

BRAZILIAN
STANDARD

**ABNT NBR
15603-3**

First edition
2007.11.30

Valid from
2007.12.01

Corrected Version
2008.08.22

**Digital terrestrial television — Multiplexing and
service information (SI) — Part 3: Syntaxes and
definitions of extension information of SI**

Descriptors: Digital terrestrial television. Multiplexing. Service information. EPG.

ICS 33.160.01

ISBN 978-85-07-00612-1



Número de referência
ABNT NBR 15603-3:2007
50 páginas

© ABNT 2007

Todos os direitos reservados. A menos que especificado de outro modo, nenhuma parte desta publicação pode ser reproduzida ou utilizada por qualquer meio, eletrônico ou mecânico, incluindo fotocópia e microfilme, sem permissão por escrito pela ABNT.

ABNT office

Av. Treze de Maio, 13 - 28º andar

20031-901 - Rio de Janeiro - RJ

Tel.: + 55 21 3974-2300

Fax: + 55 21 2220-1762

abnt@abnt.org.br

www.abnt.org.br

Impresso no Brasil

Contents

Page

Foreword.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviations	3
5 Organization of extension information of SI.....	3
6 Program group index	4
7 Program segment index.....	5
8 Program index encoding method	6
8.1 Table used for program index encoding	6
8.1.1 General aspects	6
8.1.2 Local event information table (LIT).....	7
8.1.3 Event relation table (ERT).....	9
8.1.4 Index transmission information table (ITT).....	11
8.2 Descriptors used for program index encoding	12
8.2.1 General aspects	12
8.2.2 Basic local event descriptor	13
8.2.3 Reference descriptor	15
8.2.4 Node relation descriptor	16
8.2.5 Short node information descriptor	17
8.2.6 System time clock reference descriptor (STC).....	18
8.2.7 Definition of identification values and possible locations of the descriptors	20
9 Program index transmission system.....	20
9.1 Transmission of program group index.....	20
9.2 Transmission in program segment index	20
9.3 Identifier used for transmission of program index	21
9.3.1 Stream type	21
9.3.2 Data component identifier	21
9.3.3 Service type.....	21
9.4 Descriptor used for program index transmission	21
9.4.1 General aspects	21
9.4.2 Data component descriptor	22
9.4.3 Data content descriptor	22
Annex A (normative) Program index protection system.....	24
A.1 Program index protection	24
A.2 Enable program index information	24
A.3 Transmission of index enabling information.....	25
A.3.1 Information index enabling.....	25
A.3.2 Transmission by section type	25
A.3.3 Transmission by independent PES	26
A.3.4 Transmission by PES header	26
A.3.5 Transmission by video or audio PES	26
Annex B (normative) Principle and operation method of SI.....	27
B.1 How to use SI table.....	27
B.1.1 Network information table (NIT)	27
B.1.2 Bouquet association table (BAT).....	28
B.1.3 Service description table (SDT)	28
B.1.4 Event information table (EIT).....	28

B.1.5	Time and data offset table (TOT).....	30
B.1.6	Running status table (RST).....	30
B.1.7	Stuffing table (ST).....	30
B.1.8	Partial contents announcement table (PCAT)	30
B.1.9	Broadcaster information table (BIT)	31
B.1.10	Network board information table (NBIT)	31
B.1.11	Linkage description table (LDT).....	32
B.1.12	Table updating mechanism	32
B.2	SI descriptor allocation and usage	32
B.2.1	General rule.....	32
B.2.2	Network information table (NIT) descriptors	32
B.2.3	Bouquet association table descriptor	34
B.2.4	Service description table descriptor	35
B.2.5	Descriptors of the event information table (EIT)	37
B.2.6	Descriptors of the program map table (PMT)	40
B.2.7	Descriptor of the time offset table (TOT).....	41
B.2.8	Stuffing descriptor.....	41
B.2.9	ISO/IEC 13818-1 descriptors.....	42
B.2.10	Unknown descriptors	42
B.2.11	Broadcaster information table descriptor	42
B.2.12	Network board information table descriptor (NBIT).....	43
B.2.13	Linkage description table descriptor (LDT)	43
B.3	Operational interaction status of program specific information (PSI) and SI.....	43
B.4	Application	44
B.4.1	NVOD service	44
B.4.2	Mosaic services	45
B.4.3	Mixed multiple programming (madara-broadcasting)	45
B.5	Information related to date and time coded in the SI.....	49
B.6	MJD after the year of 2038	49
	Bibliography	50

Foreword

Associação Brasileira de Normas Técnicas (ABNT) is the Brazilian Standardization Forum. Brazilian Standards, which content is responsibility of the Brazilian Committees (Comitês Brasileiros – ABNT/CB), Sectorial Standardization Bodies (Organismos de Normalização Setorial – ABNT/ONS), and Special Studies Committees (Comissões de Estudo Especiais – ABNT/CEE), are prepared by Study Committees (Comissões de Estudo – CE), made up of representants from the sectors involved including: producers, consumers and neutral entities (universities, laboratories, and others).

Brazilian Standards are drafted in accordance with the rules given in the ABNT Directives (Diretivas), Part 2.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ABNT shall not be held responsible for identifying any or all such patent rights.

ABNT NBR 15603-3 was prepared within the purview of the Special Studies Committees of Digital Television (ABNT/CEE-00:001.85). The Draft Standard was circulated for National Consultation in accordance with ABNT Notice (Edital) nº 09, from September 06, 2007 to November 05, 2007, with the number Draft 00:001.85-003/3.

Should any doubts arise regarding the interpretation of the English version, the provisions in the original text in Portuguese shall prevail at all time.

This Standard is based on Brazilian Terrestrial Digital television system in accordance with Presidential Decree nº 5.820, from 29.06.2006.

ABNT NBR 15603 consists of the following parts, under the general title “*Digital terrestrial television – Multiplexing and service information*”:

- Part 1: SI for digital broadcasting systems;
- Part 2: Data structures and definitions of basic information of SI;
- Part 3: Syntaxes and definitions of extension information of SI.

This English version is equivalent to the corrected version 2 of ABNT NBR 15603-3:2007, from 2008.08.22.

This corrected version of ABNT NBR 15603-3:2007 includes the Technical Corrigendum 1 from 2008.08.22.

Digital terrestrial television — Multiplexing and service information (SI) — Part 3: Syntaxes and definitions of extension information of SI

1 Scope

This part of the ABNT NBR 15603 specifies in details the structure for the construction of the basic information related to the SI which is part of the Brazilian terrestrial digital television system (SBTVD).

2 Normative references

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

Directive of secretary of Justice n° 1220, July 11, 2007, *Establishes the law n° 8.069, from July 13, 1990 (Teenager and Children rights), of the law n° 10.359, from December 27, 2001, and of the Decree n° 5834, from July 06, 2006, related to the parental rating process of audiovisual programs for television*

ABNT NBR 15603-2:2007, *Digital terrestrial television – Multiplexing and service information (SI) – Part 2: Syntaxes and definitions of the SI basic information*

ABNT NBR 15606-1, *Digital terrestrial television – Data coding and specifications for digital broadcasting – Part 1: Data coding*

ABNT NBR 15606-3, *Digital terrestrial television – Data coding and specifications for digital broadcasting – Part 3: Data transmission specification*

ISO 639-2, *Codes for the representation of names of languages – Part 2: Alpha-3 code*

ISO 8859-15, *Information technology – 8-bit single-byte coded graphic character sets – Part 15: Latin alphabet N° 9*

ISO/IEC 13818-1, *Information technology – Generic coding of moving pictures and associated audio information: Systems*

ARIB STD-B21, *Receiver for digital broadcasting ARIB standard (desirable specifications)*

ETSI TR 101 211:2004, *Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)*

3 Terms and definitions

For the purposes of this part of ABNT NBR 15603, the following terms and definition apply.

3.1

present event

event which is happening

NOTE During this Standard, it can be treated as only present.

3.2

future event

event which is going to happen

NOTE During the Standard, it can be treated as only following.

3.3

group index

information for describing the relation between multiple events and/or local events

3.4

program index

whole program group index and program segmentation

3.5

program segmentation index

information for describing local event information in a program or the relation between local events

3.6

node

graph element defined to describe the relation of the event (program) and/or the local event (program segment event), which is encoded as extended SI information

3.7

information provider

organization who provides information encoded in SI extended information

3.8

full-seg receiver

device enable to decoder audio, video, data etc., carried by transport stream layer of the thirteen segments designed to fixed (indoor) and mobile service

NOTE The classification (full-seg) is applied to the digital converter, also known by settop box, as well as to 13 segments receiver integrated with display, but not exclusive to these. This kind of receptor is able to receive and decode signals from terrestrial digital television in high definition and, by maker criteria, also to receive and decode information carried on layer A of the transport stream, applied for services recommended to portable receivers, here defined as one-seg

3.9

one-seg receiver

device which exclusively decode audio, video, data, etc information transported on layer "A" that is located at central segment of the 13 segments

NOTE The classification one-seg is designed to portable receivers, also called by "handheld", specially recommended for small displays, normally up to 7 inch. Among the products classified as one-seg, but not limited to these, are receivers integrated with cell phones, PDA, dongle and portable television sets which generally are powered by an internal battery, thus not necessarily energized by a external source, as well as those designated to vehicle automotive. This kind of receiver is able to receiver and decode only signal from terrestrial digital television transported on layer "A" and consequently only baseline profile signal designed for portable devices.

4 Abbreviations

For the purposes of this part of ABNT NBR 15603, the following abbreviations apply.

ERT	Event Relation Table
ITT	Index Transmission Information Table
LIT	Local Event Information Table
NPT	Normal Play Time
PTS	Presentation Time Stamp
STC	System Time Clock

5 Organization of extension information of SI

The EIT is the basic information of SI (see ABNT NBR 15603-2) and describes individually the information of the event (program). Extended SI information can describe the relation among events and information of local event and relation among local events, which are smaller parts of the events.

Extended SI information consists in three tables in addition to the EIT and ST defined in basic information of SI.

The local event information table (LIT) shall include information related to the local event (program segment event) such as name, start time and duration of a local event

The event relation table (ERT) shall include information related to node indicating attribute or group of event (program) and/or the local event (program segment event), and information of relation of those nodes.

If only EIT is used, it is indicated the relation between events. If LIT is used, it is indicated the relation between local events. In case of using EIT and LIT, it is possible to indicate the relation between both: events and local events.

The program index transmission information table (ITT) shall include auxiliary information related to program transmission, such as the relation between the STC and the time information that identifies local event (program segment event). These informations are shared with LIT, because there may be information, that is fixed at the moment of program transmission or values differing in each time of program transmission.

The flexible table structure and the compatibility for future extensions are possible by using descriptors (see Figure 1).

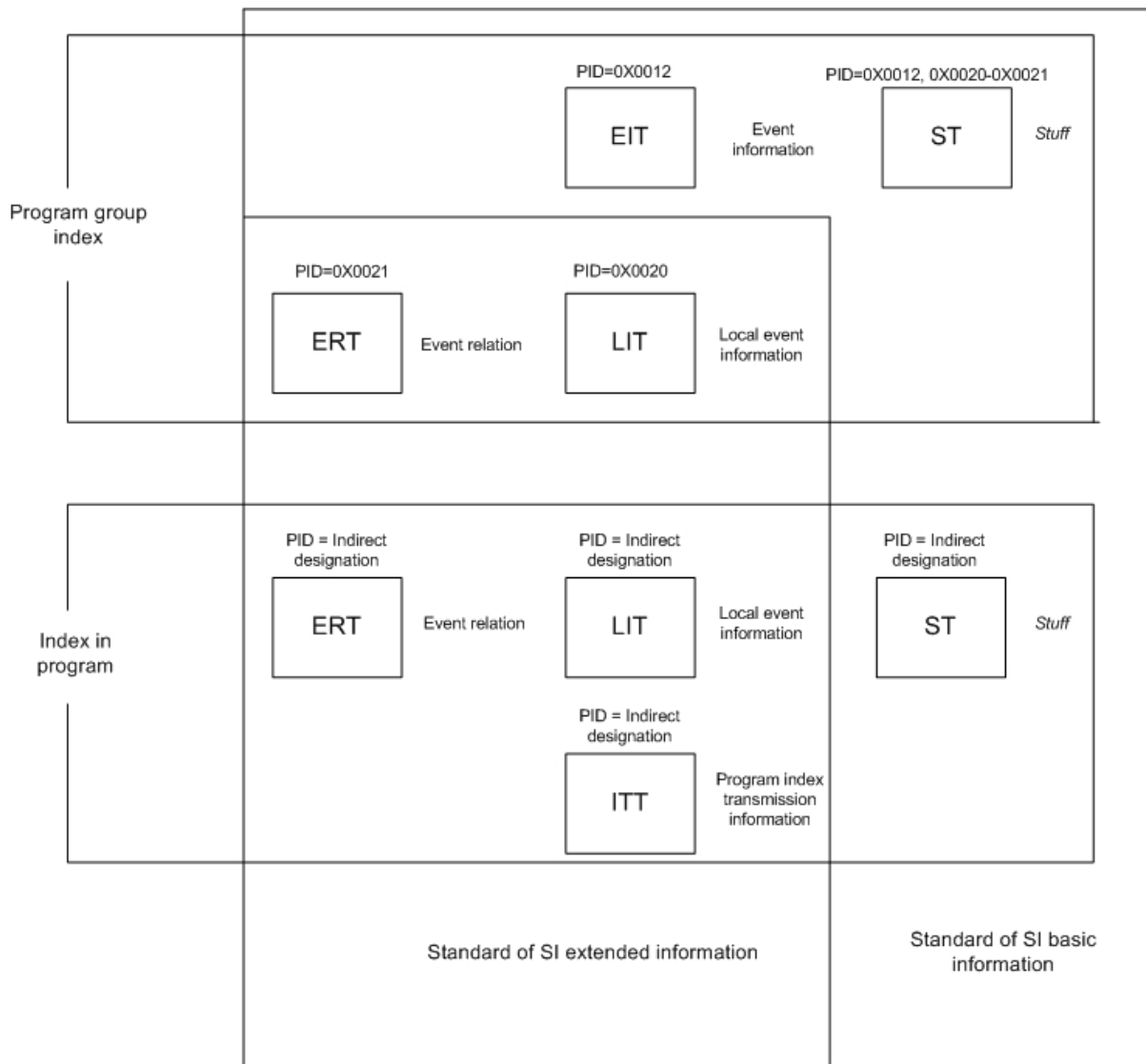


Figure 1 — Organization of extension information of SI Program group index

6 Program group index

The program group index shall provide grouping information of the event (program) and assist in selecting or searching a program by this grouping information. The program group index shall enable grouping of programs through genre, such as comedy.

