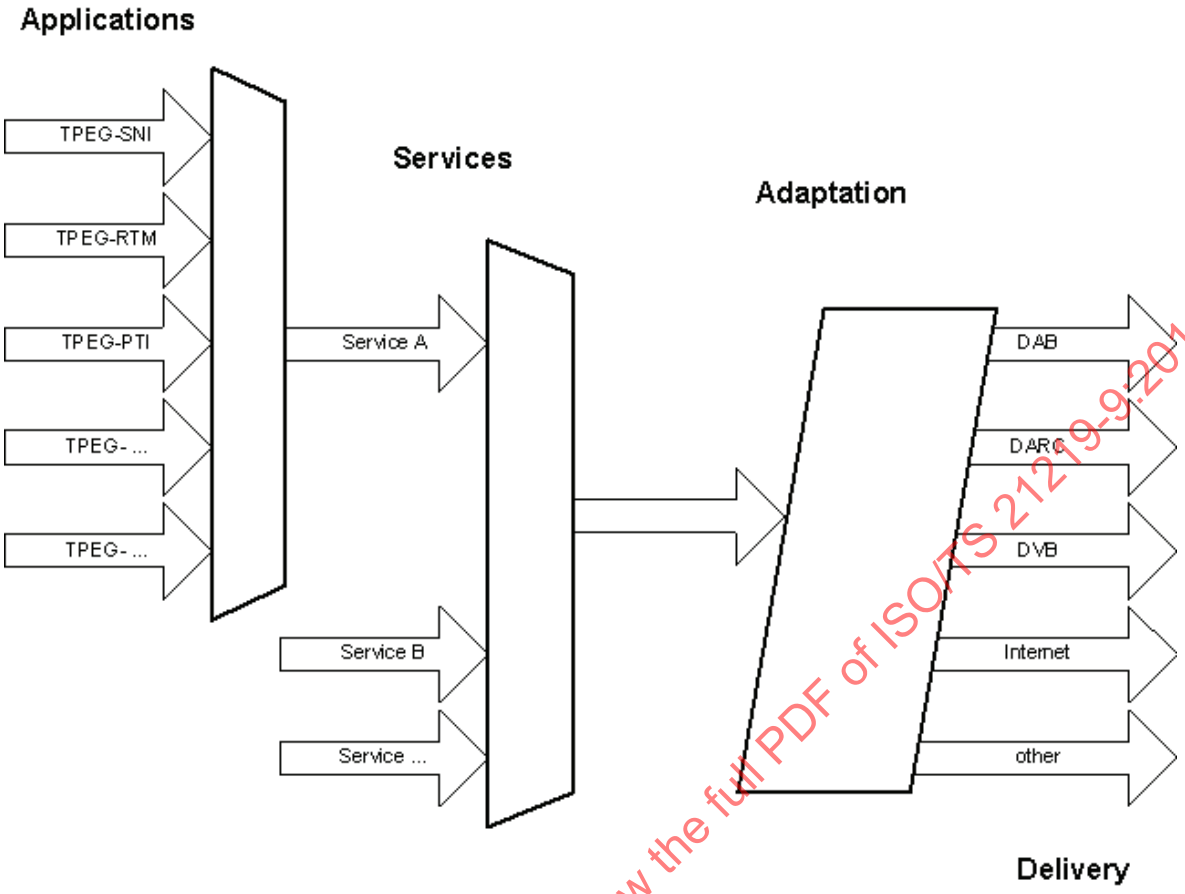

Figure 1 — Multiplexed applications and services

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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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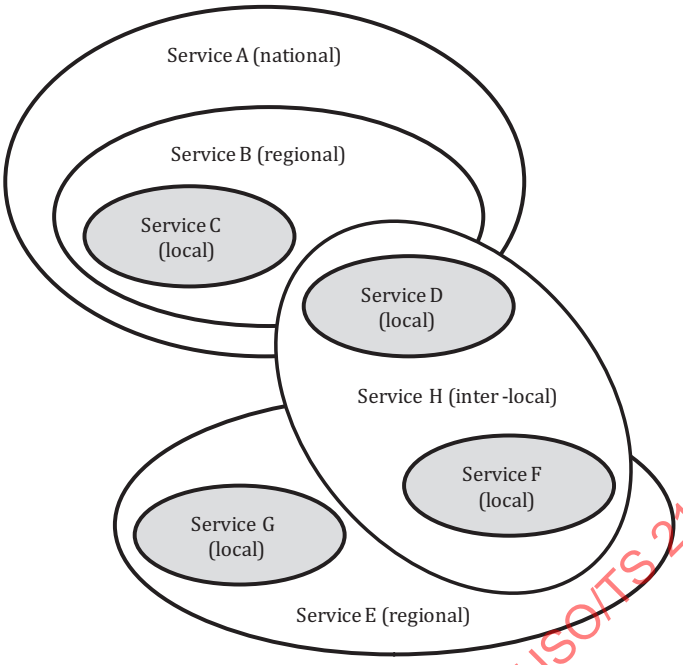

Key

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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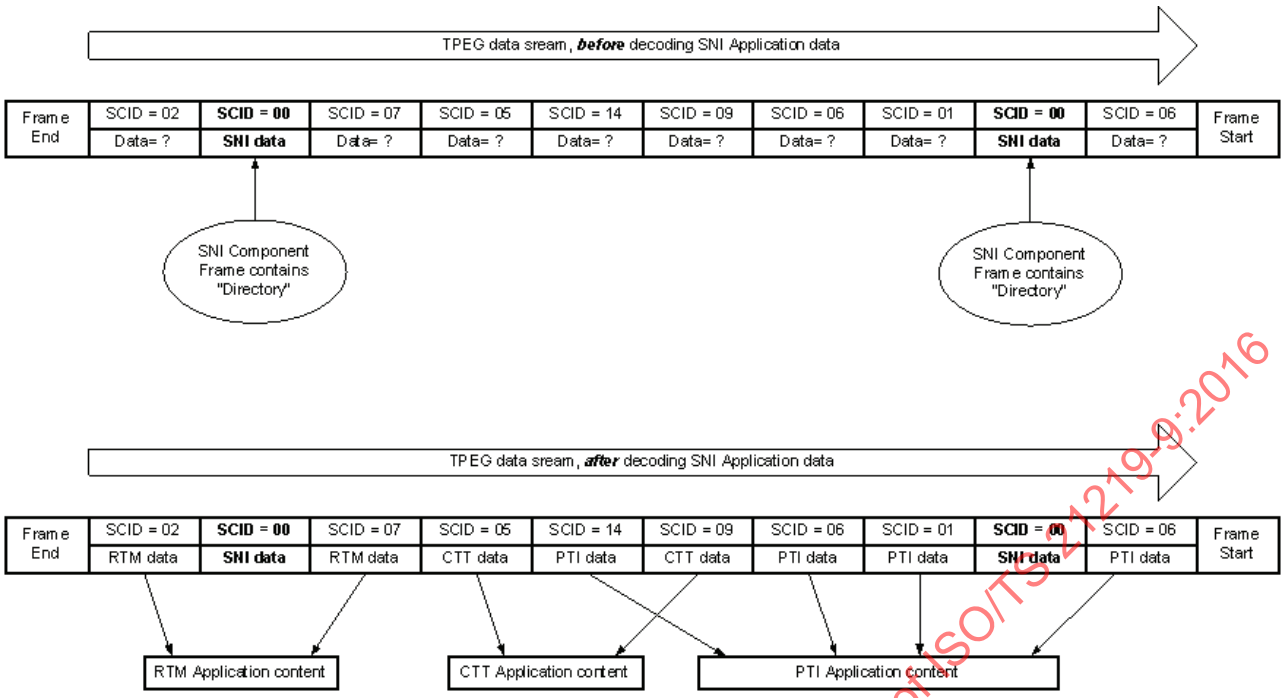

Key

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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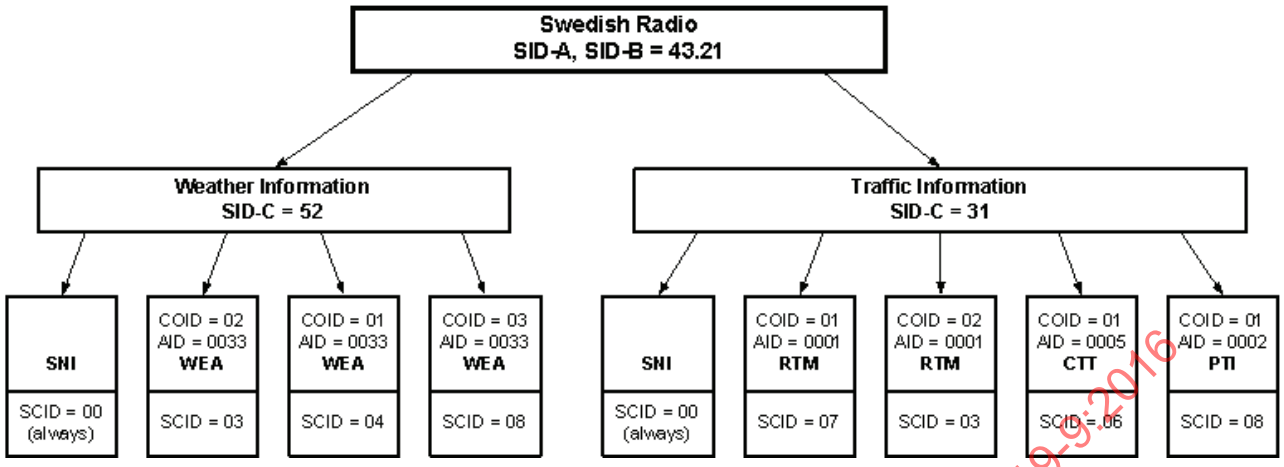

