ENGLISH TRANSLATION

OPERATIONAL GUIDELINES FOR DIGITAL TERRESTRIAL TELEVISION BROADCASTING

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Association of Radio Industries and Businesses

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Preface

The ARIB (Association of Radio Industries and Businesses) establishes the "ARIB Standards" and “ARIB Technical Reports” for the basic technical conditions such as standard specifications for a variety of radio communication equipment and broadcast transmission and reception equipment with the participation of broadcasting companies, broadcast equipment manufacturers, telecommunications carriers, radio communication equipment manufacturers and users.

This technical report encompasses materials related to “ARIB standards” which combine governmental technical standards and optional private sector standards.

This technical report stipulates provisions for general operations at broadcasting stations for digital terrestrial television broadcasting and functional specifications for digital terrestrial television receiver units.

We hope that this technical report will be put to practical use by broadcasting companies, broadcast equipment manufacturers, telecommunications carriers, radio equipment manufacturers and users.

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Volume 4

Digital Terrestrial Television Broadcasting

Provisions for PSI/SI Operations

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Contents

[Section 1] Operation in General

1 Introduction

1.1 Preface

The Electronic Program Guide (EPG) Service in digital terrestrial television broadcasting is provided in accordance with the ordinances and announcements of the Ministry of Internal Affairs and Communications and the provisions in ARIB (Associating of Radio Industries and Businesses) standard, “Service Information for Digital Broadcasting System”(ARIB STD-B10). However, more detailed provisions were required separately from this standard for its extensive utilization, and this “Digital Terrestrial Television Broadcasting – Provisions for PSI/SI operations” was established.

The delivering standard of transmission control information specified in this document is based on the premise that flexibility of program scheduling by each broadcaster and expandability towards the future development of broadcasting services are ensured.

Digital television broadcasting companies shall transmit PSI/SI in accordance with these provisions.

It is required that digital terrestrial television broadcasting receiver units are capable of receiving signals transmitted in accordance with these regulations, and sufficient consideration is given so that reception of signals which are not specified will not cause malfunctions.

1.2 Purpose

This volume defines delivering standard in digital terrestrial television broadcasting in compliance with ARIB standard STD-B10 “Service Information for Digital Broadcasting System”.

1.3 Scope

These provisions apply to structures of PSI and SI, signal types, basic data structures, use of identifiers and delivering standard used in digital terrestrial television broadcasting

The binding power of these provisions is shown below.

[Receiving End]

These provisions standardize specifications of transmission and operation of PSI/SI in digital terrestrial television broadcasting and do not force implementation of receiver units in accordance with the operation. However, even if the receiving end requires operation that is not specified in these provisions, there is no guarantee that broadcasting companies will deal with such operation.

[Transmitting End]

These provisions shall not have absolute binding power against the transmitting end but if signals are not transmitted in accordance with these provisions, there is no guarantee that receiving units will operate normally.

2 References

This volume specifies detailed provisions for operation of digital terrestrial television broadcasting based on ARIB STD-B10 “Service Information for Digital Broadcasting System”.

The related documents are listed below.

(1) ISO/IEC 13818-1 Information technology -- Generic coding of moving pictures and associated audio information: Systems (MPEG-2 Systems standard)

(2) “Data Multiplex Broadcasting System for The Conventional Television Using The Vertical Blanking Interval” ARIB STD-B5

(3) “Service Information for Digital Broadcasting System” ARIB STD-B10

(4) “Data Coding and Transmission Specification for Digital Broadcasting” STD-B24

(5) “Conditional Access System Specifications for Digital Broadcasting” ARIB STD-B25

(6) Technical Report ARIB TR-B15 “Volume 4 BS Digital Satellite Broadcasting Operational Guidelines for PSI/SI”

3 Definitions

The terms used in these provisions are defined as shown below.

8bit character code set	8bit-coded character code set is a code system that has lower overhead for switching collections of character codes than the one of the 7 unit codes to enable more efficient character transmission.
ARIB	Association of Radio Industries and Business : ARIB is an organization which standardizes technologies in relation to use of radio in Japan with participation by broadcasters, telecommunication operators, equipment manufacturers.
Basic	Schedule basic: program information based on transmission criteria in common operation SI. Extended Event Descriptor not included.
BCD	Binary Coded Decimal
BIT	Broadcaster Information Table : BIT is defined as the table that lists broadcaster information such as All-station applied transmission parameter and each station.
bslbf	Bit string, left bit first.
CA	Conditional Access system : CA is a system that controls reception of services (service channels) and events (programs).
CAT	Conditional Access Table : CAT is used to specify the packet ID of the TS packet that carries individual information from among relevant information comprising chargeable broadcasting.
CDT	Common Data Table : CDT is used to transmit common data such as logos of broadcasting companies to receiver units.
component	Component is defined as each element that makes up an event (program) such as video, audio, text and other data.
component_tag	Component_tag is defined as the label used to identify component streams
continuity_counter	Continuity_counter is a 4-bit field that is incremented for each TS packet with the same PID.
CRC	Cyclic Redundancy Check : CRC is a code to check cyclic redundancy to verify the accuracy of data.
current_next_indicator	Current_next_indicator is used to show whether each section is “currently” valid or will be valid in the “future”.
descriptor	Descriptor is defined as the description area placed in the table to list various information.
DRCS	Dynamically Re-definable Character Sets : DSCS is a system to transmit external characters in patterns. Used in character coding standards for text broadcasting and data broadcasting.
DTCP	Digital Transmission Content Protection : DTCP is a standard for the content transmission and recording control system using a digital interface for authentication and encryption.

ECM	Entitlement Control Message : ECM is defined as the common information that includes program information (program related information and descrambling keys) and control information.
EIT	Event Information Table : EIT is defined as the table in which program related information such as program titles, air dates and times and brief program descriptions is described.
EIT[p/f]	Information on the current event (p:present) and next event (f:following) in the EIT.
EIT[p/f after]	Information that follows after the present and following in M-EIT and L-EIT.
EIT type delivering flag	Collective term for H-EIT_flag/M-EIT_flag/L-EIT_flag specified within the service loop of the SDT.
EMM	Entitlement Management Message : EMM is individual information that includes work Key to decipher a contract information and common information of each subscriber.
EMM message	EMM message is individual and common messages carried in the EMM.
EPG	Electronic Program Guide : EPG is defined as the program information displayed by receiver units using the SI information transmitted by each broadcasting station to be used when selecting a program.
ERT	Event Relation Table : ERT is the table in which the relation between an event and local event is described.
ES	Elementary Stream : ES is defined as the coded video, audio or independent data in PES packet. One ES is carried in a sequence of PES packets with the same stream ID.
event	Event (or program) is defined as a collection of streams with a preset starting and ending time within the same service (service channel) such as news and dramas.
event_id	Event_id is defined as the id number of an event that is uniquely assigned within a single service.
EWS	Emergency Warning Signal
extended	Schedule extended: Information on program extended information based on the transmission criteria in individually operated SI.
following	EIT[p/f]: Time series information on the present and following events and the former is called “present” and the latter is called “following”.
free_CA_mode	Free_CA_mode is a 1bit field used to identify whether the program is “chargeable” or “free”. Chargeable program when the bit is 1. Its definition is different from the one in ARIB STD-B10.
H-EIT	Collective term for EITs for display on fixed receiver units.
IEC	International Electrotechnical Commission
IEC60958	IEC60958 is the Digital audio interface standard defined by the IEC(International Electrotechnical Commission)

Index	(Program) index is defined as additional information associated with a program to be used for digest reception, multi-scenario reception, etc.
ISO	International Organization for Standardization
ISO-639-language-code	ISO-639-language-code is used to identify components and languages in which characters are described. 3 character-codes standardized by ISO639 Part 2 are coded into 8-bit. (Ex: ”jpn” to ”0x6A706E”)
ITT	Index Transmission Table : ITT describes offset information between the time information described in the LIT and PTS in order to enable accurate synchronization of program components within a program segment index.
JST	Japan Standard Time: (Defined as ”UTC+9 hours“ by ARIB STD-B10)
JTC	Japan Time Code: JST in BCD
L-EIT	Collective term for EITs for display on partial receiver units.
LIT	Local Event Information Table : LIT is the table which includes all the descriptions regarding local events of a single program.
M-EIT	Collective term for EITs for display on mobile receiver units
MJD	Modified Julian Date : MJD is the date accumulated starting from at 0:00 on Nov 17th, 1858 (UT).
MPEG-2	Moving Pictures Expert Group-2 : MPEG-2 is defined as the compression and coding technology for data (such as moving images and audio data) specified by the International Organization for Standardization (ISO/IEC 13818).
network	Network is defined as a collection of multiplexed MPEG-2 TSs transmitted by a single distribution system.
network_id	Network_id is defined as the identifier assigned to each master transmitter.
NIT	Network Information Table : NIT is defined as the table that carries information to relate transmission path information such as frequencies to channels and that lists ID numbers for all the service channels contained in a distribution system.
NVOD	Near Video On Demand : NVOD provides the same service at different times.
original_network_id	Original_network_id is the identifier unique to each network.
PAT	Program Association Table : PAT is used to specify the ID of the TS packet that carries the PMT.
payload	Payload is defined as a stream of bytes following the header within the packet.

PCAT	Partial Content Announcement Table : PCAT is the table that includes announcements of content difference distribution and transmission schedule information in stored type data broadcasting.
PCR	Program Clock Reference
PES	Packetized Elementary Stream : PES is defined as the packetized video, audio and other data with variable lengths.
PID	Packet Identifier : PID is defined as the 13-bit stream identifier information, which shows the attributes of individual streams of the packet.
PMT	Program Map Table : PMT is used to specify the ID of the TS packet that carries coded signals for each program and the ID of the TS packet that carries common information from among chargeable broadcasting related information.
PPV	Pay Per View : PPV is the system for chargeable broadcasting, in which viewers pay for individual program or program group according to their viewing style.
program_number	Program_number is equal to service_id.
PSI	Program Specific Information : PSI is defined as information (comprised of four tables: PAT, PMT, NIT and CAT) necessary to select specific programs and defined by the MPEG-2 system standard and the ordinances of the Ministry of Internal Affairs and Communications
PTS	Presentation Time Stamp : PTS is defined as the presentation output time control information.
reserved	“Reserved” means that the relevant coding bitstream may be defiend in the ISO standard for future extension. All the bits that are separatedly defined in the ARIB standard should be set to “1”.
reserved_future_use	“Reserved_future_use” means that the relevant coding bitstream may be defined in the ARIB standard for future extension. All the bits that are separated should be set to “1”.
rpchof	Remainder polynomial coefficients,highest order first.
RST	Running Status Table : RST is the table that shows running status of a program at the current time and is not used in digital terrestrial broadcasting.
running status	Running status shows the running status of events and services such as “in execution” and “under suspension”.
schedule	EIT schedule is time-series schedule information regarding events.
SDT	Service Description Table : SDT is defined as the table that lists service channel related information such as service channel names and broadcaster names.
SDTT	Software Download Trigger Table : SDTT is defined as the table used to download software and to send schedule information about differential data for stored broadcasts.
section	Section is defined as the syntax structure used to map SI in the TS packet

section_number	Section_number enables re-placing sections in a certain table in the original order using decoder. In the ARIB standard, it is assigned to a sub-table and is unique in a single sub-table.
segment (EITsegment)	Segment(EITsegment) is the EIT schedule syntax structure that includes up to 8 sections and information on event that will start within 3 hours.
service	Service (service channel) is defined as a series of scheduled broadcasting programs transmitted by each broadcaster.
service_id	Service_id is defined as the identifier for each service in the network.
SI	Service Information : SI is defined as various information designed to improve the convenience of program selection, defined by the ordinances of the Ministry of Internal Affairs and Communications and specified by the ARIB standard. The information also includes MPEG-2 PSI information in addition to an expansion of the ARIB standard.
ST	Stuffing Table : ST is defined as the table to invalidate a table.
STD	Standard.
sub_table	Sub-table is a collection of sections with the same table ID (identifier) and same table id extension.
table	Table is composed of multiple sub-tables with the same table ID (identifier).
table_id	Table_id is defined as the identifier to specify a table to which a section belongs.
table_id_extension	Table_id_extension is used to identify a sub-table.
TDT	Time and Date Table : TDT indicates the current date and time. This is not transmitted in digital terrestrial television broadcasting.
TMCC	Transmission and Multiplexing Configuration Control : TMCC is defined as the transmission control signal that carries information, for example, about the transmission system, frame structure and TS_id.
TOT	Time Offset Table : TOT is used to specify the current date and time and to specify the time difference between the actual time and the displayed time when the summer time starts (in digital terrestrial television broadcasting, only EOT is transmitted and not TDT).
TS	Transport Stream : TS is defined as the transport stream defined by the MPEG-2 system standard (ISO/IEC 13838-1) (in digital terrestrial television broadcasting, one TS is assigned to a master transmitter).
TS_id	TS_id is defined as the identifier assigned to each TS. Same as network_id.
uimsbf	Unsigned integer, most significant bit first

UTC	Universal Time Coordinated : UTC is defined as the time commonly used around the world based on the international agreement.
version_number	version_number is used to indicate that new PSI/SI data that includes updated information will be transmitted when changing information in the table, a sub-table with the next version number will be transmitted.
Adaptation field	Adaptation field is defined as the field with the information transmission function (such as PCR) and stuffing function.
Event relay	Event relay is defined as the function to enable continuous viewing of programs (events) among different services.
Event Common	Event Common is to specify the same ES_PID for the PMTs of multiple services to share the same event among multiple services.
Service type	Service types include digital TV, digital audio, digital broadcasting, and special service.
Service list	Service list is a list of services with service identifiers and service types.
Sequence header	Sequence header is the header to show the start of the highest layer (sequence layer) which includes MPEG video coded streams
Series	A collection of programs of the same nature. For example, a series is defined for a collection of drama programs that are divided into multiple events.
Single shift (Character coding control)	Single shift is the control that calls only one code following this temporarily to the 8-bit-code table.
Stuffing	Stuffing is to fill the remaining part in a TS packet with “0xFF”.
Section	Section
Segment	segment (“Segment” used in this chapter is different from the OFDM segment)
Tiered-charging system	Tiered-charging system is defined as the system in which viewers pay for individual program or program group that they subscribe to.
Default ES	Default ES is defined as the component and group of components presented first when a service is selected. Defined with a component tag value.
Transport stream	TS
Partial transport stream	Partial transport stream is defined as a bit stream obtained by excluding TS packets which are not related to specially selected single or some programs from a transport stream.
Flat rate-charging system	Flat rate-charging system is defined as the system in which viewers pay for service channels they subscribe to.
Broadcaster	Broadcaster is defined as a broadcaster or a collection of broadcasting companies operated under the common operation system.

Payload	payload
Pointer field	Pointer field is defined as the field that exists in the payload in a TS packet and shows a number of bytes till the first byte in the first section.
Macro code (Character coding control)	Macro code is a single code with the function to process a series of code strings that comprise codes and control codes on behalf of them.
Multi-sectionization	Multi-sectionization is to transmit a single packet with more than two section inserted in it.
Multi-view Television	A system to transmit multiple video and audio streams within a single service and to switch the video and audio components grouped together by the broadcasting station.
Locking shift (Character coding control)	Locking shift is the control that calls a collection of codes to the 8-bit-code table, and constantly keeps it in the 8-bit-code table until it is switched using another locking shit.
Hierarchical transmission	Hierarchical transmission is defined as simultaneous transmission of OFDM segment groups with different transmission path coding.
Related service	Related service is defined the service style which broadcasts programs related to each other in different multiple services.
Descriptor	descriptor
Commonly operated SI	Commonly operated SI is defined as the SI transmitted in common operation by all broadcasting companies
Emergency warning broadcasting (EWS)	Emergency Warning System is used for disaster broadcasts. The start control signal, for example, forces receiver units to receive the broadcasts.
Emergency broadcasting cut-in	Cut-in news. In emergency situations, the current program is suspended and news, etc. is transmitted.
Empty section	Empty section is defined as the section that has CRC32 after the section header and in which no descriptor is described.
Individually operated SI	Individually operated SI is defined as the SI that carries information that exceeds the defined range of Commonly operated SI unique to each broadcaster.
Call control (Character coding control)	Call control is to call G0, G1, G2 and G3 to GL and GR in the 8-bit character code control.
repetition rate	Repetition rate is a cycle at which the same table is repeatedly transmitted regardless of whether it is updated or not.
Designation control (Character coding control)	Designation control is to designate a single collection of codes from the collections of codes as G0, G1, G2 and in the 8-bit character code control.
Subtitle	Subtitle is defined as the service of superimposing related text on the video broadcast on TV.
Identifier	Identifier is defined as an id assigned keeping its uniqueness in a certain range. A value to identify an element within a table and descriptor.

Repetition Rate Group	A collection of tables transmitted at the same repetition rate. Tables are grouped by table type and the EIT[schedule] is grouped by information span layer.
Product planning	Receiver functions or actions which depend on the hardware design, the software design of the receiver planed by each manufacturer.
Transmission frequency	Repetition rate
Across-the-board program	Across-the-board program is defined as a program broadcast according to the same schedule over consecutive days.
Single shot program	Single shot program is defined as a program that is not broadcast as a series or an across-the-board program. Irregular program.
Area code	Area code is defined as the code indicating the target area placed in the Emergency Information Descriptor, during emergency warning broadcasting (ARIB STD-B10 Annex D).
Terrestrial broadcaster	Terrestrial broadcaster is defined as a collection of networks in digital terrestrial television broadcasting and is assigned for each broadcaster.
Additional symbol	Additional symbol is so called external character and additional code placed in different locations from *Kanji* and alphanumeric characters such as signs and composite glyphs.
Program extended information	Program extended information is defined as detailed information included in program information that is basically transmitted in Commonly operated SI.
Program group index	Program group index is used to provide information on grouping of programs and support series definition and search using this grouping information.
caption	Program subtitle is defined as information and service to supplement the audio with texts.
Program segment index	In-program index provides information to support selection and search of part of a program (events in a program).
Service information	SI
Superimpose	Superimpose is defined as the subtitle provided asynchronously to the main video, audio and data. It is used for up-to-the-minute news, changes in air times and time signals.
Undecided event	Undecided event is defined, as an event whose broadcast schedule has not been decided and content has not been fixed. Both start_time and duration are set to all 1.
reservation term	Reservation term are defined as fixed terms to describe a program such as “Leading performers”, “Producer” and “Synopsis”.
Special service	Special service is defined as the service temporarily broadcast in another service channel that is different from regular channel. This service is only temporarily used.

4 Coding of Character Strings

The character codes and control codes that can be used in PSI/SI are based on the 8-bit code system as specified in Part 2 of Vol.1 of “Data Coding and Transmission Specification for Digital Broadcasting” ARIB STD-B24. However, due to the nature of PSI/SI, i.e. it carries information on a program, it is assumed that there maybe cases where characters which include names of people and places and the original titles of programs need to be expressed in EPG, etc and consideration should be given to such names and titles and their rights domestically and internationally. The JIS (Japan Industrial Standard) Code level 1 and level 2 *Kanji* sets are specified for the collections of *Kanji* systems in ARIB STD-B24, but they are not sufficient enough and there have been a lot of problems even in paper media, etc., and therefore, a character set with more character types was required. In digital terrestrial television broadcasting, based on ARIB STD-B24, implementation of functions of equipment including receiver units that are not compatible with the JIS level 3 and level 4 standards (JIS X0213:2004) is specified taking into account sharedness, compatibility and scalability, and implementation of the JIS level 3 and level 4 *Kanji* sets will be a target of “Product Planning”.

In addition, because EPGs are presented for free, use of external characters that use DRCS will be inevitably complicated; therefore, it has been decided not to use them.

4.1 Character Sets

The Collections of codes are shown below. G0, G1, G2 and G3 are called to the 8-bit unit code tables (GL and GR) with call controls. In addition, with designation control, a single collection of codes is designated as G0, G1, G2 and G3 from the collections of codes.

The character sets used in SI are shown in Table 4-1.

Table 4-1 Character Sets Used in SI (Collections of Codes)

Collections of character codes	
JIS-compatible *Kanji* plane 1 (2 byte code)	See [Appendix E][*1]
JIS-compatible *Kanji* plane 2 (byte code)	See [Appendix E]
Alphanumeric characters (1 byte code)	ARIB STD-B24
Hiragana (1 byte code)	ARIB STD-B24
Katakana (1 byte code)	ARIB STD-B24
Additional symbols (2 byte code)	See [Appendix E]

*1 When JIS X0213:2004 is not used, collections of kanji systems shall be placed on JIS-compatible Kanji plane 1 because ARIB STD-B24 allows to do so even if this plane is used. Please note that additional symbols defined in Row 90 to Row 94 conventionally should not be placed on this plane.

- Collection of DRCS codes

  Not used.
- Collection of macro codes

  Not used.

4.2 Control Codes

The control codes and call controls used in each character string field within a descriptor are shown in Table 4-2 and Table 4-3. In addition, the designation controls are shown in Table 4-4.

Table 4-2 Control codes used in SI

Control code	Details
APR	Linefeed at operation position
LS1	Call collection of codes 1 (Locking shift)
LS0	Call collection of codes 0 (Locking shift)
SS2	Call collection of codes 2 (Single shift)
ESC	Extended code system
SS3	Call collection of codes 1 (Single shift)
SP	Space
MSZ	Specify middle size (1-byte) character. Please note that only alphanumeric characters (1-byte codes and 2-byte codes defined in Table 8-5 of ARIB STD-B5) and space (Row 1 Cell 1 0x2121 and 0x20) can be specified.
NSZ	Specify standard size (2-byte) character.
XCS(CSI)	Define alternate code string (*1)

*1 XCS is alternative code string definition defined as the CSI extended control code (Table 7-14, Chapter 7 of ARIB STD-B24).
Conventionally, this is used to display an alterative when DRCS can not be displayed, but when a receiver unit that is not compatible with the JIS level 3 and level 4 standards can not display a level 4 standard *Kanji* code, it displays a code string within the sequence placed immediately after it. When displayed normally, the code string from the start to the end of the definition will be ignored.
When a code other than the ones defined in Table 4-1 or level 3 and level 4 standard *Kanji* code are transmitted, an alternate code string defined with XCS is transmitted immediately after each character. Therefore, the receiver unit never displays character codes that does not support and an alternate character immediately after such a code is displayed. On the transmitting end, it returns to the original code set when it is finished.

Code sequence: CSI P1 I1 F

CSI :	09/11	(Control sequence introducer)
P1 :	03/0	Start definition
	03/1	End definition
I1 :	02/0	(Intermediate character)
F :	06/6	(Terminate character)

Table 4-3 Call Controls

		Control details		
Call control	Coding	Collection of codes	Called	Call style
LS0	00/15	G0	GL	Locking shift
LS1	00/14	G1	GL	Locking shift
LS2	ESC 06/14	G2	GL	Locking shift
LS3	ESC 06/15	G3	GL	Locking shift
LS1R	ESC 07/14	G1	GR	Locking shift
LS2R	ESC 07/13	G2	GR	Locking shift
LS3R	ESC 07/12	G3	GR	Locking shift
SS2	01/9	G2	GL	Single shift
SS3	01/13	G3	GL	Single shift

Table 4-4 Code Designation Controls

Coding	Control details	
	Collection of character codes	Designate
ESC 02/8 F	1 byte G set	G0
ESC 02/9 F		G1
ESC 02/10 F		G2
ESC 02/11 F		G3
ESC 02/4 F	2 byte G set	G0
ESC 02/4 02/9 F		G1
ESC 02/4 02/10 F		G2
ESC 02/4 02/11 F		G3

The termination codes are shown in Table 4-5.

Table 4-5 Types and F (termination codes) of collections of codes

Types of collection of codes	Collection of character codes	Termination code(F)
G set	JIS-compatible *Kanji* plane 1	03/9
	JIS-compatible *Kanji* plane 2	03/10
	Alphanumeric characters	04/10
	Hiragana	03/0
	Katakana	03/1
	Additional symbols	03/11

4.3 Initialization

Initialization of each string field within a descriptor when designating and calling codes are defined in Table 4-6. Please note that item description within the Extended Event Descriptor shall be in accordance with the following decision. When item_description_length is set to 0, it is decided that the item description of an item name with the previous descriptor_number is continuously described and the both items will not be initialized as a contiguous strings.

Table 4-6 Initialization Status of Each string Field

Designation	G0	JIS-compatible *Kanji* plane 1
	G1	Collection of alphanumeric characters
	G2	Collection of *Hiragana*
	G3	Collection of *Katakana*
Call	GL	LS0(G0)
	GR	LS2R(G2)
Character size	-	NSZ

4.4 Use of External Characters

External characters are not used.

4.5 Maximum Length of Strings

The maximum length of each string field within SI is shown in Table 4-7. Please note that two 1-byte characters are counted as one 2-byte character.

Table 4-7 Maximum Length of Each String Field within SI

Field name	Descriptor	Maximum length
Network name	Network Name Descriptor	10 2-byte characters or less and 20 bytes or less
TS name	TS Information Descriptor	10 2-byte characters or less and 20 bytes or less
Service Channel name	Service Descriptor	10 2-byte characters or less and 20 bytes or less
Program title(Note 1)	Short Event Descriptor	40 2-byte characters or less and 96 bytes or less
Program description	Short Event Descriptor	80 2-byte characters or less and 192 bytes or less
Video component description	Component Descriptor	8 2-byte characters or less and 16 bytes or less
Audio component description	Audio Component Descriptor	8 2-byte characters or less and 16 bytes or less per 1 audio type. When 2 audio types exist per 1ES, a total of 33 bytes or less with 1-byte linefeed codes inserted between voice audio type names (8 2-byte characters each).
Content description	Data Contents Descriptor	Pursuant to the description in Vol.3 “Specifications for Data Broadcasting Operations”
Series name	Series Descriptor	20 2-byte characters or less and 48 bytes or less
Component group name	Component Group Descriptor	8 2-byte characters or less and 16 bytes or less
Item name	Extended Event Descriptor	8 2-byte characters or less and 16 bytes or less
Item description	Extended Event Descriptor	220 bytes or less per 1 description and up to 2 descriptors can be allocated for one item name, and a total of 200 2-byte characters or less.

(Note 1) A program title shall include “Program Title + Program Sub-Title”, and it is strongly requested to display a name of a long program within 40 characters, but taking into account that there maybe cases where only up to 20 characters can be used due to display limitations, etc. the transmitting end should make arrangements such as putting titles on the order of precedence. In addition, a name of a program that is 30 minutes or less should be displayed in 20 characters or less as a rule.

5 Definition of Tables/Descriptors

In PSI and SI, each broadcaster transmits signals in compliance with ARIB STD-B10 overlapped with transport streams that are their broadcasting signals. In this document, ARIB STD-B10 and MPEG-2 Systems (ITU-T H.222.0, ISO/IEC 13818-1:Hereinafter, referred to as “ISO/IEC 13818-1”) are referred to.

5.1 Types and Identification of Tables

In digital terrestrial television broadcasting, the following tables are used for Program Specific Information (PSI) and Service Information (SI).

The following tables specified in ministerial ordinances are used for PSI, which are also described in 4.1 of Part 1 of ARIB STD-B10. Table 5-1 lists PSI tables.

Table 5-1 PSI Tables Used in Digital Terrestrial Television Broadcasting

Table Name	Functional Overview
PAT (Program Association Table)	Specifies the PID of the TS packet that carries PMT related to each program.
CAT (Conditional Access Table)	Specifies the PID of the TS packet that carries information related to chargeable broadcasting and content protection programs.
PMT (Program Map Table)	Specifies the PID of the TS packet that carries coded signals for each program.
NIT (Network Information Table)	Carries information to relate transmission path information and broadcasting programs such as modulating frequencies.

The SI tables are described in 4.1 of Part 1 of ARIB STD-B10, and among those tables, the ones used in these provisions are shown in Table 5-2.

Table 5-2 SI Tables Used in Digital Terrestrial Television Broadcasting (Ones specified in ARIB STD-B10)

Table Name	Functional Overview
BIT (Broadcaster Information Table)	Specifies SI transmission parameters etc related to Commonly operated SI and individually operated SI for each broadcaster.
SDT (Service Description Table)	Carries service channel related information such as service channel names and broadcaster names.
EIT (Event Information Table)	Specifies program related information such as program titles, air dates and times and brief program descriptions.
TOT (Time Offset Table)	Specifies the current date and time, and the time difference between the actual time and the displayed time when the summer time starts.
ST (Stuffing Table)	Invalidate tables.

* In digital terrestrial television broadcasting, the TDT, RST, NBIT and LDT are not transmitted.
* For the BAT, LIT, ERT, ITT and PCAT, when a possibility of using them in the future arises, their information will be revised in relevant provision documents.

In digital terrestrial television broadcasting, other than SI tables, tables specified in ARIB STD-B21 are used. Table 5-3 is a list of those tables.

Table 5-3 Tables Used in Digital Terrestrial Television Broadcasting (Other Than SI tables)

Table Name	Functional Overview
SDTT (Software Download Trigger Table)	Designates notice information regarding downloaded software, such as service IDs, schedule information and types of receiver units to be updated. See Vol.1 for the details.
CDT (Common Data Table)	Carries downloaded data in a section style table. In digital terrestrial television broadcasting, only service logo data is used, at the moment.

Furthermore, PID values of transport stream packets that carry PSI/SI sections are shown in Table 5-4.

Table 5-4 Assignment of PID Values to PSI/SI

PID	Table
0x0000	PAT
Indirect specification with PAT*1	PMT
0x0001	CAT
0x0010	NIT, ST
0x0011	SDT, ST
0x0012,0x0026,0x0027	EIT*2, ST
0x0014	TOT, ST
0x0023,0x0028	SDTT
0x0024	BIT
0x0029	CDT

*1 Fixed values are used for PMT PID values for services available in the partial reception layer.

*2 Up to 3 types of PID values are used for Digital Terrestrial Television Broadcasting EITs in hierarchical transmission. For details, see section 13.9.

Among values specified in 5.2 of Part 1 of ARIB STD-B10, the ones shown in Table 5-5 below should be used for values assigned to identify PSI/SI Tables used in digital terrestrial television broadcasting (table_id).

Table 5-5 Assignment of table_id Values

table_id	Table
0x00	PAT
0x01	CAT
0x02	PMT
0x40	NIT
0x42	SDT
0x4E	EIT[p/f]
0x50-0x57	EIT[schedule basic]
0x58-0x5F	EIT[schedule extended]
0x72	ST
0x73	TOT
0xC4	BIT
0xC3	SDTT
0xC8	CDT

* For more information on the types of EIT[schedule], please see Chapter 10 and 13.

5.2 Types and Identification of Descriptors

With regard to descriptors used in PSI and SI, among the ones specified in announcements and ones specified in 4.2 of Part 1 of ARIB STD-B10, the ones shown in Table 5-6 below should be used.

Table 5-6 Descriptors Used in Digital Terrestrial Television Broadcasting[*1,*2]

Descriptor Name	Functional Overview
Conditional Access Descriptor	Describes the Conditional Access System and the PID that carries its ECM/EMM (Shows information on EMM when placed in the CAT, and information on ECM when placed in the PMT).
Network Name Descriptor	Describes the network name.
Service List Descriptor	Describes the list of service channels and their identification.
Stuffing Descriptor	Ensures descriptor space and invalidate descriptors.
Service Descriptor	Describes the service channel name and its broadcaster name.
Linkage Descriptor	Describes the linkage to another service channel name
Short Event Descriptor	Describes the program title and brief explanation of the program.
Extended Event Descriptor	Describes detailed information on a program
Component Descriptor	Describes the type of a video component and its Explanation etc.
Stream Identifier Descriptor	Describes identification of each component.
Content Descriptor	Describes the program genre
Local Time Offset Descriptor	Describes the time difference between the actual time (UTC + 9 hours) and the displayed time when the summer time starts.
Digital Copy Control Descriptor	Describes information that controls the copy generation in a digital recorder and its maximum transmission rate.
Audio Component Descriptor	Describes audio-component related parameter.
Data Contents Descriptor	Describes detailed information on data contents.
Video Decode Control Descriptor	Used to control the video decoding when the video coding system is switched within the same service_id, and to identify whether still pictures are being transmitted.
Download Content Descriptor	Describes attribute information such as size, type and download ID of content to be downloaded. Descriptor specified in ARIB STD-B21.
CA Contract Info Descriptor	Describes a type of conditional access service for a scheduled program (Tiered/Flat/PPV[*3]) and availability of viewing/recording.
CA Service Descriptor	Describes the broadcaster that provides a service when displaying an automatic display message.
TS Information Descriptor	Describes various additional information on the relevant TS.

Descriptor Name	Functional Overview
Extended Broadcaster Descriptor	Specifies the terrestrial broadcaster ID and affiliate ID for a terrestrial broadcaster.
Logo Transmission Descriptor	Specifies correspondence between a service ID and logo ID or a simple logo string.
Series Descriptor	Describes information on a series across multiple events.
Event Group Descriptor	Describes information on grouping of events with the same content at Event Common, and on links for event relay.
SI Parameter Descriptor	Describes the SI transmission parameter (Repetition Rate Group or re-transmission cycle, etc).
Component Group Descriptor	Describes the component group in Multi-view Television (MVTV).
Content Availability Descriptor	Describes information related to program recording and output control.
Terrestrial Delivery System Descriptor	Describes physical conditions for terrestrial transmission path
Partial Reception Descriptor	Describes the service identifier that is transmitted in the partial reception layer of the terrestrial transmission path.
Emergency Information Descriptor	Describes information necessary as an emergency warning signal and its functions.
Data Component Descriptor	Identifies the data coding system
System Management Descriptor	Identifies whether the relevant network is broadcasting or non-broadcasting.

*1 Among descriptors specified in ARIB STD-B10, Copyright Descriptor, Country Availability Descriptor, NVOD Reference Descriptor, Time Shifted Service Descriptor, Time Shifted Event Descriptor, Parental Rating Descriptor, Mosaic Descriptor, CA Identifier Descriptor, Partial Transport Stream Descriptor, Network Identification Descriptor, Partial Transport Stream Time Descriptor, SI Prime TS Descriptor, Board Information Descriptor, LDT Linkage Descriptor, Connected Transmission Descriptor, Broadcaster Name Descriptor, Target Region Descriptor, CA_EMM_TS Descriptor, Hierarchical Transmission Descriptor and Hyperlink Descriptor should not be used.

*2 Descriptors that are not included in Table 5-6 shall be revised in relevant provision documents when a possibility of using them in the future arises.

*3 In digital terrestrial television broadcasting, PPV will not be used when the broadcasting service starts in 2003.

Tag values (descriptor tag) assigned to descriptors shall be in accordance with the provisions in Section 5.3 of Part 1 of ARIB STD-B10. See Table 5-7.

Table 5-7 Assignment of tag values to descriptors

Tag Values	Descriptor Name
0x09	Conditional Access Descriptor
0x40	Network Name Descriptor
0x41	Service List Descriptor
0x42	Stuffing Descriptor
0x48	Service Descriptor
0x4A	Linkage Descriptor
0x4D	Short Event Descriptor
0x4E	Extended Event Descriptor
0x50	Component Descriptor)
0x52	Stream Identifier Descriptor
0x54	Content Descriptor
0x58	Local Time Offset Descriptor
0xC1	Digital Copy Control Descriptor
0xC4	Audio Component Descriptor
0xC7	Data Contents Descriptor
0xC8	Video Decode Control Descriptor
0xC9	Download Content Descriptor (Note 1)
0xCB	CA Contract Info Descriptor Note 2)
0xCC	CA Service Descriptor Note2)
0xCD	TS Information Descriptor
0xCE	Extended Broadcaster Descriptor
0xCF	Logo Transmission Descriptor
0xD5	Series Descriptor
0xD6	Event Group Descriptor
0xD7	SI Parameter Descriptor
0xD9	Component Group Descriptor
0xDE	Content Availability Descriptor
0xFA	Terrestrial Delivery System Descriptor
0xFB	Partial Reception Descriptor
0xFC	Emergency Information Descriptor
0xFD	Data Component Descriptor
0xFE	System Management Descriptor

Note 1: Descriptor specified in ARIB STD-B21

Note 2: Descriptors specified in ARIB STD-B25

5.3 Use of Identifiers

Assignment of various types of identifiers (uniqueness) is shown in Table 5-8.

Table 5-8 Use of Identifiers

Identifier	Use (Uniqueness)
system_management_id	Describes 0x0301 in digital terrestrial television broadcasting.
network_id	Assigned to a single master transmitter in digital terrestrial television broadcasting. Unique within Japan.
transport_stream_id	Assigned to TSs. Used with the same value as the one of network_id in digital terrestrial television broadcasting.
service_id(=program_number)	Assigned to each service channel. Assigned so that it is unique within all digital terrestrial television broadcasting TSs in Japan (Engineering service excluded).
event_id	Assigned to each event. Unique within a service. For the uniqueness of assignment of this identifier regarding time direction, see Section 8.2.1.
broadcaster_id	broadcaster_id in the BIT in digital terrestrial television broadcasting should not be used as a fixed value (0xFF).
terrestrial_broadcaster_id	Specified within the Extended Broadcaster Descriptor. Assigned to a terrestrial broadcaster uniquely within Japan.
affiliation_id	Specified within the Extended Broadcaster Descriptor. affiliation_id is used to show an affiliation of a digital terrestrial television broadcaster. Possible not to assign this ID to a terrestrial television broadcaster (station which does not belong to any affiliation) or to assign it to more than one ID (Cross net).
logo_id	Assigned to a service logo. Possible to share a single logo with more than one service ID. logo_id is unique within a network.
series_id	Assigned to a program series. Unique within a service group that belongs to the same media type with the same terrestrial_broadcaster_id within the Extended Broadcaster Descriptor.
component_tag	Assigned to each ES (component). Unique within a service. For the use of component_tag, see Chapter 14.
PID	Assigned uniquely within a TS. Please note that a fixed PID value is assigned to PSI/SI other than ones in the PMT (see Table 5-4).

6 Use of Items Common To All Tables

6.1 Use of version_number

version_number is assigned independently to each sub-table. In other words, sections that have the same table_id and table_id_extension within a TS should be assigned the same version_number, and different version_numbers should not be assigned to ones with the same table_id and table_id_extension.

version_number is usually incremented by 1 when updated/changed. However, it is sometimes incremented by 2 or a larger number due to special circumstances such as equipment failures. Additionally, the version may be updated even though the content has not been changed due to special circumstances such as equipment failures.

6.2 Use of current_next_indicator

current_next_indicator in all the tables should be set to ‘1’ and transmitted. A table with this value set to ‘0’ should not be transmitted.

If a table with this value set to ‘0’ is transmitted, this table will be invalid on the receiving end.

6.3 Use of running_status

running_status in the SDT and the EIT should be set to reserved (0x0) and transmitted.

If it is transmitted with a value other than reserved (0x0), the receiving end will regard this value as 0x0 and process it accordingly.

6.4 Use of reserved and reserved_future_use items

‘1’ should be set to all the bits.

The receiving end should ignore it regardless of the value in this item.

6.5 Scrambling

In digital terrestrial television broadcasting, all the tables defined in these provisions should not be scrambled.

7 Change of SI information

Each broadcaster can change SI information optionally as needed. However, the following points should be taken into cosideration because improper change of information that has been transmitted may confuse viewers.

- Basically, information related to recording control and viewing control in the EIT should not be changed once it has been defined because the recording function may have some trouble if the status of the receiver unit is defined between at programming and broadcasting.
- Basically, information related to recording control and reception control in the SDT should not be changed because it is used in conjunction with the EIT. When it is changed, it has to be changed so that information after change is consistent with information in the EIT.
- It should be avoided to change information that can help viewers understand the content of a program such as program title and program description as much as possible once it has been defined.

8 Definition of Services/Events

8.1 Definition Of Services and Service Types

A service is so called service channel and defined as “a series of programs that can be broadcast as part of the schedule and is organized by each broadcaster” (Section 3.1 of ARIB STD-B10).

A service is considered to have been defined when service_id is described in the Service List Descriptor in the NIT. Additionally, a service described in the Service List Descriptor in the NIT should be always described in the SDT (Engineering service excluded). Therefore, if a service that is described in the Service List Descriptor in the NIT and at the same time, it does not exist in the SDT, such a service can be considered being deleted or added in the transition period. Please note that such a service should be a channel selection target.

Furthermore, it is possible to transmit a program for which service is not defined in the NIT, in which case, a program that has not been defined in the NIT has been entered in the PAT. This program is not considered to be a channel selection target.

One service_type should always be assigned to each service in order to show its type. In digital terrestrial television broadcasting, the following service_types are used.

- Digital TV service
  Digital TV service is defined as the service, which contains at least one video stream whose stream_type is set to “0x02” and which is primarily designed for the listening and viewing of video streams. This service always enables stable reception of programs even on receivers not equipped with the function to receive data broadcasting.
- Data service
  Data service is defined as the service, which contains at least one data carousel whose stream_type is set to “0x0D” and which is primarily designed for real-time listening and viewing of data contents.*
- Special service (special video service/ special data service)
  Special service (special video service and special data service) is defined as the service, which was prepared for broadcasting at irregular times on different channels from those of regular service channels. This service is not used during regular operation and no prior notification is given to viewers regarding this service.
- Engineering service
  Engineering service is defined as the software maintenance service for receiver units. More specifically, the service includes fixing bugs, solving transmission related problems,

* Data carousel may not be included in some cases when the partial reception layer contains a simple movie stream with stream_type="0x1B"

correcting problems arising from the difference in the interpretation of operation among receiver units, improving the display, accelerating response and improving operability. The service also includes updating logo data of broadcasting companies, the program genre code table, program characteristic code table and reservation term commonly applied to all receiver units. For more information, see Vol.1.

- Bookmark list data service
  Bookmark list data service is defined as the service for displaying the bookmark information recorded in NVRAM of receiver units. For more information, see Vol.3.

8.2 Definition of Events

An event is defined as “a collection of broadcasting data streams with a preset starting and ending time within the same service and is a single program such as news and drama. It can be a feature in a program where necessary for operational reasons (from Section 3.1 of ARIB STD-B10). Since there is not a definition of a “program”, what sort of event should be defined for the program content is left to the discretion of each broadcaster.

An event is considered to have been set up when event_id appears in the event loop of an EIT. In digital terrestrial television broadcasting, multiple EITs for both Commonly operated SI and individually operated SI exist, and even when one of these EITs is described, an event becomes valid.

- The basic concept on event set up is shown below.
  - During a service suspension, there is no need to set up an event. Therefore, all events when a digital TV broadcasting service is provided should contain at least one video stream whose stream_type is set to “0x02” and voice stream whose stream_type = “0x0F”.
  - While test waves are being transmitted, a component exists but an event does not have to be set up.
  - More than one event with the same time slot cannot be set up within the same service.
  - The maximum number of events in a day is 96 events/service.
  - Duration time for which an event can be set up is between 48 hours and 1 minute. However, the minimum duration time can be less than 1 minute when it is inevitable. In such a case, it is desirable to organize events so that the minimum duration times are maintained as much as possible by incorporating an event of which duration time is less than one minute with previous or next events or by setting up such a period as a period in which events do not exist to enable receiving units to record programmed programs.

- In digital terrestrial television broadcasting, organization of events is often changed due to unexpected events and accidents (Refer to Chapter 19 “Event schedule change”). In other words, digital terrestrial television broadcasting is premised on changeable program scheduling. Changes include changes in start_time and duration of an event and an event becoming undecided. When organization of events is fixed, the decision should be reflected into the EIT promptly but organization of events could stay unconfirmed for a long period of time depending on the situation.

- When setting up an event, the following points should be taken into consideration.

  Setting up an event means not only defining a channel and the time for broadcasting and assigning event_id but also setting up the “content of the program to be broadcast”. When you look at this from a viewer’s standpoint, an event is the content of a program itself that can be assumed from the program title and description. Therefore, it should be avoided as much as possible to broadcast a program with a different content with the event_id unchanged.

  However, how each broadcasting station assigns events should be decided by each broadcaster according to their basic policy on the definition and setting of events (e.g. when the same sort of movie is broadcast without changing the event_id in the regular movie slot).

8.2.1 Reuse of event_id (uniqueness of time direction)

With regard to event_id described in the EIT being transmitted, the same value should not be assigned to another event within the same service. Additionally, even when an event_id value that had been assigned to an event disappears from the EIT because the event was broadcast and ended or canceled, so the description of the event disappeared, the same value should not be assigned to another event and described in the EIT within 24hours from the event ending time that can be worked out from the start_time and duration of the event that had been described in the EIT (When the start_time and duration of a previous event was changed due to fluid organization, etc, the latest ending time among all the ending times – all the descriptions before, after and during the change) (This does not mean that it will be ok as long as events whose event_id values are the same are 24 hours or more apart from each other. In the EIT that is being transmitted, more than one event with the same event_id should not exits).

Explanation:

The same event_id value cannot be assigned to two events within the service because event_id itself is unique within the service_id. However, after an event has been broadcast, and its ending time is passed, the event_id value that was assigned to the event disappears

from the EIT and after a certain period of time, the same value can be assigned to another event. However, if the same value is assigned to another event immediately after it disappeared from the EIT, it will be quite difficult to see on the receiving end whether the schedule of event was slightly changed or the event was ended. Especially, if an event to which an event_id value had been assigned was canceled and this same value is re-used after a short while, that will cause programmed programs not to be recorded properly. To prevent such cases, it was decided to make regulations.

Actual examples are shown below.

[Case 1]

Suppose that event_id = 0x0010, start_time = August 20 19:00, duration = 1 hour were assigned to Event A and described in the EIT[schedule] on August 13th. If everything goes smoothly, a program of Event A will start at 19:00 on August 20th and end 1 hour later, which is at 20:00. At this ending time, the description of Event A will disappear from both EIT[p/f] and EIT[schedule]. After the description disappears, if event_id = 0x0010 which was used for Event A is assigned to Event B, Event B will be described in the EIT after 20:00 on August 21st or later because it is prohibited to describe within 24hours after the ending time of Event A. The point here is that it will be possible to describe Event B only after 20:00 on August 21st regardless of the start-time and duration of Event B.

[Case 2]

Same as the Case 1. When Event A was not broadcast and it had disappeared from the EIT[schedule] 4 days earlier, which is on August 16th, Event B whose event_id is the same as Event A cannot be described in the EIT till 20:00 on August 21st, which is exactly the same time as the Case 1 because in both cases, it is based on the scheduled ending time of Event A.

[Case 3]

Same as Case 1, if the start_time and the duration of Event A were changed due to flexible organization, etc and change was made to the EIT, the time at which it is allowed to describe Event B whose event_id value is the same as Event A in the EIT will be worked out based on the latest ending time among all the ending times – before, after and including changes at the middle if various changes have been done. For example, if changes are made to Event A as below,

start_time = August 20th 19:00, duration = 1 hour

↓

start_time = August 20th 20:00,duration = 2 hour

↓

start_time = August 20th 20:00, duration = 1 hour

the latest ending time of the event will be"start_time = August 20th 20:00 and duration = 2hours". Actually, Event A will end at 21:00 on August 20th but it is at 22:00 on August 21st or later, which is 24hours after 22:00 on August 20th, when Event B can be described in the EIT.

9 Digital Terrestrial Television Broadcasting Transmission Models and Terrestrial Broadcaster

9.1 Network Unit

In digital terrestrial television broadcasting, a single network is specified for a single master transmitter. As described in ARIB STD-B10, a network is defined as a collection of multiplexed MPEG-2 TS' transmitted by a single delivery system, but in digital terrestrial television broadcasting, single TS is specified per network. This is because grouping networks by a unit which is larger than a master transmitter (service territory or affiliation, etc) will require a system to collect and distribute information on all TSs, which would be difficult to realize as each area or station starts digital terrestrial television broadcasting service at different times. Furthermore, if grouping networks by a unit that is smaller than a master transmitter (by transmitting station etc), there will be problems such as that the NIT should be updated at relay stations in addition SFN cannot be used.

An example of a TS structure in a network in digital terrestrial television broadcasting is shown in Figure 9-1.

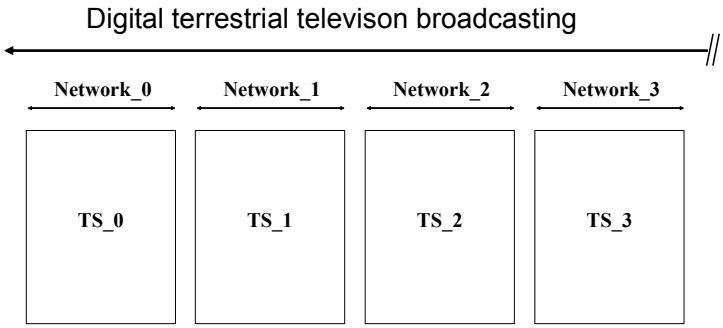


Figure 9-1 Example of a TS structure in a network

A network is identified with network_id that is assigned to each master transmitter for digital terrestrial television broadcasting. A single network is capable of transmitting single TS only.

When focusing attention on a certain network, this network is called "Actual network" and the relevant TS is called "Actual TS" (actual_TS). Additionally, networks other than this "Actual network" are called "other networks" and TSs other than this "Actual TS" are called "other TSs" (other_TS)

9.2 Media Types

Similarly to BS digital broadcasting, a concept of "Media Type" which puts together more

than one service_type is introduced also in digital terrestrial television broadcasting . In addition, also in digital terrestrial television broadcasting, SI (EIT) can be transmitted differently for each service_type (See Section 13.6). Because it is not desirable to define another group each time a new service_type is introduced in the future, operating groups which put together more than one service_type are setup.

Table 9-1 shows media types and service_type's supported by each media type, and which service_type is used in digital terrestrial television broadcasting.

Table 9-1 Media types and supported service_type

Media Type (media_type)		Supported service_type		Use in digital terrestrial television broadcasting
Value	Meaning	Value	Meaning	
'01'	TV type	0x01	Digital TV service	Use
		0xA1	Special video service	Use
'10'	Audio type	0x02	Digital audio service	Not use
		0xA2	Special audio service	Not use
'11'	Data type	0xC0	Data service	Use
		0xA3	Special data service	Use
		0xA4	Engineering service	Use
		0xAA	Bookmark list data service	Use

Note) In the future, new service_type may be added, in which case, their use will be specified separately. Even if a new service_type is used in BS digital broadcasting or broadband digital broadcasting, its provisions for operation in digital terrestrial television broadcasting will not always be exactly the same as the ones in BS digital broadcasting or broadband digital broadcasting.

Every service_type should belong to one media type only and when a new service_type is added, it will be supported by either of the three media types in the above table. Because information in the above table will not be transmitted as a parameter, SI information for the service identified by the newly added service_type cannot be received and processed by a receiving unit that does not know the service_type. Because it is assumed that if a receiver unit does not know a certain service_type, it will not access the service identified by it including channel selection, so there will be no problem if SI related to this service cannot be received and processed. In digital terrestrial television broadcasting, two media types are used.

Receiver units which were developed after a certain service_type had been added and know the relation between the service_type and its supporting media type, so they can receive and process SI related to this service. Please note that a relation between a media type and a service type that has been defined once cannot be changed.

In digital terrestrial television broadcasting, each network always has more than one service whose media type is "TV type".

This concept of “Media Type” was introduced giving strong consideration to the presentation of program information or channel selection by receiver units. Thus, receiver units are capable of using either one of the above media type when processing information for each media (TV/data). On the other hand, when a new service_type is defined, it should be assigned to one of the media types considering which media the new service_type is.

9.3 Use of Terrestrial Broadcasters

A terrestrial broadcaster is a unit to group networks (TSs) in digital terrestrial television broadcasting. In networks grouped by terrestrial broadcaster, SI is used commonly for each media type (TV type/data type).

A terrestrial broadcaster is assigned to each broadcaster and is identified by terrestrial_broadcaster_id that is Extended Broadcaster Descriptor in the BIT described later in this document. In digital terrestrial television broadcasting, the concept of broadcaster in BS digital broadcasting does not exist and broadcaster_id that exits as an area in the BIT is assigned a fixed value (0xFF) and has no meaning.

With a terrestrial broadcaster, one or more than one network/TS can be used. In addition, services that belong to different media types can be used with a terrestrial broadcaster.

An example of relations between terrestrial broadcasters, networks and TSs are shown in Table 9-2.

Table 9-2 Example of Relations between Terrestrial Broadcasters, Networks and TSs

Terrestrial_ Broadcaster	media_type		Network	TS
	TV	Data		
T_Broadcaster_0	service	service	Network_0	TS_0
T_Broadcaster_1	service	service	Network_1	TS_1
T_Broadcaster_2	service		Network_2	TS_2
T_Broadcaster_3	service	service	Network_3	TS_3
T_Broadcaster_4	service	service	Network_4 / 5	TS_4 / TS_5

In the example shown in Table 9-2, T_Broadcaster_0, _1, _2 and_3 are terrestrial broadcasters for services for TV type among the two media types which are TV type and Data type, and different networks and TSs are assigned to each broadcaster. 2 networks and 2 TSs are assigned to T_Broadcaster_4.

In BS digital broadcasting, more than one broadcaster existed in a single network, on the other hand, in digital terrestrial television broadcasting, more than one terrestrial broadcaster never exists in a single network as terrestrial broadcaster is a unit to group networks.

Individually operated SI is operated in the same way by each broadcaster for each media

type within a terrestrial broadcaster. Therefore, in networks that belong to the same terrestrial broadcaster, SI is operated in the same way for each media type. This means that values of each-station applied transmission parameter in Individually operated SI described later in the document are equal within the same terrestrial broadcaster.

Broadcasting companies can perform series and event relay for each media type within a terrestrial broadcaster. When series is performed, as the uniqueness of series_id is kept within a terrestrial broadcaster, it is possible to identify the same series even in different networks within the same terrestrial broadcaster. In addition, with regard to event relay, it may be performed across networks within the same terrestrial broadcaster; in which case, the event relay source and event relay destination are linked using SI enabling smooth service reception within the terrestrial broadcaster.

Furthermore, broadcasters (broadcaster_id) for BS digital broadcasting or broadband CS digital broadcasting can be specified for each terrestrial broadcaster as needed. This enables referring to the dedicated area for digital terrestrial television broadcaster affiliations in NVRAM in the data broadcasting contents of the specified broadcaster. For dedicated area for digital terrestrial television broadcaster affiliations, see Section 9.4 in this volume or Vol.3.

Because terrestrial broadcasters are used for grouping broadcasting companies when operating SI, it is possible to provide receiving units with a terrestrial broadcaster-conscious reception selection function to viewers. In addition, it is also possible to provide a broadcaster-conscious reception selection function for each media type.

The image of the relations between terrestrial broadcasters and networks/TSs in the Table 9-2 is shown in Figure 9-2. Additionally, the image of terrestrial broadcasters and media types are shown in Figure 9-3.

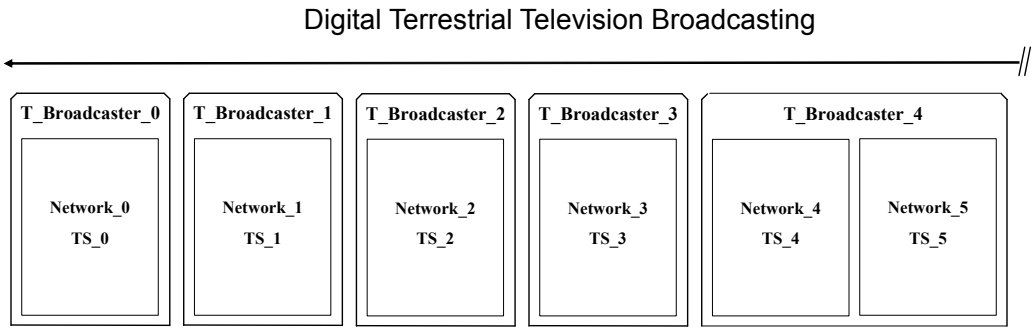


Figure 9-2 Terrestrial Broadcasters and Networks/TSs

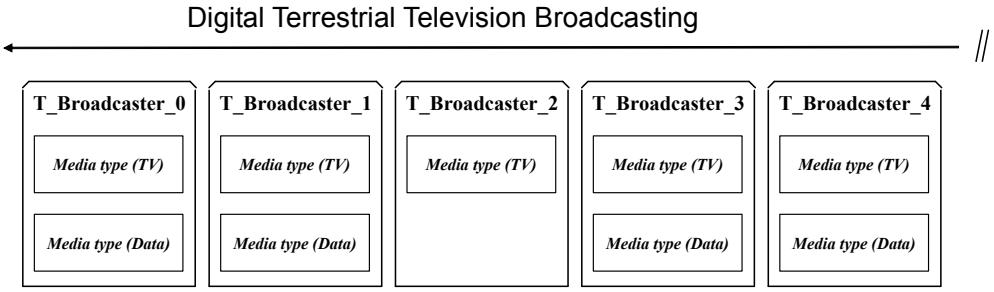


Figure 9-3 Terrestrial Broadcasters and Media Types

Services used in a terrestrial broadcaster are grouped by media type. The relation between services and media types used in a terrestrial broadcaster is shown in Figure 9-4.

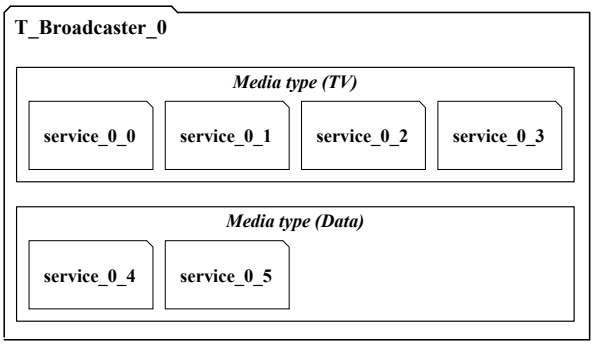


Figure 9-4 Relations between Services and Media Types Used in a Terrestrial Broadcaster

An event is defined for a program within a service. According to ARIB STD-B10, an event is defined as a collection of broadcasting data streams with a preset starting and ending time within the same service. An example of events within services is shown in Figure 9-5.

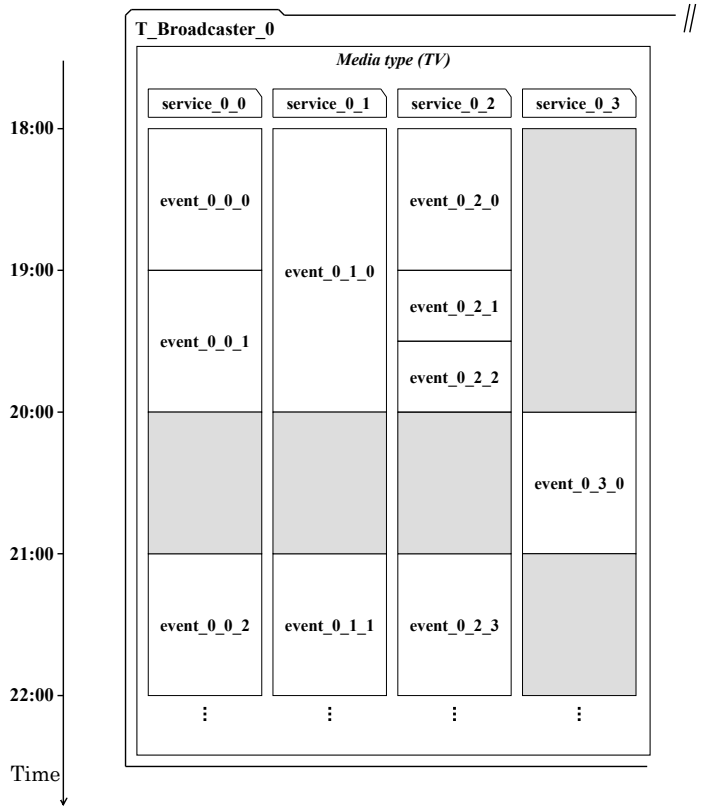


Figure 9-5 Events within a Terrestrial Broadcaster

An event is identified with event_id uniquely assigned within a service. An event that is being transmitted at a certain time is called “present event” and the event that will be transmitted next is called “following event”. For example, between 18:00 and 19:00 in the above figure, the present event in service_0_0 is event_0_0_0 and the following event is event_0_0_1.

According to the Appendix of ARIB STD-B10, only one present event can exist at any time, which means that more than one event is never used within a single service at the same time.

In addition, there are cases where events do not exist within a service, in other words, no present event or following event exist. For example, between 20:00 and 21:00 in the above figure, a present event in service_0_0 does not exist and the following event is event_0_0_2.

In services of a single media type used in a terrestrial broadcaster, when events exist in different services at different times as shown in Figure 9-5, it is possible to have receiving units provide the information presentation function and program selection function for each terrestrial broadcaster. In addition, it is possible to process linkage between services in a single media type such as event relay within a terrestrial broadcaster.

When more than one network exists within a terrestrial broadcaster, these networks usually have the same service area within the terrestrial broadcaster, but sometimes they do not. Figure 9-6 shows the relations between terrestrial broadcasters, networks and service areas in such a case.

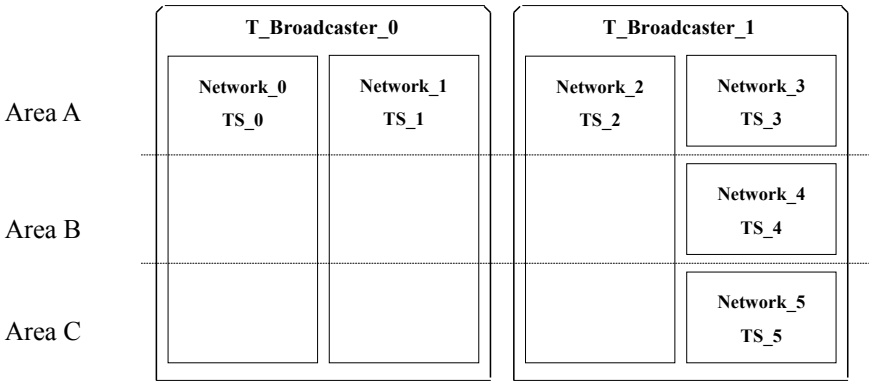


Figure9-6 Example where networks with different service areas exist within a terrestrial broadcaster

In the example shown in Figure 9-6, the two networks in T_Broadcaster_0 have the same service areas. Four networks exist in T_Broadcaster_1 and in Network_2, services are provided in the Areas A, B and C, and the service areas for Network_3, 4 and 5 are areas A, B and C only respectively. In either case, Series or Event Relay can be performed within the same media type in the terrestrial broadcaster, provided only between networks with the same service area in the terrestrial broadcaster. In other words, in the example of Figure 9-6, Event Relay can be performed between Network_2 and Netowrk_3 in T_Broadcaster_1, but not between Network_3 and Network_4. For more information, see Section 24.3.

9.4 Grouping of terrestrial broadcasters

A terrestrial broadcaster can belong to one or more than one group (affiliation of a broadcaster in digital terrestrial television broadcasting), and such groups can be identified with affiliation_id (affiliation id), which is described in the Extended Broadcaster Descriptor of the BIT. There are cases where a broadcaster does not belong to any affiliation, in which case, affiliation_id is not specified.

A terrestrial broadcaster that belongs to an affiliation can manage and operate the NVRAM area (dedicated area for digital terrestrial television broadcaster affiliations) in data broadcasting for the affiliation it belongs to. Furthremore, when services are received across more than one area (mobile receiver unit, etc), with a receiver unit which is capable of continually receiving services within terrestrial broadcasters of the same affiliate, it is possible to identify services from the same affiliate based on the affiliate identification information.

The relations between terrestrial broadcasters and affiliations are shown in Table 9-3. In addition, the image of the relations between terrestrial broadcasters and affiliations in Table 9-3 is shown in Figure 9-7.

Table9-3 Example of Relations between Terrestrial Broadcasters and Affiliations

	Terrestrial_Broadcaster	Network	Affiliation
Area A	T_Broadcaster_0	Network_0	Affiliation_0
	T_Broadcaster_1	Network_1	Affiliation_1
	T_Broadcaster_2	Network_2	Affiliation_2
	T_Broadcaster_3	Network_3 / 4	Affiliation_3
	T_Broadcaster_4	Network_5	-
Area B	T_Broadcaster_5	Network_6	Affiliation_0
	T_Broadcaster_6	Network_7	Affiliation_1 / 2
	T_Broadcaster_7	Network_8 / 9	Affiliation_3
	T_Broadcaster_8	Network_10	-

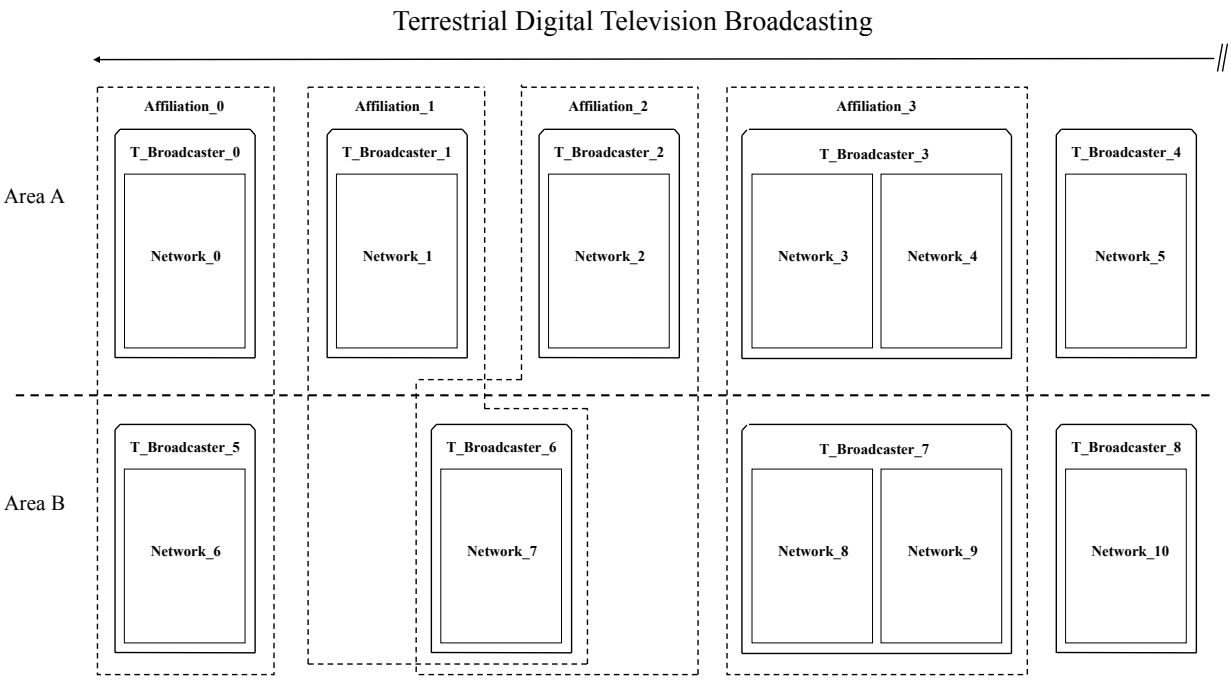


Figure 9-7 Terrestrial Broadcasters and Affiliations

In the example shown in Table 9-3, Area A and Area B are two different areas and different broadcasting companies providing services in each area. T_Broadcaster_0 to T_Broadcaster_4 and T_Broadcaster_5 to T_Broadcaster_8 exist in Area A and B respectively. T_Broadcaster_0 and T_Broadcaster_5 are broadcasters that belong to the same affiliation (Affiliation_0). T_Broadcaster_6 belongs to two affiliations, which are Affiliation_1 and Affiliation_2. Two networks are assigned to T_Broadcaster_3 and

T_Broadcaster_7 respectively and they both belong to the same affiliation (Affiliation_3). T_Broadcaster_4 and T_Broadcaster_8 do not belong to any affiliation.

When receiving services across multiple areas, a mobile receiver unit which is capable of presenting services in broadcasters of the same affiliate can presents services from broadcasting companies in the same affiliate to viewers by presenting services in terrestrial broadcasters with the same affiliation id value. In Figure 9-7, a service in T_Broadcaster_0 is presented in Area A, and when the receiver moves to Area B, T_Broadcaster_5 can be identified as a broadcaster in the same affiliate as the T_Broadcaster_0. On the other hand, when the receiver moves to Area A from Area B where a service in T_Broadcaster_6 was presented, because T_Broadcaster_6 belongs to both Affiliation_1 and Affiliation_2, two terrestrial broadcasters with the same affiliate id as the one in the source area will exist in the target area. In this case, the affiliate id that was described first among the Extended Broadcaster Descriptors in the BIT is identified as the major affiliate id (primary affiliate id). The concept of primary affiliate id is applied to all terrestrial broadcasters that belong to more than one affiliate. Therefore, a broadcaster that belongs to more than one affiliate needs to decide an order of description of affiliate id's among the Extended Broadcaster Descriptors giving consideration to this concept.

In addition, even within the same terrestrial broadcaster, each network may have different primary affiliate ids.

10 Commonly operated SI and Individually operated SI

10.1 Overview of Commonly operated SI and Individually operated SI

In digital terrestrial television broadcasting, only information of own station is carried in TSs of own station. However, each broadcaster transmits different types and amount of information, which will cause problems in terms of stable operation of receiver units when processing information and convenience of viewers.

Therefore, “Commonly operated SI” which is transmitted in common operation and “Individually operated SI” which can be transmitted in operation unique to each broadcaster is prepared.

[Commonly operated SI]

All broadcasting companies should give consideration to stable operation of receiver units when processing information and convenience of viewers, and transmit minimum information required to be transmitted as SI in operation which is common to all broadcasting companies. This SI is defined as “Commonly operated SI”.

Common operation is performed for the following items regarding programs transmitted as Commonly operated SI.

- Tables, delivering level of descriptors (See Sections 10.2 and 10.3)
- Range of each Repetition Rate Group, repetition rate of each repetition rate group (See sections 12.3 and 12.4)
- Data amount

Although there is no provision to follow regarding data amount, estimated values for data amount assumed to be stored in a receiver unit is shown in Appendix D. When SI is expected to be stored in a receiver unit, the amount of data that a receiver unit is capable of storing should not exceed much these values.

When a broadcaster that provides digital terrestrial television broadcasting services transmits Commonly operated SI, they should determine information on a target program before transmission.

As a rule, common operation IS should be transmitted by all broadcasting companies. However, there may be a possibility that it would be difficult for some broadcasting companies to transmit SI at the start of providing digital terrestrial television broadcasting services for convenience of equipment maintenance.

Even in that case, SI should be transmitted meeting the following conditions at least.

- NIT/SDT/BIT/TOT should be transmitted.
- EIT_present_following_flag, EIT_schedule_flag and EIT type delivering flag (H-EIT_flag, M-EIT_flag, L-EIT_flag) in the SDT should be correctly added for each service according to the actual operations.

[Individually operated SI]

As there is a limit to the amount of data in service information transmitted in Commonly operated SI, the description should be kept to minimum. On the other hand, broadcasting companies can transmit information which exceeds the defined range of Commonly operated SI regarding services they provide, in SI within the operational band in operation unique to individual broadcaster. This SI is defined as individually operated SI.

In individually operated SI, the followings can be described.

(1) Additional information on a program a part of which information is described in Commonly operated SI in the IT for basic delivering EIT type (*).
(2) Information on a program within 32days after the Commonly operated SI description period has passed in the EIT for basic delivering EIT type.
(3) Information on a program in the Extended delivering EIT type (*).

* For the definitions of Basic delivering EIT type and Extended delivering EIT type, see Chapter 13.

The Types and amount of individually operated SI transmitted by each broadcaster can be operated freely within the defined range. However, if the same broadcaster frequently changes such information to be transmitted as the broadcasting situation changes, that will affect the stable operation of receiver units as well as confuse viewers. Therefore, it is essential for each broadcaster to stably operate individually operated SI.

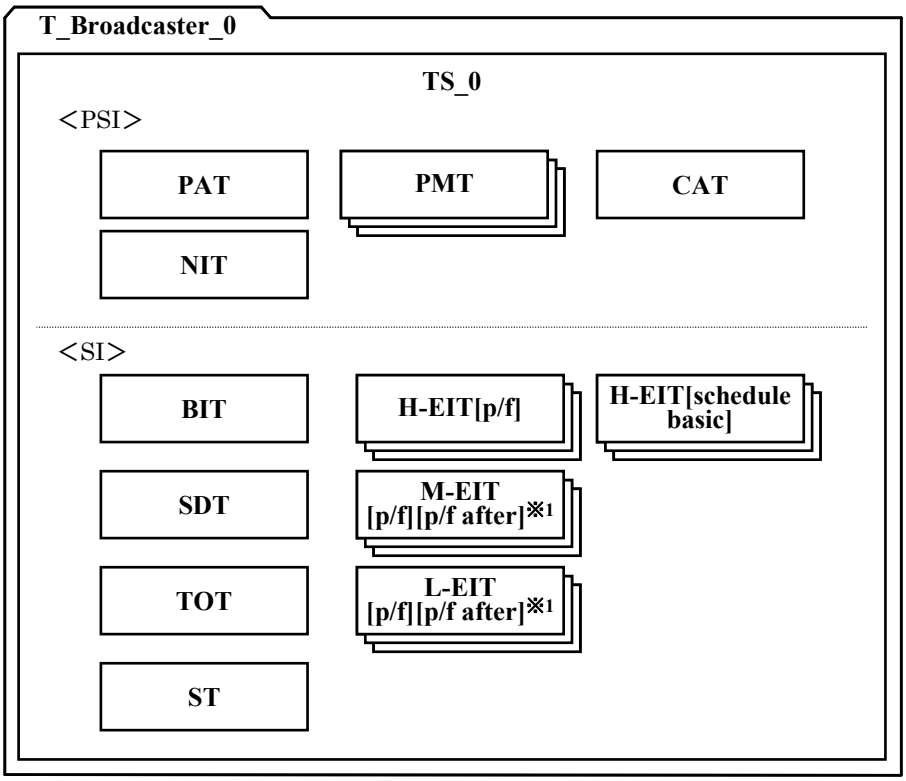
It is assumed that the types and amount of information transmitted between broadcasting companies will be different. Additionally, broadcasting companies can transmit TSs at diffident SI Table transmission cycles, and therefore, it is assumed that each TS may have different transmission cycles. Information described differently depending on received TS and service and different transmission transmission cycles, similarly to the above, may affect stable operation of receiver units and convenience of viewers. It is required to make efforts to enable receiver units to smoothly provide the above information as well as the transmitting end to operate individually operated SI stably.

When information on the same program is described in both Commonly operated SI and individually operated SI, each broadcaster should describe the information so that there will be no inconsistency. In addition, when a program is described in individually operated SI and after a certain period of time, it is described in Commonly operated SI, the information should be described so that there will be no inconsistency.

10.2 Tables and Descriptors Used in PSI and Commonly operated SI

The tables used in PSI and common operations SI are shown in Figure 10-1.

Please note that in Figure 10-1, with regard to the H-EIT/M-EIT/L-EIT, only Basic delivering EIT type are used in Commonly operated SI.



*1 p/f after in the M-EIT / L-EIT is transmitted when the number of events transmitted as Commonly operated SI is greater than 2.

Figure 10-1 Tables Used in PSI and Commonly operated SI

The tables transmitted in PSI and Commonly operated SI are shown in Table 10-1. Also, the descriptors placed in tables that are transmitted in PSI and Commonly operated SI are shown in Table 10-2.

- Tables transmitted in Commonly operated SI are NIT, BIT, TOT, SDT and EIT.
- Only one NIT is described for each network in digital terrestrial television broadcasting.
- The BIT is described regarding a terrestrial broadcaster and only one BIT is described for each network in digital terrestrial television broadcasting.
- The TOT is the table in which time information is described and transmitted in each TS.
- The SDT is the table described regarding a service provided in digital terrestrial television broadcasting and only one sub-table of the actual TS is transmitted. In digital terrestrial television broadcasting, other networks and tables and sub-tables of other TSs are not transmitted.

- The EIT is the table described regarding an event included in a service provided in digital terrestrial television broadcasting and a sub-table of a service of actual TS is transmitted for the number of times the service is applied. Similarly to the SDT, other networks, table of other TS services and sub-tables are not transmmitted.

Furthermore, table_ids in the table of information on the present event and following event (EIT[p/f]) and the table of information on an event which is scheduled to be transmitted for a certain period of time (EIT[schedule]) are different. Additionally, the 0x4E Table includes three types of EITs with different information amount and PIDs, i.e. H-EIT, M-EIT and L-EIT, which are for display on fixed receiver units, mobile receiver units and portable receiver units respectively. .

In the M-EIT and L-EIT, when the number of events transmitted as Commonly operated SI is greater than 2, the EIT[p/f after] in which information on events after the following event is described and transmitted. This is described in the section 2 or later in the same table as the EIT[p/f] and has the same PID and table_id (For more information, see Chapter 13 “EIT Transmission”).

It is assumed that period of an event described in the EIT[schedule] may be different depending on media type. Please note that if the media type is the same, the period of event described in a TS will be the same.

Table 10-1 Tables Transmitted in PSI and Commonly operated SI

Table_id	Table	Delivering level
0x00	PAT	Always
0x01	CAT	As needed
0x02	PMT	Always
0x40	NIT	Always
0x42	SDT	Always
0xC4	BIT	Always
0x4E	H-EIT[p/f], M-EIT[p/f], L-EIT[p/f]	Always(Note 1)
0x4E	M-EIT[p/f after], L-EIT[p/f after]	As needed(Note 2)
0x50-0x57	H-EIT[schedule basic]	Always(Note 3)
0x58-0x5F	H-EIT[schedule extended]	Not
0x73	TOT	Always
0x72	ST	As needed

Delivering level: Always... Always transmitted
As needed… Transmitted as needed
Not… Not transmitted

(Note1) Basic delivering EIT type is always transmitted.