The program group index shall be provided by the EIT defined in SI basic information (see ABNT NBR 15603-2) and in ERT defined in SI extended information. The EIT shall define events (programs) and describe groups of information of events in the code of the program group defined in the ERT. The ERT shall define the program group and describe its attributes in text. The ERT can also express the relation among program groups.

In the program group index, not only events (programs), but also local events (program segment events) can have objects of the group. In this case, the LIT is used to define the local events (see Figure 2).

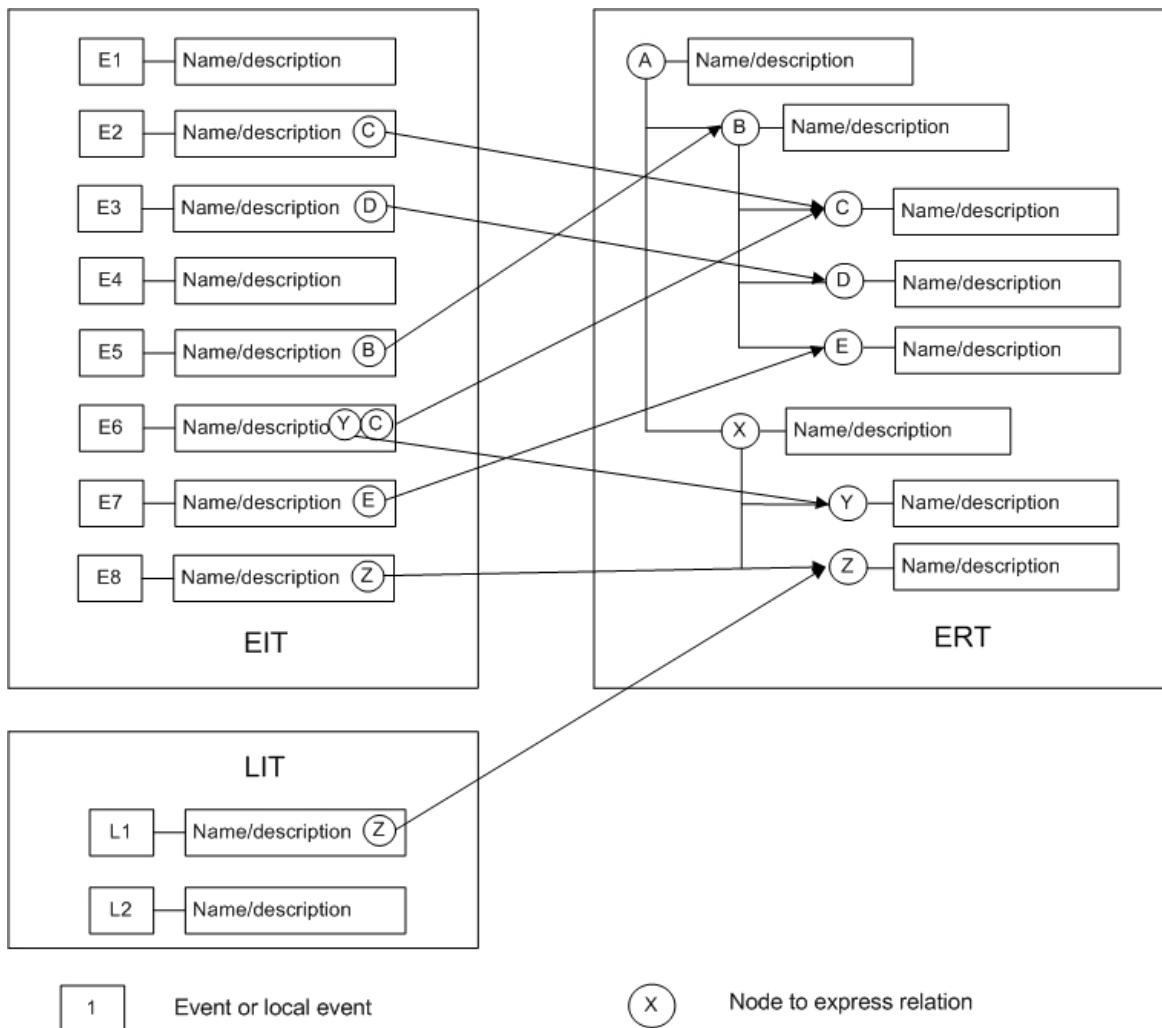


Figure 2 — Outline of program group index

7 Program segment index

The program segment index shall provide information to assist in selecting or searching local events (program segment events). Furthermore, grouped information of local events shall be provided and selecting or searching local events shall be assisted by this group of information.

The program segment index shall be provided by the LIT and the ERT which define the SI extended information. The LIT shall define the local event and also describe the group of information defined in the ERT by its code. The ERT shall define the group information of local events and describe the grouping of informations in text. The ERT can also express the relation among groups (see figure 3).

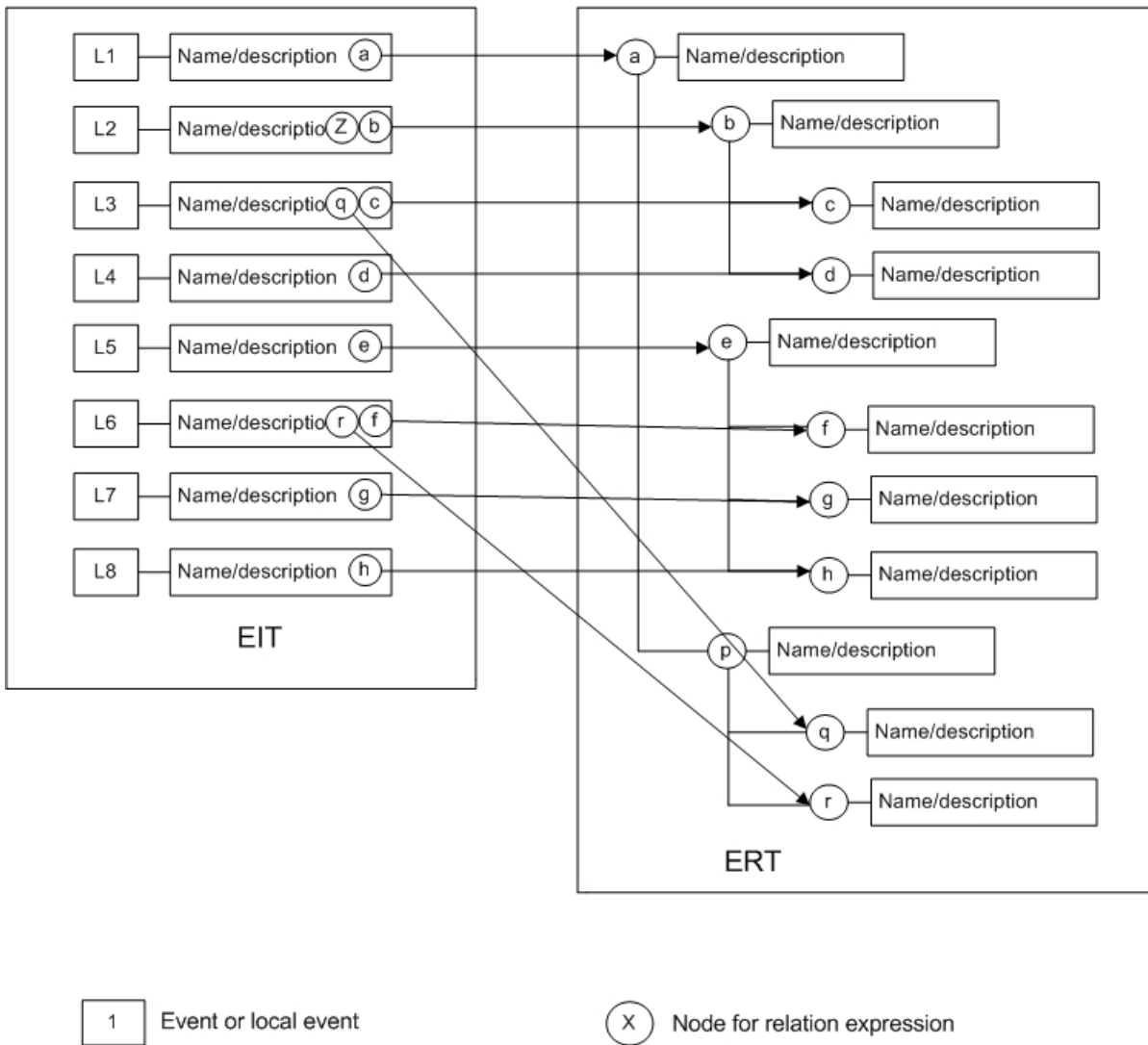


Figure 3 — Outline of program internal index

8 Program index encoding method

8.1 Table used for program index encoding

8.1.1 General aspects

The following tables are defined as SI extended information for encoding program index (see Annex A):

- local event information table (LIT);
- event relation table (ERT);
- index transmission information table (ITT).

The following tables which define as basic information of SI (see ABNT NBR 15603-2) are also used:

- event information table (EIT);
- stuffing table (ST).

NOTE Symbols, abbreviations and description method of the syntax used in this Standard is in accordance with ISO/IEC 13818-1:2000, Subclauses 2.2 and 2.3.

8.1.2 Local event information table (LIT)

The LIT shall contain information related to the local event (program segment event) included in each event (program). Each subtable shall include all descriptors related to the local event of one program and shall be composed of local event information section. The values of table_id, event_id service_id, transport_id, original_network_id, and version_number coincide.

The syntax of the local event information section is shown in Table 1.

Table 1 — Local event information section

Syntax	Number of bits	Identifier
local_event_information_section() {		
table_id	8	uimbsf
section_syntax_indicator	1	bslbf
reserved_future_use	1	bslbf
reserved	2	bslbf
section_length	12	uimbsf
event_id	16	uimbsf
reserved	2	bslbf
version_number	5	uimbsf
current_next_indicator	1	bslbf
section_number	8	uimbsf
last_section_number	8	uimbsf
service_id	16	uimbsf
transport_stream_id	16	uimbsf
original_network_id	16	uimbsf
for(i=0,i<N,i++){		
local_event_id	16	uimbsf
reserved_future_use	4	bslbf
descriptors_loop_length	12	uimbsf
for(j=0;j<M;j++){		
descriptor()		
}		
}		
CRC32	32	rpchof
}		

The semantics for the local event information section shall be the following:

- **table_id**: field that indicates the local event information section and shall be set in 0xD0;
- **section_syntax_indicator**: section syntax indicator that is a 1 bit field which shall be set to "1";
- **section_length**: 12 bits field which specifies the number of bytes of the section, starting immediately following the section_length field and including the CRC. The section_length shall not exceed 4 093 bytes so that the entire section has a maximum length of 4096 bytes;
- **event_id**: 16 bits field that indicates the event_id (uniquely assignment of a service) of the event, that the local event information section describes;
- **version_number**: 5 bits field that is the version number of the subtable. The version_number shall be incremented by 1 when a change in the information carried within the subtable occurs. When it reaches value 31, it shall wrap around to 0. When the current_next_indicator is set to "1", then the version_number shall be that of the currently applicable subtable defined by the table_id and event_id. When the current_next_indicator is set to "0", then the version_number shall be that of the next applicable subtable defined by the table_id and event_id;
- **current_next_indicator**: 1 bit indicator that, when set to "1", indicates that the subtable is the currently applicable subtable. When the bit is set to "0", it indicates that its sent is not yet applicable and shall be the next subtable to be valid;
- **section_number**: 8 bits field that gives the number of the section. The section_number of the first section in the subtable shall be "0x00". The section_number shall be incremented by 1 with each additional section with the same table_id, event_id, service_id, transport_stream_id and original_network_id;
- **last_section_number**: 8 bits field that specifies the number of the last section of the subtable whose this section belongs;
- **service_id**: 16 bits field that indicates the service_id number (a network exclusive identification) of the service for whom the event described by the local event information section which it belongs. The service_id shall be the same of the program_number in the corresponding program map section;
- **transport_stream_id**: 16 bits field that indicates the transport_stream_id (a network exclusive identification) of the transport stream for whom the event described by the local event information section belongs;
- **original_network_id**: 16 bits field that indicates the original_network_id of the original_network for whom the event, described by the local event information section, belongs;
- **local_event_id**: 16 bits field that is used as a label to identify the local_event (program segment event);
- **descriptors_loop_length**: 12 bits field that gives the total length in bytes of the next descriptor;
- **CRC_32**: 32 bits field that contains the CRC value for the entire section.

8.1.3 Event relation table (ERT)

The ERT describes the relation between the events (programs) and/or local events (program segment events). The event relation table consists of subtables.

The subtables specify the relation among the events and/or local events for a particular use, and it is constructed by the event relation section in which values of table_id, event_relation_id, information_provider_id and version_number coincide.

Event relation section is indicated in Table 2.

