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Digitalna videoradiodifuzija (DVB) – Smernice za uvedbo in uporabo servisnih informacij (SI)

Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)

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Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)

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Foreword

This ETSI Technical Report (ETR) has been produced under the authority of the Joint Technical Committee (JTC) of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECtrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

This ETR is based on the DVB document TM1324, rev. X / 162 rev. 13, and it may be converted into a standard after market feedback. For this purpose, the wording of a standard (normative elements) rather than of a technical report (informative elements) has been used.

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or the application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or an I-ETS.

NOTE: The EBU/ETSI JTC was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva *.

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Digital Video Broadcasting (DVB) Project

Founded in September 1993, the DVB Project is a market-led consortium of public and private sector organizations in the television industry. Its aim is to establish the framework for the introduction of MPEG-2 based digital television services. Now comprising over 200 organizations from more than 25 countries around the world, DVB fosters market-led systems, which meet the real needs, and economic circumstances, of the consumer electronics and the broadcast industry.

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1 Scope

The present document provides implementation guidelines for the use and implementation of the DVB Service Information (SI) coding in a DVB digital TV environment including satellite- cable- and terrestrial networks.

The guidelines are intended to be highly recommended rules for the usage of the DVB SI syntax specified in EN 300 468 [1]. As such, they facilitate the efficient and reliable implementation of basic user-interaction functions in Integrated Receiver-Decoders (IRD).

The rules apply to broadcasters, network operators as well as manufacturers.

The rules are specified in the form of constraints on the DVB SI streams or in terms of intended interpretation by IRDs.

The specification of these functions in no way prohibits IRD manufacturers from including additional features, and should not be interpreted as stipulating any form of upper limit to the performance. The guidelines do not cover features related to user-interface details or advanced Electronic Program Guides (EPG). Such issues are left to the marketplace.

NOTE: It is highly recommended that the IRD should be designed to allow for future compatible extensions to the DVB SI syntax. All the fields "reserved" (for ISO), "reserved_future_use" (for ETSI), and "user defined" in the EN 300 468 [1] should be ignored by IRDs designed not to make use of them. The "reserved" and "reserved_future_use" fields may be specified in the future by the respective bodies, whereas the "user defined" fields will not be standardized.

The present document uses the terminology defined in EN 300 468 [1] and should be read in conjunction with that ETS.

2 References

For the purposes of the present document, the following references apply:

[1] EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".

[2] ISO/IEC 13818-1: "Information Technology - Generic Coding of Moving Pictures and Associated Audio Recommendation H.222.0 (systems)".

[3] EN 300 472: "Digital Video Broadcasting (DVB); Specification for conveying ITU-R System B Teletext in DVB bitstreams".

[4] ETR 162: "Digital Video Broadcasting (DVB); Allocation of Service Information (SI) codes for DVB systems".

[5] prEN 301 192: "Digital Video Broadcasting (DVB); Specification for data broadcasting".

[6] prTR 101 202: "Digital Video Broadcasting (DVB); Guidelines for the implementation and usage of the DVB data broadcasting specification".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply:

bouquet: A collection of services marketed as a single entity.

broadcaster (SERVICE Provider): An organization which assembles a sequence of events or programmes to be delivered to the viewer based upon a schedule.

component (ELEMENTARY Stream): One or more entities which together make up an event, e.g. video, audio, Teletext.

Conditional Access (CA) system: A system to control subscriber access to services, programmes and events e.g. Videoguard, Eurocrypt.

delivery system: The physical medium by which one or more multiplexes are transmitted e.g. satellite system, wide-band coaxial cable, fibre optics, terrestrial channel of one emitting point.

event: A grouping of elementary broadcast data streams with a defined start and end time belonging to a common service, e.g. first half of a football match, News Flash, first part of an entertainment show.

MPEG-2: Refers to the standard ISO/IEC 13818. Systems coding is defined in part 1. Video coding is defined in part 2. Audio coding is defined in part 3.

multiplex: A stream of all the digital data carrying one or more services within a single physical channel.

network: A collection of MPEG-2 TS multiplexes transmitted on a single delivery system, e.g. all digital channels on a specific cable system.

section: A section is a syntactic structure used for mapping all service information into ISO/IEC 13818-1 [2] Transport Stream (TS) packets.

programme: A concatenation of one or more events under the control of a broadcaster e.g. news show, entertainment show.

service: A sequence of programmes under the control of a broadcaster which can be broadcast as part of a schedule.