(Note 2) The EIT[p/f after] is transmitted when the number of events transmitted as Commonly operated SI is greater than 2. The number of events transmitted as Commonly operated SI is specified with a parameter described with the SI Parameter Descriptor in the first loop of the BIT (All-station applied transmission parameter).

(Note3) The range of description as Commonly operated SI is specified with a parameter described with SI Parameter Descriptor in the first loop of the BIT(All-station applied transmission parameter) for each media type (D1 to D3 in Chapter 12, schedule_range field in SI Parameter Descriptor).

Table 10-2 Descriptors Placed in Tables Which are Transmitted in PSI and Commonly operated SI

Table_id	Table	Descriptor	Delivering level
0x01	CAT	Conditional Access Descriptor	A(Note2)
		CA Service Descriptor	N(Note2)
0x02	PMT (First loop)	Conditional Access Descriptor	N(Note2)
		Digital Copy Control Descriptor	N
		Emergency Information Descriptor	N
		Content Availability Descriptor	N
	PMT (Second loop)	Conditional Access Descriptor	N(Note2)
		Stream Identifier Descriptor	A
		Digital Copy Control Descriptor	N
		Video Decode Control Descriptor	N(Note1)
		Data Component Descriptor	N
0x40	NIT (First loop)	Network Name Descriptor	A
		System Management Descriptor	A
	NIT (Second loop)	Service List Descriptor	A
		Terrestrial Delivery System Descriptor	A
		TS Information Descriptor	A
		Partial Reception Descriptor	N
0x42	SDT	Service Descriptor	A
		Digital Copy Control Descriptor	N
		CA Contract Info Descriptor	N(Note2)
		Logo Transmission Descriptor	N
		Linkage Descriptor	N
0xC4	BIT (First loop)	SI Parameter Descriptor	A(Note2)
	BIT (Second loop)	Extended Broadcaster Descriptor	A
		SI Parameter Descriptor	N(Note2)
0x4E	H-EIT[p/f]	Short Event Descriptor	A
		Component Descriptor	A(Note3)
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		Audio Component Descriptor	A(Note3)
		Data Contents Descriptor	N(Note2)
		CA Contract Info Descriptor	N(Note2)
		Event Group Descriptor	N(Note2)
		Component Group Descriptor	N
		Series Descriptor	N
		Extended Event Descriptor	N(Note2)

(Table 10-2 Continued)

Table_id	Table	Descriptor	Delivering level
0x4E	M-EIT[p/f] M-EIT[p/f after]	Short Event Descriptor	A
		Component Descriptor	A(Note3)
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		Audio Component Descriptor	A(Note3)
		Data Contents Descriptor	N(Note2)
		CA Contract Info Descriptor	N(Note2)
		Event Group Descriptor	N(Note2)
		Component Group Descriptor	N
		Series Descriptor	N
0x4E	L-EIT[p/f] L-EIT[p/f after]	Short Event Descriptor	A
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		CA Contract Info Descriptor	N(Note2)
0x50-0x57	H-EIT[schedule basic]	Short Event Descriptor	A
		Component Descriptor	A(Note3)
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		Audio Component Descriptor	A(Note3)
		Data Contents Descriptor	N(Note2)
		CA Contract Info Descriptor	N(Note2)
		Event Group Descriptor	N(Note2)
		Component Group Descriptor	N
		Series Descriptor	N
0x73	TOT	Local Time Offset Descriptor	N

Delivering level: A… Always placed

N… Placed as needed

(Note1) May be not placed depending on media type.
In addition, not placed for a service in the partial reception layer

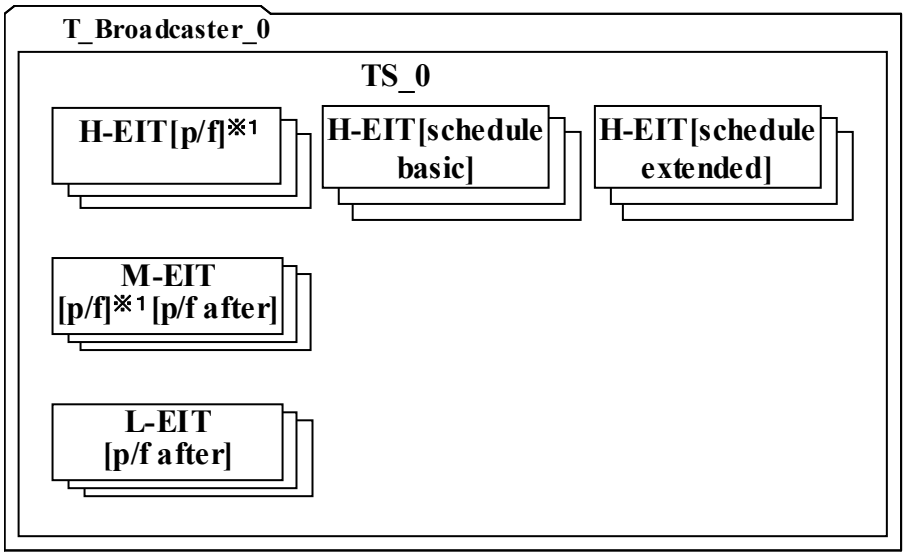
(Note 2) More than one can be placed in the same loop.

(Note 3) At least one should be inserted for a service of TV media type.

* Stuffing Descriptors are placed as needed.

10.3 Tables and Descriptors used in Individually operated SI

The overview of the tables used in individually operated SI is shown in Figure 10-2.



*1 Used in individually operated SI when it is an Extended delivering EIT type.

Figure 10-2 Tables Used in Individually operated SI

SI transmitted in individually operated SI include:

(1) Additional information on a program a part of which information is described in Commonly operated SI in the EIT for basic delivering EIT type (*).

(2) Information on a program within 32days after the Commonly operated SI description period has passed in the EIT for basic delivering EIT type.

(3) Information on a program in the Extended delivering EIT type (*).

* For the definition of Basic delivering EIT type and Extended delivering EIT type, see Chapter 13

With regard to (1), the information should be described so that its content will not be inconsistent with the one in the Commonly operated SI. Furthermore, the information in (2) should be described so that its content will not be inconsistent with the one in the Commonly operated SI as well as only fixed content should be described so that there will be no inconsistency in the contents when it becomes an event which is described in Commonly operated SI after a certain period of time passes, and also uncertain information, i.e. information whose content is not fixed and which is predicted to be changed as time passes should not be described. As for (3), the information should be described so that its content will not be inconsistent with the content described in the EIT for basic delivering EIT type.

The tables transmitted in individually operated SI and delivering levels are shown in Table10-3.

Furthermore, the descriptors placed in the tables transmitted in individually operated SI are shown in Table 10-4.

Table 10-3 Tables Transmitted in Individually operated SI

Table_id	Table	Delivering level
0x4E	H-EIT[p/f], M-EIT[p/f]	N(Note1)
0x4E	M-EIT[p/f after], L-EIT[p/f after]	N(Note2)
0x50-0x57	H-EIT[schedule basic]	N(Note2)
0x58-0x5F	H-EIT[schedule extended]	N(Note2)

Delivering level: A : Always transmitted
N : Transmitted as needed

(Note1) Extended delivering EIT type only.

(Note2) The description range is specified with a parameter described with the SI Parameter Descriptor in the second loop of the BIT (Each-station applied transmission parameter) for each media type. Please note that for the M-EIT and L-EIT, the range of description is specified across media types (D4 to D9 in Chapter 12, schedule_range field in SI Parameter Descriptor).

Table 10-4 Descriptors Placed in Tables Transmitted in Individually operated SI

Table_id	Table	Descriptor	Delivering level
0x4E	H-EIT[p/f]	Short Event Descriptor	A
		Component Descriptor	A(Note1)
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		Audio Component Descriptor	A(Note1)
		Data Contents Descriptor	N(Note2)
		CA Contract Info Descriptor	N(Note2)
		Event Group Descriptor	N(Note 2)
		Component Group Descriptor	N
		Series Descriptor	N
		Extended Event Descriptor	N(Note 2)
0x4E	M-EIT[p/f] M-EIT[p/f after]	Short Event Descriptor	A
		Component Descriptor	A(Note1)
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		Audio Component Descriptor	A(Note1)
		Data Contents Descriptor	N(Note2)
		CA Contract Info Descriptor	N(Note2)
		Event Group Descriptor	N(Note2)
		Component Group Descriptor	N
		Series Descriptor	N
0x4E	L-EIT[p/f after]	Short Event Descriptor	A
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		CA Contract Info Descriptor	N(Note2)
0x50-0x57	H-EIT[schedule basic]	Short Event Descriptor	A
		Component Descriptor	A(Note1)
		Content Descriptor	N
		Digital Copy Control Descriptor	N
		Audio Component Descriptor	A(Note1)
		Data Contents Descriptor	N(Note2)
		CA Contract Info Descriptor	N(Note2)
		Event Group Descriptor	N(Note2)
		Component Group Descriptor	N
		Series Descriptor	N
0x58-0x5F	H-EIT[schedule extended]	Extended Event Descriptor	N(Note2)

Delivering level: A : Always placed
N : Placed as needed

(Note 1) At least one should be inserted for a service of the TV media type.

(Note 2) More than one can be placed in the same loop

* Stuffing Descriptors are placed as needed

10.4 All-station/Each-Station applied transmission parameter

For a Commonly operated SI parameter, a value that is commonly used in digital terrestrial television is assigned in the first loop of the BIT. This is called All-station applied transmission parameter.

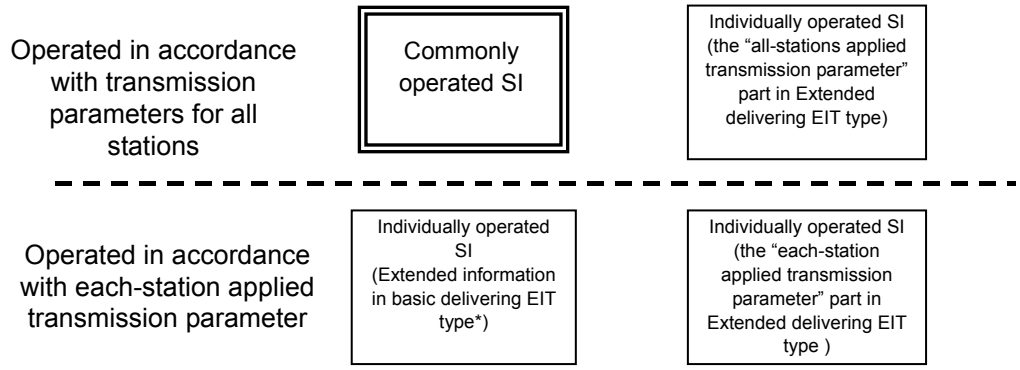
On the other hand, among three types of individually operated SI, extended information in Basic delivering EIT type can be operated uniquely by each broadcaster, and the parameter is described in the second loop of the BIT. This is called each-station applied transmission parameter.

* Extended information is either

1) Additional information regarding on an event that is described in the Commonly operated SI.
2) Information regarding on an event, which is not described in the Commonly operated SI.

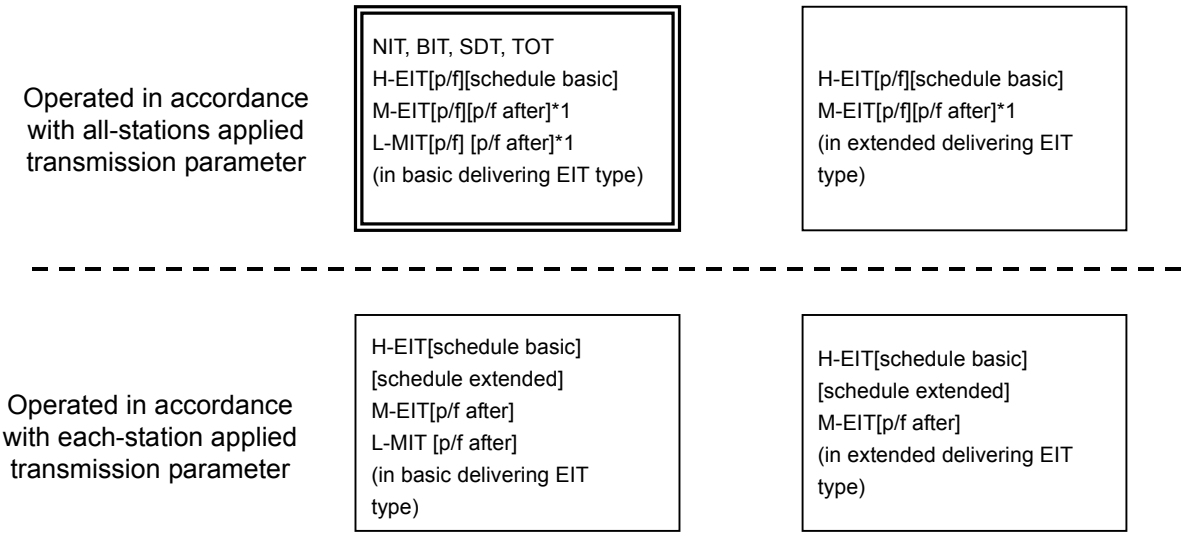
Additionally, Extended delivering EIT type is operated in accordance with All-station applied transmission parameter/each-station specified for each EIT type.

The relations between Commonly operated SI/individually operated SI and All-station applied transmission parameter/each station are shown in Figure 10-3. The relations between each part in Figure 10-3 and SI tables are shown in Figure 10-4.



* Extended information =
(1) Additional information on events which are described in common operation SI.
(2) Information on events which are not described in common operation SI.

Figure 10-3 Relations between Commonly operated SI/Individually operated SI and All-station applied transmission parameter/Each-Station



*1 p/f after in the M-EIT/L-EIT is transmitted when the number of events transmitted as common operation SI is greater than 2.

Figure 10-4 Relations between Tables Transmitted in Commonly operated SI/Individually operated SI and All-station applied transmission parameter/Each Station

(Reference) Differences between All-station SI and Each-station SI in BS digital broadcasting

In BS digital broadcasting, SI information of own and other stations is shared via collection/distribution centers and information on all services including ones of other stations is transmitted as all-station SI in order to enable receiver units to obtain SI on all services without interfering with reception of programs by viewers.
Also in digital terrestrial television broadcasting, it is desirable to transmit information on all services as all-station SI, but due to the reasons below, all-station SI, i.e. SI on all services (including ones of other stations) is not transmitted, and only SI on services of own station is transmitted.

- ○ It is difficult to define the range of all-station SI because stations from which receivers can receive information change depending on various conditions such as location of receiver units.
- ○ It is difficult to build a collection/distribution center in each region.
- ○ Because the bandwidth per TS is narrower in digital terrestrial television broadcasting than in BS digital broadcasting, it is difficult to ensure SI transmission band for services of other stations.

However, similarly to BS digital broadcasting, it is desired to display current event listing for all stations also in digital terrestrial television broadcasting. Therefore, it is required to make efforts to design receiver units which can display current event listing for all stations, for example, by collecting SI transmitted in TSs from all broadcasting companies that can be received while waiting and storing collected information within the receiver units.

However, in some cases, SI may have to be obtained while viewing programs, in which case, pausing the reception of videos/audio should be allowed as long as the user can start to obtain SI at her/his will.

11 TS-Packetization and Transmission Rules

This chapter describes the rules to be followed when sections in PSI and SI are TS-packetized and transmitted.

11.1 Detailed Rules for Placement of Sections in TS Packets

Sections should be inserted directly into a transport stream packet. Because the start of the first section in the payload in a transport stream packet is specified in a pointer field, a section does not have to begin from the start of the payload in the transport stream packet. The standard does not allow having spaces between sections in a transport stream packet; thus, the start of a section can be specified by counting the lengths of the first and subsequent sections. Therefore, only one pointer field is allowed in a transport stream packet.

In a transport stream packet with a single PID value, a section should start after the previous section ends. Otherwise, the section header to which the data belongs cannot be identified. If a section ends before a transport stream packet does and it is not convenient to start another section, the stuffing function is used to fill the space.

Stuffing is performed by filling the remaining bytes in a transport stream packet with “0xFF”. Therefore, the “0xFF” value should not be used for table identification. If a byte that is immediately after the last byte in a section is “0xFF”, the remaining bytes in the transport stream packet should be filled with “0xFF”. These bytes can be discarded in the decoder. Stuffing can be also performed using the adaptation filed function.

For the detailed method and function, see ISO/IEC 13818-1, especially Section 2.4.4 and Annex C.

The above was quoted from 5.1.2 of Part 2 of ARIB STD-B10. The above rules should be applied also in digital terrestrial television broadcasting. Furthermore, the following rules should be followed.

[Transmission Operating Rule]

- A section header should not be described across multiple TS packets.
  A section header is the first 8 bytes in a section defined by the MPEG2 Extended Section Format but an SI section has a section header that is extended uniquely for each table. A section can be placed immediately after the last byte in the previous section in a TS packet, but it is not allowed to describe a section across multiple TS packets including extended section header.

The following table shows section header lengths of PSI/SI tables.

Table 11-1 Section Header Lengths (bytes) of PSI/SI Tables

PAT	PMT	CAT	NIT	BIT	SDT	EIT*	SDTT	CDT	TOT
8	8	8	8	8	11	14	15	13	10

*This includes the H-EIT, M-EIT and L-EIT.

For example, when an EIT sections is placed in a TS packet and there are less than 14 bytes remained in the TS packet, another section should not be placed and stuffing should be performed for this 14byte remaining area.

11.1.1 Multisection Transmission

There are times when more than one section is inserted in a single packet. This transmission style is called “Multisection Transmission”. Multisection transmission itself is a transmission method defined in the MPEG system standard, as it is clear from a method to identify the start of another section is described in the above packetization rules. However, it should be clearly described as special processing maybe needed in receiver units.

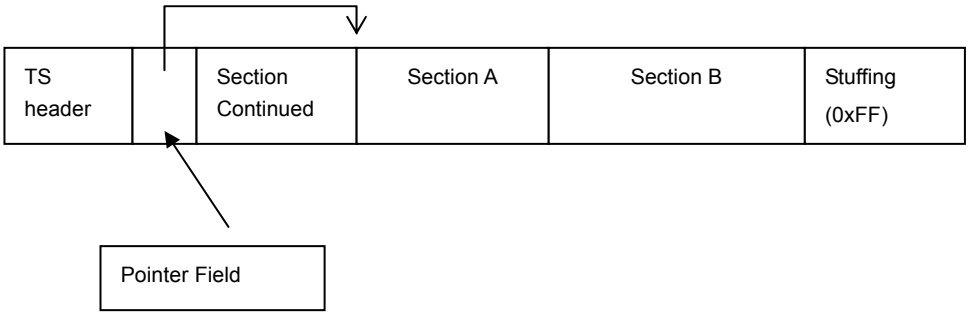


Figure 11-1 Example of Placement of Sections in a TS Packet at Multisection Transmission

Based on the above, the following rules should be followed.

[Transmission Operating Rule]

- Tables that can be transmitted in the multisection transmission method are the PMT, NIT, BIT, SDT, EIT, SDTT, CDT and TOT. Please note that the PAT and CAT cannot be transmitted in the multisection transmission method because their sub-tables do not have multiple sections.
- Even at multisection transmission, the general rules for paketization described above should be followed. Such rules include “A pointer filed specifies the first section header in a TS packet”, “No space should exist between the end of a section and the start of the next section” and “A section header should not be described across multiple TSs”. Additionally, stuffing may be performed for the ending as needed.
- The maximum number of sections that can be inserted in a single TS packet at multisection transmission is 10 (please note that in the PMT, the maximum number of programs to which

the same PID can be assigned is 4 (see Section 30.1.1), thus, the maximum number of sections that can be inserted in a single TS packet is 4).

- Multisection transmission can be performed for each repetition rate group optionally. For details of repetition rate groups, see Section 12.3.
- Multisectionization cannot be done across multiple repetition rate groups.
- Up to 4KB of sections in the same sub-table can be placed in a TS packet uninterruptedly, for example, linking “present” and “following” in the EIT[p/f] or segments in the EIT[schedule]. According with this, in digital terrestrial television broadcasting, there should not be spaces of 25ms or larger between sections in the same sub-table when transmitted. For details of the transmission rules that were established for the purpose of stable reception processing by receiver units, see Section 11.2.

11.2 Details of TS Packet Transmission

To enable stable reception of data in sections in PSI/SI, TS packets are transmitted in accordance with the following transmission rules.

[Transmission Operating Rule]

(1) When sections are carried, the maximum number of TS packets that can be transmitted uninterruptedly with the same PID is 6. This is a rule that should be applied when all TS packets in a transport stream, including video and audio, are multiplexed, and is valid regardless of the bandwidth of a transport stream.

(2) A TS packet that carries all SI sections should be transmitted at 1Mbit or less per any one second, which is a total value of SI in each table that exists in all the transmission layers in the same transport stream. To be more specific, SI sections here mean the NIT, BIT, SDT, EIT, TOT, SDTT, CDT and ST.

(3) A TS packet with the same PID that carries PSI sections should be transmitted at 320kbit or less per any one second.

(4) When sections are carried, a TS packet with the same PID is transmitted within the range of 4KB±100% per 32ms. This rule of “4KB per 32ms” was established to define furthermore the “1Mbit per 1 second” for each PID. This rule presents a section reception model based on this standard. In other words, a 4KB reception buffer per PID and the processing speed that enables processing a maximum of 4KB section data that was received within 32ms are required. Additionally, “4KB±100%” means that up to 8KB can be transmitted (when considering that the above rule (2) is guaranteed to be followed at the same time, it is obvious this “transmission of up to 8KB” is only a temporarily possibility). More than one piece of PSI and SI data is usually required to be received and processed at the same time, but taking into consideration the reception model shown above will enable setup of reception according to the capability of each receiver unit.

In digital terrestrial television broadcasting, the delivering standard regarding TS packets that carry PSI/SI tables includes only 4 rules described above. Receiver units should be designed so that they will have no failures (at least, when processing reception at the TS packet level) as long as TS packets are transmitted according to these 4 rules.

11.3 Continuity Counter

The Continuity Counter is usually incremented by 1 but not during system failures, in which case, the counter is incremented irregularly, although it rarely happens. Receiver units should be deigned assuming such a situation.

12 Table (Section) Transmission

This chapter describes transmission of tables (sections) in details.

In Sections 12.1 and 12.2, general rules for section structures are explained and in Section 12.3 and later, the rules for transmission at the table (section) level are described in details focusing on the concept of cycles.

12.1 Division of Sections

When an SI section is divided, the following rules should be applied.

[Transmission Operating Rule]

- Sections within a sub-table is placed in order starting from section number 0 and all sections till the section with the last section number should exist. However, this rule is not applied to the H-EIT[schedule]. In the H-EIT[schedule], all segments exist but with regard to sections that comprise a segment, only necessary ones are described. Please note that the section length of each section within sub-tables is variable.
- Sub-tables of the PAT, PMT and CAT are not divided into multiple sections. In other words, 0 is always set to section_number field and last_section_number field. Additionally, sub-tables of the NIT and BIT can be divided into multiple sections but only section whose section_number is set to 0 contains the first descriptor loop and other sections are divided with 0 assigned as the descriptor loop length.
- When a table includes a loop such as descriptor loop, a section is not divided in the middle of a loop. For example, in the EIT, a section can be divided between loops that includes event_id field.

12.2 Placement of Descriptors in Sections

When descriptors are placed in PSI/SI sections, the following rules are applied.

Basically, the order of placement of descriptors within a descriptor loop can be determined optionally. However, in the following cases, the placement rules are applied.

[Transmission Operating Rule]

- When the same descriptor is placed more than once, they should be placed uninterruptedly.
- Stream Identifier Descriptor placed in the PMT should be placed at the start of a descriptor loop.
- When more than one Extended Event Descriptor is placed in the EIT, they should be placed in order of descriptor number. No descriptor number should be missed. Descriptor numbers always start from 0x0 in a descriptor loop of the EIT.

12.3 Definition of a Repetition Rate Group and Re-Transmission Cycle

A repetition rate group is a collection of information transmitted at the same repetition rate within each PSI/SI table. Usually, a repetition rate group is setup for each PID value and table_id value, but special operation is performed only for the EITs (H-EIT[schedule] and M-EIT, L-EIT). For the concept of repetition rate group setup regarding the EITs, see the decription in Section 13.14.

repetition rate can be setup for each repetition rate group (excluding the PMT: See Section 12.3.1), and multisectionizaion is also done for each repetition rate group (for the relation between multsectionization units and repetition rate groups, see Section 11.1.1).

repetition rate defined for each repetition rate group are for each whole repetition rate group. On the other hand, a cycle at which individual section is re-transmitted does not exactly consistent with the re-transmission cycle for the whole repetition rate group. See the description in Section 12.6 for details.

A re-transmission cycle for a repetition rate group can be changed as service structures change. However, Repetition rate for the PSI tables (PAT, PMT, CAT) are not changed. See the description in Section 12.4 for details.

When the amount of data changes, some adjustments may be made to Repetition rate (only when it is unavoidable). See the description in Section 12.5 for details.

Please note that in reception processing, adjustments to Repetition rate are different from changes to Repetition rate.

In the following sections, operation of repetition rate groups in digital terrestrial television broadcasting is described.

12.3.1 PSI Repetition Rate Group

With regard to the PSI tables, repetition rate groups are setup for each PID value and table_id. However, with regard to PMT cycles (for services other than engineering service), only two types of cycles can be set up depending on whether it is the PMT for partial reception service or not, regardless of the repetition rate group.

12.3.2 Repetition Rate Groups of All-station applied Transmission Parameter

The repetition rate groups of All-station applied transmission parameter and the meaning of each parameter (transmission range) are shown in Tables12-1 and 12-2 respectively.

Table 12-1 Repetition Rate Groups of All-station applied Transmission Parameter

<table>
<tr><th colspan="4">Repetition Rate Group Unit</th><th>Parameter (Transmission range)</th></tr>
<tr><td colspan="4">NIT</td><td>-</td></tr>
<tr><td colspan="4">BIT</td><td>-</td></tr>
<tr><td colspan="4">SDT</td><td>-</td></tr>
<tr><td rowspan="6">H-EIT</td><td colspan="3">H-EIT[p/f]</td><td>-</td></tr>
<tr><td rowspan="5">H-EIT[schedule basic]</td><td rowspan="3">TV Type</td><td>Basic Repetition rate group</td><td>D1 (Day)</td></tr>
<tr><td>Extended Repetition rate group 1</td><td>S1 (Segment)</td></tr>
<tr><td>Extended Repetition rate group 2</td><td>S2 (Segment)</td></tr>
<tr><td rowspan="2">Data Type</td><td>Basic Repetition rate group</td><td>D3 (Day)</td></tr>
<tr><td>Extended Repetition rate group</td><td>S4 (Segment)</td></tr>
<tr><td colspan="4">M-EIT</td><td>EM1 (Program)</td></tr>
<tr><td colspan="4">L-EIT</td><td>EL1 (Program)</td></tr>
<tr><td colspan="4">TOT</td><td>-</td></tr>
</table>

(Note) “TV Type” and “Data Type” in the above Table are media types.
In Digital Terrestrial Television Broadcasting, services for the audio media type are not used.
Taking into account consistency with other media (BS, CS, etc), parameter names for the audio media type (D2,S3,D5,D8,S6) are not used.
For media types, see Section 9.2.
Also, for the definition of repetition rate groups in the EITs, see Section 13.14.

Table12-2 Meaning of Each Parameter (Transmission Range) of Repetition Rate Groups of All-station applied Transmission Parameter

Parameter	Meaning
D1	Represents the number of days (starting from the current day) for which the “transmission parameters for all station” part in the-EIT[schedule basic] for a TV type service is transmitted.
D3	Represents the number of days (starting from the current day) for which the “transmission parameters for all station” part in the H-EIT[schedule basic] for a data type service is transmitted.
S1	Represents the number of segments within the range of extended repetition rate group 1 in the “All-station applied transmission parameter” part the in the H-EIT[schedule basic] for a TV type service. S1 pieces of segments including the segment for the current time is the range of extended repetition rate group 1.

S2	Represents the number of segments within the range of extended repetition rate group 2 in the “All-station applied transmission parameter” part in the H-EIT[schedule basic] for a TV type service. S 2 pieces of segments starting from the segment immediately after the last segment in extended repetition rate group 1 is the range of extended repetition rate group 2.
S4	Represents the number of segments within the range of extended repetition rate group in the “All-station applied transmission parameter” part the in the H-EIT[schedule basic] for a data type service. S4 pieces of segments including the segment for the current time is the range of extended repetition rate group.
EM1	Represents the number of programs transmitted (starting from the present event) in the “All-station applied transmission parameter” part in the M-EIT.
EL1	Represents the number of programs transmitted (starting from the present event) in the “All-station applied transmission parameter” part in the L-EIT.

12.3.3 Repetition Rate Groups of Each-station applied Transmission Parameter

The repetition rate groups of Each-station applied transmission parameter and the meaning of each parameter (transmission range) are shown in Tables12-3 and 12-4 respectively.

Table 12-3 Repetition Rate Groups of Each-station applied Transmission Parameter

Repetition Rate Group Unit				Parameter (Transmission range)
H-EIT	H-EIT[schedule basic]	TV Type		D4 (Day)
		Data Type		D6 (Day)
	H-EIT [schedule extended]	TV Type	Basic Repetition rate group	D7 (Day)
			Extended Repetition rate group	S5 (Segment)
		Data Type	Basic Repetition rate group	D9 (Day)
			Extended Repetition rate group	S7 (Segment)
M-EIT				EM2 (Program)
L-EIT				EL2 (Program)
SDTT				-
CDT				-

Table 12-4 Meaning of Each Parameter (Transmission Range) of Repetition Rate Groups of Each-station applied Transmission Parameter

Parameter	Meaning
D4	Represents the number of days (starting from the current day) for which the “Each-station applied transmission parameter” part in the H-EIT[schedule basic] for a TV type service is transmitted.
D6	Represents the number of days (starting from the current day) for which the “Each-station applied transmission parameter” part in the H-EIT[schedule basic] for a data type service is transmitted.
D7	Represents the number of days (starting from the current day) for which the H-EIT[schedule extended] for a TV type service is transmitted.
D9	Represents the number of days (starting from the current day) for which the H-EIT[schedule extended] for a data type service is transmitted.
S5	Represents the number of segments within the range of extended repetition rate group in the H-EIT[schedule extended] for a TV type service. S5 pieces of segments including the segment for the current time is the range of extended repetition rate group.
S7	Represents the number of segments within the range of extended repetition rate group in the H-EIT[schedule extended] for a data type service. “S7 pieces of segments including the segment for the current time is the range of extended repetition rate group.
EM2	Represents the number of programs transmitted (starting from the present event) in the “Each-station applied transmission parameter” part in the M-EIT.
EL2	Represents the number of programs transmitted (starting from the present event) in the “Each-station applied transmission parameter” part in the L-EIT.

12.4 Change of Cycles and Default Repetiton Rate

Repetition rate for each repetition rate group and spans of All-station applied transmission parameter may be reviewed in the future. In addition, Each-station applied transmission parameter can be changed for each terrestrial broadcaster according to their own transmission band (very rarely). Assuming such a case, a re-transmission cycle for each repetition rate group is currently transmitted in the form of SI data (SI Parameter Descriptor in the BIT).

In the sections below, ranges of cycle changes in each repetition rate group for PSI/SI and default re-transmission cycle values are described. A range of cycle change is assigned to each repetition rate group, and transmission within this range for each repetition rate group is mandatory and will be in the future. Additionally, a default re-transmission cycle is a re-transmission cycle established as of now assuming the initial stage of Digital Terrestrial Television Broadcasting in parameters for all stations.

Furthermore, transmission parameters for the SDTT and CDT are specified as Each-station applied transmission parameter in order to show whether the table is transmitted or not (if it is,

"table_id" of the SDTT or CDT should be described in the SI Parameter Descriptor in the second loop of BIT), and a value common for all broadcasting companies should be specified for a re-transmission cycle when transmitted. For Repetition rate of the SDTT and CDT, see Vol.1 of this document.

12.4.1 Repetition Rate of PSI

Repetition rate of PSI should not be changed. Table 12-5 shows Repetition rate of each PSI table.

Table 12-5 Repetition rate of PSI

Table Type	Repetition rate
PAT	100ms
PMT (services transmitted other than in the partial reception layer)	100ms *1
PMT (services transmitted in the partial reception layer)	200ms *2
CAT	10s

*1) Please note that up to 1 second can be set up for a re-transmission cycle of PMT for engineering services
*2) Up to 500ms can be setup.

12.4.2 Ranges of Transmission Cycle Change and Default Cycles of All-station applied Transmission Parameter

The ranges of cycle change and default cycles for each repetition rate group of All-station applied transmission parameter are shown in Table 12-6 and the parameters that show the ranges of repetition rate groups of All-station applied transmission parameter are shown in Table 12-7.

Table 12-6 Ranges of Cycle Change and Default Cycles for Each Repetition Rate Group of All-station applied Transmission Parameter

Repetition rate group			Parameter	Cycle change range		Default cycle (sec)
				Min (sec)	Max (sec)	
NIT			-	1	3	1
BIT			-	1	3	1
SDT			-	1	3	2
H-EIT[p/f]			-	1	3	1
H-EIT[schedule basic]	TV Type	Basic Repetition rate group	D1	60	180	60
		Extended Repetition rate group 1	S1	3	5	3
		Extended Repetition rate group 2	S2	10	30	10
	Data Type	Basic Repetition rate group	D3	60	180	60
		Extended Repetition rate group	S4	3	5	3

M-EIT	EM1	1	3	1
L-EIT	EL1	1	3	1
TOT	-	5	5	5

Table 12-7 Parameters That Show the Ranges of Repetition Rate Groups of All-station applied Transmission Parameter

Parameter	Parameter change range		Default
	Min	Max	
D1	8 days	8 days	8 days
D3	2 days	8 days	2 days
S1	3 segments	3 segments	3 segments
S2	0 segments	21 segments	13 segments
S4	0 segments	24 segments	0 segments
EM1	2 programs	10 programs	2 programs
EL1	2 programs	10 programs	2 programs

(Note) With regard to the TV media type, the number of described days “8” and the number of segments “3” in extended repetition rate group 1 are fixed. “3 segments” is used because this can shorten the time to acquire information on programs for at least 9 hours, taking into account the range of information display, such as program listing.

12.4.3 Ranges of Transmission Cycle Change and Reference Cycles of Each-station applied Transmission Parameter

The ranges of cycle change and reference cycles for each repetition rate group of Each-station applied transmission parameter are shown in Table 12-8 and the parameters that show the ranges of repetition rate groups of Each-station applied transmission parameter are shown in Table 12-9.

Table 12-8 Ranges of Cycle Change and Reference Cycles for Each Repetition Rate Group of Each-station applied Transmission Parameter

Repetition rate group				Parameter	Cycle change range		Reference cycle (sec)
					Min (sec)	Max (sec)	
H-EIT[schedule]	basic	TV Type		D4	60	180	60
		Data Type		D6	60	180	60
	extended	TV Type	Basic Repetition rate group	D7	60	180	60
			Extended Repetition rate group	S5	3	30	20
		Data Type	Basic Repetition rate group	D9	60	180	60
			Extended Repetition rate group	S7	3	30	20
M-EIT				EM2	1	10	3
L-EIT				EL2	1	10	3

SDTT	-	180	180	180
CDT	-	600	600	600

Table 12-9 Parameters That Show the Ranges of Repetition Rate Groups of Each-station applied Transmission Parameter

Parameter	Parameter change range		Reference value
	Minimum	Maximum	
D4	Patterns are prepared for values that can be set up for Each-station applied transmission parameter in the H-EIT[schedule basic]. D4 (TV Type): 15 days/22 days/ 32 days D6 (Data Type): 8 days/ 15 days/22 days/32 days Selected for each terrestrial broadcaster. See Section 13.13.1.		
D6			
D7	Patterns are prepared for values that can be set up for the H-EIT[schedule extended] Either same as the description range of All-station applied transmission parameter (D1, D3) or same as the description range of Each-station applied transmission parameter (D4, D6). Selected for each terrestrial broadcaster. See Section 13.13.1.		
D9			
S5	0 segment	24 segments	3 segments
S7	0 segment	24 segments	0 segments
EM2	3 programs	10 programs	5 programs
EL2	3 programs	10 programs	5 programs

(Note) Each-station applied transmission parameter in the H-EIT[schedule] can be operated uniquely for each terrestrial broadcaster, but some patterns are prepared for the purpose of unification, within which they should be operated. Therefore, values cannot be setup freely for the above parameters. For details, see Section 13.14.1.4.

12.5 Cycle Adjustment

Each PSI/SI table is usually transmitted according to the re-transmission cycle defined for each repetition rate group. However, to deal with changes in data amounts at different times, Repetition rate may be slightly adjusted (usually, data amounts are minutely defined when making SI data in order to prevent changes in data amount at different times as much as possible, but there are times when adjustment has to be made due to differences in data amount for each H-EIT[p/f] event or when event schedule is changed).

Below is the description regarding the range of re-transmission cycle adjustment in such a case. Receiver units should be designed with consideration to the following rules for transmission and operation so that there will be no problems during the reception process.

[Transmission Operating Rule]

- With regard to PSI/SI tables, the range of cycle adjustment should be ±30% of the re-transmission cycle defined for each repetition rate group. For example, in case of H-EIT[p/f], if the re-transmission cycle is defined as 1 second, it can be changed, if needed,

between 0.7 second and 1.3 seconds due to the amount of transmitted data, etc.

- Adjustment of a cycle should be made for each repetition rate group. For more information, see the decryption in Section 12.7.

12.6 Transmission Cycle for Each Section

A re-transmission cycle defined for each repetition rate group is for a large scope (for each repetition rate group) and does not define a transmission cycle of each section within a repetition rate group. A transmission interval of the same section can be significantly different due to transmission swing within a repetition rate group (for details on SI transmission within a repetition rate group, see the description in Section 12.7) and behaviors when updating data (see the description in Section 12.8). However, transmission intervals for each section are considered to be important as they influence the time out setup of receiver units, so the following rules should be applied.

[Transmission Operating Rule]

- The maximum length of time for a transmission interval for each section should be two times the length of time for the re-transmission cycle set up for each repetition rate group. (The re-transmission cycle adjustment range is not added to this value). This value is considered as the length of time required to transmit a desired section securely, so it can be used for setting time out on receiver units. For example, a section that belongs to a repetition rate group whose re-transmission cycle is set to 10 seconds can be securely transmitted within 20 seconds.

12.7 Details of SI Transmission within a Repetition Rate Group

Within the range of a re-transmission cycle setup for each, sections should be transmitted in accordance with the following rules and guidelines.

[Transmission Operating Rule]

- Within a repetition rate group, a re-transmission cycle should not be changed individually, for example, for each sub-table. When a re-transmission cycle is changed within the range of±30% for cycle adjustment, the adjustment should be made for the whole repetition rate group, not for individual sub-table.

[Transmission Operating Rule]

- Within a repetition rate group, section data should be distributed within a cycle range that has been set up and transmitted. In addition, as up to 4KB of sections in the same sub-table can be multisectionalized, data is not always distributed on a sectional basis but it should be distributed as much as possible on the basis of up to 4KB-multisection.
- Within a repetition rate group, multiple sections within a sub-table should always be transmitted in the same order. As shown in the example in the figure below, in a sub-table which is comprised of four sections with sections numbers 0 to 3, if these sections are transmitted in the order of 1, 3, 2, 0, they should also be transmitted in this order the next time they are re-transmitted.

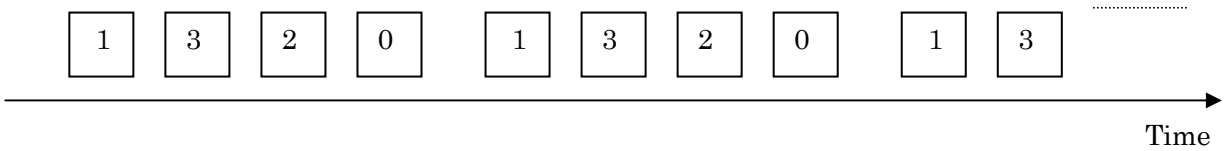


Figure 12-1 Example of Transmission of Sections (“section_number”) within a Repetition Rate Group (Order of Transmission)

However, there are cases where sections cannot be transmitted in the initial order, for example, when placement of H-EIT[schedule] in a repetition rate group is updated or when other data is updated. This should be kept in mind when the reception process is performed based on the order of transmission of sections within a repetition rate group.

In addition, sections are generally transmitted in ascending order of section number, but this rule is not always followed, therefore, performing the reception process based on this rule should be avoided (Figure 12-1 illustrates an example of a case where the rule is not followed).

It shall be noted that sections will always be retransmitted in the same order only within the same repetition rate group. For example, as shown in Figure 12-2, the sections with section numbers 0 and 1 and with section numbers 2 and 3 will be transmitted in the same respective order if multiple repetition rate groups exist for the sections comprising the sub-tables (i.e. when the repetition rate group that sections with section numbers 0 and 1 belong to is different from the repetition rate group that sections with section numbers 2 and 3 belong to).

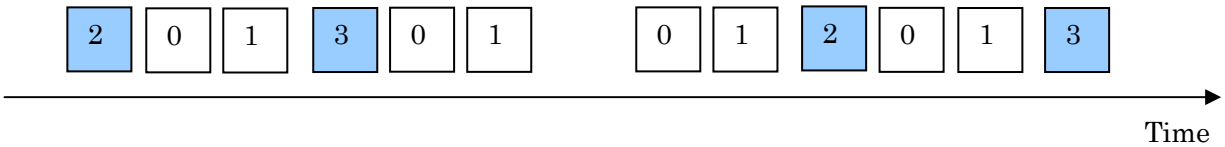


Figure 12-2 Examples of the Transmission Operation (order) by Sections ("section_number") in the case when 2 Repetition Rate Groups Exist
(When the retransmission interval of sections with section numbers 0 and 1 have been set to 1 second and those with section numbers 2 and 3 have been set to 3 seconds)

12.8 Rules When Sub-Tables Are Updated

When a sub-table is updated, the following rules should be applied. Detailed transmission methods other than described here differ depending on transmission system.

[Transmission Operating Rule]

- The new version and old versions should not exist in the same sub-table. In other words, after a section in a sub-table is updated, sections with old version numbers in the same sub-table should not be transmitted. This rule is also valid when multiple repetition rate groups are used in the same sub-table, such as H-EIT[schedule], M-EIT and L-EIT.
- It is possible to update a sub-table in the middle of a re-transmission cycle. In other words, there may be a case where the transmission interval of a section may become shorter than that of re-transmission cycle.
- When updating a sub-table, a transmission interval of the same section (section with the same section number) should not be more than two times that of the re-transmission cycle.

Figure 12-3 shows an example of when the sub-table is updated and it indicates that, when updating a sub-table consisting of 4 sections from 0-3, it would be possible to start transmitting the new version of the sub-table before all 4 sections have been fully transmitted. In such a case, sections 0 and 1 will be transmitted in a shorter interval than the re-transmission cycle; and sections 2 and 3 will be transmitted in a longer interval than the re-transmission cycle. The final item of the above transmission rules indicates that the transmission interval of section 2 or 3 must not exceed the double of the re-transmission cycle.

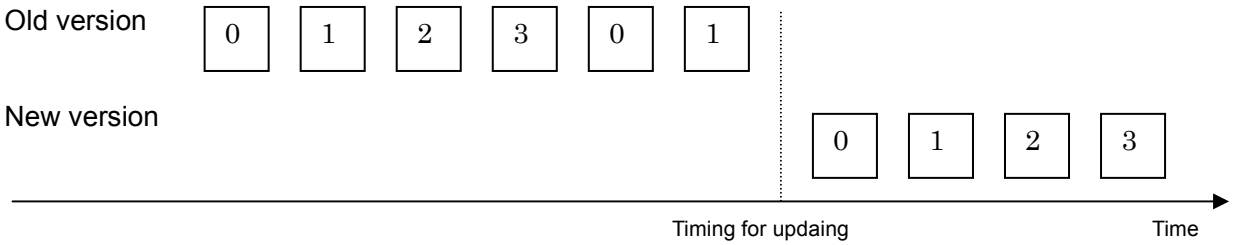


Figure 12-3 Example of Transmission of Sections ("section_number") When Updating a Sub-table

12.9 Update of Tables

The reasons for updating each table and guidelines for update frequencies are shown in Table 12-10.

Table 12-10 Reasons for Updating Tables and Guidelines for Update Frequencies

Tables	Main reasons for updating	Guidelines for update frequency	Notes
PAT	Suspension and re-start of broadcasting of a service.	Irregularly.	PIDs of the PMT are rarely changed.
PMT	Change of a component structure. Change of copy control/control access. When emergency warning signal is transmitted (Emergency Information Descriptor)	Irregularly. Frequent updates on an event basis or on a basis of smaller units are possible.	The PMT_PID values for services transmitted in the partial reception layer are fixed (See Vol.7).
CAT	Addition/deletion of a CA system. Change of PID of a stream that carries an EMM/EMM message.	Rarely changed.	May be changed because of automatically displayed messages.
NIT	Addition/change of a transmission frequency. Addition/change/transfer of a service. Change of a service structure for each layer.	Rarely changed.	
BIT	Addition/change/transfer of a service. Change of a service structure for each layer. Change of a delivering EIT type, Each-station applied transmission parameter.	Rarely changed.	
SDT	Addition/change/transfer of a service. Change of a service name.	Rarely changed.	For the SDT, the update frequency may become higher as a special service is provided (On/off of the EIT[p/f] flag). The frequency depends on the operation of each broadcaster.
H-EIT[p/f] M/L-EIT	When an event starts/ends. When event schedule is changed.	Updated on an event basis.	
H-EIT [schedule]	At 0:00 daily. When event schedule is changed. When other information is changed.	Updated daily basically.	It seems that the update frequency becomes higher the nearer it is the present time.

13 EIT Transmission

This chapter explains EIT transmission in details.

13.1 Definition of EIT-Related Terms and Outline of EIT Transmission

EIT-related terms that are used in this chapter and the whole Vol. 4 are defined and a basic EIT transmission model is explained.

13.1.1 Distinction between Actual and Other

In digital terrestrial television broadcasting, unlike BS digital broadcasting, EITs related to other TSs (other TS) are never transmitted. In other words, TSs carry EIT[actual] only. Therefore, in the explanation below, for example, the EIT[p/f] and EIT[schedule basic] mean the EIT[p/f actual] and EIT[schedule actual basic] respectively, and terms that differentiate actual from other are not used.

13.1.2 Commonly Operated EIT

Collective term for EITs commonly operated by all broadcasting companies in common operation SI. See Section 13.2.1. for details.

13.1.3 Individually Operated EIT

Collective term for EITs that are transmitted optionally for the purpose of enhancing event information presented on receiver at the discretion of each broadcaster. See Section 13.2.2 for details.

13.1.4 EPG display Types (TYPE-H EPG display/TYPE-M EPG display/TYPE-L EPG display)

Modeled EPG displays on receiver for when EITs are transmitted. See Section 6.6 in Vol. 2 of this document. EITs should be transmitted optimally considering the characteristics of each screen type.

13.1.5 H-EIT/M-EIT/L-EIT

In digital terrestrial television broadcasting, three types of EITs, namely H-EIT, M-EIT and L-EIT, are transmitted and event information obtained from these tables is displayed on corresponding EPG displays. It is assumed that receiver use the H-EIT only as the source of information to display on the “TYPE-H EPG display”, the M-EIT on the “TYPE-M EPG display” and the L-EIT on the “TYPE-L-EPG display”. The relation between the three types of EPG displays and three types of EITs are shown in Figure 13-1. These three EITs are transmitted with different PIDs (See Section 13.9).

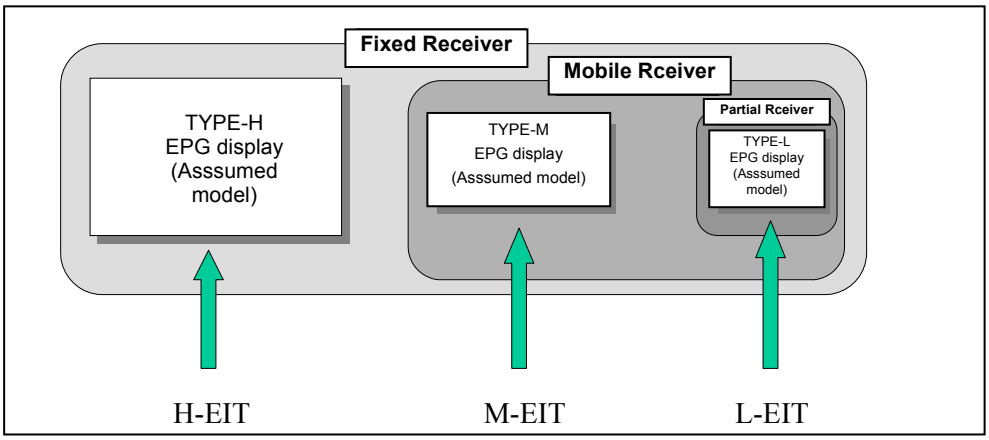


Figure 13-1 Relation between the EPG display Types and 3 Types of EITs

13.1.6 Definition of the EIT Names Used in This Volume (Volume 4)

The definition of the EIT names used in this volume is shown in Table 13-1.

Table 13-1 Definition of the EIT Names Used in This Volume

Name (Term)	Definition
EIT	Collective term for H-EIT/M-EIT/L-EIT
EIT[p/f]	Collective term for H-EIT[p/f]/M-EIT[p/f]/L-EIT[p/f] (M-EIT[p/f after] and L-EIT[p/f after] are not included)
EIT[schedule] H-EIT[schedule]	Collective term for H-EIT[schedule basic]/H-EIT[schedule extended]
H-EIT	Collective term for H-EIT[p/f]/H-EIT[schedule basic]/H-EIT[schedule extended]
M-EIT	Collective term for M-EIT[p/f]/M-EIT[p/f after]
L-EIT	Collective term for L-EIT[p/f]/L-EIT[p/f after]

For the detailed definition of each M-EIT/L-EIT, see Section 13.12.3.

13.1.7 Service Layer

The Service layer is the layer in which the PMT of a service is transmitted. For example, when three layers are used and the PMT of Service A is transmitted in the low protection layer, no matter in which layers the components which comprise Service A are transmitted, it can be said “the service layer of Service A is the low protection layer”.

13.1.8 Fixed Receiver

A fixed receiver is a receiver that is fixed for receiving and viewing programs. Stationary receiver units and indoor portable receiver units are included. This type of receiver can obtain and display information in three types of EITs, which are the H-EIT, M-EIT and L-EIT (Please note that implementation of the M-EIT/L-EIT reception function is optional).

13.1.9 Mobile Receiver

A mobile receiver is a receiver for receiving and viewing programs while moving. In-vehicle receiver units and PDAs are included. This type of receiver can obtain and display information in two types of EITs, which are the M-EIT and L-EIT.

13.1.10 Partial (Portable) Receiver

A partial (portable) receiver is a receiver that receives a single segment in the partial reception layer. Portable terminals are included. This type of receiver can obtain and display information in the L-EIT only.

13.1.11 Basic Target Receiver

In the layer operation patterns (1) to (6) shown in Section 4.2 of “General Information of the Technical Report” in the beginning of this document, a basic target receiver is a receiver at which a certain service which uses one of the layers as its service layer basically targets. In other words, a basic target receiver is a type of receiver that requires the highest CN among receiver that should be able to receive services transmitted in each layer in the normal viewing status.

Basic target receiver for each pattern are defined in Table 13-2

Table 13-2 Definition of Basic Target Receiver

Pattern *	Service Layer	Transmission Parameter Type*	Basic Target Receiver
(1)	Layer A (Low protection layer)	a	Fixed Receiver
(2)	Layer A (Low protection layer)	b	Mobile Receiver
(3)	Layer A (High protection layer)	c	Partial Receiver
	Layer B (Low protection layer)	a	Fixed Receiver
(4)	Layer A (High protection layer)	b	Mobile Receiver
	Layer B (Low protection layer)	a	Fixed Receiver
(5)	Layer A (High protection layer)	c	Partial Receiver
	Layer B (Low protection layer)	b	Mobile Receiver
(6)	Layer A (High protection layer)	c	Partial Receiver
	Layer B (Middle protection layer)	b	Mobile Receiver
	Layer C (Low protection layer)	a	Fixed Receiver

* Please note that “Transmission Parameter” as in “Transmission Parameter Type” does not mean an SI-related transmission parameter that is described later in this document (All-stations applied transmission parameter and each station) and means a modulation parameter for each layer, such as modulation system or convolution coding rate. For the patterns and transmission parameter types, see

Tables 2 and 3 in “General Information of the Technical Report” in the beginning of this document.

13.1.12 All-stations applied Transmission Parameter

Transmission parameters for commonly operated EITs (delivering table, delivering range, repetition rate and repetition rate group structure) are defined for each “EPG display Type (EIT_ type) & media_type”, and standardized and operated by all broadcasting companies. Such parameters are called All-stations applied transmission parameter. In other words, the commonly operated EIT for a service should be transmitted with All-stations applied transmission parameter defined for each EIT_type (H-EIT/M-EIT/L-EIT) and media_type, no matter the relevant service is received on which basic target receiver. However, with regard to the M-EIT and L-EIT, the same transmission parameters are used respectively for both media_type. In addition, these All-stations applied transmission parameter are the parameters that should be transmitted at least, not only when the commonly operated EIT is transmitted but also when the individually operated EIT which is the extended delivering EIT type is transmitted (See Section 13.1.15). Therefore, it has been decided that these parameters are called “All-stations applied transmission parameter”, not “commonly operated EIT transmission parameters”. There are 4 major types of All-stations applied transmission parameter, which are standardized and operated by all digital terrestrial television broadcasting companies.

1) All-stations applied transmission parameter for media_type= “TV type” for the H-EIT ([p/f] and [schedule basic])
2) All-stations applied transmission parameter for media_type= “Data type” in the H-EIT ([p/f] and [schedule basic])
3) All-stations applied transmission parameter in the M-EIT
4) All-stations applied transmission parameter in the L-EIT

13.1.13 Each-station applied Transmission Parameter

On the other hand, transmission parameters that each broadcaster can specify optionally are called Each-station applied transmission parameter. Each-station applied transmission parameter (delivering table, delivering range, repetition rate and repetition rate group structure) are also defined for each “EPG display Type (EITs) & media_type”. However, with regard to the M-EIT and L-EIT, the same transmission parameters are used respectively for both media_type. There are 4 types of Each-station applied transmission parameter, which are standardized and operated within a terrestrial broadcaster.

1) Each-station applied transmission parameter for media_type= “TV type” for the H-EIT ([schedule basic] and [schedule extended])
2) Each-station applied transmission parameter for media_type= “Data type” in the H-EIT ([schedule basic] and [schedule extended])
3) Each-station applied transmission parameter in the M-EIT
4) Each-station applied transmission parameter in the L-EIT

13.1.14 Basic delivering EIT Type

Type of EIT that should be always transmitted for each service are called basic delivering EIT type. Basic delivering EIT type and their transmission layers are defined for basic target receiver for each service in Table 13-3.

Table 13-3 Basic delivering EIT type

Basic Target Receiver	Basic delivering EIT type	Transmission Layer
Fixed Receiver	H-EIT	Same layer as the service layer
Mobile Receiver	M-EIT	Same layer as the service layer
Partial Receiver	L-EIT	Same layer as the service layer

13.1.15 Extended delivering EIT Type

In addition to basic delivering EIT type, different types of EITs can be transmitted optionally in a different layer from or the same layer as the service layer at the discretion of each broadcaster. These are called extended delivering EIT type. For example, if the service layer of a certain service is the partial reception layer, the basic target receiver for this service is a partial receiver; therefore, the L-EIT transmitted in the partial reception layer is the EIT for basic transmission service. However, in this case, EPGs are displayed only on the “TYPE-L EPG display” on fixed receiver. Therefore, to give more choices of services that can be provided on fixed receiver and to display richer information on the “TYPE-H EPG display”, the H-EIT for such a service can be additionally transmitted as an option. However, in such a case, the H-EIT should be transmitted in accordance with All-stations applied transmission parameter defined for each EIT_type and media_type at least, no matter the relevant service is received on which basic target receiver. Transmission of extended delivering EIT type can be specified for each service. Similarly to commonly operated EITs (basic delivering EIT type), stable transmission of a service for which the extended delivering EIT type has been once transmitted should be ensured.

Additionally, there are restrictions on transmission of extended delivering EIT type and their transmission layers. Table 13-4 shows extended delivering EIT type that can be transmitted and their transmission layers for the layer operation patterns from (1) to (6) shown in Section 4.2 of “General Information of the Technical Report” in the beginning of this document. All broadcasting companies should understand a pattern that is currently being used ((1) to (6)) and transmit EITs within the restriction range defined in Table 13-4 (EITs for transmission service and transmission layers) according to the pattern.
Furthermore, as shown in Table 13-4, the same type of EIT cannot be transmitted in multiple layers simultaneously (it is possible to transmit multiple types of EITs in a single layer simultaneously: Patterns (2), (3) and (5)).

Table 13-4 Extended delivering EIT Type that can be transmitted and their Transmission Layers for Each Transmission Pattern and Service Layer

Pattern (1)

Segment configuration / Service Layer	Layer A (Low protection layer)
Low protection layer	Service Layer ○H-EIT (Basic)

Pattern (2)

Segment configuration / Service Layer	Layer A (Low protection layer)
Low protection layer	Service Layer ○M-EIT (Basic) ●H-EIT (Extended)

Pattern (3)

Segment configuration / Service Layer	Layer A (High protection layer) (Partial Reception Layer)	Layer B (Low protection layer)
High protection layer(Partial Reception Layer)	Service Layer ○L-EIT (Basic) ●M-EIT (Extended)	●H-EIT (Extended)
Low protection layer		Service Layer ○H-EIT (Basic)

Pattern (4)

Segment configuration / Service Layer	Layer A (High protection layer)	Layer B (Low protection layer)
High protection layer	Service Layer ○M-EIT(Basic)	●H-EIT (Extended)
Low protection layer		Service Layer ○H-EIT(Basic)

Pattern (5)

Segment configuration / Service Layer	Layer A (High protection layer) (Partial Reception Layer)	Layer B (Low protection layer)
High protection layer(Partial Reception Layer)	Service Layer ○L-EIT (Basic)	●M-EIT (Extended) ●H-EIT (Extended)
Low protection layer		Service Layer ○M-EIT (Basic) ●H-EIT (Extended)

Pattern (6)

Segment configuration / Service Layer	Layer A (High protection layer)	Layer B (Middle protection layer)	Layer C (Low protection layer)
High protection layer	Service Layer ○L-EIT (Basic)	●M-EIT (Extended)	●H-EIT (Extended)
Middle protection layer		Service Layer ○M-EIT (Basic)	●H-EIT (Extended)
Low protection layer			Service Layer ○H-EIT (Basic)

○: Basic delivering EIT type; ●: Extended delivering EIT type

In the above table, extended delivering EIT type do not exist (can not be transmitted) in the layers in the shaded regions.

13.1.16 EIT Type delivering Flag

The EIT type delivering flag is a collective term for H-EIT_flag/M-EIT_flag/L-EIT_flag specified within the service loop of the SDT. A Flag shows the type of EIT transmitted in the relevant TS for the relevant service regardless whether it is basic delivering EIT type or extended delivering EIT type. It shows 3 bits defined as the EIT user defined flag (EIT_user_defined_flags) in ARIB STD-B10.

13.2 Commonly Operated EIT and Individually Operated EIT

Now that the terms have been defined, the precise definition of the commonly operated EIT and individually operated EIT are provided below.

13.2.1 Commonly Operated EIT

The commonly operated EIT is defined as “part transmitted with transmission parameters defined as All-stations applied transmission parameter within the basic delivering EIT type that should be transmitted for each service”. For example, the commonly operated EIT of a TV type service whose basic target receiver is a fixed receiver is the H-EIT transmitted in accordance with All-stations applied transmission parameter for media_type= “TV type” in the H-EIT (See 1) in Section 13.1.12). Also, the commonly operated EIT of a service whose basic target receiver is a mobile receiver (for all media_type) is the M-EIT transmitted in accordance with All-stations applied transmission parameter in the M-EIT (See 3) in Section 13.1.12).

Thus, for each type of receiver, event information for services that can be received will always be displayed on the EPG. Conversely, even if the source of information to be displayed on each EPG display type is restricted, for example “the source of information to be displayed on the TYPE-H EPG display is the H-EIT”, “the source of information to be displayed on the TYPE-M EPG display is the M-EIT” and “the source of information to be displayed on the TYPE-L EPG display is the L-EIT”, and information is obtained according to these restrictions, all the services that can be received on each type of receiver will be covered (displayed) (excluding cases where fixed receiver do not have the M-EIT/L-EIT reception functions).

However, there is only one thing that should be noted. When a mobile receiver has a good reception and it can receive a service whose basic target receiver is a fixed receiver, event information for such a service cannot be displayed on the EPG (because a mobile receiver is designed to receive the M-EIT and L-EIT only). To solve this problem, mobile receiver need to be designed to have the TYPE-H-EPG display or to display only information on the nearest event in the H-EIT on the TYPE-M EPG display (optional). Repetition rate should be setup on the transmitting and assuming that information on the nearest event in the H-EIT will be accessed randomly from mobile receiver.

13.2.2 Individually Operated EIT

The individually operated EIT is defined as the “part that is not the commonly operated EIT

within the basic delivering EIT type which should be transmitted for each service (additionally transmitted part) and all the extended delivering EIT type".
Individually operated EITs can be transmitted optionally at the broadcaster's discretion, but any individually operated EITs cannot be transmitted for a service for which the commonly operated EIT has not been transmitted. Additionally, when the extended delivering EIT type is transmitted for a service, it should be transmitted in accordance with All-stations applied transmission parameter (delivering range, repetition rate, repetition rate group, etc) defined for the EIT_type and media_type without fail.

Individually operated EITs are divide into the following three types.

(1) Information on the events for the delivering ranges after the delivering range defined as a All-stations applied transmission parameter in the basic delivering EIT type, and H-EIT[schedule extended] (a service for which the H-EIT is transmitted as the basic delivering EIT type) [Each-station applied transmission parameter are used].

(2) Event information transmitted in accordance with All-stations applied transmission parameter in the extended delivering EIT type for each service (should be transmitted when an extended delivering EIT type is transmitted)

(3) Information on the events for the spans after the delivering range defined as a All-stations applied transmission parameter in the extended delivering EIT type for each service, and H-EIT[schedule extended] (a service for which the H-EIT is transmitted as the extended delivering EIT type)[Each-station applied transmission parameter are used]

The relations between the above three types of individually operated EITs are shown in Figure 13-2.

[Assumption]

- Focusing on the EIT regarding Service A (media_type= "Data type") whose service layer is the high protection layer (partial reception layer) in the Pattern (6) (See Section 4.2 in "Operation Overview").
- The delivering range which is a All-stations applied transmission parameter for media_type= "Data type" in the H-EIT is defined as 3 days.
- The delivering range that is a All-stations applied transmission parameter in the M-EIT is defined as the nearest 2 events.
- The delivering range that is a All-stations applied transmission parameter in the L-EIT is defined as the nearest 2 events.

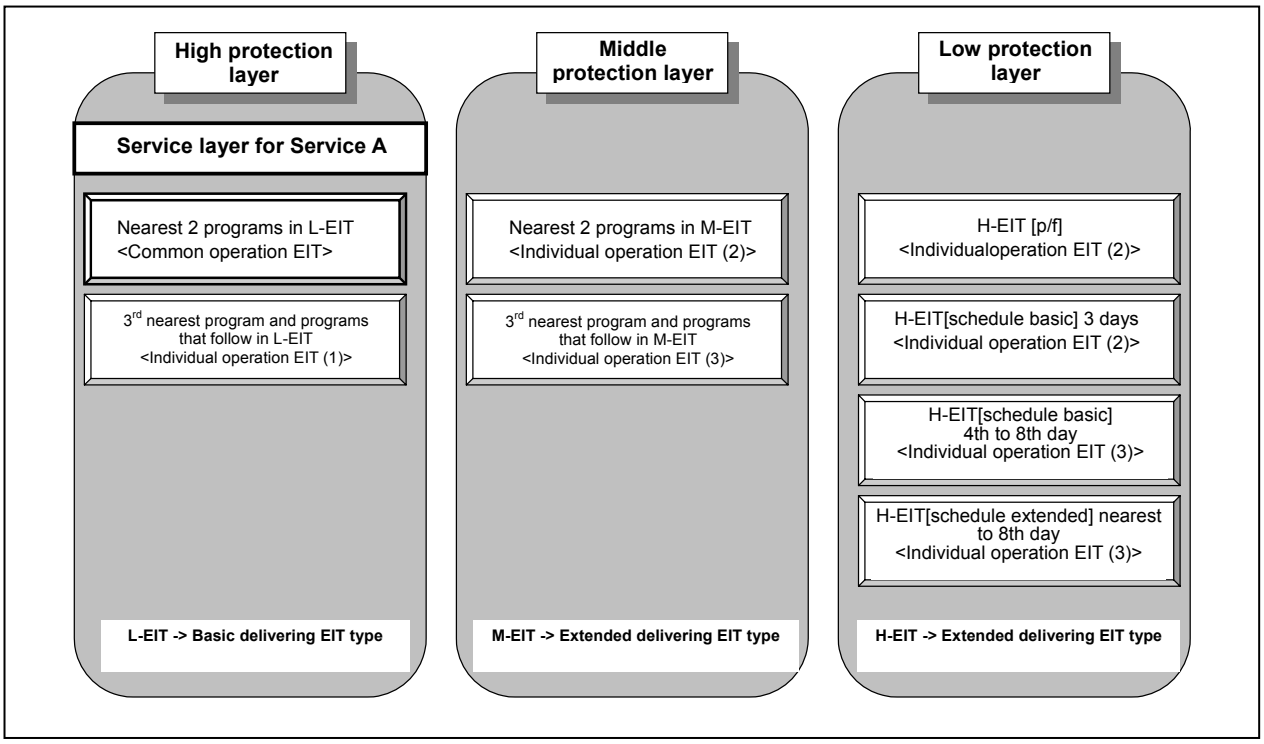


Figure 13-2 Example of Transmission of a Commonly Operated EIT and Individually Operated EITs for Service A (the Figures in Brackets correspond to the above (1) to (3)).

In the individually operated EIT, when the part other than the part transmitted in accordance with All-stations applied transmission parameter ((1) and (3) in the above figure) is transmitted, Each-station applied transmission parameter (delivering table, delivering range, repetition rate, repetition rate group structure) should be specified for each “EIT_type & media_type” by each broadcaster (terrestrial broadcaster). In other words, no matter whether it is a basic delivering EIT type or an extended delivering EIT type, the individually operated EIT for a certain service (parts transmitted with Each-station applied transmission parameter) should be transmitted using Each-station applied transmission parameter defined for the EIT_type and media_type. However, the same transmission parameters should be used for the M-EIT and L-EIT respectively for all media_type.

For example, when the H-EIT[schedule extended] is required to be transmitted for the amount of 8 days for a data type service whose target receiver is a fixed receiver, and at the same time, when even a slight part of the H-EIT is required to be transmitted for a data type service whose target receiver is a partial receiver, the latter service should transmit the H-EIT[schedule extended] for the amount of 8 days without conditions.

Furthermore, when the extended delivering EIT type is transmitted for a certain “EIT_type & media_type” and at the same time, when only a delivering range defined as a All-stations applied transmission parameter (only (2) in the above Figure) is transmitted, there is no need

to specify a Each-station applied transmission parameter for the “EIT_type & media_type” as long as it is declared that the extended delivering EIT type is transmitted (declared with EIT type delivering flag within the SDT for each service_id: See Section 13.5.3). In other words, when only a delivering range defined as a All-stations applied transmission parameter is transmitted for all the services that belong to a certain media_type, there is no need to specify a Each-station applied transmission parameter for that media_type even if the individually operated EIT is transmitted as an extended delivering EIT type.

13.3 Rough Idea of EIT Transmission

“Commonly Operated EIT / Individually Operated EIT” and “Basic delivering EIT type / Extended delivering EIT type” are categorized by looking at EITs from different points of view. Furthermore, the commonly operated EIT is always transmitted in accordance with All-stations applied transmission parameter but the individually operated EIT is divided into two major parts, which are “part transmitted in accordance with All-stations applied transmission parameter” and “part transmitted in accordance with Each-station applied transmission parameter”. This may be very difficult to understand but it is very important to understand this distinction to understand the EIT transmission in digital terrestrial television broadcasting.

[Distinction between the commonly operated EIT and the individually operated EIT]

Event information that should be always transmitted by all broadcasting companies is the commonly operated EIT, and event information that can be transmitted optionally by each broadcaster is the individually operated EIT. This concept is close to the one of “All-station SI/Each-station SI” in BS digital broadcasting.

[Distinction between the basic delivering EIT type and the extended delivering EIT type]

When focusing on a certain service, the EIT_type (H-EIT/M-EIT/L-EIT) that should always be transmitted for that service is the basic delivering EIT type and other EITs are extended delivering EIT type. Only one type of basic delivering EIT type exists for a single service.

[Distinction between All-stations applied transmission parameter and Each-station applied transmission parameter]

“All-stations applied transmission parameter” means a transmission parameter standardized by all broadcasting companies (delivering range, repetition rate grouping, repetition rate) and there is no concept of “mandatory/optional” regarding transmission of parameters.

“Each-station applied transmission parameter” is a transmission parameter that can be defined for each “EIT_type and media_type” freely by each broadcaster.

Figure 13-3 shows the concept of EIT transmission explained above when focusing on a certain service in a set.

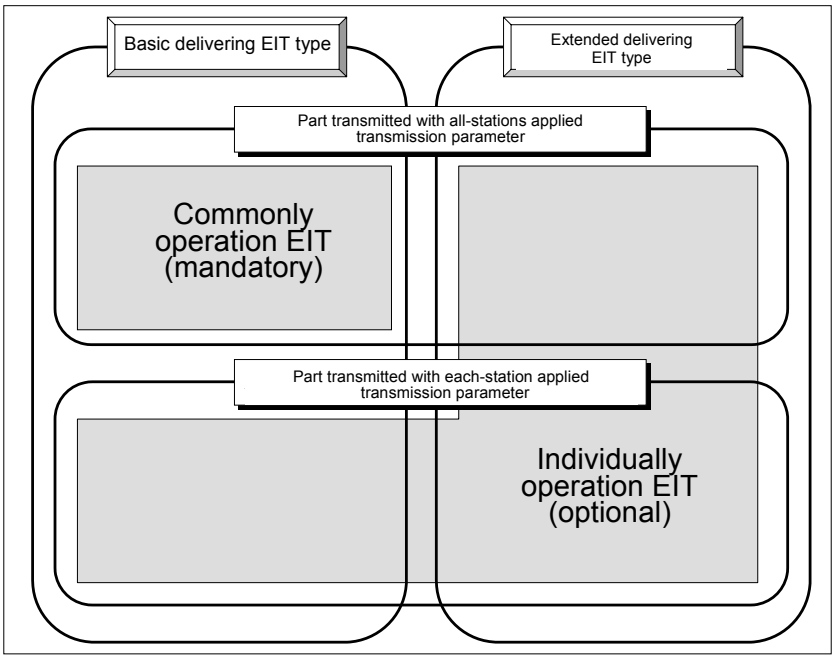


Figure 13-3 Concept of Distinction of Transmitted EITs When Focusing on a Certain Service

Figure 13-3 shows that

- “Part transmitted in accordance with All-stations applied transmission parameter” in the “Basic delivering EIT type” = “Commonly Operated EIT”
- (“Part transmitted in accordance with Each-station applied transmission parameter” in the “Basic delivering EIT type”)+ “Extended delivering EIT type” = “Individually Operated EIT”.
- “Extended delivering EIT type” are divided into the “part transmitted in accordance with All-stations applied transmission parameter” and “part transmitted in accordance with Each-station applied transmission parameter”

“Basic delivering EIT type for each service” can be found in Tables 13-2 and 13-3, and Table 13-4 should be referred to for “Extended delivering EIT type” that can be transmitted for each service.

13.4 EIT Transmission Model

A transmission model for each EIT type that explains the rough concept shown in Section 13.3 is shown in Figure 13-4.

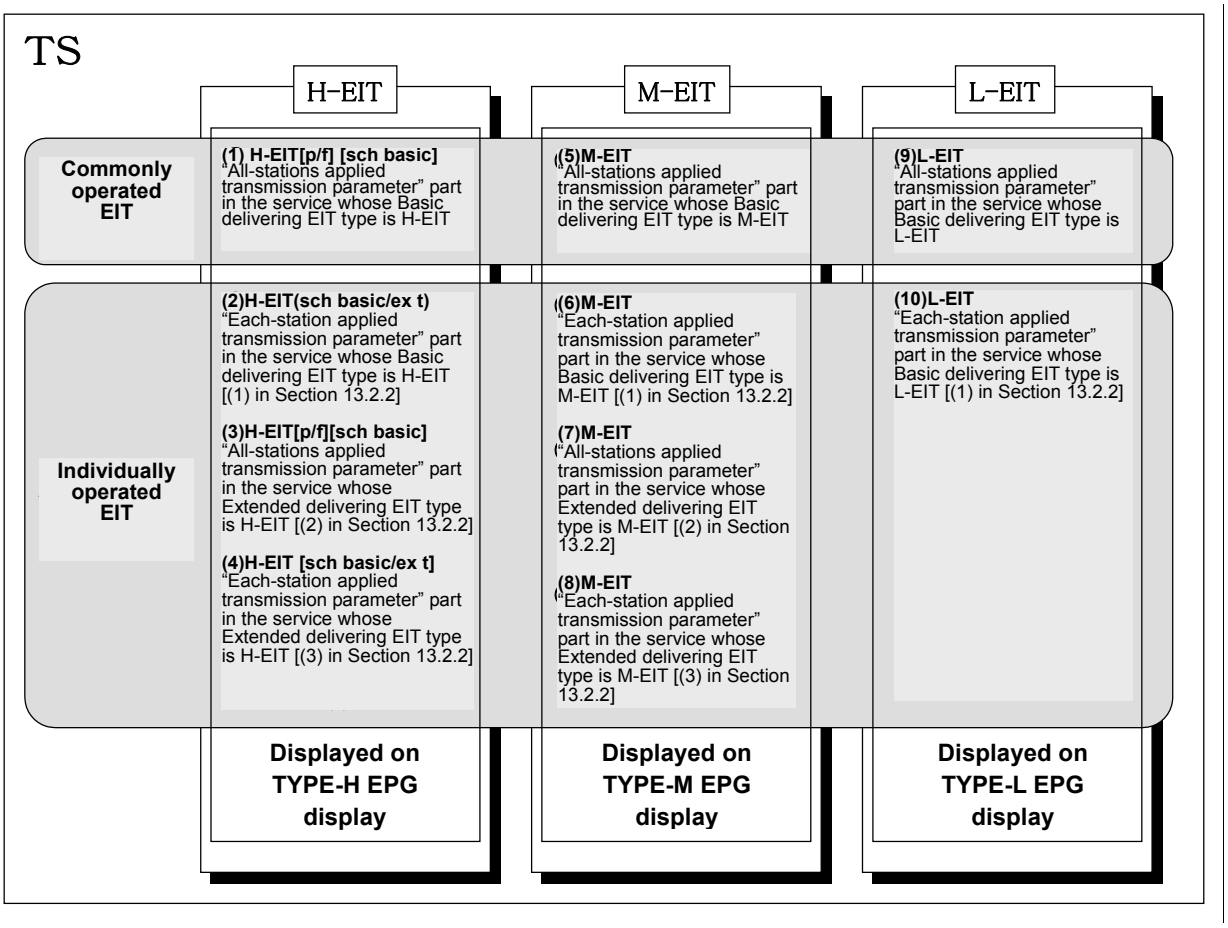


Figure 13-4 EIT Transmission Model in Digital Terrestrial Television Broadcasting

The following summarizes the transmission rules in the above EIT transmission model:

(1) Commonly operated EIT (i.e. EIT transmitted according to the All-stations applied transmission parameter of the basic delivering EIT type of each service) must be transmitted to all services, (excluding the special service_type described in Section 13.6.1) ((1) or (5) or (9)).

(2) When transmitting extended delivering EIT type to a certain service, the all-stations applied transmission parameter section of the relevant "EIT type and media_type" must at least be transmitted ((3) and (7)). However, parameter specification for each media_type shall only be possible with H-EIT.

(3) When transmitting extended delivering EIT type and information beyond the All-stations applied transmission parameter range to a certain service (Each-station applied transmission parameter section), it shall need to be operated using the same parameter as that of the Each-station applied transmission parameter section of the

basic delivering EIT type, regardless of the table type (basic or extended) (Pairs (2) and (4) and (6) and (8) shall each be operated with the same parameters at all times.). With H-EIT, however, the Each-station applied transmission parameter can be specified for each media_type. In other words, (4) must not be transmitted to a certain media_type of H-EIT if (2) will not be transmitted, and vice versa.