Table 2 — Event relation section

Syntax	Number of bits	Identifier
Event_relation_section() {		
table_id	8	uimbsf
section_syntax_indicator	1	bslbf
reserved_future_use	1	bslbf
reserved	2	bslbf
section_length	12	uimbsf
event_relation_id	16	uimbsf
reserved	2	bslbf
version_number	5	uimbsf
current_next_indicator	1	bslbf
section_number	8	uimbsf
last_section_number	8	uimbsf
Information_provider_id	16	uimbsf
Relation_type	4	uimbsf
Reserved_future_use	4	bslbf
for(i=0,i<N,i++){		
Node_id	16	uimbsf
Collection_mode	4	uimbsf
Reserved_future_use	4	bslbf
Parent_node_id	16	uimbsf
Reference_number	8	uimbsf
Descriptors_loop_length	4	bslbf
for(j=0;j<M;j++){	12	uimbsf
descriptor()		
}		
}		
CRC_32	32	rpchof
}		

The semantics for the event relation section shall be the following:

- **table_id**: table field that indicates the event relation section and shall be set in 0xD1;
- **section_syntax_indicator**: section syntax indicator of 1 bit field which shall be set to "1";

- **section_length**: 12 bits field that specifies the number of bytes of the section, starting immediately following the section_length field and including the CRC. The section_length shall not exceed 4 093 bytes so that the entire section has a maximum length of 4 096 bytes;
- **event_relation_id**: 16 bits field that serves as a label to identify the event relation;
- **version_number**: 5 bits field that is the version number of the next subtable. The version_number shall be incremented by 1 when a change in the information carried within the subtable occurs. When it reaches value 31, it shall wrap around to 0 in the next increment. When the current_next_indicator is set to "1", then the version_number shall be that of the currently applicable subtable defined by the table_id and event_id. When the current_next_indicator is set to "0", then the version_number shall be that of the next applicable subtable defined by the table_id and event_id;
- **current_next_indicator**: 1 bit indicator that, when set to "1", indicates that the subtable is the currently applicable subtable. When the bit is set to "0", it indicates that the subtable sent is not yet applicable and shall be the next subtable to be valid;
- **section_number**: 8 bits field that gives the number of the section. The section_number of the first section in the subtable shall be "0x00". The section_number shall be incremented by 1 with each additional section with the same table_id, event_id, service_id, transport_stream_id and original_network_id;
- **last_section_number**: 8 bits field that specifies the number of the last section of the subtable whose this section belongs;
- **information_provider_id**: 16 bits field that identifies the information provider that specifies the event relation;
- **relation_type**: 4 bits field that indicates the type of the relation described by the event relation section (see Table 3);
- **node_id**: 16 bits field that serves as a label to identify the node used to describe the relation between the event and/or local event. The node identifier "0x0000" is reserved for a special node that describes the event relation subtable. The node identifier "0xFFFF" is not used;
- **collection_mode**: 4 bits field that indicates the characteristics of the collection of events, local events and nodes which refer to this node through the parental_node_id, node_relation_descriptor or reference_descriptor (see Table 4);
- **parent_node_id**: 16 bits field that indicate the node_id of a parent node when the node refers to another node in the event relation subtable as a parent in the tree structure. When the parent node is not specified by this field, "0xFFFF" shall be coded;
- **reference_number**: 8 bits field that specifies the priority of reference in the collection of events, local events and nodes which refers to the same node;
- **descriptors_loop_length**: 12 bits field that gives the total length in byte of the following descriptors;
- **CRC_32**: 32 bits field that contains the CRC value for the entire section.

Table 3 — Relation type

Relation_type	Semantics
0x0	Reserved
0x1	Relation with the contents descriptors (indicates the tree structure to contents descriptors)
0x2	Relation for navigation (indicates tree structure to assist display and selection)
0x3 - 0xF	Reserved for future use

Table 4 — Collection_mode

Collection_mode	Semantics
0x0	Group (bag)
0x1	Concatenation (sequential)
0x2	Selection (alternated)
0x3	Parallel
0x4-0xF	Reserved for future use

8.1.4 Index transmission information table (ITT)

The ITT describes information that will be used for transmission of program index. The ITT consists of subtables.

The subtable is a table including information for transmission of a program index of an event (program) and constituted of programs indexes that transmit section information (see Table 5).

Table 5 — Index transmitting section

Syntax	Number of bits	Identifier
index_transmission_section() {		
table_id	8	uimbsf
section_syntax_indicator	1	bslbf
reserved_future_use	1	bslbf
reserved	2	bslbf
section_length	12	uimbsf
event_id	16	uimbsf
reserved	2	bslbf
version_number	5	uimbsf
current_next_indicator	1	bslbf
section_number	8	uimbsf
last_section_number	8	uimbsf
reserved_future_use	4	uimbsf
descriptors_loop_length	12	uimbsf
for(i=0,i<N,i++){		
descriptor()		
}		
CRC_32	32	rpchof
}		

The semantics for the program index transmitting information section shall be the following:

- **table_id**: field that indicates the event relation section and shall be set in 0xD2;
- **section_syntax_indicator**: section syntax indicator is a 1 bit field which shall be set to "1";
- **section_length**: 12 bits field that specifies the number of bytes of the section, starting immediately following the section_length field and including the CRC. The section_length shall not exceed 4 093 bytes so that the entire section has a maximum length of 4 096 bytes;
- **event_id**: 16 bits field that identifies the event (program) and indicates the event identifier of the event, by which the program index transmission information section is provided;
- **version_number**: 5 bits field that is the version number of the next subtable. The version_number shall be incremented by 1 when a change in the information carried within the subtable occurs. When it reaches value 31, it shall wrap around to 0 in the next increment. When the current_next_indicator is set to "1", then the version_number shall be that of the currently applicable subtable defined by the table_id and event_id. When the current_next_indicator is set to "0", then the version_number shall be that of the next applicable subtable defined by the table_id and event_id;
- **current_next_indicator**: 1 bit indicator that, when set to "1", indicates that the subtable is the currently applicable subtable. When the bit is set to "0", it indicates that the subtable sent is not yet applicable and shall be the next subtable to be valid;
- **section_number**: 1 bit indicator that, when set to "1", indicates that the subtable is the currently applicable subtable. When the bit is set to "0", it indicates that the subtable sent is not yet applicable and shall be the next subtable to be valid;
- **last_section_number**: 8 bits field that specifies the number of the last section of the subtable whose this section belongs;
- **descriptors_loop_length**: 12 bits field that gives the total length in bytes of the following descriptors;
- **CRC_32**: 32 bits field that contains the CRC value for the entire section.

8.2 Descriptors used for program index encoding

8.2.1 General aspects

The following descriptors are defined as standard SI extended information of program index encoding:

- basic local event descriptor;
- reference descriptor;
- node relation descriptor;
- short node information descriptor;
- STC reference descriptor.

The following descriptors are defined on basic information of SI:

- short event descriptor;
- extended event descriptor;
- hyperlink descriptor;
- stuffing descriptor.

8.2.2 Basic local event descriptor

The basic local event descriptor used in the LIT indicates segmentation information of the local event (program segment event), such as start time, duration and component identifier etc. (see Table 6).

Table 6 — Basic local event descriptor

Syntax	Number of bits	Identifier
basic_local_event_descriptor() {		
descriptor_tag	8	uimbsf
descriptor_length	8	uimbsf
reserved_future_use	4	bslbf
segmentation_mode	4	uimbsf
segmentation_info_length	8	uimbsf
if(segmentation_mode == 0){		
}		
else if(segmentation_mode == 1){		
reserved_future_use	7	bslbf
start_time_NPT	33	uimbsf
reserved_future_use	7	bslbf
end_time_NPT	33	uimbsf
}		
else if(segmentation_mode <6){		
start_time	24	uimbsf
duration	24	uimbsf
if(segmentation_info_length == 10){		
start_time_extension	12	uimbsf
reserved_future_use	4	bslbf
duration_extension	12	uimbsf
reserved_future_use	4	bslbf
}		
}		
else{		
for(i=0;i<M;i++){		
reserved	8	bslbf
}		
}		
for(i=0;i<N;i++){		
component_tag	8	uimbsf
}		
}		

The semantics for the basic local event descriptor shall be the following:

- **segmentation_mode**: 4 bits field that specifies the coding type of the segmentation information such as time and hour etc. in the basic local event descriptor (see Table 7);
- **segmentation_info_length**: 8 bits field that specifies the byte length of the subsequent segmentation information;
- **start_time_NPT**: 33 bits field that specifies the start time of the local event in NPT form;
- **end_time_NPT**: 33 bits field that specifies the end time of the local event in NPT form;
- **start_time**: 24 bits field that expresses the unit in seconds or in the greater time unit of the start time of the local event. Using six BCD of 4bits, the time shall be coded in the order of hours, minutes and seconds. When no start time is defined (for example, the start time remains undetermined, or it is not open yet), all bits in this field shall be set to "1";
- **duration**: 24 bits field that expresses the unit of seconds or the greater time unit of duration of the local event. Using six 4 bits BCD, the time duration is coded in the order of hours, minutes and seconds. When no time duration is defined (for example, the time duration remains undetermined, or it is not open yet), all bits in this field shall be set to "1". The value for this field shall be set to "0" to indicate a point on the time base;
- **start_time_extension**: 12 bits field that expresses units smaller than seconds of the start time of the local event. Using three 4 bits BCD, the time is coded in milliseconds. When no start time is defined, all bits in this field shall be set to "1". This field is omitted when no specification is made down to the millisecond level of accuracy;
- **duration_extension**: 12 bits field that expresses units smaller than seconds of the time duration of the local event. Using three 4 bits BCD, the time is coded in milliseconds. When no time duration is defined, all bits in this field shall be set to "1". The value for this field shall be set to "0" to indicate a point on the time base. This field is omitted when no specification is made down to the millisecond level of accuracy;
- **component_tag**: 8 bits field that serves as a label to identify the component stream within this local event. The component stream to which the corresponding value of this component tag is assigned in the PMT belongs to this local event. This field could be omitted if all the component streams belong to this local event. This field has the value of "0xFF" if none of the component streams belong to this local event. "0xFF" is used only for this case, and is not used for the stream identifier descriptor.

Table 7 — Segmentation mode

Segmentation_mode	Name	Semantics
0x0	Invalid	Segmentation information is not designated in the basic local event descriptor
0x1	NPT	Designated by NPT form
0x2	Relative time	Designate relative time from the start time of program in hours, minutes, seconds and milliseconds form
0x3	Relative time (STC reference descriptor is used together)	Designate relative time from the start time of program in hours, minutes, seconds and milliseconds form
0x4	UTC-3 time	Designate UTC-3 time of broadcasting in hours, minutes, seconds and milliseconds form
0x5	UTC-3 time (STC reference descriptor is used together)	Designate UTC-3 time of broadcasting in hours, minute, seconds and milliseconds form
0x6-0F	Reserved future use	Reserved for future use

8.2.3 Reference descriptor

The reference descriptor used in EIT or LIT associates the event or the local event with the event relation subtable. The reference descriptor refers to the event relation subtable (omitted in some cases) and indicates that event or local event placed with this descriptor has attribute indicated by reference node (see Table 8).

Table 8 — Reference descriptor

Syntax	Number of bits	Identifier
reference_descriptor() {		
descriptor_tag	8	uimbsf
descriptor_length	8	uimbsf
information_provider_id	16	uimbsf
event_relation_id	16	uimbsf
for(i=0,i<N,i++){		
reference_node_id	16	uimbsf
reference_number	8	uimbsf
last_reference_number	8	uimbsf
}		
}		

The semantics for the reference descriptor shall be the following:

- **information_provider_id**: 16 bits field that indicates the information provider id of the event relation subtable to which the referred node belongs;
- **event_relation_id**: 16 bits field that indicates the event relation id of the event relation subtable to which the referred node belongs;
- **reference_node_id**: 16 bits field that indicates the node id of the referred node;

- **reference_number**: 8 bits field that specifies the reference priority of the nodes to be referred to. If the referred node is the node that indicates the event or the local event itself, it shall be "0x00". If the referred node indicates the parent node of the event or the local event, the reference_number shall be specified by the value calculated based on the following equation:

$$\text{reference_number} = \text{mod} (\text{actual reference priority order} - 1, 254) + 1$$

the value shall be "0xFF" when the reference priority is not designated;

- **last_reference_number**: 8 bits field indicates the maximum value of the reference_number of the referred node. The last_reference_number shall be specified by the value calculated based on the following equation:

$$\text{last_reference_number} = \text{mod} (\text{actual last reference priority order} - 1, 254) + 1$$

The value shall be "0xFF" when the last reference priority is not designated. The last_reference_number shall not be equal to the reference_number, except when the actual reference order coincides with the last reference priority order. Therefore, when there is a possibility that the encoded value of reference order equals the encoded value of the last reference order, "0xFF" is set to the last_reference_number.

8.2.4 Node relation descriptor

The node relation descriptor is used to describe the referencing relation of nodes in event relation table (ERT). If the referencing is the basic referencing relation that is only made to the parent node and the parent node is located in the same event relation identifier, the parent node identifier field of ERT section shall be used to express the node relation (see Table 9).

Table 9 — Node relation descriptor

Syntax	Number of bits	Identifier
node_relation_descriptor() {		
descriptor_tag	8	uimbsf
descriptor_length	8	uimbsf
reference_type	4	uimbsf
external_reference_flag	1	uimbsf
reserved_future_use	3	
if(external_reference_flag == 1){		
information_provider_id	16	uimbsf
event_relation_id	16	uimbsf
}		
reference_node_id	16	uimbsf
reference_number	8	uimbsf
}		

The semantics for the node relation descriptor shall be the following:

- **reference_type**: 4 bits field that indicates the reference attribute for the node indicated by the reference_node_id (see Table 10);
- **external_reference_flag**: the value "0" indicates that the node to be referred to by the reference node id is located in the same event relation table, while the value "1" indicates that the node to be referred to by the reference node id is located in the other event relation table;
- **information_provider_id**: 16 bits field that designates information provider identifier of the subtable when the referred node belongs to different event relation subtable;

- **event_relation_id**: 16 bits field that designates event relation identifier of the subtable when the referred node belongs to different event relation subtable;
- **reference_node_id**: 16 bits field identifies the node to be referred to;
- **reference_number**: 8 bits field that specifies the reference priority of the nodes to be referred to by the reference_node_id. The value "0xFF" may be used if there is no need to specify the priority order. "0x00" is not used.

Table 10 — Reference type

Reference_type	Semantic
0x0	Reference to parent node
0x1-0xF	Reserved for future use

8.2.5 Short node information descriptor

The short node information descriptor used in the event relation table (ERT) expresses the node name as well as the descriptions on the node definition in the textual format. The short node information descriptor used in the EIT shall express the node name and the description related to the node, of the node to be referred to by the event, in textual format (see Table 11).