Key

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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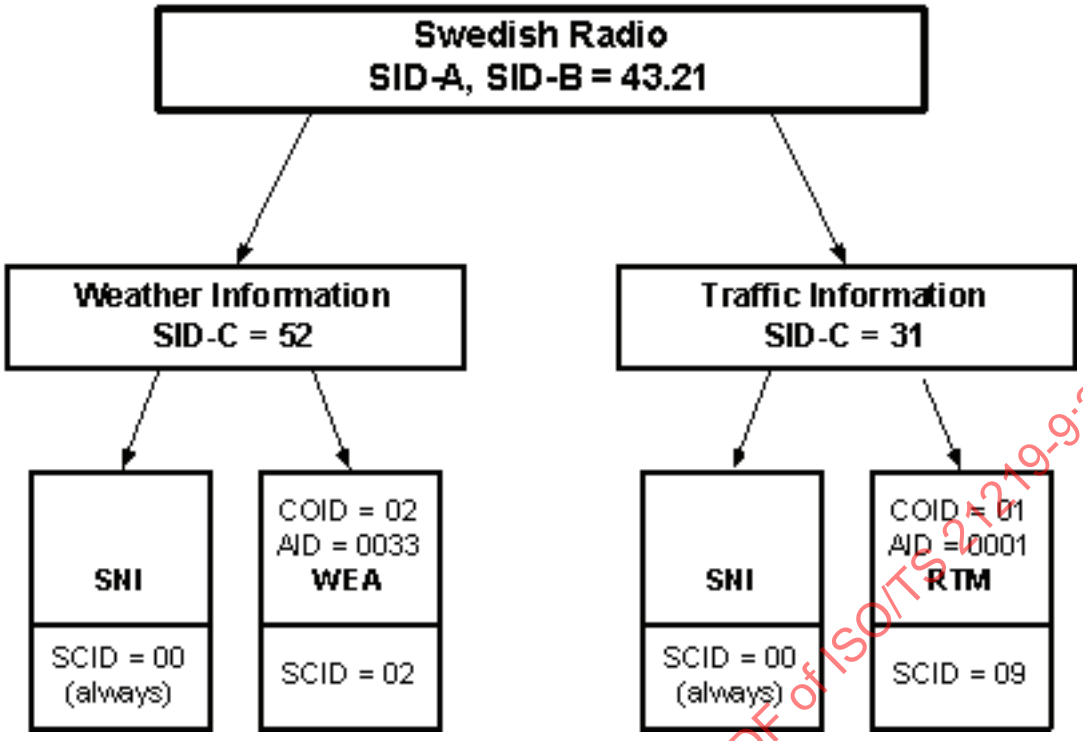

Key

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.

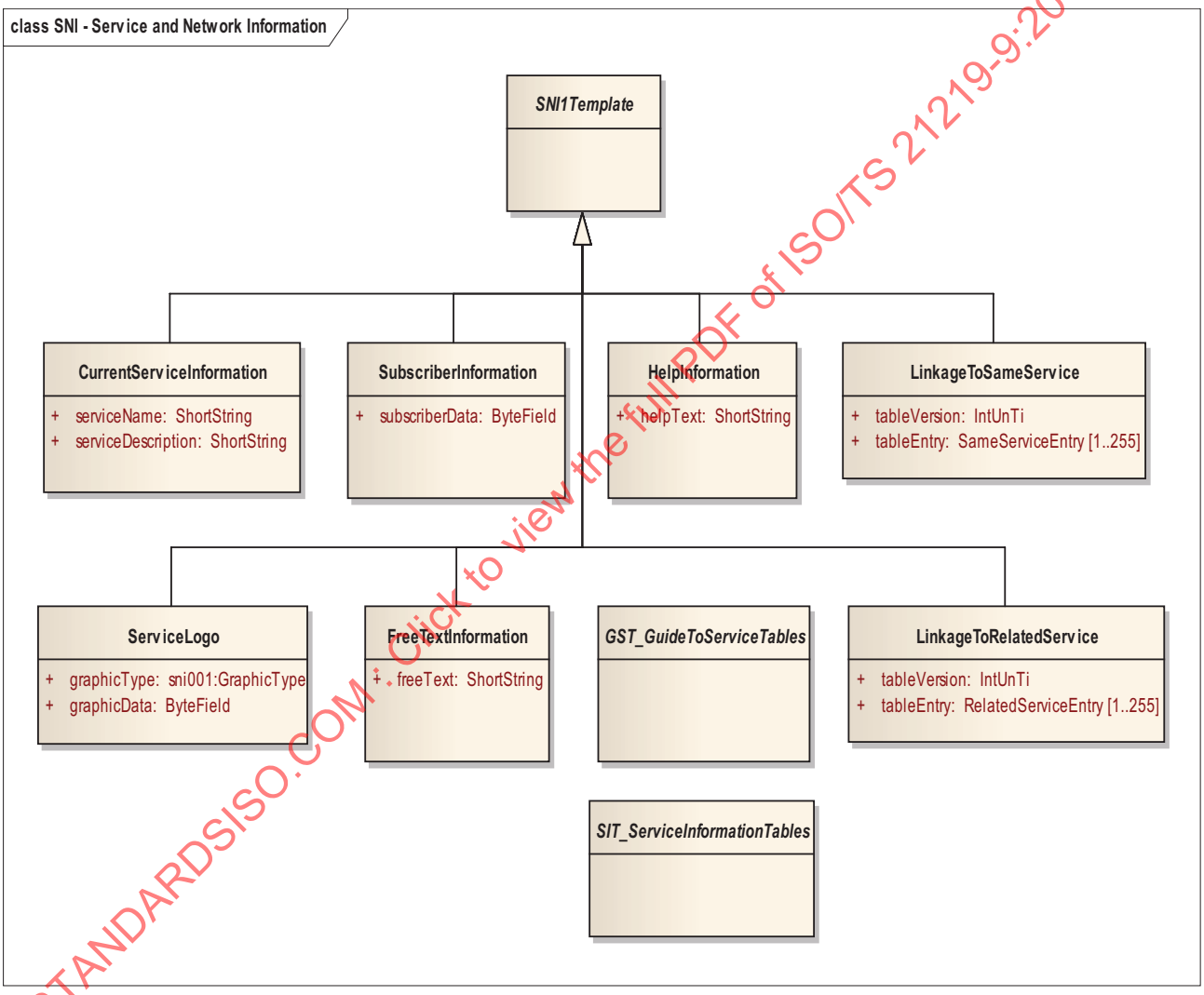

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Figure 6 — SNI message structure

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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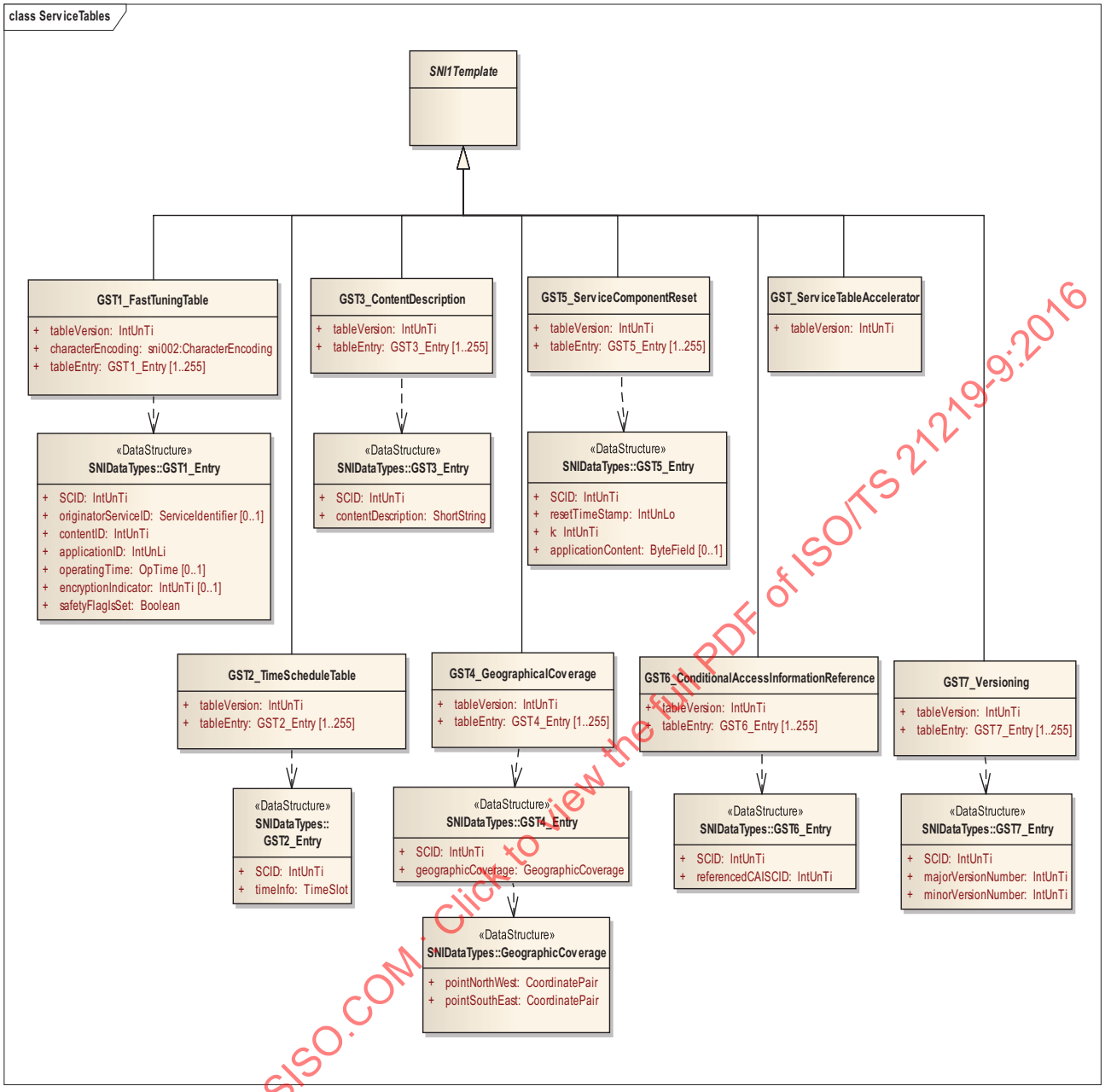

Figure 7 — SNI Service tables

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8.8 GST1_FastTuningTable

Service Table 1 is mandatory. All service components shall be defined in this table. The same SCID may never occur more than once within this table.

EXAMPLE Table 7 shows a very simple example of a GST fast tuning table, having only one entry (05) of one application (0001). This application has only one content identification (03). This information itself is carried in a component frame identified by 00, which is the default value for the SNI application.

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Table 7 — Simple example of a GST tuning table

Version Number:	Character Table Identifier:	Service Component Identification (SCID):	Content Identification: (COID):	Application Identification: (AID):
Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
<IntUnTi>1 Byte	<sni002>1 Byte	<IntUnTi>1 Byte	<IntUnTi>1 Byte	<IntUnLi>2 Bytes
7B	7D	05	03	0001

The encoding of the GST1_FastTuningTable is shown in Table 8.

Table 8 — GST1_FastTuningTable

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
characterEncoding	sni002:CharacterEncoding	1	Default character table for the current service. The one and only encoding to be used in TPEG is UTF-8. All other possible values are deprecated and included for TPEG1 backward compatibility. The character table identifier is valid for the whole service including the SNI application itself. The character table identifier belongs to the basic service features and is therefore integrated into the guide to the *Service Table*. If the <characterEncoding> is invalid or unknown to the receiver, it should assume that the <characterEncoding> equals 125 (UTF-8).
tableEntry	GST1_Entry	1..255	Lines of Table GST1.