(4) In other words, for a group of services for which “transmit/not transmit” is specified for each EIT (specified with the EIT type delivering flag in the SDT. See section 13.5.3) , the same parameters are always transmitted for each “EIT_type & media_type” (H-EIT). The M-EIT and L-EIT are transmitted with the same parameters regardless of the media_type.

The below are transmission patterns when focusing on the H-EIT based on Figure 13-4. One of the following transmission patterns is allowed for each media_type.

[Pattern 1] Only (1) is transmitted (only the commonly operated EIT is transmitted)

[Pattern 2] Only (1) and (2) are transmitted (the extended delivering EIT type is not transmitted)

[Pattern 3] Only (1) and (3) are transmitted (the commonly operated EIT and only the part in the extended delivering EIT type that is transmitted in accordance with All-stations applied transmission parameter are transmitted)

[Pattern 4] All of (1) to (4) are transmitted (parts transmitted in accordance with Each-station applied transmission parameter are also transmitted)

[Pattern 5] Only (3) is transmitted (when a service for which the EIT for basic transmission service, the H-EIT does not exist)

[Pattern 6] Only (3) and (4) are transmitted(“)

In other words, transmission of (1), (2) and (3) only or transmission of (1), (3) and (4) only are not allowed. Furthermore, in [Pattern 4], (2) and (4) are transmitted with the same parameters.

The M-EIT is also transmitted in one of the above six patterns (no difference for each media_type). The L-EIT can be transmitted in [Pattern 1] (only (9)) or [Pattern 2] ((9) and (10)) as the extended delivering EIT type can not be transmitted.

As shown in 13.2.2, Each-station applied transmission parameter for the relevant media type in the H-EIT do not have to be specified when transmitted in[Pattern 1],[Pattern 3] and [Pattern 5].

13.5 How to communicate All-stations applied Transmission Parameter/Each-station and whether or not Extended delivering EIT Type are transmitted to Receiver

Parameters are specified in the following locations

- All-stations applied transmission parameter ----- SI Parameter Descriptor within the first loop of the BIT.

- Each-station applied transmission parameter ----- SI Parameter Descriptor within the second loop of the BIT
- Whether or not extended delivering EIT type is transmitted ----- EIT type delivering flag within the SDT
  (an EIT for transmission service is specified with the EIT type delivering flag for each service_id regardless of whether it is basic delivering EIT type/extended delivering EIT type)

13.5.1 Communication of All-stations applied Transmission Parameter to Receiver

As explained above, there are two major types of EITs for which All-stations applied transmission parameter are used.

(1) Transmission parameters in the commonly operated EIT: transmission parameters in (1), (5), (9) in Figure 13-4.

(2) Transmission parameters that should be transmitted at least when the extended delivering EIT type (individually operated EIT) is transmitted: transmission parameters in (3) and (7) in Figure 13-4.

All-stations applied transmission parameter are standardized and operated by all digital terrestrial television broadcasting companies, and basically, any changes are not supposed to be made to them. However, taking into consideration changes that may be made to specifications of receiver in the future (due to penetration of receiver which implemented double tuners, etc), they are inserted in broadcast signals so that they can be changed. Specifically, in the first loop of the BIT, along with All-stations applied transmission parameter for the NIT, BIT, TOT and SDT, SI transmission parameter in which All-stations applied transmission parameter (repetition rate and delivering range, etc) for each “EIT_type & media_type” should be placed. Please note that in order to minimize the size of the BIT, the desctiption can be omitted at the table level when a default value is used.

13.5.2 Communication of Each-station applied Transmission Parameter to Receiver Untis

As explained above, there are two major types of EITs for which Each-station applied transmission parameter are used.

(1) Transmission parameters for the events information after the delivering range are defined as a All-stations applied transmission parameter in the basic delivering EIT type , and transmission parameters in the H-EIT[schedule extended] (individually operated EIT) : transmission parameters in (2), (6) and (10) in Figure 13-4.

(2) Transmission parameters for information on the events after the delivering range defined as a Each-station applied transmission parameter in the extended delivering EIT type, and transmission parameters in the H-EIT[schedule extended] (individually operated

EIT): transmission parameters in (4) and (8) in Figure 13-4.

Different Each-station applied transmission parameter can be given to each terrestrial broadcaster, so when an individually operated EIT that is not in the delivering range transmitted with All-stations applied transmission parameter is transmitted, Each-station applied transmission parameter should be inserted in broadcast signals without fail. Specifically, in the second loop of the BIT, SI Parameter Descriptor in which Each-station applied transmission parameter (including the SDTT and CDT) are described should be placed. Please note that when an individually operated EIT is transmitted as shown below, Each-station applied transmission parameter for that “EIT_type and media_type” should not be described.

- When any individually operated EIT is not transmitted for the relevant “EIT_type and media_type” ([Pattern 1] in Section 13.4)
- When an individually operated EIT is transmitted as an extended delivering EIT type but only the one in accordance with All-stations applied transmission parameter is transmitted for the relevant “EIT_type and media_type”
  ([Pattern 3] in Section 13.4)

13.5.3 Communication of whether or not Basic delivering EIT Type/Extended delivering EIT Type are transmitted to Receiver

It is required to communicate whether or not an extended delivering EIT type is transmitted as an individually operated EIT to receiver. Specifically, the type of EIT that is transmitted is specified with the EIT type delivering flag within the SDT for each service_id. Because the same parameters are used for each “EIT_type and media_type”, whether or not it is an EIT for basic delivering EIT type or an extended delivering EIT type (optional), the type of the transmitted EIT needs to be specified with the EIT type delivering flag within the SDT for each service_id. In other words, it is also required to declare that basic delivering EIT type for each service_id is being “transmitted”.

13.6 EIT Delivering Level for Each service_type

13.6.1 Commonly Operated EIT (Part in the Basic delivering EIT Type That Is Transmitted with All-stations Applied Transmission Parameter)

For services of some service_type, commonly operated EITs are not transmitted or transmitted optionally. Delivering levels of commonly operated EITs (transmitted or not) for each service_type are shown in Table 13-5.

Table 13-5 Delivering levels of Commonly Operated EITs for Each service_type

service_ type	Meaning	media_ type	Delivering level			
			Basic delivering EIT type for this service			
			H-EIT		M-EIT	L-EIT
			H-EIT [p/f]	H-EIT [schedule basic]	M-EIT	L-EIT
0x01	Digital TV service	TV type	Mandatory	Mandatory *3	Mandatory *3	- *4
0xA1	Special video service	TV type	Optional *1	No transmission	Optional *1	- *4
0xA3	Special data service	Data type	Optional *1	No transmission	Optional *1	Optional *1
0xA4	Engineering service *5	Data type	No transmission	No transmission	No transmission	- *4
0xAA	Bookmark list data service	Data type	Optional *1	Optional *2	Optional *1	Optional *1
0xC0	Data service	Data type	Mandatory	Mandatory *3	Mandatory *3	Mandatory *3

*1 : Whether or not the table is transmitted is specified with the EIT_present_following_flag in the SDT.

“2 : Whether or not the table is transmitted is specified with the EIT_schedule_flag in the SDT.

*3 : Transmission of a delivering range defined as a All-stations applied transmission parameter (number of events) is mandatory. Transmission of subsequent delivering range is optional.

*4 : This EIT (L-EIT) will never be the Basic delivering EIT type for this service_type (In other words, the service layer of this service_type will never be a partial reception layer).

*5 : Engineering service is not described in the SDT, too (see Section 31.2.1)

13.6.2 Individually Operated EIT(Other than H-EIT[schedule extended])

With regard to the individually operated EIT, due to its nature, there is no service_type that should be transmitted and transmission of all service_type is optional. However,

- The H-EIT[schedule basic] should not be transmitted for a special service (special video service, special data service).
- When the M-EIT is transmitted for a special service (special video service, special data service), only two events, i.e. the current event and the next event (p/f), can be transmitted.
- Any EIT should not be transmitted for an engineering service.

13.6.3 H-EIT[schedule extended]

The H-EIT[schedule extended] can be transmitted optionally only for a digital TV service, a data service and a bookmark list data service and should not be transmitted for other service_type.

13.7 Services for which EITs are not transmitted for Convenience of Equipment Maintenance

The commonly operated EIT should be transmitted for all the services within a TS (except for the specific service_type described in Section 13.6.1), but as decribed in Section 10.1, there

may be a possibility that it would be difficult for some broadcasting companies to transmit EITs at the start of providing digital terrestrial television broadcasting services for convenience of equipment maintenance.

In such a case, broadcasting companies should correctly add the “EIT type delivering flag”, EIT_present_following_flag and EIT_schedule_flag in the SDT for each service according to the actual operation. When it becomes possible to transmit commonly operated EITs, they should be transmitted in accordance with All-stations applied transmission parameter at least, without fail. Please note that with regard to the H-EIT, it is possible to transmit p/f only without transmitting schedule (basically, p/f and schedule should be transmitted at the same time but it is allowed not to only when it is unavoidable for convenience of equipment maintenance), transmitting schedule only without transmitting p/f is not allowed. The receiver needs to judge whether or not the EIT (commonly operated EIT) for the relevant service is transmitted eventually from the EIT_present_following_flag and EIT_schedule_flag in the SDT. Additionally, the individually operated EIT cannot be transmitted for a service for which the commonly operated EIT is not transmitted.

13.8 How to assign values to EIT_present_following_flag and EIT_schedule_flag in the SDT

13.8.1 EIT_present_following_flag

Values are assigned to EIT_present_following_flag for each service based on the following criteria.

- When the basic delivering EIT type for the relevant service is the H-EIT,
  if the H-EIT[p/f] is transmitted, ‘1’ and if not ‘0’ is assigned.
- When the basic delivering EIT type for the relevant service is the M-EIT,
  if the part transmitted with All-stations applied transmission parameter in the M-EIT is transmitted, ‘1’ and if not, ‘0’ is assigned.
- When the basic delivering EIT type for the relevant service is the L-EIT,
  if the part transmitted with All-stations applied transmission parameter in the L-EIT is transmitted, ‘1’, and if not, ‘0’ is assigned.

13.8.2 EIT_schedule_flag

Values are assigned to EIT_schedule_flag depending on whether the part of parameters for all stations in the H-EIT[schedule basic] is transmitted, regardless of the basic delivering EIT type.

- When the basic delivering EIT type for the relevant service is the H-EIT
  If the H-EIT[schedule basic] (commonly operated EIT) is transmitted, ’1’ and if not, ’0’ is assigned.

- When the basic delivering EIT type for the relevant service is the M-EIT, if the H-EIT[schedule basic] (individually operated EIT) is transmitted, ’1’ and if not, ’0’ is assigned.
- When the basic delivering EIT type for the relevant service is the L-EIT if the H-EIT[schedule basic] (individually operated EIT) is transmitted, ’1’, and if not, ’0’ is assigned.

13.8.3 How to assign values to EIT_present_following_flag and EIT_schedule_flag in the SDT for each EIT transmission pattern examples

Based on the descriptions in Sections 13.6 and 13.7 and how to assign values explained above, some examples are given in Table 13-6. Please note that the EIT transmission patterns from 1 to 28 shown in the table below are only typical ones and do not cover all the patterns.

Table 13-6 Assignment of Values to EIT Flags in the SDT for the Examples of EIT Transmission Patterns

Pattern example	service-type	Basic delivering EIT type	H-EIT [p/f]	H-EIT [sch basic] All station part	H-EIT [sch basic] Each station part	H-EIT [sch ext] Each station part	M-EIT All station part	M-EIT Each station part	L-EIT All station part	L-EIT Each station part	EIT Type delivering Flag	SDT p/f flag	SDT sch flag
1	0x01 0xC0	H-EIT	M	M	–	–					’100’	’1’	’1’
2		H-EIT	M	M	–	O					’100’	’1’	’1’
3		H-EIT	M	M	O	O					’100’	’1’	’1’
4		H-EIT	X	X	–	–					’000’	’0’	’0’
5		H-EIT	M	X	–	–					’100’	’1’	’0’
6		M-EIT	–	–	–	–	M	–			’010’	’1’	’0’
7		M-EIT	–	–	–	–	M	O			’010’	’1’	’0’
8		M-EIT	–	–	–	–	X	–			’000’	’0’	’0’
9		M-EIT	O	–	–	–	M	O			’110’	’1’	’0’
10		M-EIT	O	O	–	O	M	O			’110’	’1’	’1’
11	0xC0	L-EIT	–	–	–	–	–	–	M	–	’001’	’1’	’0’
12		L-EIT	–	–	–	–	–	–	M	O	’001’	’1’	’0’
13		L-EIT	O	O	–	–	O	O	M	O	’111’	’1’	’1’
14		L-EIT	O	O	O	O	O	O	M	O	’111’	’1’	’1’
15		L-EIT	–	–	–	–	–	–	X	–	’000’	’0’	’0’
16	0xA1	H-EIT	O								’100’	’1’	’0’
17		H-EIT	–								’000’	’0’	’0’
18		M-EIT	–				O				’010’	’1’	’0’
19		M-EIT	O				O				’110’	’1’	’0’
20		M-EIT	–				–				’000’	’0’	’0’
21	0xA3	L-EIT	–				–		O		’001’	’1’	’0’
22		L-EIT	O				O		O		’111’	’1’	’0’
23		L-EIT	–				–		–		’000’	’0’	’0’
24	0xA4	H-EIT									’000’	’0’	’0’
25	0xAA	H-EIT	O	O	–	–					’100’	’1’	’1’
26		H-EIT	–	–	–	–					’000’	’0’	’0’
27		M-EIT	–	–	–	–	O	O			’010’	’1’	’0’
28		M-EIT	–	–	–	–	–	–			’000’	’0’	’0’

M …The transmission is mandatory

O …The transmission is optional

X …The mandatory transmission item is not transmitted

– …The optional transmission item is not transmitted

Please note that the EITs in the shaded regions in the above table cannot be transmitted.

Additionally, each digit in a number in “EIT Transmission Flag” represents a value to be assigned to ’H-EIT_flag, M-EIT_flag and L-EIT_flag. For example, ’110’ means 1, 1, and 0 are assigned to H-EIT_flag, M-EIT_flag and L-EIT_flag respectively.

As shown in the table, the basic rules are:

- Cases in which EIT_present_following_flag in the SDT become ‘1’ are;
  - If the basic delivering EIT type is the H-EIT => When the H-EIT[p/f] is transmitted.
  - If the basic delivering EIT type is the M-EIT => When the part of All-stations applied transmission parameter in the M-EIT is transmitted.
  - If the basic delivering EIT type is the L-EIT => When the part of All-stations applied transmission parameter in the L-EIT is transmitted.

- ‘1’ is assigned to the EIT_schedule_flag in the SDT in the following case;
  - When the part of All-stations applied transmission parameter in the H-EIT[schedule basic] is transmitted.

13.9 PIDs of TS Packets Which Carry EIT Sections

The PIDs of TS packets that carry EITs are different in value for each EIT type.

Table 13-7 PIDs of TS Packets Which Carry EIT Sections

EIT type	PID
H-EIT	0x0012
M-EIT	0x0026
L-EIT	0x0027

As shown in Table 13-4, there are cases where multiple types of EITs are transmitted in the same layer, but on the other hand, the same type of EITs (EITs with the same PID) are never transmitted in multiple layers at the same time.

13.10 table_id of EIT Sections

The “table_id” of the EIT sections are shown in Table 13-8.

Table13-8 “table_id” of the EIT Sections

EIT type	table_id
H-EIT[p/f]	0x4E
H-EIT[schedule basic]	0x50 to 0x57
H-EIT[schedule extended]	0x58 to 0x5F
M-EIT	0x4E
L-EIT	0x4E

See Section 13.15 for details.

13.11 Detailed Transmission of the H-EIT

13.11.1 Roles and Characteristics of the H-EIT

Because the H-EIT is the source of information to be displayed on the “TYPE-H EPG display” (equivalent of the EPG in BS digital broadcasting), it is transmitted in the same way as the “EIT” in BS digital broadcasting, etc, regarding its transmission at the table level, such as the number of characters in the character fields, descriptors to be placed, delivering range and other items. Please note that as understood from the EIT transmission model in digital terrestrial television broadcasting described above, the EIT transmission method at the service level may be different from the ones in BS digital broadcasting, etc.

13.11.2 Transmission of the H-EIT[p/f]

The H-EIT[p/f] is transmitted completely compliant with the EIT[p/f actual] defined in ARIB STD-B10.

The H-EIT[p/f] should always be transmitted for a service whose H-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’. Additionally, at least, it should always be transmitted for a service whose basic delivering EIT type is the H-EIT and at the same time, whose type is shown as “mandatory” in the H-EIT[p/f] column in Table 13-5 unless it cannot be transmitted for convenience of equipment maintenance (if it cannot be transmitted for convenience of equipment maintenance, EIT_present_following_flag in the SDT should be set to ‘0’ and H-EIT_flag in the SDT also should be set to ‘0’).

For a service whose H-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, EIT_present_following_flag is set to ‘1’, a receiver may recognize that the H-EIT[p/f] is being transmitted in accordance with a All-stations applied transmission parameter decribed in table_id=0x4E(H-EIT[p/f])in the SI Parameter Descriptor within the first loop of the BIT (delivering cycle) regardless of the service layer.

Stable transmission of the H-EIT[p/f] should be ensured once the transmission has started and as long as the service exists even if its H-EIT is an extended delivering EIT type.

The transmission parameter of the H-EIT[p/f] (delivering cycle) are specified with “table_cycle” in “table_id”=0x4E within the SI Parameter Descriptor in the first loop of the BIT.

The H-EIT[p] and H-EIT[f] have one “present” section and one “following” section respectively, and information on the current event and next event is correctly described unless unavoidable such as emergency broadcasting cut-in.

In the duration of time during which an event does not exist, there are cases where both H-EIT[p] and H-EIT[f] have empty sections. An empty section is defined as a section that has

CRC32 after the 14 bytes in the section header and in which no event loop exists.

Additionally, there are cases where “duration” is set to “undefined” (all ‘1’) in “present”, where one or both of “start_time” and “duration” are set to “undefined”(all ‘1’) in “following”. In “following”, when both of “start_time” and “duration” are undefined, it will become a undefined event (See Section 19.1).

Operation of H-EIT[p/f]s, which is in between where no event exist is explained in Figure 13-5. This example shows that Event-A ends at 1:00 am and Event-B which is scheduled to be broadcast next starts at 2:00 am. In the duration of time during which Event-A is being broadcast, information on Event-B is described in the H-EIT[following] and transmitted (Pattern 1). This pattern is the basic operation but the H-EIT[following] can have an empty section in some transmission facilities (Pattern 2). Also, the H-EIT[following] in the duration of time during which an event does not exist can have an empty section (Pattern 3). In this case, information on Event-B should be described in the H-EIT[following] and transmitted at least 30 seconds before the start time of Event-B without fail. Therefore, when the duration of time during which an event does not exist is less than 30 seconds, information on Event-B should be described in the H-EIT[following] and transmitted 30 seconds before the start time of Event-B or earlier (i.e. while Event-A is being broadcast) (only pattern 1 operation is possible).
Please note that “duration during which an event does not exist” does not necessarily mean “a video/audio component is being suspended”.

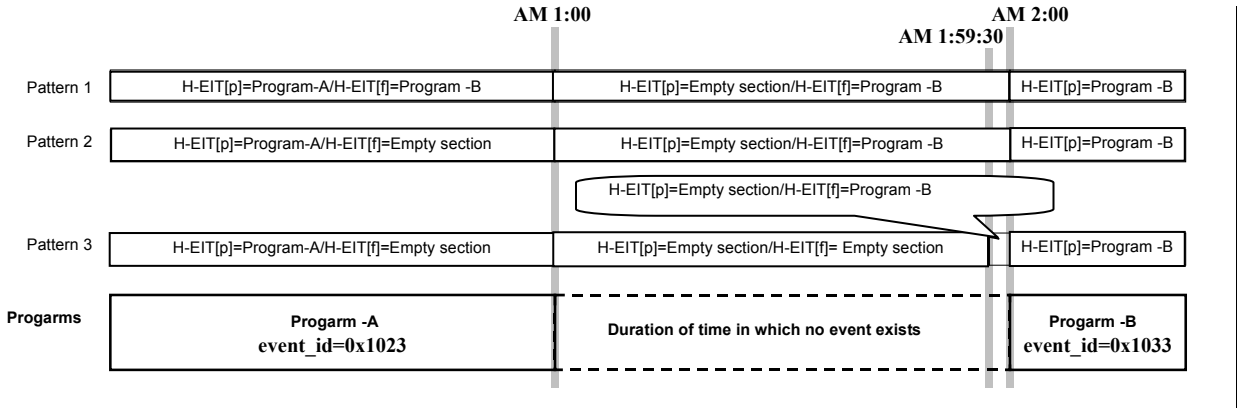


Figure 13-5 Transmission of H-EIT[p/f]s with Duration during Which an Event Does Not Exist

The running status is always set to “reserved (0x0)”.

13.11.3 Transmission of the H-EIT[schedule] (Common Operation for "basic" and "extended")

The H-EIT[schedule] is transmitted completely compliant with the EIT[schedule actual] defined in ARIB STD-B10.

Up to 8 sections can be used per 1 segment per 3 hours (segment) in the H-EIT[schedule]. A group of events with "start_time" defined within the range of segment time shown with "section_number" is stored up to 8 sections. On the other hand, even if no event which belongs to a segment in the delivering range (event in which "start_time" exists within the segment) exist, at least one empty section, which has CRC32 after the 14th bytes in the section header and in which no event loop exists, should be transmitted for the segment.

With regard to an event for the day, only a segment with the current time and subsequent segments should be transmitted, and transmission of the H-EIT[schedule] is stopped on a segment basis for a segment which becames a past segment because a certain time has passed.

For the relation between "section_number" and segments, see Section 13.15.

After the transmission of completely new information on a certain event started (event of which transmission started when a date changes, for example, an event included in the H-EIT[schedule] on the 8th day), among information regarding the event that had been described in the beginning of the transmission, such information, like the copy control information in the Digital Copy Control Descriptor, etc, that may affect programming behavior of receiver should not be changed (if it has to be changed due to unavoidable circumstances, give due consideration to viewers who have already programmed this event). However, changes may be made to the Short Event Descriptor and Extended Event Descriptor only when it is unavoidable such as a case where a name of a person was written incorrectly.

In addition, the H-EIT[schedule] should be transmitted according to the following rules.

- An event with date and time which is different from the segment date and time worked out from the current date and the "section_number" specified as "start_time" should not be described in the section with the section number.
- When all the events defined in the H-EIT[schedule] are placed based on the time-line of "start_time" and "duration", the events should not overlap at any moment. On the other hand, duration of time during which no event exists may exist.
- Over the delivering range, more than one event with the same "event_id" cannot exist (the same "event_id" should not be re-used for past events until a certain time passes. See Section 8.2.1).
- Any events whose "start_time" is set to "reserved" (all '1'), "duration" is set to (all '1') and

both “start_time” and “duration” are set to “undefined” (undefined event) should not be transmitted.

Stable transmission of the H-EIT[schedule] should be ensured once the transmission has started as long as the service exists even if its H-EIT is an extended delivering EIT type.

All the running status is set to “reserved (0x0)”.

13.11.4 Transmission of the H-EIT[schedule basic]

As described in Section 13.4, the H-EIT[schedule basic] can be divided into the following four parts.

(1) Part transmitted in accordance with All-stations applied transmission parameter for a service whose basic delivering EIT type is the H-EIT

(2) Part transmitted in accordance with each-station applied transmission parameter for a service whose basic delivering EIT type is the H-EIT

(3) Part transmitted in accordance with All-stations applied transmission parameter for a service whose extended delivering EIT type is the H-EIT

(4) Part transmitted in accordance with each-station applied transmission parameter for a service whose extended delivering EIT type is the H-EIT

(See Figure 13-6)

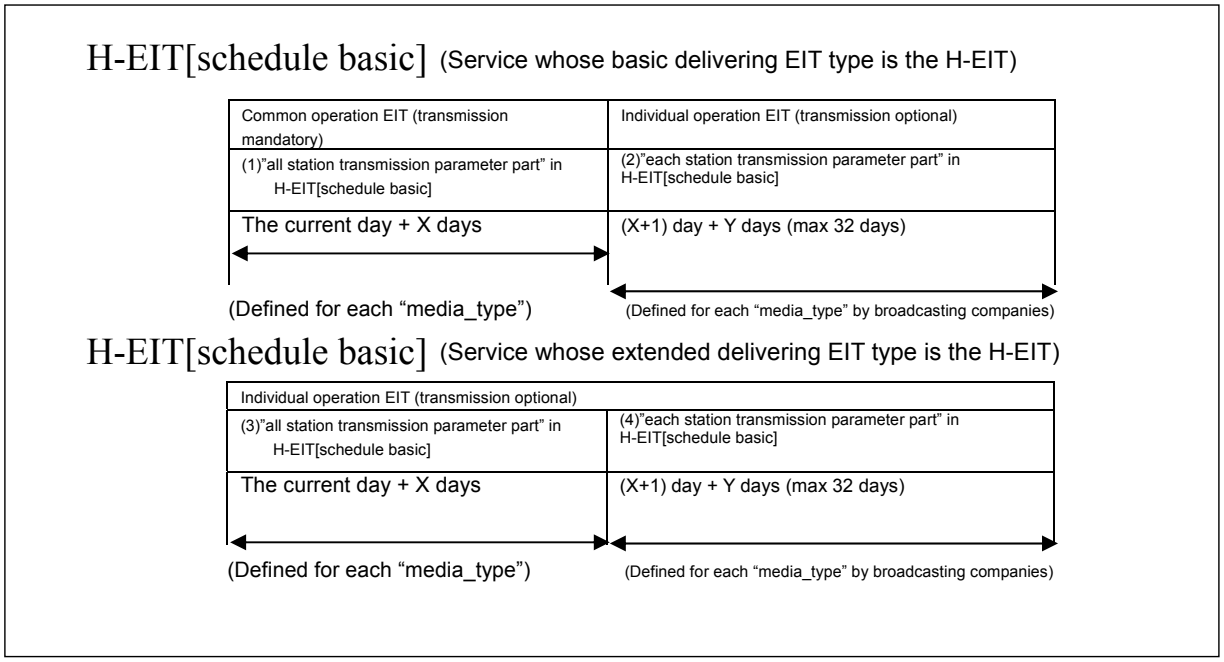


Figure 13-6 Distinctions between H-EIT[schedule basic] Services from the Operational Point of View

As described above, the transmission rules regarding the above four types are as follows.

- Transmission of (1) is mandatory for all the services (except for special “service_type” explained in Section 13.6.1)
- Transmission of (3) is mandatory when the H-EIT is transmitted as an extended delivering EIT type for a certain service.
- For all service groups which transmit the H-EIT as an extended delivering EIT type, (4) should be transmitted with the same parameters as (2) for each “media_type” (cases where only (1), (2) and (3) are transmitted and (4) is not and where only (1), (3) and (4) are transmitted and (2) is not are not allowed).

The only difference between the top part (when the H-EIT is basic delivering EIT type) and the bottom part (when the H-EIT is extended delivering EIT type) in Figure 13-6 is whether transmission is mandatory or optional and operation of tables themselves is the same. Therefore, explanation is given for the parts transmitted in accordance with All-stations applied transmission parameter ((1) and (3)) and the parts transmitted in accordance with each-station applied transmission parameter ((2) and (4)).

13.11.4.1 Transmission of the Part Transmitted in Accordance with All-stations applied transmission parameter in the H-EIT[schedule basic]

The part transmitted in accordance with All-stations applied transmission parameter in the H-EIT[schedule basic] should be transmitted for a service whose H-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, whose EIT_schedule_flag in the SDT is set to ‘1’. Additionally, at least, it should always be transmitted for a service whose basic delivering EIT type is the H-EIT and at the same time, whose type is shown as “mandatory” in the H-EIT[schedule basic] column in Table 13-5 unless it cannot be transmitted for convenience of equipment maintenance (if it cannot be transmitted for convenience of equipment maintenance, EIT_schedule_flag in the SDT should be set to ‘0’).

The delivering range of the part transmitted in accordance with All-stations applied transmission parameter in the H-EIT[schedule basic] should be defined as D1 days starting from the current day when the “media_type” is TV type (value defined when the broadcasting started: 8 days) and D3 days for data type (same: 2 days). (See table 12-1)

Repetition rate group structures and deliveringcycles that include the above D1 and D3 (see Section 13.14 for repetition rate groups) should be specified in the “table_id=0x50” part within the SI Parameter Descriptor placed in the first loop of the BIT. Additionally, parameters for all

the “media_type” (TV type and data type) should be described in the SI Parameter Descriptor placed in the first loop of the BIT, regardless of the “media_type” of the service within in the actual TS. Please note that when default All-stations applied transmission parameter are used, this description can be omitted (see Section 13.14.4 for details).

For a service whose H-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, EIT_schedule_flag is set to ‘1’, a receiver identifies the “media_type” from the “service_type” (described in the NIT) and may recognize that the part transmitted in accordance with All-stations applied transmission parameter in the H-EIT[schedule basic] is being transmitted in accordance with All-stations applied transmission parameter for this “media_type” described in “table_id=0x50” (H-EIT[schedule basic])in the SI Parameter Descriptor within the first loop of the BIT, regardless of the service layer.

13.11.4.2 Transmission of the Part Transmitted in Accordance with Each-station applied transmission parameter in the H-EIT[schedule basic]

When the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic] is transmitted, transmission parameters in “table_id=0x50”(H-EIT[schedule basic])should be described in the SI Parameter Descriptor within the second loop of the BIT for each “media_type”.

The delivering range is defined as (D1+1) days to D4 days for TV type and (D3+1) days to D6 days for data type, and specification of these is optional for each terrestrial broadcaster. Please note that there is a limit to the number of days that can be specified for D4 and D6 (See Section 13.14.1.4). (See Table 12-3)

For a service whose H-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, EIT_schedule_flag is set to ‘1’, a receiver identifies the “media_type” from the “service_type” (described in the NIT), and when transmission parameters for this “media_type” is described in the “table_id=0x50”(H-EIT[schedule basic])part in the SI Parameter Descriptor within the second loop of the BIT, it may recognize that the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic] is being transmitted in accordance with the transmission parameter, regardless of the service layer.

13.11.5 Transmission of the H-EIT[schedule extended]

In the H-EIT[schedule basic], up to eighty 2-byte characters and at the same time, up to 192-bytes described in the Short Event Descriptor can be used for explanation of a event. Therefore, more detailed information called “event extended information” can be described in the H-EIT[schedule extended] and transmitted.

The H-EIT[schedule extended] is never transmitted as a commonly operated SI and an individually operated SI that can be transmitted optionally by each broadcaster. Thus, when the H-EIT[schedule extended] is transmitted, transmission parameters (delivering range and delivering cycle) in “table_id=0x58”(H-EIT[schedule extended])should be described within the SI Parameter Descriptor in the second loop of the BIT for each “media_type” regardless of the service layer.

The H-EIT[schedule extended] is transmitted according to the following rules.

- The H-EIT[schedule extended] should be transmitted over a delivering range which is the same as or shorter than the one of the H-EIT[schedule basic] for the same service.
- An event that is not defined in the H-EIT[schedule basic] should not be defined in the H-EIT[schedule extended].
- The same “event_id” should be specified for the H-EIT[schedule basic] and H-EIT[schedule extended] of the same event.
- In the H-EIT[schedule basic] and H-EIT[schedule extended] with the same “event_id”, the same “start_time”, “duration” and “free_CA_mode” should be described without fail.

All the events defined in the H-EIT[schedule basic] do not always have to be defined within the H-EIT[schedule extended]. The ratio of the number of events defined in the H-EIT[schedule extended] to the number of events defined in the H-EIT[schedule basic] can be specified in the pattern field in the SI Parameter Descriptor within the second loop of the BIT as an operation pattern.

Furthermore, when a program is shared over events with multiple “service_id”s, the event loop does not have to be described in the “referred from” service_id (see Section 17.4.3).

Similarly to the H-EIT[schedule basic], even if no event that belongs to a segment within the delivering range of the H-EIT[schedule extended] exist, at least one empty section should be transmitted for each segment,

The delivering range should be defined as D7 days starting from the current day when

"media_type" is TV type and D9 days for data type (same: 2 days). Specification of these is optional for each terrestrial broadcaster. Please note that there is a limit to the number of days that can be specified for D7 and D9 (See Section 13.14.1.4).(See table 12-3)

For a service whose H-EIT_flag (EIT type delivering flag in the SDT) is set to '1' and at the same time, EIT_schedule_flag is set to '1', a receiver identifies the "media_type" from the "service_type" (described in the NIT), and when transmission parameters for this "media_type" is described in the "table_id=0x58" (H-EIT[schedule extended])part in the SI Parameter Descriptor within the second loop of the BIT, it may recognize that the H-EIT[schedule extended] is being transmitted in accordance with the transmission parameters, regardless of the service layer.

13.11.6 Consistency between H-EIT[schedule extended] and H-EIT[p/f]

When the H-EIT[schedule extended] is transmitted for a certain "media_type", and when an event described in the H-EIT[schedule extended] becomes a "present" or "following" event, exactly the same descriptor as the one placed in the descriptor loop for this event in the H-EIT[schedule extended] should be added in the descriptor loop for this event in the H-EIT[p/f]. This is because, when a present event exists over multiple segments, information described in "extended" of the present event will not be able to be obtained as the transmission of the H-EIT[schedule extended] is stopped for a past segment.

13.12 Detailed Transmission of the M-EIT/L-EIT

13.12.1 Roles and Characteristics of the M-EIT

The M-EIT is the source of information to be displayed on the "TYPE-M EPG display". The "TYPE-M EPG display" mainly targets mobile receiver and, which are not designed based on the assumption that they automatically search EIT information for all services which can be received when they are off and store obtained information in the receivers' memory like fixed receiver do. It targets only a few inch displays, which are not assumed that they display in the rich EPGs across broadcasting companies like fixed receiver do (equivalent of BS digital broadcasting) (the above are merely "assumptions" and do not define concrete specifications of receiver).

The most major differences between the H-EIT and M-EIT are assumed display forms as well as the amount of information to be displayed. The H-EIT, which is assumed to be displayed on fixed receiver, is transmitted based on the assumption that it is displayed in the "table form" for multiple services like the TV/radio schedule on the general newspapers, on the other hand, the M-EIT is transmitted based on the assumption that it is displayed in the "list

form” in which events are simply listed. Therefore, the EIT[schedule] that has a fixed time-line called “segments” and is strongly conscious of being displayed in the “table form” is not transmitted.

13.12.2 Roles and Characteristics of the L-EIT

The L-EIT is the source of information to be displayed on the “TYPE-L-EPG display”. The “TYPE-L EPG display” mainly targets partial receiver which have displays even smaller than mobile receiver. Also, the transmission capacity in the partial reception layer is extremely small. Due to these reasons, it is defined with the biggest goal of having the minimum information regarding the character field size, descriptors to be placed and the number of transmitted events, etc. Similarly to the M-EIT, the L-EIT is transmitted based on the assumption that it is displayed in the “list form” and the EIT[schedule] is not transmitted.

When the L-EIT is transmitted,

- The L-EIT is never transmitted as an extended delivering EIT type.
- Different values from the ones in the M-EIT can be specified for All-stations applied transmission parameter (number of events and repetition rate) and for each-station applied transmission parameter (number of events and repetition rate).

The above two points are the only difference between the M-EIT and L-MIT, and basically, it is transmitted in the same way as the M-EIT.

13.12.3 Definition of Sub-table Structures and expression format of the M-EIT/L-EIT

The M-EIT and L-EIT are transmitted completely compliant with the EIT[p/f actual] defined in ARIB STD-B10, and information on events after the next event is also transmitted in the same sub-table. The structure of a sub-table is shown below.

- Current event (present) => “ section_number” =0 (1 event in 1 section)
- Next event (following) => “ section_number” =1 (1 event in 1 section)
- Event(s) after the next event (after) => “ section_number” =2 or later (more than one event in 1 section)

In other words, the current event and the next event are transmitted in the same way as the H-EIT[p/f], but the event(s) after the next event can be described only in the H-EIT[schedule] in the H-EIT, on the other hand, in the M-EIT and L-EIT, they can be described in sections whose section number is 2 or later (more than one event in 1 section) within the same sub-table as p/f (instead, the EIT[schedule] is not transmitted in the M-EIT/L-EIT).

The M-EIT and L-EIT are transmitted according to the following rules.

- In the M-EIT, “last_section_number” should always be between 0x01 and 0x04.
- In the L-EIT, “last_section_number” should always be between 0x01 and 0x03.

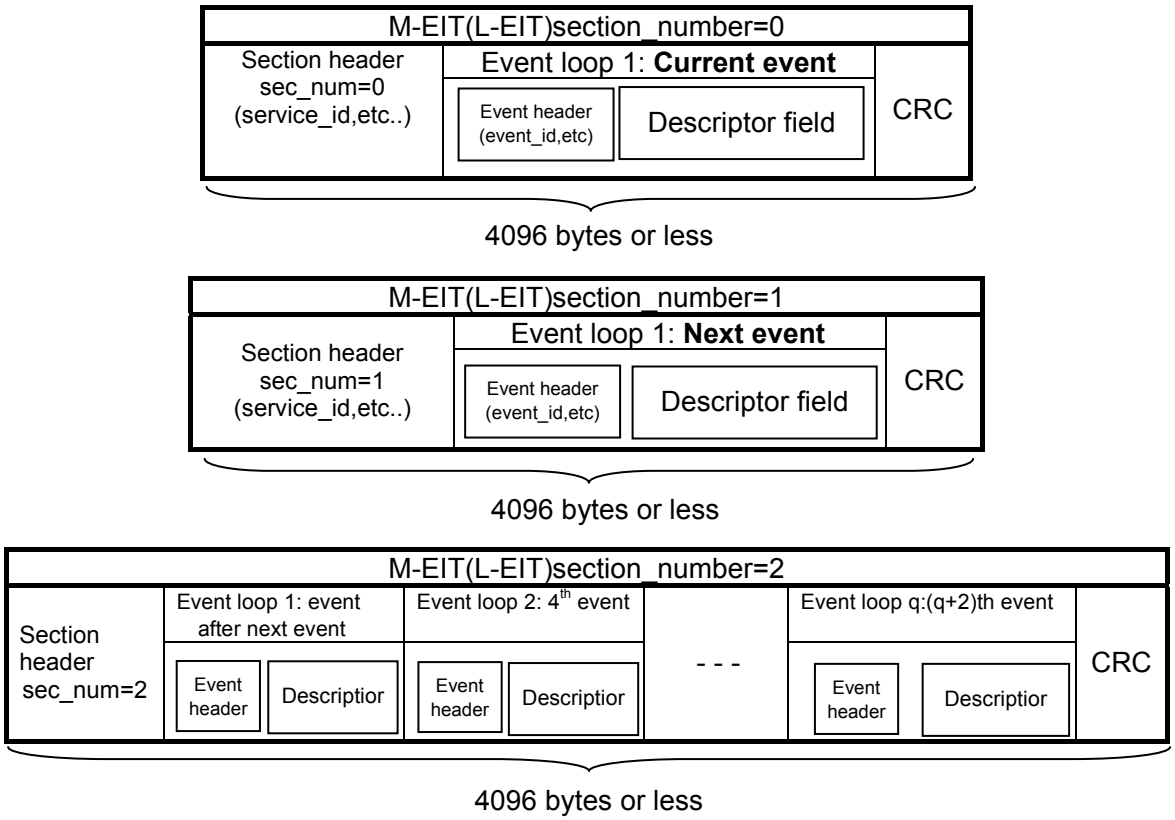
In other words, in the M-EIT, event(s) after the next event should be decribed within up to 3 sections, and in the L-EIT, they should be described within up to 2 sections.

- In both M-EIT and L-EIT, the maximum number of events that can be transmitted including the present/next events is 10 regardless whether the parameters are All-stations applied transmission parameter or each station.
- In the section(s) in which information on event(s) after the next events is stored, the event loops should be described in order of “start_time”.
- No “section_number” should be skipped.

In other words, for example, when the delivering range which is a All-stations applied transmission parameter in the M-EIT is set to 5 events and the delivering range which is a All-stations applied transmission parameter in the L-EIT is set to 2 events, the number of events that can be specified with each-station applied transmission parameter is between 6 and 10 in the M-EIT, and between 3 and 10 in the L-EIT. And when more than one event after the next event is mapped into sections, the event loops should be described in order of “start_time” and at the same time, events should be mapped in ascending order of “section_number”.

Please note that there are restrictions on how to map information on events after the next event (after) into sections depending on the delivering range that is transmitted as a All-stations applied transmission parameter (number of events). See Section 13.15.6 for details.

Figure 13-7 shows the structures of the M-EIT and L-EIT



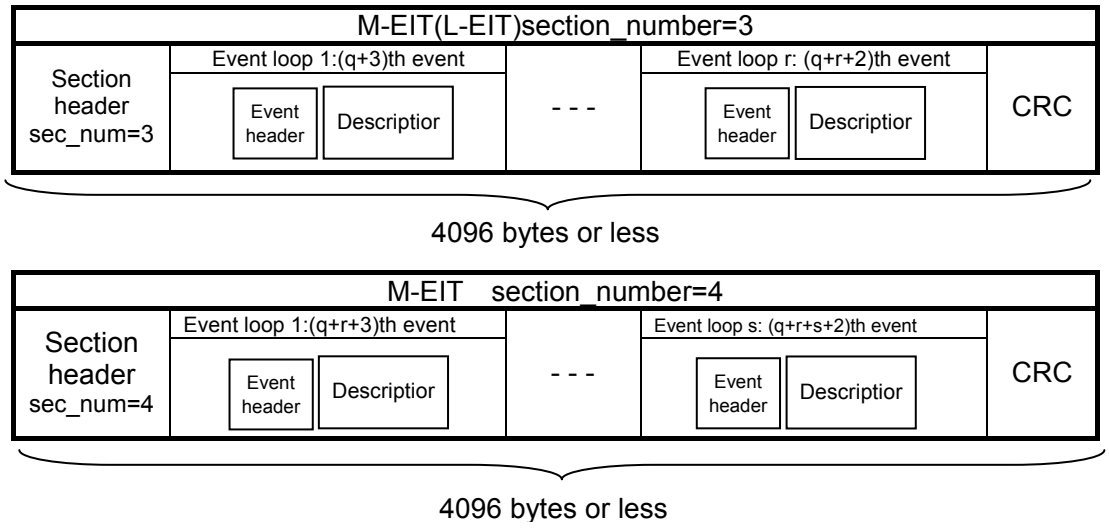


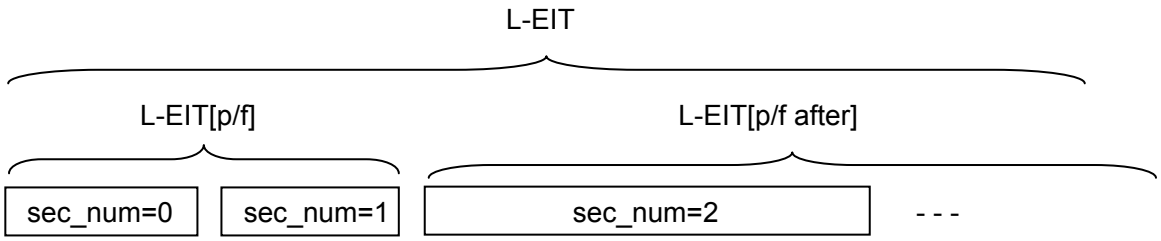
Figure 13-7 Structures of the M-EIT and L-EIT

The transmission rules in Figure 13-7 are as follows.

- The section numbers in the L-EIT should be 1<="last_section_number"<=3.
- Number of events in the L-EIT should be q+r+2<=10 (any value can be specified for q and r)
- The section numbers in the M-EIT should be 1<="last_section_number"<=4.
- Number of events in the M-EIT should be q+r+s+2<=10 (any value can be specified for q and r).

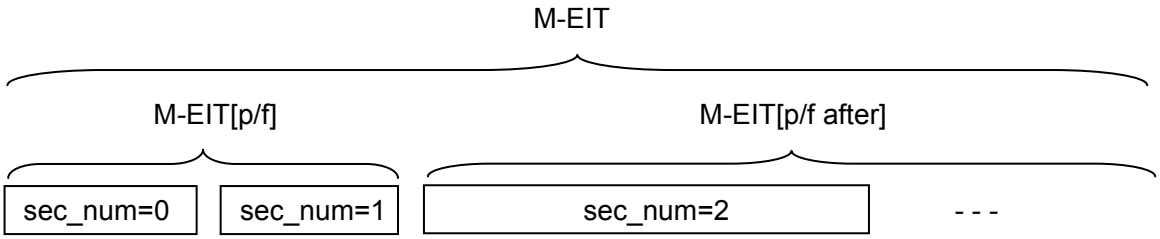
The names of each section are defined as follows.

- L-EIT



- "sec_num=0" and "sec_num=1" in the L-EIT are collectively called "L-EIT[p/f]".
- Sections with "sec_num=2" or later in the L-EIT are collectively called "L-EIT[p/f after]".

- M-EIT



  - “sec_num=0” and “sec_num=1” in the M-EIT are collectively called “M-EIT[p/f]”
  - Sections with “sec_num=2” or later in the M-EIT are collectively called “M-EIT[p/f after]”.

- Definition of terms to ensure consistency within Provisions for Operation (Vol. 4)
  M-EIT……Collective term for M-EIT[p/f] and M-EIT[p/f after]
  L-EIT…….Collective term for L-EIT[p/f] and L-EIT[p/f after]
  EIT[p/f] …… Collective term for H-EIT[p/f], M-EIT[p/f] and L-EIT[p/f]
  (M-EIT[p/f after] and L-EIT[p/f after] are not included)

Thus, special operation of the EIT[p/f] such as use of “undefined event” and “undefined time” is applied to the M-EIT[p/f] (section_number=0 and 1 in the M-EIT)and the L-EIT[p/f] (section_number=0 and 1 in the L-EIT).

13.12.4 Detailed transmission of the M-EIT/L-EIT

Similarly to the H-EIT[schedule basic], the M-EIT can be divided into the following four parts.

(1) Part transmitted in accordance with a All-stations applied transmission parameter for a service whose basic delivering EIT type is the M-EIT
(2) Part transmitted in accordance with a each-station applied transmission parameter for a service whose basic delivering EIT type is the M-EIT
(3) Part transmitted in accordance with a All-stations applied transmission parameter for a service whose extended delivering EIT type is the M-EIT
(4) Part transmitted in accordance with a each-station applied transmission parameter for a service whose extended delivering EIT type is the M-EIT.

The L-EIT can be divided into two parts as there are no services whose extended delivering EIT type is the L-EIT:

(1) Part transmitted in accordance with a All-stations applied transmission parameter for a service whose basic delivering EIT type is the L-EIT
(2) Part transmitted in accordance with a each-station applied transmission parameter for a service whose basic delivering EIT type is the L-EIT

(See Figure 13-8)

The differences from the transmission of the H-EIT are listed below.

- In the H-EIT[schedule basic], transmission parameters can be specified for each “media_type”, but in the M-EIT and L-EIT, only one transmission parameter is used respectively, regardless of the “media_type”.
- A delivering range and repetition rate group in the H-EIT[schedule basic] are set up for a number of days or segments, but in the M-EIT and L-EIT, they are set up for a number of events.
- The M-EIT and L-EIT, not like the H-EIT[schedule basic], do not have extended repetition rate groups and only two repetition rate groups can be used – one is for the part transmitted in accordance with All-stations applied transmission parameter and other is for the part transmitted in accordance with each-station applied transmission parameter

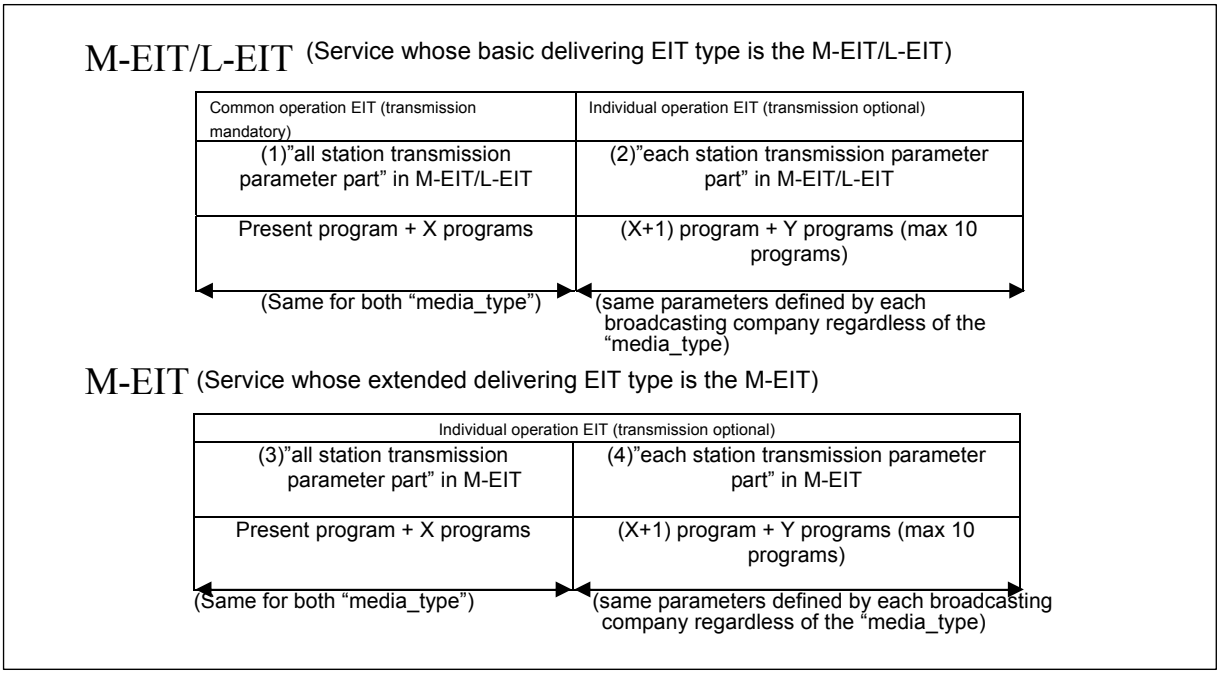


Figure 13-8 Distinction between M-EIT and L-EIT Services from the Operational Point of View

As described above, the transmission rules regarding the four types in Figure 13-8 are as follows.

- Transmission of (1) is mandatory in the M-EIT/L-EIT (except for special “service_type” explained in Section 13.6.1)

- Transmission of (3) is mandatory when the M-EIT is transmitted as an extended delivering EIT type for a certain service.
- For all service groups for which the M-EIT is transmitted as an extended delivering EIT type, (4) should be transmitted with the same parameters as (2) regardless of the "media_type" (Cases where only (1), (2) and (3) are transmitted and (4) is not, and where only (1), (3) and (4) are transmitted and (2) is not are not allowed).

Please note that there are restrictions on how to map information on events after the next event (EIT[p/f after]) into sections depending on the delivering range that is transmitted as a All-stations applied transmission parameter (number of events). See Section 13.15.6 for details.

The only difference between the top part (when the M-EIT/L-EIT is basic delivering EIT type) and the bottom part (when the M-EIT/L-EIT is extended delivering EIT type) in Figure 13-8 is whether transmission is mandatory or optional and operation of tables themselves are the same, so, explanation is given for the parts transmitted in accordance with All-stations applied transmission parameter ((1) and (3)) and the parts transmitted in accordance with each-station applied transmission parameter ((2) and (4)).

13.12.4.1 Transmission of the Part Transmitted in Accordance with All-Station applied transmission parameter in the M-EIT/L-EIT

- M-EIT

The part transmitted in accordance with All-stations applied transmission parameter in the M-EIT should always be transmitted for a service whose M-EIT_flag (EIT type delivering flag in the SDT) is set to '1' and at the same time, whose EIT_present_following_flag in the SDT is set to '1'. Additionally, at least, it should always be transmitted for a service whose basic delivering EIT type is the M-EIT and at the same time, whose type is shown as "mandatory" in the M-EIT column in Table 13-5 unless it cannot be transmitted for convenience of equipment maintenance (if it cannot be transmitted for convenience of equipment maintenance, EIT_present_following_flag in the SDT should be set to '0' and at the same time, M-EIT_flag (EIT type delivering flag in the SDT) should be set to '0').

For a service whose M-EIT_flag (EIT type delivering flag in the SDT) is set to '1' and at the same time, EIT_present_following_flag is set to '1', a receiver may recognize that the M-EIT in the part transmitted in accordance with All-stations applied transmission parameter is being transmitted in accordance with All-stations applied transmission parameter described in "table_id=0x4E" (M-EIT)in the SI Parameter Descriptor within the first loop of the BIT, regardless of the service layer.

The delivering range (number of events) of the part transmitted in accordance with All-stations applied transmission parameter in the M-EIT should be defined as EM1 event including the current event, regardless of the “media_type”.

The above EM1 and repetition rate are specified in the “table_id=0x4E” part in the SI Parameter Descriptor placed within the first loop of the BIT (repetition rate: specified with “M-EIT_table_cycle”, number of events (EM1): specified with “num_of_M-EIT_event”).

Additionally, transmission parameters regarding the M-EIT should be described in the SI Parameter Descriptor placed in the first loop of the BIT, even when any M-EIT is not used within the actual TS. Please note that when default All-stations applied transmission parameter are used, this description can be omitted (see Section 13.14.4 for details).

- L-EIT

The part transmitted in accordance with All-stations applied transmission parameter in the L-EIT should always be transmitted for a service whose L-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, whose EIT_present_following_flag in the SDT is set to ‘1’. Additionally, at least, it should always be transmitted for a service whose basic delivering EIT type is the L-EIT and at the same time, whose type is shown as “mandatory” in the L-EIT column in Table 13-5 unless it cannot be transmitted for convenience of equipment maintenance (if it cannot be transmitted for convenience of equipment maintenance, EIT_present_following_flag in the SDT should be set to ‘0’ and L-EIT_flag (EIT type delivering flag in the SDT) should be set to ‘0’).

For a service whose L-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, EIT_present_following_flag is set to ‘1’, a receiver may recognize that the L-EIT in the part transmitted in accordance with All-stations applied transmission parameter is being transmitted in accordance with the All-stations applied transmission parameter described in “table_id=0x4E” (L-EIT)within the SI Parameter Descriptor within the first loop of the BIT, regardless of the service layer.

The delivering range (number of events) of the L-EIT in the part transmitted in accordance with All-stations applied transmission parameter should be defined as EL1 event including the current event, regardless of the “media_type”.

The above EL1 and repetition rate are specified in the “table_id=0x4E” part in the SI Parameter Descriptor placed in the first loop of the BIT (repetition rate: specified with “L-EIT_table_cycle”, number of events (EL1): specified with “num_of_L-EIT_event”).

Additionally, parameters regarding the L-EIT should be described in the SI Parameter

Descriptor placed in the first loop of the BIT, even when any L-EIT is not used within the actual TS. Please note that when default All-stations applied transmission parameter are used, this description can be omitted (see Section 13.14.4 for details).

13.12.4.2 Transmission of the Part Transmitted in Accordance with Each-Station applied transmission parameter in the M-EIT/L-EIT

- M-EIT

When the part transmitted in accordance with each-station applied transmission parameter in the M-EIT is transmitted, “table_id=0x4E” should be descriebd in the SI Parameter Descriptor within the second loop of the BIT and at the same time, “table_cycle” (M-EIT)and “num_of_M-EIT_event” should be described.

A delivering range should be defined as (EM1+1) event to EM2 event, regardless of the “media_type”, and specification of EM2 is optional for each terrestrial broadcaster. Please note that the maximum number of events specified for EM2 is 10.

For a service whose M-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, EIT_present_following_flag is set to ‘1’, a receiver may recognize that the part transmitted in accordance with each-station applied transmission parameter in the M-EIT is being transmitted at the cycle described in “table_cycle”(M-EIT), regardless of the service layer, when a value larger than the number of events defined for a All-stations applied transmission parameter is described in “num_of_M-EIT_event” in “table_id=0x4E” part in the SI Parameter Descriptor within the second loop of the BIT.

- L-EIT

When the part transmitted in accordance with each-station applied transmission parameter in the L-EIT is transmitted, “table_id=0x4E” should be described in the SI Parameter Descriptor within the second loop of the BIT and at the same time, “table_cycle” (L-EIT)and “num_of_L-EIT_event” should be described.

A delivering range should be defined as (EL1+1) event to EL2 event, regardless of the “media_type”, and specification of EL2 is optional for each terrestrial broadcaster. Please note that the maximum number of events specified for EL2 is 10.

For a service whose L-EIT_flag (EIT type delivering flag in the SDT) is set to ‘1’ and at the same time, EIT_present_following_flag is set to ‘1’, a receiver may recognized that the L-EIT in the part transmitted in accordance with each-station applied transmission parameter is being transmitted at the cycle described in “table_cycle” (L-EIT), regardless of the service layer,

when a value larger than the number of events defined for a All-stations applied transmission parameter is described in “num_of_L-EIT_event” in “table_id=0x4E” part in the SI Parameter Descriptor within the second loop of the BIT.

13.12.4.3 Transmission of the M-EIT[p/f]/L-EIT[p/f] in the Duration of Time During Which No Event Exists

If the present time is in the duration of time during which an event does not exist, or it becomes duration of time where an event does not exist after a current event ends, there may be cases where M-EIT[p/f] and L-EIT[p/f] have empty sections. An empty section is defined as a section that has CRC32 after the 14 bytes in the section header and in which no event loop exists.

The transmission of the M-EIT[p/f]/L-EIT[p/f] with suspension of a event in between is compliant with the transmission of the H-EIT[p/f] (see Section 13.11.1).

13.13 Consistency between EIT types

When extended delivering EIT type are transmitted, the same event will be defined in multiple types of EITs. The following rules should be applied.

- For the same event, the same value should be assigned to “event_id” in multiple types of EITs.
- For the same “event_id”, the same values should be assigned to “start_time”, “duration” and” free_CA_mode” respectively in multiple types of EITs.
- For the same “event_id”, the same event attributes (copy control etc) should be assigned in multiple types of EITs.
- In order to update information in an EIT (version_up), basically, the relevant information in other EITs should be updated at the same time, in which case, the highest priority should be given to updating the present/next events in the Basic delivering EIT type (H-EIT[p/f], M-EIT[p/f] and L-EIT[p/f]).

13.14 Setup of EIT Repetition Rate Groups

This chapter exmplains about repetition rate groups of EITs in detail. Please see Section 12.3 for the definition of repetition rate groups. A total of 16 EIT repetition rate groups exist as shown in Table 13-9

Table 13-9 EIT Repetition Rate Groups

Group No.	Table type	media_type	Repetition rate group type
1	H-EIT[p/f]		
2	H-EIT[schedule basic] (part transmitted with All-stations applied transmission parameter)	TV type	Basic repetition rate group
3			Extended repetition rate group 1
4			Extended repetition rate group 2
5		Data type	Basic repetition rate group
6			Extended repetition rate group
7	H-EIT[schedule basic] (part transmitted with each-station applied transmission parameter)	TV type	Basic repetition rate group
8		Data type	Basic repetition rate group
9	H-EIT[schedule extended]	TV type	Basic repetition rate group
10			Extended repetition rate group
11		Data type	Basic repetition rate group
12			Extended repetition rate group
13	M-EIT (part transmitted with All-stations applied transmission parameter)	For both media_types	Basic repetition rate group
14	M-EIT (part transmitted with each-station applied transmission parameter)	For both media_types	Basic repetition rate group
15	L-EIT (part transmitted with All-stations applied transmission parameter)	For both media_types	Basic repetition rate group
16	L-EIT (part transmitted with each-station applied transmission parameter)	For both media_types	Basic repetition rate group

13.14.1 Setup of H-EIT Repetition Rate Groups

Repetition rate groups of H-EIT shall be the 12 groups with group numbers 1-12 described in Table 13-9.

Group numbers 1-6 are repetition rate groups of the all-stations applied transmission parameter section, and the parameter for each repetition rate group shall be specified in the SI Parameter Descriptor of the first loop of BIT (same parameter to be specified for all operators).

The repetition rate groups from No. 7 to 12 are for parts transmitted in accordance with each-station applied transmission parameter and parameters should be specified for each repetition rate group in the SI Parameter Descriptor within the second loop of the BIT when individually operated EITs are transmitted in accordance with the each-station applied transmission parameter (the same parameters are setup within a terrestrial broadcaster).

13.14.1.1 H-EIT[p/f] (Group No.1)

As the H-EIT[p/f] needs to be transmitted for instantaneous display of a current event, sudden change of air times due to a live baseball game broadcast, etc and execution of programming behavior of receiver, it should be transmitted at the shortest cycle among H-EITs. Only one repetition rate group is set up for the H-EIT[p/f] for all the “media_type”, so different cycles cannot be setup for each “media_type” (the H-EIT[p/f] is transmitted at the same cycle for all the services). Additionally, a H-EIT[p/f] repetition rate group is defined as a All-stations applied transmission parameter, thus, the same transmission cycle is specified for all broadcasting companies.

13.14.1.2 H-EIT[schedule] (Group No. 2 to 12)

There are two types of H-EIT[schedule] repetition rate groups – one is called basic repetition rate group and the other is called extended repetition rate group.
The H-EIT[schedule] in digital terrestrial television broadcasting is transmitted at a very long transmission cycle based on the assumption that it is stored in fixed receiver before use, and a repetition rate group for which a basic re-transmission cycle is set up based on this assumption is called basic repetition rate group. On the other hand, a repetition rate group with a shorter re-transmission cycle may be set up, for example, in order to enable a certain degree of operation even when information has not been stored such as at the start-up of a receiver, and such a repetition rate group is called extended repetition rate group.

Basic repetition rate groups and extended repetition rate groups are set up for each table type in the H-EIT[schedule] and the numbers are invariable but the values for transmission parameters for each repetition rate group are variable.

The relation between basic repetition rate groups and extended repetition rate groups for each table type in the H-EIT[schedule] (for a single “media_type”) are shown below.

- The re-transmission cycle time of a basic repetition rate group is longer than the total cycle time of all the extended repetition rate groups.

- Extended repetition rate groups are placed in chronological order in the EIT[schedule] and a repetition rate group at an earlier time has a shorter re-transmission cycle.
- The extended repetition rate group with the shortest re-transmission cycle always include the segment of the moment.

The transmission of the H-EIT[schedule] should be defined for each “media_type” (see Section 9.2). When the “media_type” is different, the number of days of event information transmitted as the H-EIT[schedule] becomes different, and a different repetition rate should be setup for each “media_type”.

13.14.1.3 H-EIT[schedule basic] Part Transmitted in Accordance with All-station applied transmission parameter(Group No. 2 to 6)

The H-EIT[schedule basic] is designed so that different repetition rate groups can be set up for different times (delivering range) and different “media_type”. Conversely, different repetition rate groups cannot be set up for services within the same “media_type”.

When an extended repetition rate group is set up, the number of segments to show the corresponding time should be defined. This number of segments is a total number of segments included in the repetition rate group for a single service. This number of segments is variable within a certain range.

The repetition rate groups defined for the H-EIT[schedule basic] and parameters to show the ranges are listed in Section 12.3.2. As shown above, repetition rate groups are set up for each “media_type” and in each repetition rate group, there are one basic repetition rate group and multiple extended repetition rate groups. The numbers of extended repetition rate groups are fixed and it is 2 when the “media_type” is “TV type” and 1 when the “media_type” “data type”.

A repetition rate group in the part transmitted with All-stations applied transmission parameter in the H-EIT[schedule basic] is defined as a All-stations applied transmission parameter, so the delivering range and repetition rate of each repetition rate group are operated in the same way by all broadcasting companies.

13.14.1.4 H-EIT[schedule basic] Parts Transmitted in Accordance with Each-station applied transmission parameter and the H-EIT[schedule extended] (Group No. 7 to 12)

The parts transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic] and the H-EIT[schedule extended] are transmitted in accordance with each-station applied transmission parameter.

Each-station applied transmission parameter in the H-EITs are standardized for each “media_type” within a terrestrial broadcaster and transmitted. Transmission of each-station applied transmission parameter can be operated for each terrestrial broadcaster uniquely and whether or not transmission should be operated is also optional.

However, making all aspects in the operation optional is not desirable when a burden of receiver development, unification of information presentation to viewers are considered. Therefore, some operational patterns are prepared enabling each terrestrial broadcaster to choose one.

Operational patterns include the following types.

(1) Each-station applied transmission parameter are not used (only the part transmitted in accordance with transmission parameters for all station in the H-EIT[schedule basic] is transmitted).
=> Only A in Figure 13-9

(2) “extended” information is added to an event for X days (same value as the delivering range defined as a All-stations applied transmission parameter).
=> A+B in Figure 13-9

(3) “basic” information for (X+1) days and Y days (the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic]) is transmitted.
=> A+C in Figure 13-9

(4) “extended” information is added to an event for X days. Furthermore, “basic” information for (X+1) days and Y days is transmitted.
=> A+B+C in Figure 13-9

(5) Both “basic” and “extended” information for Y days is transmitted.
=> A+B+C+D in Figure 13-9

Please note that X is the same value as the delivering range defined as a All-stations applied transmission parameter and the default values are 8 days when “media_type”= “TV type” (D1), and 2 days for “data type” (D3).

Y is a value of a delivering range(description range) when information is transmitted

exceeding the value of a delivering range defined as a All-stations applied transmission parameter, and specified values are limited for each “media_type” as shown below.

- “media_type” =”TV type”(D4): 15 days, 22 days or 32 days
- “media_type” = “Data type (D6): 8 days, 15 days, 22 days or 32 days.

See Section 12.3 for the above D1 to D6.

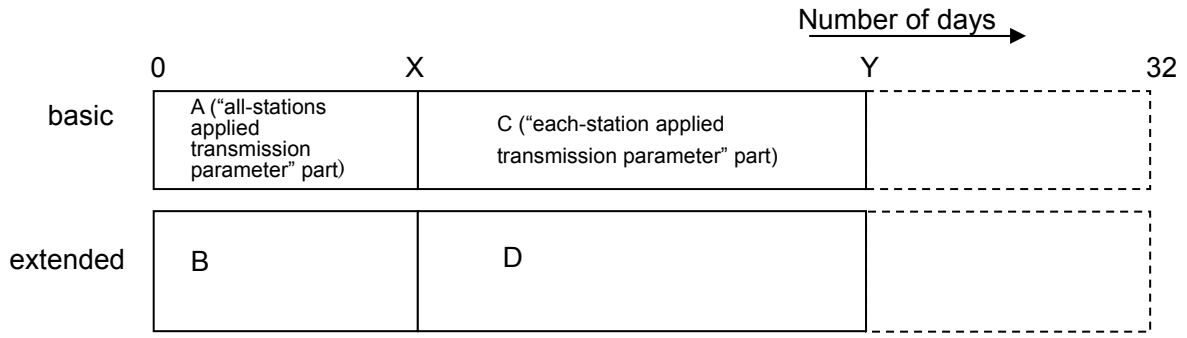


Figure 13-9 Operational Pattern of the H-EIT[schedule]

The operational pattern which is used for each “media_type” by a terrestrial broadcaster can be identified from the SI Parameter Descriptor placed in the second descriptor loop of the BIT as shown below.

(1) Both “table_id = 0x50” and “table_id = 0x58” are not described -> Operational pattern (1)
(2) “table_id = 0x50” is not described but “table_id = 0x58” is -> Operational pattern (2)
(3) “table_id = 0x50” is described but “table_id = 0x58” is not -> Operational pattern (3)
(4) Both “table_id = 0x50” and “table_id = 0x58” are described, and the value in “schedule_range” field in 0x58 is equal to the value of the delivering range defined as a All-stations applied transmission parameter (the value in “schedule_range” field in the SI Parameter Descriptor within the first descriptor loop of the BIT) -> Operational pattern (4)
(5) Both “table_id = 0x50” and “table_id = 0x58” are described, and the value in “schedule_range” field in 0x58 is equal to the value in “schedule_range” field in 0x50 -> Operational pattern (5)

Transmission is performed for each “EIT_type & “media_type”. In other words, among a group of services for which it is specified that H-EIT be transmitted (specified with EIT type delivering flag), H-EIT for all the services for this “media_type” is transmitted in accordance with the each-station applied transmission parameter for this “media_type”.

a. H-EIT[schedule basic] Part Transmitted in Accordance with Each-station applied transmission parameter (Group No. 7 and 8)

A delivering range defined for the part transmitted in accordance with each-station

applied transmission parameter in the H-EIT[schedule basic] is the subsequent range for the part transmitted in accordance with All-stations applied transmission parameter in the H-EIT[schedule basic]. For example, when the delivering range defined as a All-stations applied transmission parameter for “media_type= TV type” (D1) is 8 days, the delivering range for the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic] (D4) is for the event information after 9th day(D1+1 to D4 days).

Each-station applied transmission parameter in the H-EIT[schedule basic] can be specified as “transmit/not transmit” for each “media_type” within a terrestrial broadcaster.

In the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic], no extended repetition rate group exists and the same parameter (repetition rate) should be transmitted for all the range.

Usually, the repetition rate of the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic] should be the same as the rate of the basic repetition rate group of the part transmitted in accordance with All-stations applied transmission parameter in the H-EIT[schedule basic].

When the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic] is transmitted, an operational pattern to show how events are congested should be defined. There are two operational patterns for the part transmitted in accordance with each-station applied transmission parameter in the H-EIT[schedule basic]. One is approximately same level as the part transmitted in accordance with All-stations applied transmission parameter (i.e. almost all events are defined) and the other is to describe events fragmentarily as needed. Please note that these operational patterns are shown with the pattern field in the SI Parameter Descriptor. See Section 31.1.3.1 for details.

b. H-EIT[schedule extended] (Group No. 9 to 12)

The H-EIT[schedule extended] is specified for “transmit/not transmit” for each “media_type” within a terrestrial broadcaster.

When it is transmitted, it should be standardized for each “media_type” within a terrestrial broadcaster, and it should be transmitted for each “media_type” within a terrestrial broadcaster.

The H-EIT[schedule extended] is designed based on the assumption that it is basically stored before use, so a repetition rate of a basic repetition rate group is longer. However, as it is not possible to fix the amount of information in the H-EIT[schedule extended] to be stored beforehand, it is required to enable receiver that do not store such information to support the H-EIT[schedule extended] by shortening the repetition rate within a certain range.

Thus, extended repetition rate groups can be set up as well as a basic repetition rate group. Similarly to the setup of a repetition rate group for All-stations applied transmission parameter, repetition rate groups are classified based on the time. A repetition rate group for the latest time is the basic repetition rate group and other repetition rate groups should be transmitted at a shorter repetition rate than the repetition rate of the basic repetition rate group. The maximum number of extended repetition rate groups is 1 for each “media_type”.

Additionally, delivering range values in the H-EIT[schedule extended] (range of description) are as described in Section 13.14.1.4. In other words, when the H-EIT[schedule extended] is transmitted, the delivering range value is equal to the delivering range value for the part transmitted in accordance with parameters for all stations in the H-EIT[schedule basic] or equal to the delivering range value for the part transmitted in accordance with parameters for each station in the H-EIT[schedule basic].

When the H-EIT[schedule extended] is transmitted, an operational pattern to show how events are congested should be defined. For the H-EIT[schedule extended], the following 4 operational patterns are prepared.

0: a few events a week at maximum
1: a few events a day at maximum
2: 1/4 to 1/2 of the total number of events (approx. 10 events a day)
3: more than 1/2 of the total number of events

Please note that these operational patterns are shown with the pattern field in the SI Parameter Descriptor. See Section 31.1.3.1 for details.

13.14.2 Setup of M-EIT Repetition Rate Groups (Group No. 13 and 14)

The M-EIT has no extended repetition rate groups and only two types of repetition rate groups can be set up - one is for the “part transmitted in accordance with All-stations applied transmission parameter in the M-EIT (basic repetition rate group)” and the other is for the “part transmitted in accordance with each-station applied transmission parameter (basic repetition rate group) (for all “media_type”).

The M-EIT targets mobile receiver so it is not based on the assumption that it is stored within receiver before use. Thus, it is required to transmit not only the part transmitted in accordance with All-stations applied transmission parameter but also the part transmitted in accordance with each-station applied transmission parameter at a short cycle in order to enable viewers to obtain and display event information without any problems when they want to see it.

A delivering range of the M-EIT is specified based on the “number of events”, not like segment or number of days of the H-EIT. Therefore, attention should be paid when event information is mapped into sections. This means that “when sections that make up a certain sub-table are transmitted at multiple different cycles, a cycle should be set up on a sectional basis at least”.

In other words, the packetization rules make it impossible to transmit “n” events in the first half at Cycle “a” and “m” events in the second half at Cycle “b” when multiple event loops exist within a certain section (before the transmission of a given section is completed, the transmission of the next section should not be started: See Section 11.1).

Furthermore, when the delivering range of the part transmitted in accordance with All-stations applied transmission parameter (number of events) is specified as 3 events or more (in other words, when the M-EIT[p/f after] is transmitted as a part transmitted in accordance with All-stations applied transmission parameter), and at the same time, the cycle of the part transmitted in accordance with All-stations applied transmission parameter and the cycle of the part transmitted in accordance with each-station applied transmission parameter are different, because a receiver processes obtained information on a sectional basis, if it does not identify up to which “section_number” is included in the part transmitted in accordance with All-stations applied transmission parameter, the result is that the receiver has to obtain all the sections up to “last_section_number” in order to decide that it has completed obtaining all the information in the part transmitted in accordance with All-stations applied transmission parameter, thus there will be no point in having different repetition rate groups.

Therefore, based on the delivering range of the part transmitted in accordance with All-stations applied transmission parameter and cycles of both repetition rate groups, there are restrictions how to map event information into each section in the EIT[p/f after]. See Section 13.15.6 for the details of the mapping method.

13.14.2.1 M-EIT Part Transmitted in Accordance with All-stations applied transmission parameter (Group No. 13)

Only one transmission parameter (number of events (EM1) and repetition rate) is specified for the part transmitted in accordance with All-stations applied transmission parameter in the M-EIT, regardless of the “media_type”. Because information on the nearest events, i.e. the current event and the next event, is included in this part, it is usually transmitted at the same cycle as the one of the H-EIT[p/f].

The number of events that can be specified (EM1) is between 2 and 10, the default EM1 is 2 events.

13.14.2.2 M-EIT Part Transmitted in Accordance with Tansmission Prameters for Each Station (Group No. 14)

Only one transmission parameter (number of events (EM2) and repetition rate) is specified for the part transmitted in accordance with each-station applied transmission parameter in the M-EIT as well, regardless of the “media_type”. This repetition rate group can be operated for each terrestrial broadcaster uniquely and whether or not it should be operated is also optional. However, as explained above, as it is not based on the assumption that it is stored in receiver, it is required to specify the same level of repetition rate as that of the part transmitted accordance with All-stations applied transmission parameter.

A value between (EM1+1) and 10 can be specified for the number of events (EM2). When the part transmitted in accordance with each-station applied transmission parameter in the L-EIT is transmitted and at the same time, the part transmitted in accordance with each-station applied transmission parameter in the M-EIT is not, the value of EM1 (the number of events in the M-EIT (part transmitted in accordance with All-stations applied transmission parameter)) should be described in “num_of_M-EIT_event” in the SI Parameter Descriptor within the second loop of the BIT.

13.14.3 Setup of L-EIT Repetition Rate Groups (Group No. 15 and 16)

Similarly to the M-EIT, the L-EIT has no extended repetition rate groups and only two types of repetition rate groups can be setup - one is for the “part transmitted in accordance with All-stations applied transmission parameter in the L-EIT (basic repetition rate group)” and the other is for the part transmitted in accordance with each-station applied transmission parameter in the L-EIT (basic repetition rate group)”(for all “media_type”).

The L-EIT targets partial receiver so it is not based on the assumption that it is stored within receiver before use. Thus, it is required to transmit not only the part transmitted in accordance with All-stations applied transmission parameter but also the part transmitted in accordance with each-station applied transmission parameter at a short cycle in order to enable viewers to obtain and display event information without any stress when they want to see it.

A delivering range of the L-EIT is specified based on the “number of events”, not like segment or number of days of the L-EIT. Therefore, attention should be paid when event information is mapped into sections. (same as the M-EIT. See Section 13.14.2). See Section 13.15.6 for the details of the mapping method.

13.14.3.1 L-EIT Part Transmitted in Accordance with Transmission Paratmeters for All Stations (Group No.15)

Only one transmission parameter (number of events (EL1) and repetition rate) is specified for the part transmitted in accordance with All-stations applied transmission parameter in the

L-EIT, regardless of the “media_type”. Because information on the nearest events, i.e. the current event and the next event, is included in this part, it is usually transmitted at the same cycle as the one of the H-EIT[p/f].

The number of events (EL1) that can be specified is between 2 and 10, and the default EL1 is 2 events.

13.14.3.2 L-EIT Part Transmitted in Accordance with Transmission Paratmeters for Each Station (Group No.16)

Only one transmission parameter (number of events (EL2) and repetition rate) is specified for the part transmitted in accordance with each-station applied transmission parameter in the L-EIT as well, regardless of the “media_type”. This repetition rate group can be operated for each terrestrial broadcaster uniquely and whether or not it should be operated is also optional. However, as explained above, as it is not based on the assumption that it is stored in receiver, it is required to specify the same level of repetition rate as the one of the part transmitted accordance with All-stations applied transmission parameter.

