SLOVENSKI STANDARD
SIST ETS 300 468 E1:2005

01-november-2005

Sistemi digitalne radiodifuzije za televizijske, zvokovne in podatkovne storitve – Specifikacije za servisne informacije v sistemih digitalne videoradiodifuzije (DVB)

Digital broadcasting systems for television, sound and data services – Specification for service information (SI) in digital video broadcasting (DVB) systems

Ta slovenski standard je istoveten z: **ETS 300 468 Edition 1**

ICS:

33.170	Televizijska in radijska difuzija	Television and radio broadcasting

SIST ETS 300 468 E1:2005 **en**

EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 468

October 1995

Source: EBU/ETSI JTC

Reference: DE/JTC-DVB-5

ICS: 33.020

Key words: digital television broadcasting, Service Information (SI), MPEG

European Broadcasting Union EBU UER Union Européenne de Radio-Télévision

Digital broadcasting systems for television, sound and data services; Specification for Service Information (SI) in Digital Video Broadcasting (DVB) systems

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New presentation - see History box

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Foreword

This European Telecommunication Standard (ETS) was produced under the authority of the Joint Technical Committee (JTC) of the European Broadcasting Union (EBU) and the European Telecommunications Standards Institute (ETSI).

This ETS for Service Information (SI) in Digital Video Broadcasting (DVB) systems has been produced by Project Team 55V using as a basis, the DVB Steering Board approved specification TM1217 Rev 2.

NOTE: The EBU/ETSI JTC was established in 1990 to co-ordinate the drafting of ETSs in the specific field of radio, television and data broadcasting. The EBU is a professional association of broadcasting organisations 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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Transposition dates	
Date of adoption of this ETS:	1 September 1995
Date of latest announcement of this ETS (doa):	31 January 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 July 1996
Date of withdrawal of any conflicting National Standard (dow):	31 July 1996

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1 Scope

This European Telecommunication Standard (ETS) specifies the Service Information (SI) data which forms a part of DVB bitstreams, in order that the user can be provided with information to assist in selection of services and/or events within the bitstream, and so that the Integrated Receiver Decoder (IRD) can automatically configure itself for the selected service. SI data for automatic configuration is mostly specified within ISO/IEC 13818-1 [1] as Program Specific Information (PSI). The ETS specifies additional data which complements the PSI by providing data to aid automatic tuning of IRDs, and additional information intended for display to the user. The manner of presentation of the information is not specified in this ETS, and IRD manufacturers have freedom to choose appropriate presentation methods.

It is expected that Electronic Programme Guides (EPGs) will be a feature of Digital TV transmissions. The definition of an EPG is outside the scope of the SI specification, but the data contained within the SI specified here may be used as the basis for an EPG.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ISO/IEC 13818-1 (1994): "Information Technology - Generic Coding of Moving Pictures and Associated Audio Recommendation H.222.0 (systems)".

[2] ISO 3166: "Codes for the representation of names of countries".

[3] ISO 639: "Code for the representation of names of languages".

[4] EBU SPB 492 (1992): "Teletext specification (625 line Television Systems)".

[5] ISO 8859: "Information processing - 8-bit single-byte coded graphic character sets, Latin alphabets".

[6] ETR 162: "Digital broadcasting systems for television, sound and data services; Allocation of Service Information (SI) codes for Digital Video Broadcasting (DVB) systems".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

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

broadcaster (service provider): An organisation 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 transponder, wide-band coaxial cable, fibre optics.

Entitlement Management Messages (EMM): Are private Conditional Access information which specify the authorization levels or the services of specific decoders. They may be addressed to individual decoder or groups of decoders.

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.

forbidden: The term "forbidden" when used in the clauses defining the coded bit stream, indicates that the value shall never be used.

MPEG-2: Refers to the standard ISO/IEC 13818 [1]. 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 Transport Stream multiplexes transmitted on a single delivery system, e.g. all digital channels on a specific cable system.

original_network_id: A unique identifier of a network.