8.9 GST2_TimeScheduleTable

Service Table 2 (time schedule) is optional, except if the GST1 OpTime feature is used, then this table is mandatory. The same SCID may never occur more than once within this table. The encoding of the GST2_TimeScheduleTable is shown in Table 9.

NOTE The time information field is present in both tables. If there is a contradiction between the time information in the Fast Tuning GST and the Time Schedule GST, the fast tuning table gives the master time.

If the SCID of a specific service component is not present in the time schedule GST, then the specific service is operating permanently or will start in the future as specified in the fast tuning table.

Table 9 — GST2_TimeScheduleTable

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented if any of the entries is changed.
tableEntry	GST2_Entry	1..255	Lines of guide to the services Table 2 (time schedule).

8.10 GST3_ContentDescription

Service Table 3 is optional. The same SCID may never occur more than once within this table. The encoding of the GST3_ContentDescription is shown in Table 10.

NOTE If there is no additional content in *Service Table* 2 and/or *Service Table* 3 related to a specific service component, it is not necessary to put this SCID into the table(s). Therefore, the total number of SCID entries in this table will be less than or equal to the number of SCID entries in the fast tuning table (*Service Table* 1).

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Table 10 — GST3_ContentDescription

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
tableEntry	GST3_Entry	1..255	Lines of Table GST3.

8.11 GST4_GeographicalCoverage

Guide to the *Service Table* 4 (geographical coverage). *Service Table* 4 is optional. The same SCID may never occur more than once within this table. The encoding of the GST4_GeographicalCoverage is shown in Table 11.

NOTE Although the geographical coordinates are optional, it is not necessary to use a bit switch function. If no geographical coordinates exist, no line will be present.

Table 11 — GST4_GeographicalCoverage

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
tableEntry	GST4_Entry	1..255	Lines of Table GST4.

8.12 GST5_ServiceComponentReset

Guide to the *Service Table* 5 (service component reset - SCR). *Service Table* 5 is optional. The same SCID may never occur more than once within this table. The encoding of the GST5_ServiceComponentReset is shown in Table 12.

Table 12 — GST5_ServiceComponentReset

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
tableEntry	GST5_Entry	1..255	Lines for Table GST5.

8.13 GST6_ConditionalAccessInformationReference

Service Table 6 is optional. The same SCID may never occur more than once within column 1 of this table. The encoding of the GST6_ConditionalAccessInformationReference is shown in Table 13.

NOTE 1 If a CAI component is needed by all encrypted service components within a service, the SNI service component with an SCID of 0 is used in column one with the common CAI SCID in the second column.

NOTE 2 If there is no additional content in Table 6 related to a specific service component, it is not necessary to put this SCID into the table. Therefore, the total number of SCID entries in this table will be less than or equal to the number of SCID entries in the Fast Tuning Table.

Table 13 — GST6_ConditionalAccessInformationReference

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
tableEntry	GST6_Entry	1..255	Lines of Table 6.

8.14 GST7_Versioning

Service Table 7 is mandatory. The same SCID may never occur more than once within this table.

This table lists IDs of all components which are contained in the TPEG Service. For each component the version number of the used TPEG Application is given in 2 bytes. The first byte shall signal the major

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version number whereas the second byte describes the minor version number. All backward compatible changes to the protocol shall result in the increment of the minor version number. All other changes will lead to an increment of the major version number. The encoding of the GST7_Versioning is shown in Table 14.

Table 14 — GST7_Versioning

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
tableEntry	GST7_Entry	1..255	Lines of Table 7.

8.15 GST_ServiceTableAccelerator

This component (*Service Table* accelerator) for the shortcut version number is repeated more often than the normal guide to the *Service Table* s. But this shall not reduce the repetition rate of all the other GSTs. The benefit is that the receiver saves time while checking the change of the guide to the *Service Table*. The *Service Table* accelerator is an optional feature.

The repetition rate of the guide to the *Service Tables* is defined as follows.

— A receiver cannot decode a service component until it has received the current fast tuning GST. It is therefore important that the fast tuning GST is repeated at a high repetition rate such that a receiver has a low set-up time for identification of a service component.

— The scanning time of the receiver for finding a service component will be greatly affected by the repetition rate of the fast tuning GST.

— The repetition rate for the GST should by fixed according the needs of the service provider and the end-user. It also should take into account the bandwidth and capacity of the bearer system.

— All other tables are dependent on the fast tuning GST; therefore, their repetition rate should be set in relation to the repetition rate of the GST.

— The repetition rate of the GST is dependent on the types of application within the service. Some applications may require a higher rate of repetition than others.

EXAMPLE For an RTM application on a wide band bearer, the fast tuning GST may be repeated every second to allow for optimal receiver scanning functionality.

The coding for the *Service Table* accelerator is illustrated in Table 15.

Table 15 — GST_ServiceTableAccelerator

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Table incremental version number. Incremented each time a change to the versioning of the GST tables occurs.

8.16 LinkageToSameService

This subclause defines the linkage information to the components of the same service. The encoding of the LinkageToSameService is shown in Figure 8.

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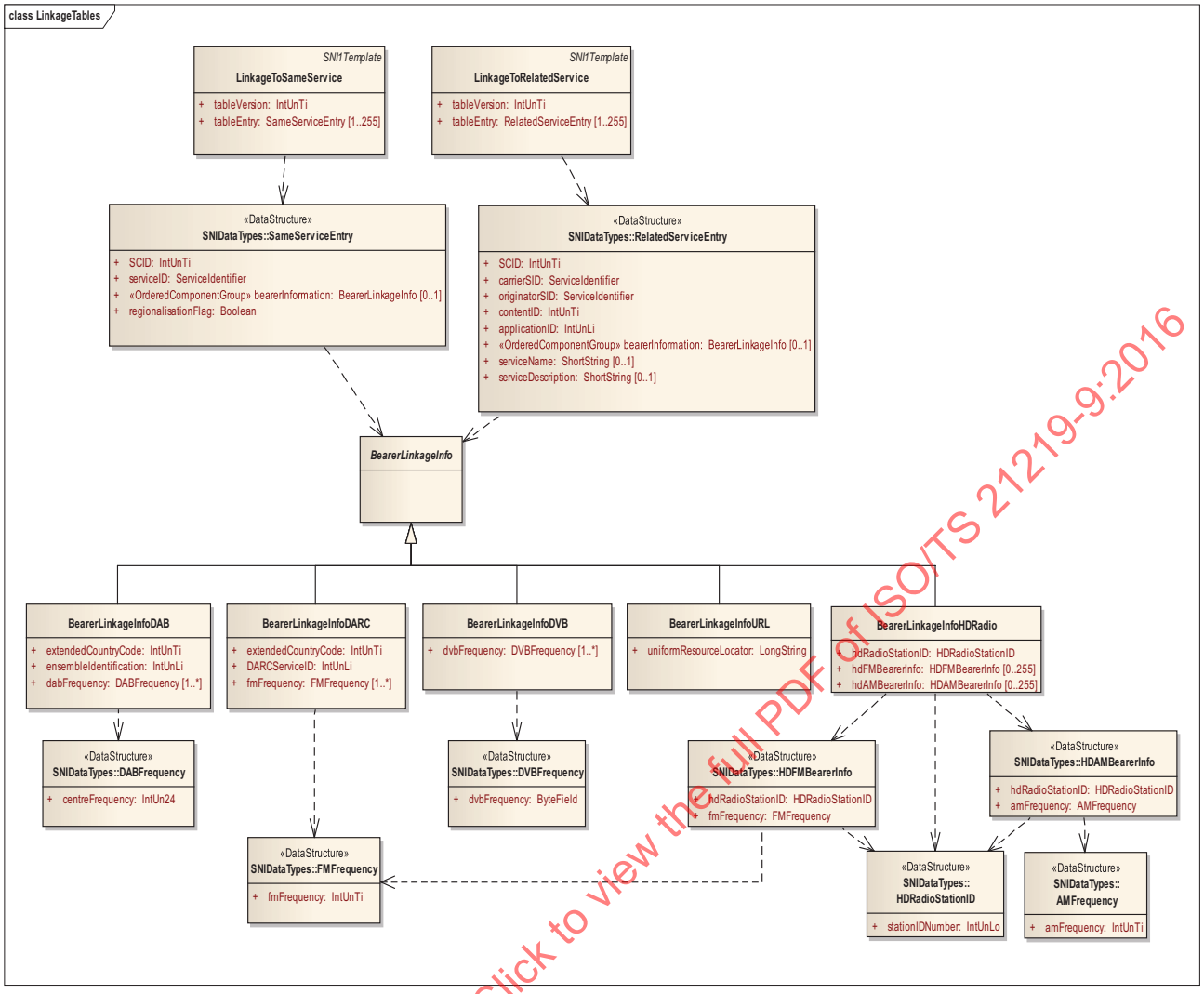

Figure 8 — SNI Linkage

The SNI Linkage helps the receiver to find the same service components on the same bearer in the same network or on other bearers on other networks. It provides information on how to find the same service components on the same or on another bearer. The SNI Linkage is optional and depends on the service provider.

8.17 Same Service Definition

TPEG, unlike other systems, allows splitting up a service in smaller packets, called service components. So the same service can be transmitted simultaneously on narrow band and on broadband bearers. As a result, a user may get more, exactly the same or fewer service components when switching from one channel to another. This increases the flexibility of the service provider, but at the same time makes the linkage procedure more complicated. The encoding of the LinkageToSameService is shown in Table 16.

Table 16 — LinkageToSameService

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
tableEntry	SameServiceEntry	1..255	Lines of table.

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8.18 LinkageToRelatedService

The LinkageToRelatedService provides information that links a service component to the components of related services. It supports the receiver to find similar service components on the same bearer in the same network. It provides information on how to find related service components on the same or on another bearer. The encoding of the LinkageToRelatedService is shown in Table 17.

Table 17 — LinkageToRelatedService

Name	Type	Multiplicity	Description
tableVersion	IntUnTi	1	Incremented, if any of the entries is changed.
tableEntry	RelatedServiceEntry	1..255	n.a.

8.19 Reserved for future use

Void.

8.20 BearerLinkageInfoDAB

The BearerLinkageInfoDAB provides information about bearer type and linkage info for DAB (see TPEG2-INV and ETSI/TS 101 759). The encoding of the BearerLinkageInfoDAB is shown in Table 18.

NOTE While being in a DAB ensemble, the TPEG service can be found by evaluating the FIC.