A value between (EL1+1) and 10 can be specified for the number of events (EL2). When the part transmitted in accordance with each-station applied transmission parameter in the M-EIT is transmitted, and at the same time, the part transmitted in accordance with each-station applied transmission parameter in the L-EIT is not, the value of EL1 (the number of events in the L-EIT (part transmitted in accordance with All-stations applied transmission parameter)) should be described in “num_of_L-EIT_event” in the SI Parameter Descriptor within the second loop of the BIT.

13.14.4 How to Describe Transmission Parameters in the BIT

How to describe transmission parameters for each repetition rate group of the EITs is shown in Figure 13-10.

The same contents should bet described in the SI Parameter Descriptors placed within the first loop of the BIT by all Digital Terrestrial Television Broadcasting companies.

Placement of SI Parameter Descriptors into the first descriptor loop of the BIT is mandatory, but when the default values shown in Table 12-6 and 12-7 in Chapter 12 are used, the description can be omitted on a “table_id” basis (on a “table_id & media_type” basis only for the H-EIT[schedule]) (omission is optional). For example, when the default values are used for all the tables (NIT, BIT, SDT, EIT and TOT), the part after “update_time” does not have to be described (See Section 31.1.2.1). Conversely, when only the delivering range value of the extended repetition rate group 2 of the “TV type” in the H-EIT[schedule basic] (S2) is different from the default value (the default values are used for all the other parameters), only the “table_id=0x50, media_type=‘01’ (TV type)” part needs to be described.

Parameters described in SI Parameter Descriptors placed in the second loop of the BIT can be specified optionally at the discretion of each broadcaster. However, the same content should be described within a group of networks that belongs to the same terrestrial broadcaster. Additionally, parameters for table types or “media_type” which are not transmitted using each-station applied transmission parameter should not be described.

When All-stations applied transmission parameter are changed, an SI Parameter Descriptor with the date and time of the change specified, as “update_time” should be placed additionally as “update_time” at least two days before the date and the time of the change. In other words, for two days immediately before the date and time of the parameter change, more than one SI Parameter Descriptor with different values specified for “update_time” is placed within the same descriptor loop.

[BIT]

+Section header
+First descriptor loop

	Group Nos. in Table 13-9
SI Parameter Descriptor (description of All-stations applied transmission parameter)	
- Cycles of tables other than EITs (NIT,BIT,SDT,TOT)	
- All-stations applied transmission parameter of “table_id=0x4E” (H-EIT[p/f]/M-EIT/L-EIT)	
- Cycle of the H-EIT[p/f]	1
- Cycle/Delivering range(number of events) of the M-EIT (“all stations” part)	13
- Cycle/Delivering range(number of events) of the L-EIT (“all stations” part)	15
- All-stations applied transmission parameter in “table_id=0x50” (H-EIT[schedule basic])	
- media_type= “TV type”	
- Cycle/Delivering range(number of days) of basic repetition rate group	2
- Cycle/Delivering range(number of segments) of extended repetition rate group1	3
- Cycle/Delivering range(number of segments) of extended repetition rate group2	4
- media_type= “Data type”	
- Cycle/Delivering range(number of days) of basic repetition rate group	5
- Cycle/Delivering range(number of segments) of extended repetition rate group	6

+Broadcaster loop (number of loops=1)
- broadcaster_id (0xFF fixed)
+Second descriptor loop

Extended Broadcaster Descriptor (terrestrial_broadcaster_id, etc.)

SI Parameter Descriptor (description of each-station applied transmission parameter)	
(described as needed)	
- Each-station applied transmission parameter of “table_id=0x4E”(M-EIT/L-EIT)	
- Cycle/Delivering range (number of events) of the M-EIT (“each station” part)	14
- Cycle/Delivering range (number of events) of the L-EIT (“each station” part)	16
- Each-station applied transmission parameter of “table_id=0x50” (H-EIT[schedule basic])	
- media_type=“TV type”	
- Cycle/Delivering range (number of days) of basic repetition rate group	7
- media_type= “Data type”	
- Cycle/Delivering range (number of days) of basic repetition rate group	8
- Each-station applied transmission parameter of “table_id=0x58” (H-EIT[schedule extended])	
- media_type=“TV type”	
- Cycle/Delivering range (number of days) of basic repetition rate group	9
- Cycle/Delivering range (number of segments) of extended repetition rate group	10
- media_type=“Data type”	
- Cycle/Delivering range (number of days) of basic repetition rate group	11
- Cycle/Delivering range (number of segments) of extended repetition rate group	12
- Cycles of tables other than EITs (SDTT, CDT)	

Figure 13-10 Specifications of Transmission Parameters in the BIT

To change a each-station applied transmission parameter, one of the following three patterns for placing SI Parameter Descriptors into the second descriptor loop of the BIT should be followed.

(1) When transmission in accordance with a each-station applied transmission parameter is performed before and after the change, but the parameter is changed,
Similarly to a All-stations applied transmission parameter, at least for two days immediately before the date and time of the change, more than one SI Parameter Descriptor with

different values specified for “update_time” should be placed within the second descriptor loop of the BIT.

(2) When transmission in accordance with a each-station applied transmission parameter was never performed before the change (the part transmitted in accordance with a All-stations applied transmission parameter only) but it will start after the change,
At least two days immediately before the date and time of the change, an SI Parameter Descriptor with the changed parameter described should be placed in the second loop of the BIT.

(3) When transmission in accordance with a each-station applied transmission parameter was performed before the change but it will never be performed after the change (the part transmitted in accordance with a All-stations applied transmission parameter only)
At least two days immediately before the date and time of the change, an empty SI Parameter Descriptor with the date and time of the change specified for “update_time” (in which the part after “update_time” does not exist) should be added into the second descriptor loop of the BIT and at least for two days after the change, this empty SI Parameter Descriptor should be kept.

When the description of a certain “table_id” in an SI Parameter Descriptor within the first loop of the BIT (All-stations applied transmission parameter) disappears after a change, a receiver will recognize that the value of the transmission parameter of the table will go back to the default value (with regard to the H-EIT[schedule], when the description of a certain “media_type” disappears, a receiver will recognize that the value of the transmission parameter of the H-EIT[schedule] for that “media_type” will go back to the default value).

When the description of a certain “table_id in an SI Parameter Descriptor within the second loop of the BIT (each-station applied transmission parameter) disappears after a change, a receiver will unit recognize that the part transmitted in accordance with a each-station applied transmission parameter of the table will not be transmitted (with regard to the H-EIT[schedule], when the description of a certain “media_type” disappears, a receiver will recognize that the part transmitted in accordance with a each-station applied transmission parameter of the H-EIT[schedule] for that “media_type” will not be transmitted).

13.14.5 Summary for Repetition Rate Group Setup

One may easily realize that terms such as “Commonly Operated EITs/Individually Operated EITs” or “Basic delivering EIT type/ Extended delivering EIT type” have never appeared in Figure 13-10 and the description so far in this Section 13.14 (Setup of EIT Repetition rate groups).

In other words, terms such as “Commonly Operated EITs/Individually Operated EITs” or “Basic delivering EIT type/ Extended delivering EIT type” are for “defining the operation of”

“services for which EITs should be transmitted by each broadcaster”. This means that a receiver will identify what kind of EIT is being transmitted in a certain TS at what kind of cycle only from “SI Parameter Descriptors” in the BIT shown in Figure 13-10, “EIT type delivering flag” included in the SDT and “EIT_present_following_flag” and “EIT_schedule_flag” in the SDT (Please note that to which “media_type” each service belongs needs to be identified from the NIT).

When a certain type of EIT is transmitted for a certain service (identified by the EIT type delivering flag), a receiver does not have to know whether it is transmitted as a basic delivering EIT Type or as an extended delivering EIT type. However, if different types of EITs have different contents of information for the same event, a receiver has to decide information written in which EIT type should be trusted (it preferentially trusts basic delivering EIT type), in which case, the receiver needs to identify which type of EIT is being transmitted. A receiver may decide that, for all services, if “1” is specified for EIT type delivering flag for each EIT type, at least the part transmitted in accordance with All-stations applied transmission parameter defined for each EIT type is always transmitted. (unless “0” is specified for “EIT_present_following_flag” and “EIT_schedule_flag” in the SDT). Conversely, as explained many times before, this means that the part transmitted in accordance with All-stations applied transmission parameter defined for each EIT type should be transmitted for each service, if “1” is specified for EIT type delivering flag. Also with regard to transmission in accordance with each-station applied transmission parameter, types of EITs are identified from EIT type delivering flag and SI Parameter Descriptor placed in the second loop of the BIT. However, because there are cases where an EIT which is “defined to be transmitted” can not be transmitted due to convenience of equipment maintenance or transmission of some EITs is optional depending on the “service_type” (see Section 13.6), the final decision has to be made from EIT_present_following_flag and EIT_schedule_flag in the SDT.

13.15 Assignment of “table_id” and “section_number” in the EIT

13.15.1 H-EIT[p/f]

The “table_id” and “section_number” in the H-EIT[p/f] are shown in Table 13-10. A sub-table is formed for each “service_id” and “last_section_number” is 0x01 (fixed) but the possibility of using sections 0x02 or later in the future is not yet denied.

In such a case, a receiver should be implemented so that it normally processes sections 0x00 and 0x01, and ignores sections 0x02 or later.

Table 13-10 Assignment of "table_id" and "section_number" in the H-EIT[p/f]

	table_id	section_ number	Details
H-EIT [p/f]	0x4E	0x00	Current event (present)
	0x4E	0x01	Next event (following)

13.15.2 H-EIT[schedule basic]

The "table_id" and "section_number" in the H-EIT[schedule basic] are shown in Table 13-11. A sub-table is formed for each "service_id" and "table_id".

One day is devided by each 3 hours (0:00 to 03:00, 03:00 to 06:00.....21:00 to 24:00) and for each segment, a table of up to 8 sections is used to decribe event information. Because the last section number within a segment is descibed in "segment_last_section_number", there will be no problem even if a "section_number" is skipped when the amount of event information does not need all 8 sections. In addition, when there is no event that will start within duration of time assignetd to a segment, an empty EIT table should be transmitted with the first "section_number" of this segment.

Unlike DVB and ARIB STD-B10, the range described in each table is the range of each "last_table_id" and a receiver can detect the delivering range of each H-EIT[schedule basic] also from the "last_table_id" value and "last_section_number" value. However, as a unified operational policy, the delivering range and repetition rate group as All-stations applied transmission parameter should be standardized and operated by all Digital Terrestrial Television Broadcasting companies according to the content described in the first loop of the BIT, and the delivering range and repetition rate group as each-station applied transmission parameter should be standardized and operated within the relevant terrestrial broadcaster according to the content described in the second loop of the BIT.

Table 13-11 Assignment of “table_id” and “section_number” in the H-EIT[schedule basic]

		0:00:00 ～2:59:59	3:00:00 ～5:59:59	6:00:00 ～8:59:59	9:00:00 ～11:59:59	12:00:00 ～14:59:59	15:00:00 ～17:59:59	18:00:00 ～20:59:59	21:00:00 ～23:59:59
today	table_id	0x50	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
next day	table_id	0x50	←	←	←	←	←	←	←
	section_number	0x40～0x47	0x48～0x4F	0x50～0x57	0x58～0x5F	0x60～0x67	0x68～0x6F	0x70～0x77	0x78～0x7F
3rd day	table_id	0x50	←	←	←	←	←	←	←
	section_number	0x80～0x87	0x88～0x8F	0x90～0x97	0x98～0x9F	0xA0～0xA7	0xA8～0xAF	0xB0～0xB7	0xB8～0xBF
4th day	table_id	0x50	←	←	←	←	←	←	←
	section_number	0xC0～0xC7	0xC8～0xCF	0xD0～0xD7	0xD8～0xDF	0xE0～0xE7	0xE8～0xEF	0xF0～0xF7	0xF8～0xFF
5th day	table_id	0x51	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
6th day	table_id	0x51	←	←	←	←	←	←	←
	section_number	0x40～0x47	0x48～0x4F	0x50～0x57	0x58～0x5F	0x60～0x67	0x68～0x6F	0x70～0x77	0x78～0x7F
7th day	table_id	0x51	←	←	←	←	←	←	←
	section_number	0x80～0x87	0x88～0x8F	0x90～0x97	0x98～0x9F	0xA0～0xA7	0xA8～0xAF	0xB0～0xB7	0xB8～0xBF
8th day	table_id	0x51	←	←	←	←	←	←	←
	section_number	0xC0～0xC7	0xC8～0xCF	0xD0～0xD7	0xD8～0xDF	0xE0～0xE7	0xE8～0xEF	0xF0～0xF7	0xF8～0xFF
9th day	table_id	0x52	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
13th day	table_id	0x53	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
17th day	table_id	0x54	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
21st day	table_id	0x55	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
25th day	table_id	0x56	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
29th day	table_id	0x57	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
32nd day	table_id	0x57	←	←	←	←	←	←	←
	section_number	0xC0～0xC7	0xC8～0xCF	0xD0～0xD7	0xD8～0xDF	0xE0～0xE7	0xE8～0xEF	0xF0～0xF7	0xF8～0xFF

13.15.3 H-EIT[schedule extended]

The “table_id” and “section_number” in the H-EIT[schedule extended] are shown in Table 13-12. Unlike DVB and ARIB STD-B10, the range described in each table is the range of each “last_table_id” and a receiver can detect the delivering range of each H- EIT[schedule extended] also from the “last_table_id” value and “last_section_number” value. However, patterns of delivering ranges and description ratios are defined and use of each terrestrial broadcaster (especially, whether transmitted or not) needs to be detected from parameters described in the second loop of the BIT.

One day is devided by each 3 hours (0:00 to 03:00, 03:00 to 06:00.....21:00 to 24:00) and for each segment, a table of up to 8 sections is used to decribe event information. Because the last section number within a segment is descibed in “segment_last_section_number“, there will be no problem even if a “section_number” is skipped when the amount of event information does not need all the 8 sections. In addition, when there is no event that will start within

duration of time assignetd to a segment, an empty EIT table should be transmitted with the first “section_number” of this segment.

Table 13-12 Assignment of “table_id” and “section_number” in the H-EIT [schedule extended]

		0:00:00 ～2:59:59	3:00:00 ～5:59:59	6:00:00 ～8:59:59	9:00:00 ～11:59:59	12:00:00 ～14:59:59	15:00:00 ～17:59:59	18:00:00 ～20:59:59	21:00:00 ～23:59:59
Today	table_id	0x58	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
Next day	table_id	0x58	←	←	←	←	←	←	←
	section_number	0x40～0x47	0x48～0x4F	0x50～0x57	0x58～0x5F	0x60～0x67	0x68～0x6F	0x70～0x77	0x78～0x7F
3rd day	table_id	0x58	←	←	←	←	←	←	←
	section_number	0x80～0x87	0x88～0x8F	0x90～0x97	0x98～0x9F	0xA0～0xA7	0xA8～0xAF	0xB0～0xB7	0xB8～0xBF
4th day	table_id	0x58	←	←	←	←	←	←	←
	section_number	0xC0～0xC7	0xC8～0xCF	0xD0～0xD7	0xD8～0xDF	0xE0～0xE7	0xE8～0xEF	0xF0～0xF7	0xF8～0xFF
5th day	table_id	0x59	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
6th day	table_id	0x59	←	←	←	←	←	←	←
	section_number	0x40～0x47	0x48～0x4F	0x50～0x57	0x58～0x5F	0x60～0x67	0x68～0x6F	0x70～0x77	0x78～0x7F
7th day	table_id	0x59	←	←	←	←	←	←	←
	section_number	0x80～0x87	0x88～0x8F	0x90～0x97	0x98～0x9F	0xA0～0xA7	0xA8～0xAF	0xB0～0xB7	0xB8～0xBF
8th day	table_id	0x59	←	←	←	←	←	←	←
	section_number	0xC0～0xC7	0xC8～0xCF	0xD0～0xD7	0xD8～0xDF	0xE0～0xE7	0xE8～0xEF	0xF0～0xF7	0xF8～0xFF
9thday	table_id	0x5A	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
13th day	table_id	0x5B	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
17th day	table_id	0x5C	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
21st day	table_id	0x5D	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
25th day	table_id	0x5E	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
29th day	table_id	0x5F	←	←	←	←	←	←	←
	section_number	0x00～0x07	0x08～0x0F	0x10～0x17	0x18～0x1F	0x20～0x27	0x28～0x2F	0x30～0x37	0x38～0x3F
:		:							
32nd day	table_id	0x5F	←	←	←	←	←	←	←
	section_number	0xC0～0xC7	0xC8～0xCF	0xD0～0xD7	0xD8～0xDF	0xE0～0xE7	0xE8～0xEF	0xF0～0xF7	0xF8～0xFF

Information on all events which are scheduled to be broadcast is not necessarily transmitted in the H-EIT[schedule extended] and a level of information to be transmitted can be defined for each “media_type” for each terrestrial broadcaster, and is described in the pattern parameter in the second loop of the BIT. As a result, an extreme example, “within the range of a whole table” up to the field with “last_section_number” described in a sub-table specified with “table_id” which is the same value as the “last_table_id”, when no event that will start within duration of time assigned to a segment exists, an empty H-EIT[schedule extended] table with the first section_number of this segment should be transmitted. In other words, when " last_table_id = 0x5E” is described in the H-EIT[schedule extended] table for a certain “service_id” (table identification extension), and at the same time, “last_section_number=0xE8” is described in a sub-table with “table_id = 0x5E”, all segments of “27days and 18hours” from the “0:00 to 03:00 segment” on the day to the “15:00 to 18:00” segment on the 28th day ((27x8) + 6 =222 segments) are transmitted, and when information in a segment is empty, an empty section should be transmitted for this empty segment.

13.15.4 M-EIT

The “table_id” and “section_number” in the M-EIT are shown in Table 13-13. A sub-table is formed for each “service_id” and “last_section_number” is between 0x01 and 0x04 but the possibility of using sections 0x05 or later in the future is not denied.

In such a case, a receiver should be implemented so that it normally processes sections up to 0x04, and ignores sections 0x05 or later.

Table 13-13 Assignment of “table_id” and “section_number” in the M-EIT

	table_id	section_ number	Details
M-EIT [p/f]	0x4E	0x00	Current event (present)
	0x4E	0x01	Next event (following)
M-EIT [p/f after]	0x4E	0x02 - 0x04	Event(s) after next event (after)

As explained in Section 13.12.3, with regard to a current event (section_number=0) and a next event (section_number=1), one section always has only one event, and with regard to events after the next event (M-EIT[p/f after]), one section can have multiple events. For how to map event information into sections in the M-EIT[p/f after], see Section 13.15.6.

13.15.5 L-EIT

The “table_id” and “section_number” in the L-EIT are shown in Table 13-14. A sub-table is formed for each “service_id” and “last_section_number” is between 0x01 and 0x03 but the possibility of using sections 0x04 or later in the future is not denied.

In such a case, a receiver should be implemented so that it normally processes sections up to 0x03, and ignores sections 0x04 or later.

Table 13-14 Assignment of “table_id” and “section_number” in the L-EIT

	table_id	section_ number	Details
L-EIT [p/f]	0x4E	0x00	Current event (present)
	0x4E	0x01	Next event (following)
L-EIT [p/f after]	0x4E	0x02 - 0x03	Event(s) after next event (after)

As explained in 13.12.3, with regard to a current event (section_number=0) and a next event (section_number=1), one section always has only one event, and with regard to events after the next event (L-EIT[p/f after]), one section can have multiple events. Up to 2 sections can be used in the L-EIT[p/f after]), and “last_section_number” should be correctly described according to the number of sections. For how to map event information into sections in the L-EIT[p/f after], see Section 13.15.6.

13.15.6 How to Map Event Information into Sections in the M-EIT[p/f after] and L-EIT[p/f after]

As described in Section 13.14.2, when information on events in the part transmitted in accordance with All-stations applied transmission parameter and in the part transmitted in accordance with each-station applied transmission parameter exist in the EIT[p/f after] and at the same time, the repetition rate of the part transmitted in accordance with All-stations applied transmission parameter is different from the one of the part transmitted in accordance with each-station applied transmission parameter, “section_number” which includes event information in the part transmitted in accordance with All-stations applied transmission parameter should be defined clearly. The transmission rules on how to map event information into the sections in the EIT[p/f after] are defined as below. Please note that these rules are applied to both M-EIT[p/f after] and L-EIT[p/f after].

- When the delivering range (number of events) of the part transmitted in accordance with All-stations applied transmission parameter is specifed as less than 2 events, ”section_number=0” (current event) and ”section_number=1” (next event) should be transmitted as the part transmitted in accordance with All-stations applied transmission parameter, and event information in the part transmitted in accordance with each-station applied transmission parameter should be mapped into “section_number=2” or later and

transmitted.

- When the delivering range (number of events) of the part transmitted in accordance with All-stations applied transmission parameter is specified as 3 events or more and at the same time, when the repetition rate of the parts transmitted in accordance with All-stations applied transmission parameter and for each-station are the same, “section_number=0” (current event) and “section_number=1” (next event) should be transmitted as the part transmitted in accordance with All-stations applied transmission parameter, and event information in the part transmitted in accordance with each-station applied transmission parameter after this should be mapped so that it is included in “section_number=2”. Furthermore, event information in the part transmitted in accordance with each-station applied transmission parameter should be mapped into “section_number=2” or later (in other words, event information in the part transmitted in accordance with each-station applied transmission parameter may be additionally mapped into “section_number=2”).
- When the delivering range (number of events) of the part transmitted in accordance with All-stations applied transmission parameter is specified as 3 events or more and at the same time, when the repetition rate of the parts transmitted in accordance with All-stations applied transmission parameter and for each-station are different, ”section_number=0” (current event) and ”section_number=1” (next event) should be transmitted as the part transmitted in accordance with All-stations applied transmission parameter, event information in the part transmitted in accordance with All-stations applied transmission parameter after this should be mapped so that it is included in “section_number=2”. Additionally, event information in the part transmitted in accordance with each-station applied transmission parameter should be mapped into “section_number=3” or later.

When the above rules are followed, a receiver may recognize that, when the delivering range of the part transmitted in accordance with All-stations applied transmission parameter (“num_of_M-EIT_event/num_of_L-EIT_event” within the first loop of the BIT) is specified as 2 events or less and when it is specified as 3 events or more, up to “section_number=1” and up to “section_number=2” are transmitted at a cycle of the part transmitted in accordance with All-stations applied transmission parameter (value of the table_cycle(M-EIT/L-EIT) within the first loop of the BIT) respectively and process obtained information accordingly.

13.16 Transmission of the H-EIT[schedule] as Time Passes

Transmission of the H-EIT[schedule] that became past information as time passed should be stopped on a “segment” basis. For example, at 18:00, a segment that includes information on a event that is scheduled to have started between 15:00 and 18:00 should be stopped immediately. Therefore, if information on a event is included in two segments, there is duration of time in which H-EIT[schedule] is not transmitted for the event when it is being broadcast (described only in the H-EIT[p/f]).

Additionally, when the date changes once a day at 0:00, “table_id” and “section_number” are updated as well as the schedule for the whole last day (8 segments) within the range defined for a “media_type” is added. In other words, because transmission is stopped on a segment basis and transmission is started on a day basis, the number of transmitted segments decreases by one every three hours towards the time that the date changes, and when the date changes, 8 segments are added at a time.

A repetition rate of an extended transmission group shifts on a “segment” basis. For example, a repetition rate defined for information on events between the present time and 48 hours is a “cycle at which information on events for 16 segments is transmitted including the segment in which “the present time” at any time exists.”

Ex) If the present time is 19:30 on the 15th, information transmitted at a “repetition rate of present to 48 hours” is information on events that will start between 18:00 on the 15th and 18:00 on the 17th (information on a event that will start at 18:00 on the 17th is not included).

13.17 Transmission of the M-EIT/L-EIT as Time Passes

The M-EIT and L-EIT, including [p/f after], has a nature similar to the one of EIT[p/f] in the ARIB STD-B10 standard. In other words, every time a event changes, the event information described in the table also shifts.

The following is an example to show the operation of the L-EIT as time passes as below.

[All-stations applied transmission parameter] Number of events (EL1)=2,
Repetition rate = 1 second

[Each-station applied transmission parameter] Number of events (EL2)=6,
Repetition rate= 3 seconds

An event of “event_id=a” is being broadcast

sec_num=0 (present)	sec_num=1 (following)	sec_num=2			
event_id=a	event_id=b	event_id=c	event_id=d	event_id=e	event_id=f

↓

The “start_time” of an event of “event_id=b” comes, and after broadcasting of an event of “event_id=b” has started

sec_num=0 (present)	sec_num=1 (following)	sec_num=2			
event_id=b	event_id=c	event_id=d	event_id=e	event_id=f	event_id=g

Furthermore, events after the following events may shift in the opposite direction when the next event becomes a “undefined” event at the moment the possibility of extending the current event arises, or when an emergency news cut-in takes place.

An event of “event_id=a” is being broadcast

sec_num=0 (present)	sec_num=1 (following)	sec_num=2			
event_id=a	event_id=b	event_id=c	event_id=d	event_id=e	event_id=f

↓

When an event of “event_id=a” is being broadcast, emergency news cut-in arises and an event of “event_id=a” is being suspended.

sec_num=0 (present)	sec_num=1 (following)	sec_num=2			
event_id=x (Emergency news)	event_id=a (being suspended)	event_id=b	event_id=c	event_id=d	event_id=e

The M-EIT[p/f] and L-EIT[p/f] can show the “undefined event” status or “undefined time” status similarly to the H-EIT[p/f]. For details of the operation, see Chapter 19.

13.18 Rules on How to Update the H-EIT[schedule] at the Change of the Date

All H-EIT[schedule]s should be updated at 0:00 every day without fail because of its structure. The following rules should be followed.

1) H-EIT[schedule] is never date-updated before 0:00.
2) A transition period of 30 seconds starts from 0:00 sharp.
3) After the transition period, an old version of the H-EIT[schedule] (for the previous day) is never transmitted.

During the transition period, transmission of an old version (table for the previous day) is stopped and transmission of a new version (table for the day) is started, but how this is done is up to each broadcasting station. However, the following rules should be followed.

1) Even during the transition period, transmission of a section should be completed.
2) Different versions should not exist in a sub-table. In other words, after even one section in a sub-table is updated, other sections with old version numbers in the sub-table should not be transmitted.
3) There are no rules defined for timing of updating during a transition period (timing of starting transmission of a new version). Transmission of a new version may start before transmission of an old version is completed. Different sub-tables can have different timing of updating.

Please note that the above rules are applied to all H-EIT[schedule]s.

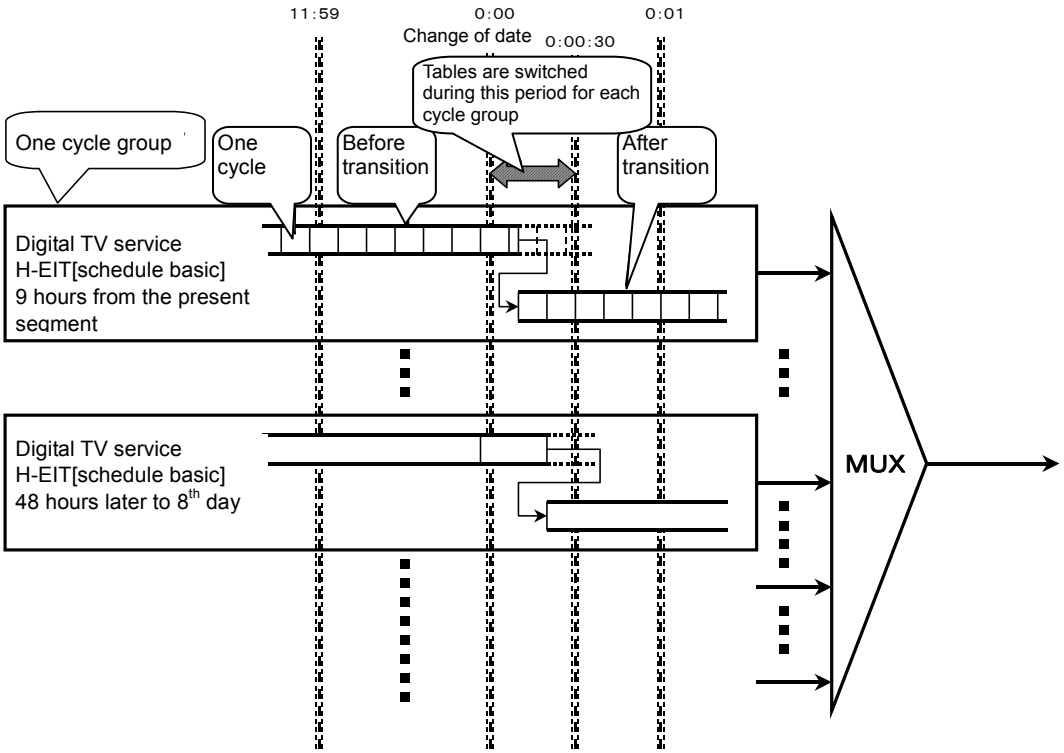


Figure 13-11 Change of Date and Update of the H-EIT[schedule]

There are no regulations defined for how receiver receive and process the H-EIT[schedule], but the following ideas can be adopted.

1) As it is never date-updated before 0:00, it can be processed as usual before 0:00, in which case, it should be ensured that the process will finish before 0:00.
2) Because it becomes stable after a transition period, it would be better to perform a bulk reception process; etc after it becomes stable as much as possible. Please note that even if event information obtained from a table with an old version number is stored, such information will not always be wasted, as the content of event information is not always changed.
3) After 0:00 when a transition period passes, the positions of segments change. It should not be expected that a segment before a change would be transmitted during a transition period. Special attention should be paid when a segment is obtained before and after 0:00.
4) For example, when information is obtained from a specified segment for monitoring update of a event list display range, etc., if the “version_number” value of a new segment position is known in advance, the segment position can be changed at exactly 0:00 and at the same time, information can be obtained with the new “version_number” value (if time out for process completion needs to be setup, the transition period can be added). Even when the “version_number” value is not known in advance, whether the version is old or new can be normally judged from the relation between the obtained segment and event start time. However, when no event does exists (empty section), it has to wait till the transition period ends because the judgment can not be made.

14 Use of “component_tag”

It is mandatory to specify a “component_tag” value (assignment of a Stream Identifier Descriptor) for every ES defined within the PMT. This chapter explains the use of “component_tag” and PIDs for ESs.

14.1 Concept of “component_tag” and PID

Because the user selects an ES from SI when they select a station or for programming, a “component_tag” value that relates the user interface to an ES is very important. A receiver unit selects an ES based on a “component_tag” when selecting a service, and finds its PID to separate it from TS and decode it. With regard to an ES that has been selected (is being displayed), a receiver unit keeps decoding ESs with the same “component_tag” value. In other words, for example, when an ES of component_tag=”0x11” is being displayed, no matter whether it is within an event or between events, a receiver units keeps decoding ESs of”0x11” as long as the viewer does nothing. Therefore, when there are no ESs with a “component_tag” value that was selected and received, a receiver unit performs a process that is similar to the one to be performed when a station is selected because a new “component_tag” has to be selected.

In addition, the rule that a receiver unit keeps decoding ESs with the same “component_tag” value is followed even when the value of a PID with the “component_tag” value is changed, but when ES_PID value defined in the PMT is changed, the receiver unit performs PID filtering control, so it appears on the display the same phenomenon as a tuning operation. In other words, it is highly possible that decoding of video or audio streams gets suspended. Therefore, when continuous display on a receiver unit is desired, changing a PID value the middle of a program should be avoided whenever possible.

The number of components (ESs) can be changed within an event or between events but the default ES’ should always exist.

14.2 Assignment of “component_tag” Values

As explained above, for continuous display on a receiver unit, “component_tag” values should not be changed.

In digital terrestrial television broadcasting, based on the concept explained in Section 14.1, “component_tag” values are assigned to each component type as shown in Table 14-1, and especially, fixed values are assinged to the default ES’.

Table 14-1 Assignment of "component_tag" Values

Component type	component_tag value
Video*1	0x00 to 0x0F Please note that 0x00 is assigned to the default ES.
Audio*1	0x10 to 0x2F Please note that 0x10 is assigned to the default ES.
Others *2	0x30 to 0x7F Please note that 0x40 is assigned to the default ES for data broadcasting. 0x30, 0x31 to 0x37, 0x38 and 0x39 to 0x3F are assigned to subtitle main, subtitle sub, teletext main and teletext sub respectively.
Components used in the partial reception layer	0x80 to 0x8F*3 In ESs used in the partial reception layer, 0x80, 0x81, and 0x83 or 0x85 are assigned to the default ES in a data carousel, in a video stream and audio stream respectively.
Reserved	0x90 to 0xFF

*1: Video and audio streams defined in the vol 7 of the document. A video/audio stream to which a "component_tag" value within this range was assigned can be a target for individual component selection by a receiver unit.

*2: Video/audio streams other than the above *1 can be included. However, a video/audio stream to which a "component_tag" value within this range is assigned cannot be a target for individual component selection by a receiver unit.

*3: See Vol. 7 for details.

When there are no video and audio ESs with "component_tag" values being decoded in the PMT, both video and audio will be switched to default ES'.

14.2.1 ES Priority

With regard to video and audio ESs, when there is more than one ES of the same "stream_type" in a single PMT, and when more than one Component Descriptor (or Audio Component Descriptor) is placed in an EIT, an ES with a smaller "component_tag" value has a higher priority. In other words, the default ES has the highest priority and the larger the "component_tag" value, the lower the priority becomes. This order of priority can be applied, for example, when a list of streams is displayed on the EPG or when the stream switch button is pressed. In case of MVTV, the default ES for a component group is the ES with the smallest "component_tag" value of a stream type among "component_tag" values described in the component group in the Component Group Descriptor. The main group (main channel) should include default ES (component_tag="0x00" and "0x10") for the whole MVTV service (related information described in Section 20.4 and Chapter 25).

14.3 Assignment of PIDs

There are no rules defined for how to assign PID values to ESs. However, as shown in Section 14.1, changing a PID value in the middle of a program or when a program switches is equal to selecting a service on a receiver unit. Therefore, it is desired that assignment of PIDs, especially PIDs of default components, should not be changed as much.

Possibilities of changing PIDs at the broadcasting system are shown below.

[Change of a PID in the middle of an event]

Generally, it should not be changed. However, when a “component_type” (video/audio mode) is switched in the middle of a program or when a transmission system failure occurs, a PID value may be changed as the encoder changes.

[Change of a PID value as an event changes]

When event common is applied to HD program, a PID value may be changed as the program changes from HD program to SD program (vice versa). Therefore, this should be taken into account as a quite common situation.

15 Definition of Service “On service”/ “Off service”

Use of PSI/SI with regard to “On service”/ “Off service” is as follows.

- Valid PAT and PMT should be transmitted for a service on service.
- The description of a service in the SDT should not be changed depending on the status of “on service”/ “off service”.
- When all the services within relevant TS are off service, PAT should be emptied regardless of other PSI/SI.
- Only for media data type services, a status where PMT_PID is described in the PAT but no PMT is transmitted (use not defined in the MPEG regulation) can be allowed.
- “On service” and “Off service” are one of the following statuses in Table 15-1.

Table 15-1 Types of “On service” and “Off service”

Status	NIT in TS	Description of service list in NIT	Description of this service into PAT	PMT of this service	Remarks
On service	Yes	Yes	Yes	Yes	Normal broadcasting
Off service	Yes	Yes	No	-	
	Yes	Yes	Yes	No	Only for media data type services
No signals	No	No	No	No	RF only/off the air

(‘-’: not valid even when transmitted)

Combinations other than the above are in a transition status and previous status is displayed.

Please note that the interpretation of receiver unit operation is assumed as below.

- When valid PAT and PMT exist, the service is “on service*)”.
- SDT is never used to judge whether a service is “on service” or “off service”.
- When PAT is empty, all the services within this TS is “off service”, regardless of other PSI and SI.
- ”On service” or “Off service” should be in either of the status in Table 15-1.

*) A receiver unit which receives only the partial reception layer judges whether a service is “on service” or “off service” depending on whether PMT exists or not.

16 Operation of Time-Related Information

Information on the present date and present time (JST_time) is transmitted in the TOT. The JST_time is defined as “UTC (Universal Time Coordinated) + 9 hours” in the ARIB STD-B10, which will be the same all year even if daylight saving time is introduced. A receiver unit is capable of using the TOT to correct its internal clock and based on this internal clock, the time display and the synchronous presentation are implemented. A total of 40 bit field, which consists of lower 16 bits in coded MJD (year/month/day) and 24 bit JTC (JST in 6 binary coded decimal numbers (4 bit each. hour/minute/second)) are used to represent information on dates and times.
(see Annex C, Part 2 of the ARIB STD-B10)

16.1 Relation between the TOT and Program Presentation and Delays in Recording

- The TOT should be transmitted so that at the moment it is received by a receiver unit. Its allowable difference range should be ±500ms. However, when adjustments are made by inserting leap seconds, a maximum difference of approximately 1.5 seconds is allowed for a few minutes before and after the insertion of leap seconds.
- After program source signals are transmitted from a VTR or camera at a broadcasting station until they are presented on a receiver unit, delays caused by transmission media should be taken into account. Such delays include a delay caused by encoding a video at a broadcasting station and decoding it on a receiver unit and a delay caused by transmission lines between broadcasting stations. Some digital terrestrial television broadcasting channels/programs are simultaneously broadcast with terrestrial broadcasting (analogue) programs. Therefore, if the same program source is used for simultaneous broadcasting, there will be an approximately 1 to 4 second difference in the presentation of a terrestrial broadcasting program(analogue) and a digital terrestrial television broadcasting program.

16.2 Information Related to Dates and Times Coded in SI

A list of information related to dates and times coded in SI is shown in Table 16-1.

Table 16-1 Date/Time-related information coded in SI

TOT	
JST_time	40bit (year, month, date, hour, minute, second)
EIT	
start_time	40bit (year, month, date, hour, minute, second)
duration	24bit (hour, minute, second)
Local Time Offset Descriptor (TOT)	
local_time_offset	16bit (hour, minute)
Time_of_change	40bit (year, month, date, hour, minute, second)
next_time_offset	16bit (hour, minute)
SI Parameter Descriptor (BIT)	
update_time	16bit (year, month, date)
Series Descriptor (EIT)	
expire_date	16bit (year, month, date)

Coded “UTC (Universal Time Coordinated) + 9 hours” should always be used for the three types of time-related information in the above table (“JST_time” in TOT, “start_time” in EIT and “time_of_change” (Local Ttime Offset Descriptor)) whether or not daylight saving time is introduced.

16.3 MJD after the year 2038

The lower 16 bits in MJD (Modified Julian Date) will become all ‘1’ on a day in 2038 and all ‘0’ the next day. If the conversion formula in Annex C, Part 2 of the ARIB STD-B10 was used, all ’0’ would be a day in the 1800’s. Therefore, in Digital Terrestrial Television Broadcasting, the following measures will be taken.

- The conversion formula defined in Annex C, Part 2 of the ARIB STD-B10 will be used after the year 2038 until February 28th, 2100, and lower 16 bits in a converted MJD value will be transmitted.
- Receiver units should memorize dates such as the shipping date of the receiver unit and when information dated obviously later than this date is transmitted, it should be calculated with the 17th bit as ‘1’ and processed accordingly.
- What should be done after the year 2100 has not been decided as of now because a new MJD conversion formula itself should be defined.

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[Section 2] Operational Methods

17 Event Common

17.1 About Event Common

Describing the same ES_PID in PMTs for multiple services makes it possible to view the same event, regardless of the service being viewed. Figure 17-1 shows an example.

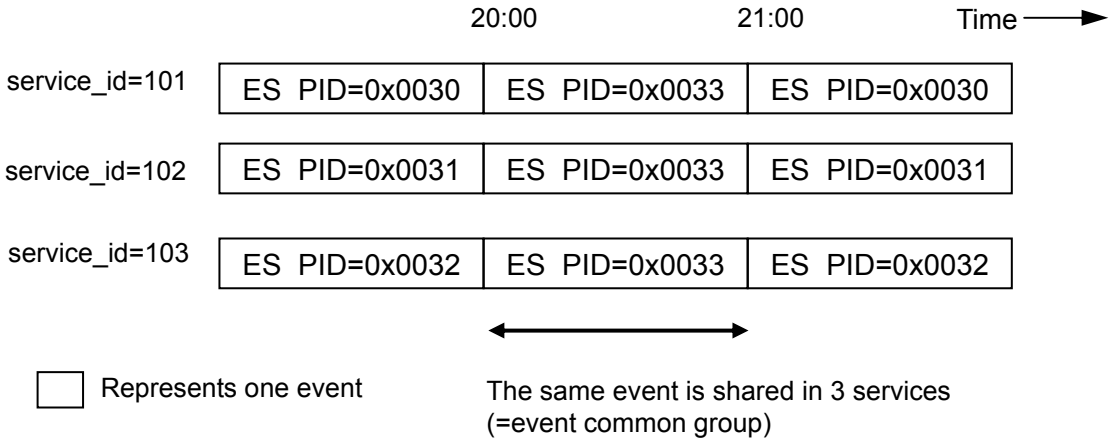


Figure 17-1 Example of Switching

As shown above, if the same “ES_PID” is described in PMTs for multiple services, the same event can be viewed no matter which service is selected. This style of broadcasting is called “Event Common” and a group of services in which the same event is broadcast by performing “Event Common” is called an “Event Common group”. The use of “Event Common” and “Event Common group” is explained below.

17.2 Rules on Event Common

The following rules should be applied when performing Event Common.

1) Event Common should be performed within a TS within the same media type.
2) Event Common should be performed only for services transmitted in the layer using the low protection layer.
3) “service_id” numbers in an Event Common group should be consecutive as a rule but exceptions are also allowed.
4) Event Common should not be started or ended, and no changes may be made to an Event Common group in the middle of an event.
5) When Event Common is performed, the same component tag value and “ES_PID” should be described for services which share an event described in PMTs.

6) When the start time or program length is changed due to changeable program scheduling, etc, the same change should be made to all the services that share the event.
7) The same information should be described in EITs for all services except for “service_id” and “event_id”.

17.3 Description in EITs

As explained in Chapter 13, there are three types of EITs, namely H-EIT, M-EIT and L-EIT, and information obtained from these tables is displayed on corresponding EPG displays. However, an Event Group Descriptor for Event Common will never be described in the L-EIT because of the restriction that says “Event Common should be performed only for services transmitted in the low protection layer”. Therefore, explanation will be given only for the H-EIT and M-EIT and they are referred to as “EIT” for simplicity in Chapter 17.

When Event Common is performed, the same information is described in EITs for all the services except for “service_id” and “event_id”. Therefore, describing such information in EITs for multiple services would be a waste of transmission capacity and storage capacity of receiver units. In addition, if a receiver unit can recognize that it is actually receiving the same event in multiple services, arrangements can be made for display of program listing or user interfaces.

Therefore, when information on events in an Event Common group is described in EITs, “referred to”/“referred from” should be set up for each service and descriptors for common information are placed only in the “referred to” in order to reduce SI transmission amount. Furthermore, the Event Common group and “referred to”/"referred from” should be described using Event Group Descriptors.

Rules on how to describe information in EITs when Event Common is performed are provided below.

1) One of the services in an Event Common group should be set up as “referred to”.
2) All the other services are “referred from”.
3) “referred to” can be set up for each Event Common group.
4) After information on event common is described in EITs, “referred to” should not be changed within an Event Common group.
5) In the event loops of EITs in which events in an Event Common group are described, Event Group Descriptor should be placed. The rules on placement of Event Group Descriptor are provided below.

- group_type is “Event Common (“0x01”)”.
- The char field should not be used.

- In the Event Group Descriptor in the “referred to”, all the “service_id” and “event_id” in the Event Common group including own event should be described.
- In the Event Group Descriptor in the “referred from”, only “service_id” and “event_id” of the “referred to” should be described.

In the “referred to” event loop, all the descriptors that need to be described should be placed. On the other hand, in the “referred from” event loops, descriptors can be omitted in accordance with the rules of H-EIT[p/f], H-EIT[schedule basic] and H-EIT[schedule extended] respectively. Information in the omitted descriptors is obtained from the “referred to” event loops. Rules on the omission are provided in the next section for each table type.

Whether it is “referred from” or “referred to” can be judged from whether one’s own “service_id” and “event_id” are described in the Event Group Descriptor of own EIT. In other words, it is judged that it is the “referred to” if one’s own “service_id” and “event_id” are described in the Event Group Descriptor and on the other hand, if there is no description of one’s own “service_id” and “event_id” in the Event Group Descriptor, it is judged that it is a “referred from” and “event_id” of “service” id described in the Event Group Descriptor are “referred to”.

17.4 Rules and Examples for Each Table Type

17.4.1 H-EIT[p/f]

The rules on how to describe events for Event Common in H-EIT[p/f]s are provided below.

- Event Group Descriptors should be placed in all the event loops for Event Common.
- The descriptors transmitted in the H-EIT[schedule extended] should be placed in all the H-EIT[p/f]s, no matter whether it is “referred to”/”referred from” or the H-EIT is EIT for basic delivering EIT type /Extended delivering EIT type.
- When descriptors transmitted in the H-EIT[schedule extended] are placed, they should be placed only in the “referred to” and “referred from” should refer to the information in the “referred to”.

Figure 17-2 illustrates the above explanation. The figure is an example of an Event Common group of three services (“service_id”=101, 102 and 103) in a HD program called “Professional baseball game Team A vs. Team B”. All the three events in the figure (“service_id” =101 / “event_id” =3251, “service_id” =102 / “event_id” =8381, “service_id” =103 / “event_id” =64) are the same event but one of the services is defined as the “referred to”. In the figure, the event loop of “service_id” =101/”event_id” =3251 is the “referred to”. On the other hand, the remaining two event loops (“service_id” =102 / “event_id” =8381 and “service_id” =103 / “event_id” =64) are “referred from”.

In the “referred to”, all the “service_id” and “event_id” that make up the Event Common group are described using an Event Group Descriptor. On the other hand, in the Event Group Descriptors in the “referred from”, only service_id and event_id in the “referred to” (service_id=101/event_id=3251) are described.

In the H-EIT[p/f], the same descriptors except for Extended Event Descriptors are placed in all the three event loops. Additionally, Extended Event Descriptors are placed only in the “referred to”.

When information other than in an Extended Event Descriptor such as program title is needed, a receiver unit can use any H-EIT[p/f]s regardless whether it is “referred to”/”referred from”. When information in an Extended Event Descriptor is needed, “referred to” H-EIT[p/f] should be used.

This is because if descriptors other than Extended Event Descriptors are referred to in order to obtain information, it will take a long time to obtain information and that will be inconvenient when a change has to be made urgently due to changeable program scheduling, etc. However, as there will be no problem in referring to Extended Event Descriptors because of their different usage, they are referred to obtain information.

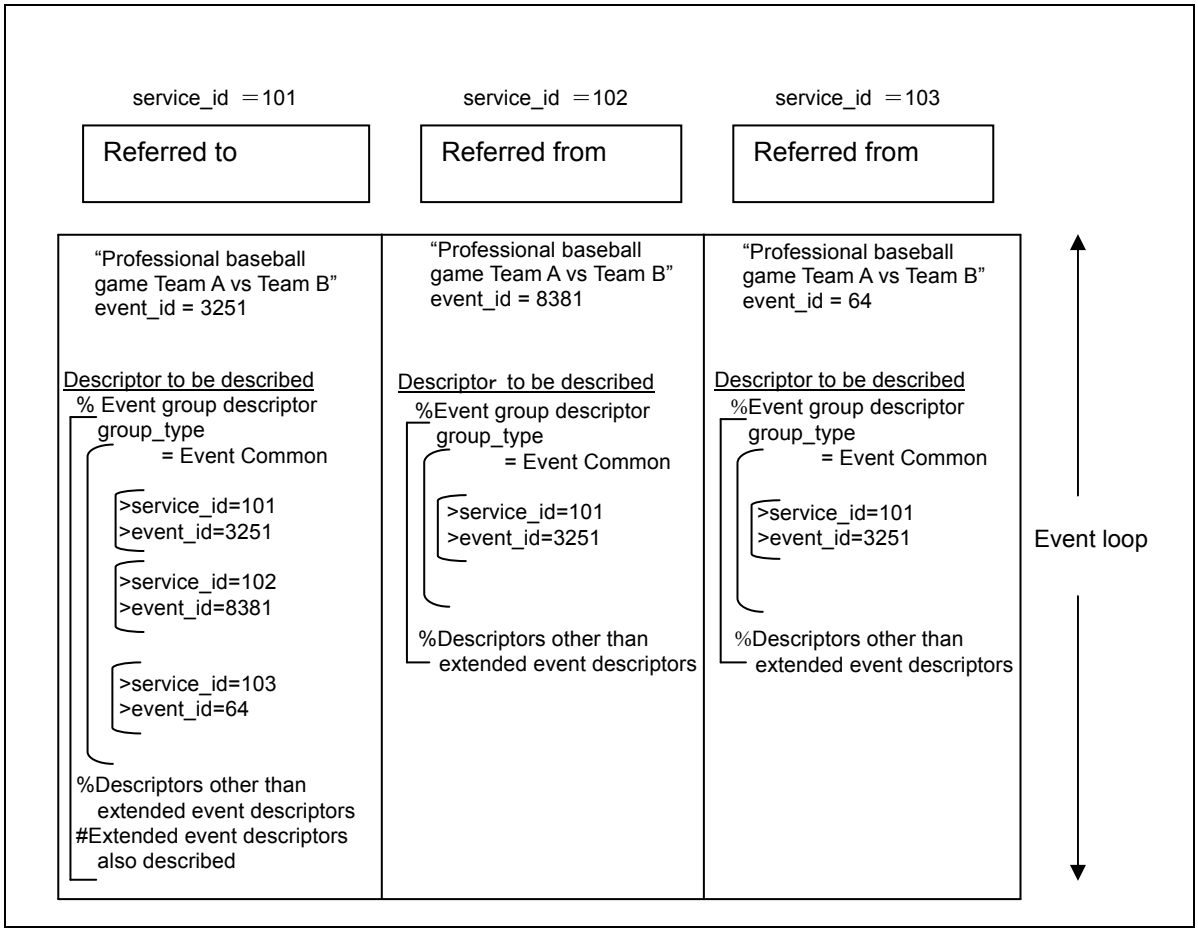


Figure 17-2 Example of Description into the H-EIT[p/f]s

17.4.2 H-EIT[schedule basic]

The rules on how to describe events for Event Common in the H-EIT[schedule basic]s are provided below.

- Event Group Descriptors should be described in all the event loops for Event Common.
- All the descriptors that should be described in the H-EIT[schedule basic] should be placed in the “referred to”.
- Only Event Group Descriptor is placed in the “referred from”.

Figure 17-3 illustrates the above explanation. The figure is an example of the same Event Common group as the one in H-EIT[p/f] shown in Figure 17-2 but this is for H-EIT[schedule basic]. Descriptors that should be usually described are placed only in the “referred to” and in the “referred from”, only Event Group Descriptor is placed. In the Event Group Descriptor in the “referred to”, all the “service_id” and “event_id” in the Event Common group are described and in the Event Group Descriptor in the “referred from”, only the “service_id” and “event_id” of the “referred to” are described.

A receiver unit judges whether it is “referred to” or “referred from” from Event Group Descriptors similarly to the H-EIT[p/f]. When described information is needed in the “referred from”, the descriptor in the event loop of the “referred to” H-EIT[schedule basic] that is guided from the “service_id” and “event_id” described in the Event Group Descriptor is referred to.

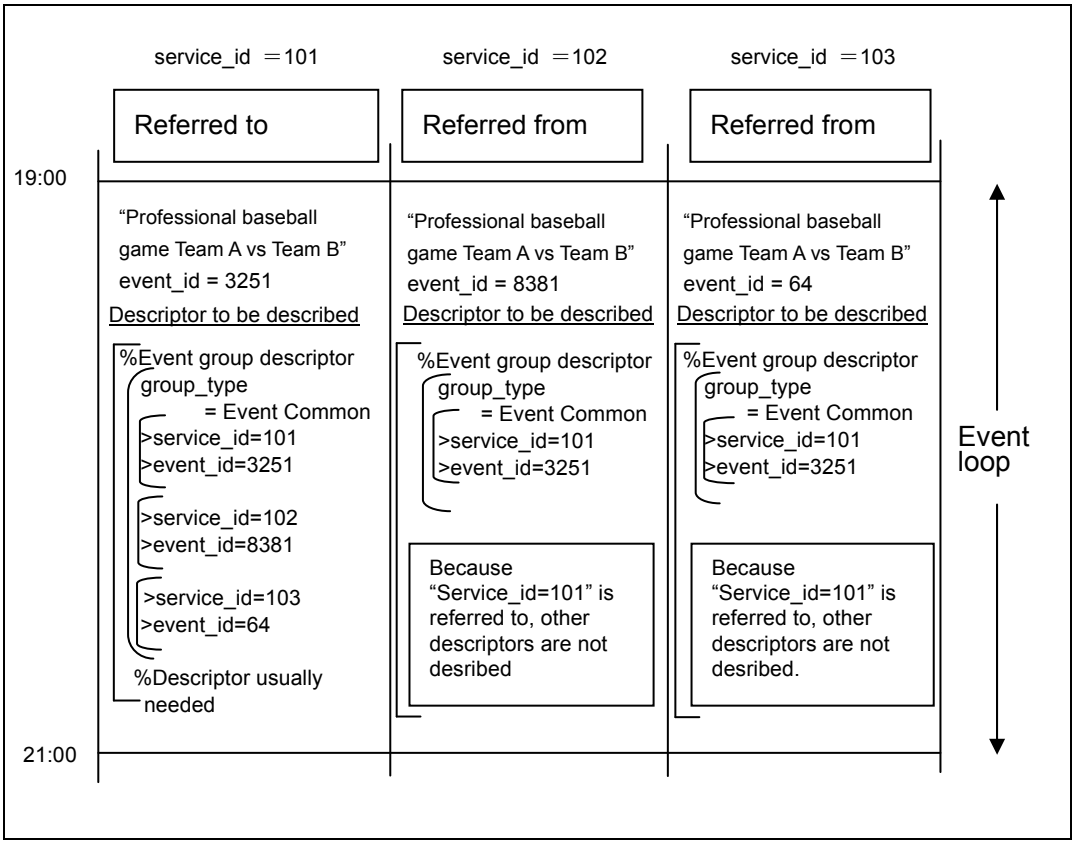


Figure 17-3 Example of Description into the H-EIT[schedule basic]s

17.4.3 H-EIT[schedule extended]

Rules on how to describe events that belong to an Event Common group into the H-EIT[schedule extended]s are provided below.

- Descriptors that need to be described in H-EIT[schedule extended] should be placed in the “referred to”.

  Please note that when there is no need to place a descriptor in H-EIT[schedule extended], the event loop can be omitted as defined in the H-EIT[schedule extended] operational standard.
- The event loop of the “referred from” should not be described (no event loop exists).
- Information on the Event Common group can be obtained from the H-EIT[schedule basic] and whether it is “referred to” or “referred from” can be also judged from the H-EIT[schedule basic].

Figure 17-4 illustrates the above explanation. The figure is an example of the same Event Common group as the one in H-EIT[p/f] shown in Figure 17-2 but this is for H-EIT[schedule extended]. The descriptors that should be usually described are described only in the “referred to” and the event loop itself is not placed in the “referred from”.

When a receiver unit needs to refer to information in H-EIT[schedule extended] for an event which belongs to an event group, it obtains information from the “referred to” H-EIT[schedule extended]. Whether it is “referred to” or “referred from” can be judged from the Event Group Descriptor in the H-EIT[schedule basic] in which the same event is described. The idea is that information in the H-EIT[schedule extended] is needed when the H-EIT[schedule basic] is processed and there will be no possibility of needing to obtain information in the H-EIT[schedule extended] only, and information on the Event Common group and “referred to” and “referred from” can be obtained by looking at the H-EIT[schedule basic], therefore, there is no need to place Event Group Descriptors in the H-EIT[schedule extended] and at the same time, event loop itself does not need to be described in the “referred from” H-EIT[schedule extended].

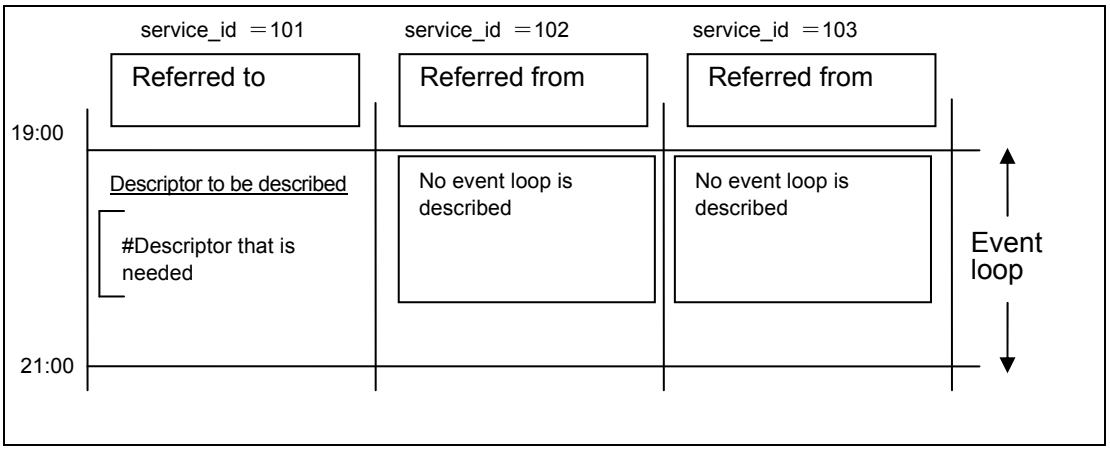


Figure 17-4 Description into the H-EIT[schedule extended]

17.4.4 M-EIT

The M-EIT can be categorized into the M-EIT[p/f] and the M-EIT[p/f after], but use of Event Common is the same for both types. Descriptors transmitted in H-EIT[schedule extended] are placed but they are not in the M-EIT, therefore, Event Common in the M-EIT has the following characteristics which are different from the ones of the H-EIT.

- All the descriptors including the Event Group Descriptor should be placed in both “referred to” M-EIT and “referred from” M-EIT.
- The same information should be described in all the descriptors other than Event Group Descriptor in both “referred to” and “referred from”.

Figure 17-5 illustrates the above explanation. The figure is an example of an Event Common group of three services (“service_id”=101, 102 and 103) in a HD program called “Professional baseball game Team A vs. Team B”. The three events in the figure (“service_id” =101 / “event_id” =3251, “service_id” =102 / “event_id” =8381 and “service_id” =103 / “event_id” =64) are the same event but one of the services is defined as the “referred to”. In the figure, the event loop of “service_id” =101/” event_id”=3251 is the “referred to”. On the other hand, the remaining two event loops (“service_id” =102 / “event_id” =8381 and “service_id” =103 / “event_id” =64) are “referred from”.

In the “referred to”, all the “service_id” and “event_id” that make up the Event Common group are described using an Event Group Descriptor. On the other hand, in the Event Group Descriptors in the “referred from”, only service_id and event_id in the “referred to” (“service_id” =101/”event_id”=3251) are described.

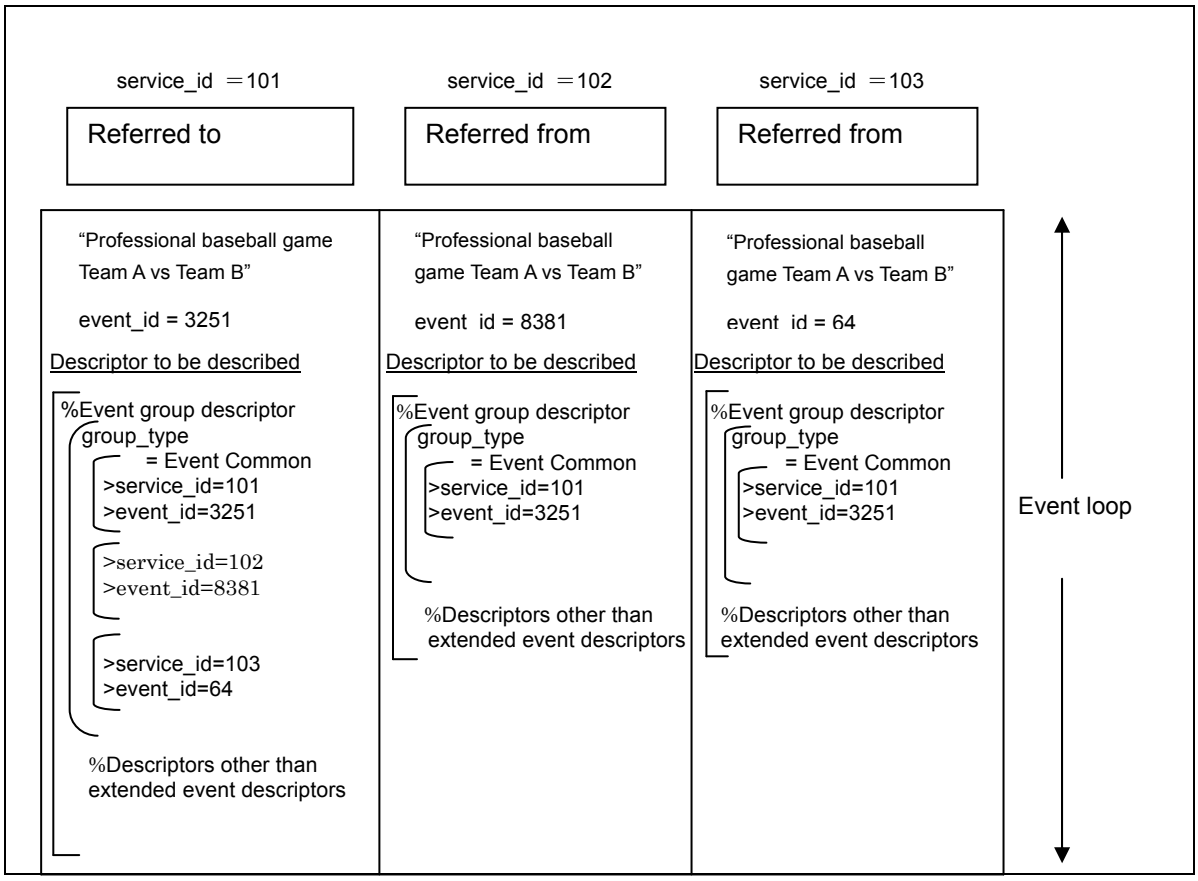


Figure 17-5 Example of Description into the M-EITs

18 Operation of A Series of Events

One of the possible applications to handle programs as a group is an application to program a serial drama as a series.

The operation of a series of events is described below.

18.1 Descriptors to be used

- A Series Descriptor is used to define a series.
- A Series Descriptor is placed only in the H-EIT and M-EIT.
- A Series Descriptor described in the EIT is transmitted as common operation SI.
- A Series Descriptor is not always placed for every event.
- There are cases where a series name is not described even if a Series Descriptor is placed in the EIT. In such a case, a receiver unit understands that the event name described in the Short Event Descriptor is the series name. If it is desired to give a series name that is different from a event name, a series name should be described in a Series Descriptor.

18.2 Assignment of Values

(1) series_id

A “series_id” value is assigned uniquely within multiple services that belong to the same media type within the same terrestrial broadcaster described in the BIT.

There are cases where events that belong to a series are broadcast in multiple services of a broadcaster. In such a case, when events with the same series_id are within multiple services of the same media type within the same terrestrial broadcaster to which the services which have the events belong, such events can be defined as in the same series, and if multiple events have Series Descriptors with the same “series_id” within services which belong to the same media type within the same terrestrial broadcaster, they are recognized as they are in the same series even if they are in multiple services. A series should not be defined for multiple media types no matter whether it is within multiple terrestrial broadcasters or within the same terrestrial broadcaster.

For 100 days starting from the next day of the day when an event that belongs to a certain series was broadcast, the same “series_id” value as this event should not be assigned to another event in a different series. If another event with the same “series_id” value exists in this 100-day period, that means this event belongs to the same series as the one that ended.

(2) repeat_label

There are cases where the first-time broadcasting and a rerun of a certain series are broadcast in the same period. An example is that first-time broadcasting of a drama broadcast daily on weekdays is broadcast in the morning and its rerun is broadcast at noon. In such a case, 0 and 1 are assigned to “repeat_label” of first-time broadcasting and the rerun respectively. When another rerun is broadcast (for example, it is broadcast on another service channel in the evening), 2 is assigned to “repeat_label”. Thus, first-time broadcasting and up to 15 reruns can be differentiated in the same period. The “repeat_label” value itself has no meaning and is used only to differentiate broadcasting groups. In other words, “repeat_label 1” does not mean the first-time rerun. However, it is clear that reruns with different “repeat_label” values are in different broadcasting groups.

Use of both “series_id” and “repeat_label” can differentiate reruns uniquely. Basically, when first-time broadcasting of a certain series is programmed, first-time broadcasting will be programmed and when a rerun of a certain series is programmed, a rerun will be programmed. However, because the same “series_id” has been assigned to both events, it is possible to recognize that the contents of the programs are the same, thus, if another program has been programmed in the same duration of time, an episode of the same number in another group can be programmed as an alternative.

Even if a certain series is a rerun of a series broadcast in the past, that rerun can be

handled as first-time broadcasting and 0 can be given to “repeat_label” as long as the broadcasting periods do not overlap.

(3) program_pattern

This represents a broadcasting pattern of a series of programs. This makes it possible to know roughly at what time an event that belongs to a series will appear next.

(4) expire_date_valid_flag

0 is assigned when a scheduled end date of a series is undecided.

(5) expire_date

An expiry date of a series is described in MJD. Even when an event of the last episode could not be identified for some reason, a receiver unit will understand that the series has ended after this date. This date does not have to be the same as the date when the last episode is broadcast and can be a date later than that date.

(6) episode_number

A value between 0x000(0) and 0xFFF(4095) is assigned to “episode_number”.
0x000 is assigned when a number of episodes cannot be defined such as a news program. A receiver unit does not think that multiple events with 0x000 are of the same episode number.
Normally, the same “episode_number” value is assigned to a rerun of the same series of the same episode number.

(7) last_episode_number

A value between 0x000(0) and 0xFFF(4095) is assigned to ”last_episode_number”.
0x000 is assigned when the episode number of the last episode (total number of episodes in a program) is undecided.
When the value of “last_episode_number” is not 0 and at the same time, the values of both “episode_number” and “last_episode_number” are the same, this event is recognized as the last episode in a series.
A series of programs with more than 4095 episodes should be divided into multiple series.

18.3 End of a Series

A series is recognized as having ended in one of the following cases.

(1) An event whose “last_episode_number” is not 0 and at the same time, whose “episode_number” and “last_episode_number” have the same value ends.

(2) When the date described in “expire_date” passed.

When the last event in a series whose “expire_date” is undecided is identified and for the next 100 days, the next event that belongs to that series is not received.

18.4 Examples of Operation

18.4.1 Common Example

Figure 18-1 and Table 18-1 shows an example of series.

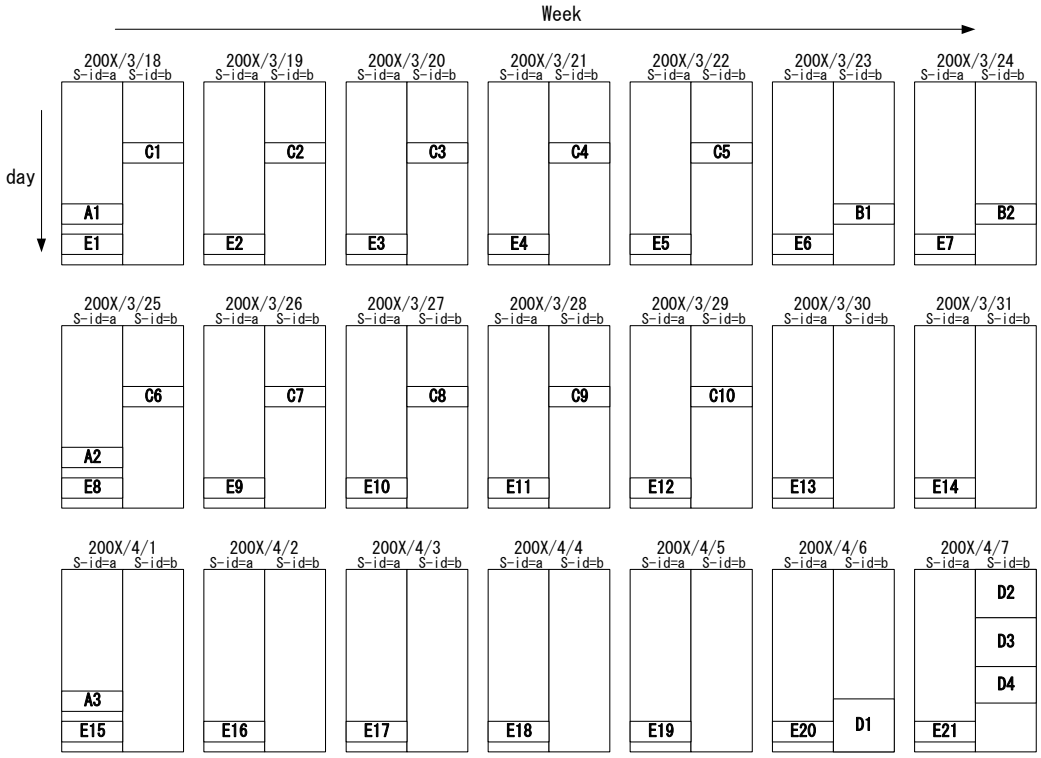


Figure 18-1 Example of Series Operation(1)

Table 18-1 Example of Description of Series Descriptors for the Events in Figure 18-1

Event		series_id	repeat_label	episode_no	last_episode_no	pgm_ptn	expire_date
A1	12 episode drama broadcast weekly	100	0	1	12	2	200X/6/30
A2		100	0	2	12	2	200X/6/30
A3		100	0	3	12	2	200X/6/30
B1	Drama broadcast two consecutive nights	101	0	1	2	0	200X/3/24
B2		101	0	2	2	0	200X/3/24
C1	Drama broadcast daily on weekdays	102	0	51	60	1	200X/3/29
…							
C10		102	0	60	60	1	200X/3/29
D1	24hour program	107	0	0	0	5	200X/4/7
D2		107	0	0	0	5	200X/4/7
D3		107	0	0	0	5	200X/4/7
D4		107	0	0	0	5	200X/4/7
E1	Daily news (number of episodes not fixed)	109	0	0	0	1	********
…		…	…	…	…	…	
E21		109	0	0	0	1	********

Services of “service_id” = a and b belong to the same media type within the same terrestrial broadcaster.

- Program A1 to A3 is an example of a 12-episode drama that is broadcast weekly. This series will end on June 20th, 200X at the latest. Other examples include dramas, music programs, variety shows, etc which are broadcast weekly.
- Program B1 and B2 is a series of 2 episodes (part 1 and part 2) within the same service.
- Program C1 to C10 is a drama broadcast daily on weekdays and the last episode (60th episode) will be broadcast on March 29th, 200X.
- Program D1-D4 is an example of a 24hour program. Normally, it should be a single event but in this example, it is divided into a few events and there is no concept of “episode numbers”.

Program E1 to E21 is an example of regular programs with uncertain number of episodes, such as a news program. As long as the scheduled end date is undecided, the date in “expire_date” should be described as “invalid” (******** in the table means that the date is invalid).

18.4.2 Examples of reruns

Figure 18-2 and Table 18-2 show example of reruns of series.

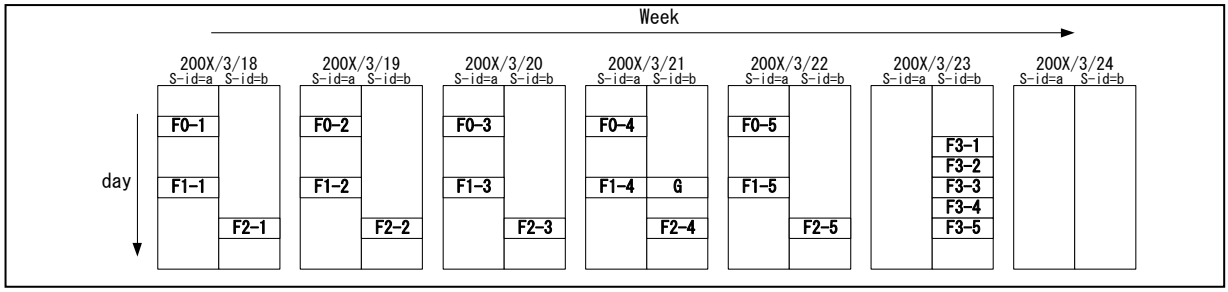


Figure 18-2 Example of Series Operation (2)

Table 18-2 Example of Description of Series Descriptors for the Events in Figure 18-2

Event		series _id	repeat _label	episode _no	last_episode _no	pgm _ptn	expire _date
F0-1	First-time broadcast of a drama broadcast daily on weekdays	110	0	51	55	1	200X/3/22
F0-2		110	0	52	55	1	200X/3/22
F0-3		110	0	53	55	1	200X/3/22
F0-4		110	0	54	55	1	200X/3/22
F0-5		110	0	55	55	1	200X/3/22
F1-1	Rerun of F0 broadcast in a different slot on the same day	110	1	51	55	1	200X/3/22
F1-2		110	1	52	55	1	200X/3/22
F1-3		110	1	53	55	1	200X/3/22
F1-4		110	1	54	55	1	200X/3/22
F1-5		110	1	55	55	1	200X/3/22
F2-1	Rerun of F0 broadcast on another channel in a different slot on the same day	110	2	51	55	1	200X/3/22
F2-2		110	2	52	55	1	200X/3/22
F2-3		110	2	53	55	1	200X/3/22
F2-4		110	2	54	55	1	200X/3/22
F2-5		110	2	55	55	1	200X/3/22
F3-1	F0 broadcast at once on a weekend	110	3	51	55	4	200X/3/23
F3-2		110	3	52	55	4	200X/3/23
F3-3		110	3	53	55	4	200X/3/23
F3-4		110	3	54	55	4	200X/3/23
F3-5		110	3	55	55	4	200X/3/23

Services of “service_id” =a and b belong to the same media type within the same terrestrial broadcaster.

- Program F0-1 to F0-5 is the first-time broadcasting of a program broadcast daily on weekdays.
- Program F1-1 to F1-5 is a rerun broadcast on the same service channel and on the same day as the first-time broadcasting but in a different time slot.
- Program F2-1 to F2-5 is a rerun broadcast on a different service channel and in a different slot from the first-time broadcasting but on the same day.

- Program F3-1 to F3-5 is a rerun of programs for a whole week broadcast at once on a different service channel and on a different day from the first-time broadcasting.
- If F1-1 to F1-5 is programmed as a series when Program G has been programmed, because F1-4 and G are in the same slot, F1-4 cannot be programmed. However, because it is understood that the contents of F0-4, F2-4 and F3-4 are the same, it will be possible to program one of the three instead.

19 Event Schedule Change

This chapter describes the rules on and the concept of updating SI information (mainly, EIT[p/f]) when initial broadcasting schedule has to be changed (mostly urgently) as event schedule is changed.

19.1 Undefined Status

As a way to handle an urgent event schedule change and show the status of the actual operation at a station, schedule “undefined status” can be defined.

There are two types of schedule “undefined status” – one is “undecided event status” to show that an event cannot be fixed and the other is “undefined time status” to show that an event has been fixed but time has not.

19.1.1 Undecided Event

“Undecided event” shows that the broadcasting schedule has not been decided and its content has not been fixed. “Undecided event” can be defined only in the EIT[p/f] when the event schedule is urgently changed,

“Undecided event” is identified with the “start_time” and “duration” fields in an EIT. In other words, an event with all 1 assigned to both “start_time” and “duration” is “undecided event”. In such a case, “event_id” has no meaning.

“Undecided event” is allowed to exist only in “following” in the EIT[p/f].

19.1.2 Undefined Time

“start_time” and “duration” can be defined as “undecided” only in the EIT[p/f] when the event schedule is urgently changed. When all 1 is assigned to either of “start_time” or “duration”, that means that the time information is undecided. Moreover, when all 1 is assigned to both “start_time” and “duration”, that means that the event is an undecided event.

Even when “undefined time” is set up, its “event_id” is valid.

When “undefined time” is set up, events are recognized as below.

- When the “start_time” is undecided.
  This means that the event is scheduled to be broadcast as the next program but the precise start time is undecided due to reasons such as that the ending time of the currently broadcast program is not fixed. This status can occur only in “following” in the EIT[p/f].
- When “duration” is undecided.
  This means that the duration of time that was set up initially may be changed in an event currently being broadcast or being suspended. This status can occur only in “present” and “following” in the EIT[p/f].

19.2 Principles regarding change of programming

- Once the start time of an event has been defined, it should not be transmitted at an earlier time. However, there are times events are started earlier due to unavoidable circumstances.
- The EIT[p/f] reflects changes made to event schedule most reliably.
- Generally, the ETI[p/f] should be transmitted with the corrected content at least 30 seconds before the update and if it is transmitted later, normal operation of recording devices, etc. can not be guaranteed. However, there are cases where this rule cannot be followed due to unavoidable circumstances. Examples of such cases are shown below.
  1) When a program registered in “following” is changed to another program immediately before the start time (3 seconds at the shortest).
  2) When a program suddenly appears in “present” without appearing in “following” and broadcasting of the program starts.
  3) When the current event is extended without updating “present/following” and the start of the next event is delayed.
  4) When the current event is extended and the start time of the next event is delayed but “present/following” is updated at the times as described.
  5) When a program was accounted as a single event initially because it was a long time live program, etc. but it is suspended due to “emergency news” cut-in, etc. and re-started.