Service Information (SI): Digital data describing the delivery system, content and scheduling/timing of broadcast data streams etc. It includes MPEG-2 Program Specific Information (PSI) together with independently defined extensions.

sub-table: A sub-table is comprised of a number of sections with the same value of table_id, table_id_extension and version_number. The table_id_extension field is equivalent to the fourth and fifth byte of a section when the section_syntax_indicator is set to a value of "1".

table: A table is comprised of a number of sections with the same value of table_id.

Transport Stream (TS): A data structure defined in ISO 13818-1 [2]. It is the basis of the DVB standards.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATSC	Advanced Television Systems Committee of the USA
BAT	Bouquet Association Table
bslbf	bit string, left bit first
CA	Conditional Access
DIT	Discontinuity Information Table
DVB	Digital Video Broadcasting
EIT	Event Information Table
EPG	Electronic Program Guide
IRD	Integrated Receiver-Decoder
MFN	Multi-Frequency Network
MJD	Modified Julian Date
MPEG	Moving Pictures Expert Group
NIT	Network Information Table
NVOD	Near Video On Demand
PAT	Program Association Table
PCR_PID	Program Clock Reference_Packet IDentifier
PID	Packet IDentifier
PMT	Program Map Table
PSI	Program Specific Information
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RST	Running Status Table
SDT	Service Description Table
SFN	Single Frequency Network
SHY	Soft HYphen
SI	Service Information
SIT	Selection Information Table
SMATV	Satellite Master Antenna TeleVision
ST	Stuffing Table
TDT	Time and Date Table
TOT	Time Offset Table
TS	Transport Stream
uimsbf	unsigned integer, most significant bit first
UTC	Universal Time Coordinated
VCR	Video Cassette Recorder

4 Rules of operation

This clause contains some recommendations on the usage of the Digital Video Broadcasting (DVB) Service Information (SI) syntax.