Table 18 — BearerLinkageInfoDAB

Name	Type	Multiplicity	Description
extendedCountryCode	IntUnTi	1	ECC (Extended Country Code)
ensembleIdentification	IntUnLi	1	EID (Ensemble Identification)
dabFrequency	DABFrequency	1..*	DAB frequency information

8.21 BearerLinkageInfoDARC

The BearerLinkageInfoDARC provides information about the DARC (Data Radio Channel) bearer and linkage information. The encoding of the BearerLinkageInfoDARC is shown in Table 19.

Table 19 — BearerLinkageInfoDARC

Name	Type	Multiplicity	Description
extendedCountryCode	IntUnTi	1	ECC (extended country code)
DARCServiceID	IntUnLi	1	DARC service identification
fmFrequency	FMFrequency	1..*	FM frequency information

8.22 BearerLinkageInfoDVB

The BearerLinkageInfoDVB provides information about the bearer type and linkage info for DVB. The encoding of the BearerLinkageInfoDVB is shown in Table 20.

Table 20 — BearerLinkageInfoDVB

Name	Type	Multiplicity	Description
dvbFrequency	DVBFrequency	1..*	DVB frequency

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8.23 BearerLinkageInfoURL

The BearerLinkageInfoURL provides information about related Internet services and linkage information. The encoding of the BearerLinkageInfoURL is shown in Table 21.

Table 21 — BearerLinkageInfoURL

Name	Type	Multiplicity	Description
uniformResourceLocator	LongString	1	URL (Uniform Ressource Locator) as defined in RFC 1738.

8.24 BearerLinkageInfoHDRadio

The BearerLinkageInfoHDRadio provides information about the HD Radio System (as described in iBiquity Digital Corporation, *HD Radio™ Air Interface Design Description Station Information Service Transport,* Doc. No. SY_IDD_1020s) bearer and linkage information. Multiple hdFMBearerInfo and/or hdAMBearerInfo fields within one BearerLinkageInfoHDRadio component allow for coding of service following information to all adjacent stations of the station ID given by the transmitter field. Multiple of such BearerLinkageInfoHDRadio components may be used to allow for fast service following within a dense network of TPEG services. For any transmitter as given by the HD Radio station ID field, only one BearerLinkageInfoHDRadio is allowed with a single SNI service component. The encoding of the BearerLinkageInfoHDRadio is shown in Table 22.

Table 22 — BearerLinkageInfoHDRadio

Name	Type	Multiplicity	Description
hdRadioStationID	HDRadioStationID	1	Transmitter HD Radio station for which a list of applicable alternate stations is given by the following lists of HDFMBearerInfo and HDAMBearerInfo entries.
hdFMBearerInfo	HDFMBearerInfo	0..255	HD FM bearer information.
hdAMBearerInfo	HDAMBearerInfo	0..255	HD AM bearer Information

8.25 SIT_ServiceInformationTables

This subclause describes the Service Information tables.

The tables in this subclause have the same structure as the Guide to the *Service Tables* (every line in the table is identified by a SCID). The major difference with Guide to the *Service Tables* is the definition and usage of the version number. The encoding of the SIT_ServiceInformationTables is shown in Figure 9.

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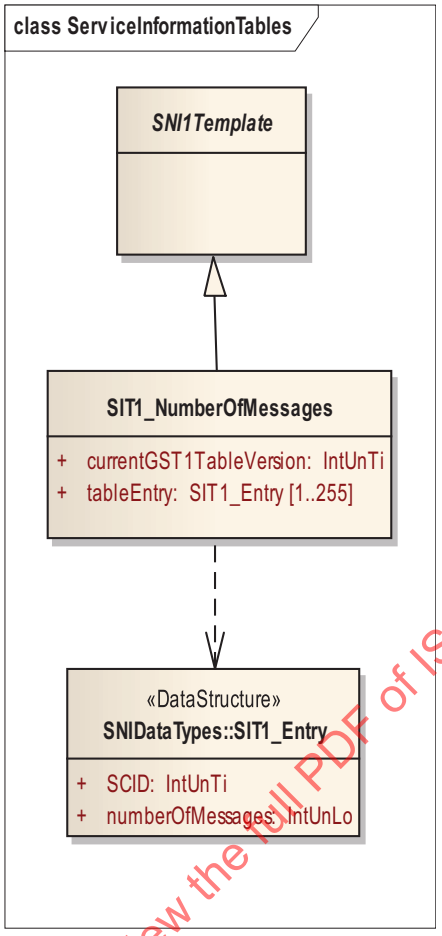

Figure 9 — SNI Service Information Tables

8.26 SIT1_NumberOfMessages

Service Information Table 1 is optional. The same SCID shall never occur more than once within this table. The encoding of the SIT1_NumberOfMessages is shown in Table 23.

Table 23 — SIT1_NumberOfMessages

Name	Type	Multiplicity	Description
currentGST1TableVersion	IntUnTi	1	The version in this table shall equal the version number in the corresponding GST 1 table. Consequently, the version number will only change when the version number in the GST 1 table changes, either directly (change in GST 1 table) or indirectly (change in another GST table). The version number in this Service Information Table shall therefore NOT change when any of the contained total number of messages changes.
tableEntry	SIT1_Entry	1..255	Line of Table SIT1.

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9 SNI Datatypes

9.1 MaskedTime

The MaskedTime data type expresses fixed date and time information. Each byte can have a zero value meaning that the signalled event occurs periodically in this range. The value zero is reserved for indicating repetition; therefore, 1 has to be added to the hours, minutes and seconds. The start year is therefore the year 2000 (2000 - 1999 = 1). The first usage of the year element in the masked time function will thus not be before the year 2000. The next box shows the changed MaskedTime type, the right hand column gives the formula how to get the type element (e.g. hour) from the real value. Hence, two functions are available simultaneously: Pointing to a specific time and indicating a repeating event. The encoding of the MaskedTime is shown in Table 24.

EXAMPLE 1 MaskedTime = 01 0C 00 0F 1F 01 hex. Meaning: The event starts every day in December 2000 at 14 h 30 min and 00 s.

EXAMPLE 2 MaskedTime = 00 00 0B 00 2E 38 hex. Meaning: The event starts every year, every month, on the 11th day of the month, every hour, 45 min and 55 s after the full hour.

Table 24 — MaskedTime

Name	Type	Multiplicity	Description
year	IntUnTi	1	Year, 0:any; 1..255: Year-1999
month	IntUnTi	1	Month, 0:any; 1..12:Month
day	IntUnTi	1	Day, 0:any; 1..31: Day
hour	IntUnTi	1	Hour, 0:any; 1..24:Hour+1
min	IntUnTi	1	Min, 0:any; 1..60; Min+1
sec	IntUnTi	1	Sec, 0:any; 1..60: Sec+1

9.2 DayMask

The DayMask is similar to the TPEG1 day_mask data type and to the TPEG2 DaySelector type. The encoding of the DayMask is shown in Table 25.

Table 25 — DayMask

Name	Type	Multiplicity	Description
everySunday	Boolean	1	n.a.
everyMonday	Boolean	1	n.a.
everyTuesday	Boolean	1	n.a.
everyWednesday	Boolean	1	n.a.
everyThursday	Boolean	1	n.a.
everyFriday	Boolean	1	n.a.
everySaturday	Boolean	1	n.a.

9.3 AppStartTime

This type is a compound element and is helpful to indicate the start time and also the repeatability of an event at the same time. The encoding of the AppStartTime is shown in Table 26.

IMPORTANT — All time information is absolute and always referenced to UTC. For example, an event in China is repeated every Tuesday and Friday at 06.00 hrs. This automatically leads to a change of the DayMask value, becoming Monday and Thursday. Also, the MaskedTime value must change according to the China time zone offset in relation to UTC. All receiving clients shall

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"know its local time offset", thus allowing it to convert all time information to the format that the end-user expect.

NOTE The day in the masked time can be set along with the day mask. The resulting start time will be the first day of the day mask on or after the specified day in the masked time.

EXAMPLE Assume the first of July is a Thursday. If the masked time indicates the second of July and the day mask is Monday and Tuesday, then the resulting start time is Monday the fifth of July. The next occurrence is then Tuesday the sixth.

Table 26 — AppStartTime

Name	Type	Multiplicity	Description
maskedTime	MaskedTime	1	At what time and date
dayMask	DayMask	1	At which day of the week

9.4 TimeSlot

This compound type allows to indicate start time, repetition and duration of an event in one. The encoding of the TimeSlot is shown in Table 27.

Table 27 — TimeSlot

Name	Type	Multiplicity	Description
appStartTime	AppStartTime	1	At what time and date
duration	Duration	1	How long it lasts

9.5 OpTime

This time element consists of the start and stop time of a service component within a specific application. The start and stop time is transmitted as an absolute UTC value to be independent from any other vague time description (e.g. one hour after midday). The service provider may use this time information to announce the next occurrence of a component of a certain service.

The decoder then can tell the end-user what he might expect in the near future. To take full advantage of this function, six cases are distinguished in Table 28.

Table 28 — Operating time

#	Condition	Explanation	Meaning
1	$T_p <= T_s <= T_e$	Component of the service starts and ends in the future	Default situation
2	$T_s <= T_p <= T_e$	Component of the service has already started and ends in the future	Programme is running
3	$T_s <= T_e <= T_p$	Component of the service was transmitted, change to condition 1 expected	Programme is over
4	$T_p <= T_e <= T_s$	Same as condition 2, but next start time is already announced	Programme is running
5	$T_e <= T_p <= T_s$	This condition indicates that a new service will be established	New programme in the future
6	$T_e <= T_s <= T_p$	This condition indicates that a service has been abandoned	Old programme dropped

The time descriptors have the following meaning:

— $\mathbf{T_p}$: Present or current time, i.e. the actual time that changes continuously;

— $\mathbf{T_s}$: Start time of a component within an application, fixed by the service provider;

— $\mathbf{T_e}$: End (stop) time of a component within an application, fixed by the service provider.

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The encoding of the start time and stop time is shown in Table 29.

Table 29 — Start time and Stop time

Name	Type	Multiplicity	Description
startTime	IntUnLo	1	Next start date and time
stopTime	IntUnLo	1	Next stop date and time

9.6 GeographicCoverage

This basic type is needed to define an area, to which a specific service component is allocated. This feature only makes sense if the application that uses that service component has a relation to a certain coverage area. The encoding of the GeographicCoverage is shown in Table 30.

NOTE Notional rectangle on a flat map.

Table 30 — GeographicCoverage

Name	Type	Multiplicity	Description
pointNorthWest	CoordinatePair	1	Northwest corner of rectangle
pointSouthEast	CoordinatePair	1	Southeast corner of rectangle

9.7 CoordinatePair

Definition of the corner of rectangular. The encoding of the CoordinatePair is shown in Table 31 and its numerical representation in Table 32.