19.3 Basic Rules regarding Event Progress

Progress of an event is shown in the EIT[p/f]. To understand the precise progress, the EIT[p/f] should be obtained. There are three parameters to show event progress in the EIT[p/f] as shown below.

- Placement of an event in “present” / “following”
- “start_time” of an event
- “duration” of an event
  Please note that the “running_status” in an EIT exists to show the progress of an event like this, but in Digital Terrestrial Television Broadcasting, it is always defined as “reserved” and is not used.
- Judgement of “Ongoing” / “Ended”
  Whether or not an event is ongoing (and an event has ended) can be judged from whether the event is placed in “present” in the EIT[p/f]. In other words, when an event is placed in “present”, it is being broadcast and when an event that was placed in “present” disappears from the EIT[p/f], it is regarded that the event has ended.
- Judgement of “Started”
  Whether or not an event has started is judged based on the “start_time” of “following” in the

EIT[p/f]. In other words, it is regarded that an event has started when it is the time shown in “start_time” of “following”. Please note that an EIT will not always be updated at the time shown in “start_time” because of EIT cycles. EIT[p/f] should be updated without fail within 10 seconds after “start_time” of “following”. If it is not updated within 10 seconds, it is regarded that it is in an abnormal status. Only during this 10 seconds, while a program is regarded as “being broadcast” based on the status of “present”, it is regarded as started based on the status of “following”.

- Judgement of “Interrupted”
  Whether or not an event is being interrupted is judged by comparing “start_time” of “following” in the EIT[p/f] and the present time. Please note that when an event is going to be interrupted soon, the times in “present” and “following” may overlap each other. To interrupt an event, the content of “present” should be moved to “following” without changing “start_time” (an event can be recognized as “suspended” when it is in this status). To re-start an event, the content of “following” should be placed in “present” without changing “start_time”. Additionally, an event is judged as “re-started” when the EIT[p/f] is placed in “present”. This is because the re-start time cannot be described as “start_time” of a intterupted event (following) should not be changed.
- Judgement of “Cancelled”
  A broadcaster judges that an event has been cancelled when this event has not been described in SI after more than 3 hours have passed from the initially scheduled start time. For example, even when event schedule is changed and a program will be broadcast the next day or later, the EIT[schedule] needs to be updated within 3 hours.

Table 19-1 shows progress of events judged from “start_time” and “duration” in the EIT[p/f]

Table 19-1 Values of "start_time" and "duration" in the EIT[p/f] and Status Shown with Those Values

	start_time	duration (end_time)	Status
Present	Before the present time	Before the present time	Program in progress (during the transition period) (Note 1)
	Before the present time	After the present time	Program in progress
	Before the present time	Undecided	Program in progress and ending time undecided (Very likely to change to "early ending", "extension", etc)
	Undecided	Optional	Abnormal status
	After the present time	Any value	Abnormal status
Following	Any value	Before the present time	Abnormal status
	Before the present time	After the present time	Program being suspended. Scheduled to end at the ending time shown with "duration" value including the suspended period (Note 1).
	Before the present time	Undecided	Program being suspended. Scheduled ending time undecided.
	After the present time	After the present time	Schedule to be broadcast as the next program.
	After the present time	Undecided	Schedule to be broadcast as the next program but the ending time undecided.
	Undecided	Other than Undecided	Schedule to be broadcast as the next program but the scheduled start time undecided. The "duration" value is valid.
	Undecided	Undecided	Next program itself is undecided. Described event has no meaning.

(Note 1) Although the rule says that EIT[p/f] should be updated without fail within 10 seconds after "start_time" of "following", there may be just a delay in the update of the EIT[p/f]. For example, if "start_time" and "duration" of "following" are before the present time and after the present time respectively as shown in the above table, this can be regarded that the program is being suspended. On the other hand, if the present time is very close to "start_time" of "following" (less than10 seconds), there may be a delay in the update of the EIT[p/f], so this should be taken into account and should be regarded that the program is in progress.

19.4 Consistency between EITs

There are two types of EITs included in common operation SI, which are EIT[p/f] and, EIT[schedule basic]. The same content of information is usually described in these tables but the consistency may not be able to be maintained as event schedule is changed.

19.4.1 Consistency between H-EIT[p/f] and H-EIT[schedule]

The EIT[p/f] is given a higher priority than the EIT[schedule] and updated information is reflected more accurately in the EIT[p/f].

Additionally, because transmission of the EIT[schedule] is stopped on a segment basis as the time passes, there is a possibility that information on a program currently broadcast will not

be able to be obtained. Information on a program currently broadcast is always described in the EIT[p/f] but only up to 2 programs.

As a result, when a receiver unit needs to create an event list in chorological order starting from the currently broadcast event, the EIT[p/f] and the EIT[schedule] need to be merged.

Under normal conditions, it is easy to merge these tables as they are in consistency, but when changes are made to event schedule, information in the EIT[p/f] and the EIT[schedule] becomes inconsistent.

Receiver units' guidelines for merging the EIT[p/f] and the EIT[schedule] are provided below.

- present events shown in EIT[p/f] should be preferentially merged.
- When the duration of time of a present event is undecided, it should be merged so that it overlaps an event that includes the present time in the EIT[schedule].
- When a following event shown in the EIT[p/f] is fixed (in other words, it is not in "undefined status"), this following event should be preferentially merged. In this case, an event in the EIT[schedule] that overlaps the following event can be presented as a frame from the ending time of the following event. (Please note that changing the start time of an event should be avoided).
- When a following event is in "undefined status", a priority should be given to the EIT[schedule]. In other words, events after the present event should be presented based on the EIT[schedule].

19.4.2 Consistency between M-EIT[p/f]/L-EIT[p/f] and M-EIT/L-EIT[p/f after]

Because only up to 2 programs and up to 8 programs can be described in the M-EIT[p/f]/L-EIT[p/f] and the M-EIT[p/f after]/L-EIT[p/f after] respectively, when a receiver unit needs to create an event list in chorological order starting from the currently broadcast event, the M-EIT[p/f]/L-EIT[p/f] and the M-EIT[p/f after]/L-EIT[p/f after] need to be merged.

They can be merged simply under normal conditions, but when changes have been made to event schedule, information in the M-EIT[p/f]/L-EIT[p/f] and the M-EIT[p/f after]/L-EIT[p/f after] may become inconsistent. When the M-EIT[p/f]/L-EIT[p/f] and the M-EIT[p/f after]/L-EIT[p/f after] are merged on a receiver unit, it is desirable to pay attention to the following points.

- ○ When a following event shown in the M-EIT[p/f]/L-EIT[p/f] is fixed (in other words, it is not in "undefined status"), the M-EIT[p/f]/L-EIT[p/f] and the M-EIT[p/f after]/L-EIT[p/f after] should be merged and displayed.
- ○ When the duration of time of the present event is undecided, the M-EIT[p/f after]/ L-EIT[p/f after] may be transmitted as an empty section. In addition, even when the M-EIT[p/f after]/L-EIT[p/f after] have been transmitted, it is highly possible that they will become inconsistent with M-EIT[p/f]/L-EIT[p/f].

○ When a following event is in “undefined status”, the M-EIT[p/f after]/L-EIT[p/f after] may be transmitted as an empty section, or even when the M-EIT[p/f after]/L-EIT[p/f after] have been transmitted, it is highly possible that they will become inconsistent with the M-EIT[p/f]/L-EIT[p/f].

19.5 Guidelines for Transmission of Change of Programming

Guidelines for transmission of the change of programming are shown below. The operation as described below cannot always be guaranteed because actual operation at each station may be different (For example, “undecided event” or “undefined time” may be transmitted before schedule change is fixed). However, they should be considered as a basic idea.

Please note that the following guidelines are given to describe schedule change of events described in SI and not to mention management units such as programs within a station. How events should be assigned to management units within a station should be decided by each broadcaster based on the definition of events.

19.5.1 Event-Extension

When an event is extended (a program is broadcast beyond the scheduled ending time), changes should be made to the EITs as shown below.

At least 30 seconds before the scheduled ending time of the event, “duration” of “present” in the EIT[p/f] should be changed. In other words, the “duration” value should be changed to a correct value for the extension or set to “undecided”. At the same time, “start_time” of “following” should be changed for consistency. It is prohibited to set up the times in “present” and “following” in a way they overlap each other. Additionally, the minimum extension time is 1 minute.

Changed information should be reflected also into the EIT[schedule] as quickly as possible but “undefined times” should not be described in the EIT[schedule].

EIT can be updated repeatedly to extend an event. For example, when a baseball game program is extended, the EIT is updated for 10-minute extension tentatively and can be updated again for further extension according to the situation.

Please note that even after an EIT is transmitted with “undefined times”, it is desirable to update the EIT accordingly as soon as extension schedule is fixed.

19.5.2 Event-shortening(Early Ending of an Event)

Event-Shortening (a program ends earlier than the scheduled time), changes should be made to the EITs as shown below.

When it is decided to end an event earler , the EIT[p/f] based on the new schedule should be transmitted promptly, in which case, the “duration” value of “present” should be smaller than

the original one. It is desirable to have transmitted the fixed EIT[p/f] at least 30 seconds before the actual early ending time. Please note that a receiver unit regards that a program has ended when the description disappears from the EIT[p/f].

Changed information should be reflected also into the EIT[schedule] as soon as possible.

How to describe an EIT after an event ends earlier is up to each broadcaster but it should be avoided to broadcast an event at a time earlier than the initially defined starting time.

19.5.3 Event-Delay

When an event starts later (a program starts later than the scheduled time), changes should be made to the EITs as shown below.

When it is decided to start an event later, the EIT[p/f] should be updated and transmitted promptly if necessary (if it is decided that the change will influence the table). In this case, the “start_time” value should be changed so that the event will be delayed for a required duration of time. Also, at least 30 seconds before the initially scheduled start time, fixed EIT[p/f] should be transmitted.

Event if the change due to the late starts of an event will not influence the EIT[p/f], the fixed content should be reflected into the EIT[schedule] promptly. In this case, information on the event including the newly fixed broadcasting time should be described within 3 hours of the initially scheduled start time. If it takes more than 3 hours before the fixed information is described, a receiver unit should recognize that this event has been canceled.

19.5.4 Event-Interrupption

When an event is suspended (a program is stopped while it is being broadcast for some reason and another program is broadcast), changes should be made to the EITs as shown below.

When the suspension time comes, the present event in the EIT[p/f] should be described in “following” and ”start_time” and “duration” should not be changed (when it is clear that the duration of time will be changed because of the event suspension, only “duration” should be changed). The description of the “present” event can be decided according to the content of the program to be broadcast.

It is allowed to suddenly place (more than one) event, such as “information” in “present” during suspension, but it should be avoided to place events previously defined in the EIT[schedule], etc.

To re-start an event, it should be re-placed in “present” at the re-start time.

To end an event that is being suspended without re-starting it, the description of the suspended event should be erased from the EIT[p/f] (another event should be described in “following”).

How to reflect information on a suspended event into the EIT[schedule] is up to each broadcaster but it should be avoided

- ○ to describe the same event more than once.
- ○ to setup event times in a way they overlap each other in a sub-table.
- ○ to describe “undefined times” in the EIT[schedule].

One of the options is not to make any change to the EIT[schedule] during suspension.

Additionally, times in “present” and “following” may overlap each other during suspension.

19.5.5 Cut-in of an Event

When an event cuts in (a program is suddenly inserted during broadcast), changes should be made to the EITs as shown below.

When prior arrangement can be made, a cut-in event should be described in “following” in the EIT[p/f]. When prior arrangement cannot be made, a cut-in event should be suddenly described in “present” in the EIT[p/f]. A cut-in event needs to be given a new event ID but the same ID should not be given as described in the event ID assignment rules.

To suspend an event that is currently broadcast as an event cuts in, changes should be made to the EIT[p/f] in accordance with the description in Section 19.6.4.

19.5.6 Event-Forwarding(Early Start of an Event)

As a rule, starting an event earlier should be avoided (to start a program earlier than the initial start time). However, if it has to be done due to unavoidable reasons regarding the schedule, the EITs should be operated as shown below to enable a receiver unit to behave accordingly.

For an event that is assumed to be started early beforehand, “early start possible” should be specified in the Content Descriptor as information attached to a program for digital broadcasting. This enables a receiver unit to show the possibility that an event may be broadcast earlier to viewers when they reserve events for viewing or recording. As a rule, “possible to start early” should be specified when the difference between the initial start time and the assumed early start time is 1 hour or less. This should not be used, for example, when a serial drama is broadcast on a day before the scheduled date due to cancellation of a sport program.

When a receiver unit which supports early start of events is expected to behave accordingly, the program start time after the early start of an event should be fixed at least 1 hour before the initially scheduled start time. Moreover, at least 1 hour and 30 seconds before the initially scheduled start time after the program start time after the early start of an event has been fixed, the EIT[schedule] and the EIT[p/f] with the updated information should be transmitted.

When an event starts more than 1 hour earlier, even a receiver unit that supports the early start of events will not be able to behave accordingly. In addition, the minimum duration of time for early start is 1 minute.

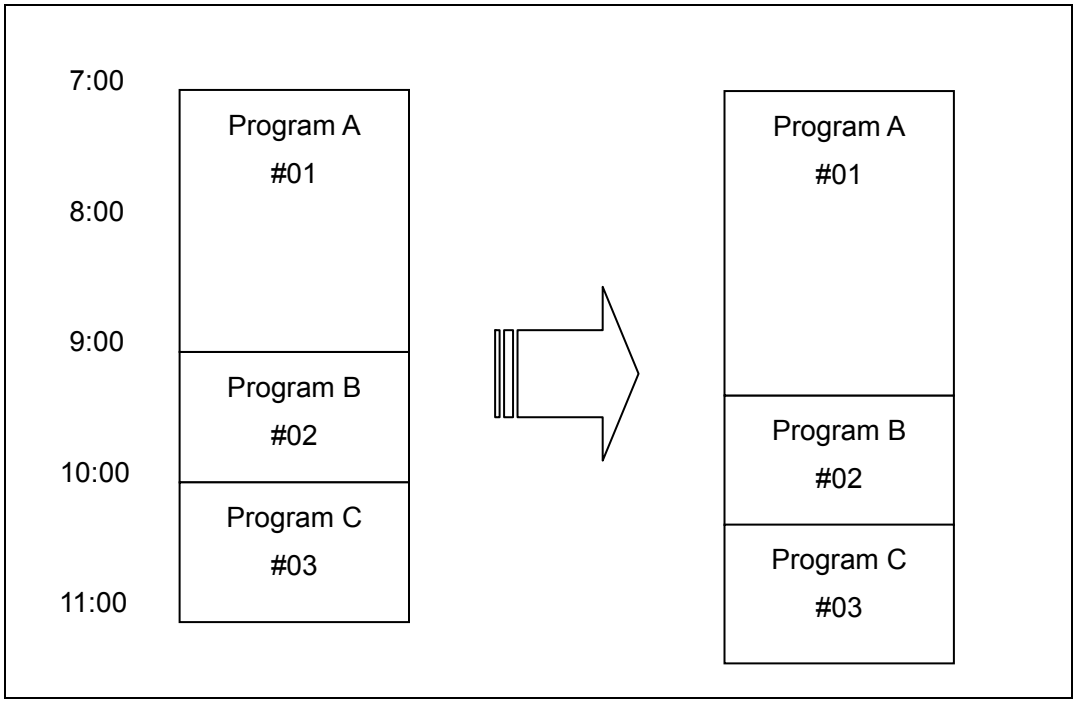
19.6 Examples of Transmission of the change of programming

Examples of EIT[p/f] transmission of the change of programming in each case are shown below.

Tables will not always be transmitted as described below but they can be useful for how to define undefined times and undecided events.

19.6.1 Case of event-extention

As the ending time of Program A is changed from 9:00 to 9:20, the start times of Program B and C is delayed for 20 minutes.



[Initial Schedule]

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
9:00	Program B	02	9:00	1:00	Program C	03	10:00	1:00

[Examples of Schedule Change]

When extension of the event is repeated based on the fixed content.

It is decided to extend an event for 10 minutes first (8:55), then another extension for 10 minutes is fixed (9:05).

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:55	Program A	01	7:00	2:10	Program B	02	9:10	1:00
9:05	Program A	01	7:00	2:20	Program B	02	9:20	1:00
9:20	Program B	02	9:20	1:00	Program C	03	10:20	1:00

When the content is fixed quickly when “undecided” events are used.

The programs after the next are defined as “undecided” when a possibility of extension arises (8:55) and the EIT is fixed when the extension times are fixed (9:15).

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:55	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
9:15	Program A	01	7:00	2:20	Program B	02	9:20	1:00
9:20	Program B	02	9:20	1:00	Program C	03	10:20	1:00

When it takes long to fix the content when “undecided” events are used (1)

The programs after the next are defined as “undecided” when a possibility of extension arises (8:55), the contents of events in “undefined status” cannot be fixed in time (9:30) and Program B starts without notice (9:20).

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:55	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
9:20	Program B	02	9:20	Undecided	Undecided	Any	Undecided	Undecided
9:30	Program B	02	9:20	1:00	Program C	03	10:20	1:00

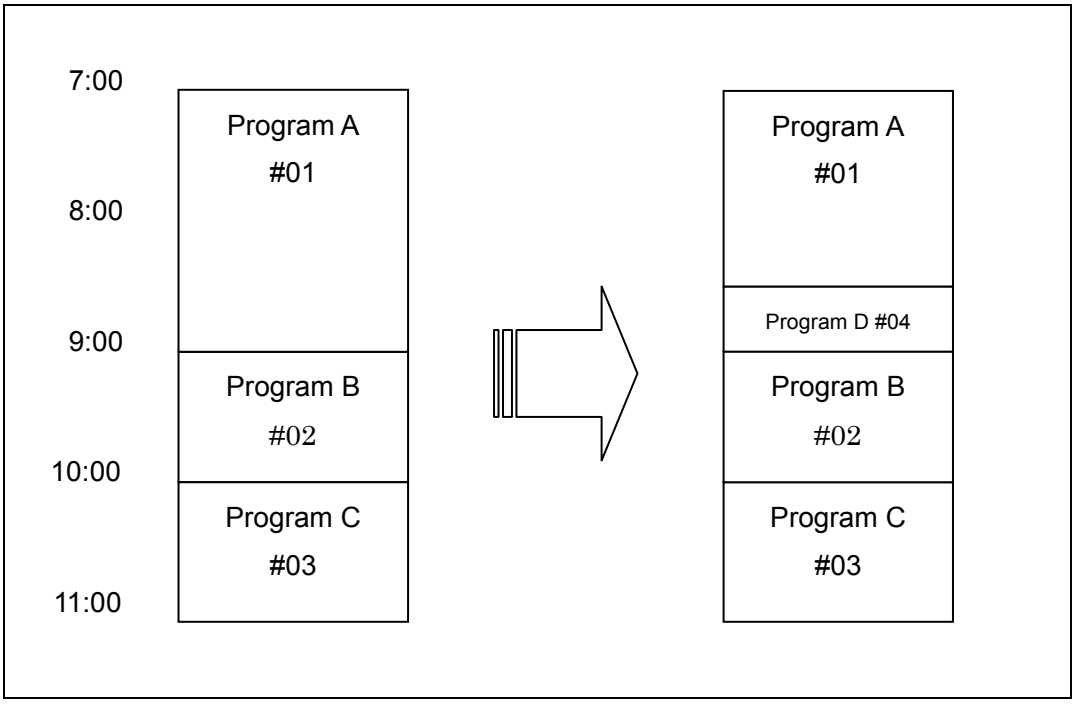
When it takes long to fix the content when “undecided” events are used (2)

The programs after the next are defined as “undecided” when a possibility of extension arises (8:55), the contents of events in “undefined status” cannot be fixed in time (9:30) and Program B starts without notice (9:20). Please note that whether or not Program A will be canceled has not been decided at the time (9:20).

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:55	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
9:20	Program B	02	9:20	Undecided	Program A	01	7:00	Undecided
9:30	Program B	02	9:20	1:00	Program C	03	10:20	1:00

19.6.2 Event-Shortening

As Program A ends 20 minutes earlier than the initial schedule, a new Program D is broadcast for 20 minutes. Programs B and C are broadcast as scheduled.



[Initial Schedule]

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
9:00	Program B	02	9:00	1:00	Program C	03	10:00	1:00

[Examples of Schedule Change]

When changes are made based on the fixed content.

At 8:30, it is fixed that Program A will end earlier and Program D will be broadcast after Program A.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:30	Program A	01	7:00	1:40	Program D	04	8:40	0:20
8:40	Program D	04	8:40	0:20	Program B	02	9:00	1:00
9:00	Program B	02	9:00	1:00	Program C	03	10:00	1:00

When the content is fixed quickly when “undecided” events are used.

When the possibility of ending an event earlier becomes high (8:30), programs after the next are defined as “undecided”. Then, before the actual early ending time (8:40), the content of the next programs can be fixed (8:35).

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:30	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
8:35	Program A	01	7:00	1:40	Program D	04	8:40	0:20
8:40	Program D	04	8:40	0:20	Program B	02	9:00	1:00
9:00	Program B	02	9:00	1:00	Program C	03	10:00	1:00

When it takes long to fix the content when “undecided” events are used (1)

When the possibility of ending an event earlier becomes high (8:30), programs after the next are defined as “undecided” and information can not be updated in time for the actual early ending time (8:40). (8:50)

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:30	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
8:40	Program D	04	8:40	Undecided	Undecided	Any	Undecided	Undecided
8:50	Program D	04	8:40	0:20	Program B	02	9:00	1:00
9:00	Program B	02	9:00	1:00	Program C	03	10:00	1:00

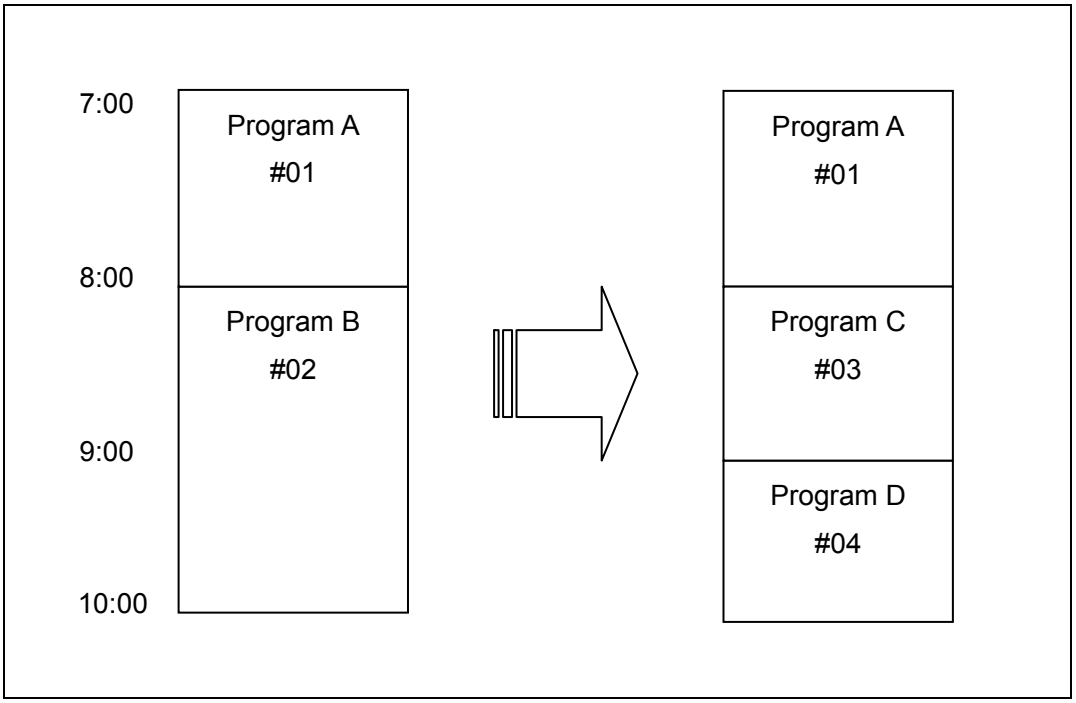
When it takes long to fix the content when “undecided” events are used (2)

When the possibility of ending an event earlier becomes high (8:30), programs after the next are defined as “undecided” and information can not be updated in time for the actual early ending time (8:40) (8:50). (Program A remains in “following” at the time of 8:40).

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	2:00	Program B	02	9:00	1:00
8:30	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
8:40	Program D	04	8:40	Undecided	Program A	01	7:00	Undecided
8:50	Program D	04	8:40	0:20	Program B	02	9:00	1:00
9:00	Program B	02	9:00	1:00	Program C	03	10:00	1:00

19.6.3 Event-Change

Program B that was scheduled to be broadcast is canceled and Programs C and D are broadcast instead.



[Initial Schedule]

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	2:00

[Examples of Schedule Change]

When changes are made based on the fixed content.

At 7:40, the cancellation of Program B and the broadcasting of Programs C and D are fixed.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	2:00
7:40	Program A	01	7:00	1:00	Program C	03	8:00	1:00
8:00	Program C	03	8:00	1:00	Program D	04	9:00	1:00

When the content is fixed quickly when “undecided” events are used.

When the possibility of canceling Program B becomes high (7:20), programs after the next are defined as “undecided”. Then, at the time when the cancellation is fixed (7:40), the next program, Program C, is described.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	2:00
7:20	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
7:40	Program A	01	7:00	1:00	Program C	03	8:00	1:00
8:00	Program C	03	8:00	1:00	Program D	04	9:00	1:00

When it takes long to fix the content when “undecided” events are used (1)

When the possibility of canceling Program B becomes high (7:20), programs after the next are defined as “undecided”. Then, the cancellation is fixed and broadcasting of Program C starts (8:00) but information cannot be updated in time (8:10).

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	2:00
7:20	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
8:00	Program C	03	8:00	Undecided	Undecided	Any	Undecided	Undecided
8:10	Program C	03	8:00	1:00	Program D	04	9:00	1:00

When it takes long to fix the content when “undecided” events are used (2)

When the possibility of canceling Program B becomes high (7:20), programs after the next are defined as “undecided”. Then, the cancellation is fixed and broadcasting of Program C starts (8:00) but information cannot be updated in time (8:10). (Program A remains in “following” at the time of 8:00).

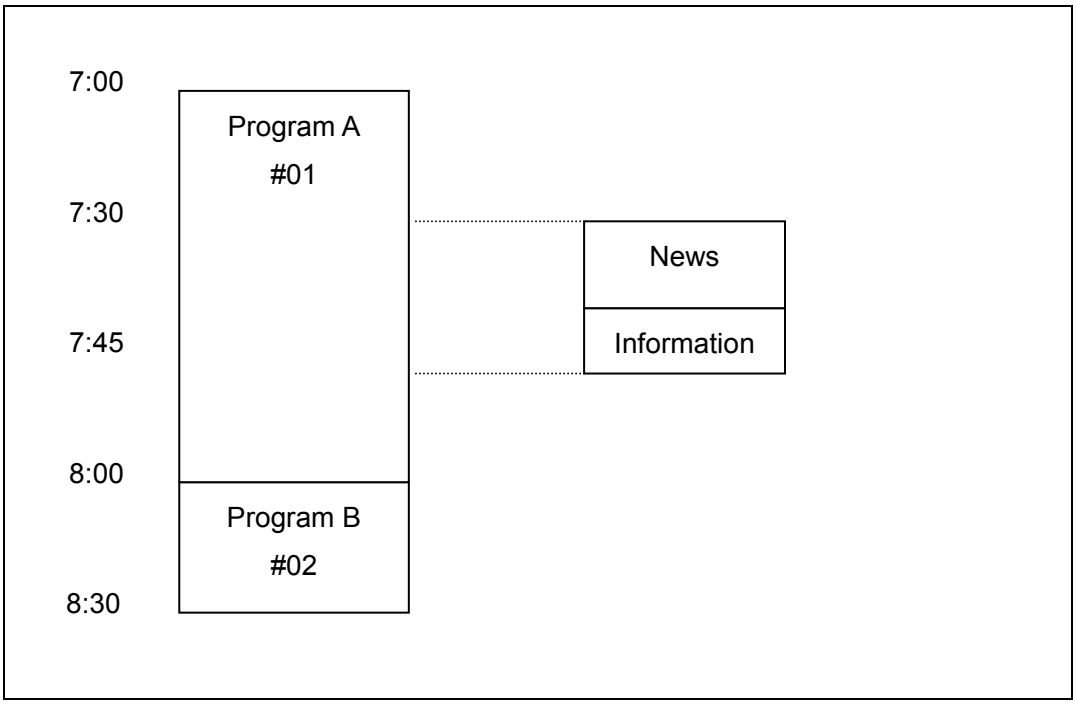
	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	2:00
7:20	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
8:00	Program C	03	8:00	Undecided	Program A	01	7:00	Undecided
8:10	Program C	03	8:00	1:00	Program D	04	9:00	1:00

19.6.4 Program Cut-in (1)

While Program A is being broadcast, emergency news, etc. is inserted.

After the news, a filler or information is broadcast.

Then, Program A is re-started.



[Initial Schedule]

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30

[Examples of Schedule Change]

When changes are made based on the fixed content.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:25	Program A	01	7:00	1:00	News	99	7:30	0:10
7:30	News	99	7:30	0:10	Program A	01	7:00	1:00
7:40	Information	88	7:40	0:05	Program A	01	7:00	1:00
7:45	Program A	01	7:00	1:00	Program B	02	8:00	0:30

* It is also possible to make sudden changes at 7:30 without making changes at 7:25.

When information is updated after “undefined status” is defined

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:25	Program A	01	7:00	undecided	undecided	Any	undecided	undecided
7:30	News	99	7:30	undecided	Program A	01	7:00	undecided
7:40	Information	88	7:40	undecided	Program A	01	7:00	undecided
7:45	Program A	01	7:00	1:00	Program B	02	8:00	0:30

When dealing with the changes by changing the event name without changing the event.

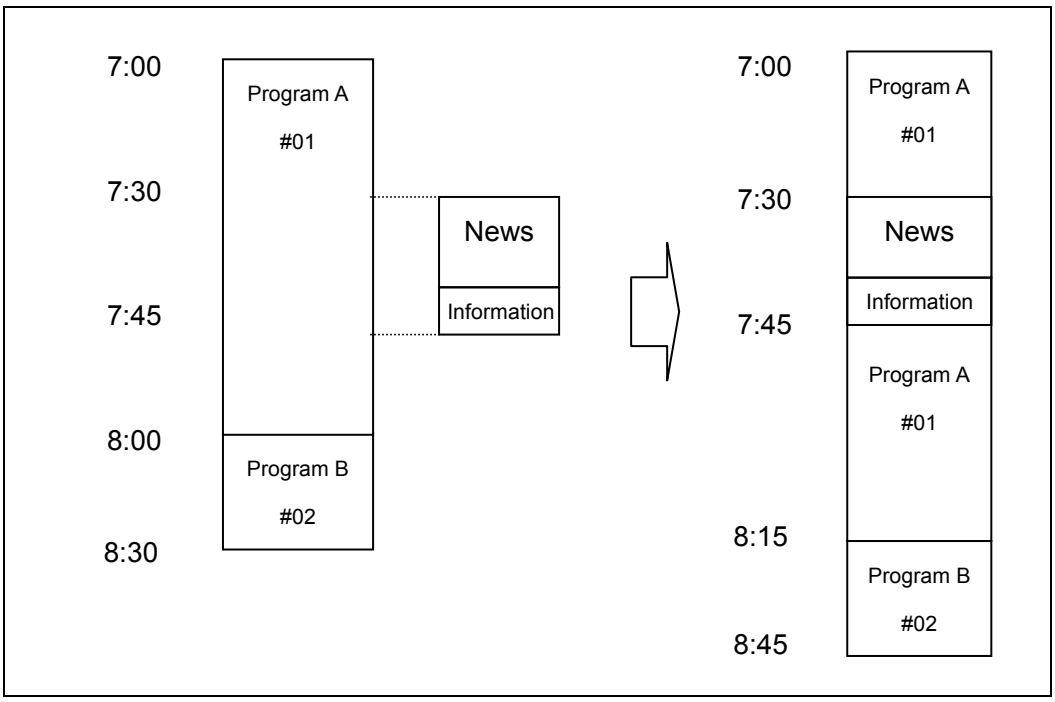
	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:30	News	01	7:00	1:00	undecided	Any	undecided	undecided
7:40	Information	01	7:00	1:00	undecided	Any	undecided	undecided
7:45	Program A	01	7:00	1:00	Program B	02	8:00	0:30

19.6.5 Program Cut-in (2)

While Program A is being broadcast, emergency news, etc. is inserted.

After the news, a filler or information is broadcast.

Then, Program A is re-started from where it was suspended. Therefore, the ending time of Program A is delayed.



[Initial Schedule]

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30

[Examples of Schedule Change]

When changes are made based on the fixed content.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:25	Program A	01	7:00	1:15	News	99	7:30	0:10
7:30	News	99	7:30	0:10	Program A	01	7:00	1:15
7:40	Information	88	7:40	0:05	Program A	01	7:00	1:15
7:45	Program A	01	7:00	1:15	Program B	02	8:15	0:30

* It is also possible to make sudden changes at 7:30 without making changes at 7:25.

When information is updated after “undefined status” is defined.

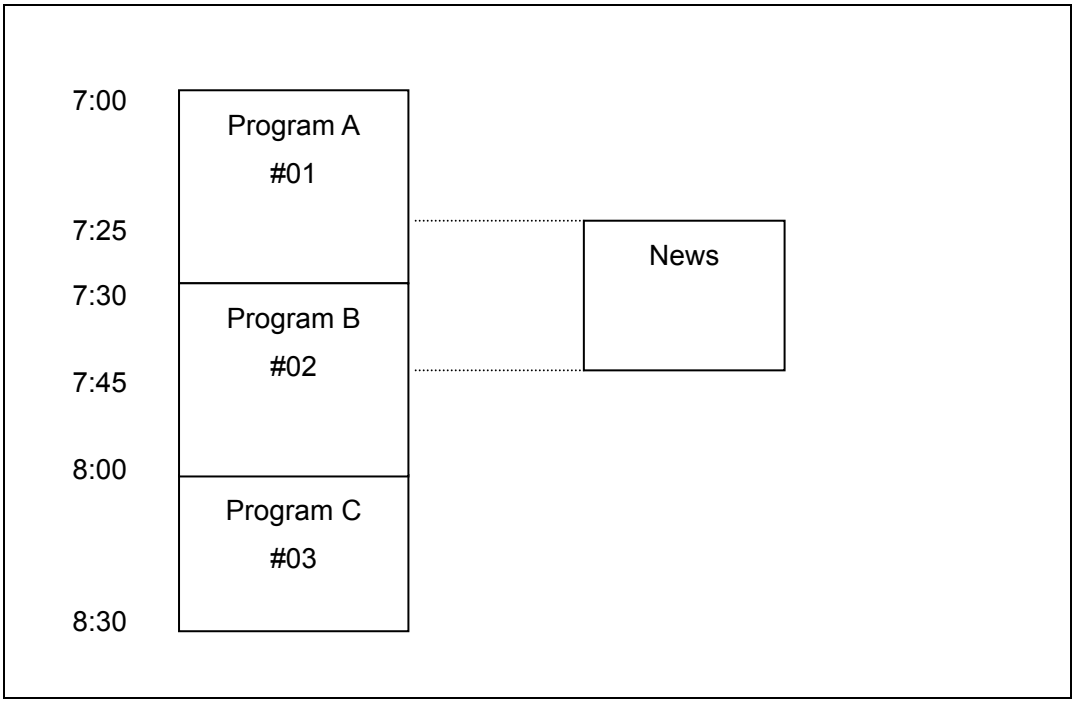
	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:25	Program A	01	7:00	undecided	undecided	Any	undecided	undecided
7:30	News	99	7:30	undecided	Program A	01	7:00	undecided
7:40	Information	88	7:40	0:05	Program A	01	7:00	1:15
7:45	Program A	01	7:00	1:15	Program B	02	8:15	0:30

When dealing with the changes by changing the event name without changing the event.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:30	News	01	7:00	undecided	undecided	Any	undecided	undecided
7:40	Information	01	7:00	undecided	undecided	Any	undecided	undecided
7:45	Program A	01	7:00	1:15	Program B	02	8:15	0:30

19.6.6 Program Cut-in (3)

Emergency news is inserted during broadcasting of Program A and ends during the scheduled broadcasting time of Program B. Then, Program B is re-started (started).



[Initial Schedule]

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	0:30	Program B	02	7:30	0:30
7:30	Program B	02	7:30	0:30	Program C	03	8:00	0:30

[Examples of Schedule Change]

When changes are made based on the fixed content.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	0:30	Program B	02	7:30	0:30
7:20	Program A	01	7:00	0:25	News	99	7:25	0:20
7:25	News	99	7:25	0:20	Program B	02	7:45	0:15
7:45	Program B	02	7:45	0:15	Program C	03	8:00	0:30

* It is also possible to make sudden changes at 7:25 without making changes at 7:20.

When information is updated after “undefined status” is defined.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	0:30	Program B	02	7:30	0:30
7:25	News	99	7:25	undecided	Program A	01	7:00	0:30
7:30	News	99	7:25	undecided	undecided	Any	undecided	undecided
7:45	Program B	02	7:45	0:15	Program C	03	8:00	0:30

When dealing with the changes by changing the event name without changing the event.

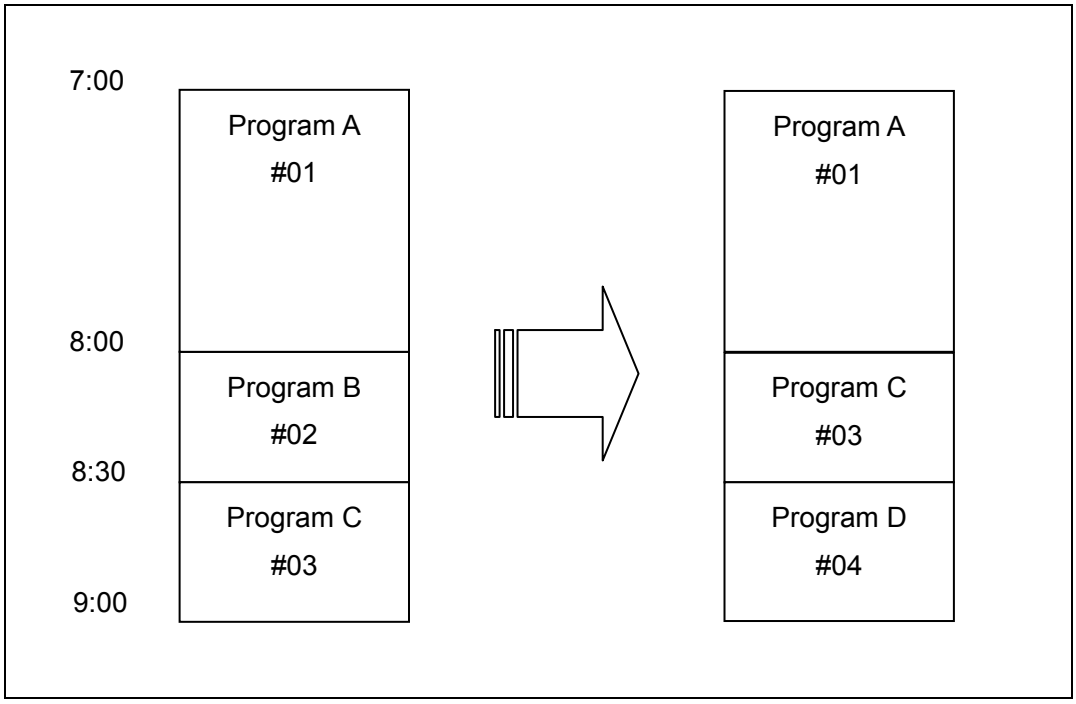
	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	0:30	Program B	02	7:30	0:30
7:25	News	01	7:00	0:30	undecided	Any	undecided	undecided
7:30	News	02	7:30	0:30	undecided	Any	undecided	undecided
7:45	Program B	02	7:30	0:30	Program C	03	8:00	0:30

When “following” is defined as “undecided”.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	0:30	Program B	02	7:30	0:30
7:20	Program A	01	7:00	undecided	undecided	Any	undecided	undecided
7:25	News	99	7:25	undecided	Program A	01	7:00	undecided
7:40	News	99	7:25	0:20	Program B	02	7:45	0:15
7:45	Program B	02	7:45	0:15	Program C	03	8:00	0:30

19.6.7 Event-Forwarding

Program B is canceled suddenly and the next events start early.



[Initial Schedule]

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
8:00	Program B	02	8:00	0:30	Program C	03	8:30	0:30

[Examples of Schedule Change]

○ Changes are made 1 hour and 30 seconds before or earlier.

The cancellation of Program B is fixed and an EIT with earlier start time of Program C is transmitted at 7:15.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:15	Program A	01	7:00	1:00	Program C	03	8:00	0:30
8:00	Program C	03	8:00	0:30	Program D	04	8:30	0:30

* The changed EIT is transmitted more than 1 hour and 30 seconds before than the initial scheduled start time of Program C (8:30), in which case, a receiver unit which supports early start of events can behave accordingly.

○ Chages are made later than 1 hour and 30 seconds

The cancellation of Program B is fixed and an EIT with earlier start time of Program C is transmitted at 7:45.

	present				following			
Time	Program title	event_id	start	duration	Program title	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:30	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:45	Program A	01	7:00	1:00	Program C	03	8:00	0:30
8:00	Program C	03	8:00	0:30	Program D	04	8:30	0:30

* The changed EIT is transmitted from 7:45. It has not been transmitted at 7:29:30, which is 1 hour and 30 seconds before the initial scheduled start time of Program C (8:30), in which case, even a receiver unit which supports early start of events cannot behave accordingly for viewing and recording reservations.

20 Conditional Access

Note) The content of this chapter is applied when conditional access is used for services transmitted in layers other than the partial reception layer. When it is used for services transmitted in the partial reception layer, separate regulations shall be added. See Vol. 5 for details.

Attention should be paid to the following points when PSI/SI is created and transmitted in conditional access broadcasting. See Vol. 5 for details

20.1 Specification of EMM Streams

How to describe PSI/SI when an EMM stream is transmitted is shown below.

- When an EMM stream is transmitted, a Conditional Access Descriptor should be present in the CAT in a TS.
- When EMM streams in multiple Conditional Access Systems are transmitted, Conditional Access Descriptors for each system should be present.
- When an EMM stream is transmitted, its transmission format should be described in the first byte in the “private_data_byte” field of the Conditional Access Descriptor placed in the CAT.

The transmission format of an EMM stream should be specified according to Table 20-1. For the details of EMM stream transmission formats, see Vol. 5.

Table 20-1 EMM Stream Transmission Formats

Value	Meaning
0x00	Undifined
0x01	Type A
0x02	Type B
0x03 to FF	Reserved for future use

20.2 Setup of Chargeable Units for Programs

Setup of a chargeable unit, relations between a chargeable unit and an ECM, and between an ECM and scrambling are shown below.

○ Setup of a chargeable unit

- Only one chargeable unit can be setup for one program.

○ Relation between a chargeable unit and an ECM

- One ECM corresponds to a chargeable unit.
- For a Protected Free Program, one ECM corresponds to each Conditional Access System in the program.

  However, even in the above case, if an ES has “component_tag” set to either of 0x30 to 0x7F or 0x84 to 0x86, it does not have to correspond to an ECM.

○ Relation between ECM and scrambled ES

- An ES which has a corresponding ECM are scrambled.
- However, when there is a transient response between programs on the transmitting end or a filler is inserted, an ECM-supporting ES is not necessarily scrambled. Whether or not a component is scrambled can be shown with the “transport_scrambling_control” field in a TS packet header.

Please note that programs can be defined and categorized as follows depending on whether the program is chargeable/non-chargeable.

○ Free program: A program whose group of default ES’ are non-chargeable

- In Digital Terrestrial Television Broadcasting, all ESs that belong to a free program are non-chargeable.

○ Pay program: A program whose group of default ES’ are chargeable

- The same chargeable unit (ECM) should be setup for group of default ES’ at least.
- Components other than group of default ES’ can be setup as non-chargeable only when they are ESs whose “component_tag” is set to either of 0x30 to 0x7F, 0x84 or 0x86.

Groups of default ES' in Conditional Access Broadcasting are defined for each "service_type" taking into chargeable/non chargeable programs (See Table 30-56). This is shown in Table 20-2.

Table 20-2 Groups of Default ES' in Conditional Access

service_type	Content	Groups of default ES'
0x01	Digital TV service	Video default ES (component_tag=0x00), Audio default ES (component_tag=0x10)
0xA1	Special video service	Video default ES (component_tag=0x00), Audio default ES (component_tag=0x10)
0xC0	Data service	Data (entry component)
0xA3	Special data service	Data (entry component)
0xAA	Bookmark list data service	Data (entry component)

Services which are not defined above are not chargeable, therefore their groups of default ES' are not defined.

20.2.1 PMT

When a program is charged, or scrambled because it is a Protected Free Program, a Conditional Access Descriptor should be present in the PMT and a valid ECM should be specified. The rules of PMT are provided below.

1) For a pay program or a Protected Free Program, a Conditional Access Descriptor describing a valid ECM should be present in the first loop.
2) For a Protected Free Program, a ECM_PID with a Broadcaster identifier for copyright protection should be specified. For Broadcaster identifier values for copyright protection, see Vol. 8.
3) Even when a Conditional Access Descriptor describing a valid ECM is present in the first loop, an ES can be non-scrambled by placing a Conditional Access Descriptor in which “ECM_PID” is set to 0x1FFF in the second loop as long as it is an ES whose “component_tag” is set to either of 0x30 to 0x7F, 0x84 or 0x86 other than groups of default ES’.
   ECM whose “ECM_PID” is set to 0x1FFF is not transmitted in the above case.
4) When Conditional Access Descriptors are present in both first and second loops, the Descriptior in the second loop will be valid for an ES.

20.2.2 SDT/EIT

In the SDT and EIT, taking into account convenience for scheduling of program recording, in Digital Terrestrial Television Broadcasting, values of the “free_CA_mode” field are assigned as shown below to identify whether a program is free or chargeable.

0: Free program
1: Pay program

The rules for setting up the values are provided below.

- In the SDT, a free/chargeable ID value which is setup by a broadcaster for each service channel should be assigned.

  For example, “1” is normally assigned to this field in the SDT for a service channel subscribed under a flat/tiered-rate charging contract on which pay programs are broadcast, and even if a free program is broadcast for a certain period of time or in a certain slot on this service channel, this value remains “1”.

- In the EIT, a free/chargeable ID value should be assigned to identify whether each program is free/chargeable.

Therefore, in order to identify whether each program is free or chargeable, a receiver unit uses the values in EITs, not the values in SDTs.

20.3 Setup of Information on Confirmation of Programming for Viewing (Recording)

A CA Contract Info Descriptor provides the information on the availability of viewing or recording the program on the view or schedule recording of a chargeable program. Attention should be paid to the following points when this descriptor is described.

○ Because only one chargeable unit can be set up for a program in Digital Terrestrial Television Broadcasting, “CA_unit_id” in a CA Contract Info Descriptor is set only ‘0x01’.

○ Because the PPV service is not provided in Digital Terrestrial Television Broadcasting, a fee name should not be described.

CA Contract Info Descriptors can be present in the SDT and EIT. The rules are provided below.

1) When a chargeable unit has been set up, only one descriptor can be present.
   In other words,
   – When “free_CA_mode” is set to ‘0’, this descriptor should not be present.
     (this should not be present for a Protected Free Program).
   – When “free_CA_mode” is set to ‘1’, a descriptor whose “CA_unit_id” is set to ‘0x1’ should be always present.
2) In the SDT, default contract confirmation information for overall programs transmitted on the service channel should be described.
3) In the EIT, contract confirmation information for each program should be described.
4) This descriptor in the EIT can be omitted only when the same descriptor is present in the SDT.
5) The content of this descriptor is set up as a receiver unit will give a priority to the presence and description of this descriptor in the EIT when the presence and descriptions between descriptors in the SDT and EIT are different.

A receiver unit will make judgments based on the following criteria.

1) Contract confirmation information in the SDT is invalid in either of the following cases.
   a) When “free_CA_mode” is set to ‘0’ and at the same time, a CA Contract Info Descriptor whose ”CA_unit_id” is set to ‘0x1’ exists.
   b) When “free_CA_mode” is set to ‘1’ and at the same time, a CA Contract Info Descriptor whose “CA_unit_id” is set to ‘0x1’ does not exist.
2) Contract conformation information in the EIT is invalid in either of the following cases.
   a) When “free_CA_mode” is set to ‘0’ and at the same time, a CA Contract Info Descriptor whose ”CA_unit_id” is set to ‘0x1’ exists.

b) When “free_CA_mode” is set to ‘1’ and at the same time, a CA Contract Info Descriptor whose “CA_unit_id” is set to ‘0x1’ does not exist, and at the same time, other than a valid CA Contract Info Descriptor whose “free_CA_mode” is set to ‘1’ is present in the SDT (in other words, other than when the description in the CA contract information in the EIT and SDT is the same and presence of this descriptor in the EIT is omitted).

3) Only ‘0x 1’ is allowed to be assigned to “CA_unit_id” in this descriptor but a value either of 0x2 to 0xF may be assigned to “CA_unit_id” when the PPV service is provide in the future.
   When this descriptor whose “CA_unit_id” is set to a value either of 0x2 to 0xF exists in the SDT and EIT,
   a) When IC card contract confirmation command/response was “PPV service”, it will be processed as PPV non-compatible receiver unit.
   b) When it was other than “PPV service”, this descriptor is treated as invalid.
4) When the description in the EIT is valid and the descriptions in the SDT and EIT are different, a priority should be given to the description in the EIT.
5) When the description in the EIT is invalid, scheduling view/record is impossible. In addition, when the description in the SDT is invalid and there is no valid description in the EIT either, scheduling view/record is impossible.
6) In case of Event Common, whether or not a program is chargeable or non-chargeble should be identified based on the description in “reffered to” including “free_CA_mode”.

Please note that once confirmation information has been transmitted, changing it should be avoided as much as possible as that may cause a malfunciton when scheduling view/record of a receiver unit starts.

20.4 Setup of Chargeable Units in the Multi-View Television

In the multi-view Television (MVTV), components are grouped within an event and presented on a group basis. When charging is setup for MVTV events, attention should be paid to the following points with “on a group basis” in mind.

- ○ In Digital Terrestrial Television Broadcasting, charging is not setup on a component basis, and only one chargeable unit can be setup within an event.
  The group of default ES’ in a whole MVTV event should be included in this chargeable unit.
- ○ A chargeable unit can be setup across more than one group.
- ○ The same chargeable unit should be setup for groups of default ES’ within a whole MVTV event similarly to normal events, in accordance with Table 20-2.
- ○ When a group of default ES’ in a sub-component group set up a different non-chargeable unit from the one for the main component group, a group of default ES’ should set up completely different from the one for the main component group.

In the Multi-view Television service, a Component Group Descriptor whose “component_group_type” is set to ‘000’ should be present in the EIT. The description rules are provided below.

1) A group of default ES’ in each component group should be described in the component loop placed in the beginning of the CA_unit loop.
2) In the main component group (“component_group_id”=0x0),
   - ○ When a group of default ES’ within the component group is non-chargeable, ‘0’ should be set to “free_CA_mode” and a component loop whose CA_unit_id is set to ‘0x1’ should not be setup.
   - ○ When a group of default ES’ within the component group is chargeable, ‘1’ should be set to “free_CA_mode” and a CA unit whose “CA_unit_id” is set to ‘0x1’ is present and their component_tags are described.
3) In a sub-component group (component_group_id > 0x0),
   - ○ For a sub-component group, only the same chargeable unit as the one for the main group or non-chargeable unit can be setup.
   - ○ When a group of default ES’ within the component group is non-chargeable, a CA unit whose “CA_unit_id” is set to ‘0x0’ is present and their component_tags are described.
   - ○ When a group of default ES’ within the component group is chargeable, a CA unit whose “CA_unit_id” is set to ‘0x1’ is present and their component_tags are described.
   - ○ If a CA unit whose “CA_unit_id” is set to ‘0x1’ is not described in the main component group, a sub-component group should not be present.

CA Contract Info Decriptors should be present in accordance with chargeable unit, similarly to normal events.
Please note that see Chapter 25 for details of MVTV operation.

20.5 Setup of Display Control in Automatic display of message

A broadcaster (broadcaster which uses a Broadcaster identifier) may use Automatic display of message. In such a case, a CA Service Descriptor should be present in the CAT in a TS including the target service. A set of display control parameters is setup for each broadcaster unit within a TS. Taking this into consideration, attention should be paid to the following points when describing a CA Service Descriptor.

- ○ All services for which display control is setup by a broadcaster in a TS should be described.
- ○ When a broadcaster uses an Automatic display of message across multiple TSs, a CA Service Descriptor should be present in the CAT in each TS.
- ○ When more than one broadcaster use Automatic displays of message at the same time within the same TS, CA Service Descriptors should be present in the CAT for each broadcaster.
- ○ When Automatic display of message is used in more than one Conditional Access Systems, CA Service Descriptors should be present for each Conditional Access System (and each broadcaster).

Furthermore, CAT should be transmitted taking into consideration that a receiver unit can perform display control only when this descriptor exists when the target service is selected. For details of Automatic display of message, see Vol. 5.

20.6 Setup of a Link to a CA substitute service

In Digital Terrestrial Television Broadcasting, when scrambled broadcasting service selected by a receiver unit can not be viewed because it was not subscribed, etc, a Linkage Descriptor may be used to guide the viewer to select another service (CA substitute service). A message may be described in this Linkage Descriptor to present to the viewer in order to guide them to select another service.

To give a link to a CA substitute service, a Linkage Descriptor whose “linkage_type” is set to ‘0x03’ should be present in the SDT. The description rules are provided below.

- Only one Linkage Descriptor describing a linked service within the same TS should be present in the SDT.
- During a period when a Linkage Descriptor is present in the SDT, the linked service should be non-scrambled.
- The below is how to describe a message in a Linkage Descriptor.
  - A message number should be described in the first 1 byte of “private_data_byte”. A message number is a 8-bit field with a value between 41 and 60 (0x29 and 0x3C). A message number should be unique within the whole Digital Terrestrial Television Broadcasting. When Linkage Descriptors in different services have the same message number, a receiver unit will regard that they have the same message content.
  - A message body should be described in the second byte and later in “private_data_byte”.
    When the same message number is specified for services in a TS, the message body can be omitted. However in this case the first message body that is described in the SDT can not be omitted.

For details of operation of CA substitute service, see Vol. 3 and 5.

21 Digital Copy Control

Digital Copy Control Descriptors and Content Availability Descriptors are used by a broadcaster to transmit information on digital recording and signal output conditions of a program to receiver units and digital recorders. In a Digital Copy Control Descriptor, digital copy control information in DTCP-compatible high-speed digital interfaces and the maximum bit rate used to check recording availability and to select a recording mode can be specified. Additionally, in a Content Availability Descriptor, the encryption status of output signals can be specified.

In Digital Terrestrial Television Broadcasting, any TS outputs except DTCP-compatible high-speed digital interfaces are not allowed at the moment. In other words, if a broadcaster sets “copy_control_type” in a Digital Copy Control Descriptor to ‘01’ for a service transmitted in a layer other than the partial reception layer in order to protect the contents, that means that contents protection under DTCP is used. In addition, for a service transmitted in the partial reception layer, if “copy_control_type” in a Digital Copy Control Descriptor is set to ‘10’, digital copy control is performed even though not under DTCP. An important point to keep in mind here is that if, for example, in a digital TV service, a value other than ‘01’ is set for “copy_control_type” or in a data service transmitted in the partial reception layer, a value other than ‘10’ is set for “copy_control_type”, basically, not only digital data output but also analogue video output will be prohibited. When a new digital output method is implemented in a receiver unit in the future, new regulations should be added (For details, see Table 5-1 in Part 1 of Vol. 8 and Table 5-1 in Part 2 of Vol. 8).

A Digital Copy Control Descriptor can be present in the first and second loops of the PMT and the SDT and EIT (for details, see Table 10-2 and Table 10-4 in Chapter 10 of this Volume). Basic copy control is performed in accordance with Annex F of the ARIB STD-B10, but the detailed operation is described in the section about the descriptors. Moreover, a Content Availability Descriptor can be placed in the first loop of PMT.

21.1 Priorities of Copy Control Information

Copy control information in a Digital Copy Control Descriptor placed in the PMT is used when a program is actually recorded, and copy control information described in the EIT is used when preparing for the start of recording. Please note that when there is no descriptor in the EIT and when there is in the SDT, the description in the SDT should be used.

When descriptors are present in the first and second loops of the PMT, the description in the second loop should be given a priority for the relevant component. However, the copy control information described in the second loop becomes valid only for components whose “component_tag” is set to a value between ‘0x40’ and ‘0x7F’ (See Section 30.3.3.3). When a

descriptor is present in the second loop for a component with other values (for example, when the maximum bit rate of a video component needs to be specified), the description of the first loop is given a priority (when there is no descriptor in the first loop, the default copy control information is applied).

Additionally, for the control of analogue video output, digital audio output and output of IEC60958 conformant audio streams from a high-speed digital interface, the description of the descriptor in the first loop of the PMT should be given a priority. For the control of MPEG TS output from a high-speed digital interface, the description of a component with the most strict copy control among components to be output (when specific components are deleted from received services, remaining components after the deletion) should be given a priority. See the section of Digital Copy Control Descriptor for concrete levels of copy control.

The real recording control is definitely performed based on the description in the PMT. When non-default copy control (see next section) is performed, a descriptor should be present also in the PMT.

Information of Digital Copy Control Descriptors in the SDT and EIT is used when events are reserved for recording. To specify information on copy control regarding a whole service, a Digital Copy Control Descriptor should be present in the SDT. To specify information regarding copy control specific to each event, a Digital Copy Control Descriptor should be present in the EIT. When Digital Copy Control Descriptors are present in both SDT and EIT, the description in the EIT should be given a priority.

21.2 Default Digital Copy Control Information

The default digital copy control information, when a Digital Copy Control Descriptor is not present in either of PMT, SDT or EIT, is “Copy freely”. Specifically, this is equivalent to

(a) For a digital TV service and special video service,
copy_control_type=‘01’, digital_recording_control_data=‘00’

(b) For a data service transmitted in a layer other than the partial reception layer and special data service
copy_control_type=‘01/11’, digital_recording_control_data=‘00’

(c) For a data service transmitted in the partial reception layer
copy_control_type=‘10’, digital_recording_control_data=‘00’

As described above, as the final recording control is performed in accordance with the description in the PMT, no matter what sort of digital copy control information is in the EIT and SDT, as long as this descriptor specified as other than “Copy freely” is not present in the PMT, the final control will be “Copy freely”, which should be kept in mind. However, as the basic rule,

there should not be any inconsistency between information in the SI (SDT and EIT) and PSI (PMT).

21.3 Maximum bit rate information

In the “maximum_bit_rate” field in a Digital Copy Control Descriptor, a rough value worked out by rounding to the nearest 1/4Mbit/s above for each event is described. In other words, for example, if this value is “0x24”, the maximum bit rate is 9Mbit/s. For a variable bit rate, the maximum value is described. The maximum value is described also in the PMT and the value should not be changed real time as the actual bit rate changes.

When the maximum bit rate of a transmitted service exceeds or is remarkably below a value shown in Tables from 21-1 to 21-4 in the next section, or is not listed in any of these tables, a broadcaster should set a Digital Copy Control Descriptor and describe the value in the “maximum_bit_rate”. The description method is described in “Digital Copy Control Descriptor” in [Section 3] “Detailed Use of Table” of this Volume.

21.3.1 The Maximum Bit Rate Values When the Maximum Bit Rate is not Described.

See “5.2.7. Default Maximum Bit Rate” in Vol. 7 for this section. Specific values are shown in Tables 21-1, 21-2, 21-3 and 21-4.

Table 21-1 Default Maximum Bit Rates for Each Component (TS rate)

Video	1080i	8 to 20Mbit/s
	720p	8 to 20Mbit/s
	480p	4 to 12Mbit/s
	480i	1.5 to 8Mbit/s
Audio	Standard stereo	to 330kbit/s
	High quality sound stereo	to 330kbit/s
	5.1ch stereo	to 458kbit/s
Additional Data		4Mbit/s
Caption		256kbit/s
Superimpose		256kbit/s

Table 21-2 Default Maximum Bit Rates for Each Media Type (TS rate)

TV type	1080i	21Mbit/s
	720p	21Mbit/s
	480p	12Mbit/s
	480i	11Mbit/s
	Multi-view	21Mbit/s
Data type		2.2Mbit/s

Table 21-3 Default Maximum Bit Rates for Each Component in the Partial Reception Layer (TS rate)

Video	low-frame-rate and low-resolution picture	to 650kbit/s
Audio	MPEG2 AAC audio	to 330kbit/s
Data		to 650kbit/s
Caption		256kbit/s
Superimpose		256kbit/s

Table 21-4 Default Maximum Bit Rate for Each Media Type in the Partial Reception Layer (TS rate)

Data type		to 650kbit/s

21.3.2 How to Specify the Maximum Bit Rate in the Multi-View Television

The maximum bit rate is specified for each event or component using a Digital Copy Control Descriptor but the maximum bit rate in the multi-view Television is specified with a Component Group Descriptor. Therefore, in an event where a Component Group Descriptor is present, when “component_group_type” is set to ‘000’ (MVTV) and at the same time, “total_bit_rate” value is specified for each component group, the total bit rate in the Component Group Descriptor should be given a priority.

21.4 Change of Copy Control Information

Basically, once copy control information of an event has been defined, it should not be changed. Especially, when the status is changed from “Copy allowed”(Copy freely / Copy one generation) to “Copy never”, an event which was allowed to record when scheduling to record will not be recorded after all. If an event has a possibility of changing to “Copy never”, when information on the event is transmitted first in an EIT, a Digital Copy Control Descriptor specified for “Copy never” should be set and when it is decided that the program is allowed to be copied, “Copy allowed” information should be transmitted.

For the same reason, the content of copy control information described in the SDT should not be changed carelessly. This is because, when a Digital Copy Control Descriptor is not present in the EIT, the information described in the SDT will be used and scheduling of recording might have been done based on that information. To change copy control information described in the SDT, up to N days before the day when the change will be made (when information for N days is transmitted in SI), Digital Copy Control Descriptors should be present in EITs which are newly transmitted for all the programs so that there are no programs which are scheduled to record using the copy control information in the SDT, and then, the copy control information in the SDT can be changed.

21.5 Copy Control Restriction of Contents

By using “encryption_mode” in a Content Availability Descriptor, a broadcaster can control the output from a high-speed digital interface for “Copy freely” contents.

A Content Availability Descriptor can be set only in the first loop of the PTM. Please note that for details of Copy control restriction of contents, see 5.3 in Part 1 and 5.3 in Part 2 of Vol. 8.

21.5.1 Default Copy Control Restriction

A Content Availability Descriptor is used in combination with copy control information in a Digital Copy Control Descriptor. When a Digital Copy Control Descriptor is not present simultaneously, a Content Availability Descriptor will not be valid. When a Content Availability Descriptor or a Digital Copy Control Descriptor is not present in the first loop of the PMT, the default is “encryption_mode” is set to ‘1’ (Output content is not protected).

21.5.2 Encryption Plus Non-Assertion (EPN)

For a service transmitted in a layer other than the partial reception layer, “encryption_mode” will be valid for output from a high-speed digital interface when “copy_control_type” is set to ‘01’ and “digital_recording_control_data” is set to “Copy freely”. In addition, for a service transmitted in the partial reception layer, when “copy_control_type” is set to ‘10’ and “digital_recording_control_data” is set to “Copy freely” in a Digital Copy Control Descriptor, output from a high-speed digital interface will be prohibited but EPN will be valid when it is recorded in record media. The conditions for the default copy control information when a Digital Copy Control Descriptor is not present can be interpreted as the same as the above (for a service transmitted in a layer other than the partial reception layer, “copy_control_type” is set to ‘01’ and “digital_recording_control_data” is set to “Copy freely”, and for a service transmitted in the partial reception layer, “copy_control_type” is set to ‘10’ and “digital_recording_control_data” is set to “Copy freely”). However, in order to validate the description in a Content Availability Descriptor, a Digital Copy Control Descriptor needs to be present. Therefore, presence of a Digital Copy Control Descriptor specified as above is mandatory to set a value for “encryption_mode”, which should be kept in mind.

A Digital Copy Control Descriptor can be present also in the second loop of the PMT but when all the components included in output from a high-speed digital interface is “Copy freely”, “encryption_mode” will be valid. In other words, when “copy_control_type” is set to ‘01’ and “digital_recording_control_data” is set to “Copy freely” in a Digital Copy Control Descriptor present in the first loop of the PMT and at the same time, when copy control information other than “Copy freely” is not described in the second loop of the PMT, “encryption_mode” will be valid.

For details of operation of “encryption_mode”, see Vol. 8 and the DTCP specifications.

21.6 Retension of Contents

The concept of retension has a meaning only when the copy control information is “Copy never”.

Even when the copy control information is “Copy never”, the contents can be temporarily stored for up to the maximum allowed temporary retension time. A Digital Copy Control Descriptor can be present also in the second loop of the PMT but if any of the components to be retained is “Copy never”, such a content will be temporarily retained.

More than one value of maximum allowed temporary retension time is defined in the ARIB STD-B10, but only “one hour and 30 minutes” (retention_mode=‘0’, retention_state=‘111’) can be used.

For details of Retention, see Vol. 8.

21.7 Restricted copying

If the digital copy control information of the Digital Copy Control Descriptor in PMT is "copy one generation", it is possible to specify whether or not "copyable with restriction" will be operated using copy_restriction_mode of the Content Availability Descriptor. (Refer to Section 30.3.2.4.)

If a Digital Copy Control Descriptor specified as "copy one generation" is placed in PMT but no Content Availability Descriptor is placed in PMT, "copyable with restriction" (default value) shall be applied. Therefore, if "copyable with restriction" will not be operated, both the Digital Copy Control and Content Availability Descriptors must always be placed in PMT. Moreover, copy_restriction_mode of the Content Availability Descriptor shall only be meaningful when a Digital Copy Control Descriptor set to "copy one generation" has been placed in the first or/and second loop of PMT.

While a Digital Copy Control Descriptor is placeable in both the first and second loops of PMT, a Content Availability Descriptor can only be placed in the first loop. When "copy one generation" has been specified to the relevant component by the Digital Copy Control Descriptor in the second loop of PMT, whether or not "copyable with restriction" will be operated shall be determined based on the Content Availability Descriptor in the first loop of the same PMT. If no Content Availability Descriptor is placed in PMT, "copyable with restriction" shall be applicable to its components.

Refer to Vol.8 for the details of "restricted copying".

22 PSI/SI Transmission Layers at Layered Transmission

In Digital Terrestrial Television Broadcasting, multiple (up to three) modulation systems can be used simultaneously for a single carrier (channel). Thus, a single TS can be transmitted in multiple modulation systems, which is called layered transmission. For the definition of layered transmission, see Section 7.1 of Vol. 7.

This section defines PSI/SI transmission layers at layered transmission.

PSI/SI transmission layers for each pattern (Patterns (1) to (6)) in Table 2 in “General Information of the Technical Report” in the beginning of this document are defined in Table 22-1. For EIT transmission layers, see Table 13-4 in Section 13.1.15. Additionally, PMTs should be transmitted in a service layer for each service (For details of PMT transmission layers, see Sections 8.1.2 to 8.1.4 of Vol. 7).

Table 22-1 PSI/SI Transmission Layers (PMT and EIT transmission layers excluded)

Pattern			
	Layer A (low protection layer)		
(1),(2)	- PAT - CAT - NIT - TOT - SDT - BIT - SDTT for low protection layer - SDTT for high protection layer - CDT		
	Layer A (high protection layer: Partial Layer)	Layer B (low protection layer)	
(3),(5)	- CAT - NIT - TOT - SDT - BIT - SDTT for high protection layer	- PAT - SDTT for low protection layer - CDT	
	Layer A (high protection layer)	Layer B (low protection layer)	
(4)	- PAT - CAT - NIT - TOT - SDT - BIT - SDTT for high protection layer	- SDTT for low protection layer - CDT	
	Layer A (high protection layer: Partial Layer)	Layer B (middle protection layer)	Layer C (low protection layer)
(6)	- CAT - NIT - TOT - SDT - BIT - SDTT for high protection layer	- PAT	- SDTT for low protection layer - CDT

23 Special Services

The content of this chapter is applied to services other than the ones transmitted in the partial reception layer. Special services are not transmitted in the partial reception layer.

23.1 Definition of a Special Service

A special service is defined as a service which is not provided regularly and at the same time, is not scheduled, and “service_type” of which described with a Service List Descriptor in the NIT and a Service Descriptor in the SDT is set as “Special video service” or “Special data service” in Table 23-1. In this chapter, these services are collectively called “Special service”. On the other hand, a normal service is called regular service. A regular service is provided almost all the time except for when the maintenance for broadcast facilities or off-service at midnight.

Table 23-1 “service_type” for Special Service

service_type	Meaning
0xA1	Special Video Service
0xA3	Special Data Service

23.2 Transmission of a special service

- “service_id” of a special service
  - When a special service is broadcast, the “service_id” of a special service should be defined in a Service List Descriptor in the NIT and a Service Descriptor in the SDT beforehand.
  - One of the “sevice_id” values assigned to each broadcaster should be used for “service_id” of a special service and up to 2 services can be defined for each media type in a TS regardless of the layer.
  - “service_type” of special services are shown in Table 23-1.
  - When a special service is not broadcast, TS packet of the relevant video/audio ES is not transmitted and PMT PID of the relevant service is not described in the PAT. PMT is not transmitted, either.
  - For layers in which special services can be transmitted, see Vol. 7.
- Special Service Unit
  - Only one event can be transmitted as a special service. Multiple events which are consecutive temporally can not be transmitted as a special service.

  - The start and ending of a special service and regular services do not have to be at the same time. In other words, a special service can be started and ended at any time regardless of the start/ending time of regular services.
- Start of a special service
  - To start a special service, TS packet of its video/audio/data ES and PMT should be transmitted and the special service should be described in the PAT.
  - The start of a special service will be informed to the viewers using superimpose or an announcement within a program (viewers select a station for a special service).
- Ending of a special service
  - To end a special service, the description of the special service should be deleted from the PAT.
- EIT transmission for a special service
  - EIT[p/f] can be transmitted for a special service event. This transmission is optional and there is the case that EIT[p/f] is not transmitted.
  - When EIT[p/f] is transmitted, '1' is set to "EIT_present_following_flag" regarding the relevant service in the SDT. When EIT[p/f] has been transmitted, the existence of the special service can be confirmed on the EPG.
  - A special service is not scheduled (for viewers at least), and H-EIT[schedule], M-EIT[p/f after] and L-EIT[p/f after] are not transmitted for a special service. Viewers do not know that a special service will appear beforehand, and therefore special services are not programmed to be viewed or recorded.
- Operation of Event Relay with a special service
  - When a regular service event can not be ended on time a special service can be transmitted to perform an event relay from the regular service event to the special service event.
  - In above case event relay can not be performed from a special service event to another event. In addition, an event should be ended in accordance with the definition of how to end a special service.

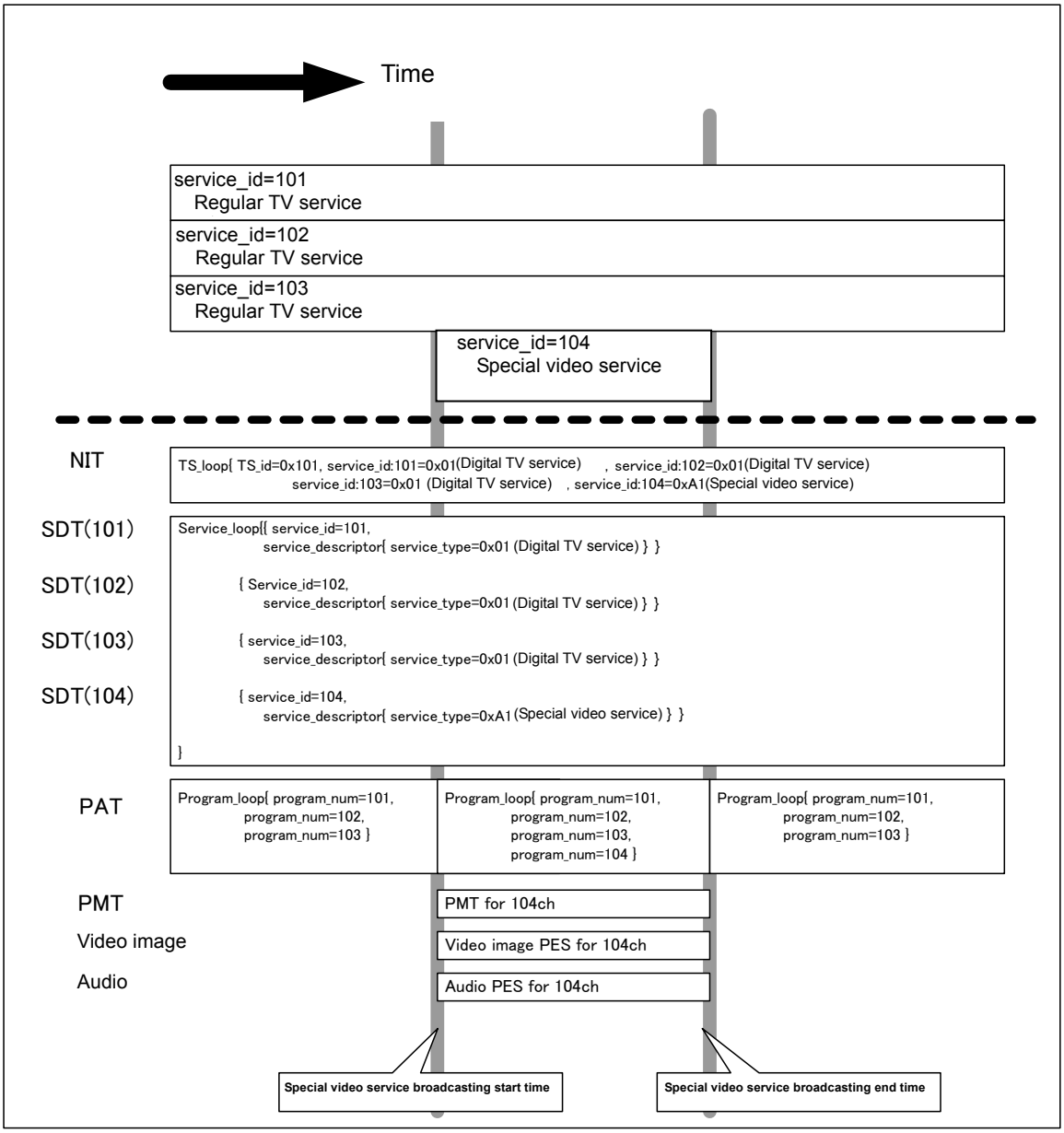


Figure 23-1 Image of Special Service Operation

23.3 Assumed Process Performed by a Receiver Unit

The existence of a service specified with “service_type” for a special service shown in Table 23-1 is not usually (when it is not broadcast) presented on the EPG, etc. Also, it is not presented through up/down channel selection or one-touch button selection. However, it is recommended to receive the PAT of the relevant TS to check the PMT PID of the specified special service has been setup.

While the version of the PAT is being updated and the PMT PID for a special service is being setting up (in other words, the special service is being broadcasted), a viewer can select the special service. There is no special system to inform viewers that a special service is being broadcasted, and broadcast stations need to inform viewers that a special service is being broadcasted with superimpose or an announcement within regular services of own station.

However, when EIT[p/f] is being transmitted, the service will appear on the EPG while the special service is being broadcast, thus viewers can know of the existence of the special service. On a receiver unit with which stations can be selected from the EPG, viewers can select a special service using this function.

When a special service ends, it goes back to either of regular service of the “service_id” for the same media type in a TS to which the special service is included at the moment the descripion of the special service disappears from the PAT.

24 Event Relay

There are times when the rest of a program is continued, usually in another service, such as when a high school baseball tournament program is broadcast. This form of broadcasting is called “Event Relay”.

24.1 Event relay within a Network

24.1.1 Transmission of EITs in an event relay

At the moment when it is decided that an event relay will be performed, “Event Group Descriptor” whose “group_type” is set to ‘0x2’ (event relay) and in which the event and the service of the event relay destination are described should be placed in the EIT[p/f] of the event (event relay source event). Only one event can be described as an event of the event relay destination. At least 30 seconds before an event is relayed to another event, ” Event Group Descriptor” should be placed. When an event relay is planned initially, “Event Group Descriptor” is placed beforehand.

The start time of an event of the event relay destination should be the same as the ending time of the evevt relay source event or earlier.

An event relay is performed between services for the same media type within the same terrestrial broadcaster. In addition, when more than one type of EIT is transmitted for a service for which an event relay is performed, “Event Group Descriptor” should be placed in an EIT of basic delivering EIT type at least.