Table 11 — Short node information descriptor

Syntax	Number of bits	Identifier
Short_node_information_descriptor() {		
descriptor_tag	8	uimbsf
descriptor_length	8	uimbsf
ISO_639_language_code	24	bslbf
node_name_length	8	uimbsf
for(i=0;i<node_name_length;i++){		
node_name_char	8	
}		
text_length	8	uimbsf
for(i=0; i<text_length; i++){		
text_char	8	uimbsf
}		
}		

The semantics for the short node information descriptor shall be the following:

- **ISO_639_language_code**: 24 bits field that indicates the language of the subsequent character information field in a form of three alphabetical characters specified by ISO 639-2. Each character is encoded in eight bits in accordance with ISO 8859-15 and inserted into the 24 bits field in the same order as that of the character code;

EXAMPLE Portuguese, Brazilian official language, has 3 coded characters "por", which is coded as: "0111 0000 0110 1111 0111 0010".

- **node_name_length**: 8 bits field that indicates the byte length of the following node name;
- **node_name_char**: 8 bits field that the series of character information shall indicate the node name;

- **text_length**: 8 bits field that indicates the byte length of the following node description;
- **text_char**: 8 bits field that the series of character information provide an explanation of the node.

8.2.6 System time clock reference descriptor (STC)

The system time clock reference descriptor describes the corresponding relationship between the time information described in the LIT and the STC to enable accurate synchronizing of the event component in program segment index (see Table 12).

Table 12 — STC reference descriptor

Syntax	Number of bits	Identifier
STC_reference_descriptor() {		
descriptor_tag	8	uimbsf
descriptor_length	8	uimbsf
reserved_future_use	3	bslbf
external_event_flag	1	bslbf
STC_reference_mode	4	uimbsf
if(external_event_flag == 1){		
external_event_id	16	uimbsf
external_service_id	16	uimbsf
external_network_id	16	uimbsf
}		
if(STC_reference_mode == 0){		
}		
else if (STC_reference_mode == 1){		
reserved_future_use	7	bslbf
NPT_reference	33	uimbsf
reserved_future_use	7	bslbf
STC_reference	33	uimbsf
}		
else if (STC_reference_mode == 3		
STC_reference_mode == 5){		
time_reference	24	uimbsf
time_reference_extension	12	uimbsf
reserved_future_use	11	bslbf
STC_reference	33	uimbsf
else{		
for(i=0;i<M;i++){		
reserved	8	bslbf
}		
}		
}		

The semantics for the STC reference descriptor shall be the following:

- **external_event_flag**: field set to "1" when the information of the STC reference descriptor is the reference information of the stream which is broadcasted as a different program from this program index;
- **external_event_id**: 16 bits field that designates the event_id of the broadcasting program which the STC reference descriptor indicates;
- **external_service_id**: 16 bits field that designates the service_id of the broadcasting program which the STC reference descriptor indicates;
- **external_network_id**: 16 bits field that designates the original _network_id of the broadcasting program which the STC reference descriptor indicates;
- **STC_reference_mode**: 4 bits field that designates the reference type of the time in the STC reference descriptor (see Table 13). Generally, the mode corresponding to the segmentation mode of the basic local event descriptor is used;
- **STC_reference**: 33 bits field that indicates the STC value corresponding to the time designated with the NPT reference value or time reference value (extension) in 90 kHz unit;
- **NPT_reference**: 33 bits field that indicates the NPT expression time referring to the STC;
- **time_reference**: 24 bits field that indicates unit of more than a 1 s either the relative time in the expression of hour, minute, second and millisecond expression referring to the STC or the UTC-3 time. Using six 4-bit BCD, the time is coded in the order of hours, minutes and seconds;
- **time_reference_extension**: 12 bits field that indicates units of less than a second, either the relative time in the expression of hour, minute, second and millisecond expression referring to the STC or the UTC-3 time. Using three 4 bits BCD, the time is coded in milliseconds. The value "0" is specified when no specification is made down to the millisecond level of accuracy.

Table 13 — STC reference mode

STC_reference_mode	Name	Semantics
0x0	Invalid	No relation is specified
0x1	NPT	Designates relation between NPT and STC
0x2	Undefined	Reserved for future use
0x3	Relative time	It's designated the relation between the relative of the beginning of the program (hour, minute, second, milissecond) an the STC
0x4	Undefined	Reserved for future use
0x5	UTC-3 hour	It's designated the relation between theUTC-3 (hour, minute, second, MS) and the STC.
0x6-0xF	Undefined	Reserved for future use

8.2.7 Definition of identification values and possible locations of the descriptors

The definition of identification values and possible locations of the descriptors shall be according to Table 14.

Table 14 — Definition of identification values and possible location of the descriptors

Descriptor	Tag value	EIT	LIT	ERT	ITT
Stuffing descriptor	0x42	X	X	X	X
Short event descriptor	0x4D	X	X		
Extended event descriptor	0x4E	X	X		
Hyperlink descriptor	0xC5	X	X	X	
Basic local event descriptor	0xD0		X		
Reference descriptor	0xD1	X	X		
Node relation descriptor	0xD2			X	
Short node information descriptor	0xD3	X		X	
STC reference descriptor	0xD4				X

9 Program index transmission system

9.1 Transmission of program group index

Each table of program group index is transmitted by the same method as tables of EIT: basic information of SI (see ABNT NBR 15603-2) and transmitted PID are specified according to Table 15.

When grouping the local event (program segment event) as the program group index, the LIT is transmitted. The PID transmitting the LIT in this case shall also be specified according to Table 15.

Table 15 — Table ID and PID used for program and program group index

Table	Table ID	PID used for transmission
EIT	0x4E - 0x6F	0x0012
LIT	0xD0	0x0020
ERT	0xD1	0x0021

9.2 Transmission in program segment index

Each table of the program segment index is transmitted as one program component in ISO/IEC 13818-1 and transmitted PID is specified indirectly by the PMT. To identify that the program component is each table of the index in the PMT, the data component descriptor specified as basic information of SI (see ABNT NBR 15603-2) shall be used.

The PID used to transmit each table section is shown in Table 16.

Table 16 — Table ID and PID used for index in program

Table	Table ID	PID used for transmission
LIT	0xD0	Indirect designation by PMT
ERT	0xD1	Indirect designation by PMT
ITT	0xD2	Indirect designation by PMT

9.3 Identifier used for transmission of program index

9.3.1 Stream type

The value of stream_type in the section transmitting program index shall be "0x05", which indicates private section in ISO/IEC 13818-1 as shown in Table 17.

Table 17 — Stream type

Value	Semantics
0x05	ISO/IEC 13818-1, private section

9.3.2 Data component identifier

The standardization organization shall specify the value of data coding method identifier (data_component_id) which will be transmitted by the program index. The data component identifier is encoded in data component descriptor.

9.3.3 Service type

The service type value, included in the program index, indicates the main service and shall be in accordance with Table 18.

EXAMPLE When index information is added to the digital television service, "0x01" is used which indicates digital television service, the main service. When providing the program index as an independent service, "0xC0" is used as a value of service type; this value is also used for broadcasting of the mobile segment.

Table 18 — Service type

Value	Description
0x01	Digital television service
0x02	Reserved
0xA1	Special video service
0xA2	Special audio service
0xA3	Special data service
0xA4	Updating download service
0xA5	Promotion video service
0xA6	Promotion audio service
0xA7	Promotion data service
0xA8	Data service for storing beforehand
0xA9	Data service exclusive for accumulation
0xAA	Book mark list data service
0xC0	Data service

9.4 Descriptor used for program index transmission

9.4.1 General aspects

The data component descriptor and data contents descriptor are used for transmission of the program index in accordance with the basic information of SI (see ABNT NBR 15603-2).

When transmitting the program segment index in other time (other event) or other program channel (other service) than the program body, or when providing the program segment index as an independent service, the hyperlink descriptor shall be used in accordance with the basic information of SI. The standard location of these descriptors is showed in Table 19.

Table 19 — Location of descriptor used for index transmission

Descriptor	Tag value	CAT	1 ^o loop PMT	2 ^o loop PMT	NIT	BAT	SDT	EIT
Data component descriptor	0xFD			X				
Hyperlink descriptor	0XC5							X
Data contents descriptor	0XC7							X

9.4.2 Data component descriptor

Area for additional identification information of data component descriptor is used for program index transmission, and the table identifier information is shown in the Table 20.

Table 20 — Table identifier information

Syntax	Number of bits	Identifier
<pre>table_identifier_info() { for(i=0; i<N; i++){ table_id } }</pre>	8	uimbsf

The semantics definition of fields in the table identifier information:

- **table_id**: 8 bits field that indicates the table_id of the table or subtable transmitting in that component. When multiple tables are transmitting, multiple table_id can be specified.

9.4.3 Data content descriptor

When transmitting the program index, index transmission information such as table transmission status and size are described using selector area of the data content descriptor. Index transmission information is shown in Table 21.

Table 21 — Index transmission information

Syntax	Number of bits	Identifier
<pre>index_transmission_info() { start_time_offset end_time_offset version_upgrading_indicator interim_version_indicator reserved index_version cycle_time reserved leak_rate table_size }</pre>	<p>24</p> <p>24</p> <p>1</p> <p>1</p> <p>6</p> <p>16</p> <p>32</p> <p>2</p> <p>22</p> <p>32</p>	<p>bslbf</p> <p>bslbf</p> <p>bslbf</p> <p>bslbf</p> <p>bslbf</p> <p>uimbsf</p> <p>uimbsf</p> <p>bslbf</p> <p>uimbsf</p> <p>uimbsf</p>

The semantics definition of fields in index transmission information: shall be the following:

- **start_time_offset**: 24 bits field that specifies the offset time of the index information transmission when starting index information transmission preceding the event starting time. Using six 4 bits BCD, the time is coded in the order of hours, minutes and seconds. When transmission is not made before the event, all bits in this field shall be set to "0". When transmission time before the event is not defined, all bits in this field shall be set to "1";
- **end_time_offset**: 24 bits field that specifies the duration of index information transmission when continuing index information transmission after the event end time. Using six 4 bits BCD, the time is coded in the order of hours, minutes and seconds. When transmission is not made after the event, all bits in this field shall be set at "0". When transmission time after the event is not defined, all bits in this field shall be set at "1";
- **version_updating_indicator**: 1 bit flag that indicates that the index information is updated within transmission time. When updating of the index information is not made in the event, this field shall be set to "0" and when updating is made, this field shall be set to "1";
- **interim_version_indicator**: 1 bits flag that indicates that the index information is interim information. When the index of this event is interim information, that is, when broadcasting of updated information is scheduled in other event, this field shall be set to "1". When updated information other than the index of (final version) of the event is not broadcast, this field shall be set to "0";
- **index_version**: 16 bits field that indicates the index information version (differing with the version number of the section). When the index information is updated in the event, it indicates the final version. When the version is not specified, all bits shall be set to "1";
- **cycle_time**: 32 bits field that indicates the upper limit (the uppermost value) of the cycle which the subtable is transmitted, in milliseconds unit. When table transmission is made, this subtable is completed when section of hours indicated here is gathered. It can be used as time out hour in the IRD. When cycle time is not specified, all bits shall be set to "1";
- **leak_rate**: 22 bits field that indicates leak rate (size of data which should be taken out per unit time from transport buffer) of the subtable. Unit is 50 bytes;
- **table_size**: 32 bits field that indicates the upper limit (the uppermost value) of the subtable in byte units. When multiple subtables are transmitted, it indicates the upper limit of the total. When size is not specified, all bits shall be set to "1".

For additional details of the functions of the EIT descriptors, see Annex B.

Annex A (normative)

Program index protection system

A.1 Program index protection

The program index protection system is specified to suppress the use of the program segment index, which is against the service provider or program producer's will. This protection system is optional.

The LIT is protected beforehand and transmitted. The IRD store the LIT, which is protected. The protected program index information cannot be used in this condition, but when the program signal is decoded at the order of the service providers or at the program producers' will, the program index enables the information to work in the correct order and the program index information becomes available.

When transmitting the LIT, start time and duration of the local event shall be protected before hand and then transmitted using the local event information section. This protection herein shall be made by the following methods:

- value not defined is set;
- value with low accuracy, including tolerance is set.

A.2 Enable program index information

The protected program index information shall be enabled by overwriting new information using index enabling information. To enforce the program index protection function, ciphering is used in some cases when encoding index enabling information. When encoding the index enabling information, it can be specified otherwise in the service provider specification. An example of index enabling information is shown in Table A.1.

Table A.1 — Index enabling information

Syntax	Number of bits	Identifier
index_enable_info() {		
local_event_id	16	uimbsf
enable_info_type	4	uimbsf
enable_info_priority	4	uimbsf
if(enable_info_type==1){		
start_time	24	uimbsf
duration	24	uimbsf
}		
if(enable_info_type==2){		
start_time	24	uimbsf
duration	24	uimbsf
start_time_extension	12	uimbsf
reserved_future_use	4	bslbf
duration_extension	12	uimbsf
reserved_future_use	4	bslbf
}		
}		

The semantic definition of fields in index enabling information shall be the following:

- local_event_id: 16 bits field that indicates the local event to operate the enabling information;
- enable_info_type: field that indicates information to protect and enable the index. This field classifies the syntax on and after the enabling information priority field (see Table A.2);
- enable_info_priority: field that Indicates priority when setting multiple enabling information to the same local event. On the IRD side, the enabling information is worked to the LIT when the value of the decoded enabling information priority is greater than the previous value of the decoded enabling information priority. When this doesn't happen, the decoded enabling information is cancelled;
- start_time: 24 bits field that specifies the value to overwrite as the local event start time of the LIT. Using six 4 bits BCD, the start time is coded in the order of hours, minutes and seconds;
- duration: 24 bits field that specifies the value to overwrite as the local event duration of the LIT. Using six 4 bits BCD, the duration is coded in the order of hours, minutes and seconds;
- start_time_extension: 12 bits field that specifies the value to overwrite as the local event start time extension of the LIT. Using three 4 bits BCD, the start time extension is coded in milliseconds;
- duration_extension: 12 bits field that specifies the value to overwrite as the local event duration extension of the LIT. Using three 4 bits BCD, the duration extension is coded in milliseconds.