Table 31 — Numerical presentation of the coordinates

Range of Type	Min. value	Max. value	Resolution (deg)	Resolution (km)	Remarks
Decimal range of <intsili>:	- 32 768	+ 32 767	N/A	N/A	
Decimal range for Longitude:	- 18 000	+ 18 000	N/A	N/A	
Range of Longitude in degrees:	- 180,00	+180,00	0,01	1,08	Resolution (km) constant
Decimal range for Latitude:	- 9 000	+ 9 000	N/A	N/A	
Range of Latitude in degrees:	- 90,00	+ 90,00	0,01	1,08	Resolution (km) variable

Table 32 — CoordinatePair

Name	Type	Multiplicity	Description
longitude	IntSiLi	1	WGS 84 Longitude in units of 0,01 degrees
latitude	IntSiLi	1	WGS 84 Latitude in units of 0,01 degrees

9.8 ByteField

The ByteField is a placeholder data type for any number of bytes.

9.9 GST1_Entry

The encoding of the GST1_Entry is shown in Table 33.

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Table 33 — GST1_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identification
originatorServiceID	ServiceIdentifier	0..1	The originator service identification needs to be specified when the carrier service provider is not the originator of the content of the related service component. If the carrier service provider is also the originator of the content of the related service component, then it is not necessary to indicate the service identification in this column. In this case, the default is the carrier service provider. Belongs to the Application and Content Indentifier (ACID), if present.
contentID	IntUnTi	1	Content Identification (COID), belongs to the Application and Content Indentifier (ACID).
applicationID	IntUnLi	1	Application Identification (AID), belongs to the Application and Content Indentifier (ACID).
operatingTime	OpTime	0..1	Next operating time. From year 1970 to 2106.
encryptionIndicator	IntUnTi	0..1	In the service frame of the TPEG frame structure, a service encryption indicator (ServEncID) is already defined for encrypting at the service frame level. If this mechanism is used, all underlying levels including the SNI data are "hidden". There is another encryption possibility in the SNI application at the service component level. Individual service components may or may not be encrypted. This is indicated in the fast tuning GST. The SNI service component (00) cannot be encrypted at this level. Where encryption is applied to a service component, then encryption shall not be applied to its SCID, field length and the header CRC of the service component frame, but to its body only. The encryption indicator (EncID) in the fast tuning GST is defined in TPEG2-SNI.
safetyFlagIsSet	Boolean	1	Absent or False = Safety flag not set A stream of service components is marked with the safety flag if it contains safety-related (LHW) messages only: Messages can be used in devices without a map, but that have the position and (driving) direction available Messages can be presented in short text or spoken form similar to "attention, in 500 metres on the M6, slippery road due to oil spillage".

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9.10 GST2_Entry

The encoding of the GST2_Entry is shown in Table 34.

NOTE Although the periodic time information is optional, it is not necessary to use a bit switch function. If no time information exists, no line will be present.

Table 34 — GST2_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identification (SCID)
timeInfo	TimeSlot	1	Periodic time information. Operating time. Indicates the start time, the repetition and the duration of any SCID.

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9.11 GST3_Entry

The encoding of the GST3_Entry is shown in Table 35.

NOTE Although the content description is optional, it is not necessary to use a bit switch function. If no content description exists, no line will be present.

Table 35 — GST3_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identification (SCID).
contentDescription	ShortString	1	Content Description: Gives further information related to a service component. The general description of a service is signalled by the CurrentServiceInformation component.

9.12 GST4_Entry

The encoding of the GST4_Entry is shown in Table 36.

Table 36 — GST4_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identification (SCID).
geographicCoverage	GeographicCoverage	1	Geographical Coordinates. NOTE The compound type Geographical Coverage is defined in 8.11.

9.13 GST5_Entry

The encoding of the GST5_Entry is shown in Table 37.

NOTE Although the service component reset is optional, it is not necessary to use a bit switch function. If no service component reset exists, no line will be present.

Table 37 — GST5_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identifier (SCID).
resetTimeStamp	IntUnLo	1	Service Component Reset Timestamp. Explanation: The SCR can be used as a tool by a service provider to clear previously received data for a particular service component.
k	IntUnTi	1	Number of bytes following. If k = 0, nothing follows. Then k is used as a terminator.
applicationContent	ByteField	0..1	Byte field containing application specific data with exactly k bytes. Needs to be defined in each application.

9.14 GST6_Entry

The encoding of the GST6_Entry is shown in Table 38.

NOTE Although the content description is optional, it is not necessary to use a bit switch function. If no content description exists, no line will be present.

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Table 38 — GST6_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identifier (SCID).
referencedCAISCID	IntUnTi	1	Reference to Service Component Identification (SCID) of CAI-Component (CAI-SCID)

9.15 GST7_Entry

The encoding of the GST7_Entry is shown in Table 39.

Table 39 — GST7_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identification (SCID)
majorVersionNumber	IntUnTi	1	Major Version Number
minorVersionNumber	IntUnTi	1	Minor Version Number

9.16 RelatedServiceEntry

The encoding of the RelatedServiceEntry is shown in Table 40.

NOTE The applications in the related services are not necessarily the same as those in the current service. The same SCID may occur more than once within this table to indicate more than one component of a related service. It is not allowed to use SCID = 00 here. Only in the case for linkage to the components of the same service SCID = 00 is possible.

EXAMPLE A service provider may reference a weather application from a traffic application. There may be multiple references from any one SCID to related services.

Table 40 — RelatedServiceEntry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component ID of the current service. EXAMPLE 08
carrierSID	ServiceIdentifier	1	Service ID of the carrier of the linked service. EXAMPLE 43.51.252
originatorSID	ServiceIdentifier	1	Service ID of the originator of the linked service. This default to the carrier service ID. EXAMPLE 34.45.124
contentID	IntUnTi	1	Content ID of the linked application. EXAMPLE 34
applicationID	IntUnLi	1	Application ID of the linked application. EXAMPLE 0014
Ordered Components			

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Table 40 *(continued)*

Name	Type	Multiplicity	Description
bearerInformation	BearerLinkageInfo	0..1	Bearer Information. EXAMPLES: Internet: URL DVB: tba DARC: ECC SI m*fc DAB: ECC EID m*fc HD Radio: SIS m1*(SIS,fm) m2*(SIS,am)
serviceName	ShortString	0..1	Name of the related service. EXAMPLE Swedish Radio
serviceDescription	ShortString	0..1	Description of the related service. EXAMPLE National Traffic Information

9.17 DABFrequency

The encoding of the DABFrequency is shown in Table 41.

Table 41 — DABFrequency

Name	Type	Multiplicity	Description
centreFrequency	IntUn24	1	Definition of the centre frequency 19 bits (b0 to b18) as defined in EN 300 401, b19 to b23 filled with zeros Carrier frequency = 0 Hz + (centreFrequency * 16 kHz)

9.18 DVBFrequency

The encoding of the DVBFrequency is shown in Table 42.

Table 42 — DVBFrequency

Name	Type	Multiplicity	Description
dvbFrequency	ByteField	1	Placeholder, tbd DVB frequency information. Other information to be added according to ETSI EN 300 468.

9.19 FMFrequency

The encoding of the FMFrequency is shown in Table 43.

Table 43 — FMFrequency

Name	Type	Multiplicity	Description
fmFrequency	IntUnTi	1	Frequency of the FM bearer carrying DARC. Definition of the frequency, same as in the RDS Standard IEC 60106, Table 10.

9.20 AMFrequency

AMFrequency provides the frequency code for HD Radio Broadcast. The coding of AMFrequency is defined as follows. The encoding of the AMFrequency is shown in Table 44.

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Table 44 — AMFrequency

Name	Type	Multiplicity	Description
amFrequency	IntUnTi	1	Integer value in the range of 0 to 122 or 128 to 246, where: range 0 to 122 encodes AM frequencies for ITU region 1 and 3 as follows: f = n * 9kHz + 522kHz, and range 128 to 246 encodes AM frequencies for ITU region 2 as follows: f = (n-128) * 10kHz + 530kHz

9.21 SameServiceEntry

In general, there are three instances where linkage will be used:

a) the same carrier service provider SID on a different bearer;

b) a different carrier service provider SID on the same bearer;

c) a different carrier service provider SID on a different bearer.

If the optional "bearer and linkage info" is not specified, then the linked service is on the same bearer. The carrier service identification of the linked service may be the same as that of the current service, in which case the "bearer and linkage info" will be used to specify an alternative bearer. It is not recommended to use the current carrier service provider SID in this linkage function without a "bearer and linkage info" specified, since this would lead to linking to itself. The following rules shall be applied.

— The same SCID may occur more than once within this table to indicate more than one alternative linkage on other services.

— Once a link to an alternative service is established, the ACID within the SNI of the linked service has to be compared to the ACID of the current service. If the ACIDs are identical, then the application's content is identical.

— The SCID of the current service and the SCID of the linked service are not necessarily the same. Once the ACID of the linked service has been confirmed as being the same as the current service, then the SCID of the linked service is found from the linked service's fast tuning guide to the *Service Table*

Linkage of all service components at once is possible in two cases as follows.

a) Exactly the same service.

   1) If all components of the current service exist as a whole within another service, then the SCID 00 (SNI application) is used to link to the other service with the same content. The regionalisation flag shall be unset in this case.

   2) It is possible that the linked service has more components than the current service. What is important is that the linked service contains all components of the current service.

   3) Even though the components are present in both services, they may have different SCIDs.

b) Regionalised service.

   1) If all applications of the current service exist as a whole within another service, but their contents are carried with suitably regionalised components, then the SCID 00 (SNI application) is used to link to the other service with the same content. The regionalisation flag shall be set in this case.

   2) It is possible that the linked service has more components than the current service. What is important is that the linked service contains all applications of the current service with suitably regionalised components.

   3) Even though the components are present in both services, they may have different SCIDs.

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Linkage to an application component distributed by the following alternative carriers:

— the GST always gives the SID (A-B-C) of the originator of the service (explicit or implicit);

— the linkage table gives the SIDs (A-B-C) of the alternative carriers;

— the alternative carriers will signal the SIDs (A-B-C) of the originator in their GSTs, to allow the link to to be confirmed.

The encoding of the SameServiceEntry is shown in Table 45.

Table 45 — SameServiceEntry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component Identifier (SCID) EXAMPLE 00
serviceID	ServiceIdentifier	1	Carrier Service Identification of the linked service. EXAMPLE 43.51.52
Ordered Components			
bearerInformation	BearerLinkageInfo	0..1	Bearer and Linkage Information EXAMPLES: Internet: URL DVB: tba DARC: ECC SI m*fc DAB: ECC EID m*fc HD Radio: SIS m1*(SIS,fm) m2*(SIS,am)
regionalisationFlag	Boolean	1	True if regionalisation flag is set.