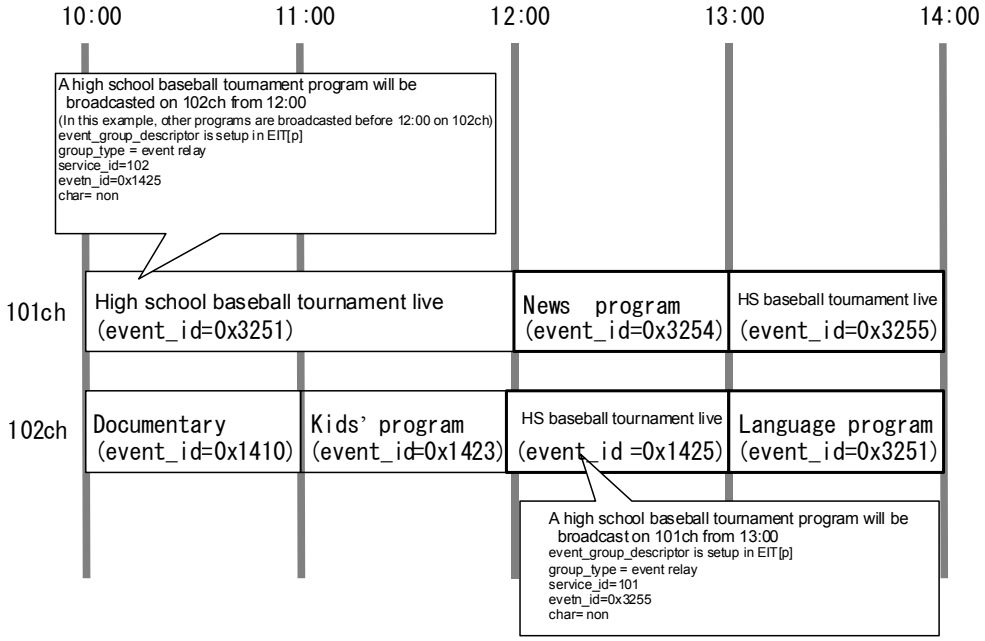


Figure 24-1 Image of Event Relay Operation

Furthermore, one of the special cases of an event relay is a case when an event relay is performed from a HD event of Event Common to a SD event, in which case, an event can be relayed to another event in the same service. The below is an example.

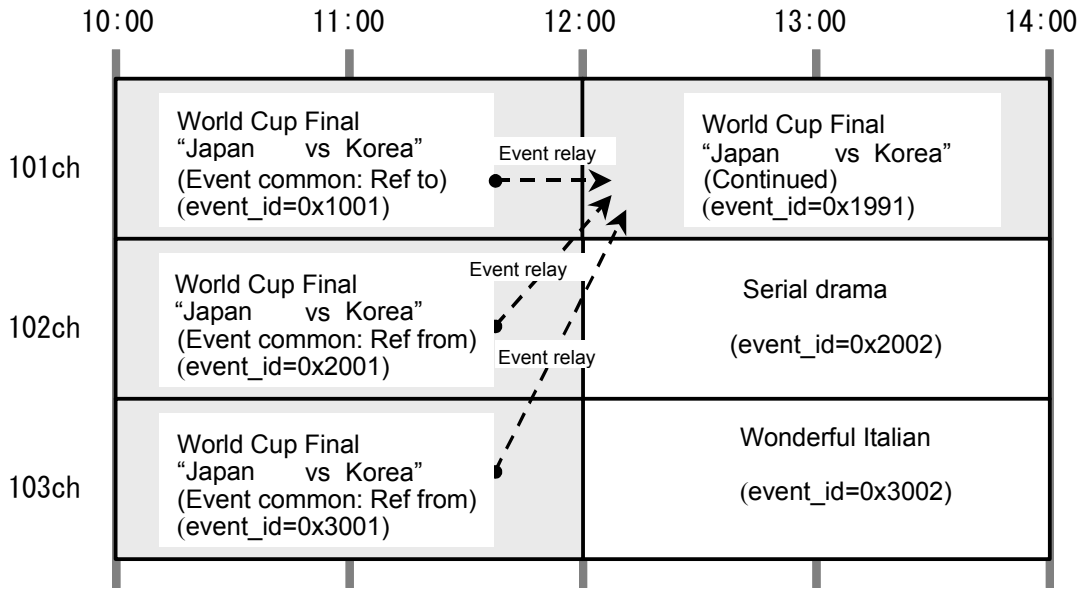
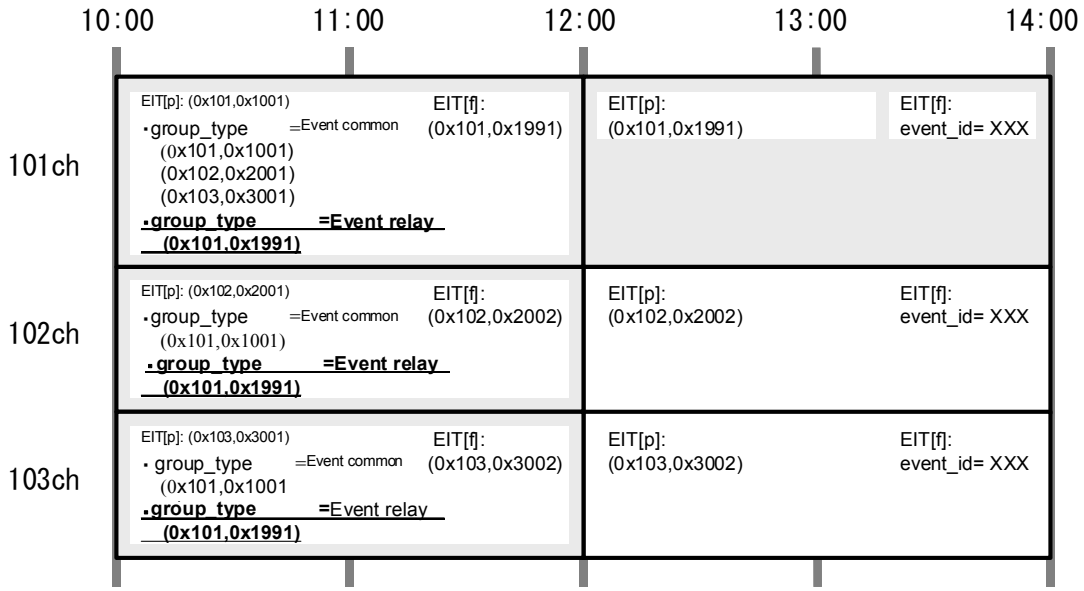


Figure 24-2 An Example of an Event Relay from a HD Event to a SD Event

The description of the EIT[p/f] in this case is shown below.



Note: (0x101, 0x1001) means "service_id = 0x101, event_id=0x1001"

Figure 24-3 Description of EIT[p/f] for an Event Relay from a HD Event to a SD Event

Please note that for the restrictions on transmission parameters of layers in which events of event relay sources and events of event relay destinations are transmitted, see “8.5 Event Relays” in Vol. 7.

24.1.2 Assumed Process Performed by a Receiver Unit

When a receiver unit detects that “Event Group Descriptor” whose “group_type” is set to ‘0x2’ (event relay) is setup within the EIT[p/f] of an event that is being received, it should display that the event will be broadcast in another service well in advance before the switching time, and if viewers expect viewing the relay destination event continuously, it will be switched to the specified event at the same time the relay is performed. It should be confirmed that the specified event will be broadcast referring to the EIT[p/f] of the service of the event relay destination before switching.

When an event relay source event was scheduled to be recorded and is being recorded as scheduled and if an event relay has been setup for the event, the event relay source event will be automatically switched to the event relay destination event when the event relay source event ends and the event relay destination event will be recorded as scheduled.

The above procedure should be followed when a HD event is relayed to a SD event within the same service. However, in such a case, seamless recording may not be possible just like it is not in an event relay performed between differrent services, due to changes in the video bit rate and the shock received when a HD event is switched to a SD event, even when an event relay is performed within the same service.

24.2 Event relay to a special service event

There are cases when a service of the event relay destination is a special service. For example, when a live broadcast cannot end at a scheduled time, a special service is set up separately from a regular program that is scheduled to be started after the live broadcast to continue the live broadcast.

The above case will be handled in the same way as an event relay to a regular service. However, a special service should not be relayed to another event.

Additionally, for a special service, the EIT [p/f] delivering level is left to the discretion of each broadcaster but when an event is relayed to a special service, the EIT [p/f] of an event of the event relay destination should be transmitted at least.

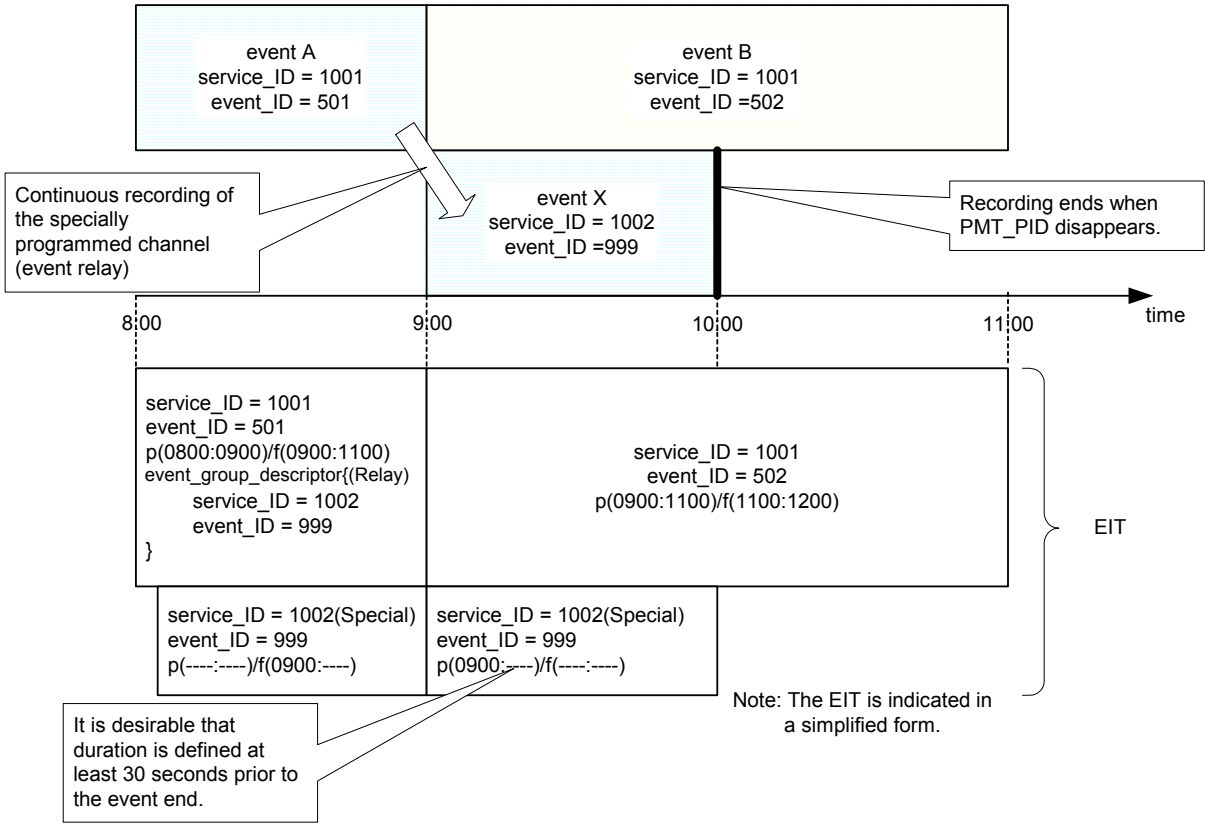


Figure 24-4 Special Service and Event Relay

24.3 Event relay to Other Networks

In Digital Terrestrial Television Broadcasting, an event relay may be performed between networks that belong to the same terrestrial broadcaster.

24.3.1 Transmission of EITs in an event relay

'0x04' should be specified for "group_type" (event relay to other networks). The event relay destination should be in a service in a network that belongs to the same terrestrial broadcaster. The rest is the same as the transmission of EITs for event relays within a network, but attention should be paid to the following points.

- As a "event relay destination" event, an event in a network that belongs to the same terrestrial broadcaster should be described. Normally, only one event is specified as a "event relay destination" event, but when networks in more than one area are included in a single terrestrial broadcaster, more than one event relay destination event may be described. The figure below illustrates an example.

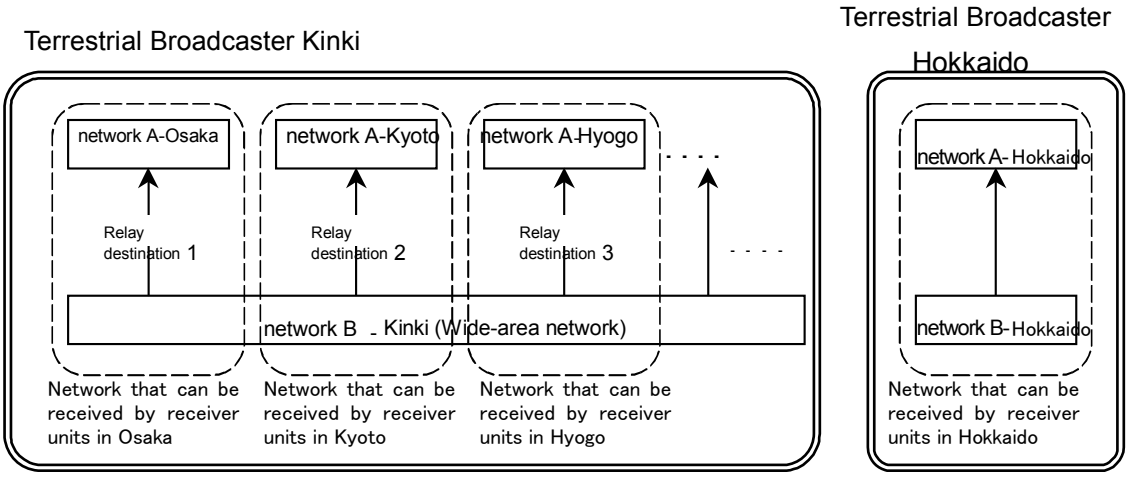


Figure 24-5 Event Relay to Other Networks (Example)

When an event in network B is relayed to an event in network A, in the Hokkaido area, the event relay destination event belongs to only one network, which is network A-Hokkaido, but in the Kinki area, the event relay destination event exists in multiple networks in different areas.

Receiver units in Osaka: network A-Osaka

Receiver units in Kyoto: network A-Kyoto

****

Thus, more than one event relay destinations, i.e. network A-Osaka, network A-Kyoto, network A-Hyogo, etc. are described in a wide-area network – network B.

Please note that when events are described as above, receiver units will not always perform event relays as intended. For example, when an event relay as shown above is performed in Osaka, if receiver units can receive services of network A-Kyoto transmitted in the partial reception layer only and has stored network A-Kyoto as “network that can be received” in receiver units, the event may be relayed to network A-Kyoto even in Osaka.

- A receiver unit cannot check the EIT[p/f] of a event relay destination event beforehand. Therefore, to prevent a receiver unit from malfunctioning, when there is no event relay destination event, “Event Group Descriptor” whose “group_type” is set to ‘0x04’ (event relay to other networks) should not be placed.

  In addition, when an event relay is performed between networks, the event relay destination event should be in a regular service.

Please note that for the restrictions on transmission parameters of layers in which original events and events of event relay destination are transmitted, see “8.5 Event Relays” in Vol. 7.

24.3.2 Assumed Process by a Receiver Unit

When a receiver unit detected that “Event Group Descriptor” whose “group_type” was set to ‘0x4’ (event relay to other networks) was setup within the EIT[p/f] of an event that is being received, based on the information which the receiver unit keeps, it checks whether the event relay destination network can be received and at the same time, whether the event relay destination service exists. When the event relay destination network can be received and at the same time, the event relay destination service exists, it should display that the event will be broadcast in a service in another network well in advance before the switching time, and if viewers expect viewing the event relay destination event continuously, it will be switched to the specified event at the same time the event relay is performed.

In this case, as it is not possible to check the EIT[p/f] of the event relay destination service before switching, the event relay source event will be switched to the event relay destination service before checking the EIT[p/f]. Therefore, if the specified event cannot be confirmed in the EIT[p/f] of the event relay destination service, this will be regarded as “abnormal status”.

Additionally, services in the list of services in networks that can be received kept by receiver units cannot always be received in fringe areas, etc. In such a case, there is a possibility that a receiver unit can be setup so that events cannot be relayed to such services, and also that a event relay destination service cannot be received after switched from the event relay source service and an event relay cannot be performed.

When an event relay source event was scheduled to be recorded and is being recorded as scheduled and if an event relay has been setup for the event, the event relay source event will be automatically switched to the event relay destination event when the event relay source event ends and the event relay destination event will be recorded as scheduled.

When an event is relayed to another event in other networks, more than one event relay destination may be described in the Event Group Descriptor. In such a case, if one of the networks that a viewer assigns to his/her remote control key is the event relay destination, this network will be the event relay destination. If not, a network that includes a service with an area code that is pre-set in the receiver unit will be the event relay destination (See [Section 5] “Reference Manual - PSI/SI Receiver Unit Guideline” C.11.5)

25 Multi-view Television (MVTV)

The Multi-view Television is a form of broadcasting in which a combination of multiple (up to 3) video and audio broadcasts intended by a broadcaster can be defined in a single service. In a MVTV program, viewers can easily select a combination of more than one video and audio broadcast intended by a broadcaster and can enjoy images from cameras at various angles and their matching audio. For example, in a golf program, as well as a normal broadcast, a broadcast of the final hole and a broadcast of the top group would be possible.

Please note that the content of this chapter will be applied to services other than the ones transmitted in the partial reception layer. The Multi-view Television is not operated in the partial reception layer.

25.1 Transmission Operation of MVTV

To operate MVTV, “Component Group Descriptor” whose “component_group_type” is set to ‘000’ (MVTV) should be placed in the EIT[schedule] and EIT[p/f] for the relevant program. In this descriptor, “component_tag” for each component should be used to group components and create a component group. “component_group_id” should be assigned to each component group for identification. The CA contract information for each component within a component group can be shown by relating it to a CA Contract Info Descriptor using “CA_unit_id”. However, if all the components within a program are not chargeable, ‘0x0’ (non-chargeable) should be assigned to “CA_unit_id”, and CA Contract Info Descriptor should not be placed. The description of each component group is shown with the “text_char” loop, which can be used when selecting a component group.

The total bit rate of each component group is shown using “total_bit_rate” with “total_bit_rate_flag” set to ‘1’. When the total bit rate of a component group is within the range of the default bit rate, ‘0x00’ should be assigned to “total_bit_rate”. When the total bit rate of all the components is within the range of the default bit rate, ‘0’ is assigned to “total_bit_rate_flag” to omit the description of “total_bit_rate” itself (For default bit rates, see the regulations in Section 21.3.1).

Additionally, ‘0x0’ is set for “component_group_id” for the main component group (main channel) that is presented first when a service in which a MVTV program is being broadcast is selected. The default ES’ (ESs whose “component_tag” value is ‘0x00’ [video] or ‘0x10’ [audio]) for a whole event should be included in this main component group. There are cases where more than one ES of the same type exists in each component group, and groups of default ES’ for each group are used for identification. In a digital TV service, there are video and audio in group of default ES’. Within a Component Group Descriptor, ESs are described in ascending order of “component_tag” values for video and audio and a group of firstly appeared

ESs of video and audio is called a group of default ES'. Therefore, in the main component group, the default ES' (ESs whose "component_tag" value is '0x00' [video] or '0x010' [audio]) in a whole event should be described in ascending order of "component_tag" values.

Two examples of common transmission operation are shown below.

25.1.1 MVTV in a Free Program

An image of MVTV operation in a free program and all the components are non-chargeable is shown in Figure 25-1. Video and audio default ES' are described in ascending order respectively and groups of default ES' for each component group are shown in the shaded regions. For example, the group of default ES' for the sub 1 are V1 and A0.

In Figure 25-1, all the groups of default ES' belong to the same non-chargeable unit and "audio A0" is commonly used for all component groups.

Component_group_descriptor is placed in the EIT for a MVTV program

(1) component_group_id = “0x0” (main)

CA_unit_id = “0x0” (non-chargeable)	: component_tag = V0 : component_tag = A0
text = “Normal broadcast”	

(2) component_group_id = “0x1” (sub1)

CA_unit_id = “0x0” (non-chargeable)	: component_tag = V1 : component_tag = A0
	: component_tag = A3
text =“Last hole”	

(3) component_group_id = “0x2” (sub2)

CA_unit_id = “0x0” (non-chargeable)	: component_tag = V2 : component_tag = A0
text = “Top group”	

Units of presentation to users	Main	Golf program (normal broadcast)
		video_PID = ”0x0100” : component_tag = V0 audio_PID = ”0x0200” : component_tag = A0
	Sub 1	Golf program (last hole)
		video_PID = ”0x0300” : component_tag = V1 audio_PID = ”0x0200” : component_tag = A0
		audio_PID = ”0x0700” : component_tag = A3
	Sub 2	Golf program (top group)
		video_PID = ”0x0500” : component_tag = V2 audio_PID = ”0x0200” : component_tag = A0

Figure 25-1 Image of MVTV operation in a free program

25.1.2 MVTV in a Pay Program

An image of MVTV operation when the same chargeable unit is used for all the components in a pay program is shown in Figure 25-2.

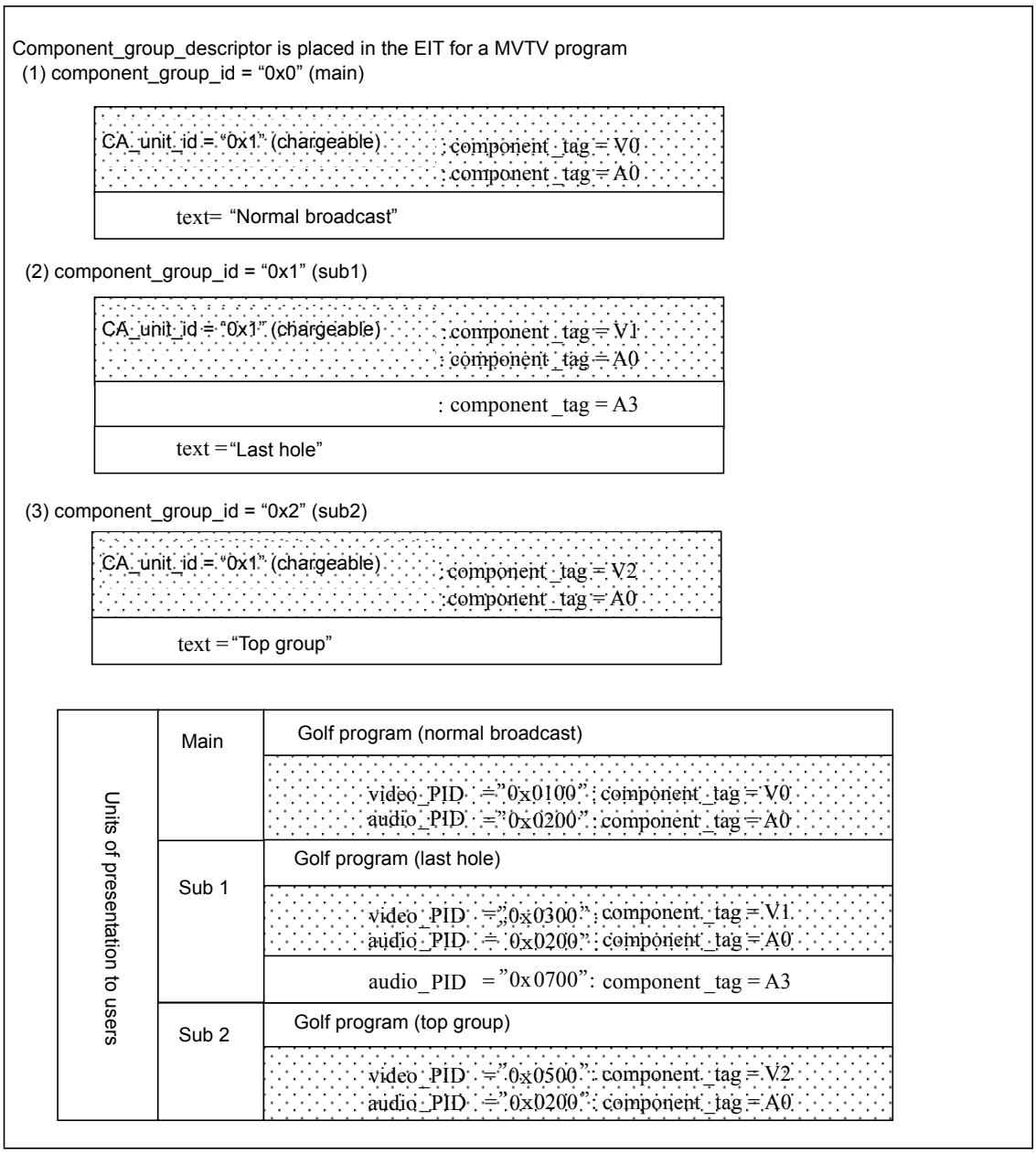


Figure 25-2 Image of MVTV Operation in a Pay Program

25.2 Assumed Process by a Receiver Unit

When “Component Group Descriptor” whose “component_group_type” is set to ‘000’ (MVTV) is placed in the EIT[p] of a program that is being received, a receiver unit should present that this program is a MVTV broadcast and it should also present the main group. Additionally, based on the “text_char” loop of each component group, it displays a list to enable viewers to easily switch component groups using video buttons,etc. When switching component groups, the group of default ES’ of each component (ESs firstly shown with “component_tag” described in ascending order within Component Group Descriptors for video and audio) is presented first.

When scheduling of recording, when “Component Group Descriptor” whose “component_group_type” is set to ‘000’ (MVTV) is placed in the EIT[schedule], a receiver unit should present that this program is a MVTV broadcast. Especially, when scheduling of recording, this enables viewers to easily specify a component group that they want to record. At the same time, based on the total bit rate of each component group described in the descriptor, recording availability can be presented to viewers.

26 Use of Emergency Warning Broadcasting (Emergency Warning System (EWS))

26.1 Transmission of Emergency Warning Broadcasting

The following steps should be used to start and stop the EWS.

(When starting the EWS)

(1) The Emergency Information Descriptor that specifies EWS conditions (start_end_flag, the classification of Type 1 and Type 2, and area code) should be carried in the PMT.

(2) Broadcaster should set the start flag for emergency warning broadcasting in the TMCC signal to 1 for transmission.

(3) Contents that can be recognized as emergency warning broadcasting should be used to start the broadcasting.

(When stopping the EWS)

(1) The start flag for emergency warning broadcasting should be set to 0 for transmission.

(2) The Emergency Information Descriptor should be deleted from the PMT.

26.2 How to Handle the Start Flag for Emergency Warning Broadcasting in the TMCC Signal

Senders should keep the start flag for emergency warning broadcasting in the TMCC signal set to 1 while emergency warning broadcasting is provided on a channel carried by the TS (network) under the emergency warning system, regardless of the transmission layer in which the service that provides the EWS is carried. The receiver units with automatic startup function periodically monitor the start flag for emergency warning broadcasting in the TMCC signal.

26.3 Multiplexing Locations of the Emergency Information Descriptor

The Emergency Information Descriptor should be included in the first descriptor's loop of the PMT for the emergency warning broadcasting service. In order to clearly indicate that the emergency warning broadcasting is being provided for EWS-compatible receiver units, it is mandatory to include this descriptor in the PMT for the emergency warning broadcasting service. It is up to each broadcaster as to which PMT (or which service) to use to include the Emergency Information Descriptor. Please note that when services in different layers are described, they may be ignored on receiver units.

Table 26-1 PMT Used to Include the Emergency Information Descriptor

	PMT for the non-emergency warning broadcast on a service carried by the TS (network) under the emergency warning system	PMT for the emergency warning broadcast
Whether or not to include the Emergency Information Descriptor	Optional	Mandatory

26.4 Modification of the Information in the Emergency Information Descriptor

If a necessity to change the information (for example, the area code) in the Emergency Information Descriptor arises during emergency warning broadcasting, the procedure to end the EWS should be performed (which specifically involves setting the start flag for emergency warning broadcasting in the TMCC signal to 0 and deleting the Emergency Information Descriptor from the PMT). Then, after inserting the modified Emergency Information Descriptor into the PMT, the start flag for emergency warning broadcasting in the TMCC signal should be set to 1 again. Alternatively, the start flag for emergency warning broadcasting in the TMCC signal should be set to 0, and then, after modifying the information while the Emergency Information Descriptor remains in the PMT, the same flag should be set to 1.

In either case, the duration from when the start flag for emergency warning broadcasting is set to 0 to when the same flag is set to 1 should be a minimum of one second (if the length of the 4 OFDM frame is less than one second) and four OFDM frames (if the length of the 4 OFDM frame is more than one second). The receiver units continuously perform ESW processes for 90 seconds after the start flag for emergency warning broadcasting switches to 0 (See 6.11.4 Reception of Emergency Warning Broadcasting (under the Emergency Warning System (EWS)) in Vol. 2). To change, for example, the target area, without ending the EWS processes, therefore, the broadcaster should switch the start flag for emergency warning broadcasting to 1 within 90 seconds.

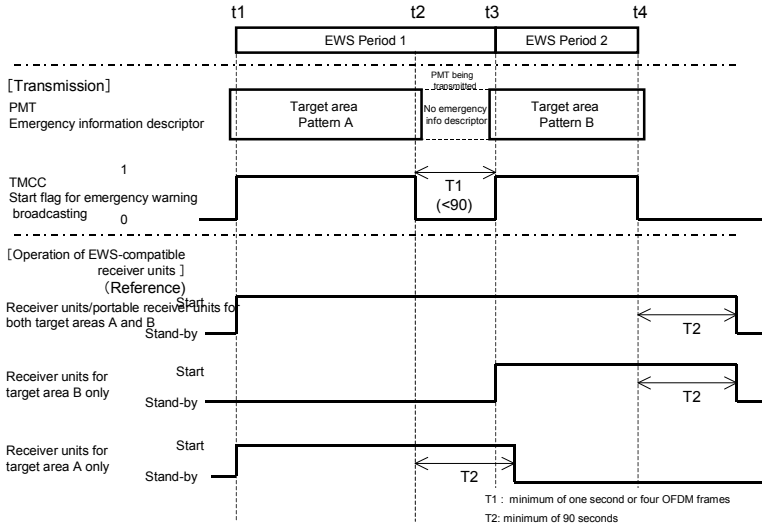


Figure 26-1 Modification of the Emergency Information Descriptor and An Example of Operation of the Receiver Unit

26.5 Use of Emergency Warning Broadcasting Test Signals

During the test emergency warning broadcasting, the start_end_flag value in the Emergency Information Descriptor should be set to 0 (meaning an end) from the beginning. During the test broadcasting period, the descriptor should continuously be included in the PMT. After the end of the test broadcasting, when the start flag for emergency warning broadcasting in the TMCC signal switches to 0, the Emergency Information Descriptor should be deleted from the PMT.

27 Operation of PSI/SI of programs with caption

Operation of PSI/SI of programs with caption are described in Vol. 3 of the document.

28 Operation of PSI/SI for Daylight Saving Time

28.1 Use of a Local Time Offset Descriptor

By inserting a Local Time Offset Descriptor into the TOT when the daylight saving time is introduced, the time difference between the actual time (UTC + 9 hours) and the displayed time is transmitted. Conversely, a Local Time Offset Descriptor is not inserted when the daylight saving time is not introduced, and from the moment the date and time when the offset time will be changed next time is fixed, it can be inserted.

This descriptor should be continuously transmitted starting from at least 32 days before the date and time when the offset time (date and time which is described in “time_of_change”) will be changed. In addition, after the offset time is changed (after the “time_of_change” has passed), the offset time that was set for “next_time_offset” should be set for “local_time_offset” and transmitted after 48hours but within 7 days after the switching.

[Example of description of a Local Time Offset Descriptor]
(When the daylight saving time will be introduced from 2011, and the displayed time will moved forward one hour between 2:00 am on April 1st and 2:00 am on October 1st).

(1) A Local Time Offset Descriptor as below will be transmitted 32 days before the daylight saving time starts at the latest (March 1st).
- local_time_offset_polarity=0 (Offset to forward direction)
- local_time_offset=0:00
- time_of_change= 2:00:00 on April 1st, 2011
- next_time_offset=1:00

(2) The Local Time Offset Descriptor will be changed as below and transmitted within 7days after the daylight saving time starts (April 1st) at the latest.
- local_time_offset_polarity=0 (Offset to forward direction)
- local_time_offset=1:00
- time_of_change= 2:00:00 on October 1st, 2011
- next_time_offset=0:00

(3) The Local Time Offset Descriptor will be changed as below and transmitted within 7 days after returning to the normal time (UTC+9 hours) from the daylight saving time (October 1st) at the latest.
- local_time_offset_polarity=0 (Offset to forward direction)
- local_time_offset=0:00
- time_of_change= 2:00:00 on April 1st, 2012
- next_time_offset=1:00

(If it is not known when the daylight saving time will start in 2012 at this moment, this descriptor does not have to be transmitted up to 1 month before the daylight saving time starts in 2012)

29 Change of Service Structures and Layers

As definition of services is very important in terms of interfaces with viewers, once a service is defined, it should not be changed easily. In other words, definition of a service structure in a TS is usually fixed.

In addition, a service should not be transferred from one layer to another and transmission parameter types of a whole transmission layer to which a service belongs (See Tables 2 and 3 in “General Information of the Technical Report”) should not be changed frequently because change of the coverages may disable viewers to receive some services which could be received without notice or may enable them to receive some services which could not be received, which will confuse viewers.

Change of service structures and layers include the following cases:

- Addition and deletion of a service
- Transfer of a service from one layer to another
- Change of transmission parameters of a whole layer

In addition, a service type should not be changed for a service. Furthermore, in Digital Terrestrial Television Broadcasting, single TS is specified per network so a TS is never deleted/added within a network or transferred between networks.

29.1 Addition/Deletion of Services

A receiver unit identifies addition/deletion of a service based on the Service List Descriptor in the NIT. In other words, if a service has been deleted from the Service List Descriptor in the NIT, that means that the service has been deleted, and if a new service has been added to the list that means that the service has been added.

Also, when “service_id” which has been deleted is re-used for a service with a different content, it should not be used for at least 32days after the deletion in order to avoid confusion with the previous service.

When updating, related SI information should be updated almost at the same time. However, when updating, it is unavoidable for the information to become inconsistent temporarily. “Inconsistent” means that the information is described in the NIT but SDT and EIT are not transmitted or vice versa. The information can stay inconsistent only during transition when updating, and it should not stay inconsistent for a period longer than this transition period. Because a receiver unit identifies addition and deletion of a service based on the information in the NIT, even during transition, if SDT and EIT of the service described in the NIT are transmitted at least, the influence on the reception process will be little.

When a service is added, it should be added to the Service List Descriptor and TS Information Descriptor in the NIT, and the description should be added to the SDT as well as necessary EIT should be transmitted. How many days before the start of broadcasting a service should be defined is left up to the discretion of each broadcaster.

When a service is deleted, it should be deleted from the Service List Descriptor and TS Information Descriptor in the NIT and the service description should be deleted from the SDT as well as transmission of the EIT should end. This procedure should be performed after the broadcasting of a program is ended and the service is off. An event should not be setup after the time when the service is deleted.

29.2 Change of service layers

There are the following two cases where a layer in which a service is transmitted is changed, which are collectively called “change of service layers”.

1) When a service transfers from one existing layer to another existing layer.
2) When transmission parameter types of a whole layer to which a service belongs are changed.

When a service layer is changed, the description of this service in the TS Information Descriptor in the NIT should be changed to the transmission parameter type after the change. The description of delivering EIT type in the SDT should be changed as well as the transmission of the corresponding EIT should be started / stopped.

At the same time, the basic delivering EIT type for the service layer should be transmitted after the change at least. In addition, the EIT type described in the SDT should be consistent with the transmitted EIT. However, in this case also, it is unavoidable for the information to become inconsistent temporarily during transition when changing, but it should not stay inconsistent for a long period of time. However, even during transition, if the EIT type described in the SDT is transmitted at least, the influence on receiver units will be little.

When a service layer is changed, a receiver unit may re-obtain all PSI/SI. This may cause some influence on the reception of services, such as sudden nonavailability of a service, failure to record a program on a receiver unit (discontinuation of recording, failure to start), no control with SI such as event relay or inconsistency in the display on the EPG. Taking these into consideration, service layers should be changed carefully. For example, when a service layer is changed while the service is being off or broadcast emission is being stopped, influence on the process by receiver unit will be little.

In addition, if the same EIT types are transmitted before and after a service layer is changed,

there will be a possibility that the service will be continuously displayed on the EPG.

Ex: When a layer is changed from the transmission parameter a layer to b layer,

Before change: Transmit H-EIT

After change: Transmit H-EIT as well as M-EIT

Thus, there will be a possibility that this service will be continuously displayed on the TYPE-H EPG display on a fixed receiver unit.

Please note that whether or not services transmitted in different transmission layers will be continuously displayed on the EPG is up to the product planning of receiver units. However, in the above example, if H-EIT is not transmitted after the change at least, this service will not be displayed on the TYPE-H EPG.

[Section 3] Detailed Use of Table

30 Use of PSI Table

30.1 PAT(Program Association Table)

30.1.1 Structure and Use of PAT

[Use]

Specify TS packet PID to transmit PMT related to broadcast program

[Syntax]

PAT structure is shown in Table 30-1.

Table 30-1 Structure of PAT (Program Association Table)

Data structure	bit	Identifier
program_association_section () {		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
'0'	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
transport_stream_id	**16**	**uimsbf**
reserved	**2**	**bslbf**
version_number	**5**	**uimsbf**
current_next_indicator	**1**	**bslbf**
section_number	**8**	**uimsbf**
last_section_number	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
program_number	**16**	**uimsbf**
reserved	**3**	**bslbf**
if(program_number == "0x0000"){		
network_PID	**13**	**uimsbf**
}		
else{		
program_map_PID	**13**	**uimsbf**
}		
}		
CRC_32	**32**	**rpchof**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.1 of Part 2 in ARIB STD-B10 and the definitions in Section 2.4.4 of ISO/IEC13818-1.

[Transmission Operating Rule]

- ◎ **PAT should be transmitted whenever any stream is included in the transport stream.**
- ◎ **Transmission layer should be the strongest one except partial reception layer.**
- ○ Do not describe PMT_PID that has not been transmitted. However, it is allowable to describe PMT_PID only for data service, even if it has not been transmitted (use except for MPEG2 provisions).
- ○ In the partial reception layer service, describe PMT_PID assigned to each service number. (For details, see "5.2.9 Operation of Partial Reception" of Vol.7.)
- ○ 1 PAT is transmitted in 1 transport stream.
- ○ For repetition rate, follow Section 12.4 of this document.
- ○ For update frequency, follow Section 12.9 of this document.
- ○ When the same PMT_PID is specified to the different program_number including multi-section PMT, the maximum number of program_number that can be specified to the same PMT_PID is 4. However, since the multi-section transmission cannot be used for partial reception layer service, only one program_number can be specified to the same PMT_PID. (For details, see "5.2.9 Operation of Partial Reception" of Vol.7.)

The Transmission Operating Rule for each field are shown in Table 30-2.

Table 30-2 Transmission Operating Rule for PAT

Transmission Operating Rule for each field of PAT	
table_id	Set to "0x00”.
section_syntax_indicator	Set to '1’.
section_length	Describe PAT section length. Since the maximum length of section is 1024 bytes, this value should be 1021 at maximum.
transport_stream_id	Describe transport_stream_id of transport stream containing PAT.
version_number	For normal use, describe a value incremented by 1 every time contents are updated. However, when a system error occurs, a value incremented by more than 1 can be described.
current_next_indicator	Set to '1’.
section_number	Set to "0x00”.
last_section_number	Set to "0x00”.
[program_loop]	Do not define the maximum loop count.
program_number	Describe service_id of the target service. Make sure to describe only one program_loop of program_number=”0x0000” in PAT. (Describe PID[“0x0010”] of NIT in the following PID field.)
network_PID	Describe PID(“0x0010”) of NIT.
program_map_PID	Describe PID of PMT. The maximum number of programs (service) that can be assigned to the same PID value is 4.

[Rules for Reception Processing]

○ If PAT cannot be received except in partial reception layer, it should be judged that any receivable stream is not included in transport stream or that transmission system is not properly functioning.

○ If the service information described in NIT is not described in PAT, it should be judged that the relative service is off.

The Rules for Reception Processing for each field are shown in Table 30-3.

Table 30-3 Rules of PAT Receiving Process

Rules for Reception Processing for each field	
table_id	= “0x00” : Judge that the relative table is PAT.
section_syntax_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_length	<=1021: Section length >1021: Judge that the relative section is invalid.
transport_stream_id	Judge as transport_stream_id of transport stream containing the relative PAT.
version_number	If any change occurs, judge that the relative table has been updated.
current_next_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_number	=”0x00”: Judge that the relative section is valid. ≠”0x00” : Judge that the relative section is invalid.
last_section_number	=”0x00”: Judge that the relative section is valid. ≠”0x00” : Judge that the relative section is invalid.
[loop]	
program_number	≠”0x0000”: Judge as service_id of service included in the target transport stream. =”0x0000”: Judge as NIT PID of the target transport stream. If the service information described in NIT but not described in PAT, is shown that the relative service is off. (See Chapter 15.)
network_PID	
program_map_PID	

[Special Remarks]

None

30.2 CAT (Conditional Access Table)

30.2.1 Structure and Use of CAT

[Use]

Describe the relationship between CA system (conditional access system) and EMM stream.

[Syntax]

The structure of CAT is shown in Table 30-4.

Table 30-4 Structure of CAT(Conditional Access Table)

Data structure	bit	Identifier
conditional_access_section () {		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
'0'	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
reserved	**18**	**bslbf**
version_number	**5**	**uimsbf**
current_next_indicator	**1**	**bslbf**
section_number	**8**	**uimsbf**
last_section_number	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
descriptor()		
}		
CRC_32	**32**	**rpchof**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.2 of Part 2 in ARIB STD-B10 and the definitions in Section 2.4.4 of ISO/IEC13818-1.

[Transmission Operating Rule]

- ◎ **Only one table should be transmitted in the same TS during the period of transmitting EMM.**
- ◎ **The transmission layer should be layer A.**
- ○ Update when changing the PID of stream that transmits EMM/EMM message for CA system.
- ○ For repetition rate, follow Section 12.4 of this document.
- ○ For update frequency, follow Section 12.9 of this document.

The Transmission Operating Rule for each field are shown in Table 30-5.

Table 30-5 P Transmission Operating Rule for CAT

Transmission Operating Rule for each field of CAT	
table_id	Set to "0x01”.
section_syntax_indicator	Set to '1’.
section_length	Describe CAT section length. Since the maximum length of section is 1024 bytes, this value should be 1021 at maximum.
version_number	For normal use, describe a value incremented by 1 every time contents are updated. However, when a system error occurs, a value incremented by more than 1 can be described.
current_next_indicator	Set to '1’.
section_number	Set to "0x00”.
last_section_number	Set to "0x00”.
[descriptor_loop]	Do not define the maximum loop count.

[Rules for Reception Processing]

○ When CAT is received within the provided transmission frequency, it should be judged that EMM/EMM message is transmitted in the same TS.

The Rules for Reception Processing for each field are shown in Table 30-6.

Table 30-6 Rules of CAT Receiving Process

Rules for Reception Processing for each field	
table_id	= “0x01” : Judge that the relative table is CAT.
section_syntax_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_length	<=1021: Section length >1021: Judge that the relative section is invalid.
version_number	If any change occurs, judge that the relative table has been updated.
current_next_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_number	=”0x00”: Judge that the relative section is valid. ≠”0x00” : Judge that the relative section is invalid.
last_section_number	=”0x00”: Judge that the relative section is valid. ≠”0x00” : Judge that the relative section is invalid.
[descriptor_loop]	

[Special Remarks]

None

30.2.2 Descriptor to be Inserted into CAT

30.2.2.1 Conditional Access Descriptor

[Use]

Specify the PID of EMM stream based on CA system (conditional access system).

[Syntax]

The structure of Conditional Access Descriptor is shown in Table 30-7.

Table 30-7 Structure of Conditional Access Descriptor

Data structure	bit	Identifier
CA_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
CA_system_ID	**16**	**uimsbf**
reserved	**3**	**bslbf**
CA_PID	**13**	**uimsbf**
for(i=0; i<N; i++){		
private_data_byte	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 in ARIB STD-B10 and the definitions in Section 2.6.16 of ISO/IEC13818-1.

[Transmission Operating Rule]

◎ **Only one descriptor should be transmitted for 1 Conditional access system identifier.**

○ If there are more than two conditional access systems for transmitting EMM, then allocate more than two descriptors.

The Transmission Operating Rule for each field are shown in Table 30-8.

Table 30-8 Transmission Operating Rule of Conditional AccessDescriptor (CAT)

Transmission Operating Rule for each field	
descriptor_tag	Set to "0x09”.
descriptor_length	Describe the descriptor length of the relative descriptor.
CA_system_ID	Describe the Conditional access system identifier. Do not describe any other identification values than those applicable to Digital Terrestrial Television Broadcasting.
CA_PID	Describe EMM_PID.
private_data_byte	Describe EMM transport system in the first byte (See Table 30-9). Do not describe in the second and later byte.

Table 30-9 EMM Transport System

Value	Transport system
0x01	Type A
0x02	Type B

Note) For the meanings of Type A and B, see Chapter 4 of Vol.5.

[Rules for Reception Processing]

○ If CAT, where the descriptors are allocated under the above Transmission Operating Rule, cannot be received, it should be judged that the specification of transporting stream for EMM/EMM message is invalid.

○ If any invalid value is described in EMM transport system, it's not required to ensure to obtain EMM.

The Rules for Reception Processing for each field is shown in Table 30-10.

Table 30-10 Receiver Process Standard for Conditional Access Descriptor (CAT)

Rules for Reception Processing for each field	
descriptor_tag	= “0x09” : Judge that the relative descriptor is a Conditional Access Descriptor.
descriptor_length	Judge as the descriptor length of Conditional Access Descriptor.
CA_system_ID	= Identification value applicable to Digital Terrestrial Television Broadcasting: Judge as the relative Conditional access system identifier. = Other value: Judge that the relative descriptor is invalid.
CA_PID	Judge as EMM_PID.
private_data_byte	Interpret that the first byte is EMM transport system (See Table 30-9.) Ignore all values in the second and later byte if any value is described.

[Special Remarks]

None

30.2.2.2 CA Service Descriptor

[Use]

Indicate the scheduled service channels of broadcasters who use automatic display messages and describe the display control information of the relative message.

[Syntax]

The structure of CA Service Descriptor is shown in Table 30-11.

Table 30-11 Structure of CA Service Descriptor

Data structure	bit	Identifier
CA_service_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
CA_system_ID	**16**	**uimsbf**
CA_broadcaster_group _id	**8**	**uimsbf**
message_control	**8**	**uimsbf**
for(i=0;i<N;i++){		
service_id	**16**	**uimsbf**
}		
}		

[Semantics of Each Field]

The definitions of each field are shown in Table 30-12.

Table 30-12 Definitions of each field for CA Service Descriptors

Definition of each field	
CA_system_ID	This 16-bit field indicates the target Conditional access system identifier.
CA_broadcaster _group_id	This 8-bit field indicates the target Broadcaster identifier.
message_control	This 8-bit field indicates the delay time in increments of day up to the time when the automatic display message previously built in CA IC card is displayed. However, 0xFF shows that the delay time is not transported (suspension of delay time start). The start time of computing follows the current date of "Automatic Display Message Display Information Acquire Command" described in ARIB STD B-25. When the least significant bit of message_control is set to 1, it means that the automatic display message will not be displayed if the program is received and recorded by a receiver unit with bound recording, and presented. For details, see Vol.5.
[service_id]	This 16-bit field indicates all service identifiers in TS for the broadcasters mentioned above, which are display control targets of automatic display message.

[Transmission Operating Rule]

- ◎ **Place 1 descriptor for each broadcaster if automatic display message control is used for the target services of broadcasters.**
- ◎ **If multiple conditional access systems are used, the same number of descriptors as that of conditional access systems can be placed for each broadcaster.**

The Transmission Operating Rule for each field are shown in Table 30-13.

Table 30-13 Transmission Operating Rule of CA Service Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to "0xCC”.
descriptor_length	Describe the descriptor length of the relative descriptor.
CA_system_ID	Describe the target Conditional access system identifier. Do not describe any other identification values than those applicable to Digital Terrestrial Television Broadcasting.
CA_broadcaster_group_id	Describe the target Broadcaster identifier. Do not describe any other identification values than those applicable to Digital Terrestrial Television Broadcasting.
message_control	Describe the delay time in increments of days up to the time automatic display message is displayed. 0x0 - 0xFE: Delay time until automatic display message is displayed (days) 0xFF: Suspension of delay time start For details, see Vol.5.
[service_id]	Describe all service identifiers in TS for the broadcasters mentioned above, which are display control targets of automatic display message. Do not omit this field.

[Rules for Reception Processing]

- ○ If the relative descriptor is in CAT, make sure to transfer the fields, CA_broadcaster_group_id and message_control described in the relative descriptor, together with the current date (MJD lower 16 bit) to CA IC card using "Automatic Display Message Display Information Acquire Command" shown in ARIB STD B-25 to obtain the display information on the relative service. Based on this information, automatic display message control including display enable/disable is executed.
- ○ If the relative descriptor is not in CAT, judge that automatic display message is not displayed when the service of the target broadcaster is selected.

The Rules for Reception Processing for each field are shown in Table 30-14.

Table 30-14 Receiver Process Standard for CA Service Descriptor

Rules for Reception Processing for each field	
descriptor_tag	="0xCC": Judge that the relative descriptor is a CA Service Descriptor.
descriptor_length	<6: Invalid >=6: Judge as the descriptor length of the relative descriptor.
CA_system_ID	Check if it matches CA_system_ID obtained from CA IC card. If not, ignore the whole descriptor.
CA_broadcaster _group_id	It indicates the broadcaster identifier of the relative service. Transmit this identifier to CA IC card as a parameter of "Automatic Display Message Display Information Acquire Command" shown in ARIB STD B-25.
message_control	It indicates the delay time until automatic display message of the relative service is displayed. Transmit to CA IC card as a parameter of "Automatic Display Message Display Information Acquire Command" shown in ARIB STD B-25. For details, see Vol.5.
[service_id]	It indicates all services in TS for the relative broadcaster, which are display control targets of automatic display message. If this field is not displayed, judge that the relative descriptor is invalid.

[Special Remarks]

○ For detailed use of automatic display message and receiver unit process, see Vol.5.

30.3 PMT (Program Map Table)

30.3.1 Structure and Use of PMT

[Use]

Specify the PID of TS packet that carries coded signals for each program.

[Syntax]

The structure of PMT is shown in Table 30-15.

Table 30-15 Structure of PMT (Program Map Table)

Data structure	bit	Identifier
program_map_section () {		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
'0'	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
program_number	**16**	**uimsbf**
reserved	**2**	**bslbf**
version_number	**5**	**uimsbf**
current_next_indicator	**1**	**bslbf**
section_number	**8**	**uimsbf**
last_section_number	**8**	**uimsbf**
reserved	**3**	**bslbf**
PCR_PID	**13**	**uimsbf**
reserved	**4**	**bslbf**
program_info_length	**12**	**uimsbf**
for (i = 0;i< N;i++) {		
descriptor()		
}		
for (i = 0;i< N;i++) {		
stream_type	**8**	**uimsbf**
reserved	**3**	**bslbf**
elementary_PID	**13**	**uimsbf**
reserved	**4**	**bslbf**
ES_info_length	**12**	**uimsbf**
for (j = 0;j< M;j++) {		
descriptor()		
}		
}		
CRC_32	**32**	**rpchof**
}		

[semantics of each field]

For the definition of each field, comply with the provisions in 5.2.3 of Part 2 in ARIB STD-B10 and the definitions in Section 2.4.4 of ISO/IEC13818-1.

[Transmission Operating Rule]

- ◎ **PMT should be transmitted for each service described in PAT. However, in case of data service, PMT does not have to be transmitted even though the service is described in PAT (for use except for MPEG2 provisions).**
- ◎ **For the PID of PMT for partial reception layer service, the value assigned for each service number is used. (For details, see "5.2.9 Operation of Partial Reception" of Vol.7.)**
- ○ For repetition rate, follow Section 12.4 of this document.
- ○ For update frequency, follow Section 12.9 of this document.

The Transmission Operating Rule for each field are shown in Table 30-16.

Table 30-16 Transmission Operating Rule of PMT

Transmission Operating Rule for each field of PMT	
table_id	Set to "0x02”.
section_syntax_indicator	Set to '1’.
section_length	Describe PMT section length. Since the maximum length of section is 1024 bytes, this value should be 1021 at maximum.
program_number	Describe service_id for the relative service.
version_number	For normal use, describe a value incremented by 1 every time contents are updated. However, when a system error occurs, a value incremented by more than 1 can be described.
current_next_indicator	Set to '1’.
section_number	Set to "0x00”.
last_section_number	Set to "0x00”.
PCR_PID	Describe the PID of PCR. Set to "0x1FFF” if the relative service does not see PCR.
program_info_length	Describe the length of the first loop. The maximum loop length is limited by section_length.
[1st(program) loop]	
[2nd(ES)_loop]	The maximum loop count is 32.
stream_type	Describe the stream type identifier for the target ES (provided in Table 30-17).
elementary_PID	Describe the PID of TS packet that carries the related ES or payload.
ES_info_length	Describe the length of subsequent ES descriptor.

The assignments for stream type identifiers to be used in Digital Terrestrial Television Broadcasting are shown in Table 30-17.

Table 30-17 Stream Type Identifier Applicable when Digital Terrestrial Television Broadcasting Starts

stream_type	Assignment
0x01	ISO/IEC 11172Video (MPEG1 VIDEO)
0x02	ITU-T Rec.H.262 | ISO/IEC 13818-2 (MPEG2 VIDEO)
0x06	ITU-T Rec.H.222 | ISO/IEC 13818-1 (MPEG2 SYSTEMS) PES packets containing private data (caption/superimpose)
0x0D	ISO/IEC 13818-6 (data carousel)
0x0F	ISO/IEC 13818-7 (MPEG2 AAC)
0x1B	ITU-T Rec. H.264 | ISO/IEC 14496-10Video (law-frame-rate and low-resolution picture)

[Rules for Reception Processing]

○ When the service is carried in the layer except for partial reception layer,and is except for engineering service, and the PMT of the service described in PAT is not received within 1000ms, judge that the relative service is off or disabled to receive*.

○ When the service is carried in the partial reception layer, and the PMT of the service described in PAT (if the receiver unit receives only partial reception layer, the service which are described in NIT as in the partial reception layer) is not received within 2000ms, judge that the target service is off or disabled to receive*.

○ In case of engineering service, when the PMT of the service described in PAT is not received within 4000ms, judge that the target service is off or disabled to receive*.

* For off or disabled service, see Vol.2.

The Rules for Reception Processing for each field are shown in Table 30-18.

Table 30-18 Receiver Process Standard for PMT

Rules for Reception Processing for each field	
table_id	= “0x02” : Judge that the relative table is PMT.
section_syntax_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_length	<=1021: Section length >1021:Judge that the relative section is invalid.
program_number	Judge as service_id of the target service.
version_number	If any change occurs, judge that the relative table has been updated.
current_next_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_number	=”0x00”: Judge that the relative section is valid. ≠”0x00”: Judge that the relative section is invalid.
last_section_number	=”0x00”: Judge that the relative section is valid. ≠”0x00”: Judge that the relative section is invalid.
PCR_PID	=”0x1FFF” : Judge that the relative service does not see PCR. ≠”0x1FFF” : Judge as the PID of PCR for the relative service.
program_info_length	
[1st(program) loop]	
[2nd(ES) loop]	If the second loop count exceeds 32, judge that ES information for the succeeding loop is invalid.
stream_type	If receiver unit does not support the described stream_type, judge that the relative ES loop is invalid.
elementary_PID	Judge as the PID of ES.
ES_info_length	

[Special Remarks]

None

30.3.2 Descriptor Described in the First Loop (Program Loop) of PMT

30.3.2.1 Conditional Access Descriptor

[Use]

Specify the PID of ECM stream in CA (conditional access) system when the whole service is for conditional access.

[Syntax]

The structure of Conditional Access Descriptor is shown in Table 30-7.

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 in ARIB STD-B10 and the definitions in Section 2.6.16 of ISO/IEC13818-1.

[Transmission Operating Rule]

◎ **Only one descriptor can be transmitted for 1 Conditional access system identifier.**
If multiple conditional access systems are used, place 1 descriptor for each Conditional access system identifier.

The Transmission Operating Rule for each field are shown in Table 30-19.

Table 30-19 Transmission Operating Rule of Conditional Access Descriptor (First Loop of PMT)

Transmission Operating Rule for each field	
descriptor_tag	Set to "0x09”.
descriptor_length	Describe the length of Conditional Access Descriptor.
CA_system_ID	Describe the Conditional access system identifier. Do not describe any other Conditional access system identifier values than those applicable to Digital Terrestrial Television Broadcasting.
CA_PID	Describe ECM_PID. CA_PID=”0x1FFF” can be designated only when the relative program is not for conditional access. (See Section 20.2.1.)
private_data_byte	Do not describe.

[Rules for Reception Processing]

- ○ Judge that the relative service is for conditional access.
- ○ If this descriptor is placed but TS packet (ECM) for PID described in CA_PID field cannot be received within 2 seconds, judge that the transmission system is not properly functioning. (Except for the case of CA_PID=”0x1FFF”)
- ○ If multiple descriptors are placed, interpret only the descriptors with supported CA_system_ID by a receiver unit.
- ○ If this descriptor is placed in the PMT for the service carried in partial reception layer, the noncompliant error message is displayed. For details, see Vol.5.

The Rules for Reception Processing for each field are shown in Table 30-20.

Table 30-20 Receiver Process Standard for Conditional Access Descriptor (First Loop of PMT)

Rules for Reception Processing for each field	
descriptor_tag	= “0x09”: Judge that the relative descriptor is a Conditional Access Descriptor.
descriptor_length	Judge as the length of Conditional Access Descriptor.
CA_system_ID	= Identification value used for Digital Terrestrial Television Broadcasting: Judge as the relative Conditional access system identifier.*1 = Other value: Judge that the relative Conditional Access Descriptor is invalid.
CA_PID	Judge as ECM_PID. However, in case of ”0x1FFF”, judge as the non-chargeable program. (The ECM for the relative PID is not transported in this case.)
private_data_byte	Judge that any entered value is invalid.

*1 If CA_system_ID is other than supporting Conditional access system identifier, judge that the relative Conditional Access Descriptor is invalid.

[Special Remarks]

For use of conditional access, see Vol.5.

30.3.2.2 Digital Copy Control Descriptor

[Use]

For the whole relative service, place this descriptor when control information regarding digital and analog copy is displayed, or when the maximum bit rate is described.

[Syntax]

The structure of Digital Copy Control Descriptor is shown in Table 30-21.

Table 30-21 Structure of Digital Copy Control Descriptor

Data structure	bit	Identifier
digital_copy_control_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
digital_recording_control_data	**2**	**bslbf**
maximum_bit_rate_flag	**1**	**bslbf**
component_control_flag	**1**	**bslbf**
copy_control_type	**2**	**bslbf**
if(copy_control_type != 00){		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bit_rate_flag == 1) {		
maximum_bit_rate	**8**	**uimsbf**
}		
if(component_control_flag ==1){		
component_control_length	**8**	**uimsbf**
for(j=0;j<N;j++){		
component_tag	**8**	**uimsbf**
digital_recording_control_data	**2**	**bslbf**
maximum_bitrate_flag	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
copy_control_type	**2**	**bslbf**
if(copy_control_type != 00) {		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bitrate_flag==1){		
maximum_bitrate	**8**	**uimsbf**
}		
}		
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 in ARIB STD-B10 and the definitions in 6.2.23 of Part 2 and Annex F in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed for the relative service if the copy control other than default copy control is performed.**

○ This descriptor should be placed if the maximum bit rate for the relative service is not within the range of default maximum bit rate specified in Table 21-2. In this case, it is required to describe the correct copy control information if the same copy control as that for default is performed.

The Transmission Operating Rule for each field are shown in Table 30-22.

Table 30-22 Transmission Operating Rule of Digital Copy Control Descriptor (First Loop of PMT)

Transmission Operating Rule for each field	
descriptor_tag	Set to "0xC1”.
descriptor_length	Describe the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and is coded according to Table 30-23 and Table 30-24.
maximum_bit_rate_flag	Set to '0’ if the maximum bit rate for the relative service is not described. Set to '1’ if the maximum bit rate for the relative service is described.
component_control_flag	If ‘0’ is set, the digital copy control information is defined for the whole program, and the field later than component_control_length does not exist. If this descriptor is transmitted using PMT, always set to '0’.
copy_control_type	This 2-bit field indicates the information used for copy generation control and is coded according to Table 30-23 and Table 30-24.
APS_control_data	Analog output copy control information. This 2-bit field indicates the information used for analog output copy control if copy_control_type is set to '01’, ’10’ or ’11’ and is coded according to Table 30-23 and Table 30-24.
maximum_bit_rate	Describe the maximum bit rate for the whole service. (Describe in increments of 1/4Mbit/s.)

Note that the specifications for controlling each output terminal using Digital Copy Control Descriptor vary according to service_type.

[Points of Use (Digital TV Service and Special Video Service)]

If service_type described in the NIT Service List Descriptor is set to "0x01" (digital TV service) and "0xA1" (special video service), it should be coded according to Table 30-23.

Table 30-23 Operation of Descriptors for Digital TV Service and Special Video Service

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control*3</th><th colspan="3">Operation of the Digital Copy Control Descriptor</th><th colspan="2">Operation of the Content Availability Descriptor</th></tr>
<tr><th>copy_ control_ type</th><th>digital_ recording_ control_data</th><th>APS_ control_ data</th><th>encryption_ mode *6</th><th>copy_ restriction_ mode*6</th></tr>
<tr><td>Copy freely *5</td><td rowspan="2">Copy freely</td><td rowspan="8">01</td><td rowspan="2">00</td><td rowspan="2">00</td><td>0</td><td rowspan="2">Don't care</td></tr>
<tr><td>Copy freely</td><td>1</td></tr>
<tr><td rowspan="2">Copy never *1</td><td>Copy never, without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">11*9</td><td>00</td><td>Don't care</td><td>Don't care</td></tr>
<tr><td>Copy never *4</td><td>Other than 00</td><td>Don't care</td><td>Don't care</td></tr>
<tr><td>Copy one generation *2 *7</td><td rowspan="2">Copy one generation, without Macrovision protection. It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="4">10</td><td rowspan="2">00</td><td rowspan="2">Don't care</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>0*10</td></tr>
<tr><td>Copy one generation *2 *7</td><td>Becomes "Copy never" after copying over one generation *4 *8</td><td rowspan="2">Other than 00</td><td rowspan="2">Don't care</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>Becomes "Copy never" after copying over one generation *4</td><td>0*10</td></tr>
</table>

*1: In the case of high-speed digital interface output, the Copy Never process of the source function defined in DTCP shall be performed. However, the No More Copies process shall be performed when only outputting the audio stream in IEC60958-conformant format.

*2: In the case of high-speed digital interface output, the Copy One Generation process of the source function defined in DTCP shall be performed.

*3: It shall only be applicable to composite and component video outputs. It shall also include the case of outputting the received video signal after format conversion. Macrovision control shall be applicable to 480i composite and component video signals.

*4: Refer to Section 5.3 and Section 5.5.2 in Part 1 of Vol.8 for the analog video output.

*5: In the case of high-speed digital interface output, encryption shall be performed according to the prescriptions defined in DTCP. However, no encryption will be performed when outputting only the audio stream in IEC60958-conformant format.

*6: If there is no Content Availability Descriptor, encryption_mode and copy_restriction_mode shall both be judged to be '1'.

*7: Recordable (accumulatable) as "copyable with restriction".

*8: Refer to Section 5.8 in Part 1 of Vol.8 if content was recorded (accumulated) with "copyable with restriction".

*9: digital_recording_control_data of the Digital Copy Control Descriptor set to '11' will not be operated as pay-per-view will not be operated at the initial stage of the broadcasting. (Refer to Vol.8 for details.)

*10: copy_restriction_mode='0' of the Content Availability Descriptor will not be operated for the time being.

[Points of Use (Data Service, Special Data Service and Bookmark List Data Service)]

If service_type described in the NIT Service List Descriptor is set to "0xC0" (data service), "0xA3" (special data service) and "0xAA" (bookmark list data service), it should be coded according to Table 30-24.

Table 30-24 Operation of Descriptors for Data Service, Special Data Service and Bookmark List Data Service*7

(1) When providing services other than those in partial reception layer:

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control*3</th><th colspan="3">Operation of the Digital Copy Control Descriptor</th><th colspan="2">Operation of the Content Availability Descriptor</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th><th>encryption_mode *6</th><th>copy_restriction_mode*6</th></tr>
<tr><td>Copy freely *5</td><td rowspan="3">Copy freely</td><td rowspan="2">01</td><td rowspan="3">00</td><td rowspan="2">00</td><td>0</td><td rowspan="3">Don't care</td></tr>
<tr><td rowspan="2">Copy freely</td><td>1</td></tr>
<tr><td>11</td><td>00</td><td>1</td></tr>
<tr><td rowspan="2">Copy never *1</td><td>Copy never, without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">01</td><td rowspan="4">11</td><td>00</td><td rowspan="2">Don't care</td><td rowspan="2">Don't care</td></tr>
<tr><td>Copy never *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy never, and the output of MPEG_TS is disabled.*15</td><td>Copy never, without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">11</td><td>00</td><td rowspan="2">Don't care</td><td rowspan="2">Don't care</td></tr>
<tr><td>Copy never *4</td><td>Other than 00</td></tr>
<tr><td>Copy one generation *2 *11</td><td rowspan="2">Copy one generation, without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="4">01</td><td rowspan="7">10</td><td rowspan="2">00</td><td rowspan="4">Don't care</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>0*14</td></tr>
<tr><td>Copy one generation *2 *11</td><td>Becomes "Copy never" after copying over one generation *4 *12</td><td rowspan="2">Other than 00</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>Becomes "Copy never" after copying over one generation *4</td><td>0*14</td></tr>
<tr><td>Copy one generation, but the output of MPEG_TS is disabled. *11 *15</td><td>Copy one generation, without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td>11</td><td>00</td><td>Don't care</td><td>1</td></tr>
</table>

Copy one generation, but the output of MPEG_TS is disabled. *15						0*14
Copy one generation, but the output of MPEG_TS is disabled. *11 *15	Becomes "Copy never" after copying over one generation *4 *12			Other than 00		1
Copy one generation, but the output of MPEG_TS is disabled. *15	Becomes "Copy never" after copying over one generation *4					0*14

(2) In the case of a service in the partial reception layer *10

Digital Copy Control	Analog Copy Control*3	Operation of the Digital Copy Control Descriptor			Operation of the Content Availability Descriptor	
		copy_ control_ type	digital_ recording_ control_data	APS_ control_ data	encryption_ mode *6	copy_ restriction_ mode*6
Copy freely *8	Copy freely	10	00	00	0	Don't care
Copy freely					1	
Copy one generation *8 *11	Copy one generation, without Macrovision protection. It shall therefore be copyable on conventional analog recording devices.		10	00	Don't care	1
Copy one generation *8						0*14
Copy one generation *8 *11	Becomes "Copy never" after copying over one generation *9 *13			Other than 00		1
Copy one generation *8	Becomes "Copy never" after copying over one generation *9					0*14

*1: In the case of high-speed digital interface output, the Copy Never process of the source function defined in DTCP shall be performed. However, the No More Copies process shall be performed when only outputting the audio stream in IEC60958-conformant format.

*2: In the case of high-speed digital interface output, the Copy One Generation process of the source function defined in DTCP shall be performed.

*3: It shall only be applicable to composite and component video outputs. It shall also include the case of outputting the received video signal after format conversion. Macrovision control shall be applicable to 480i composite and component video signals.

*4: Refer to Section 5.3 and Section 5.5.2 in Part 1 of Vol.8 for the analog video output.

*5: In the case of high-speed digital interface output, encryption shall be performed according to the prescriptions defined in DTCP. However, no encryption will be performed when outputting only the audio stream in IEC60958-conformant format.

*6: If there is no Content Availability Descriptor, encryption_mode and copy_restriction_mode shall both be judged to be '1'.

*7: Refer to "4.1 Operation rules for content protection" in Vol.8 for the relationship between the operation of copy control and service types.

*8: In the case of the partial reception layer, it shall not be possible to output protected content (i.e. content with digital_recording_control_data set to other than '00' or encryption_mode set to '0') from the high-speed digital interface output.

*9: Refer to Section 5.3 and Section 5.5.2 in Part 2 of Vol.8 for the analog video output.

*10: Data service shall be the only service in the partial reception layer.

*11: Recordable (accumulatable) as "copyable with restriction".

*12: Refer to Section 5.8 in Part 1 of Vol.8 if content was recorded (accumulated) with "copyable with restriction".

*13: Refer to Section 5.8 in Part 2 of Vol.8 if content was recorded (accumulated) with "copyable with restriction".

*14: copy_restriction_mode='0' of the Content Availability Descriptor will not be operated for the time being.

*15: In the case of IP interface, outputting of MPEG_PS shall also be prohibited.

[Points of Use (Common in All Services)]

Transmission and use should not be applied to other combinations than those specified in Table 30-23 and Table 30-24.

For CGMS-A, when copy_control_type is set to ’01’, ’10’ and ’11’, digital_recording_control_data and APS_control_data are copied in the area specified by CGMS-A.

When the relative descriptor includes the copy control information, the copyright process appropriate to analog video output, high-speed digital interface output and digital audio output is performed before outputting. CGMS-A and MACROVISION is used for analog video output, DTCP for high-speed digital interface output, and SCMS for digital audio output. For the details of process, see the specifications and standards.

When multiple services are outputted from the high-speed digital interface, the copy control designation (including output control) for each service is interpreted as follows:

- Outputting streams which includes services where output is prohibited or disabled is prohibited.
- The stream cannot be outputted if the service where copy_control_type=01 and the other where copy_control_type=11 are mixed. However, it can be outputted if the services of copy freely are mixed.
- Copy control is most strict for copy never, then copy one generation and copy freely in order.

The information should be accurately reflected in the copyright bit and category code of the channel status specified by IEC 60958.

The category code is set to "001_0000L " if Digital Copy Control Descriptor is provided.

Copy freely: Set the copyright information bit to 1.
Copy one generation: Set the copyright information bit to 0 and L bit of category code to 0.
Copy never: Set the copyright information bit to 0 and L bit of category code to 1.

If no relative descriptor is described, it is regarded as copy freely.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 30-25.

Table 30-25 Receiver Process Standard for Digital Copy Control Descriptor (First Loop of PMT)

Rules for Reception Processing for each field	
descriptor_tag	= “0xC1” : Judge that the relative descriptor is Digital Copy Control Descriptor.
descriptor_length	Judge that it is the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and decoded according to Table 30-23 and Table 30-24.
maximum_bit_rate_flag	=‘0’: Judge that the maximum bit rate for the relative service is within the range of default maximum bit rate specified in Table 21-1 and Table 21-2. =‘1’: Judge that the maximum bit rate for the relative service is described below.
component_control_flag	=‘0’ : Judge that the relative descriptor is valid. =‘1’ : Judge that the relative descriptor is invalid.
copy_control_type	This 2-bit field indicates the information used for copy generation control and is decoded according to Table 30-23 and Table 30-24.
maximum_bit_rate	Judge that it is the maximum bit rate for the relative service.

[Special Remarks]

Since the analog output signal copy control conforms to the individual contracts between broadcastiers and Macrovision, it seems necessary to re-consider carefully.

If this descripter is not described in the first loop but described in the second loop only, the copy control information for the first loop is regarded as "Copy freely".

If the Rules for Reception Processing are not specified in Table 30-23 and Table30-24, see Table 5-1 of Part 1 in Vol. 8 and Table 5-1 of Part 2 in Vol. 8.

30.3.2.3 Emergency Information Descriptor

[Use]

Indicate the emergency warning broadcasting or emergency warning test broadcasting is implemented in the relative service.

[Syntax]

The structure of Emergency Information Descriptor is shown in Table 30-26.

Table 30-26 Structure of Emergency Information Descriptor

Data structure	bit	Identifier
emergency_information_descriptor(){		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i=0;i<N;i++){		
service_id	**16**	**uimsbf**
start_end_flag	**1**	**bslbf**
signal_level	**1**	**bslbf**
reserved_future_use	**6**	**bslbf**
area_code_length	**8**	**uimsbf**
for (j=0;j<N;j++){		
area_code	**12**	**bslbf**
reserved_future_use	**4**	**bslbf**
}		
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.24 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be inserted if the emergency warning broadcasting or emergency warning test broadcasting is being implemented in the relative service. If they are implemented in other services, the insertion of this descriptor is optional.**

The Transmission Operating Rule for each field are shown in Table 30-27.

Table 30-27 Transmission Operating Rule of Emergency Information Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to "0xFC”.
descriptor_length	Describe the length of Emergency Information Descriptor.
[service_id_loop]	The loop count is 1.
service_id	Describe service_id where the emergency warning broadcasting or emergency warning test broadcasting is implemented.
start_end_flag	Set to '1’ for actual emergency warning broadcasting and ’0’ for test broadcasting.
signal_level	Describe according to 6.2.24 of Part 2 in ARIB STD-B10.
area_code_length	It is limited based on the maximum length of descriptor_length.
[area_code_loop]	Loop for the number of target area codes. Loop at least once.
area_code	Describe the area code specified in Annex D of Part 2 in ARIB STD-B10.

[Rules for Reception Processing]

○ Judge that the emergency awarning broadcasting or emergency warning test broadcasting is being implemented in the service shown in service_id.

○ Judge that the emergency warning broadcasting is being implemented in the area specified by the area code during the period when start_end_flag=‘1’ is described in the relative descriptor and the relative descriptor is placed.

○ Judge that the emergency warning test broadcasting is being implemented in the relative service during the period when start_end_flag=‘0’ is set in the relative descriptor and the relative descriptor is placed.

○ If the relative descriptor is not placed, judge that the emergency warning broadcasting or emergency warning test broadcasting is not being implemented.

The Rules for Reception Processing for each field are shown in Table 30-28.

Table 30-28 Receiver Process Standard for Emergency Information Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xFC” : Judge that the relative descriptor is the Emergency Information Descriptor.
descriptor_length	Judge that it is the length of Emergency Information Descriptor.
[service_id_loop]	Judge that the loops except for the first loop are invalid.
service_id	Judge that it is service_id where the emergency warning broadcasting or emergency warning test broadcasting is implemented.
start_end_flag	‘0’ : Judge that the emergency warning test broadcasting is being implemented in the relative service. ‘1’ : the emergency warning broadcasting is being implemented for the area specified by the area code in the relative service.
signal_level	Judge that it is the signal type described according to 6.2.24 of Part 2 in ARIB STD-B10.
area_code_length	
[area_code_loop]	Judge that the area codes to be looped exist.
area_code	Judge that it is the area code specified in Annex D of Part 2 in ARIB STD-B10.

[Special Remarks]

For detailed use of emergency warning broadcasting, see Chapter 26.

30.3.2.4 Content Availability Descriptor

[Use]

Place this descriptor when describing control information on recording and outputting regarding the relative program. This descriptor shall also be placed for specifying whether "copyable with restriction" will be operated for the relevant program or component.

[Syntax]

The structure of Content Availability Descriptor is shown in Table 30-29.

Table 30-29 Structure of Content Availability Descriptor

Data structure	bit	Identifier
content_availability_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
reserved_future_use	**1**	**bslbf**
copy_restriction_mode	**1**	**bslbf**
image_constraint_token	**1**	**bslbf**
retention_mode	**1**	**bslbf**
retention_state	**3**	**bslbf**
encryption_mode	**1**	**bslbf**
for(i=0;i<N;i++){		
reserved_future_use	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.45 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed if the relative program is the output protection target.**

Output protection refers to the use of the output protection bit (encryption_mode) of the Content Availability Descriptor to protect the copy-freely contents from being output to the high-speed digital interface.

◎ **If "copyable with restriction" will be operated with the digital copy control information of the relevant program or component set to "copy one generation", this descriptor shall either be not placed or placed with copy_restriction_mode = '1'.**

The Transmission Operating Rule for each field are shown in Table 30-30.

Table 30-30 Transmission Operating Rule of Content Availability Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to "0xDE”.
descriptor_length	Describe the length of Content Availability Descriptor.
copy_restriction_mode	Set to '1' if "copyable with restriction" will be operated, and '0' if not. (Note that the default value of '1' will be set if the relevant descriptor is not placed.)
image_constraint_token	Set to ‘1’.
retention_mode	Set to '0’.
retention_state	Set to ‘111’.
encryption_mode	Set to ’0’ if the digital copy control information is "Copy freely " and high-speed digital interface output protection is used. (Note that the default value is set to ’1’ when the relative descriptor is not placed.)

[Points of Use]

The relative descriptor is used in combination with the Digital Copy Control Descriptor. Place the Digital Copy Control Descriptor whenever the relative descriptor is placed.

With regard to the information described in copy_restriction_mode, image_constraint_token, retention_state and encryption_mode, note that '1' shows the default state.

[Rules for Reception Processing]

The relative descriptor is used in combination with the Digital Copy Control Descriptor; therefore, the relative descriptor is regarded as invalid if the Digital Copy Control Descriptor is not placed in the first loop of PMT.