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

reserved: The term "reserved" when used in the clause defining the coded bit stream, indicates that the value may be used in the future for ISO defined extensions. Unless otherwise specified within this ETS all "reserved" bits shall be set to "1".

reserved_future_use: The term "reserved_future_use", when used in the clause defining the coded bit stream, indicates that the value may be used in the future for ETSI defined extensions. Unless otherwise specified within this ETS all "reserved_future_use" bits shall be set to "1".

section: A section is a syntactic structure used for mapping all service information defined in this ETS into ISO/IEC 13818 [1] Transport Stream packets.

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

service_id: A unique identifier of a service within a transport stream.

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

sub_table: A sub_table is collection of sections with the same value of table_id and:

for a NIT:	the same table_id_extension (network_id) and version_number;
for a BAT:	the same table_id_extension (bouquet_id) and version_number;
for a SDT:	the same table_id_extension (transport_stream_id), the same original_network_id and version_number;
for a EIT:	the same table_id_extension (service_id), the same transport_stream_id, the same original_network_id 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 sub_tables with the same value of table_id.

Transport Stream: A Transport Stream is a data structure defined in ISO/IEC 13818-1 [1]. It is the basis of the ETSI Digital Video Broadcasting (DVB) standards.

transport_stream_id: A unique identifier of a transport stream within an original network.

The relationships of some of these definitions are illustrated in the service delivery model in figure 1.