Tabela A.2 — Enabling information type

Value	Semantics
0x0	Reserved for future use
0x1	Time information (seconds unit)
0x2	Time information (milliseconds unit)
0x3 - 0xF	Reserved for future use

A.3 Transmission of index enabling information

A.3.1 Information index enabling

The index enabling information is transmitted by either of the methods as shown in A.3.2 to A.3.5. The IRD is decoded in accordance with the program signal decoding.

The closer the layer to transmit index enabling information approaches the grade of the presentation layer, the stronger the index protection function becomes. However, decoding process of the index enabling information becomes more complex accordingly. The transmission method of the index enabling information shall be operated considering the balance of the strength of protection function and complexity of the decoding process.

A.3.2 Transmission by section type

When transmitting the index enabling information using the section type, private descriptor of the service provider standard is placed using the ITT, or the private table of the service provider standard is used.

Though the protection function is not so strong, decoding process is the easiest (decode material for index method is available) and the transmission method does not depend on a service encoding method.

A.3.3 Transmission by independent PES

When the index enabling information is transmitted using the data transmission method of independent PES, it shall be in accordance with the transmission method of ABNT NBR 15606-1.

As the transmission method does not depend on the service encoding method and the strength of the protection function is almost the same as method described A.3.4, independent PES shall be set for the index protection method.

A.3.4 Transmission by PES header

When transmitting the index enabling information using the PES private data area of the PES packet header such as video and audio PES, it shall be in accordance with ISO/IEC 13818-1.

The protection method is the strongest among those transmission methods, which do not depend on the service encoding methods, but index enabling information, which can be transmitted is limited to a maximum of 16 bytes.

A.3.5 Transmission by video or audio PES

When transmitting the index enabling information using the data transmission method of video PES or audio PES, it shall be in accordance with the transmission method of ABNT NBR 15606-1.

Though it offers the strongest protection, the transmission method depends on the service encoding method.

Annex B (normative)

Principle and operation method of SI

B.1 How to use SI table

B.1.1 Network information table (NIT)

NIT shall be in accordance with ETSI TR 101 211, regarding the following:

- a) the digital television terrestrial transmission network is composed by one or multiple bases transmitting the same TS. Therefore, NIT includes only one TS loop;
- b) the sequential order of services described in NIT has no meaning and function in the operation of receiver units. They are often listed in ascendant order from service identification number (`service_id`);
- c) under an environment of multiple frequencies, MFN (Multi-Frequency Network), the terrestrial delivery system descriptor includes all frequencies used by transmission bases;
- d) the use of the information described in the NIT allows an almost automatic adjustment of received services when the STB is installed;
- e) the names of TS in TS information descriptor in the NIT are presented as options for inclusion in the service list, with the purpose to help the users to make a selection when several options are available for channel button task;
- f) define the area codes (`area_code`) in the terrestrial delivery system descriptor (`terrestrial_delivery_system_descriptor`) to be used in Brazil;
- g) the displaying of broadcaster number is based on `remote_control_key_id` information present in NIT descriptor named as "TS_Information_Descriptor". Services' order shall be given from lowest to the highest `service_id`. When selecting in the remote control, the number corresponding to `remote_control_key_id`, the user shall access the main program of broadcaster (the program with the lowest `service_id`);
- h) NIT may have information to be collected by digital receivers in the start scan or re-scan, which can be periodic or on user demand. Terrestrial digital television broadcasters use different network identifiers (`network_id`) for each main television control equipment and it is assumed that information about services offered by other broadcasters are not included in the NIT. The DTV receiver, therefore, need to make a search within all receivable channels in the location in order to create a service list (receivable frequency table) using the service identifier (`service_id`). This way, the channel changes can be made in less time. Due to MFN (Multi-Frequency Network), there may be areas where the same network identifier (`network_id`) is defined for different physical channels (receivable). In this case, the channel with better C/N (Carrier/Noise) or BER (Bit Error Rate) shall be recorded in the receivable frequency table.

B.1.2 Bouquet association table (BAT)

BAT shall be in accordance with the ABNT NBR 15603-2:2007, Subclause 7.2.5.

B.1.3 Service description table (SDT)

SDT is used in the following main applications:

- a) to present the name and logo of related service;
- b) to generate a reference list with standard limitation values for a viewing/recording for each program.

SDT is also used to recognize which type of EIT (H-EIT, M-EIT and L-EIT) is transmitted for each service, when EIT [p/f] and EIT [schedule] (H-EIT [schedule]) are transmitted. The EIT_user_defined_flag, is the general term used for H-EIT_flag, M-EIT_flag and L-EIT_flag, specified in SDT loop. This flag, when in 1, shows the transmission type of EIT for each service.

B.1.4 Event information table (EIT)

B.1.4.1 Syntax

EIT shall be in according with the ABNT NBR 15603-2:2007, Subclause 7.2.7.

B.1.4.2 EIT present/following event

NOTE This subclause shows the rule simplifies the acquisition of the EIT present/following event. The SI specification states that an EIT section can have a maximum size of 4 096 bytes.

The SI bit stream has two sections per service for an EIT present/following event with the section_number 0x00 reserved for the description of the present event and section_number 0x01 for the following event. However, these constraints do not apply in the case of an NVOD reference service which may have more than one event description of the EIT present/following. The event after the following event can be implied optionally, using the section_number 0x02, 0x03 etc.

The SI bit stream has a maximum of 4 096 bytes to describe a single event in a section.

The organization of the EIT is based on the concept of present and following events.

Which event can be determined using the following scheme:

- a) at each instant in time, there is at most one present event;
- b) when there is a present event, this event is described in section 0 of the EIT present/following;
- c) when there is no present event (for example, in the case of a gap in the schedule) an empty section 0 of the EIT present/following;
- d) the running_status field in the description of the present event is given the interpretation according to Table B.1. The duration of an event as encoded in the EIT includes the duration of all times when the event has the status "not running" or "paused". The start time of an event as encoded in the field start_time of the EIT is the start time of the entire event, and not the start time after the pause has finished;
- e) at each point in time, there is at most one following event;

- f) if a following event exists, it is described in section 1 of the EIT present/following;
- g) if no following event exists, an empty section 1 of the EIT present/following is transmitted;
- h) the `running_status` field in the definition of the following event is given the following interpretation of Table B.2.

Table B.1 – Running_status of the present event

<i>undefined</i>	No information except the nominal status shall be provided. IRDs shall treat the present event as running
<i>running</i>	IRDs shall treat the present event as running
<i>not running</i>	IRDs shall treat the present event as not running. In other words, this event is nominally the present one, but at this time has either not started or has already ended
<i>pausing</i>	IRDs shall treat the present event as pausing. In other words, this event is nominally the present one and has already started, but at this time the material being broadcast is not part of the event itself
<i>starts in a few seconds</i>	IRDs shall prepare for the change of event status to "running" in a few seconds

Table B.2 – Running_status of the following event

<i>undefined</i>	No information except the nominal status shall be provided. IRDs shall treat the present event as not running
<i>running</i>	Not allowed
<i>not running</i>	IRDs shall treat the present event as not running
<i>pausing</i>	This status is intended to indicate that the following event has been running at some time, but is now overlapped by another event. In such case, during all the time that the following event has status "pausing", one and the same overlapping event shall be encoded in section 0 of the EIT present/following
<i>starts in a few seconds</i>	IRDs shall prepare for the change of event status to "running" in a few seconds

The start time of one event plus its duration may be smaller than the start time of the following event. In other words, gaps between events are allowed. In such a case, the following event is considered to be the event scheduled to begin after the gap. This event is encoded in section 1 of the EIT present/following. The start time and duration are scheduled times. Some broadcasts may update this information if the schedule is running late, whereas others may prefer to keep the indicated start time unchanged, for example, to avoid having an event called "The News at 8" shall be as starting at 8:01:23, instead of 8:00:00.

B.1.4.3 EIT present/following event – EIT schedule structure

The EIT schedule structure shall be in accordance with ETSI TR 101 211 and in accordance with:

- a) the location of events in the segments is made by reference to t_0 time. The t_0 is equal to midnight in the Brazilian local time (UTC-3);
- b) there are the following two methods of placing event information in segments:
 - the segment #0 of table_id 0x50 (0x60 for other TS) contains information about events that start between midnight and 02:59:59 of "today". The segment #1 contains events that start between 03:00:00 and 05:59:59, and so on. This means that the first subtable (table_id 0x50, or 0x60 for other TS) contains information about the first four days of the schedule, starting today at midnight;
 - the segment #0 of table_id 0x50 (0x60 for other TS) contains information about events that start between midnight and 02:59:59 of the first day in every month. The segment #1 contains events that start between 03:00:00 and 05:59:59, and so on. This means that the first subtable (table_id 0x50, or 0x60 for other TSs) contains information about the first four days of schedule, starting the first day of every month at midnight.

B.1.5 Time and data offset table (TOT)

The TOT (time offset table) shall be in according with the ABNT NBR 15603-2.

B.1.6 Running status table (RST)

The RST (running status table) shall be in according with the ETSI TR 101211:2004, subsection 4.1.7.

B.1.7 Stuffing table (ST)

The stuffing table shall be in according with the ETSI TR 101211:2004, subsection 4.1.8.

B.1.8 Partial contents announcement table (PCAT)

The partial contents announcement table is used to announce the schedule of partial contents to update a part of information in the specific data broadcasting contents accumulated in the IRD etc.

The rules to maintain consistency to realize partial contents to accumulated data broadcasting contents are as follows:

- a) total contents are broadcast as normal data broadcasting program that is an event. Partial contents are broadcast with the same service as total contents;
- b) partial contents shall always announce the partial content depending on the total contents and do not depend on the prior partial contents. For example, when it is announced in the order of: total content -> partial content (A) -> partial content (B), partial content (B) does not depend on the partial content (A);
- c) version of the contents is controlled by the total announcement version (contents version) and version of the partial announcement (contents minor version) depending on it;
- d) a field for the content identifier (content_id) and the contents version (content_version) is operated in the selector area of the EIT data contents descriptor at the time of total announcement, for data component expressing contents which can be accumulated;

- e) when intending to update by overwriting a partial or total contents on an accumulated content, their content identifier should have the same value consistently.

EXAMPLE The Figure B.1 indicates the relation of version of the total contents announcement and the partial content announcement, and version of the accumulated contents gained by the result of those receptions.

Version/Type of content	Total announcement	→	Partial content announcement	→	Partial content announcement	→	Total announcement
content_version	1		(1)		(1)		2
content_minor_version	-		1		2		-
Version of accumulated content	1.0	→	1.1	→	1.2	→	2.0

Figure B.1 – Relation of the partial and total content announcement

B.1.9 Broadcaster information table (BIT)

The broadcaster information table provides combination of the broadcaster existing on the original network and the relating SI transmission parameter information. The BIT can be used to know in what cycle/span the SI table including NIT is transmitted in the IRD. The BIT is applied with the following rules:

- a) the BIT constructs a subtable in each original network;
- b) in the subtable, a descriptor loop exists in each original network and broadcaster. In the original network descriptor area (the first descriptor area), the SI transmission parameter operated commonly in the original network is denoted. In the broadcaster descriptor area (the second descriptor area), information for each broadcaster is denoted. The information for each broadcaster means the broadcaster name, a service list provided by the broadcaster and the SI transmission parameter operated in each broadcaster.

The broadcaster name is indicated in the broadcaster name descriptor. When the broadcaster view propriety is "1", it can be used to realize functions of the IRD to indicate or select a program list for each broadcaster.

The service list for each broadcaster can be used to know the searching area of the series identification.

B.1.10 Network board information table (NBIT)

The NBIT is a table that provides board information for the network.

The schedule information is a reference to acquire its own schedule information. This information is provided by the identifier division of the table table_id.

The board information is provided as noticing information to viewers, including service id and genre codes, the IRD can give also indication of service id and genre icons at the beginning of the message.

The NBIT is applied under the following rules:

- a) the NBIT constructs a subtable in each original network;
- b) information identifier is given to information, each transmitted as board information. When certain information is transmitted and the content of the information is changed, other information identifier is given;
- c) the information type with service or genre information to the board information is provided with a key identifier;
- d) the content body of the actual board information is indicated by placing the board information descriptor in the descriptor area.

B.1.11 Linkage description table (LDT)

The LDT is provided with collecting various descriptions referred from other tables. The LDT linkage descriptor is placed to other table to indicate linkage to the LDT.

The LDT is applied under the following rules.

- a) the LDT constructs a subtable in each group to collect descriptions such as service id of the representative service etc.
- b) in case of linkage from other tables, the descriptor identifier indicated in the LDT descriptor and descriptor type are given as information when linked. The value of the descriptor identifier and the descriptor indicated in the descriptor type are indicated in the descriptor area in the corresponding table;
- c) one event may be linked to multiple collecting groups.

B.1.12 Table updating mechanism

The section syntax used for SI has various mechanisms to indicate the updating of the SI contents.

The updating of the section is indicated by the increase of the version number field. Updating becomes effective immediately after the final byte of the CRC32 of the new version section. Therefore, the value of the current next indication shall always be "1". The section with the current next indication "0" shall not be transmitted.

B.2 SI descriptor allocation and usage

B.2.1 General rule

The allocation and usage of SI descriptors shall be according to ABNT NBR 15603-2.

B.2.2 Network information table (NIT) descriptors

NOTE The NIT is organized as described in ABNT NBR 15603-2:2007, Subclause 7.2.4.

B.2.2.1 First descriptor *loop*

NOTE In the first loop of the NIT, the SI descriptors are defined in according with the definitions of ABNT NBR 15603-2:2007, Annex H.