9.22 SIT1_Entry

The encoding of the SIT1_Entry is shown in Table 46.

Table 46 — SIT1_Entry

Name	Type	Multiplicity	Description
SCID	IntUnTi	1	Service Component ID
numberOfMessages	IntUnLo	1	Total number of messages for service component (including cancellations). NOTE The total number of messages in the service component shall be the total that is currently in the notional carousel being transmitted in the service component stream, which a client device can be expected to receive before the service provider changes the carousel.

9.23 HDRadioStationID

The HDRadioStationID datatype is defined as below by the HD Radio SIS message “Station ID number”. This SIS message with MSG ID 0000 is the HD Radio system equivalent of the DARC service identification see iBiquity Digital Corporation, “HD RadioTM Air Interface Design Description Station Information Service Transport”, Doc. No. SY_IDD_1020s, Rev G (NRSC 5-B standard, available from http://www.nrscstandards.org/)].

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The HD Radio SIS message "Station ID number" (SIS MSG ID 0000) is the HD Radio identification of a Transmitter facility/frequency allocation, and as such, more specific than, e.g. the DARC service identification (or an RDS PI code) which can be the same on different (alternative) frequencies. A receiver, having obtained this information, can inspect the given frequencies and compare the station identification parameter as provided with the HDFMBearerInfo or HDAMBearerInfo with the actually transmitted station ID number on this other FM or AM frequency. If they are the same, then the receiver can look for the invariably more slowly transmitted TPEG service parameters. The encoding of the HDRadioStationID is shown in Table 47.

Table 47 — HDRadioStationID

Name	Type	Multiplicity	Description
stationIDNumber	IntUnLo	1	HD Radio 32 bit SIS message "Station ID number" (SIS MSG ID 0000)

9.24 HDFMBearerInfo

The HD_FM_bearer_info and HD_AM_bearer_info datatypes provide information on possible alternate HD Radio Stations on FM or AM frequencies respectively.

The <HD_FM_bearer_info> consists of an HD Radio station ID number and an FM frequency code as defined in the RDS standard (see specification of <FMFrequency> below the BearerLinkageInfoDARC subclause). The encoding of the HDFMBearerInfo is shown in Table 48.

Table 48 — HDFMBearerInfo

Name	Type	Multiplicity	Description
hdRadioStationID	HDRadioStationID	1	Station ID of alternate HD Radio Station.
fmFrequency	FMFrequency	1	FM frequency of alternate HD Radio station.

9.25 HDAMBearerInfo

The HDFMBearerInfo and HDAMBearerInfo datatypes provide information on possible alternate HD Radio Stations on FM or AM frequencies, respectively.

The <HDAMBearerInfo> consists of an HD Radio station ID number and now an AM frequency code as defined below. The encoding of the HDAMBearerInfo is shown in Table 49.

Table 49 — HDAMBearerInfo

Name	Type	Multiplicity	Description
hdRadioStationID	HDRadioStationID	1	Station ID of alternate HD Radio Station
amFrequency	AMFrequency	1	AM frequency of alternate HD Radio station

10 SNI Tables

10.1 sni001:GraphicType

The encoding of the sni001:GraphicType is shown in Table 50.

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Table 50 — sni001:GraphicType

Code	TISA English "Word"	Comment	Example
0	BMP		
1	PNG		
2	JPG		

10.2 sni002:CharacterEncoding

Whithin TPEG2, the only character encoding method allowed is UTF-8 (value 125 decimal). However, due to backward compatibility of the SNI to TPEG1, this table is provided. The encoding of the CharacterEncoding is shown in Table 51.

Table 51 — CharacterEncoding

Code	TISA English "Word"	Comment	Example
0	Reserved		
1	ISO 8859-1 (deprecated)		
2	ISO 8859-2 (deprecated)		
3	ISO 8859-3 (deprecated)		
4	ISO 8859-4 (deprecated)		
5	ISO 8859-5 (deprecated)		
6	ISO 8859-6 (deprecated)		
7	ISO 8859-7 (deprecated)		
8	ISO 8859-8 (deprecated)		
9	ISO 8859-9 (deprecated)		
10	ISO 8859-10 (deprecated)		
11	Reserved		
12	Reserved		
13	ISO 8859-13 (deprecated)		
14	ISO 8859-14 (deprecated)		
15	ISO 8859-15 (deprecated)		
125	ISO 10646 UTF-8	This is the only valid entry for TPEG2 compliant services.	
126	ISO 10646 UTF-16 (deprecated)		
127	ISO 10646 UTF-32 (deprecated)		

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Annex A
(normative)

TPEG SNI, TPEG-Binary Representation

A.1 General

This Annex provides the TPEG binary representation derived via application of the UML to binary conversion rules specified in TPEG2-UBCR.

The following changes have been done after the application of the UML to binary conversion rules (TPEG2-UBCR):

— changed LengthIndicator type to IntUnLi;

— removed Line with lengthAttr;

— counters for Table line entries removed;

— changed type for selectors from bit_switch to BitArray and changed numbering of bits accordingly. Continuitiy indicator always set to "0"/False.

EXAMPLE bit_switch bit 0 is now BitArray bit 6 (the least significant bit of the first byte), bit_switch bit 1 is now BitArray bit 5, and so on. bit_switch bit 6 is BitArray bit 0. Please see ISO/TS 21219-3 (TPEF2-UBCR) for encoding details.

— Changed types for counters in BearerLinkageInfoHDRadio with limit 0..255 from IntUnLoMB to IntUnTi:

Table A.1 shows the encoding of the BearerLinkageInfoHDRadio as a data type IntUnTi.

Table A.1 — BearerLinkageInfoHDRadio

<IntUnTi>(n),	— : {0 <= *n* <= 255}

— Substracted 100 from GCIds larger than 99 to avoid duplicate ids in TPEG2-UML.

— Changed bit ordering in selector according to TPEG1-Spec for GST1_Entry.

— Removed Selector from GST5_Entry.

— Removed Selectors from HDBearerLinkageInfo.

— Moved Selector to first table column after SCID in "Same Service Entry".

— Moved Selector to first table column after SCID in "RelatedServiceEntry".

A.2 Message components

A.2.1 List of generic component Ids

Table A.2 shows the List of Generic Component Ids.

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Table A.2 — List of generic component Ids

Name	Id
CurrentServiceInformation	0
GST1_FastTuningTable	1
GST2_TimeScheduleTable	2
GST3_ContentDescription	3
GST4_GeographicalCoverage	4
GST5_ServiceComponentReset	5
GST_ServiceTableAccelerator	6
ServiceLogo	7
LinkageToSameService	8
LinkageToRelatedService	9
SubscriberInformation	10
FreeTextInformation	11
HelpInformation	12
GST6_ConditionalAccessInformationReference	13
GST7_Versioning	14
BearerLinkageInfoHDRadio	15
SIT1_NumberOfMessages	33

A.2.2 TPEG 1 non unique component IDs

Table A.3 shows BearerLinkageInfo values which are present to maintain backwards compatibility with TPEG1-SNI.

Table A.3 — TPEG 1 non unique component IDs

Name	Id
BearerLinkageInfoDAB	0
BearerLinkageInfoURL	1
BearerLinkageInfoDARC	2
BearerLinkageInfoDVB	3

A.2.3 SNI1Template

Table A.4 shows the SNI1Template.

Table A.4 — SNI1Template

<SNI1Template(x)>:=	
<IntUnTi>(x),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component

A.2.4 CurrentServiceInformation

The following Table A.5 shows the CurrentServiceInformation.

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Table A.5 — CurrentServiceInformation

<CurrentServiceInforma-tion(0)<SNI1Template(0)>>:=	
<IntUnTi>(0),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<ShortString>(serviceName),	: Identifies the service to a human being. Identifies the service by a label, comparable to PS in RDS. EXAMPLE "BBC 2 - TPEG Service"
<ShortString>(serviceDescription);	: 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"

A.2.5 ServiceLogo

Table A.6 shows the ServiceLogo.

Table A.6 — ServiceLogo

<ServiceLogo(7)<SNI1Template(7)>>:=	
<IntUnTi>(7),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<sni001:GraphicType>(graphicType),	
<ByteField>(graphicData);	

A.2.6 SubscriberInformation

Table A.7 shows the SubscriberInformation.

Table A.7 — SubscriberInformation

<SubscriberInformation(10)<SNI1Template(10)>>:=	
<IntUnTi>(10),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<ByteField>(subscriberData);	: Contents defined by the service provider. Gives information about payment and tariffs for restricted service components.

A.2.7 FreeTextInformation

Table A.8 shows the FreeTextInformation.

Table A.8 — FreeTextInformation

<FreeTextInformation(11)<SNI1Template(11)>>:=	
<IntUnTi>(11),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<ShortString>(freeText);	: Additional information, that is not coded and therefore language dependent.

A.2.8 HelpInformation

Table A.9 shows the HelpInformation.

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Table A.9 — HelpInformation

<HelpInformation(12)<SNI1Template(12)>>:=	
<IntUnTi>(12),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<ShortString>(helpText);	: Additional information that gives addresses to which the user can apply to. A link between the user and the service provider for feedback.

A.2.9 GST_GuideToServiceTables

Table A.10 shows the GST_GuideToServiceTables.

Table A.10 — GST_GuideToServiceTables

<GST_GuideToServiceTables(x)>:=	
<IntUnTi>(x),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component

A.2.10 GST1_FastTuningTable

Table A.11 shows the GST1_FastTuningTable.

Table A.11 — GST1_FastTuningTable

<GST1_FastTuningTable(1)<SNI1Template(1)>>:=	
<IntUnTi>(1),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
<sni002:CharacterEncoding>(characterEncoding),	Default character table for the current service. The one and only encoding to be used in TPEG is UTF-8. All other possible values are deprecated and included for TPEG1 backward compatibility. The character table identifier is valid for the whole service including the SNI application itself. The character table identifier belongs to the basic service features and is therefore integrated into the guide to the *Service Table*. If the <characterEncoding> is invalid or unknown to the receiver, it should assume that the <characterEncoding> equals 125 (UTF-8).
n *<GST1_Entry>(tableEntry);	: Lines of Table GST1.

A.2.11 GST2_TimeScheduleTable

Table A.12 shows the GST2_TimeScheduleTable.

Table A.12 — GST2_TimeScheduleTable

<GST2_TimeScheduleTable(2)<SNI1Template(2)>>:=	
<IntUnTi>(2),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: incremented if any of the entries is changed
n *<GST2_Entry>(tableEntry);	: Lines of guide to the services Table 2 (time schedule)

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A.2.12 GST3_ContentDescription

Table A.13 shows the GST3_ContentDescription.