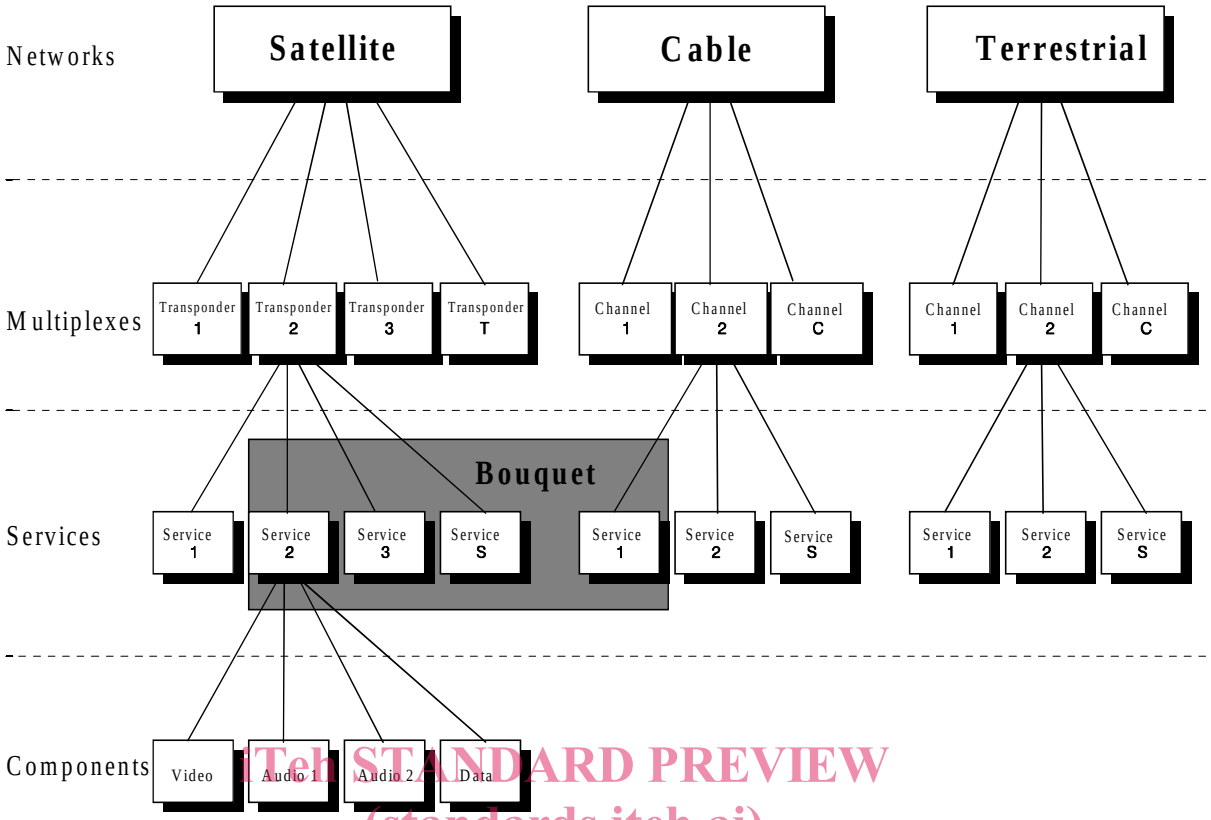

Figure 1: Digital broadcasting, service delivery model

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

BAT	Bouquet Association Table
BCD	Binary Coded Decimal
CA	Conditional Access
CAT	Conditional Access Table
CRC	Cyclic Redundancy Check
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union
EIT	Event Information Table
EMM	Entitlement Management Message
EPG	Electronic Programme Guide
ETS	European Telecommunication Standard
ETSI	European Telecommunications Standards Institute
FEC	Forward Error Correction
IEC	International Electrotechnical Commission
IRD	Integrated Receiver Decoder
ISO	International Organisation for Standardisation
JTC	Joint Technical Committee
LSB	Least Significant Bit
MJD	Modified Julian Date
MPEG	Moving Pictures Expert Group
NIT	Network Information Table
NVOD	Near Video On Demand
PAT	Program Association Table
PID	Packet IDentifier
PMT	Program Map Table
PSI	Program Specific Information
PSTN	Public Switched Telephone Network

QAM	Quadrature Amplitude Modulation
QPSK	Quaternary Phase Shift Keying
RS	Reed Solomon
RST	Running Status Table
SDT	Service Description Table
SI	Service Information
ST	Stuffing Table
TDT	Time and Date Table
UTC	Universal Time, Co-ordinated

bslbf	bit string, left bit first
rpchof	remainder polynomial coefficients, highest order first
uimsbf	unsigned integer most significant bit first

4 Service Information (SI) description

ISO/IEC 13818 [1] specifies SI which is referred to as PSI. The PSI data provides information to enable automatic configuration of the receiver to demultiplex and decode the various streams of programs within the multiplex.

The PSI data is structured as four types of table. The tables are transmitted in sections.

1) Program Association Table (PAT):

- for each service in the multiplex, the PAT indicates the location (the PID values of the Transport Stream packets) of the corresponding Program Map Table (PMT). It also gives the location of the Network Information Table (NIT).

2) Conditional Access Table (CAT):

- the CAT provides information on the Conditional Access (CA) systems used in the multiplex; the information is private (not defined within this ETS) and dependent on the CA system, but includes the location of the EMM stream, when applicable.

3) Program Map Table (PMT):

- the PMT identifies and indicates the locations of the streams that make up each service, and the location of the Program Clock Reference fields for a service.

4) Network Information Table (NIT):

- the location of the NIT is defined in this ETS in compliance with ISO/IEC 13818-1 [1] specification, but the data format is outside the scope of ISO/IEC 13818-1 [1]. It is intended to provide information about the physical network. The syntax and semantics of the NIT are defined in this ETS.

In addition to the PSI, data is needed to provide identification of services and events for the user. The coding of this data is defined in this ETS. In contrast with the PAT, CAT, and PMT of the PSI, which give information only for the multiplex in which they are contained (the actual multiplex), the additional information defined within this ETS can also provide information on services and events carried by different multiplexes, and even on other networks. This data is structured as six tables:

1) Bouquet Association Table (BAT):

- the BAT provides information regarding bouquets. As well as giving the name of the bouquet, it provides a list of services for each bouquet.

2) Service Description Table (SDT):

- the SDT contains data describing the services in the system e.g. names of services, the service provider, etc..