B.2.2.1.1 Linkage descriptor

The linkage descriptor is used to give a link to another service or TS. If it appears in this loop it links to a service that is attached to the network operator. This descriptor is allowed more than once in this loop. It can, for example, point to the "123 info channel" and to "123 text". The transmission of this descriptor is optional. The meaning of the descriptor when it occurs here depends on the value of the *linkage_type*. If the *linkage_type* is:

- a) 0x01 refers to a service that contains information about the network. An example of the intended use is for the IRD to switch to the information service when the user requests additional information about the network;
- b) 0x02 refers to an Electronic Program Guide (EPG) for the network. The IRD can only make use of this type of linkage if it can decode the EPG service. This standard does not specify the contents of such a service;
- c) 0x04 refers to a TS which carries comprehensive SI. The SI carried in the referenced TS includes at least all the SI information available on all other TS of the network.

The meaning of other values of *linkage_type* are not defined in this context.

The *linkage_type* does not indicate the *service_type* of the referenced service.

EXAMPLE An IRD user interface could include a mechanism like "info about the network" which would make the IRD tune to the linked service after the user initiated the mechanism.

B.2.2.1.2 Network name descriptor

The network name descriptor is used to transmit the name of a physical network in text format. This descriptor is used once in any NIT subtable.

B.2.2.2 Second descriptor loop

NOTE In the second loop of NIT, the SI descriptor shall transmit the information about the services transmitted by broadcasters.

B.2.2.2.1 Delivery system descriptor

The delivery system descriptor is used to transmit the physical parameters for each transport multiplex in the network.

One (and only one) *delivery_system_descriptor* shall appear in each loop. IRD is able to interpret the delivery system descriptor in order to tune to TS quickly.

B.2.2.2.2 Service list descriptor

The service list descriptor shall be in accordance with ABNT NBR 15603-2:2007, Subclause 8.3.14.

B.2.2.2.3 Emergency information descriptor

The emergency information descriptor shall be transmitted when broadcaster decide to transmit an emergency alarm, this shall includes information and function necessary for the correct signaling in IRD.

B.2.2.2.4 Partial reception descriptor

The partial reception descriptor is used to indicate for one-seg receivers, which *service_id* contain the partial service. When there is a service transmitted in conditional access hierarchy, this transmission is mandatory.

B.2.2.2.5 TS information descriptor

The TS information descriptor indicates, for digital terrestrial television broadcasting, the remote control key identifier to which the applicable TS shall be allocated during scan operation in the initial setting of the receiver. Such operation includes grasping of receivable network identifiers, transport stream identifiers, and receivable frequency information. This descriptor also indicates the relationship between the service identifier and the transmission layer.

B.2.3 Bouquet association table descriptor

B.2.3.1 General rule

The composition of the BAT is indicated in ABNT NBR 15603-2:2007, Subclause 7.2.5.

The BAT gives a logical grouping of services into bouquets, which may group together services delivered by different networks. A TS may contain services from more than one bouquet within a network. Each BAT collects the services that are allocated to the specified bouquet.

B.2.3.2 First descriptor loop

NOTE The SI descriptors have a defined meaning in the first loop of the BAT.

B.2.3.2.1 Bouquet name descriptor

The bouquet name descriptor is used to transmit the name of the bouquet of the following services which are allocated to.

This descriptor is allowed once in each subtable of the BAT. It is mandatory to be transmitted in any BAT subtable in the TS.

B.2.3.2.2 Country availability descriptor

The country availability descriptor shall be in accordance with ABNT NBR 15603-2:2007, Subclause 8.3.6.

B.2.3.2.3 Linkage descriptor

The linkage descriptor is used to give a link to another service or TS. If it appears in this loop, it links to a service that is attached to the bouquet provider.

The *linkage_descriptor* is allowed more than once in this loop. It can, for example, point to the "123 info channel" and to "123 text". The transmission of this descriptor is optional. The meaning of the descriptor, when it occurs, depends on the value of the *linkage_type*. If the *linkage_type* is:

- a) 0x01, it refers to a service that contains information about the bouquet. An example of the intended use is for the IRD to switch to the information service when the user requests additional information about the bouquet;
- b) 0x02, it refers to an Electronic Program Guide (EPG) for the bouquet. This standard does not specify the contents of such a service;
- c) 0x04, it refers to a TS which carries comprehensive SI. The SI carried in the referenced TS includes at least all the SI information available on all other TS which carry services of the bouquet.

B.2.3.3 Second descriptor loop

The SI descriptors have a defined meaning in the second loop of the BAT.

The service list descriptor shall be in accordance with ABNT NBR 15603-2.

B.2.4 Service description table descriptor

NOTE SDT construction is indicated in ABNT NBR 15603-2:2007, Subclause 7.2.6. In the SDT, there is a loop for the descriptors of each service described in SDT. The SI descriptor defines the meaning of this loop.

B.2.4.1 Bouquet name descriptor

The bouquet name descriptor is used to transmit the name of the bouquet the service is allocated to. This descriptor is allowed more than once in the loop because a service could belong to more than one bouquet. Transmission of this descriptor is optional in the SDT. The use of this descriptor in the SDT is wasteful of bandwidth, since the information can be conveyed more efficiently using the BAT.

B.2.4.2 CA identifier descriptor

If a service is generally CA protected, the CA identifier descriptor may be used to transmit data of the CA system. The CA_identifier_descriptor is not involved in any CA control function, it is an indication for the user interface software in the IRD that a service is under conditional access and which CA system is used. Then the user interface software may decide whether this service is reachable or not. The aim of the transmission of this descriptor is to avoid frustration to users caused by services being displayed for selection that are not reachable. This descriptor is allowed only once in the loop. Transmission of this descriptor is optional.

B.2.4.3 Country availability descriptor

The country availability descriptor shall be in accordance with ABNT NBR 15603-2:2007, Subsection 8.3.6..

B.2.4.4 Linkage descriptor

The linkage descriptor is used to give a link to another service. If it appears in this loop it links to a service that is attached to this service. This descriptor is allowed more than once in this loop. Transmission of this descriptor is optional. The meaning of the descriptor when it occurs here depends on the value of the linkage_type. If the linkage_type is:

- a) 0x01, it refers to a service that contains information about this service. An example of the intended use is for the IRD to switch to the information service when the user requests additional information about this service;
- b) 0x02, it refers to an Electronic Program Guide (EPG) for this service. The IRD can only make use of this type of linkage if it can decode the EPG service. This standard does not specify the contents of such a service;
- c) 0x03, it refers to a CA replacement service for this service. An example of the intended use is for the IRD to switch automatically to the replacement service if the CA system denies access to this service.
- d) 0x05, it refers to a replacement service for this service. An example of the intended use is for the IRD to switch automatically to this replacement service when the selected service has a running status of "not running".

The linkage_type does not indicate the service_type of the reference service. An example of the intended use of the linkage descriptor is that an IRD user interface could include a mechanism like "info about the service" which would make the IRD tune to the linked service after the user initiated the mechanism.

B.2.4.5 Mosaic descriptor

The mosaic descriptor can be located in the SDT and/or PMT and it is used to describe mosaic services. This service is described in B.4.2.

B.2.4.6 NVOD reference descriptor

The NVOD reference descriptor lists the services which belong to a Near Video On Demand (NVOD) service. A description of the NVOD mechanism is given in B.4.1.

The NVOD_reference_descriptor is allowed only once in each loop and if there is no time_shifted_service_descriptor in it. It is mandatory to be transmitted if the corresponding services are described using the time_shifted_service_descriptor.

IRD are recommended to make use of the NVOD_reference_descriptor in order to allow access to NVOD_services.

B.2.4.7 Service descriptor

The service descriptor shall be in accordance with ABNT NBR 15603-2:2007, Subsection 8.3.13.

The service type defined in this Standard is the service used for:

- a) temporary service (video, audio, data): is not a regular service, but a service temporarily organizing the programs;
- b) engineering service (software download): is a service for software download (version) and data for receivers;
- c) promotion service (video, audio, data): for promoting or announcing contents of programs or services;
- d) data service for storage in advance: is a service which is used independently of storage media location belonging to service which can be viewed after accumulating data in receiver;
- e) exclusive data service for media storage belonging to a service which can be viewed after accumulating data in the receiver;
- f) bookmark data service is a service indicating the recording marking on the receiver.

B.2.4.8 Time shifted service descriptor

The time shifted service descriptor identifies a service as a time shifted copy of another service. The time_shifted_service_descriptor is allowed only once in each loop, if there is no service_descriptor. It is mandatory to be transmitted for services listed in a NVOD_reference_descriptor. IRD are recommended to be able to interpret it in order to access NVOD-events.

B.2.4.9 Digital copy control descriptor

The digital copy control descriptor is mapped to the SDT when digital copy control information and maximum transmission rate are the same in most programs of the same service. When a program differing with this information exists, this descriptor is mapped to the PMT and/or EIT.

When the descriptor is transmitted in multiple tables, priority of information expressed by this descriptor is PMT > EIT > SDT.

B.2.4.10 Logo transmission descriptor

The logo transmission descriptor describes service logo information, such as pointing to PNG logo data transmitted by CDT (see ARIB STD-B21), logo identifier, logo version, and the 8-unit code alphanumeric character string for simple logo. The transmission is essential in a service that refers to simple logo or PNG logo data transmitted by using CDT.

B.2.4.11 Content availability descriptor

The content availability descriptor is used in combination with the digital copy control descriptor. It can be put into the SDT when information to control record and output is the same in most programs of the same service. When there is a program with different information or when this descriptor is not put into the SDT, it can be put into the PMT and/or EIT.

When the descriptor is transmitted in multiple tables, priority of information expressed by this descriptor is PMT>EIT>SDT.

B.2.5 Descriptors of the event information table (EIT)

NOTE An EIT-section is organized as shown in ABNT NBR 15603-2:2007, Subclause 7.2.7. The EIT has a loop for descriptors for each event described in the EIT. The SI descriptors have a defined meaning in the loop.

B.2.5.1 Component descriptor

The component descriptor is used to specify all streams that are attached to an event. The descriptor can appear more than once in a loop since there may be more than one stream. Even if there is a `time_shifted_event_descriptor`, this descriptor is allowed.

It is useful to indicate which streams are available for future events.

B.2.5.2 Content descriptor

The content descriptor is used to classify the content of the event. Only one content descriptor may appear in the loop, but there is the possibility to transmit more than one classification term because there is a loop within the descriptor. Even if there is a `time_shifted_event_descriptor`, this descriptor is allowed. The content information can be provided in the EIT subtable for the corresponding NVOD reference service. The transmission of this descriptor is optional.

B.2.5.3 Extended event descriptor

The extended event descriptor is used to transmit a larger amount of textual information for an event than is possible with the `short_event_descriptor`. The information in extended event descriptors supplements that given in a short event descriptor. A language code is transmitted in order to indicate in which language the text is written. More than one `extended_event_descriptor` is allowed, for different languages. Descriptors for the same language have to be grouped together, and the `last_descriptor` field specifies the number of the last `extended_event_descriptor` for a specific language.

The transmission of this descriptor is optional.

B.2.5.4 Linkage descriptor

The linkage descriptor is used to give a link to another service. If it appears in this loop it links to a service that is attached to this event. This descriptor is allowed more than once in this loop. The transmission of this descriptor is optional. Even if there is a `time_shifted_event_descriptor`, this descriptor is allowed. The meaning of the descriptor when it occurs here depends on the value of the `linkage_type`. If the `linkage_type` is 0x01, the descriptor refers to a service that contains information about this event. An example of the intended use is for the IRD to switch to the information service when the user requests additional information about this event.

The meaning of other values of `linkage_type` is not defined in this context. The `link-age_type` does not indicate the `service_type` of the referenced service. An example of the intended use of the linkage descriptor is that an IRD user interface could include a mechanism like "info about the event" which would make the IRD tune to the linked service after the user initiated the mechanism.

B.2.5.5 Parental rating descriptor

The parental rating descriptor is used to allow the parental rating of a program based on Ordinance N° 1.220, of November 7, 2007, where the rating criterion is made based on age, thus protecting children from watching events which are undesirable for their age. Even if there is a `time_shifted_event_descriptor` type descriptor, this descriptor is allowed. The information about parental rating can be presented in the EIT subtable for the corresponding NVOD reference service.

B.2.5.6 Short event descriptor

The short event descriptor is used to transmit the name and a short text description for an event. A language code is transmitted in order to indicate in which language the title and the text are written. The transmission of this descriptor is mandatory, unless there is a `time_shifted_event_descriptor`, in which case the descriptor is allowed. This descriptor is allowed more than once in the loop for different languages. Thus it is not allowed to have more than one `short_event_descriptor` with the same language code.

B.2.5.7 Time shifted event descriptor

The time shifted event descriptor is used to indicate that an event is the `time_shifted` copy of another event, although shifted in time. Transmission of this descriptor is mandatory in case of NVOD. IRD are recommended to decode this descriptor, without which access to the SI of NVOD events is not possible.

B.2.5.8 Digital copy control descriptor

The digital copy control descriptor indicates digital copy control information of individual program and the maximum transmission rate.

When this descriptor is transmitted in multiple tables, priority of the information indicated by this descriptor is PMT > EIT > SDT.

B.2.5.9 Audio component descriptor

The audio component descriptor is used to specify each parameter of audio stream composing an event. As multiple audio streams exist for one event in some cases, this descriptor may occur more than once in one loop.

B.2.5.10 Data component descriptor

The data component descriptor describes data component of the contents in the event, and component tag of the component stream. `Selector_byte` area in the descriptor is used to describe information of language of multimedia service or picture size, or capacity for storage, according to the form specified in each data component. The component stream composing data broadcasting contents may be transmitted in the event or in other event or service, and this descriptor describes component tag of all component streams related to the corresponding contents in the former event.

EXAMPLE The component tag of all streams necessary to indicate video/audio and related data in data contents descriptor are described when program linked data produced at the same time as the video and audio in the same transport stream (TS) are announced in the same event in the same service. Therefore, all component streams necessary to record data broadcasting are specified only by referring to the data content descriptor.

B.2.5.11 Hyperlink descriptor

The hyperlink descriptor is used to describe linkage information when two related programs are made in different events and services, for the following:

- a) video audio program and related information program;

- b) video audio program and index program in program;
- c) video audio program and its guide information program;
- d) others.

When the hyperlink type is `combined_data` (0x01), `combined_stream` (0x02), `index_data` (0x03), or `index_stream` (0x04), it is recommended to link in bi-directional. It means that when the hyperlink made to other event B is made by mapping the hyperlink descriptor in the EIT of event A, it is recommended to make hyperlink to event A by mapping the hyperlink descriptor to the EIT of event B.