Table A.13 — GST3_ContentDescription

<GST3_ContentDescription(3)<SNI1Template(3)>>:=	
<IntUnTi>(3),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
n *<GST3_Entry>(tableEntry);	: Lines of Table GST3.

A.2.13 GST4_GeographicalCoverage

Table A.14 shows the GST4_GeographicalCoverage.

Table A.14 — GST4_GeographicalCoverage

<GST4_GeographicalCoverage(4)<SNI1Template(4)>>:=	
<IntUnTi>(4),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
n *<GST4_Entry>(tableEntry);	: Lines of Table GST4.

A.2.14 GST5_ServiceComponentReset

Table A.15 shows the GST5_ServiceComponentReset.

Table A.15 — GST5_ServiceComponentReset

<GST5_ServiceComponentReset(5)<SNI1Template(5)>>:=	
<IntUnTi>(5),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
n *<GST5_Entry>(tableEntry);	: Lines for Table GST5.

A.2.15 GST6_ConditionalAccessInformationReference

Table A.16 shows the GST6_ConditionalAccessInformationReference.

Table A.16 — GST6_ConditionalAccessInformationReference

<GST6_ConditionalAccessInformationReference(13) <SNI1Template(13)>>:=	
<IntUnTi>(13),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
n *<GST6_Entry>(tableEntry);	: Lines of Table 6.

A.2.16 GST7_Versioning

Table A.17 shows the GST7_Versioning.

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Table A.17 — GST7_Versioning

<GST7_Versioning(14)<SNI1Template(14)>>:=	
<IntUnTi>(14),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
n *<GST7_Entry>(tableEntry);	: Lines of Table 7.

A.2.17 GST_ServiceTableAccelerator

Table A.18 shows the GST_ServiceTableAccelerator.

Table A.18 — GST_ServiceTableAccelerator

<GST_ServiceTableAccelerator(6)<SNI1Template(6)>>:=	
<IntUnTi>(6),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion);	: Table incremental version number. Incremented each time a change to the versioning of the GST tables occurs.

A.2.18 LinkageToSameService

Table A.19 shows the LinkageToSameService.

Table A.19 — LinkageToSameService

<LinkageToSameService(8)<SNI1Template(8)>>:=	
<IntUnTi> (8),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
n *<SameServiceEntry>(tableEntry);	: Lines of table.

A.2.19 LinkageToRelatedService

Table A.20 shows the LinkageToRelatedService.

Table A.20 — LinkageToRelatedService

<LinkageToRelatedService(9)<SNI1Template(9)>>:=	
<IntUnTi>(9),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(tableVersion),	: Incremented, if any of the entries is changed.
n *<RelatedServiceEntry>(tableEntry);	

A.2.20 BearerLinkageInfo

Table A.21 shows the BearerLinkageInfo.

Table A.21 — BearerLinkageInfo

<BearerLinkageInfo(x)>:=	
<IntUnTi>(x),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component

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A.2.21 BearerLinkageInfoDAB

Table A.22 shows the BearerLinkageInfoDAB.

Table A.22 — BearerLinkageInfoDAB

<BearerLinkageInfoDAB(0)<BearerLinkageInfo(0)>>:=	
<IntUnTi>(0),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(extendedCountryCode),	: ECC (Extended Country Code)
<IntUnLi>(ensembleIdentification),	: EID (Ensemble Identification)
n *<DABFrequency>(dabFrequency);	: DAB frequency information

A.2.22 BearerLinkageInfoDARC

Table A.23 shows the BearerLinkageInfoDARC.

Table A.23 — BearerLinkageInfoDARC

<BearerLinkageInfoDARC(2)<BearerLinkageInfo(2)>>:=	
<IntUnTi>(2),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(extendedCountryCode),	: ECC (extended country code)
<IntUnLi>(DARCServiceID),	: DARC service identification.
n *<FMFrequency>(fmFrequency);	: FM frequency information

A.2.23 BearerLinkageInfoDVB

Table A.24 shows the BearerLinkageInfoDVB.

Table A.24 — BearerLinkageInfoDVB

<BearerLinkageInfoDVB(3)<BearerLinkageInfo(3)>>:=	
<IntUnTi>(3),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
n *<DVBFrequency>(dvbFrequency);	: DVB frequency according to 0

A.2.24 BearerLinkageInfoURL

Table A.25 shows the BearerLinkageInfoURL.

Table A.25 — BearerLinkageInfoURL

<BearerLinkageInfoURL(1)<BearerLinkageInfo(1)>>:=	
<IntUnTi>(1),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<LongString>(uniformResourceLocator);	: URL (Uniform Resource Locator) as defined in RFC 1738.

A.2.25 BearerLinkageInfoHDRadio

Table A.26 shows the BearerLinkageInfoHDRadio.

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Table A.26 — BearerLinkageInfoHDRadio

<BearerLinkageInfoHDRadio(15) < BearerLinkageInfo(15) > > : =	
<IntUnTi>(15),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<HDRadioStationID>(hdRadioStationID),	: Transmitter HD Radio station for which a list of applicable alternate stations is given by the following lists of HDFMBearerInfo and HDAMBearerInfo entries.
<IntUnTi>(n),	: {0 <= *n* <= 255}
n *<HDFMBearerInfo>(hdFMBearerInfo),	: HD FM bearer information.
<IntUnTi>(n),	: {0 <= *n* <= 255}
n *<HDAMBearerInfo>(hdAMBearerInfo);	: HD AM bearer Information

A.2.26 SIT_ServiceInformationTables

Table A.27 shows the SIT_ServiceInformationTables.

Table A.27 — SIT_ServiceInformationTables

<SIT_ServiceInformationTables(x)>:=	
<IntUnTi>(x),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component

A.2.27 SIT1_NumberOfMessages

Table 28 shows the SIT1_NumberOfMessages.

Table A.28 — SIT1_NumberOfMessages

<SIT1_NumberOfMessages(33)<SNI1Template(33)>>:=	
<IntUnTi>(33),	: id of this component
<IntUnLi>(lengthComp),	: number of bytes in component
<IntUnTi>(currentGST1TableVersion),	: The version in this table shall equal the version number in the corresponding GST 1 table. Consequently, the version number will only change when the version number in the GST 1 table changes, either directly (change in GST 1 table) or indirectly (change in another GST table). The version number in this Service Information Table shall therefore NOT change when any of the contained total number of messages changes.
n *<SIT1_Entry>(tableEntry);	: Line of Table SIT1.

A.3 SNI Datatypes

A.3.1 MaskedTime

Table A.29 shows the MaskedTime.

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Table A.29 — MaskedTime

<MaskedTime>:=	
<IntUnTi>(year),	: Year, 0:any; 1..255: Year-1999
<IntUnTi>(month),	: Month, 0:any; 1..12:Month
<IntUnTi>(day),	: Day, 0:any; 1..31: Day
<IntUnTi>(hour),	: Hour, 0:any; 1..24:Hour+1
<IntUnTi>(min),	: Min, 0:any; 1..60; Min+1
<IntUnTi>(sec);	: Sec, 0:any; 1..60: Sec+1

A.3.2 DayMask

Table A.30 shows the DayMask.

Table A.30 — DayMask

<DayMask>:=	
BitArray(selector),	
if (bit 6 of selector is set)	
<Boolean>(everySunday),	
if (bit 5 of selector is set)	
<Boolean>(everyMonday),	
if (bit 4 of selector is set)	
<Boolean>(everyTuesday),	
if (bit 3 of selector is set)	
<Boolean>(everyWednesday),	
if (bit 2 of selector is set)	
<Boolean>(everyThursday),	
if (bit 1 of selector is set)	
<Boolean>(everyFriday),	
if (bit 0 of selector is set)	
<Boolean>(everySaturday);	

A.3.3 AppStartTime

Table A.31 shows the AppStartTime.

Table A.31 — AppStartTime

<AppStartTime>:=	
<MaskedTime>(maskedTime),	: At what time and date
<DayMask>(dayMask);	: At which day of the week

A.3.4 TimeSlot

Table A.32 shows the TimeSlot.

Table A.32 — TimeSlot

<TimeSlot>:=	
<AppStartTime>(appStartTime),	: At what time and date
<Duration>(duration);	: How long it lasts

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A.3.5 OpTime

Table A.33 shows the OpTime.

Table A.33 — OpTime

<OpTime>:=	
<IntUnLo>(startTime),	: Next start date and time
<IntUnLo>(stopTime);	: Next stop date and time

A.3.6 GeographicCoverage

Table A.34 shows the GeographicCoverage.

Table A.34 — GeographicCoverage

<GeographicCoverage>:=	
<CoordinatePair>(pointNorthWest),	: Northwest corner of rectangle
<CoordinatePair>(pointSouthEast);	: Southeast corner of rectangle

A.3.7 CoordinatePair

Table A.35 shows the CoordinatePair.

Table A.35 — CoordinatePair

<CoordinatePair>:=	
<IntSiLi>(longitude),	: WGS 84 Longitude in units of 0,01 degrees
<IntSiLi>(latitude);	: WGS 84 Latitude in units of 0,01 degrees

A.3.8 ByteField

Table A.36 shows the ByteField.

Table A.36 — ByteField

<ByteField>:=	Some bytes.

A.3.9 GST1_Entry

Table A.37 shows the GST1_Entry.

Table A.37 — GST1_Entry

<GST1_Entry>:=	
<IntUnTi>(SCID),	: Service Component Identification
BitArray(selector),	
if (bit 6 of selector is set)	

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Table A.37 *(continued)*

<ServiceIdentifier>(originatorServiceID),	: The originator service identification needs to be specified when the carrier service provider is not the originator of the content of the related service component. If the carrier service provider is also the originator of the content of the related service component, then it is not necessary to indicate the service identification in this column. In this case, the default is the carrier service provider. Belongs to the Application and Content Indentifier (ACID), if present.
<IntUnTi>(contentID),	: Content Identification (COID), belongs to the Application and Content Indentifier (ACID).
<IntUnLi>(applicationID),	: Application Identification (AID), belongs to the Application and Content Indentifier (ACID).
if (bit 4 of selector is set)	
<OpTime>(operatingTime),	: Next operating time. From year 1970 to 2106.
if (bit 3 of selector is set)	
<IntUnTi>(encryptionIndicator),	: In the service frame of the TPEG frame structure, a service encryption indicator (ServEncID) is already defined for encrypting at the service frame level. If this mechanism is used, all underlying levels including the SNI data are "hidden". There is another encryption possibility in the SNI application at the service component level. Individual service components may or may not be encrypted. This is indicated in the fast tuning GST. The SNI service component (00) cannot be encrypted at this level. Where encryption is applied to a service component, then encryption shall not be applied to its SCID, field length and the header CRC of the service component frame, but to its body only. The encryption indicator (EncID) in the fast tuning GST is defined in TPEG2-SNI.
if (bit 2 of selector is set)	
<Boolean>(safetyFlagIsSet);	: Absent or False = Safety flag not set A stream of service components is marked with the safety flag if It contains safety related (LHW) messages only: Messages can be used in devices without a map, but that have the position and (driving) direction available. Messages can be presented in short text or spoken form similar to "attention, in 500 metres on the M6, slippery road due to oil spillage".