4.1 Service Information (SI) table information

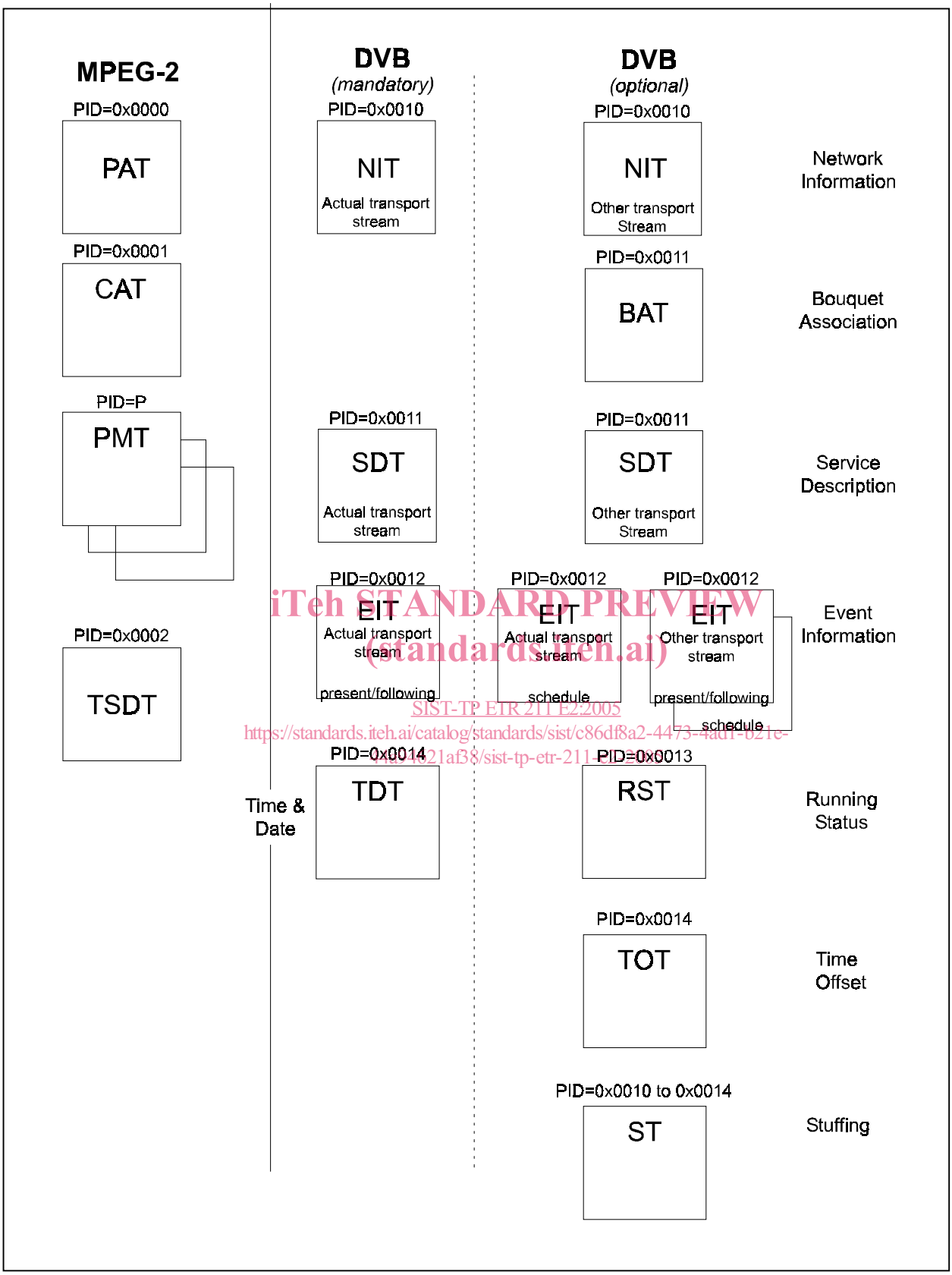

Figure 1: SI table information

4.1.1 Network Information Table (NIT) information

The Network Information Table (NIT) provides a grouping of Transport Streams (TSs) and the relevant tuning information. The NIT could be used during set-up procedures of the IRD and the relevant tuning information may be stored in non-volatile memory. The NIT also could be used to signal changes of tuning information. The following rules apply to the NIT:

a) transmission of the NIT is mandatory for the actual delivery system;

b) the NIT describing the actual delivery system is valid if and only if it contains applicable delivery system descriptors for the actual delivery system. This rule specifies the conditions under which the NIT contains valid information. At some transitions of broadcast delivery system boundaries, the NIT carried in a TS is allowed to describe an earlier network in the broadcast chain. A different mechanism has to be selected by the IRD to obtain the relevant tuning information for the actual delivery system. If a satellite IRD receives a satellite delivery system descriptor for the actual delivery system, then it is valid. If a cable IRD receives a cable delivery system descriptor for the actual delivery system, then it is valid. If a cable IRD receives a satellite delivery system descriptor for the actual delivery system, then it is assumed to be invalid for the cable IRD;

c) if a valid NIT for the actual delivery system is present in the SI bit stream then it shall list all TSs of the actual delivery system;

d) the SI stream shall have at least 8 TS packets per 10 seconds carrying NIT data or NULL packets. This rule simplifies the replacement of the NIT at broadcast delivery system boundaries. With the simple replacement mechanism, local frequency control is possible with relatively low cost equipment.

The SI uses two labels related to the concept of a delivery system, namely the network_id and the original_network_id. The latter is intended to support the unique identification of a service, contained in a TS, even if that TS has been transferred to another delivery system than the delivery system where it originated. A TS can be uniquely referenced through the path original_network_id/transport_stream_id. A service can be uniquely referenced through the path original_network_id/transport_stream_id/service_id. The network_id, thus, is not part of this path. In addition each service_id shall be unique within each original_network_id. When a service (contained inside a TS) is transferred to another delivery system, only the network_id changes, whereas the original_network_id remains unaffected.

By way of example, consider the following, where two services (A and B), which originate in two different delivery systems and happen to have the same service_ids and transport_stream_ids, are transferred to a new delivery system.

In the example, the two services are located on different TSs (X and Y) in the new network. If the two services were being combined onto the same TS, then it would be necessary to modify the identification of the services, since the same service_id value cannot be assigned to more than one service within a TS, and only one original_network_id can be associated with a TS (see subclause 5.3 for further discussion on transitions at broadcast delivery media boundaries).