The Rules for Reception Processing for each field are shown in Table 30-31.

Table 30-31 Receiver Process Standard for Content Availability Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xDE” : Judge that the relative descriptor is Content Availability Descriptor.
descriptor_length	Judge that it is the length of Content Availability Descriptor.
copy_restriction_mode	=‘1’:It shall be judged that "copyable with restriction" will be operated.*3 =‘0’:It shall be judged that "copyable with restriction" will not be operated.*3
image_constraint_token	Judge that the resolution for outputting video signal is not limited even though any value is entered.
retention_mode	Judge that the temporary recording is enabled even though any value is entered. *1
retention_state	Judge that the temporary recording permission time is 1.5 hour even though any value is entered. *1
encryption_mode	=‘1’: Judge that protection is not applied to high-speed digital interface outputting. *2 =‘0’: Judge that protection is applied to high-speed digital interface outputting.*2

*1 It is applicable only when the digital copy control information is "Copy never". (For details, see Vol. 8.)

*2 It is applicable only when the digital copy control information is "Copy freely". (For details, see Vol. 8.)

*3 It will be meaningful only if the digital copy control information is "Copy one generation". (Refer to Vol.8 for details.)

[Special Remarks]

If the relative descriptor is not placed, the value for each field is regarded as follows:

- copy_restriction_mode = ‘1’
- image_constraint_token = ‘1’
- retention_mode = ‘0’
- retention_state = ‘111’
- encryption_mode = ‘1’

For detailed use and process, see Chapter 21 and Vol. 8.

The high-speed digital interface control should be processed in accordance with the DTCP specifications.

30.3.3 Descriptor Inserted in the Second Loop of PMT (ES Loop)

30.3.3.1 Conditional Access Descriptor

[Use]

If the relative ES is for conditional access, specify the PID for ECM stream in CA system (conditional access system).

[Syntax]

The structure of Conditional Access Descriptor is shown in Table 30-7.

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 in ARIB STD-B10 and the definitions in Section 2.6.16 of ISO/IEC13818-1.

[Transmission Operating Rule]

◎ **Only one descriptor should be transmitted for each Conditional access system identifier if the descriptor specifies the different ECM_PID from that described in the Conditional Access Descriptor that is placed in the first loop of the PMT.**
If multiple conditional access systems are used, place one relative descriptor for each Conditional access system identifier.

The Transmission Operating Rule for each field are shown in Table 30-32.

Table 30-32 Transmission Operating Rule for Conditional Access Descriptor (Second Loop of PMT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x09”.
descriptor_length	Describe the length of Conditional Access Descriptor.
CA_system_ID	Describe the Conditional access system identifier. Do not describe any other identification values than those applicable to Digital Terrestrial Television Broadcasting.
CA_PID	Only CA_PID=”0x1FFF” can be specified. (See 20.2.1.)
private_data_byte	Do not describe any.

[Rules for Reception Processing]

○ Judge that the relative ES is applied to the conditional access.

○ If the relative descriptor is described both in the first and second loops of PMT, the information of descriptor described in the second loop is valid.

○ If this descriptor is placed in the PMT for the service carried in partial reception layer, the noncompliant error message is displayed. For details, see Vol.5.

The Rules for Reception Processing for each field are shown in Table 30-33.

Table 30-33 Receiver Process Standard for Conditional Access Descriptor (Second Loop of PMT)

Rules for Reception Processing for each field	
descriptor_tag	= “0x09” : Judge that the relative descriptor is the Conditional Access Descriptor.
descriptor_length	Judge as the length of Conditional Access Descriptor.
CA_system_ID	= Identification value used for Digital Terrestrial Television Broadcasting: Judge as the relative Conditional access system identifier.*1 = Other value: Judge that the relative Conditional Access Descriptor is invalid.
CA_PID	Judge that any other than “0x1FFF” is invalid. In case of ”0x1FFF”, the ECM for the relative PID is not transported.
private_data_byte	Judge that any entered value is invalid.

*1 If CA_system_ID is other than supporting Conditional access system identifier, judge that the relative Conditional Access Descriptor is invalid.

[Special Remarks]

None

30.3.3.2 Stream Identifier Descriptor

[Use]

This descriptor is used to label the relative ES.

[Syntax]

The structure of Stream Identifier Descriptor is shown in Table 30-34.

Table 30-34 Structure of Stream Identifier Descriptor

Data structure	bit	Identifier
stream_identifier_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
component_tag	**8**	**uimsbf**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.16 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed at the head of the second loop of the PMT.**

The Transmission Operating Rule for Stream Identifier Descriptor are shown in Table 30-35.

Table 30-35 Transmission Operating Rule of Stream Identifier Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to ”0x52”.
descriptor_length	Describe the length of Stream Identifier Descriptor.
component_tag	Describe component_tag for the relative ES loop.

[Rules for Reception Processing]

◎ **ES loops with the same component_tag described in the EIT are linked each other.**

The Rules for Reception Processing for each field are shown in Table 30-36.

Table 30-36 Receiver Process Standard for Stream Identifier Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x52” : Judge that the relative descriptor is the Stream Identifier Descriptor.
descriptor_length	Judge as the length of Stream Identifier Descriptor.
component_tag	Judge as the component_tag value for the relative ES loop.

[Special Remarks]

○ Unique component_tag value can be assigned for each service.

○ For the rules of assigning component_tag value, see 14.2.

30.3.3.3 Digital Copy Control Descriptor

[Use]

For each ES in the relative service, place this descriptor when control information regarding digital and analog copy is displayed, or when the maximum bit rate is described.

[Syntax]

The structure of Digital Copy Control Descriptor is shown in Table 30-37.

Table 30-37 Structure of Digital Copy Control Descriptor

Data structure	bit	Identifier
digital_copy_control_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
digital_recording_control_data	**2**	**bslbf**
maximum_bit_rate_flag	**1**	**bslbf**
component_control_flag	**1**	**bslbf**
copy_control_type	**2**	**bslbf**
if(copy_control_type != 00){		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bit_rate_flag == 1) {		
maximum_bit_rate	**8**	**uimsbf**
}		
if(component_control_flag ==1){		
component_control_length	**8**	**uimsbf**
for(j=0;j<N;j++){		
component_tag	**8**	**uimsbf**
digital_recording_control_data	**2**	**bslbf**
maximum_bitrate_flag	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
copy_control_type	**2**	**bslbf**
if(copy_control_type != 00) {		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bitrate_flag==1){		
maximum_bitrate	**8**	**uimsbf**
}		
}		
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.23 and Annex F of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed for the relative service when specifying the digital copy control and analog copy control that are different from that specified for the whole service.**
However, the different copy control from that for the whole service can be specified only if the component tag value is set to 0x40 to 0x7F.

○ This descriptor should be placed if the maximum bit rate for the relative ES is not within the range of default maximum bit rate specified in Table 21-1.

○ When this descriptor is placed, make sure to describe the value in the field if it is different from the default value.
For example, even though the maximum bit rate is same as that for the whole service, the field value should be described if it is different from the default maximum bit rate. (Otherwise, the field value is regarded as the default maximum bit rate.)

The Transmission Operating Rule for each field are shown in Table 30-38.

Table 30-38 Transmission Operating Rule of Digital Copy Control Descriptor (Second Loop of PMT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xC1”.
descriptor_length	Describe the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and is coded according to Table 30-39 and Table 30-40.
maximum_bit_rate_flag	Set to '0’ if the maximum bit rate for the relative service is not described. Set to '1’ if the maximum bit rate for the relative service is described.
component_control_flag	If ‘0’ is set, the digital copy control information is defined for the relative ES, and the field later than component_control_length does not exist. If this descriptor is transmitted using PMT, always set to '0’.
copy_control_type	This 2-bit field indicates the information used for copy generation control and is coded according to Table 30-39 and Table 30-40.
APS_control_data	Analog output copy control information. This 2-bit field indicates the information used for analog output copy control if copy_control_type is set to '01’, ’10’ or ’11’ and is coded according to Table 30-39 and Table 30-40.
maximum_bit_rate	Describe the maximum bit rate. (Describe in increments of 1/4Mbit/s.)

Note that the specifications for controlling each output terminal using Digital Copy Control Descriptor vary according to service_type.

[Points of Use (Digital TV Service and Special Video Service)]

If service_type described in the NIT Service List Descriptor is set to "0x01" (digital TV service) and "0xA1" (special video service), it should be coded according to Table 30-39.

Table 30-39 Operation of Descriptors for Digital TV Service and Special Video Service

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control*3</th><th colspan="3">Operation of the Digital Copy Control Descriptor</th><th colspan="2">Operation of the Content Availability Descriptor*11</th></tr>
<tr><th>copy_ control_ type</th><th>digital_ recording_ control_data</th><th>APS_ control_ data</th><th>encryption_ mode *6</th><th>copy_ restriction_ mode*6</th></tr>
<tr><td>Copy freely *5</td><td rowspan="2">Copy freely</td><td rowspan="8">01</td><td rowspan="2">00</td><td rowspan="2">00</td><td>0</td><td rowspan="2">Don't care</td></tr>
<tr><td>Copy freely</td><td>1</td></tr>
<tr><td rowspan="3">Copy never *1</td><td rowspan="2">Copy never, without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="3">11*9</td><td>00</td><td>Don't care</td><td>Don't care</td></tr>
<tr><td>Other than 00</td><td>Don't care</td><td>Don't care</td></tr>
<tr><td>Copy one generation *2 *7</td><td rowspan="3">Copy one generation, without Macrovision protection. It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="5">10</td><td rowspan="2">00</td><td rowspan="2">Don't care</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>0*10</td></tr>
<tr><td>Copy one generation *2 *7</td><td>Becomes "Copy never" after copying over one generation *4 *8</td><td rowspan="2">Other than 00</td><td rowspan="2">Don't care</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>Becomes "Copy never"after copying over one generation *4</td><td>0*10</td></tr>
</table>

*1: In the case of high-speed digital interface output, the Copy Never process of the source function defined in DTCP shall be performed. However, the No More Copies process shall be performed when only outputting the audio stream in IEC60958-conformant format.

*2: In the case of high-speed digital interface output, the Copy One Generation process of the source function defined in DTCP shall be performed.

*3: It shall only be applicable to composite and component video outputs. It shall also include the case of outputting the received video signal after format conversion. Macrovision control shall be applicable to 480i composite and component video signals.

*4: Refer to Section 5.3 and Section 5.5.2 in Part 1 of Vol.8 for the analog video output.

*5: In the case of high-speed digital interface output, encryption shall be performed according to the prescriptions defined in DTCP. However, no encryption will be performed when outputting only the audio stream in IEC60958-conformant format.

*6: If there is no Content Availability Descriptor, encryption_mode and copy_restriction_mode shall both be judged to be '1'.

*7: Recordable (accumulatable) as "copyable with restriction".

*8: Refer to Section 5.8 in Part 1 of Vol.8 if content was recorded (accumulated) with "copyable with restriction".

*9: digital_recording_control_data of the Digital Copy Control Descriptor set to '11' will not be operated as pay-per-view will not be operated at the initial stage of the broadcasting.(Refer to Vol.8 for details.)

*10: copy_restriction_mode='0' of the Content Availability Descriptor will not be operated for the time being.

*11: It shall be placed in the first loop of PMT.

[Points of Use (Data Service, Special Data Service and Bookmark List Data Service)]

If service_type described in the NIT Service List Descriptor is set to "0xC0" (data service), "0xA3" (special data service) and "0xAA" (bookmark list data service), it should be coded according to Table 30-40.

Table 30-40 Operation of Descriptors for Data Service, Special Data Service and Bookmark List Data Service*7

(1) When providing services other than those in partial reception layer:

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control*3</th><th colspan="3">Operation of the Digital Copy Control Descriptor</th><th colspan="2">Operation of the Content Availability Descriptor*16</th></tr>
<tr><th>copy_ control_ type</th><th>digital_ recording_ control_data</th><th>APS_ control_ data</th><th>encryption_ mode *6</th><th>copy_ restriction_ mode*6</th></tr>
<tr><td>Copy freely *5</td><td rowspan="3">Copy freely</td><td rowspan="2">01</td><td rowspan="3">00</td><td rowspan="2">00</td><td>0</td><td rowspan="3">Don't care</td></tr>
<tr><td>Copy freely</td><td>1</td></tr>
<tr><td></td><td>11</td><td>00</td><td>00</td><td>1</td></tr>
<tr><td rowspan="2">Copy never *1</td><td>Copy never, without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">01</td><td rowspan="4">11</td><td>00</td><td rowspan="2">Don't care</td><td rowspan="2">Don't care</td></tr>
<tr><td>Copy never *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy never, and the output of MPEG_TS is disabled. *15</td><td>Copy never, without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">11</td><td>00</td><td rowspan="2">Don't care</td><td rowspan="2">Don't care</td></tr>
<tr><td>Copy never *4</td><td>Other than 00</td></tr>
<tr><td>Copy one generation *2 *11</td><td rowspan="3">Copy one generation, without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="4">01</td><td rowspan="4">10</td><td rowspan="2">00</td><td rowspan="4">Don't care</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>0*14</td></tr>
<tr><td>Copy one generation *2 *11</td><td>Becomes "Copy never" after copying over one generation *4 *12</td><td rowspan="2">Other than 00</td><td>1</td></tr>
<tr><td>Copy one generation *2</td><td>Becomes "Copy never" after copying over one generation *4</td><td>0*14</td></tr>
</table>

Copy one generation, but the output of MPEG_TS is disabled. *11 *15	Copy one generation, without Macrovision protection. It shall therefore be copyable on conventional analog recording devices.	11		00	Don't care	1
Copy one generation, but the output of MPEG_TS is disabled. *15						0*14
Copy one generation, but the output of MPEG_TS is disabled. *11 *15	Becomes "Copy never" after copying over one generation *4 *12			Other than 00		1
Copy one generation, but the output of MPEG_TS is disabled. *15	Becomes "Copy never" after copying over one generation *4					0*14

(2) In the case of a service in the partial reception layer *10

Digital Copy Control	Analog Copy Control*3	Operation of the Digital Copy Control Descriptor			Operation of the Content Availability Descriptor*16	
		copy_ control_ type	digital_ recording_ control_data	APS_ control_ data	encryption_ mode *6	copy_ restriction_ mode*6
Copy freely *8	Copy freely	10	00	00	0	Don't care
Copy freely					1	
Copy one generation *8 *11	Copy one generation, without Macrovision protection. It shall therefore be copyable on conventional analog recording devices.		10	00	Don't care	1
Copy one generation *8						0*14
Copy one generation *8 *11	Becomes "Copy never" after copying over one generation *9 *13			Other than 00		1
Copy one generation *8	Becomes "Copy never" after copying over one generation *9					0*14

*1: In the case of high-speed digital interface output, the Copy Never process of the source function defined in DTCP shall be performed. However, the No More Copies process shall be performed when only outputting the audio stream in IEC60958-conformant format.

*2: In the case of high-speed digital interface output, the Copy One Generation process of the source function defined in DTCP shall be performed.

*3: It shall only be applicable to composite and component video outputs. It shall also include the case of outputting the received video signal after format conversion. Macrovision control shall be applicable to 480i

composite and component video signals.

*4: Refer to Section 5.3 and Section 5.5.2 in Part 1 of Vol.8 for the analog video output.

*5: In the case of high-speed digital interface output, encryption shall be performed according to the prescriptions defined in DTCP. However, no encryption will be performed when outputting only the audio stream in IEC60958-conformant format.

*6: If there is no Content Availability Descriptor, encryption_mode and copy_restriction_mode shall both be judged to be '1'.

*7: Refer to "4.1 Operation rules for content protection" in Vol.8 for the relationship between the operation of copy control and service types.

*8: In the case of the partial reception layer, it shall not be possible to output protected content (i.e. content with digital_recording_control_data set to other than '00' or encryption_mode set to '0') from the high-speed digital interface output.

*9: Refer to Section 5.3 and Section 5.5.2 in Part 2 of Vol.8 for the analog video output.

*10: Data service shall be the only service in the partial reception layer.

*11: Recordable (accumulatable) as "copyable with restriction".

*12: Refer to Section 5.8 in Part 1 of Vol.8 if content was recorded (accumulated) with "copyable with restriction".

*13: Refer to Section 5.8 in Part 2 of Vol.8 if content was recorded (accumulated) with "copyable with restriction".

*14: copy_restriction_mode='0' of the Content Availability Descriptor will not be operated for the time being.

*15: In the case of IP interface, outputting of MPEG_PS shall also be prohibited.

*16: It shall be placed in the first loop of PMT.

[Points of Use (Common in All Services)]

Transmission and use should not be applied to other combinations than those specified in Table 30-39 and Table 30-40.

For CGMS-A, when copy_control_type is set to ’01’, ’10’ and ’11’, digital_recording_control_data and APS_control_data are copied in the area specified by CGMS-A.

When the relative descriptor includes the copy control information, the copyright process appropriate to analog video output, high-speed digital interface output and digital audio output is performed before outputting. CGMS-A and MACROVISION is used for analog video output, DTCP for high-speed digital interface output, and SCMS for digital audio output. For the details of process, see the specifications and standards.

When multiple services are outputted from the high-speed digital interface, the copy control designation (including output control) for each component is interpreted as follows:

- The use of descriptor specified for each service is applied to the descriptor described in the first and second loops.
- Outputting streams which includes components where output is prohibited or disabled is prohibited.
- The stream cannot be outputted if the service where copy_control_type=01 and the other where copy_control_type=11 are mixed. However, it can be outputted if the services of copy freely are mixed.
- Copy control is most strict for copy never, then copy one generation and copy freely in order.

The information should be accurately reflected in the copyright bit and category code of the channel status specified by IEC 60958.

The category code is set to "001_0000L " if Digital Copy Control Descriptor is provided.

Copy freely: Set the copyright information bit to 1.

Copy one generation: Set the copyright information bit to 0 and L bit of category code to 0.

Copy never: Set the copyright information bit to 0 and L bit of category code to 1.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 30-41.

Table 30-41 Rules for Reception Processing for Digital Copy Control Descriptor (Second Loop of PMT)

Rules for Reception Processing for each field	
descriptor_tag	= “0xC1” : Judge that the relative descriptor is Digital Copy Control Descriptor.
descriptor_length	Judge as the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and decoded according to Table 30-39 and Table 30-40.
maximum_bit_rate_flag	=‘0’: Judge that the maximum bit rate for the relative ES is within the range of default maximum bit rate specified in Table 21-1 and Table 21-2. =‘1’: Judge that the maximum bit rate for the relative ES is described below.
component_control_flag	=‘0’ : Judge that the relative descriptor is valid. =‘1’ : Judge that the relative descriptor is invalid.
copy_control_type	This 2-bit field indicates the information used for copy generation control and is decoded according to Table 30-39 and Table 30-40.
maximum_bit_rate	Judge as the maximum bit rate for the relative service.

[Special Remarks]

Since the analog output signal copy control conforms to the individual contracts between broadcasers and Macrovision, it seems necessary to re-consider carefully.

If the Rules for Reception Processing are not specified in Table 30-39 and Table 30-40, see Table 5-1 of Part 1 in Vol. 8 and Table 5-1 of Part 2 in Vol. 8.

30.3.3.4 Data Component Descriptor

The transmission operating rule of the relative descriptor is described in Vol. 3.

30.3.3.5 Video Decode Control Descriptor

[Use]

This descriptor is used for controlling the video decode at the moment when the video coding system is changed in the same service_id. Also, it shows whether the relative ES is MPEG-I frame still image or not.

[Syntax]

The structure of Video Decode Control Descriptor is shown in Table 30-42.

Table 30-42 Structure of Video Decode Control Descriptor

Data structure	bit	Identifier
video_decode_control_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
still_picture_flag	**1**	**bslbf**
sequence_end_code_flag	**1**	**bslbf**
video_encode_format	**4**	**bslbf**
reserved_future_use	**2**	**bslbf**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.30 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed when transmitting still image streams.**

○ This descriptor should be placed when the seamless switching is used.
In this case, the PMT which has relative descriptor containing the information of components after the switching is performed, istransmitted 0.5 to 2 seconds before the video is switched.

○ Except the above, this descriptor can be placed any time.

The Transmission Operating Rule for each field is shown in Table 30-43.

Table 30-43 Transmission Operating Rule of Video Decode Control Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xC8”.
descriptor_length	Describe the length of Video Decode Control Descriptor.
still_picture_flag	Set to ’1’ when the relative component is the still picture (MPEG-I picture) and ’0’ when it is the moving picture.
sequence_end_code_flag	Set to ’1’ if the old video component (*1) transmits the sequence end code.
video_encode_format	Describe the encode format of new video component (*2). 0000: 1080p 0001: 1080i 0010: 720p 0011: 480p 0100: 480i 0101: 240p 0110: 120p 1000 to 1111:video_encode_format Extension

*1: It refers to the video component used at the moment when transmission of the PMT, where the relative descriptor is placed, is started.

*2: It refers to the component used after the switching has been performed.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 30-44.

Table 30-44 Rules for Reception Processing for Video Decode Control Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xC8” : Judge that the relative descriptor is the Video Decode Control Descriptor.
descriptor_length	Judge that it is the length of Video Decode Control Descriptor.
still_picture_flag	=‘1’: Judge that the relative component is the still picture (MPEG-I picture). =‘0’ : Judge that the relative component is the moving picture.
sequence_end_code_flag	=’1’: Sequence end code is transmitted; therefore, it can be used for switching of decoding.
video_encode_format	It is used for setting to decoding as an encode format for new component.

[Special Remarks]

The Video Decode Control Descriptor is described for the purpose of sending the operation sequence to the receiver unit if HD/SD switching is applied so that the receiver unit can implement the seamless switching based on the sequence, as well as showing that it is the still picture. For the details of seamless switching, see "Appendix 1 Method of Switching the Video Format" in ARIB STD-B21.

30.4 NIT(Network Information Table)

30.4.1 Structure and Use of NIT

[Use]

Transmit the information on transmission path such as modulation frequency and linking broadcasting service. Show the service structure of the entire network.

[Syntax]

The structure of NIT is shown in Table 30-45.

Table 30-45 Structure of NIT (Network Information Table)

Data structure	bit	Identifier
network_information_section(){		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
network_id	**16**	**uimsbf**
reserved	**2**	**bslbf**
version_number	**5**	**uimsbf**
current_next_indicator	**1**	**bslbf**
section_number	**8**	**uimsbf**
last_section_number	**8**	**uimsbf**
reserved_future_use	**4**	**bslbf**
network_descriptor_length	**12**	**uimsbf**
for (i = 0;i< N;i++) {		
descriptor()		
}		
reserved_future_use	**4**	**bslbf**
transport_stream_loop_length	**12**	**uimsbf**
for (i = 0;i< N;i++) {		
transport_stream_id	**16**	**uimsbf**
original_network_id	**16**	**uimsbf**
reserved_future_use	**4**	**bslbf**
transport_descriptors_length	**12**	**uimsbf**
for (j = 0;j< N;j++) {		
descriptor()		
}		
}		
CRC_32	**32**	**rpchof**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.4 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

- ◎ **NIT should be transmitted if any stream is included in the transport stream.**
- ◎ **The transmission layer should always be layer A.**
- ○ The network is structured by each transmission master, and only one TS is defined.
- ○ For repetition rate, follow Section 12.4 of this document.
- ○ For update frequency, follow Section 12.9 of this document.
- ○ NIT and SDT shall generally contain the same service information (except for engineering services) , except for transition period.

The Transmission Operating Rule for each field are shown in Table 30-46.

Table 30-46 Transmission Operating Rule of NIT

Transmission Operating Rule for each field	
table_id	Set to “0x40”.
section_syntax_indicator	Set to ‘1’.
section_length	Describe the section length of NIT. Since the maximum length of section is 1024 bytes, this value should be 1021 at maximum.
network_id	One "network_id" is assigned for each transmission master.
version_number	For normal use, describe a value incremented by 1 every time contents are updated. However, when a system error occurs, a value incremented by more than 1 can be described.
current_next_indicator	Set to '1’. Use based on the MPEG standards.
section_number	
last_section_number	
network_descriptor_length	The maximum loop count is not defined.
[1st_loop]	
[descriptor]	
transport_stream_loop_length	
[2nd_loop]	Describe the information on transport stream included in the target network. In Digital Terrestrial Television Broadcasting, the loop count is set to 1.
transport_stream_id	
original_network_id	Describe the same value as that for "network_id".
transport_descriptors_length	The maximum value is not defined.
[descriptor]	

[Rules for Reception Processing]

○ Since the NIT is not the table that is often upgraded, the receiver units can receive information based on the NIT information stored in the non-volatile memory to shorten the operation time. If the NIT cannot be received within the specified repetition rate, judge that any receivable stream does not exist in the transport stream, or that the transmission system is not normally functioning. If the NIT is received, follow the received information.

○ The different network is structured by each transmission master; therefore, the receiver units need to manage multiple receivable NITs.

○ If the service information in the NIT is different from that in the SDT, judge that it is in transition period, except for the case that only service type related to engineering service is different.

The Rules for Reception Processing for each field are shown in Table 30-47.

Table 30-47 Rules for Reception Processing for NIT

Rules for Reception Processing for each field	
table_id	= "0x40": Judge that the relative table is NIT.
section_syntax_indicator	= '0' : Judge that the relative section is invalid. = '1' : Judge that the relative section is valid.
section_length	Judge as the section length of NIT.
network_id	Judge as "network_id" for the target network.
version_number	If any change occurs, judge that the relative table has been updated.
current_next_indicator	= '0' : Judge that the relative section is invalid. = '1' : Judge that the relative section is valid.
section_number	
last_section_number	
network_descriptor_length	The maximum loop count is not defined.
[1st_loop]	
[descriptor]	
transport_stream_loop_length	
[2nd_loop]	It shows each transport stream information included in the target network. If it is set to more than '2', ignore the second and later loop information.
transport_stream_id	
original_network_id	
transport_descriptors_length	
[descriptor]	

[Special Remarks]

None

30.4.2 Descriptor Inserted into the First Loop of NIT (Network Loop)

30.4.2.1 Network Name Descriptor

[Use]

Describe network name.

[Syntax]

The structure of Network Name Descriptor is shown in Table 30-48.

Table 30-48 Structure of Network Name Descriptor

Data structure	bit	Identifier
network_name_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
char	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.11 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed for the network loop in the NIT.**

○ The network name should be the texts representing the broadcasting station name.

The Transmission Operating Rule for each field are shown in Table 30-49.

Table 30-49 Transmission and Use of Network Name Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x40”.
descriptor_length	Describe the length of the relative descriptor.
[char]	The maximum number of characters is 10 two-byte or 20 one-byte characters. Do not use linefeed codes. For the rule on use, see [Appendix H].

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 30-50.

Table 30-50 Rules for Reception Processing for Network Name Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x40”: Judge that the relative descriptor is the Network Name Descriptor.
descriptor_length	Judge as the length of Network Name Descriptor.
[char]	Judge as the network name. It is not generally presented to viewers.

[Special Remarks]

None

30.4.2.2 System Management Descriptor

[Use]

This descriptor judges whether the relative network is for broadcasting or not, and is used for identifying the standard system if the relative network is for broadcasting.

[Syntax]

The structure of System Management Descriptor is shown in Table 30-51.

Table 30-51 Structure of System Management Descriptor

Data structure	bit	Identifier
system_management_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
system_management_id() {		**uimsbf**
broadcasting_flag	**2**	**uimsbf**
broadcasting_identifier	**6**	**uimsbf**
additional_broadcasting_identification	**8**	**uimsbf**
}		
for (i = 0;i< N;i++) {		
additional_identification_info	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.21 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed for the network loop in the NIT.**

The Transmission Operating Rule for each field are shown in Table 30-52.

Table 30-52 Transmission Operating Rule of System Management Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xFE”.
descriptor_length	Describe the length of System Management Descriptor.
[system_management_id]	
broadcasting_flag	Set to ‘00’. (It refers to "broadcast".)
broadcasting_identifier	Set to ‘000011’. (It refers to the broadcasting system for Digital Terrestrial Television Broadcasting.)
additional_broadcasting_identification	Set to “0x01”.
[loop]	
additional_identification_info	Do not describe.

[Rules for Reception Processing]

○ Judge whether the target network is for broadcasting or not and whether the broadcasting is Digital Terrestrial Television Broadcasting or not if the network is for broadcasting.

The Rules for Reception Processing for each field are shown in Table 30-53.

Table 30-53 Rules for Reception Processing for System Management Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xFE”: Judge that the relative descriptor is the System Management Descriptor.
descriptor_length	Judge as the length of System Management Descriptor.
[system_management_id]	
broadcasting_flag	= ‘00’: Judge that the relative network is for broadcasting. ≠ ‘00’: Judge that the relative network is for any other than broadcasting.
broadcasting_identifier	= ‘000011’: Judge that the relative network is for Digital Terrestrial Television Broadcasting. ≠’000011’: Judge that the relative network is for any other than Digital Terrestrial Television Broadcasting.
additional_broadcasting_identification	Ignore.
[loop]	
additional_identification_info	Ignore.

[Special Remarks]

None

30.4.3 Descriptor Inserted into the Second Loop (TS Loop) of NIT

30.4.3.1 Service List Descriptor

[Use]

Describe the list by services and service types in the transport stream.

[Syntax]

The structure of Service List Descriptor is shown in Table 30-54.

Table 30-54 Structure of Service List Descriptor

Data structure	bit	Identifier
service_list_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i= 0;i< N;i++) {		
service_id	**16**	**uimsbf**
service_type	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.14 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed for TS loop in NIT.**

The Transmission Operating Rule for each field are shown in Table 30-55. The values for "service_type" are shown in Table 30-56.

Table 30-55 Transmission Operating Rule of Service List Descriptor (Second Loop of NIT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x41”.
descriptor_length	Describe the length of Service List Descriptor.
[loop]	Describe the loops for the number of services included in the target transport stream.
service_id	Describe "service_id" included in the relative transport stream.
service_type	Describe the service type of the relative service. (Specified in Table 30-56.)

Table 30-56 "service_type"

service_type	Definitions
0x01	Digital TV service
0x02	Digital audio service (Note2)
0xC0	Data service
0xA1	Special video service
0xA2	Special audio service (Note2)
0xA3	Special data service
0xA4	Engineering service (Note1)
0xAA	Bookmark list data service

Note that the number of "service_type" may increase in the future.

Note1: For details, see the Operation Rule in Vol. 1.

Note2: Not available in Digital Terrestrial Television Broadcasting.

[Rules for Reception Processing]

○ Judge that it is the information on transport stream included in the target network.

The Rules for Reception Processing for each field are shown in Table 30-57.

Table 30-57 Rules for Reception Processing for Service List Descriptor (Second Loop of NIT)

Rules for Reception Processing for each field	
descriptor_tag	“0x41”: Judge that the relative descriptor is the Service List Descriptor.
descriptor_length	Judge as the length of Service List Descriptor.
[loop]	
service_id	Judge as "service_id" for the relative transport stream.
service_type	It indicates the type of the relative service. Judge that any other service than that specified in Table 30-56 is invalid.

[Special Remarks]

None

30.4.3.2 Terrestrial Delivery System Descriptor

[Use]

Indicate the physical conditions of terrestrial transmission path.

[Syntax]

The structure of Terrestrial Delivery System Descriptor is shown in Table 30-58.

Table 30-58 Structure of Terrestrial Delivery System Descriptor

Data structure	bit	Identifier
terrestrial_delivery_system_descriptor(){		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
area_code	**12**	**bslbf**
guard_interval	**2**	**bslbf**
transmission_mode	**2**	**bslbf**
for (i = 0;i< N;i++) {		
frequency	**16**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.31 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed for the TS loop when the NIT is transmitted.**

○ 1/32 guard interval and Model1 are not available. (For details, see Section 7.3 of Vol. 7.)

○ In case of MFN, enter all frequencies used by the transmission facility for transmitting the relative TS.

The Transmission Operating Rule for each field are shown in Table 30-59.

Table 30-59 Transmission Operating Rule of Terrestrial Delivery System Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xFA”.
descriptor_length	Describe the length of Terrestrial Delivery System Descriptor
area_code	Enter the service area code. (Each value is specified in Table D-2 of Annex D of Part 2 in ARIB STD-B10.)
guard_interval	Enter the guard interval. (Specified in Table 30-60.)
transmission_mode	Enter the mode information. (Specified in Table 30-61.)
[loop]	In case of MFN, describe the loop for the number of frequencies used by the transmission facility for transmitting the relative TS.
frequency	Describe the frequency. Unit is 1/7MHz. Refer to the related description in Section 32.1 of this document.

Table 30-60 Guard Interval

guard_interval	Definitions
00	1/32 Note1
01	1/16
10	1/8
11	1/4

Note1: Not available in Digital Terrestrial Television Broadcasting.

Table 30-61 Mode Information

transmission_mode	Definitions
00	Mode1 Note1
01	Mode2
10	Mode3
11	Undefined

Note1: Not available in Digital Terrestrial Television Broadcasting.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 30-62.

Table 30-62 Rules for Reception Processing for Terrestrial Delivery System Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xFA”: Judge that the relative descriptor is the Terrestrial Delivery System Descriptor.
descriptor_length	Judge as the length of the Terrestrial Delivery System Descriptor.
area_code	Judge as the service area code of the relative TS.
guard_interval	Judge as the guard interval length of the relative TS.
transmission_mode	Judge as the transmission mode of the relative TS.
[loop]	
frequency	Judge as each frequency of the broadcast for the relative TS. Note that the entered frequency information may not completely match the actual transmission frequency due to added transmission station and frequency repacking. Refer to the related description in Section 32.1 of this document.

[Special Remarks]

None

30.4.3.3 Partial Reception Descriptor

[Use]

Specify the service identifier transmitted in the partial reception layer of the terrestrial transmission path.

[Syntax]

The structure of Partial Reception Descriptor is shown in Table 30-63.

Table 30-63 Structure of Partial Reception Descriptor

Data structure	bit	Identifier
partial_reception_descriptor(){		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
service_id	**16**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.32 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed for the TS loop when using the partial reception layer.**

The Transmission Operating Rule for each field are shown in Table 30-64.

Table 30-64 Transmission Operating Rule of Partial Reception Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xFB”.
descriptor_length	Describe the length of Partial Reception Descriptor.
service_id	Describe "service_id" transmitted in the partial reception layer.

[Rules for Reception Processing]

○ Judge that the receiver units only for receiving in partial reception layer are available for "service_id" described here only.

The Rules for Reception Processing for each field are shown in Table 30-65.

Table 30-65 Rules for Reception Processing for Partial Reception Descriptor

Rules for Reception Processing for each field	
descriptor_tag	“0xFB”: Judge that the relative descriptor is the Partial Reception Descriptor.
descriptor_length	Judge as the length of the Partial Reception Descriptor.
service_id	Judge as "service_id" transmitted in the partial reception layer.

[Special Remarks]

None

30.4.3.4 TS Information Descriptor

[Use]

Write various additional information attached to the relative TS.

[Syntax]

The structure of TS Information Descriptor is shown in Table 30-66.

Table 30-66 Structure of TS Information Descriptor

Data structure	bit	Identifier
ts_information_descriptor(){		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
remote_control_key_id	**8**	**uimsbf**
length_of_ts_name	**6**	**bslbf**
transmission_type_count	**2**	**uimsbf**
for (i = 0;i< length_of_ts_name;i++) {		
ts_name_char	**8**	**uimsbf**
}		
for (j = 0;j< transmission_type_count;j++) {		
transmission_type_info	**8**	**bslbf**
num_of_service	**8**	**uimsbf**
for (k = 0;k< num_of_service;k++) {		
service_id	**16**	**uimsbf**
}		
}		
for (l = 0;l< N;l++) {		
reserved_future_use	**8**	**bslbf**
}		
}		

[Semantics of Each Field]

The definition of each field is shown in Table 30-67.

Table 30-67 Definitions of TS Information Descriptor Fields

Definitions of fields	
remote_control_key_id	This 8-bit field indicates the remote control ID value.
length_of_ts_name	This 6-bit field indicates the number of bytes for the TS name.
transmission_type_count	This 2-bit field indicates the number of transmission parameter types to be entered later. It is equal to the number of layers structuring the relative TS.
ts_name_char	This 8-bit field indicates the name of the relative transport stream.
transmission_type_info	This -8-bit field is used for classifying the transmission layers.
num_of_service	This 8-bit field indicates the number of services where the relative layer is used as a service layer.
service_id	This 16-bit field indicates "service_id" of the service where the relative layer is used as a service layer (including engineering service).

[Transmission Operating Rule]

- ◎ **This descriptor should be placed for the TS loop in the NIT.**
- ◎ **If the transmission parameter type value is "type a", the modulation system should be set to “64QAM” usually, but can be set to “16QAM” only for accident/disaster broadcasting.**

The Transmission Operating Rule for each field are shown in Table 30-68.

Table 30-68 Transmission Operating Rule of TS Information Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xCD“.
descriptor_length	Describe the length of TS Information Descriptor.
remote_control_key_id	Describe the remote control key ID value in the binary mode. The values are limited to 1 to 12 (0x01 - 0x0C). Other values are for the future extension. (For the relation to remote control key, see Section 6.2.3 of Vol. 2.)
length_of_ts_name	Describe the byte length of the TS name. The maximum length is 20.
transmission_type_count	Describe the number of transmission parameter types (= the number of layers structuring the relative TS) to be entered later. The values are limited to 1 to 3.
[ts_name_char _loop]	
ts_name_char	Describe the name of the relative transport stream. The name should be more general name than the network name. The maximum number of characters is 10 two-byte characters (20 bytes) or less. Do not use linefeed codes. For the rule on use, see [Appendix H].
[transmission_type_loop]	Multiple parameter types should be entered in the alphabetical order.
transmission_type_info	It is used for classifying the transmission layers. Use MSB 2 bits out of 8 bits to describe the transmission parameter type value used for Digital Terrestrial Television Broadcasting (see Table 3 in General Information of the Technical Report) and 2 bits to describe the modulation system of the relative layer. The remaining 4 bits are for the future extension, however, use 0xF for the time being. - Transmission parameter type value 00: Type a 01: Type b 10: Type c 11: Reserved - Modulation system 00: 64QAM 01: 16QAM 10: QPSK 11: Reserved For example, when the transmission parameter type and modulation system for the relative loop are "Type b and QPSK", this area should be set to ‘01101111(0x6F)’ in the transmitting order.
num_of_service	Describe the number of services where the relative layer is used as a service layer.
[service_id_loop]	Describe the primary service of each layer first.
service_id	Describe "service_id" of the service where the relative layer is used as a service layer.

[Rules for Reception Processing]

○ For the receiver units with the one-touch key channel selection function, the optimum services out of primary services entered in each "transmission_type" are assigned to the specified keys. The optimum service is, for example, the primary service defined in type 'a' for the receiver units that can receive all parameter types and primary service defined in type 'c' for the receiver units that can receive only type 'c' of parameter.

○ Judge as the broadcasting period for emergency such as accidents and disasters if the transmission parameter type value is type 'a' and the modulation system is “16QAM”.

The Rules for Reception Processing for each field are shown in Table 30-69.

Table 30-69 Rules for Reception Processing for TS Information Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xCD”: Judge that the relative descriptor is the TS Information Descriptor.
descriptor_length	Judge as the length of TS Information Descriptor.
remote_control_key_id	Judge as the remote control key ID value. If the value is any other than 1 to 12 (0x01 to 0x0C), it does not have to be assigned to the remote control key.
length_of_ts_name	Judge as the byte length of the TS name.
transmission_type_count	Judge as the number of transmission parameter types (= the number of layers structuring the relative TS) to be entered later. If the value is '0', judge that the entire relative descriptor is invalid.
[ts_name_char _loop]	
ts_name_char	Judge as the name of the relative transport stream.
[transmission_type_loop]	
transmission_type_info	Judge as the values for classifying the transmission layers regarding the relative layer. For the first MSB 2 bits, judge as the transmission parameter type value. If the value is set to '11', judge that the relative "transmission_type_loop" is invalid. The entered "service_id" does not have to be received. For the next 2 bits, judge as the modulation system of the relative layer. If the value is set to '11', it is the new modulation system but it can be processed as well as other existing systems if it can be normally demodulated. For the remaining 4 bits, ignore from the receiver unit side. For example, when the transmission parameter type and modulation system for the relative loop are "Type b and QPSK", this area should be set to ‘01101111(0x6F)’ in the transmitting order.
num_of_service	Judge as the number of services where the relative layer is used as a service layer.
[service_id_loop]	
service_id	Judge as the service where the relative layer is used as a service layer. Also judge that the first service is the primary service of the relative layer.

[Special Remarks]

None

31 Operation of SI Table

31.1 BIT (Broadcaster Information Table)

31.1.1 Structure and Use of BIT

[Use]

Present the information on the terrestrial broadcasters on the network.

Also, write the information on all stations/each station parameters.

[Description]

The BIT constitutes sub-tables for each original network and has the information loop for each broadcaster. In sub-tables, there are separate descriptor loops for each original network and broadcaster; therefore, it provides such structure that each information can be described. However, since an original network is defined for each transmission master in Digital Terrestrial Television Broadcasting, if a broadcaster has multiple transmission masters, one terrestrial broadcaster is operated on the multiple original networks.

Unlike BS digital broadcasting, "broadcaster_id" itself described by the broadcaster loop does not have meanings in Digital Terrestrial Television Broadcasting, but "terrestrial_broadcaster_id" in the Extended Broadcaster Descriptor is used as a significant broadcaster identifier.

In the terrestrial broadcaster identified by this "terrestrial_broadcaster_id" and the same media type of services, each station transmission parameter is defined. The series and event relays are also used in the same terrestrial broadcaster and same media type of services.

In addition, this table can provide the information on the relationship with other broadcasters in the affiliation where terrestrial broadcasters belong, BS digital broadcasting and broadband CS digital broadcasting.

For detailed information on the terrestrial broadcasters, see Section 9.3.

[Syntax]

The structure of BIT is shown in Table 31-1.

Table 31-1 Structure of BIT (Broadcaster Information Table).

Data structure	bit	Identifier
broadcaster_information_section(){		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
original_network_id	**16**	**uimsbf**
reserved	**2**	**bslbf**
version_number	**5**	**uimsbf**
current_next_indicator	**1**	**bslbf**
section_number	**8**	**uimsbf**
last_section_number	**8**	**uimsbf**
reserved_future_use	**4**	**bslbf**
first_descriptors_length	**12**	**uimsbf**
for (i = 0;i< N1;i++) {		
descriptor()		
}		
for (j = 0;j< N2;j++) {		
broadcaster_id	**8**	**uimsbf**
reserved_future_use	**4**	**bslbf**
broadcaster_descriptors_length	**12**	**uimsbf**
for(k=0;k<N3;k++){		
descriptor()		
}		
}		
CRC_32	**32**	**rpchof**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.13 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

- ◎ **This table should be transmitted in Digital Terrestrial Television Broadcasting.**
- ◎ **All services belong to one of terrestrial broadcasters.**
- ◎ **Sub-tables should be structured for each "original_network_id".**
- ◎ **The same descriptor in the first loop should be placed for all Digital Terrestrial Television Broadcasting.**
- ◎ **The transmission layer should be always layer A.**
- ○ For retransmission cycle, follow Section 12.4 of this document.
- ○ For update frequency, follow Section 12.9 of this document.

The Transmission Operating Rule for each field are shown in Table 31-2.

Table 31-2 Transmission Operating Rule of BIT

Transmission Operating Rule for each field	
table_id	Set to “0xC4”.
section_syntax_indicator	Set to ‘1’.
section_length	Describe the section length of BIT. Since the maximum length of all sections is 1024 bytes, this value should be 1021 at maximum.
original_network_id	Describe "original_network_id" for the target BIT network.
version_number	When the contents of sub-table are changed, set a value incremented by 1.
current_next_indicator	Set to ‘1’.
section_number	Describe the section number. The section number for the first section is 0; therefore, set a value incremented by 1 every time the section is increased by 1.
last_section_number	Describe the last section number.
first_descriptors_length	Describe the descriptor length to be mentioned later. When the section number is greater than 0, set to '0' for the section.
[descriptor loop]	Place the information available for the whole Digital Terrestrial Television Broadcasting as a descriptor. Describe the same contents in Digital Terrestrial Television Broadcasting.
[broadcaster loop]	In Digital Terrestrial Television Broadcasting, only one loop can be operated. During the loop, the section should not be divided.
broadcaster_id	Describe "broadcaster_id" for broadcaster. Describe the fixed value (0xFF) in Digital Terrestrial Television Broadcasting and the value itself does not have any meaning.
broadcaster_descriptors_length	Describe the length of Broadcaster Descriptor to be mentioned later.
[descriptor loop]	Place the information effective for the individual broadcasters as a descriptor.

[Rules for Reception Processing]

○ Since the BIT is not the table that is often upgraded, the receiver units can receive information based on the BIT information stored in the nonvolatile memory to shorten the operation time.

The Rules for Reception Processing for each field are shown in Table 31-3.

Table 31-3 Rules for Reception Processing for BIT

Rules for Reception Processing for each field	
table_id	= “0xC4”: Judge that the relative table is BIT.
section_syntax_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_length	<=1021: Judge as the section length. >1021: Judge that the relative section is invalid.
original_network_id	If this value is equal to that of the network identifier for Digital Terrestrial Television Broadcasting, judge as BIT in Digital Terrestrial Television Broadcasting.
version_number	If any change occurs, judge that the relative sub-table has been updated.
current_next_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_number	<= "last_section_number": Section number in the relative sub-table > "last_section_number": The relative section is invalid.
last_section_number	Last section number in the relative sub-table
first_descriptors_length	It shows the length of the later descriptor loop. Given the value of "section_length", if the value of this field seems abnormal, judge that the relative section itself is invalid. If this value is set to 0, the descriptor does not exist in the descriptor loop. This value is set to 0 except that for section number 0. If this value is set to any other than 0, skip only the descriptor length described in this field (that is, skip the contents for the later descriptor loop only); then continue to process.
[descriptor loop]	In this loop, the descriptors available for the whole Digital Terrestrial Television Broadcasting are laid out consecutively. Only the descriptor announced to be placed should be processed so that other descriptors can be skipped.
[broadcaster loop]	The length of the relative loop is judged from the values of "section_length" and "first_descriptors_length" for each section. When the entire sub-table is received, any other broadcasters than those existing in this loop means do not exist in the network. Since only one loop can be operated in Digital Terrestrial Television Broadcasting, judge that the contents in the second or later loop are invalid.
broadcaster_id	Ignore this value since it has no meaning in Digital Terrestrial Television Broadcasting.
broadcaster_descriptors_length	It shows the length of the later descriptor loop. When this value is set to 0, the descriptor does not exist in the descriptor loop. Given the value of "section_length", if the value of this field seems abnormal, judge that the relative section itself is invalid.
[descriptor loop]	In this loop, the descriptors available for the relative broadcasters are laid out consecutively. Only the descriptor announced to be placed should be processed so that other descriptors can be skipped.

[Special Remarks]

None

31.1.2 Descriptor Inserted into the First Loop of BIT

31.1.2.1 SI Parameter Descriptor

[Use]

Specify the SI transmission parameter.

Specify the All-stations applied transmission parameter if this descriptor is placed in the first descriptor loop of BIT.

[Syntax]

The structures of SI Parameter Descriptor and "table_description_byte" for each "table_id" are shown in Table 31-4 and Table 31-5.

Table 31-4 Structure of SI Parameter Descriptor

Data structure	bit	Identifier
SI_parameter_descriptor() {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
parameter_version	**8**	**uimsbf**
update_time	**16**	**bslbf**
for(i=0:i<N;i++){		
table_id	**8**	**uimsbf**
table_description_length	**8**	**uimsbf**
for(j=0;j<N;j++){		
table_description_byte	**8**	**uimsbf**
}		
}		
}		

Table 31-5 Structure of "table_description_byte" for each "table_id" (First Loop of BIT)

table_id	table_description_byte	bit	Identifier
0x40 (NIT)	**table_cycle**	**8**	**bslbf**
0xC4 (BIT)	**table_cycle**	**8**	**bslbf**
0x42 (SDT)	**table_cycle**	**8**	**bslbf**
0x4E (H-EIT[p/f],M-EIT,L-EIT)	**table_cycle(H-EIT[p/f]) table_cycle(M-EIT) table_cycle(L-EIT) num_of_M-EIT_event num_of_L-EIT_event**	**8 8 8 4 4**	**bslbf bslbf bslbf uimsbf uimsbf**

0x50 (H-EIT[schedule])	**for(;;){
	media_type
	pattern
	reserved
	schedule_range
	base_cycle
	reserved
	cycle_group_count
	for(i=0;i<cycle_group_count;i++){
	num_of_segment
	cycle
	}
	}**
		
		**2
		2
		4
		8
		12
		2
		2
		
		8
		8**
			
			**uimsbf
			uimsbf
			bslbf
			bslbf
			bslbf
			bslbf
			uimsbf
			
			bslbf
			bslbf**

[Semantics of Each Field]

The definitions of each field for SI Parameter Descriptor and "table_description_byte" are shown in Table 31-6 and Table 31-7.

Table 31-6 Definition of Each Field for SI Parameter Descriptor (First Loop of BIT)

Field	Definitions
parameter_version	This 8-bit field indicates the version number of All-stations applied transmission parameter. However, it has no meaning in Digital Terrestrial Television Broadcasting; therefore, describe the fixed value.
update_time	This 16-bit field indicates the date when the described transmission parameter becomes valid. Describe the lower 16 bits of MJD.
table_id	This 8-bit field indicates the type of table to be described in the later field.
table_description_length	This 8-bit field indicates the length of description to be described in the later field. It is coded in the 8-bit binary mode (unit: byte).
table_description_byte	In this field, describe the transmission parameter for each SI table type used by All-stations applied transmission parameter.

Table 31-7 Definition of Each Field for "table_description_byte" (First Loop of BIT)

Field	Definitions
table_cycle	This 8-bit field indicates the retransmission cycle for each table. It is coded in the two-digit BCD format (unit: second).
table_cycle(H-EIT[p/f])	This 8-bit field indicates the retransmission cycle for table. It is coded in the two-digit BCD format (unit: second). If "table_id" is set to 0x4E, the first byte indicates the retransmission cycle for H-EIT[p/f].
table_cycle(M-EIT)	This 8-bit field indicates the retransmission cycle for table. It is coded in the two-digit BCD format (unit: second). If "table_id" is set to 0x4E, the second byte indicates the retransmission cycle for M-EIT used by All-stations applied transmission parameter.
table_cycle(L-EIT)	This 8-bit field indicates the retransmission cycle for table. It is coded in the two-digit BCD format (unit: second). If "table_id" is set to 0x4E, the third byte indicates the retransmission cycle for L-EIT used by All-stations applied transmission parameter.
num_of_M-EIT_event	This 4-bit field indicates the number of programs transmitted using M-EIT (serial programs including the currently transmitted programs) used by All-stations applied transmission parameter, provided that it is coded in the binary mode.
num_of_L-EIT_event	This 4-bit field indicates the number of programs transmitted using L-EIT (serial programs including the currently transmitted programs) used by All-stations applied transmission parameter, provided that it is coded in the binary mode.
media_type	This 2-bit field indicates the media type described in the relative loop.
pattern	This 2-bit field indicates the operation pattern of the relative table type/media type.
schedule_range	This 8-bit field indicates the transmission range of H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. It is coded in the two-digit BCD format (unit: day).
base_cycle	This 12-bit field indicates the retransmission cycle of the basic repetition rate group for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. It is coded in the three-digit BCD format (unit: second).
cycle_group_count	This 2-bit field indicates the number of extended repetition rate groups.
num_of_segment	This 8-bit field indicates the segment range (number of segments per service) of the extended repetition rate group for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. It is coded in the two-digit BCD format (unit: number of segments).
cycle	This 8-bit field indicates the retransmission cycle of the extended repetition rate group for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. It is coded in the two-digit BCD format (unit: second).

[Transmission Operating Rule]

- ◎ **This descriptor should be placed for the first loop of BIT (including the case of default operation in all tables). In general, the use of transmission parameter is changed at 0:00. In this case, the descriptor should be placed two days before the change. If the transmission system cannot change at 0:00, the value should be placed at the same time when the use of All-stations applied transmission parameter is changed.**
- ◎ **Regardless of the layer operation pattern for the relative network, the same contents should be described in all Digital Terrestrial Television Broadcasting.**
- ○ In case of the default transmission parameter and table type with no change, it is possible to omit the description of "table_id" and "table_description_byte".
- ○ The transmission parameters should be set within the allowable range.
- ○ Multiple descriptors with the different "update_time" in the same loop can be placed. For example, if a valid descriptor is currently placed and the parameter will be changed three days later, multiple descriptors should be placed.
- ○ All-stations applied transmission parameter are changed generally within one month in all terrestrial television broadcasting networks.

The Transmission Operating Rule for each field are shown in Table 31-8 and Table 31-9.

Table 31-8 Transmission Operating Rule of SI Parameter Descriptor (First Loop of BIT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xD7”.
descriptor_length	Describe the length of the relative descriptor (byte).
parameter_version	Describe the fixed value (0xFF) in Digital Terrestrial Television Broadcasting and the value itself does not have any meaning.
update_time	Describe the date when the relative descriptor becomes valid using the lower 16 bits of MJD. If the future date is described in this field and the prior transmission is performed, make sure to send just at 0:00 of the date shown in the field according to the parameters shown in this descriptor. If the prior transmission is not performed, describe All-stations applied transmission parameter after updated and transmit the descriptor including the changed date in this field.
[table_id loop]	It is required to describe the table type if updating the default transmission parameter. Otherwise, it is not required to describe. For the default transmission parameters, see Section 12.4.
table_id	Describe the typical table identifier of the target table types. For the available values, see Table 31-5.
table_description_length	Describe the description length (byte) of the latter "table_description_byte" field.
table_description_byte	Describe the All-stations applied transmission parameter based on the separately determined format by table type. For detailed information on each table type, see Table 31-5 and Table 31-7.

Table 31-9 Transmission Operating Rule of "table_description_byte" (First Loop of BIT)

table_description_byte : Transmission Operating Rule for each field	
table_cycle	Describe the retransmission cycle for each table type (unit: second). It is coded in the two-digit BCD format (unit: second).
table_cycle(H-EIT[p/f])	Describe the retransmission cycle for H-EIT[p/f].
table_cycle(M-EIT)	Describe the retransmission cycle for M-EIT used by All-stations applied transmission parameter.
table_cycle(L-EIT)	Describe the retransmission cycle for L-EIT used by All-stations applied transmission parameter.
num_of_M-EIT_event	Describe the number of programs transmitted using M-EIT (serial programs including the currently transmitted programs) used by All-stations applied transmission parameter.
num_of_L-EIT_event	Describe the number of programs transmitted using L-EIT (serial programs including the currently transmitted programs) used by All-stations applied transmission parameter.
[media_type loop]	It is required to describe regarding the media type if the default transmission parameter is changed in H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. Otherwise, it is not required to describe.
media_type	Describe the media type that describes the transmission parameter. The targets are all media types that transmit H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. For the relationship between media type value and service type, see Table 9-1.
pattern	Describe the operation pattern for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. Regardless of the media type, set to 0 here.
schedule_range	Regarding the relative media type, describe the transmission range of H-EIT[schedule] in the EIT used by All-stations applied transmission parameter (unit: day). For the available values, see Section 12.4.
base_cycle	Regarding the relative media type, describe the retransmission cycle of the basic repetition rate group for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter (unit: second). For the available values, see Section 12.4.
cycle_group_count	Regarding the relative media type, describe the number of extended repetition rate groups for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. The allowable numbers depend on media type. The maximum number is 2 for television type and 1 for data type. (See Section 12.3.2.)
[cycle_group loop]	With regard to loops, the extended repetition rate groups should be described in order of time. (Start from the extended repetition rate group 1, then 2.)
num_of_segment	Describe the segment range (number of segments per service that belongs to the relative repetition rate group) of the extended repetition rate group described in the relative loop. For the available values, see Section 12.4.
cycle	Describe the retransmission cycle of the extended repetition rate group described in the relative loop (unit: second). This value should not be slower than that for the basic repetition rate group described in "base_cycle" field. For the available values, see Section 12.4.

The definitions of media type values are shown in Table 31-10.

Table 31-10 Definition of Media Type

media_type	Definitions
‘01’	Television type
‘10’	Audio type (Not used in Digital Terrestrial Television Broadcasting)
‘11’	Data type

[Rules for Reception Processing]

◎ **Judge that the SI transmitted by All-stations applied transmission parameter is transmitted according to the default transmission parameter if there is no value for "table_id" (defined in Table 31-5) in the relative descriptor in the first descriptor loop of BIT.**

◎ **Judge that the contents described in the relative descriptor becomes effective at 0:00 of the date described in "update_time" field if the date is set to the time later than next day. If the date described in "update_time" field is set to the time before the current day, judge that the contents are effective at least at the present time.**

◎ **Even if the relative descriptor exists in the first descriptor loop of BIT, judge that the SI transmitted by All-stations applied transmission parameter is transmitted according to the default transmission parameter (at the present time) if there is not effective descriptor at the present time (judge from the "update_time" field in the descriptor).**

◎ **If the table type to be specified by All-stations applied transmission parameter is not described in the relative descriptor, judge that the relative table type is used by the default transmission parameter.**

○ If multiple SI Parameter Descriptors are placed, judge that the descriptor with the latest date and time from the current moment is effective at the present time.

○ In case that the relative descriptor does not exist in the first descriptor loop of BIT, judge that the SI transmitted by All-stations applied transmission parameter is transmitted according to the default transmission parameter.

The Rules for Reception Processing for each field are shown in Table 31-11 and Table 31-12.

Table 31-11 Rules for Reception Processing for SI Parameter Descriptor (First Loop of BIT)

Rules for Reception Processing for each field	
descriptor_tag	=“0xD7”: Judge that the relative descriptor is the SI Parameter Descriptor.
descriptor_length	
parameter_version	The receiver unit ignores this field since this field is set to the fixed value, "0xFF", in Digital Terrestrial Television Broadcasting.
update_time	It is used as the date when the transmission parameter described in the relative descriptor becomes effective. If the date specified in this field is the time later than next day, judge that the transmission parameter is actually updated and effective at 0:00 of the relative date. If the date is the time before the current day, judge that the transmission parameter is already effective at least at the present time. It is coded using the lower 16 bits of MJD; therefore, how to handle the date such as 2038 complies with the description in the TOT.
[table_id loop]	If the table type is specified by All-stations applied transmission parameter that does not exist in the relative loop, judge that it is used by the default transmission parameter. If any unsupported table type exists, care should be taken not to cause faulty operation by ignoring the loop itself. For the default transmission parameters, see Section 12.4.
table_id	It indicates the table type described in the relative loop.
table_description_length	It indicates the description length (byte) of the later "table_description_byte".
table_description_byte	All-stations applied transmission parameter should be interpretable based on the separately determined format by table type.

Table 31-12 Rules for Reception Processing for "table_description_byte" (First Loop of BIT)

table_description_byte : Rules for Reception Processing for each field	
table_cycle	The retransmission cycle for the relative table type is described (unit: second). If the relative table type is received at the date and time later than that described in " update_time " field of the relative descriptor, it is recommended to perform the receiving process based on the value described in this field. For the available range of values, see Section 12.4. Judge as an abnormal state if the value is not within the range.
table_cycle(H-EIT[p/f])	Judge as the retransmission cycle for H-EIT[p/f].
table_cycle(M-EIT)	Judge as the retransmission cycle for M-EIT used by All-stations applied transmission parameter.
table_cycle(L-EIT)	Judge as the retransmission cycle for L-EIT used by All-stations applied transmission parameter.
num_of_M-EIT_event	Judge as the number of programs transmitted using M-EIT (serial programs including the currently transmitted programs) used by All-stations applied transmission parameter.
num_of_L-EIT_event	Judge as the number of programs transmitted using L-EIT (serial programs including the currently transmitted programs) used by All-stations applied transmission parameter.
[media_type loop]	Judge that the media type not existing in the relative loop is used according to the default transmission parameter. If any unsupported media type exists, care should be taken not to cause faulty operation by ignoring the loop itself. For the default transmission parameters, see Section 12.4.
media_type	It indicates the media type described in the relative loop. For the relationship between media type value and service type, see Table 9-1.
pattern	Do not refer to this field.
schedule_range	It indicates the transmission range of H-EIT[schedule] in the EIT used by All-stations applied transmission parameter (unit: day). For the available range of values, see Section 12.4. Judge as an abnormal state if the value is not within the range.
base_cycle	It indicates the retransmission cycle of the basic repetition rate group in the relative media type for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter (unit: second). The retransmission cycle of the basic repetition rate group is set to the slowest value of all basic groups of the relative loop; therefore, this field value can be used for timeout setup for receiving the table of the relative loop. For the available range of values, see Section 12.4. Judge as an abnormal state if the value is not within the range.
cycle_group_count	It indicates the number of extended repetition rate groups in the relative media type for H-EIT[schedule] in the EIT used by All-stations applied transmission parameter. It is equal to the number of latter loops. This field value is determined by table type/media type. See Section 12.3.2. Therefore, regardless of table types, the maximum number is 2 for television type and 1 for data type. Judge as an abnormal state if the value is different from those values.
[cycle_group loop]	The number of the relative loops is equal to the value in "cycle_group_count" field.
num_of_segment	It indicates the number of segments per service as the segment range of the extended repetition rate group described in the relative loop. In the relative loop, the repetition rate groups are described in order of time;

	therefore, the start segment of the relative repetition rate group can be judged from the sum of values in "num_of_segment" field in the loop. The start segment of the first repetition rate group in the loop is regarded as the segment displaying the current time. For the available range of values, see Section 12.4. Judge as an abnormal state if the value is not within the range.
cycle	It indicates the retransmission cycle of the extended repetition rate group described in the relative loop (unit: second). For the available range of values, see Section 12.4. Judge as an abnormal state if the value is not within the range.

[Special Remarks]

For the details of SI transmission parameters, see 12.3.2, 12.4, and 13.12.4.

For example, H-EIT[p/f], M-EIT and L-EIT in the EIT used by All-stations applied transmission parameter are set to the following transmission parameter from January 1, 2010:

- Delivering cycle: 3 seconds
- Number of programs transmitted using M-EIT: 4
- Number of programs transmitted using L-EIT: 2

  In addition, in the television service with H-EIT[schedule],
- Description range of H-EIT[schedule]: 8 days
- Retransmission cycle of the basic repetition rate group: 360 seconds
- H-EIT[schedule basic]: 10 seconds for the first 9 hours (3 segments), then 20 seconds for the next 48 hours (16 segments)

  Then, the coding will be as follows:

Table 31-13 Example of SI Parameter Descriptor (First Loop of BIT)

Field	Coded value
[SI_parameter_descriptor]	
descriptor_tag	**0xD7**
descriptor_length	**19**
parameter_version	**0xFF**
update_time	**55197**
[table_id loop 1]	
table_id	**0x4E**
table_description_length	**4**
table_cycle(H-EIT[p/f])	**3**
table_cycle(M-EIT)	**3**
table_cycle(L-EIT)	**3**
num_of_M-EIT_event	**4**
num_of_L-EIT_event	**2**
[table_id loop 2]	
table_id	**0x50**
table_description_length	**8**
[table_description_byte loop]	
media_type	**1**
pattern	**0**
reserved	**all 1**
schedule_range	**8**

base_cycle	**360**
reserved	**all 1**
cycle_group_count	**2**
[cycle_group loop 1]	
num_of_segment	**3**
cycle	**10**
[cycle_group loop 2]	
num_of_segment	**13**
cycle	**20**

31.1.3 Descriptor Inserted into the Second Loop (Broadcaster Loop) of BIT

31.1.3.1 SI Parameter Descriptor

[Use]

- Specify the SI transmission parameter.
- Specify the each station transmission parameter independently used by the relative terrestrial broadcaster if this descriptor is inserted into the second descriptor loop of the BIT.
- Regarding SDTT and CDT, each terrestrial broadcaster indicates the existence of SDTT and CDT transmission.

[Syntax]

- The structure of SI transmission parameter is shown in Table 31-14 SI Structure of SI Parameter Descriptor
  The structure is same as that in Table 31-4.

Table 31-14 SI Structure of SI Parameter Descriptor

Data structure	bit	Identifier
SI_parameter_descriptor() {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
parameter_version	**8**	**uimsbf**
update_time	**16**	**bslbf**
for(i=0:i<N;i++){		
table_id	**8**	**uimsbf**
table_description_length	**8**	**uimsbf**
for(j=0;j<N;j++){		
table_description_byte	**8**	**uimsbf**
}		
}		
}		

The structure of " table_description_byte " for each "table_id" is shown in Table 31-15.

Table 31-15 Structure of " table_description_byte " for each "table_id" (Second Loop of BIT)

table_id	table_description_byte	bit	Identifier
0x4E (M-EIT,L-EIT)	**reserved** **table_cycle(M-EIT)** **table_cycle(L-EIT)** **num_of_M-EIT_event** **num_of_L-EIT_event**	**8** **8** **8** **4** **4**	**bslbf** **bslbf** **bslbf** **uimsbf** **uimsbf**
0x50(H-EIT[schedule basic] used by each-station applied transmission parameter) **0x58 (H-EIT[schedule extended] used by each-station applied transmission parameter)**	**for(;;){** **media_type** **pattern** **reserved** **schedule_range** **base_cycle** **reserved** **cycle_group_count** **for(i=0;i<cycle_group_count;i++){** **num_of_segment** **cycle** **}** **}**	 **2** **2** **4** **8** **12** **2** **2** **8** **8**	 **uimsbf** **uimsbf** **bslbf** **bslbf** **bslbf** **bslbf** **uimsbf** **uimsbf** **bslbf**
0xC3(SDTT)	**table_cycle**	**16**	**bslbf**
0xC8(CDT)	**table_cycle**	**16**	**bslbf**

[Semantics of Each Field]

The definitions of each field for SI Parameter Descriptor and "table_description_byte" are shown in Table 31-16 and Table 31-17.

Table 31-16 Definitions of Each Field for SI Parameter Descriptor (Second Loop of BIT)

Field	Definitions
parameter_version	This 8-bit field indicates the version number of each station transmission parameter. However, it has no meaning in Digital Terrestrial Television Broadcasting; therefore, describe the fixed value.
update_time	This 16-bit field indicates the date when the described transmission parameter becomes valid. Describe the lower 16 bits of MJD.
table_id	This 8-bit field indicates the type of table to be described in the later field.
table_description_length	This 8-bit field indicates the length of descriptor to be described in the later field. It is coded in the 8-bit binary mode (unit: byte).
table_description_byte	In this field, describe the transmission parameter for each SI table type used by each-station applied transmission parameter.

Table 31-17 Definitions of Each Field for "table_description_byte" (Second Loop of BIT)

Field	Definitions
table_cycle	It indicates the retransmission cycle for table. It is coded in the four-digit BCD format (unit: second).
table_cycle(M-EIT)	This 8-bit field indicates the retransmission cycle for each table. It is coded in the two-digit BCD format (unit: second). If "table_id" is set to '0x4E', the second byte indicates the retransmission cycle for M-EIT used by each-station applied transmission parameter.
table_cycle(L-EIT)	This 8-bit field indicates the retransmission cycle for each table. It is coded in the two-digit BCD format (unit: second). If "table_id" is set to "0x4E", the third byte indicates the retransmission cycle for L-EIT used by each-station applied transmission parameter.
num_of_M-EIT_event	This 4-bit field indicates the number of programs transmitted using M-EIT (serial programs including the currently transmitted programs) used by each-station applied transmission parameter in the relative terrestrial broadcaster, provided that it is coded in the binary mode.
num_of_L-EIT_event	This 4-bit field indicates the number of programs transmitted using L-EIT (serial programs including the currently transmitted programs) used by each-station applied transmission parameter in the relative terrestrial broadcaster, provided that it is coded in the binary mode.
media_type	This 2-bit field indicates the media type described in the relative loop.
pattern	This 2-bit field indicates the operation pattern of the relative table type/media type.
schedule_range	This 8-bit field indicates the transmission range of EIT[schedule] used by each-station applied transmission parameter. It is coded in the two-digit BCD format (unit: day).
base_cycle	This 12-bit field indicates the retransmission cycle of the basic repetition rate group for EIT[schedule] used by each-station applied transmission parameter. It is coded in the three-digit BCD format (unit: second).
cycle_group_count	This 2-bit field indicates the number of extended repetition rate groups.
num_of_segment	This 8-bit field indicates the segment range (number of segments per service) of the extended repetition rate group for EIT[schedule] used by each-station applied transmission parameter. It is coded in the two-digit BCD format (unit: number of segments).
cycle	This 8-bit field indicates the retransmission cycle of the extended repetition rate group for EIT[schedule] used by each-station applied transmission parameter. It is coded in the two-digit BCD format (unit: second).

[Transmission Operating Rule]

- ◎ **This descriptor should be placed if the EIT used by each-station applied transmission parameter is used, or if SDTT or CDT is transmitted.**
- ◎ **The table type that is transmitted as the EIT used by each-station applied transmission parameter should be described.**
- ◎ **In general, the use of transmission parameter is changed at 0:00. In this case, the descriptor should be placed two days before the change. If the transmission system cannot change at 0:00, the value should be placed at the same time when the use of each-station applied transmission parameter is changed.**

○ The transmission parameters should be set within the defined range.

○ Multiple descriptors with the different "update_time" in the same loop can be placed. For example, if a valid descriptor is currently placed and the parameter will be changed three days later, multiple descriptors should be placed.

The Transmission Operating Rule for each field are shown in Table 31-18 and Table 31-19.

Table 31-18 Transmission Operating Rule of SI Parameter Descriptor (Second Loop of BIT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xD7”.
descriptor_length	Describe the length of the relative descriptor (byte).
parameter_version	Describe the fixed value ('0xFF') in Digital Terrestrial Television Broadcasting and the value itself does not have any meaning.
update_time	Describe the date when the relative descriptor becomes valid using the lower 16 bits of MJD. If the date later than next day is described in this field and the prior transmission is performed, make sure to send just at 0:00 of the date shown in the field according to the parameters shown in this descriptor. If the prior transmission is not performed, describe each-station applied transmission parameter after updated and transmit the descriptor including the changed date in this field.
[table_id loop]	The table type that is transmitted as the SI used by each-station applied transmission parameter should be described. The table type that is not transmitted should not be described.
table_id	Describe the target table type. For the available values, see Table 31-15.
table_description_length	Describe the description length (byte) of the later "table_description_byte" field.
table_description_byte	Describe the each-station applied transmission parameter based on the separately determined format by table type. For detailed information on each table type, see Table 31-15 and Table 31-17.

Table 31-19 Transmission Operating Rule of "table_description_byte" (Second Loop of BIT)

table_description_byte : Transmission Operating Rule for each field	
table_cycle	This field is used only when "table_id=0xC3 (SDTT)" and "table_id=0xC8 (CDT)". In this case, describe the cycle commonly used in all Digital Terrestrial Television Broadcastings.
table_cycle(M-EIT)	Describe the retransmission cycle for M-EIT used by each-station applied transmission parameter. However, if the M-EIT used by each-station applied transmission parameter is not transmitted, set this field to '0'.
table_cycle(L-EIT)	Describe the retransmission cycle for L-EIT used by each-station applied transmission parameter. However, if the L-EIT used by each-station applied transmission parameter is not transmitted, set this field to '0'.
num_of_M-EIT_event	Describe the number of programs transmitted using M-EIT (serial programs including the currently transmitted programs) used by each-station applied transmission parameter in the relative terrestrial broadcaster. If the M-EIT is not transmitted in the relative terrestrial broadcaster due to the single layer operation, etc., set this field to '0'. If the M-EIT used by each-station applied transmission parameter is not transmitted, set to the same value as that described when M-EIT is used by All-stations applied transmission parameter. If the M-EIT used by each-station applied transmission parameter is transmitted, set to the value greater than that described when M-EIT is used by All-stations applied transmission parameter.

table_description_byte : Transmission Operating Rule for each field	
num_of_L-EIT_event	Describe the number of programs transmitted using L-EIT (serial programs including the currently transmitted programs) used by each-station applied transmission parameter in the relative terrestrial broadcaster. If the L-EIT is not transmitted in the relative terrestrial broadcaster due to the single layer operation, etc., set this field to '0'. If the L-EIT used by each-station applied transmission parameter is not transmitted, set to the same value as that described when L-EIT is used by All-stations applied transmission parameter. If the L-EIT used by each-station applied transmission parameter is transmitted, set to the value greater than that described when L-EIT is used by All-stations applied transmission parameter.
[media_type loop]	It is required to describe the media type if the media type is used in the relative table type for H-EIT[schedule] used by each-station applied transmission parameter.
media_type	Describe the media type that describes the transmission parameter. For the relationship between media type value and service type, see Table 9-1.
pattern	"table_id = 0x50": Describe the operation pattern for H-EIT[schedule basic] used by each-station applied transmission parameter. "table_id = 0x58": Describe the operation pattern for H-EIT[schedule extended] used by each-station applied transmission parameter. For the values to be described, see Table 31-20. This field is only for reference for receiver units; therefore, it does not have to be strictly considered.
schedule_range	It indicates the transmission range in the relative media type for H-EIT[schedule] used by each-station applied transmission parameter (unit: day). In the H-EIT[schedule] used by each-station applied transmission parameter, the operation cases are previously determined. This field is also determined depending on the media type and operation case. When "table_id = 0x50": Television type: Set to '15', '22' or '32'. Data type: Set to '8', '15', '22' or '32'. When "table_id=0x58": Set to the same transmission range as that for H-EIT[schedule] used by All-stations applied transmission parameter (value described in "schedule_range" field) or that for H-EIT[schedule basic] used by each-station applied transmission parameter (value described in "schedule_range" field when " table_id = 0x50"). For details, see Section 13.11.4.2.
base_cycle	Describe the retransmission cycle of the basic repetition rate group in the relative table type/media type for EIT[schedule] used by each-station applied transmission parameter (unit: second). The available retransmission cycles are determined for each table type/media type. See Section 12.4.
cycle_group_count	Describe the number of extended repetition rate groups in the relative table type/media type for H-EIT[schedule] used by each-station applied transmission parameter. If all of the relative table types/media types are included in the basic repetition rate group, set to '0'. When "table_id = 0x50": Always set to '0'. When "table_id = 0x58": Set to any value up to 1. For details, see Section 12.3.3.
[cycle_group loop]	Describe the repetition rate groups in the loop in order of time.
num_of_segment	Describe the segment range of repetition rate group (number of segments per service that belongs to the relative repetition rate group) described in the relative loop.

table_description_byte : Transmission Operating Rule for each field	
cycle	Describe the retransmission cycle of the repetition rate group described in the relative loop (unit: second). Do not set to any value slower than the retransmission cycle of basic repetition rate group described in "base_cycle" field.

The values described in "pattern" field and their definitions are shown in Table 31-20.

Table 31-20 Definitions of "pattern"

table_id	pattern	Definitions
0x50	0	Describe (almost all) events as much as those of H-EIT used by All-stations applied transmission parameter.
	1	Describe events if necessary.
0x58	0	Describe at most several events in a week.
	1	Describe at most several events in a day.
	2	Describe 1/4 to a half of all events (about 10 events in a day).
	3	Describe more than a half of all events.

[Rules for Reception Processing]

◎ **Judge that the EIT used by each-station applied transmission parameter is not used, and SDTT and CDT are not transmitted if the relative descriptor does not exist in the second descriptor loop of BIT.**

◎ **Judge that the contents described in the relative descriptor becomes effective at 0:00 of the date described in "update_time" field if the date is set to the time later than next day. If the date described in "update_time" field is set to the time before the current day, judge that the contents are effective at least at the present time.**

◎ **Even if the relative descriptor exists in the second descriptor loop of BIT, judge that the EIT used by each-station applied transmission parameter is not used at the present time if there is not effective descriptor at the present time (judge from the "update_time" field in the descriptor).**

◎ **If the table type included in the EIT used by each-station applied transmission parameter or SDTT and CDT descriptions are not described in the relative descriptor, judge that the relative table type, or SDTT and CDT are not used.**

○ If multiple SI Parameter Descriptors are placed, judge that the descriptor with the latest date and time from the current moment is effective at the present time.

The Rules for Reception Processing for each field are shown in Table 31-21 and Table 31-22.

Table 31-21 Rules for Reception Processing for SI Parameter Descriptor (Second Loop of BIT)

Rules for Reception Processing for each field	
descriptor_tag	=“0xD7”: Judge that the relative descriptor is the SI Parameter Descriptor.
descriptor_length	
parameter_version	The receiver unit ignores this field since this field is set to the fixed value, "0xFF", in Digital Terrestrial Television Broadcasting.
update_time	It is used as the date when the transmission parameter described in the relative descriptor becomes effective. If the date specified in this field is the time later than next day, judge that the transmission parameter is actually updated and effective at 0:00 of the relative date. If the date is the time before the current day, judge that the transmission parameter is already effective at least at the present time. It is coded using the lower 16 bits of MJD; therefore, how to handle the date such as 2038 complies with the description in the TOT. (See Section 16.3.)
[table_id loop]	If the SI table type is used by each-station applied transmission parameter that does not exist in the relative loop, judge that it is not used.
table_id	It indicates the table type described in the relative loop. If any unknown table type exists, care should be taken not to cause faulty operation by ignoring the loop itself. When "table_id=0xC3 (SDTT)": Judge that SDTT is transmitted in the relative terrestrial broadcaster. When "table_id=0xC8 (CDT)": Judge that CDT is transmitted in the relative terrestrial broadcaster.
table_description_length	It indicates the description length (byte) of the later "table_description_byte".
table_description_byte	Each-station applied transmission parameter should be interpretable based on the separately determined format by table type.