B.2.5.12 Series descriptor

The series descriptor is used to identify multiple events, which are made in series. An individual series is identified with the series identifier. The IRD can use it when operating as a whole (such as reservation) for the series event group.

B.2.5.13 Event group descriptor

The event group descriptor describes grouping information for the same event of a common event, linkage information for the event node, information about the original event when moving the event to a different service.

Common event is a broadcasting style, which the same program can be viewed whichever service is selected by describing the same `ES_PID` in the PMT of multiple services.

Event relay is a broadcasting style, in which a program is broadcast continuously on a different service from midway in the program.

Event moving is a broadcasting style, by which a program is broadcast on the service differing from the service scheduled before the broadcasting starts.

B.2.5.14 Component group descriptor

The component group descriptor is used to indicate that the component group is organized in a group, when there is a relation in multiple components composing one event. Its relation is identified with the component group type. CA setting and total bit rate description for each component group can be made. It is used for the multiview television (MVTV) etc.

NOTE Multi-view (MVTV) is an application to broadcast related contents in one service by multiple video, audio and other components, simultaneously.

B.2.5.15 LDT linkage descriptor

The descriptor provides information of linkage for the descriptor collected in the LDT.

When placed in the EIT, the event information linked from the descriptor is collected to the LDT and transmitted.

B.2.5.16 Content availability descriptor

The descriptor is used combined to the digital copy control descriptor. It can be inserted in SDT when the storage and output control information is the same for most of programs in a same service. When there is a program with different information or this descriptor is not inserted in SDT, it can be used in PMT and/or EIT.

B.2.5.17 Carousel compatible composite descriptor

The carousel compatible composite descriptor presents the storage control information for each program through the use of area information module descriptors and the private area defined in the data carousel transmission scheme (see ABNT NBR 15606-3) as subdescriptors.

More than one subdescriptor may be used in a carousel compatibility composite descriptor.

B.2.6 Descriptors of the program map table (PMT)

NOTE In addition to the descriptors defined in ISO/IEC 13818-1, the SI descriptors specified in B.2.6.1 to B.2.6.10 can be used in the PMT.

B.2.6.1 Mosaic descriptor

The mosaic descriptor may be located in the PMT and/or SDT. It's used to describe mosaic type services (see B.4.2).

B.2.6.2 Stream identifier descriptor

The stream identifier descriptor shall be according to ABNT NBR 15603-2:2007, Subclause 8.3.16.

B.2.6.3 Hierarchical transmission descriptor

The hierarchical transmission descriptor indicates the relation between hierarchical streams when transmitting elementary stream composing program in order to avoid the selection of wrong service. Hierarchical transmission presupposes to transmit with the same TS and the same service identifier, to improve response characteristics at user selection and for SI transmission efficiency. The hierarchical transmission description is denoted in the second loop of the PMT.

When video stream is transmitted in two-hierarchical transmission, the higher-level and lower-level streams refer to each other.

If hierarchical level has more than two levels, an undefined bit is added before the hierarchical level to use as an hierarchical level to have cyclic linkage construction from the higher level to the lower level.

B.2.6.4 Digital copy control descriptor

The digital copy control descriptor is used to indicate a program, digital copy control information of an elementary stream composing program, and maximum transmission rate.

When the descriptor is transmitted in PMT, the component control flag shall always be "0". When this descriptor exists in the first descriptor loop, this information shall be applied to all elementary streams composing the program. When this descriptor is in the second descriptor loop, it is designated in each elementary stream. When designation to whole program and to individual elementary stream differs, designation to individual elementary stream has the priority.

When this descriptor is transmitted in multiple tables, information priority which the descriptor indicates is in the order of PMT > EIT > SDT.

B.2.6.5 Country availability descriptor

The country availability descriptor is used to indicate if the service is available in a specific country.

The descriptor can be used twice at maximum within the program loop of the PMT, once to indicate the country list where the service is available and once to list the countries where the service is not available.

B.2.6.6 Component descriptor

The component descriptor balances the use in the EIT for specifying all streams, which composes the service and can be used in the PMT. This descriptor can be used only once in the ES loop of the PMT.

B.2.6.7 Parental rating descriptor

The parental rating descriptor is used to allow the parental rating of a program based on Ordinance N° 1220, of July 11, 2007, Ministry of Justice, where the rating criteria is based on age, thus protecting children from watching events which are undesirable for their age.

B.2.6.8 Linkage descriptor

The linkage descriptor is used to give a link to another service. If it appears in the first loop, it links to other service that is attached to this service. This descriptor is allowed only once in the first loop. Transmission of this descriptor is optional. The meaning of the descriptor depends on the value of the linkage_type. If the linkage_type is 0x03, it refers to a CA substitution service for this service.

The meaning of other values of linkage_type are not defined in this context. O linkage_type does not indicate the service_type of the referenced service. An example of the intended use of the linkage descriptor is that when access to this service is denied by the conditional access system, and when the substitution service exists to the selected service, information necessary to switch to the substitution service can be transmitted.

B.2.6.9 Content availability descriptor

The content availability descriptor is used in combination with the digital copy control descriptor, describes information to control the record and output of each program and the elementary streams that constitute the program.

When this descriptor is in the first descriptor loop, the information applies to all the elementary stream that constitutes the program. When this descriptor is in the second descriptor loop, specific information is applied to each elementary stream. When specifications applied are different between the entire program and each elementary stream, priority is given to the specifications for each elementary stream.

When this descriptor is transmitted by multiple tables, the priority of information expressed by this descriptor is PMT > EIT > SDT.

B.2.6.10 Emergency information descriptor

The emergency information descriptor is transmitted during emergency situations, when the broadcaster shall send an emergency signal with instructions and actions recommended for that situation.

B.2.7 Descriptor of the time offset table (TOT)

The composition of the TOT is indicated in ABNT NBR 15603-2:2007, Subclause 7.2.9. The TOT includes all items defined in the TDT, adding only the descriptor area.

The local_time_offset_descriptor is placed in TOT descriptor and contains the region time zone in relation with Brazilian official time and with or without daylight saving.

B.2.8 Stuffing descriptor

The stuffing descriptor can be placed anywhere, by which the descriptor is usable in SI. This descriptor is used to fill up the table or to make enabled descriptor to non-operation status for a certain reason (such as remultiplexer etc.) The IRD shall skip all the stuff descriptor.

B.2.9 ISO/IEC 13818-1 descriptors

The ISO 13818-1 descriptors (MPEG-2) can be expressed in the SI bit stream format.

B.2.10 Unknown descriptors

If an unknown descriptor appears in a context where its meaning is not specified in this standard, or if the IRD encounters a descriptor with an unrecognized tag, the IRD is recommended to skip over that descriptor (using the length field) and proceed with decoding the following SI data.

B.2.11 Broadcaster information table descriptor

NOTE The construction of the BIT (broadcaster identification table) is specified in ABNT NBR 15603-2:2007, Subclause 7.2.13.

B.2.11.1 First descriptor loop

B.2.11.1.1 SI transmission parameter descriptor

When this descriptor is placed in the first descriptor area of the BIT, it is used to indicate the SI transmission parameter information operated commonly in the original network. This descriptor can be placed more than once in the same area. This is because for enabling transmission of the parameter to be used in the near future beforehand, as well as transmission of the actually enabled parameter, when changing the SI transmission parameter from a certain time. The changing time of the parameter, either enabled or disabled, is indicated with the parameter version number and `update_time` of the descriptor.

B.2.11.1.2 SI prime TS descriptor

When the SI prime TS descriptor is placed in the first descriptor area of the BIT (original network group), the identification information and transmission parameter of the SI prime TS of the network (TS of the special transmission style regarding the SI) is provided.

In the table description length byte, both NBIT and LDT information are provided. Even when they are the default parameter, description is not omitted, as it is the judgment reference of the table usage for the IRD. That is, when there is no description, it means that the table is not transmitted.

B.2.11.2 Second descriptor loop (broadcaster group)

B.2.11.2.1 Broadcaster name descriptor

The broadcaster name descriptor is used to transmit the broadcaster name. Only one descriptor can be placed for one broadcaster group.

B.2.11.2.2 Service list descriptor

The service list descriptor provides a list of the service and service type in each broadcaster. One descriptor can be placed for one broadcaster group.

B.2.11.2.3 SI transmission parameter descriptor

When this descriptor is placed in the second descriptor area of the BIT, it is used to indicate the SI transmission parameter information operated commonly in the broadcaster. This descriptor can be placed more than once in the same area. This is because it is for enabling transmission of the parameter to be used in the near future before hand, as well as enable current transmission parameters when changing the SI transmission parameter for a certain period. The changing time of the parameter, either enabled or disabled, is indicated with the parameter version number and `update_time` of the descriptor.

B.2.11.2.4 Extended broadcaster descriptor

The extended broadcaster descriptor is used for describing the extended information of broadcasters. Terrestrial broadcasters are identified as digital terrestrial television broadcasting.

A terrestrial broadcaster may share the same NVRAM in the receiver with terrestrial broadcasters who are out of the service area or broadcasters of other networks. Other than the access right to the NVRAM, this descriptor can also be used, when full-seg receiver moves out of the service area of a digital terrestrial television broadcaster, describing information needed to tune terrestrial broadcasters of other areas who might be broadcasting the same program. For the above purposes, this descriptor is used for grouping the relation of a terrestrial broadcaster with other terrestrial broadcasters and broadcasters of other networks.

B.2.12 Network board information table descriptor (NBIT)

The construction of the NBIT is specified in ABNT NBR 15603-2:2007, Table 22.

When the descriptor is placed in the NBIT, the title and the content of the board information are provided in text format.

B.2.13 Linkage description table descriptor (LDT)

The construction of the LDT is shown in ABNT NBR 15603-2:2007, Table 25.

Operation of the event descriptor, which is linked with the EIT using the LDT linkage descriptor, shall be in accordance with the operation of the same descriptor in the EIT.

When linking from LDT linkage descriptor to the LDT, the item name is not described in cases where the descriptor identification is in independent style.

B.3 Operational interaction status of program specific information (PSI) and SI

For a description of possible status of services are relevant: program association table (PAT), PMT, SDT and EIT (see Table B.3).

Table B.3 - Services states

Service present in					State of the service
PAT	PMT	SDT	SDT running status	EIT present/following	
Yes	Yes	Yes	Running or undefined	Yes	Service is running and broadcasting
No	No	Yes	Not running or undefined	No	Service definition still exists but the elementary stream does not exist and the broadcasting is not made
Yes	Yes	Yes	Pausing	Yes	Service definition still exists and the elementary stream exists and the broadcasting is not made (stopped) . Example: other service guide or test broadcasting during broadcasting stop time
No	No	Yes	Start within several seconds or undefined	Yes	Service definition still exists and broadcasting will start soon (stopped)
No	No	No	-	No	Under preparation, starting to make the service or corresponding to the end status of the service (service does not exist)

NOTE All states other than listed above are in transition status.

B.4 Application

NOTE The syntax of SI is designed so that it operates under a wide range of operation conditions.

B.4.1 NVOD service

In MPEG-2, a method to transmit multiple video programs at once on one transport stream is provided. This has the possibility to provide the NVOD service by one broadcast service provider.

The concept to provide one service or six services by shifting time is shown in Figure B.2. This is the simplest form of such service. All programs are the same in all channels.

NOTE Other forms, such as inserting different commercial messages between programs, can also be made.

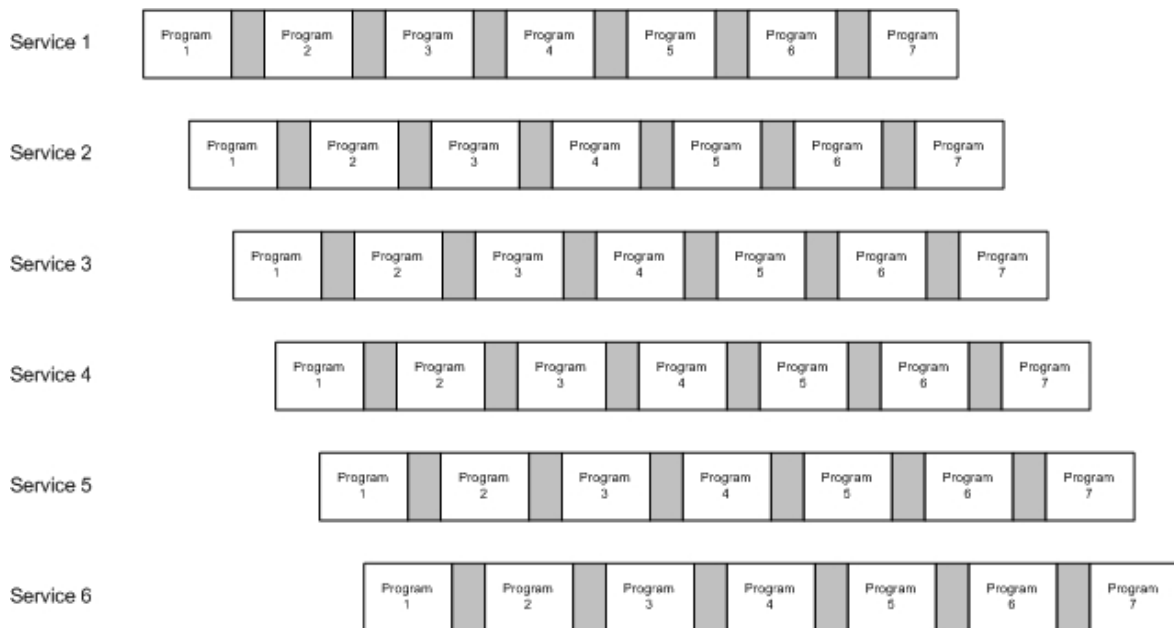


Figure B.2 - Example of NVOD service

In order to describe such NVOD service by SI, event information table (EIT) shall be transmitted six times repeatedly. Instead of this method, a concept of "reference service" is used herein.