A.3.10 GST2_Entry

Table A.38 shows the GST2_Entry.

Table A.38 — GST2_Entry

<GST2_Entry>:=	
<IntUnTi>(SCID),	: Service Component Identification (SCID)
<TimeSlot>(timeInfo);	: Periodic time information. Operating time. Indicates the start time, the repetition and the duration of any SCID.

A.3.11 GST3_Entry

Table A.39 shows the GST3_Entry.

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Table A.39 — GST3_Entry

<GST3_Entry>:=	
<IntUnTi>(SCID),	: Service Component Identification (SCID).
<ShortString>(contentDescription);	: Content Description: Gives further information related to a service component. The general description of a service is signalled by the CurrentServiceInformation component.

A.3.12 GST4_Entry

Table A.40 shows the GST4_Entry.

Table A.40 — GST4_Entry

<GST4_Entry>:=	
<IntUnTi>(SCID),	: Service Component Identification (SCID).
<GeographicCoverage>(geographicCoverage);	: Geographical Coordinates. NOTE The compound type Geographical Coverage is defined in 8.11.

A.3.13 GST5_Entry

Table A.41 shows the GST5_Entry.

Table A.41 — GST5_Entry

<GST5_Entry>:=	
<IntUnTi>(SCID),	: Service Component Identifier (SCID).
<IntUnLo>(resetTimeStamp),	: Service Component Reset Timestamp. Explanation: The SCR can be used as a tool by a service provider to clear previously received data for a particular service component.
<IntUnTi>(k),	: Number of bytes following. If k = 0, nothing follows. Then k is used as a terminator.
<ByteField>(applicationContent);	: Byte field containing application specific data with exactly k bytes. Needs to be defined in each application.

A.3.14 GST6_Entry

Table A.42 shows the GST6_Entry.

Table A.42 — GST6_Entry

<GST6_Entry>:=	
<IntUnTi>(SCID),	: Service Component Identifier (SCID).
<IntUnTi>(referencedCAISCID);	: Reference to Service Component Identification (SCID) of CAI-Component (CAI-SCID).

A.3.15 GST7_Entry

Table A.43 shows the GST7_Entry.

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Table A.43 — GST7_Entry

<GST7_Entry>:=	
<IntUnTi>(SCID),	: Service Component Identification (SCID)
<IntUnTi>(majorVersionNumber),	: Major Version Number
<IntUnTi>(minorVersionNumber);	: Minor Version Number

A.3.16 RelatedServiceEntry

Table A.44 shows the RelatedServiceEntry.

Table A.44 — RelatedServiceEntry

<RelatedServiceEntry>:=	
<IntUnTi > (SCID),	: Service Component ID of the current service. EXAMPLE 08
BitArray(selector),	
<ServiceIdentifier>(carrierSID),	: Service ID of the carrier of the linked service. EXAMPLE 43.51.252
<ServiceIdentifier>(originatorSID),	: Service ID of the originator of the linked service. This defaults to the carrier service ID. EXAMPLE 34.45.124
<IntUnTi>(contentID),	: Content ID of the linked application. EXAMPLE 34
<IntUnLi>(applicationID),	: Application ID of the linked application. EXAMPLE 0014
if (bit 6 of selector is set)	
<BearerLinkageInfo>(bearerInformation),	: Bearer Information. EXAMPLES: Internet: URL DVB: tba DARC: ECC SI m*fc DAB: ECC EID m*fc HD Radio: SIS m1*(SIS,fm) m2*(SIS,am)
if (bit 5 of selector is set)	
<ShortString>(serviceName),	: Name of the related service. EXAMPLE Swedish Radio
if (bit 4 of selector is set)	
<ShortString>(serviceDescription);	: Description of the related service. EXAMPLE National Traffic Information

A.3.17 DABFrequency

Table A.45 shows the DABFrequency.

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Table A.45 — DABFrequency

<DABFrequency>:=	
<IntUn24>(centreFrequency);	: Definition of the centre frequency 19 bits (b0 to b18) as defined in EN 300 401, b19 to b23 filled with zeros Carrier frequency = 0 Hz + (centreFrequency * 16 kHz)

A.3.18 DVBFrequency

Table A.46 shows the DVBFrequency.

Table A.46 — DVBFrequency

<DVBFrequency>:=	
<ByteField>(dvbFrequency);	: Placeholder, tbd DVB frequency information. Other information to be added according to the ETSI Standard.

A.3.19 FMFrequency

Table A.47 shows the FMFrequency.

Table A.47 — FMFrequency

<FMFrequency>:=	
<IntUnTi>(fmFrequency);	: Frequency of the FM bearer carrying DARC. Definition of the frequency, same as in the RDS Standard IEC: 60106, 3.2.1.6, Table 10.

A.3.20 AMFrequency

Table A.48 shows the AMFrequency.

Table A.48 — AMFrequency

<AMFrequency>:=	
<IntUnTi>(amFrequency);	: Integer value in the range of 0-122 or 128-246, where: range 0 to 122 encodes AM frequencies for ITU region 1 and 3 as follows: f = n * 9kHz + 522kHz, and, range 128 to 246 encodes AM frequencies for ITU region 2 as follows: f = (n-128) * 10kHz + 530kHz

A.3.21 SameServiceEntry

Table A.49 shows the SameServiceEntry.

Table A.49 — SameServiceEntry

<SameServiceEntry>:=	
<IntUnTi>(SCID),	: Service Component Identifier (SCID) EXAMPLE 00
BitArray(selector),	
<ServiceIdentifier>(serviceID),	: Carrier Service Identification of the linked service. EXAMPLE 43.51.52

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Table A.49 *(continued)*

if (bit 6 of selector is set)	
<BearerLinkageInfo>(bearerInformation),	: Bearer and Linkage Information EXAMPLES: Internet: URL DVB: tba DARC: ECC SI m*fc DAB: ECC EID m*fc HD Radio: SIS m1*(SIS,fm) m2*(SIS,am)
if (bit 5 of selector is set)	
<Boolean>(regionalisationFlag);	: True if regionalisation flag is set.

A.3.22 SIT1_Entry

Table A.50 shows the SIT1_Entry.

Table A.50 — SIT1_Entry

<SIT1_Entry>:=	
<IntUnTi>(SCID),	: Service Component ID
<IntUnLo>(numberOfMessages);	: Total number of messages for service component (including cancellations). NOTE The total number of messages in the service component shall be the total that is currently in the notional carousel being transmitted in the service component stream, which a client device can be expected to receive before the service provider changes the carousel.

A.3.23 HDRadioStationID

Table A.51 shows the HDRadioStationID.

Table A.51 — HDRadioStationID

<HDRadioStationID>:=	
<IntUnLo>(stationIDNumber);	: HD Radio 32 bit SIS message “Station ID number” (SIS MSG ID 0000)

A.3.24 HDFMBearerInfo

Table A.52 shows the HDFMBearerInfo.

Table A.52 — HDFMBearerInfo

<HDFMBearerInfo>:=	
<HDRadioStationID>(hdRadioStationID),	: Station ID of alternate HD Radio Station.
<FMFrequency>(fmFrequency);	: FM frequency of alternate HD Radio station

A.3.25 HDAMBearerInfo

Table A.53 shows the HDAMBearerInfo.

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Table A.53 — HDAMBearerInfo

<HDAMBearerInfo>:=	
<HDRadioStationID>(hdRadioStationID),	: Station ID of alternate HD Radio Station
<AMFrequency>(amFrequency);	: AM frequency of alternate HD Radio station

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Annex B
(normative)

TPEG SNI, tpegML representation

NOTE In the course of ISO processing, XML-compliant quotation marks are replaced with non-compliant quotation marks. When taking over material from these sections, be advised to substitute any double quote to the XML-compliant equivalent quotation mark (Unicode U +0022).

B.1 General

This Annex provides the xml representation derived via application of the UML to xml conversion rules specified in TPEG2-UXCR.

B.2 Message components

B.2.1 SNI1Template

```
<xs:element name=”SNI1Template” type=”SNI1Template”/>
<xs:complexType name=”SNI1Template”>
<xs:complexContent>
<xs:extension base=”tsf:ApplicationRootMessageML”>
 <xs:sequence>
 <xs:choice minOccurs=”1” maxOccurs=”1”>
 <xs:element name=”optionCurrentServiceInformation” type=”CurrentServiceInformation”
minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionServiceLogo” type=”ServiceLogo” minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionSubscriberInformation” type=”SubscriberInformation” minOccurs=”1”
maxOccurs=”1”/>
 <xs:element name=”optionFreeTextInformation” type=”FreeTextInformation” minOccurs=”1”
maxOccurs=”1”/>
 <xs:element name=”optionHelpInformation” type=”HelpInformation” minOccurs=”1”
maxOccurs=”1”/>
 <xs:element name=”optionGST1_FastTuningTable” type=”GST1_FastTuningTable” minOccurs=”1”
maxOccurs=”1”/>
 <xs:element name=”optionGST2_TimeScheduleTable” type=”GST2_
TimeScheduleTable” minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionGST3_ContentDescription” type=”GST3_ContentDescription”
minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionGST4_GeographicalCoverage” type=”GST4_GeographicalCoverage”
minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionGST5_ServiceComponentReset” type=”GST5_ServiceComponentReset”
minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionGST6_ConditionalAccessInformationReference” type=”GST6_
ConditionalAccessInformationReference” minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionGST7_Versioning” type=”GST7_Versioning” minOccurs=”1”
maxOccurs=”1”/>
 <xs:element name=”optionGST_ServiceTableAccelerator” type=”GST_ServiceTableAccelerator”
minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionLinkageToSameService” type=”LinkageToSameService” minOccurs=”1”
maxOccurs=”1”/>
 <xs:element name=”optionLinkageToRelatedService” type=”LinkageToRelatedService”
minOccurs=”1” maxOccurs=”1”/>
 <xs:element name=”optionSIT1_NumberOfMessages” type=”SIT1_NumberOfMessages” minOccurs=”1”
maxOccurs=”1”/>
 </xs:choice>
 </xs:sequence>
</xs:extension>
</xs:complexContent>
</xs:complexType>
```

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