3) Event Information Table (EIT):

- the EIT contains data concerning events or programmes such as event name, start time, duration, etc.;

- the use of different descriptors allows the transmission of different kinds of event information e.g. for different service types.

4) Running Status Table (RST):

- the RST gives the status of an event (running/not running). The RST updates this information and allows timely automatic switching to events.

5) Time and Date Table (TDT):

- the TDT gives information relating to the present time and date. This information is given in a separate table due to the frequent updating of this information.

6) Stuffing Table (ST):

the ST is used to invalidate existing sections, for example at delivery system boundaries.

Where applicable the use of descriptors allows a flexible approach to the organisation of the tables and allows for future compatible extensions.

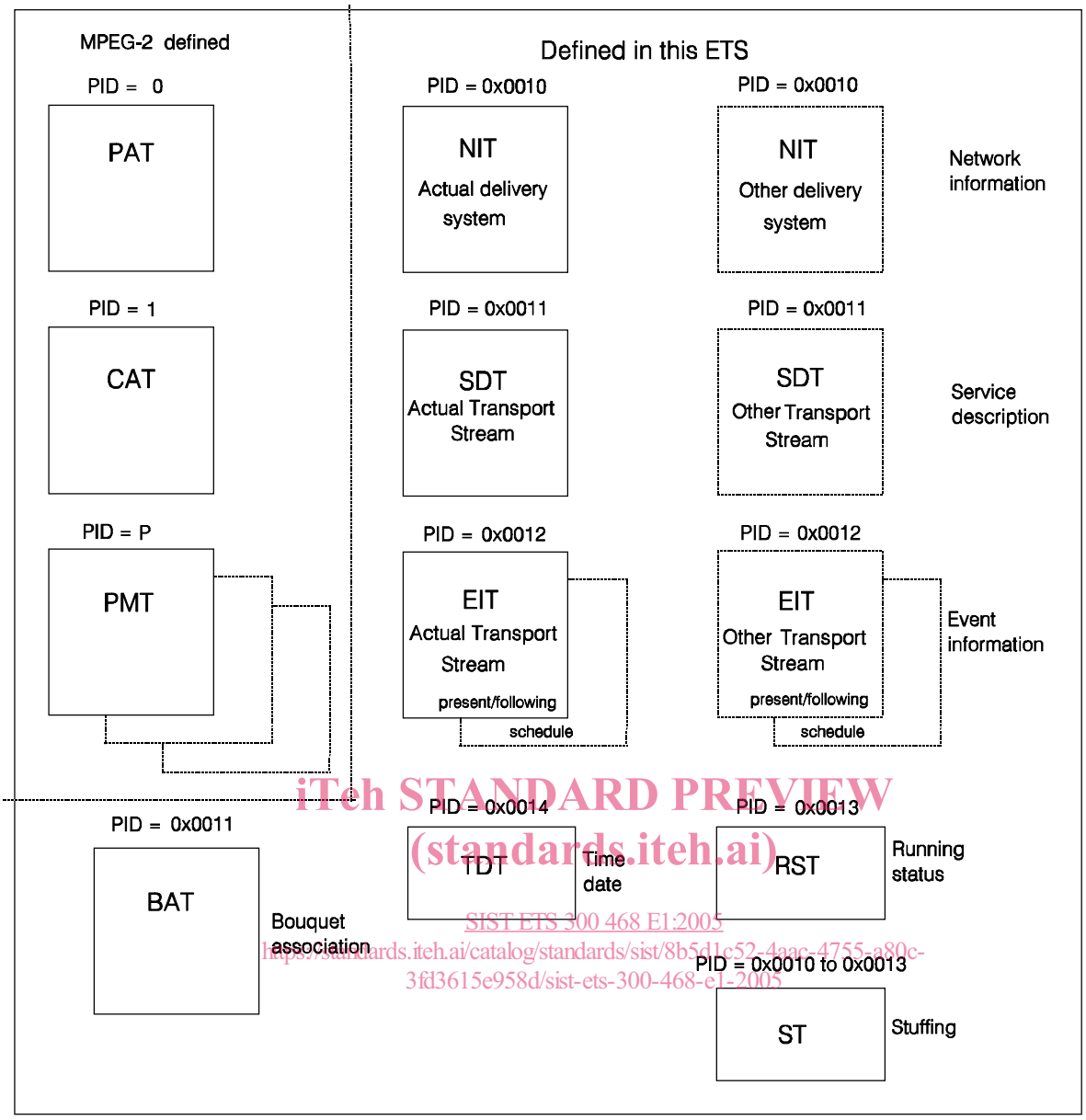

Figure 2: General organisation of the SI

5 The SI tables

5.1 SI table mechanism

The SI specified in this ETS and MPEG-2 PSI tables shall be segmented into one or more sections before being inserted into Transport Stream packets. The tables listed in clause 4 are conceptual in that they need never be regenerated in a specified form within an IRD. The tables, when transmitted shall not be scrambled, with the exception of the EIT, which may be scrambled if required (see subclause 5.1.5). A section is a syntactic structure that shall be used for mapping all MPEG-2 tables and SI tables specified in this ETS, into Transport Stream packets. These SI syntactic structures conform to the private section syntax defined in ISO/IEC 13818-1 [1].

5.1.1 Explanation

Sections may be variable in length. The sections within each table are limited to 1 024 bytes in length, except for sections within the EIT which are limited to 4 096 bytes. Each section is uniquely identified by the combination of the following elements:

a) table_id:
The table_id identifies to which table the section belongs.

Some table_ids have been defined by ISO and others by ETSI. Other values of the table_id can be allocated by the user for private purposes. The list of values of table_id is contained in table 2.

b) table_id_extension:
The table_id_extension is used for identification of a sub_table.

The interpretation of each sub_table is given in subclause 5.2.

c) section_number:
The section_number field allows the sections of a particular sub_table to be reassembled in their original order by the decoder. It is recommended, that sections are transmitted in numerical order, unless it is desired to transmit some sections of the sub_table more frequently than others, e.g. due to random access considerations.