"Reference service" is a kind of fictional service, and provides the means to relate the time shift services (services 1 to 6) during transmission with SI. This "reference service" is identified by the reference service identifier linked to the description common to the event in all the services belonging to the NVOD. The event information table (EIT) of the reference service always exists in the transport stream, by which the NVOD service is transmitted. Each time, the shift service is referred to transport stream identifier, original network identifier and service identifier. These services are listed to the NVOD reference descriptor. Those are shown in Figure B.3.

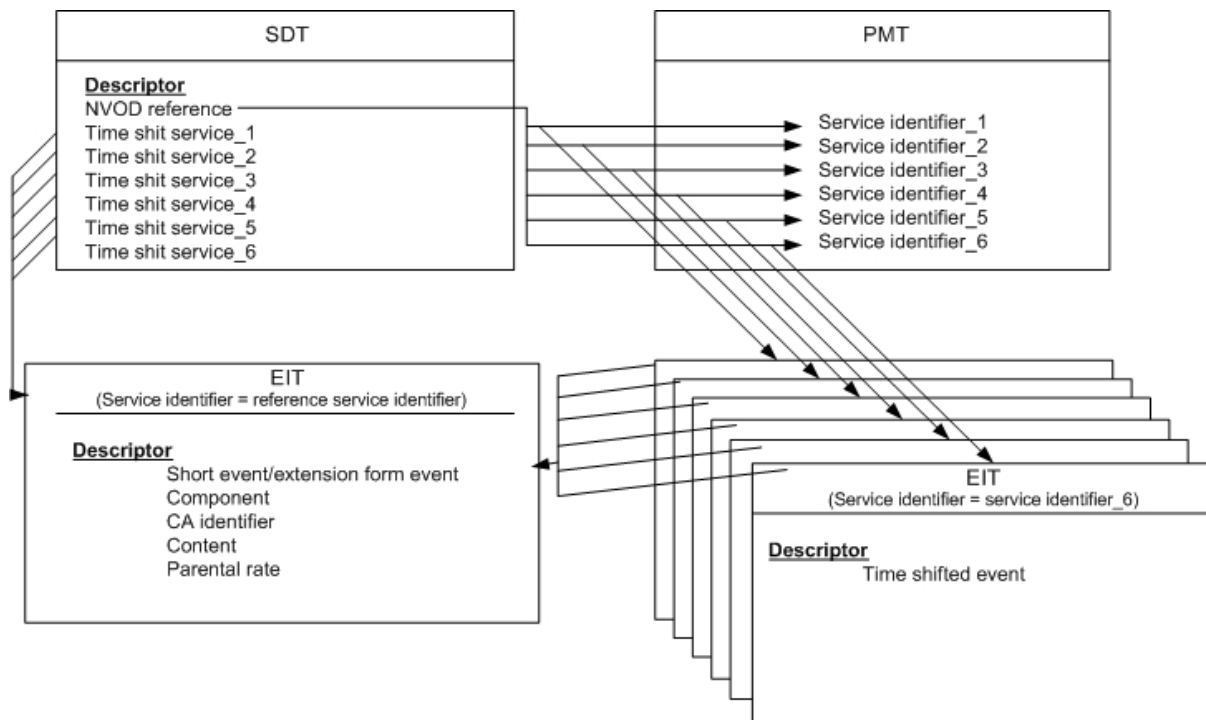


Figure B.3 - Description of SI in NVOD service

By using this method, data quantity can be reduced to 1/5. All the start times of the "reference service event information table" are set to "1" which is an invalid value, and the correct start time of each event is given in the EIT for each event with time shift service.

B.4.2 Mosaic services

B.4.2.1 General consideration

The mosaic services shall be according to ETSI TR 101 211:2004; Subclause 5.2.

B.4.2.2 Relationship between mosaic service and SI/PSI table

The relationship between mosaic service and SI/PSI table shall be according to ETSI TR 101 211:2004, Subclause 5.2.2.

B.4.3 Mixed multiple programming (madara-broadcasting)

NOTE A Mixed multiple programming is referred as Madara-broadcasting, where is switched between a HDTV services to plural SDTVs in time series within the same band area.

B.4.3.1 Service image

NOTE There are three service images in the madara-broadcasting: when all service_id exists all the time, when a part of SDTV service_id stops during the HDTV service broadcasting and when the HDTV service_id and SDTV service_id are defined as different services.

B.4.3.1.1 When all service_id exists all the time

Madara-broadcasting when all service exists all the time is allocated with elementary PID (ES_PID) as shown in Table B.4 and services are broadcast as shown in Table B.5.

Table B.4 – Settings example of ES_PID in madara-broadcasting when all services exist all the time

service_id	ES_PID entered PMT	
	SDTV	HDTV
0x0001	0x0030	0x0033
0x0002	0x0031	0x0033
0x0003	0x0032	0x0033

Table B.5 – Service image of the madara-broadcasting in which all services exists all the time

service_id	19:00	20:00	21:00
0x0001	SDTV(ES_PID=0x0030)	HDTV(ES_PID=0x0033)	SDTV(ES_PID=0x0030)
0x0002	SDTV(ES_PID=0x0031)		SDTV(ES_PID=0x0031)
0x0003	SDTV(ES_PID=0x0032)		SDTV(ES_PID=0x0032)

B.4.3.1.2 When a part of SDTV services stops

While the HDTV service is broadcast, madara-broadcasting, which a part of SDTV services pause is allocated with ES_PID as shown in Table B.6 and services are broadcast as shown in Table B.7.

Table B.6 – Entry sample of ES_PID in madara-broadcasting which part of service pauses

service_id	ES_PID entered in PMT	
	SDTV	HDTV
0x0001	0x0030	0x0033
0x0002	0x0031	-
0x0003	0x0032	-

Table B.7 – Service image of the madara-broadcasting which part of services pause

service_id	19:00	20:00	21:00
0x0001	SDTV(ES_PID=0x0030)	HDTV(ES_PID=0x0033)	SDTV(ES_PID=0x0030)
0x0002	SDTV(ES_PID=0x0031)	stopped	SDTV(ES_PID=0x0031)
0x0003	SDTV(ES_PID=0x0032)	stopped	SDTV(ES_PID=0x0032)

B.4.3.1.3 When the HDTV service and SDTV service are defined as different services

The madara-broadcasting, by which the HDTV service and SDTV services are defined as different services, is allocated with the elementary PID as shown in Table B.8 and the services are broadcast as shown in Table B.9.

Table B.8 – Examples of settings of ES_PID which the HDTV service and SDTV services are defined as different services

service_id	ES_PID in PMT	
	SDTV	HDTV
0x0001	0x0030	-
0x0002	0x0031	-
0x0003	0x0032	-
0x0004	-	0x0033

Table B.9 – Service image when the HDTV service and SDTV services are defined as different services

service_id	19:00	20:00	21:00
0x0001	SDTV(ES_PID=0x0030)	stopped	SDTV(ES_PID=0x0030)
0x0002	SDTV(ES_PID=0x0031)	stopped	SDTV(ES_PID=0x0031)
0x0003	SDTV(ES_PID=0x0032)	stopped	SDTV(ES_PID=0x0032)
0x0004	paralizado	HDTV(ES_PID=0x0033)	stopped

B.4.3.2 Seamless switching of HDTV/SDTV

B.4.3.2.1 Pre-supposition condition

PTS and DTS are synchronized between video ES of target HDTV and SDTV. STC of both encoding equipment are synchronized.

The GOP is synchronized between the video ES of the target HDTV and SDTV.

The video ES on the ending transmission side should add the sequence end code after the final frame of the GOP transmission is finished, before ending.

The video ES on the starting transmission side should start as the closed GOP having a sequence header.

The video ES on the ending transmission side and the video ES on the starting transmission side should not be overlapped on TS.

There should be no gap which underflows buffer for the video ES of the IRD equipment.

B.4.3.2.2 PMT procedures

Updating of the PMT shall be 0.5 s to 2.0 s. prior to switching control time between the HDTV and SDTV. Actual switching time of the video ES shall be delayed 0.0 s to 0.5 s. to control time as there is a time lag in the cycle of 500.5 ms in 1 GOP (in case of 15 frame) though the service control device is controlled in correct seconds generally.

At least the previous PMT before and after the switching control time of the HDTV and SDTV shall include the video control descriptor. The IRD equipment corresponding to the seamless switching shall detect updating of the PMT version number, and selection of the video ES and decoding of the video are made according to the change of the video encode format of the video control descriptor.

The sequence_end_code_flag included in the video decode control descriptor shall indicate whether or not the sequence end code exists when the transmission of the video ES indicated by the PMT ends.

B.4.3.2.3 Time mapping chart

Switching of the video ES in a multiplied TS and version upgrade position of the PMT are shown in Figure B.4.

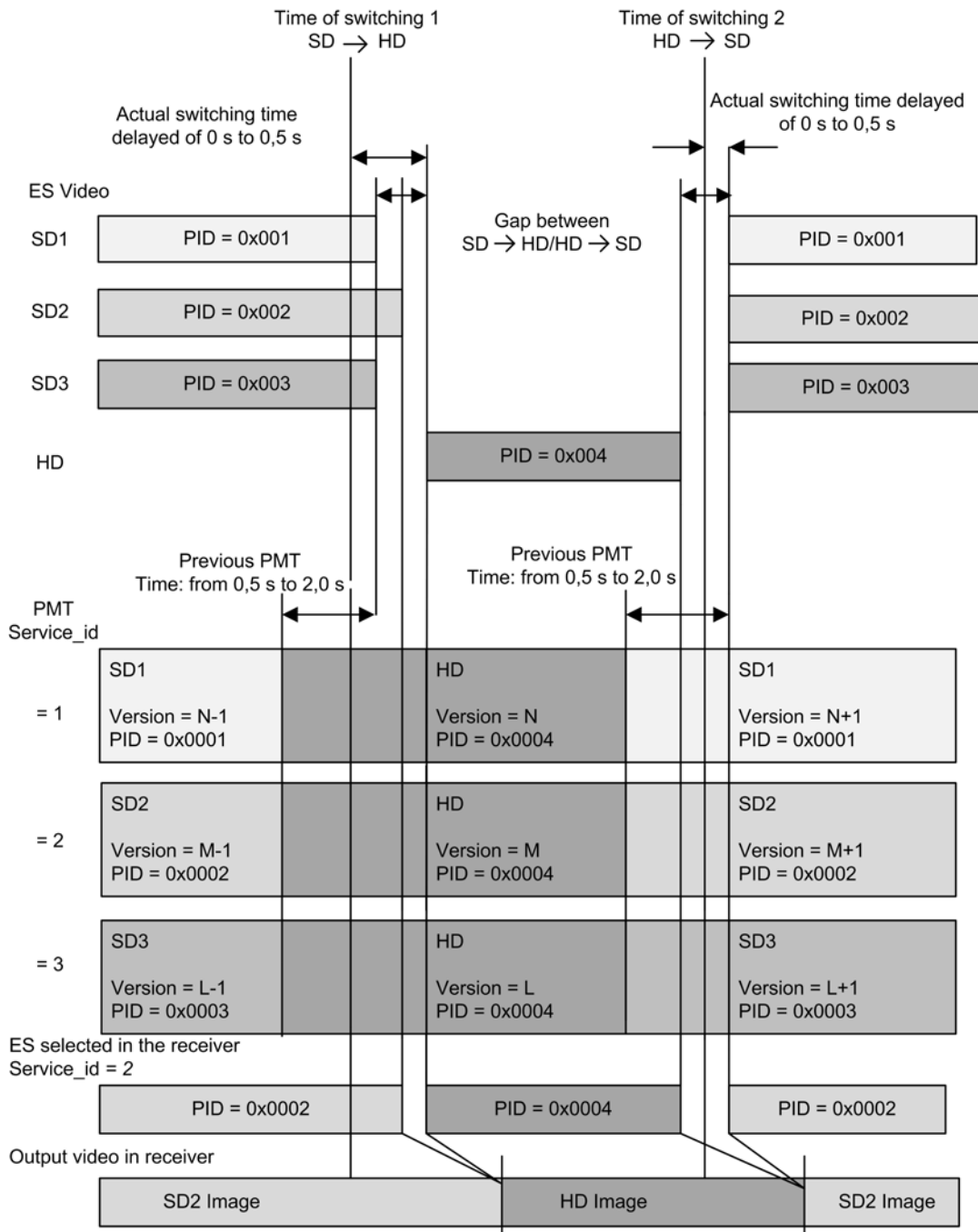


Figure B.4 - Time mapping chart of seamless switching

B.5 Information related to date and time coded in the SI

The information related to date and time coding is shown in Table B.10.

Table B.10 – Information on date and time in SI tables

TOT	
UTC_time	40 bits (year, month, date, time, hour, minute, second)
EIT	
start_time	40 bits (year, month, date, time, hour, minute, second)
duration	24 bit
Local time offset descriptor (TOT)	
local_time_offset	16 bits (hour, minute)
time_of_change	40 bits (year, month, date, hour, minute, second)
next_time_offset	16 bits (hour, minute)
SI parameter descriptor (BIT)	
update_time	16 bits (hour, minute)
Series descriptor (EIT)	
expire_date	16 bits (hour, minute)

The “UTC - 3 hours” coding shall be always used for the following time information: UTC_time na TOT, start_time na EIT and Time_of_change (no local_time_offset_descriptor).

B.6 MJD after the year of 2038

The least significant of the 16 bits in MJD is "1" any day in the year 2038 and will be "0" in the following day. If using the formula presented in ABNT NBR 15603-2:2007, Annex C, the system is reported to the year of 1800. In order to avoid such event, all of the following measures shall be taken:

- a) formula shown in ABNT NBR 15603-2:2007, Annex C, shall be kept after the year of 2038 until February 28, 2100, transmitting the 16 converted bits of MJD;
- b) TA shall memorize date transmitted and when they are transmitted to a date inferior to the last one transmitted, the receiver shall assume the 17th bit as 1 and then process this new information;
- c) for the years after 2100, a processing method has being studied.

Bibliography

- [1] ARIB STD-B24:2006, *Data coding and transmission specification for digital broadcasting*
- [2] ARIB STD-B10:2006, *Service information for digital broadcasting system*