For the SI tables as specified in this ETS, section numbering applies to sub_tables.

d) version_number:
When the characteristics of the Transport Stream described in the SI given in this ETS change (e.g. new events start, different composition of elementary streams for a given service), then new SI data shall be sent containing the updated information. A new version of the SI data is signalled by sending a sub_table with the same identifiers as the previous sub_table containing the relevant data, but with the next value of version_number.

For the SI tables specified in this ETS, the version_number applies to all sections of a sub_table.

e) Current_next_indicator:
Each section shall be numbered as valid "now" (current), or as valid in the immediate future (next). This allows the transmission of a future version of the SI in advance of the change, giving the decoder the opportunity to prepare for the change. There is however, no requirement to transmit the next version of a section in advance, but if it is transmitted, then it shall be the next correct version of that section.

5.1.2 Mapping of sections into Transport Stream packets

Sections shall be mapped directly into Transport Stream packets. Sections may start at the beginning of the payload of a Transport Stream packet, but this is not a requirement, because the start of the first section in the payload of a Transport Stream packet is pointed to by the pointer_field. There is never more than one pointer_field in a Transport Stream packet, as the start of any other section can be identified by counting the length of the first and any subsequent sections, since no gaps between sections within a Transport Stream packet are allowed by the syntax.

Within Transport Stream packets of any single PID value, one section is finished before the next one is allowed to be started, or else it is not possible to identify to which section header the data belongs. If a section finishes before the end of a Transport Stream packet, but it is not convenient to open another section, a stuffing mechanism may be used to fill up the space.

Stuffing may be performed by filling each remaining byte of the Transport Stream packet with the value "0xFF". Consequently the value "0xFF" shall not be used for the table_id. If the byte immediately following the last byte of a section takes the value of "0xFF", then the rest of the Transport Stream packet shall be stuffed with "0xFF" bytes. These bytes may be discarded by a decoder. Stuffing may also be performed using the adaptation_field mechanism.