Table 31-22 Rules for Reception Processing for "table_description_byte" (Second Loop of BIT)

table_description_byte : Rules for Reception Processing for each field	
table_cycle	The retransmission cycle for the relative table type is described (unit: second). If the relative table type is received at the date and time later than that described in "update_time" field of the relative descriptor, it is recommended to perform the receiving process based on the value described in this field.
table_cycle(M-EIT)	Judge as the retransmission cycle for M-EIT used by each-station applied transmission parameter. However, if it is set to '0', judge that the M-EIT used by each-station applied transmission parameter is not transmitted.
table_cycle(L-EIT)	Judge as the retransmission cycle for L-EIT used by each-station applied transmission parameter. However, if it is set to '0', judge that the L-EIT used by each-station applied transmission parameter is not transmitted.
num_of_M-EIT_event	Judge as the number of programs transmitted using M-EIT (serial programs including the currently transmitted programs) used by each-station applied transmission parameter in the relative terrestrial broadcaster. If it is set to '0', judge that the M-EIT is not transmitted.

table_description_byte : Rules for Reception Processing for each field	
num_of_L-EIT_event	Judge as the number of programs transmitted using L-EIT (serial programs including the currently transmitted programs) used by each-station applied transmission parameter in the relative terrestrial broadcaster. If it is set to '0', judge that the L-EIT is not transmitted.
[media_type loop]	Judge that the media type not existing in the relative loop is not used.
media_type	It indicates the media type described in the relative loop. For the values to be described and their definitions, see Table 9-1.
pattern	For the values to be described and their definitions, see Table 31-20. This field is only for reference; therefore, it does not have to be strictly considered. Only when the receiver unit judges that it is still effective information, it may be used at its discretion.
schedule_range	It indicates the transmission range in the relative media type for H-EIT[schedule] used by each-station applied transmission parameter (unit: day). This value is determined depending on the media type and operation case. See Section 13.11.4.2. Judge as an abnormal state if the value is not within the range.
base_cycle	It indicates the retransmission cycle of the basic repetition rate group in the relative table type/media type for H-EIT[schedule] used by each-station applied transmission parameter (unit: second). The retransmission cycle of the basic repetition rate group is set to the slowest value of all basic groups of the relative media type; therefore, this field value can be used for timeout setup for receiving the table of the relative media type. The available retransmission cycles are determined for each table type/media type. See Section 12.4. Judge as an abnormal state if the value is not within the range.
cycle_group_count	It indicates the number of extended repetition rate groups in the relative table type/media type for H-EIT[schedule] used by each-station applied transmission parameter. The later length of loop is judged based on this field. If this field value is set to '0', judge that all of EIT[schedule] in the relative table type/media type are included in the basic repetition rate group. The number of extended repetition rate groups are determined for each table type/media type (see Section 12.3.3): When "table_id = 0x50": '0' When "table_id = 0x58": '1' Judge as an abnormal state if the value is different from the above values.
[cycle_group loop]	The number of the relative loops is judged from the value in "cycle_group_count" field.
num_of_segment	It indicates the number of segments per service as the segment range of the repetition rate group described in the relative loop. In the relative loop, the repetition rate groups are described in order of time; therefore, the start segment of the relative repetition rate group can be judged from the sum of values in "num_of_segment" field in the loop. The start segment of the first repetition rate group in the loop is regarded as the segment number 0.
cycle	It indicates the retransmission cycle of the repetition rate group described in the relative loop (unit: second).

[Special Remarks]

For the details of SI transmission parameters, see 12.3 and 12.4.

For example, the television service with H-EIT[schedule] used by each-station applied transmission parameter is set to the following transmission parameter from January 1, 2010:

- EIT[schedule basic] used by each-station applied transmission parameter is not used

- In EIT[schedule extended] used by each-station applied transmission parameter,
  Retransmission cycle of basic repetition rate group: 180 seconds
  Retransmission cycle for next 48 hours (16 segments): 10 seconds

Then, the coding will be as follows:

Table 31-23 Example of SI Parameter Descriptor (Second Loop of BIT)

Field	Coded value
[SI_parameter_descriptor]	
descriptor_tag	**0xD7**
descriptor_length	**11**
parameter_version	**0xFF**
update_time	**55197**
[table_id loop]	
table_id	**0x58**
table_description_length	**6**
[table_description_byte loop]	
media_type	**1**
pattern	**0-3**
reserved	**all 1**
schedule_range	**8**
base_cycle	**180**
cycle_group_count	**1**
[cycle_group loop]	
num_of_segment	**16**
cycle	**10**

31.1.3.2 Extended Broadcaster Descriptor

[Use]

Present the extended broadcaster information not limited to within network.

[Syntax]

The structure of Extended Broadcaster Descriptor is shown in Table 31-24.

Table 31-24 Structure of Extended Broadcaster Descriptor

Data structure	bit	Identifier
extended_broadcaster_descriptor(){		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
broadcaster_type	**4**	**uimsbf**
reserved_future_use	**4**	**bslbf**
if (broadcaster_type == 0x1) {		
terrestrial_broadcaster_id	**16**	**uimsbf**
number_of_affiliation_id_loop	**4**	**uimsbf**
number_of_broadcaster_id_loop	**4**	**uimsbf**
for(i=0; i<N1; i++) {		
affiliation_id	**8**	**uimsbf**
}		
for(j=0; j<N2; j++) {		
original_network_id	**16**	**uimsbf**
broadcaster_id	**8**	**uimsbf**
}		
for(k=0; k<N3; k++) {		
private_data_byte	**8**	**bslbf**
}		
}		
else{		
for(i=0; i<N; i++) {		
reserved_future_use	**8**	**bslbf**
}		
}		
}		

[Semantics of Each Field]

The definitions of each field are shown in Table 31-25.

Table 31-25 Definitions of Each Field for Extended Broadcaster Descriptor

Definitions	
broadcaster_type	This 4-bit field indicates the broadcaster type to be described in the later field. '0x1' refers to the digital terrestrial television broadcaster.
terrestrial_broadcaster_id	This 16-bit field indicates the digital terrestrial television broadcaster identifier.
number_of_affiliation_id_loop	This 4-bit field indicates the number of "affiliation_id" to be described in the later field.
number_of_ broadcaster_id_loop	This 4-bit field indicates the number of broadcasters in the BS digital/broadband CS digital broadcasting ("original_network_id" and "broadcaster_id" are described in pairs).
affiliation_id	This 8-bit field indicates the affiliation identifier.
original_network_id	This 16-bit field indicates the original network identifier in the related BS digital/broadband CS digital broadcasting.
broadcaster_id	This 8-bit field indicates the broadcaster identifier in the related BS digital/broadband CS digital broadcasting.

[Transmission Operating Rule]

- ◎ **This descriptor should be placed for the TS loop in the BIT.**
- ◎ **If the terrestrial broadcaster uses multiple networks, the relative descriptor with the same description in all networks except for the order of describing "affiliation_id" values is transmitted.**
- ◎ **In the same terrestrial broadcaster, the primary affiliation identifier may be different among networks. In this case, "affiliation_id" value indicating each primary affiliation identifier is placed first.**

The Transmission Operating Rule for each field are shown in Table 31-26.

Table 31-26 Transmission Operating Rule of Extended Broadcaster Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xCE”.
descriptor_length	Describe the length of the Extended Broadcaster Descriptor.
broadcaster_type	Set to "0x1".
terrestrial_broadcaster_id	Describe the digital terrestrial television broadcaster ID.
number_of_affiliation_id_loop	Describe the number of "affiliation_id" to be described in the later field. Set to '0' if there is no relative affiliation identifier.
number_of_ broadcaster_id_loop	Describe the number of broadcasters (to be described in the later field) in the BS digital/broadband CS digital broadcasting ("original_network_id" and "broadcaster_id" are described in pairs). Set to '0' if there is no relative broadcaster.
affiliation_id	Describe the necessary affiliation ID values that the relative broadcaster belongs to. If there is multiple ID values, they are described on the order of precedence defined in the relative network.
original_network_id	Describe the original network identifier in the related BS digital/broadband CS digital broadcasting.
broadcaster_id	Describe the broadcaster identifier in the related BS digital/broadband CS digital broadcasting.
private_data_byte	Do not describe.

[Rules for Reception Processing]

○ "affiliation_id" is used for judging if the mobile receiver units continuously receive at the affiliated stations and identifying the NVRAM area. If multiple "affiliation_id" are described when judging if the mobile receiver units continuously receive at the affiliated stations, judge that the firstly described "affiliation_id" is prioritized.

○ "original_network_id" and "broadcaster_id" for BS digital broadcasting are used for judging if it is the area exclusive for the digital terrestrial television broadcasters in NVRAM where the data broadcasting contents for the specified broadcaster can be used. Also, it is possible for the data contents sent by the broadcaster specified in "broadcaster_id" field to access the affiliation area exclusive for "affiliation_id" that is described in the Extended Broadcaster Descriptor of BIT that the broadcaster specifying "broadcaster_id" field sends

The Rules for Reception Processing for each field are shown in Table 31-27.

Table 31-27 Rules for Reception Processing for Extended Broadcaster Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xCE”: Judge that the relative descriptor is the Extended Broadcaster Descriptor.
descriptor_length	Judge as the length of the Extended Broadcaster Descriptor.
broadcaster_type	= '0x1': Judge that the digital terrestrial television broadcaster is described and process the following fields. If it is set to any other value, judge that the relative descriptor is invalid.
terrestrial_broadcaster_id	Judge as the ID value for the digital terrestrial television broadcaster.
number_of_affiliation_id_loop	Judge as the number of affiliation ID values described in the subsequent fields.
number_of_ broadcaster_id_loop	Judge as the number of broadcasters (to be described in the later field) in the BS digital/broadband CS digital broadcasting ("original_network_id" and "broadcaster_id" are described in pairs).
affiliation_id	Judge as the affiliation ID value that the digital terrestrial television broadcaster belongs to. Judge that the firstly described value is the primary affiliation ID value defined in the relative network.
original_network_id	Judge as the original network identifier in the related BS digital/broadband CS digital broadcasting.
broadcaster_id	Judge as the broadcaster identifier in the related BS digital/broadband CS digital broadcasting.
private_data_byte	The receiver units ignore this field.

[Special Remarks]

None

31.2 SDT (Service Description Table)

31.2.1 Structure and Use of SDT

[Use]

Describe the information on service channel such as service channel name.

[Syntax]

The structure of SDT is shown in Table 31-28.

Table 31-28 Structure of SDT (Service Description Table)

Data structure	bit	Identifier
service_description_section(){		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
transport_stream_id	**16**	**uimsbf**
reserved	**2**	**bslbf**
version_number	**5**	**uimsbf**
current_next_indicator	**1**	**bslbf**
section_number	**8**	**uimsbf**
last_section_number	**8**	**uimsbf**
original_network_id	**16**	**uimsbf**
reserved_future_use	**8**	**bslbf**
for (i = 0;i< N;i++) {		
service_id	**16**	**uimsbf**
reserved_future_use	**3**	**bslbf**
H-EIT_flag	**1**	**bslbf**
M-EIT_flag	**1**	**bslbf**
L-EIT_flag	**1**	**bslbf**
EIT_schedule_flag	**1**	**bslbf**
EIT_present_following_flag	**1**	**bslbf**
running_status	**3**	**uimsbf**
free_CA_mode	**1**	**bslbf**
descriptors_loop_length	**12**	**uimsbf**
for (j = 0;j< M;j++) {		
descriptor()		
}		
}		
CRC_32	**32**	**rpchof**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.6 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

- ◎ **The own TS information should be transmitted using one actual table.**
- ◎ **The transmission layer should be always layer A.**
- ○ Describe all service channels defined in the NIT. However, do not describe regarding engineering service.
- ○ Changing the information on the service channels should be based on the changed contents.
- ○ For the update frequency, comply with the provisions in Section 12.9 of this document.

Transmission Operating Rule for each field are shown in Table 31-29.

Table 31-29 Transmission Operating Rule of SDT

Transmission Operating Rule for each field	
table_id	Set to “0x42”.
section_syntax_indicator	Set to ‘1’.
section_length	Describe the section length of SDT. Since the maximum length of section is 1024 bytes, this value should be 1021 at maximum.
transport_stream_id	Describe "transport_stream_id" (unique in all Digital Terrestrial Television Broadcastings) for the target TS.
version_number	For normal use, describe a value incremented by 1 every time version is updated. However, when a system error occurs, a value incremented by more than 1 can be described.
current_next_indicator	Set to ‘1’.
section_number	Describe the section number in the relative sub-table.
last_section_number	Describe the last section number in the relative sub-table.
original_network_id	Describe "network_id" for the target network.
[loop]	Do not define the maximum value for loop.
service_id	Describe "service_id" (unique in all Digital Terrestrial Television Broadcastings) for the target service channel.
H-EIT_flag	Set to '1' if the H-EIT for the target service channel is transmitted. For transmitting H-EIT, comply with the provisions in Chapter 13.
M-EIT_flag	Set to '1' if the M-EIT for the target service channel is transmitted. For transmitting M-EIT, comply with the provisions in Chapter 13.
L-EIT_flag	Set to '1' if the L-EIT for the target service channel is transmitted. For transmitting L-EIT, comply with the provisions in Chapter 13.
EIT_schedule_flag	Comply with the provisions in Section 13.8.2 of this document. For special services, set to '0' since the EIT[sch] is not used.
EIT_present_following _flag	Comply with the provisions in Section 13.8.1 of this document. For special services, set to '1' only when transmitting EIT[p/f] in the relative service.
running_status	Set to ‘0’.
free_CA_mode	Set to ‘0’ if the relative service is based on free programs. Set to ‘1’ if the relative service is based on chargeable programs. For the definitions of free and chargeable programs, see Section 20.2.
descriptor_loop_length	Describe the loop length of the subsequent descriptor. The maximum value is 1013.
[descriptor_loop]	Do not define the maximum loop count.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 31-30.

Table 31-30 Rules for Reception Processing for SDT

Rules for Reception Processing for each field	
table_id	= “0x42” : Judge that the relative table is the SDT for the target TS.
section_syntax_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_length	<=1021: Section length >1021: Judge that the relative section is invalid.
transport_stream_id	Judge as "transport_stream_id" for the target TS.
version_number	If any change occurs, judge that the relative table has been updated.
current_next_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.
section_number	<= "last_section_number": Judge as the section number in the relative sub-table. > "last_section_number": Judge that the relative section is invalid.
last_section_number	Judge as the last section number in the relative sub-table.
original_network_id	Judge as "network_id" for the target network.
[loop]	
service_id	Judge as "service_id" for the target service.
H-EIT_flag	= ‘0’ :Judge that H-EIT for the relative service does not exist. = ‘1’ : Judge that H-EIT for the relative service exists.
M-EIT_flag	= ‘0’ : Judge that M-EIT for the relative service does not exist. = ‘1’ : Judge that M-EIT for the relative service exists.
L-EIT_flag	= ‘0’ : Judge that L-EIT for the relative service does not exist. = ‘1’ : Judge that L-EIT for the relative service exists.
EIT_schedule_flag	= ‘0’ : Judge that H-EIT[schedule basic] for the relative service does not exist in the target TS. = ‘1’ : Judge that H-EIT[schedule basic] for the relative service exists in the target TS.
EIT_present_following _flag	= ‘0’ : Judge that EIT[p/f] of the basic transmission EIT type for the relative service does not exist in the target TS. = ‘1’ : Judge that EIT[p/f] of the basic transmission EIT type for the relative service exists in the target TS. For the basic transmission EIT type, see Section 13.1.14.
running_status	= “0x0” : Undefined ≠ “0x0” : Process on the assumption that it is set to “0x0”.
free_CA_mode	=’0’: Judge that the relative service is based on free programs. =’1’: Judge that the relative service is based on chargeable programs. For the definitions of free and chargeable programs, see Section 20.2.
descriptor_loop_length	<=1013: Loop length of the subsequent descriptor >1013: Judge that the relative section is invalid.
[descriptor]	

[Special Remarks]

- When a move is in progress including addition/deletion of service channels, the service channels described in the NIT may not be described in the SDT. These service channels should be also selectable.

31.2.2 Descriptor Inserted into SDT (Service Loop)

31.2.2.1 Service Descriptor

[Use]

Describe the basic information on services such as service name and company name.

[Syntax]

The structure of Service Descriptor is shown in Table 31-31.

Table 31-31 Structure of Service Descriptor

Data structure	bit	Identifier
service_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
service_type	**8**	**uimsbf**
service_provider_name_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
char	**8**	**uimsbf**
}		
service_name_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
char	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and definitions in 6.2.13 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **Only one descriptor should be placed for the target service channel.**

The Transmission Operating Rule for each field are shown in Table 31-32.

Table 31-32 Transmission Operating Rule of Service Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x48”.
descriptor_length	Describe the length of the relative descriptor.
service_type	Describe the service type. For the service types, see Table 30-56.
service_provider_name _length	Set to “0x00” since "service_provider_name" is not used in Digital Terrestrial Television Broadcasting.
[char]	Do not describe any.
service_name_length	Describe the length of service channel name. The maximum value is 20.
[char]	Describe the service channel name within the range of 20 bytes and 10 standard size characters. For the rule on use, see [Appendix H].

[Rules for Reception Processing]

◎ **Judge that the basic information on the target service is invalid if the SDT placed in accordance with the above rules on transmission cannot be received.**

The Rules for Reception Processing for each field are shown in Table 31-33.

Table 31-33 Rules for Reception Processing for Service Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x48” : Judge that the relative descriptor is the Service Descriptor.
descriptor_length	Judge as the length of Service Descriptor.
service_type	Judge that the relative descriptor is invalid except for "service_type" shown in Table 30-56.
service_provider_name _length	Judge as invalid except for “0x00”.
[char]	Ignore the contents described.
service_name_length	= < 20: Length of service channel name > 20: Judge that the service channel name is invalid.
[char]	Judge as the service channel name.

[Special Remarks]

- For the service definitions by service type, see 8.1.

31.2.2.2 Digital Copy Control Descriptor

[Use]

For the whole relative services, place this descriptor when control information regarding digital and analog copy is displayed, or when the maximum bit rate is described.

[Syntax]

The structure of Digital Copy Control Descriptor is shown in Table 31-34.

Table 31-34 Structure of Digital Copy Control Descriptor

Data structure	bit	Identifier
digital_copy_control_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
digital_recording_control_data	**2**	**bslbf**
maximum_bit_rate_flag	**1**	**bslbf**
component_control_flag	**1**	**bslbf**
copy_control_type	**2**	**bslbf**
if(copy_control_type != 00)){		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bit_rate_flag == 1) {		
maximum_bit_rate	**8**	**uimsbf**
}		
if(component_control_flag ==1){		
component_control_length	**8**	**uimsbf**
for(j=0;j<N;j++){		
component_tag	**8**	**uimsbf**
digital_recording_control_data	**2**	**bslbf**
maximum_bitrate_flag	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
copy_control_type	**2**	**bslbf**
if(copy_control_type != 00) {		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bitrate_flag==1){		
maximum_bitrate	**8**	**uimsbf**
}		
}		
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.23 and Annex F of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor can be placed for the relative service when implementing copy control that is different from the default copy control. (See Chapter 21.)**

○ This descriptor can be placed if the maximum bit rate for the relative service is not within the range of default maximum bit rate specified in Table 21-2. In this case, it is required to describe the correct copy control information even when implementing the same copy control as the default copy control. (See Chapter 21.)

The Transmission Operating Rule for each field are shown in Table 31-35.

Table 31-35 Transmission Operating Rule of Digital Copy Control Descriptor (SDT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xC1”.
descriptor_length	Describe the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and is coded according to Table 31-36 and Table 31-37.
maximum_bit_rate_flag	Set to '0’ if the maximum bit rate for the relative service is not described. Set to '1’ if the maximum bit rate for the relative service is described.
component_control_flag	Set to ‘0’ (whole program only)
copy_control_type	This 2-bit field indicates the information used for copy generation control type and is coded according to Table 31-36 and Table 31-37.
APS_control_data	Analog output copy control information. This 2-bit field indicates the information used for analog output copy control if "copy_control_type" is set to '01’, ’10’ or ’11’ and is coded according to Table 31-36 and Table 31-37.
maximum_bit_rate	Describe the maximum bit rate.

The details of each service are shown in the following sections.

Note that the specifications for controlling each output terminal using Digital Copy Control Descriptor vary according to the service contents.

[Points of Use (Digital TV Service and Special Video Service)]

If "service_type" described in the NIT Service List Descriptor is set to "0x01" (digital TV service) and "0xA1" (special video service), it should be coded according to Table 31-36.

Table 31-36 Operation of Descriptors for Digital TV Service and Special Video Service

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control *3</th><th colspan="3">Operation of each field</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th></tr>
<tr><td>Copy freely</td><td>Copy freely</td><td rowspan="5">01</td><td>00</td><td>00 *5</td></tr>
<tr><td rowspan="2">Copy never *1</td><td>Copy never without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">11</td><td rowspan="2">00</td></tr>
<tr><td>Copy never *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy one generation *2</td><td>Copy one generation without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="2">10</td><td>00</td></tr>
<tr><td>Becomes “Copy never” after copying over one generation. *4</td><td>Other than 00</td></tr>
</table>

*1: When output to the High-Speed Digital Interface, the Copy Never protection of the Source function specified by DTCP shall be applied. However, when outputting only audio streams in the IEC60958 conformant format, the No More Copies protection shall be applied.

*2: When output to the High-Speed Digital Interface, the Copy One Generation protection of the Source function specified by DTCP shall be applied.

*3: Applicable to composite and component video output. Also applicable to the cases where received video signals are format converted and output. Macrovision copy protection is applied to 480i composite and component video signals.

*4: Analog video output should be performed in accordance with the parameters specified by Macrovision and specified "APS_control_data".

*5: The receiver units do not use this field value for the judgment of receiving process.

[Points of Use (Data Service, Special Data Service and Bookmark List Data Service)]

If "service_type" described in the NIT Service List Descriptor is set to "0xC0" (data service), "0xA3" (special data service) and "0xAA" (bookmark list data service), it should be coded according to Table 31-37.

Table 31-37 Operation of Descriptors for Data Service, Special Data Service and Bookmark List Data Service

(1) When providing services other than those in partial reception layer:

Digital Copy Control	Analog Copy Control *3	Operation of each field		
		copy_control_type	digital_recording_control_data	APS_control_data
Copy freely	Copy freely	01/11	00	00 *5
Copy never *1	Copy never without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.	01	11	00
	Copy never. *4			Other than 00
Copy never, and the output of MPEG_TS is disabled. *9	Copy never without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.	11		00
	Copy never. *4			Other than 00
Copy one generation *2	Copy one generation without Macrovision protection. It shall therefore be copyable on conventional analog recording devices.	01	10	00
	Becomes "Copy never" after copying over one generation. *4			Other than 00
Copy one generation, but the output of MPEG_TS is disabled. *9	Copy one generation without Macrovision protection. It shall therefore be copyable on conventional analog recording devices.	11		00
	Becomes "Copy never" after copying over one generation. *4			Other than 00

(2) When providing services in partial reception layer[*8]:

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control [*3]</th><th colspan="3">Use of each field</th></tr>
<tr><th>copy_control _type</th><th>digital_recording_ control_data</th><th>APS_control_ data</th></tr>
<tr><td>Copy freely</td><td>Copy freely</td><td rowspan="3">10</td><td>00</td><td>00</td></tr>
<tr><td rowspan="2">Copy one generation [*6]</td><td>Copy one generation without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="2">10</td><td>00</td></tr>
<tr><td>Becomes ”Copy never” after copying over one generation. [*7]</td><td>Other than 00</td></tr>
</table>

*1: When output to the High-Speed Digital Interface, the Copy Never protection of the Source function specified by DTCP shall be applied. However, when outputting only audio streams in the IEC60958 conformant format, the No More Copies protection shall be applied.

*2: When output to the High-Speed Digital Interface, the Copy One Generation protection of the Source function specified by DTCP shall be applied.

*3: Applicable to composite and component video output. Also applicable to the cases where received video signals are format converted and output. Macrovision copy protection is applied to 480i composite and component video signals.

*4: Analog video output should be performed in accordance with the parameters specified by Macrovision and specified "APS_control_data".

*5: The receiver units do not use this field value for the judgment of receiving process.

*6: Regarding the partial reception layer, the output from High-Speed Digital Interface is prohibited for protected contents (i.e. contents with the digital_recording_control_data other than ‘00’ or the encryption_mode ‘0’).

*7: For more information on analog video output, see Part 2, 5.3 and 5.5.2 of Vol.8.

*8: Service in the partial reception layer is available only for data service.

*9: In the case of IP interface, outputting of MPEG_PS shall also be prohibited.

[Points of Use (Common in All Services)]

Transmission and use should not be applied to other combinations than those specified in Table 31-36 and Table 31-37.

For CGMS-A, when "copy_control_type" is set to ’01’, ’10’ and ’11’, "digital_recording_control_data" and "APS_control_data" are copied in the area specified by CGMS-A.

When the relative descriptor includes the copy control information, the copyright process appropriate to analog video output, high-speed digital interface output and digital audio output is performed before outputting. CGMS-A and MACROVISION is used for analog video output, DTCP for high-speed digital interface output, and SCMS for digital audio output. For the details of process, see the specifications and standards.

When multiple services are output from the high-speed digital interface, the copy control designation (including output control) for each service is interpreted as follows:

- Outputting streams (including services where output is prohibited or disabled) is prohibited.
- The stream cannot be output if the service where "copy_control_type=01" and the other where “copy_control_type=11" are mixed. However, it can be output if the services where copy is unconditionally enabled are mixed.
- Copy control is most strict for copy disabled, then copy enabled for one generation and copy enabled unconditionally in order.

The information should be accurately reflected in the copyright bit and category code of the channel status specified by IEC 60958.

The category code is set to "001_0000L" if Digital Copy Control Descriptor is provided.

Copy is enabled unconditionally: Set the copyright information bit to '1'.

Copy is enabled for one generation: Set the copyright information bit to '0' and L bit of category code to '0'.

Copy is disabled: Set the copyright information bit to '0' and L bit of category code to '1'.

If no relative descriptor is described, it is regarded as copy free.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 31-38.

Table 31-38 Rules for Reception Processing for Digital Copy Control Descriptor (SDT)

Rules for Reception Processing for each field	
descriptor_tag	= “0xC1” : Judge that the relative descriptor is Digital Copy Control Descriptor.
descriptor_length	Judge as the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and coded according to Table 31-36 and Table 31-37.
maximum_bit_rate_flag	=‘0’: Judge that the maximum bit rate for the relative service is within the range of default maximum bit rate specified in Table 21-1 and Table 21-2. =‘1’: Judge that the maximum bit rate for the relative service is described below.
component_control_flag	=‘0’ : Judge that the relative descriptor is valid. =‘1’ : Judge '0'.
copy_control_type	This 2-bit field indicates the information on type used for copy generation control and is coded according to Table 31-36 and Table 31-37.
maximum_bit_rate	Judge as the maximum bit rate for the relative service.

[Special Remarks]

Since the analog output signal copy control conforms to the individual contracts between broadcasting companies and Macrovision, it seems necessary to re-consider carefully.

If the Rules for Reception Processing are not specified in Table 31-36 and Table 31-37, see Table 5-1 of Part 1 in Vol. 8 and Table 5-1 of Part 2 in Vol. 8.

31.2.2.3 CA Contract Info Descriptor

[Use]

Describe the default verification information to check if viewing (recording) by reserving programs is possible with regard to the programs including the chargeable components (groups) in the service channels.

[Syntax]

The structure of CA Contract Info Descriptor is shown in Table 31-39.

Table 31-39 Structure of CA Contract Info Descriptor

Data structure	bit	Identifier
CA_contract_info_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
CA_system_id	**16**	**uimsbf**
CA_unit_id	**4**	**uimsbf**
num_of_component	**4**	**uimsbf**
for (i = 0;i< num_of_component ;i++) {		
component_tag	**8**	**uimsbf**
}		
contract_verification_info_length	**8**	**uimsbf**
for (i = 0;i< contract_verification_info_length ;i++) {		
contract_verification_info	**8**	**uimsbf**
}		
fee_name_length	**8**	**uimsbf**
for (i = 0;i< fee_name_length ;i++) {		
fee_name	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

The definitions of each field are specified in Table 31-40.

Table 31-40 Definitions of Each Field for CA Contract Info Descriptor

Definitions	
CA_system_id	This 8-bit field indicates the Conditional access system identifier.
CA_unit_id	This 4-bit field indicates chargeable/non-chargeable unit identifier that the component belongs to. However, the relative descriptor does not use "0x0". 0x0: Non-chargeable unit group 0x1: Chargeable unit group including group of default ES' of the event 0x2-0xF: Chargeable unit group except for the above
num_of_component	This 4-bit field indicates the number of chargeable unit components specified in the above "CA_unit_id"
[component_tag]	This 8-bit field is the label for identifying the target component streams in the chargeable unit components specified in the above "CA_unit_id". If the Stream Identifier Descriptor exists in the PMT, it is the same value as the component tag described in the Stream Identifier Descriptor.
contract_verification _info_length	This 8-bit field indicates the byte length of the subsequent contract verification information.
[contract_verification _info]	This is a 8-bit field. The contract verification information is described in a sequence of verification information fields.
fee_name_length	In this 8-bit field, the value is fixed to '0' in Digital Terrestrial Television Broadcasting.
[fee_name]	This 8-bit field is not used in Digital Terrestrial Television Broadcasting.

[Transmission Operating Rule]

◎ **Only one descriptor should be placed and transmitted if the relative service is based on the chargeable services.**

○ When "free_CA_mode=0", the relative descriptor for "CA_unit_id=0x1" should not be placed.

○ When "free_CA_mode=1", the relative descriptor for "CA_unit_id=0x1" should be placed.

○ Do not change the value if possible, once it is set up.

The Transmission Operating Rule for each field are shown in Table 31-41.

Table 31-41 Transmission Operating Rule of CA Contract Info Descriptor (SDT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xCB”.
descriptor_length	Describe the length of the relative descriptor. The maximum value is 209.
CA_system_id	Describe the Conditional access system identifier.
CA_unit_id	Describe the chargeable unit identifier. Only "0x1" is used in Digital Terrestrial Television Broadcasting.
num_of_component	Describe the number of the relative chargeable unit components. The maximum value is 12.
[component_tag]	Describe the tag value of the relative chargeable unit components.
contract_verification _info_length	Describe the length of contract verification information. The maximum value is 172.
[contract_verification _info]	Describe the contract verification information.
fee_name_length	Set to the fixed value, '0'.
[fee_name]	This field is not used.

[Rules for Reception Processing]

○ When either of the following conditions is fulfilled, judge that the contract verification information for the SDT is invalid.

- The relative descriptor including "free_CA_mode=0" and "CA_unit_id=0x1" is placed.
- The relative descriptor including "free_CA_mode=1" and "CA_unit_id=0x1" is not placed.

The Rules for Reception Processing for each field are shown in Table 31-42.

Table 31-42 Rules for Reception Processing for CA Contract Info Descriptor (SDT)

Rules for Reception Processing for each field	
descriptor_tag	= “0xCB” : Judge that the relative descriptor is the CA Contract Info Descriptor.
descriptor_length	Judge as the length of the CA Contract Info Descriptor.
CA_system_id	It is valid if the value is a valid conditional access system identification value specified in Vol. 5 (Section 5.6). Judge that any other value refers to the noncompliant conditional access system (reservation is not available).
CA_unit_id	=0x0: Judge as invalid. =0x1: Judge as the chargeable unit identifier including group of default ES’. >0x1: Perform the receiving process for noncompliant PPV if the contract confirmation command/response indicates PPV. For any other contract programs, judge that the whole relative descriptor is invalid.
num_of_component	= 0: Judge that the whole relative descriptor is invalid. <=12: Judge as the number of relative chargeable unit components. >12: Judge that the whole relative descriptor is invalid.
[component_tag]	Judge as the tag value for the relative chargeable unit component.
contract_verification _info_length	<=172: Length of contract verification information >172: Judge that the whole relative descriptor is invalid.
[contract_verification _info]	Judge as the contract verification information.
fee_name_length	The receiver unit ignore.
[fee_name]	The receiver unit ignore.

31.2.2.4 Logo Transmission Descriptor

Transmission and use of the relative descriptor is described in Vol. 1.

31.2.2.5 Linkage Descriptor

[Use]

Describe the linkage to the CA alternative service.

[Syntax]

The structure of the Linkage Descriptor is shown in Table 31-43.

Table 31-43 Structure of Linkage Descriptor

Data structure	bit	identifier
linkage_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
transport_stream_id	**16**	**uimsbf**
original_network_id	**16**	**uimsbf**
service_id	**16**	**uimsbf**
linkage_type	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
private_data_byte	**8**	**bslbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.8 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **Only one descriptor should be placed for one service.**

The Transmission Operating Rule for each field are shown in Table 31-44.

Table 31-44 Transmission Operating Rule of Linkage Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x4A”.
descriptor_length	Describe the length of the Linkage Descriptor.
transport_stream_id	Describe the transport stream identifier including the linked service.
original_network_id	Describe the network identifier where the linked service is transmitted.
service_id	Describe the service identifier for the linked service.
linkage_type	Set to “0x03” (CA alternative service).
[private_data_byte]	If any message is described, describe the message number in the first byte. The message number should be unique in Digital Terrestrial Television Broadcasting from 41 to 60 (0x29 - 0x3C). From the second byte, describe the message text within 160 bytes (80 standard size characters). If the same message number is specified in the sub-table, the message text can be omitted. However, the first message text in the sub-table cannot be omitted even with the same message number.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 31-45.

Table 31-45 Rules for Reception Processing for Linkage Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x4A”: Judge that the relative descriptor is the Linkage Descriptor.
descriptor_length	Judge as the length of the Linkage Descriptor.
transport_stream_id	Judge as the transport stream identifier including the linked service.
original_network_id	Judge as the network identifier where the linked service is transmitted.
service_id	Judge as the service identifier for the linked service.
linkage_type	= ”0x03” : Judge as the CA alternative service. ≠ ”0x03” : Judge as invalid.
[private_data_byte]	Judge that the first byte indicates the message number and the second and later indicate the message text. Judge that the message exceeding the 160 bytes (80 standard size characters) is invalid. If the message number is same, judge that the message text is also same. If the message text for the message number in the sub-table is not described, it could be judged that this area itself does not exist. For the examples of process, see Vol. 5.

[Special Remarks]

None

31.3 EIT (Event Information Table)

31.3.1 Structure of EIT

[Use]

Specify the program related information such as program titles, air dates and times and brief program descriptions.

[Syntax]

The structure of EIT is shown in Table 31-46. This structure can commonly apply to H-EIT, M-EIT and L-EIT.

Table 31-46 Structure of EIT (Event Information Table)

Data structure	bit	Identifier
event_information_section(){		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
service_id	**16**	**uimsbf**
reserved	**2**	**bslbf**
version_number	**5**	**uimsbf**
current_next_indicator	**1**	**bslbf**
section_number	**8**	**uimsbf**
last_section_number	**8**	**uimsbf**
transport_stream_id	**16**	**uimsbf**
original_network_id	**16**	**uimsbf**
segment_last_section_number	**8**	**uimsbf**
last_table_id	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
event_id	**16**	**uimsbf**
start_time	**40**	**bslbf**
duration	**24**	**uimsbf**
running_status	**3**	**uimsbf**
free_CA_mode	**1**	**bslbf**
descriptors_loop_length	**12**	**uimsbf**
for (j = 0;j< M;j++) {		
descriptor()		
}		
}		
CRC_32	**32**	**rpchof**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.7 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **Regarding the service used in the target network, this table should be transmitted within the All-stations applied transmission parameter of the basic transmission EIT type.**

◎ **The PID for each EIT type (H-EIT, M-EIT and L-EIT) complies with Table 5-4.**

○ For retransmission cycle, follow 12.4 of this document.

○ For update frequency, follow 12.9 of this document.

The Transmission Operating Rule for each field are shown in Table 31-47.

Table 31-47 Transmission Operating Rule of EIT

Transmission Operating Rule for each field		
table_id	Describe according to Table 13-8 to 13-12.	
section_syntax_indicator	Set to ‘1’.	
section_length	Describe the section length of EIT. Since the maximum length of all sections is 4096 bytes, this value should be 4093 at maximum.	
service_id	Describe "service_id" for the target program.	
version_number	For normal use, describe a value incremented by 1 every time version is updated. However, when a system error occurs, a value incremented by more than 1 can be described.	
current_next_indicator	Set to ‘1’.	
section_number	Describe the section number.	
last_section_number	Describe the maximum section number. The description for each table type complies with the following rule:	
	Table type	**Description**
	H-EIT[p/f]	Fix to '0x01'.
	H-EIT[schedule]	Describe the last "section_number" in the relative sub-table.
	M-EIT	Describe the last "section_number".
	L-EIT	
transport_stream_id	Describe "transport_stream_id" for the target transport stream.	
original_network_id	Describe "network_id" for the original delivery system.	
segment_last_section_number	Describe the last "section_number" used in each relative segment. The description for each table type complies with the following rule:	
	Table type	**Description**
	H-EIT[p/f]	Fix to '0x01'.
	H-EIT[schedule]	Describe the last "section_number" used in each relative segment.
	M-EIT	Set to the same value as that for "last_section_number" field.
	L-EIT	
last_table_id	Describe the last "table_id". The description for each table type complies with the following rule:	
	Table type	**Description**
	H-EIT[p/f]	Same as "table_id"
	H-EIT[schedule]	Last "table_id"
	M-EIT	Same as "table_id"
	L-EIT	
[loop]	The maximum loop count for each table type complies with the following rule:	
	Table type	**Description**
	H-EIT[p/f]	1
	H-EIT[schedule]	Do not define.
	M-EIT[p/f]	1
	M-EIT[p/f after]	8
	L-EIT[p/f]	1
	L-EIT[p/f after]	8

Transmission Operating Rule for each field	
event_id	Describe "event_id". It is uniquely assigned in "service_id". For the unique "event_id" for the direction of time, see Section 8.2.1.
start_time	Describe the program start time. Describe in MJD+BCD hours:minutes:seconds format. Only in case of "following", "Undefined" (all bit ‘1’) is available.
duration	Describe the program length for the event. Describe in BCD hours:minutes:seconds format. Only in case of "present/following", "Undefined" (all bit‘1’) is available.
running_status	Set to “0” (undefined) for all.
free_CA_mode	Set to ’0’ if the relative program is a free program. Set to '1' if the relative program is a chargeable program. For the definitions of free and chargeable program, see Section 20.2.
descriptors_loop_length	Describe within the range of section length.
[descriptor_loop]	
[descriptor]	

[Rules for Reception Processing]

Specify the program related information such as program titles, air dates and times and brief program descriptions. The Rules for Reception Processing for each field are shown in Table 31-48.

Table 31-48 Rules for Reception Processing for EIT

Rules for Reception Processing for each field		
table_id	= “0x4E, 0x50 - 0x5F”: Judge that the relative table is the EIT.	
section_syntax_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.	
section_length	<=4093: Section length >4093: Judge that the relative section is invalid.	
service_id		
version_number	If any change occurs, judge that the relative table has been updated.	
current_next_indicator	= ‘0’ : Judge that the relative section is invalid. = ‘1’ : Judge that the relative section is valid.	
section_number	Judgment for each table type complies with the following rule:	
	Table type	**Description**
	H-EIT[p/f]	=‘0’: Judge that the relative section is information on "present". =‘1’: Judge that the relative section is information on "following". >‘1’: Ignore the relative section.
	H-EIT [schedule]	Judge as "section_number" for the relative section.

Rules for Reception Processing for each field		
	M-EIT	='0': Judge that the relative section is information on the current event ("present"). ='1': Judge that the relative section is information on the next event ("following"). ='2', '3' and '4': Judge that the relative section is information on the following or later program after the next event ("after"). >'4': Ignore the relative section.
	L-EIT	='0': Judge that the relative section is information on the current event ("present"). ='1': Judge that the relative section is information on the next event ("following"). ='2' and '3': Judge that the relative section is information on the following or later program after the next event ("after"). >'3': Ignore the relative section.
last_section_number		
transport_stream_id		
original_network_id		
segment_last_section_number		
last_table_id		
[loop]		
event_id		
start_time	Only in case of "following", judge as undefined if all bit is set to '1'.	
duration	Only in case of "present/following", judge as undefined if all bit is set to '1'.	
running_status	= '0' : Judge that the relative event is valid. ≠ '0' : Perform process on the assumption to be set to '0'.	
free_CA_mode	= '0' : Judge that the relative program is a free program. = '1' : Judge that the relative program is a chargeable program. For the definitions of free and chargeable program, see Section 20.2.	
descriptors_loop_length		
[descriptor_loop]		
[descriptor]		

[Special Remarks]

- The maximum "duration" is 48 hours.
- The maximum number of events for a day is 96 per service.

For reissuing another program with the same "event_id" (unique "event_id" for the direction of time), see 8.2.1.

31.3.2 Descriptor Inserted into EIT (Event Loop)

The descriptors to be placed for the event loops in the EIT are shown in Table 31-49.

Table 31-49 Descriptors to be Placed for Event Groups in EIT

Tag	Descriptor	H-EIT [p/f]	H-EIT [schedule basic]	H-EIT [schedule extended]	M-EIT [p/f]	M-EIT [p/f after]	L-EIT [p/f]	L-EIT [p/f after]
0x4D	Short Event Descriptor	◎	◎*3	×	◎	◎	◎	◎
0x4E	Extended Event Descriptor	O	×	O	×	×	×	×
0x50	Component Descriptor	◎*1	◎*1*3	×	◎*1	◎*1	×	×
0x54	Content Descriptor	O	O	×	O	O	O	O
0xC1	Digital Copy Control Descriptor	O	O	×	O	O	O	O
0xC4	Audio Component Descriptor	◎*1	◎*1*3	×	◎*1	◎*1	×	×
0xC7	Data Contents Descriptor	O	O	×	O	O	×	×
0xCB	CA Contract Info Descriptor	O	O	×	O	O	O	O
0xD6	Event Group Descriptor	O	O*2	×	O	O	×	×
0xD9	Component Group Descriptor	O	O	×	O	O	×	×
0xD5	Series Descriptor	O	O	×	O	O	×	×
0x42	Stuffing Descriptor	O	O	O	O	O	O	O

◎: Should be inserted into the relative descriptor area in table
O: Can be inserted into the relative descriptor area in table voluntarily
× : Cannot be inserted into the relative descriptor area in table

*1: At least 1 in mandatory in the digital television service

*2: If Event Group Descriptor, where "group_type=Event Common" in H-EIT[schedule basic], is placed and the descriptor is set to the "referred from" for other "service_id", all descriptors except for Event Group Descriptor can be omitted. See Chapter 17 (Event Common).

*3: If Event Group Descriptor, where "group_type=Event Common" in H-EIT[schedule basic], is placed and the descriptor is set to the "referred from" for other "service_id", all descriptors can be omitted.

31.3.2.1 Short Event Descriptor

[Use]

Describe the short textual information related to event names and events.

[Syntax]

The structure of Short Event Descriptor is shown in Table 31-50.

Table 31-50 Structure of Short Event Descriptor

Data structure	bit	Identifier
short_event_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
ISO_639_language_code	**24**	**bslbf**
event_name_length	**8**	**uimsbf**
for (i = 0;i< event_name_length;i++) {		
event_name_char	**8**	**uimsbf**
}		
text_length	**8**	**uimsbf**
for (i = 0;i< text_length;i++) {		
text_char	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and definitions in 6.2.15 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **Only one descriptor should be transmitted for one event except for the special case (Event Common).**

The Transmission Operating Rule for each field are shown in Table 31-51.

Table 31-51 Transmission Operating Rule of Short Event Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x4D”.
descriptor_length	Describe the length of the Short Event Descriptor. Do not define the maximum value.
ISO_639_language_code	Set the language code to “jpn (“0x6A706E”)”.
event_name_length (Note1)	Describe the length of program title. It should be less than 96 bytes and 40 standard size characters.
[event_name_char]	Describe the program title. It should be less than 96 bytes and 40 standard size characters. Do not use APR codes. If the Series Descriptor exists in the same loop and the series name is not described in the descriptor, this program title is also used as series name.
text_length	Describe the description length of the program. It should be less than 192 bytes and 80 standard size characters.
[text_char]	Describe the program description. It should be less than 192 bytes and 80 standard size characters. The total number of APR codes used in the relative field is not limited, but to avoid abusing, the purposes of use are limited as follows: - To avoid that a personal name is displayed across the line. - To avoid beginning a new line from the undesired part of a sentence.

(Note1) The program title should consist of "program title + subtitle". It is strongly recommended to use 40 characters for the program title of long-time program. However, the transmitter always consider the case that only 20 characters can be displayed due to the display limitation and need to adjust by listing the titles in order of precedence, etc. For 30-minute or shorter programs, generally use 20 characters or less.

[Rules for Reception Processing]

- It can judge the title and subtitle for each event and is used for displaying, etc.

The Rules for Reception Processing for each field are shown in Table 31-52.

Table 31-52 Rules for Reception Processing for Short Event Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x4D”: Judge that the relative descriptor is the Short Event Descriptor.
descriptor_length	Judge as the length of the relative descriptor.
ISO_639_language_code	If it is set to any other value than “jpn (“0x6A706E”)”, assume that the character code to be placed later is “jpn”.
event_name_length	<=96 bytes and 40 standard size characters or less: Length of program title >96 bytes or 41 standard size characters or more: Ignore the parts of the program title exceeding 96 bytes (40 standard size characters).
[event_name_char]	Judge as the program title. If the Series Descriptor exists in the relative loop and the series name is not described in the descriptor, judge as program title = series name.
text_length	<=192 bytes or 80 standard size characters or less: Length of program description >192 bytes or 81 standard size characters or more: Ignore the parts of the program title exceeding 192 bytes (80 standard size characters).
[text_char]	Judge as the program description.

[Special Remarks]

None

31.3.2.2 Component Descriptor

[Use]

Describe the information on video component streams structuring event.

[Syntax]

The structure of Component Descriptor is shown in Table 31-53.

Table 31-53 Structure of Component Descriptor

Data structure	bit	Identifier
component_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
reserved_future_use	**4**	**bslbf**
stream_content	**4**	**uimsbf**
component_type	**8**	**uimsbf**
component_tag	**8**	**uimsbf**
ISO_639_language_code	**24**	**bslbf**
for (i = 0;i< N;i++) {		
text_char	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and definitions in 6.2.3 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **One descriptor should be transmitted for every video component, which have the "component_tag" value (from 0x00 to 0x0F) included in an event.**

The Transmission Operating Rule for each field are shown in Table 31-54.

Table 31-54 Transmission Operating Rule of Component Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x50”.
descriptor_length	Describe the length of the Component Descriptor. Do not define the maximum value.
stream_content	Set to “0x01” (video).
component_type	Describe the video component type for the relative component. For the component types, see Table 6-5 of Part 2 in ARIB STD-B10 and for the values transmitted in Digital Terrestrial Television Broadcasting, see Table 31-55.
component_tag	Describe the component tag value that is unique in the relative program. For assigning the component tag values, see Section 14.2.
ISO_639_language_code	Set to “jpn (“0x6A706E”)”.
[text_char]	When multiple video components exist, describe 16 byte (8 standard size characters) or shorter video type name. Do not use APR codes. This field can be omitted if the component description is the default character string. The default character string is "video". (See Vol. 2.)

Table 31-55 "component_type" Values Available for Digital Terrestrial Television Broadcasting

component_type	Definitions
0x01	Video: 480i(525i), Aspect ratio: 4:3
0x03	Video: 480i(525i), Aspect ratio: 16:9, No panvector
0x04	Video: 480i(525i), Aspect ratio: >16:9
0xA1	Video: 480p(525p), Aspect ratio: 4:3
0xA3	Video: 480p(525p), Aspect ratio: 16:9, No panvector
0xA4	Video: 480p(525p), Aspect ratio: >16:9
0xB1	Video: 1080i(1125i), Aspect ratio: 4:3
0xB3	Video: 1080i(1125i), Aspect ratio: 16:9, No panvector
0xB4	Video: 1080i(1125i), Aspect ratio: >16:9
0xC1	Video: 720p(750p), Aspect ratio: 4:3
0xC3	Video: 720p(750p), Aspect ratio: 16:9, No panvector
0xC4	Video: 720p(750p), Aspect ratio: >16:9
0xD1	Video: 240p, Aspect ratio: 4:3
0xD3	Video: 240p, Aspect ratio: 16:9, No panvector
0xD4	Video: 240p, Aspect ratio: >16:9

Note) Panvector is not used in Digital Terrestrial Television Broadcasting.

[Rules for Reception Processing]

- It can judge the video component types structuring events and use the component description for selecting video component.
- Only video components where "component_tag" is set from “0x00” to “0x0F” can be selected independently. If "component_tag" is not set to the above, the video component cannot be selected independently; therefore, the video component is not the target for the component selection function, etc.

The Rules for Reception Processing for each field are shown in Table 31-56.

Table 31-56 Rules for Reception Processing for Component Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x50”: Judge that the relative descriptor is the Component Descriptor.
descriptor_length	Judge as the length of the relative descriptor.
stream_content	=“0x01”: Judge as valid (video). ≠“0x01”: Judge as invalid.
component_type	Judge as the video component type of the relative component. (For component types, see Table 31-55.)
component_tag	It is the component tag value that is unique in the relative program and can be used in response to the component tag for stream identifier in PMT.
ISO_639_language_code	If it is set to any other value than “jpn (“0x6A706E”)”, assume that the character code to be placed later is “jpn”.
[text_char]	Judge that 16 byte (8 standard size characters) or shorter description is the component description. If this field is omitted, judge as the default component description. The default character string is "video". (See Vol. 2.)

[Special Remarks]

- The component description may not match the actual component due to changed mode during event.
  (In "component_type" for this descriptor, the representative component type of the relative component is described and is not changed in real time even when the mode is changed during the program.)
- "component_type" described in this descriptor is referred to judge the default "maximum_bit_rate" when the Digital Copy Control Descriptor is omitted for the relative event. (See Section 21.3.1.)

31.3.2.3 Audio Component Descriptor

[Use]

Describe the information on audio component streams structuring events.

[Syntax]

The structure of Audio Component Descriptor is shown in Table 31-57.

Table 31-57 Structure of Audio Component Descriptor

Data structure	bit	Identifier
audio_component_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
reserved_future_use	**4**	**bslbf**
stream_content	**4**	**uimsbf**
component_type	**8**	**uimsbf**
component_tag	**8**	**uimsbf**
stream_type	**8**	**uimsbf**
simulcast_group_tag	**8**	**bslbf**
ES_multi_lingual_flag	**1**	**bslbf**
main_component_flag	**1**	**bslbf**
quality_indicator	**2**	**bslbf**
sampling_rate	**3**	**uimsbf**
reserved	**1**	**bslbf**
ISO_639_language_code	**24**	**bslbf**
if(ES_multi_lingual_flag==1){		
ISO_639_language_code_2	**24**	**bslbf**
}		
for(i=0; i<N; i++){		
text_char	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and definitions in 6.2.26 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

One descriptor should be transmitted for every audio component including "component_tag" value (from “0x10” to “0x2F” and from “0x84” to “0x86”) included in an event.

The Transmission Operating Rule for each field are shown in Table 31-58.

Table 31-58 Transmission Operating Rule of Audio Component Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xC4”.
descriptor_length	Describe the length of the Audio Component Descriptor. Do not define the maximum value.
stream_content	Set to “0x2” (audio).
component_type	Describe the audio component type for the relative component. For the audio component types, see Table 6-46 of Part 2 in ARIB STD-B10 and for the values transmitted in Digital Terrestrial Television Broadcasting, see Table 31-59.
component_tag	Describe the component tag value that is unique in the relative program. For assigning the component tag values, see Section 14.2.
stream_type	Set to “0x0F” (ISO/IEC13818-7 audio)
simulcast_group_tag	Describe the simulcast group identifier. Assign the same number to the components used for simulcasting. If the simulcasting is not implemented, set to “0xFF”. However, how to implement simulcasting has not been defined in details.
ES_multi_lingual_flag	Describe the ES multilingual flag. Set to '1' for dual mono, bilingual and multiplexing broadcast.
main_component_flag	Describe the main component flag. Set to '1' if the audio component is the main audio.
quality_indicator	Describe the quality indicator.
sampling_rate	Describe the sampling frequency for the relative audio component. For the sampling frequencies, see Table 6-48 of Part 2 in ARIB STD-B10 and for the values transmitted in Digital Terrestrial Television Broadcasting, see Table 31-60.
ISO_639_language_code	Describe the language name for the (first) audio component. (See ISO639-2/ISO8859-1 and Table 31-62.)
ISO_639_language_code_2	In the ES multilingual mode, describe the language name for the second audio component. (See ISO639-2/ISO8859-1 and Table 31-62.)
[text_char]	Describe 16 byte (or 8 standard size characters) or shorter audio type name. For 1ES dual mono, place APR code(1 byte) between the audio type names so that the total length can be 33 bytes (16 standard size characters) or shorter. Ex) "general commentary" CR "third-base commentary" in baseball program If the above description is the default character string, this field can be omitted. With regard to the default character string, set to "audio" except for dual mono and "first audio" CR (APR code) "second audio" for dual mono. (See Vol. 2.)

Table 31-59 "component_type" Values Specified in Digital Terrestrial Television Broadcasting

component_type	Definitions
0x01	1/0 mode (single mono)
0x02	1/0+1/0 mode (dual mono)
0x03	2/0 mode (stereo)
0x07	3/1 mode
0x08	3/2 mode
0x09	3/2+LFE mode

Table 31-60 "sampling_rate" Values Specified in Digital Terrestrial Television Broadcasting

sampling_rate	Definitions
011	24kHz
101	32kHz
111	48kHz

[Rules for Reception Processing]

- ◎ **Judge the audio component types structuring events and use the component description for selecting audio component.**
- ◎ **Select the audio component only where "component_tag" is set from '0x10' to '0x2F' and from '0x84' to '0x86' independently. With regard to '0x84', if the receiver unit does not include the play function, it does not have to be selective target. If "component_tag" is not set to the above, the audio component cannot be selected independently; therefore, the audio component is not the target for the component selection function, etc.**

The Rules for Reception Processing for each field are shown in Table 31-61.

Table 31-61 Rules for Reception Processing for Audio Component Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xC4”: Judge that the relative descriptor is the Audio Component Descriptor.
descriptor_length	Judge as the length of the relative descriptor.
stream_content	=“0x2”: Judge as valid (audio). ≠“0x2”: Judge as invalid.
component_type	Judge as the audio component type of the relative component. (For component types, see Table 31-59.)
component_tag	It is the component tag value that is unique in the relative program and can be used in response to the component tag for stream identifier in PMT.
stream_type	=“0x0F”: Judge as valid (ISO/IEC13818-7 audio). ≠“0x0F”: Judge as invalid.
simulcast_group_tag	Judge that the components with the same number implement simulcasting. If it is set to “0xFF”, judge that the simulcasting is not implemented. How to implement simulcasting at the initial stage has not been defined; therefore, the receiver unit ignore this field regardless of its value.
ES_multi_lingual_flag	=‘1’: Judge that the bilingual and multiplexing broadcast is implemented if dual mono is set. =‘0’: Judge that the bilingual and multiplexing broadcast is not implemented
main_component_flag	=‘1’: Judge that the audio component is the main audio component. =‘0’: Judge that the audio component is not the main audio component.
quality_indicator	The audio quality mode can be judged.
sampling_rate	Judge as the sampling frequency for the relative audio component. (For the sampling frequencies, see Table 31-60.)
ISO_639_language_code	Judge as the language name for the (first) audio component.
ISO_639_language_code_2	In the ES multilingual mode, judge as the language name for the second audio component.
[text_char]	Judge as the audio type name within 33 bytes (16 standard size characters). If a APR code is included, judge that two audio types are separated from the APR code and described separately. If more than two APR codes are included, judge that the audio type after the second APR code is invalid; therefore, "first audio type name" CR "second audio type name" is available. If this field is omitted, judge that the default audio type name is used. With regard to the default character string, set to "audio" except for dual mono and "first audio" CR (APR code) "second audio" for dual mono. (See Vol. 2.)

[Special Remarks]

- The component description is prioritized over a language code, if any.
- If the component type is dual mono, "first audio" is firstly described, then "second audio".
- The component description may not match the actual component due to changed mode during event. (In "component_type" for this descriptor, the representative component type of

the relative component is described and is not changed in real time even when the mode is changed during the program.

- For the language names described in "ISO_639_language_code" and "ISO_639_language_code_2", see Table 31-62.

Table 31-62 Language Names Described in "ISO_639_language_code" and "ISO_639_language_code_2" in Audio Component Descriptor

ISO_639_language_code ISO_639_language_code_2	code	Language name
jpn	0x6A706E	Japanese
eng	0x656E67	English
deu	0x646575	German
fra	0x667261	French
ita	0x697461	Italian
rus	0x727573	Russian
zho	0x7A686F	Chinese
kor	0x6B6F72	Korean
spa	0x737061	Spanish
etc	0x657463	Foreign languages - language than the above Unknown Cannot determine one language because multiple languages are mixed

31.3.2.4 Data Contents Descriptor

The transmission and use of the relative descriptor is described in Vol. 3.

31.3.2.5 Content Descriptor

[Use]

Describe the information on the genre of events.

[Syntax]

The structure of Content Descriptor is shown in Table 31-63.

Table 31-63 Structure of Content Descriptor

Data structure	bit	Identifier
content_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
content_nibble_level_1	**4**	**uimsbf**
content_nibble_level_2	**4**	**uimsbf**
user_nibble	**4**	**uimsbf**
user_nibble	**4**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and definitions in 6.2.4 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **One Content Descriptor is voluntarily transmitted for one program.**

The Transmission Operating Rule for each field are shown in Table 31-64.

Table 31-64 Transmission Operating Rule of Content Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x54”.
descriptor_length	Describe the length of the Content Descriptor. Set the maximum loop count to 7 ("content_nibble": 3, "user_nibble": 4). Therefore, the maximum descriptor length is 14 bytes.
[loop]	
content_nibble_level_1	Describe the large genre of program. Set to “0xE” to provide the program characteristic.
content_nibble_level_2	Describe the middle genre of program. Set to “0x0” when "content_nibble_level_1"=“0xE”. See [Appendix B].
user_nibble	If "content_nibble" is set to “0xE0” (program attachment information for BS digital broadcasting), describe in accordance with [Appendix B]. In other case, set to “0xFF”.

[Rules for Reception Processing]

◎ **Judge the categories of events and use for displaying/searching genre based on the information.**

Find the program characteristic.

The Rules for Reception Processing for each field are shown in Table 31-65.

Table 31-65 Rules for Reception Processing for Content Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x54”: Judge that the relative descriptor is the Content Descriptor.
descriptor_length	Judge the end of data described in this descriptor. <=14byte: Valid >14byte: Can ignore the part exceeding 14 bytes
[loop]	
content_nibble_level_1	Judge as the large grenre of program. It can be used to search/display based on this genre with the middle genre. However, if it is set to “0xE”, it is not judged as a genre. (Judge that any program characteristic is specified in the subsequent field, "user_nibble".)
content_nibble_level_2	Judge as the middle genre of program. It can be used to search/display based on this genre with the large genre. When "content_nibble_level_1"=“0xE”, judge as the type of program characteristic code. (See [Appendix A].)
user_nibble	Only when "content_nibble_level_1"=“0xE”, judge as the program characteristic. When "content_nibble"=“0xE0”, judge as the program attachment information for digital broadcasting. For the program attachment information, See [Appendix B]. When "content_nibble_level_1"≠“0xE”, ignore any value. If "content_nibble_level_2" (program characteristic code table type) is added for "content_nibble_level_1"=“0xE” (program characteristic instruction), judge based on the added program characteristic code table.
user_nibble	

[Special Remarks]

None

(Detailed Operation of Content Descriptor)

- The Content Descriptor indicates the genre information on events by "content_nibble_level_1" (large genre) and "content_nibble_level_2" (middle genre).
- The maximum loop count for genre code is 7. ("content_nibble": 3, "user_nibble": 4)
- The genre code table used at the initial stage of broadcasting is shown in [Appendix A]. The genre code table may be extended by adding downloading function, etc. but the genre contents (descriptions) already defined in [Appendix A] will not be changed/deleted. (Codes will not be changed either). Accordingly, new texts will be added only to the blank cells in the genre code table if necessary.

- After genre codes are added, the case that the receiver units understand the genre names in "content_nibble_level_1" but not in "content_nibble_level_2" may be caused. In this case, judge that only genre specified in the large genre ("content_nibble_level_1") is valid.
- "Others" in the table of [Appendix A] has two meanings both in the large and middle categories:
  1. They are not categorized by the given categories but other categories.
  2. They can be categorized by multiple categories. It is difficult to categorize the program as one genre.
- "user_nibble" uses the program attachment information for digital broadcasting (shown in [Appendix B]) only in Digital Terrestrial Television Broadcasting. In this case, set "content_nibble" to “0xE0”.
- If "content_nibble_level_1" is set to other than “0xE”, set both "user_nibble" to “0xF”. Therefore, both genre and program characteristic cannot be defined in one loop.
- "content_nibble_level_1"=“0xE” is the large genre that judge what type of program characteristic code table is used to code the information in the subsequent field, "user_nibble", from "content_nibble_level_2"; therefore, it is not used as a genre name and should be excluded from the target of search function used by the receiver units.
- With regard to "user_nibble", new program characteristic code tables may be added. In this case, new categories to identify the types of code tables will be also added to "content_nibble". Therefore, in Digital Terrestrial Television Broadcasting, the setting of "content_nibble_level_1"=“0xE” and "content_nibble_level_2"≠“0x0” is not possible (the receiver units will judge as invalid), but it could be possible in the future by downloading, etc.

31.3.2.6 Digital Copy Control Descriptor

[Use]

For the relative event, place this descriptor when control information regarding digital and analog copy is set, or when the maximum bit rate is described.

[Syntax]

The structure of Digital Copy Control Descriptor is shown in Table 31-66.

Table 31-66 Structure of Digital Copy Control Descriptor

Data structure	bit	Identifier
digital_copy_control_descriptor () {		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
digital_recording_control_data	2	bslbf
maximum_bit_rate_flag	1	bslbf
component_control_flag	1	bslbf
copy_control_type	2	bslbf
if(copy_control_type != 00){		
APS_control_data	2	bslbf
}		
else{		
reserved_future_use	2	bslbf
}		
if(maximum_bit_rate_flag == 1) {		
maximum_bit_rate	8	uimsbf
}		
if(component_control_flag ==1){		
component_control_length	8	uimsbf
for(j=0;j<N;j++){		
component_tag	8	uimsbf
digital_recording_control_data	2	bslbf
maximum_bitrate_flag	1	bslbf
reserved_future_use	1	bslbf
copy_control_type	2	bslbf
if(copy_control_type != 00) {		
APS_control_data	2	bslbf
}		
else{		
reserved_future_use	2	bslbf
}		
if(maximum_bitrate_flag==1){		
maximum_bitrate	8	uimsbf
}		
}		
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.23 and Annex F of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor should be placed if the relative event is the target for digital/analog copy control.**

However, the completely same descriptor as the relative descriptor to be placed in the SDT can be omitted.

○ This descriptor should be placed if the maximum bit rate for the relative event is not within the range of default maximum bit rate specified in Table 21-1 and Table 21-2.

However, the completely same descriptor as the relative descriptor to be placed in the SDT can be omitted.

○ When this descriptor is placed, all fields with the different values from the default values should be described.

For example, even when the maximum bit rate is same as that for the whole service, it should be described if it is different from the default maximum bit rate.
(If it is not described, it is regarded as the default maximum bit rate.)

The Transmission Operating Rule for each field are shown in Table 31-67.

Table 31-67 Transmission Operating Rule of Digital Copy Control Descriptor (EIT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xC1”.
descriptor_length	Describe the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and is coded according to Table 31-68 and Table 31-69.
maximum_bit_rate_flag	Set to '0' if the maximum bit rate for the relative service is not described. Set to '1' if the maximum bit rate for the relative service is described.
component_control_flag	When it is set to '1', the fields later than the component control length become valid, and the digital copy control information is specified for every component structuring a program. When it is set to '0', the digital copy control information is defined for the whole program, and the fields later than the component control length do not exist.
copy_control_type	This 2-bit field indicates the information used for copy generation control type and is coded according to Table 31-68 and Table 31-69.
APS_control_data	Analog output copy control information. This 2-bit field indicates the information used for analog output copy control if "copy_control_type" is set to ’01’, ’10’ or ’11’ and is coded according to Table 31-68 and Table 31-69.
maximum_bit_rate	Describe the maximum bit rate.

The details of each bit are shown in the following sections.

Note that the specifications for controlling each output terminal using Digital Copy Control Descriptor vary according to the service contents.

[Points of Use (Digital TV Service and Special Video Service)]

If "service_type" described in Service List Descriptor of NIT is set to ”0x01” (digital TV service) and ”0xA1” (special video service), it should be coded according to Table 31-68.

Table 31-68 Operation of Descriptors for Digital TV Service and Special Video Service

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control *3</th><th colspan="3">Operation of each field</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th></tr>
<tr><td>Copy freely</td><td>Copy freely</td><td rowspan="5">01</td><td>00</td><td>00 *5</td></tr>
<tr><td rowspan="2">Copy never *1</td><td>Copy never without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">11</td><td rowspan="2">00</td></tr>
<tr><td>Copy never. *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy one generation *2</td><td>Copy one generation without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="2">10</td><td>00</td></tr>
<tr><td>Becomes ”Copy never” after copying over one generation. *4</td><td>Other than 00</td></tr>
</table>

*1: When output to the High-Speed Digital Interface, the Copy Never protection of the Source function specified by DTCP shall be applied. However, when outputting only audio streams in the IEC60958 conformant format, the No More Copies protection shall be applied.

*2: When output to the High-Speed Digital Interface, the Copy One Generation protection of the Source function specified by DTCP shall be applied.

*3: Applicable to composite and component video output. Also applicable to the cases where received video signals are format converted and output. Macrovision copy protection is applied to 480i composite and component video signals.

*4: Analog video output should be performed in accordance with the parameters specified by Macrovision and specified "APS_control_data".

*5: The receiver units do not use this field value for the judgement of receiving process.

[Points of Use (Data Service, Special Data Service and Bookmark List Data Service)]

If "service_type" described in Service List Descriptor of NIT is set to ”0xC0” (data service), ”0xA3” (special data service) and ”0xAA” (bookmark list data service), it should be coded according to Table 31-69.

Table 31-69 Operation of Descriptors for Data Service, Special Data Service and Bookmark List Data Service

(1) When providing services other than those in partial reception layer:

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control *3</th><th colspan="3">Operation of each field</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th></tr>
<tr><td>Copy freely</td><td>Copy freely</td><td>01/11</td><td>00</td><td>00 *5</td></tr>
<tr><td rowspan="2">Copy never *1</td><td>Copy never without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">01</td><td rowspan="4">11</td><td>00</td></tr>
<tr><td>Copy never. *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy never, and the output of MPEG_TS is disabled. *9</td><td>Copy never without Macrovision protection. Therefore, it shall only be copyable on conventional analog input/recording devices.</td><td rowspan="2">11</td><td>00</td></tr>
<tr><td>Copy never. *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy one generation *2</td><td>Copy one generation without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="2">01</td><td rowspan="4">10</td><td>00</td></tr>
<tr><td>Becomes ”Copy never” after copying over one generation. *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy one generation, but the output of MPEG_TS is disabled. *9</td><td>Copy one generation without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="2">11</td><td>00</td></tr>
<tr><td>Becomes ”Copy never” after copying over one generation. *4</td><td>Other than 00</td></tr>
</table>

(2) When providing services in partial reception layer[*8]:

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control [*3]</th><th colspan="3">Use of each field</th></tr>
<tr><th>copy_control _type</th><th>digital_recording_ control_data</th><th>APS_control_ data</th></tr>
<tr><td>Copy freely</td><td>Copy freely</td><td rowspan="3">10</td><td>00</td><td>00</td></tr>
<tr><td rowspan="2">Copy one generation [*6]</td><td>Copy one generation without Macrovision protection.
It shall therefore be copyable on conventional analog recording devices.</td><td rowspan="2">10</td><td>00</td></tr>
<tr><td>Becomes ”Copy never” after copying over one generation. [*7]</td><td>Other than 00</td></tr>
</table>

*1: When output to the High-Speed Digital Interface, the Copy Never protection of the Source function specified by DTCP shall be applied. However, when outputting only audio streams in the IEC60958 conformant format, the No More Copies protection shall be applied.

*2: When output to the High-Speed Digital Interface, the Copy One Generation protection of the Source function specified by DTCP shall be applied.

*3: Applicable to composite and component video output. Also applicable to the cases where received video signals are format converted and output. Macrovision copy protection is applied to 480i composite and component video signals.

*4: Analog video output should be performed in accordance with the parameters specified by Macrovision and specified "APS_control_data".

*5: The receiver units do not use this field value for the judgement of receiving process.

*6: Regarding the partial reception layer, the output from High-Speed Digital Interface is prohibited for protected contents (i.e. contents with the digital_recording_control_data other than ‘00’ or the encryption_mode ‘0’).

*7: For more information on analog video output, see Part 2, 5.3 and 5.5.2 of Vol.8.

*8: Data service shall be the only service in the partial reception layer.

*9: In the case of IP interface, outputting of MPEG_PS shall also be prohibited.

[Points of Use (Common in All Services)]

Transmission and use should not be applied to other combinations than those specified in Table 31-68 and Table 31-69.

For CGMS-A, when "copy_control_type" is set to ’01’, ’10’ and ’11’, "digital_recording_control_data" and "APS_control_data" are copied in the area specified by CGMS-A.

When the relative descriptor includes the copy control information, the copyright process appropriate to analog video output, high-speed digital interface output and digital audio output is performed before outputting. CGMS-A and MACROVISION is used for analog video output, DTCP for high-speed digital interface output, and SCMS for digital audio output. For the details of process, see the specifications and standards.

The information should be accurately reflected in the copyright bit and category code of the channel status specified by IEC 60958.

The category code is set to "001_0000L" if Digital Copy Control Descriptor is provided.

Copy is enabled unconditionally: Set the copyright information bit to '1'.

Copy is enabled for one generation: Set the copyright information bit to '0' and L bit of category code to '0'.

Copy is disabled: Set the copyright information bit to '0' and L bit of category code to '1'.

If no relative descriptor is described, it is regarded as copy free.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 31-70.

Table 31-70 Rules for Reception Processing for Digital Copy Control Descriptor (EIT)

Rules for Reception Processing for each field	
descriptor_tag	= “0xC1” : Judge that the relative descriptor is Digital Copy Control Descriptor.
descriptor_length	Judge as the length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field indicates the information used for copy generation control and coded according to Table 31-68 and Table 31-69.
maximum_bit_rate_flag	=‘0’: Judge that the maximum bit rate for the relative service is within the range of default maximum bit rate specified in Table 21-1 and Table 21-2. =‘1’: Judge that the maximum bit rate for the relative service is described below.
component_control_flag	=’0’ : Judge that the digital copy control for each component is not implemented. =’1’ : Judge that the digital copy control for each component is implemented.
copy_control_type	This 2-bit field indicates the information on type used for copy generation control and is coded according to Table 31-68 and Table 31-69.
maximum_bit_rate	Judge as the maximum bit rate for the relative service.

[Special Remarks]

Since the analog output signal copy control conforms to the individual contracts between broadcasting companies and Macrovision, it seems necessary to re-consider carefully.

If the Rules for Reception Processing are not specified in Table 31-68 and Table 31-69, see Table 5-1 of Part 1 in Vol. 8 and Table 5-1 of Part 2 in Vol. 8.

31.3.2.7 CA Contract Info Descriptor

[Use]

Describe the verification information to check if viewing (recording) by reserving with regard to the program including the chargeable components (groups).

[Syntax]

The structure of CA Contract Info Descriptor is shown in Table 31-39.

[Semantics of Each Field]

The definitions of each field are specified in Table 31-40.

[Transmission Operating Rule]

◎ **Only one descriptor should be placed and transmitted if the relative event is based on the chargeable services.**
However, the completely same descriptor as the relative descriptor to be placed in the SDT can be omitted.

○ When "free_CA_mode=0", the relative descriptor for "CA_unit_id=0x1" should not be placed.

○ When "free_CA_mode=1", the relative descriptor for "CA_unit_id=0x1" should be placed.

○ Do not change the value if possible, once it is set up.

The Transmission Operating Rule for each field are shown in Table 31-71.

Table 31-71 Transmission Operating Rule of CA Contract Info Descriptor (EIT)

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xCB”.
descriptor_length	Describe the length of the relative descriptor. The maximum value is 209.
CA_system_id	Describe the conditional access system identifier.
CA_unit_id	Describe the chargeable unit identifier. Only "0x1" is used in Digital Terrestrial Television Broadcasting.
num_of_component	Describe the number of the relative chargeable unit components. The maximum value is 12.
[component_tag]	Describe the tag value of the relative chargeable unit components.
contract_verification _info_length	Describe the length of contract verification information. The maximum value is 172.
[contract_verification _info]	Describe the contract verification information.
fee_name_length	Set to the fixed value, '0'.
[fee_name]	This field is not used.

[Rules for Reception Processing]

○ When either of the following conditions is fulfilled, judge that the contract verification information for the EIT is invalid.

- The relative descriptor including "free_CA_mode=0" and "CA_unit_id=0x1" is placed.
- The relative descriptor including "free_CA_mode=1" and "CA_unit_id=0x1" is not placed.

In addition, the description in the SDT is invalid.

○ The description in the EIT prioritizes that in the SDT if it is valid and different from that in the SDT.

○ If the description in the EIT is invalid, the reservation is disabled.

The Rules for Reception Processing for each field are shown in Table 31-72.

Table 31-72 Rules for Reception Processing for CA Contract Info Descriptor (EIT)

Rules for Reception Processing for each field	
descriptor_tag	= “0xCB”: Judge that the relative descriptor is the CA Contract Info Descriptor.
descriptor_length	Judge as the length of the CA Contract Info Descriptor.
CA_system_id	The value is valid if it is the valid conditional access system identification value specified in Vol. 5 (Section 5.6). Judge that any other value refers to the noncompliant conditional access system (reservation is disabled).
CA_unit_id	=0x0: Judge as invalid. =0x1: Judge as the chargeable unit identifier including group of default ES’. >0x1: Perform the receiving process for noncompliant PPV if the contract confirmation command/response indicates PPV. For any other contract programs, judge that the whole relative descriptor is invalid.
num_of_component	= 0: Judge that the whole relative descriptor is invalid. <=12: Judge as the number of relative chargeable unit components. >12: Judge that the whole relative descriptor is invalid.
[component_tag]	Judge as the tag value for the relative chargeable unit component.
contract_verification _info_length	<=172: Length of contract verification information >172: Judge that the whole relative descriptor is invalid.
[contract_verification _info]	Judge as the contract verification information.
fee_name_length	The receiver unit ignores.
[fee_name]	The receiver unit ignores.

31.3.2.8 Event Group Descriptor

[Use]

Describe the information on grouping of events for Event Common, linkage information for implementing event relays and information on move source used when event movements occur across services.

[Syntax]

The structure of Event Group Descriptor is shown in Table 31-73.

Table 31-73 Structure of Event Group Descriptor

Data structure	bit	Identifier
event_group_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
group_type	**4**	**uimsbf**
event_count	**4**	**uimsbf**
for (i=0 ;i<event_count ; i++) {		
service_id	**16**	**uimsbf**
event_id	**16**	**uimsbf**
}		
if(group_type == 4 || group_type ==5){		
for(i=0;i< N ; i++){		
original_network_id	**16**	**uimsbf**
transport_stream_id	**16**	**uimsbf**
service_id	**16**	**uimsbf**
event_id	**16**	**uimsbf**
}		
}		
else{		
for(i=0 ;i< N ; i++){		
private_data_byte	**8**	**uimsbf**
}		
}		
}		

[Semantics of Each Field]

The definitions of each field for the Event Group Descriptor are shown in Table 31-74.

Table 31-74 Definitions of Each Field for Event Group Descriptor

Definitions	
group_type	Event group type. For the types, see Table 31-75.
event_count	Loop count for subsequent "event_id"
service_id	Assigned service identifier
event_id	Assigned event identifier
original_network_id	Assigned original network identifier
transport_stream_id	Assigned transport stream identifier
[private_data_byte]	Undefined

Table 31-75 Group Types Specified in Digital Terrestrial Television Broadcasting

group_type	Type names
0x1	Event Common
0x2	Event relay
0x3	Event movement
0x4	Event relay to other network
0x5	Event movement from other network

The definitions for "original_network_id", "transport_stream_id" "service_id" and "event_id" vary depending on group types as follows:

- Event Common (Implement grouping when one program is broadcasted using multiple services)
  With regard to the events regarded as “referred to”, describe the reference destination (itself) and describe “service_id” and “event_id” for all “referred from” if necessary. For the services regarded as “referred from”, describe “service_id” and “event_id” for “referred to”.
- Event relay (Guide from a certain event to other event)
  For the service constituting relay source, place the relative descriptor including “service_id” and "event_id" of the relay destination.
- Event movement (Move events along with change of service channels)
  Place the relative descriptor in the EIT of event constituting move destination and describe "service_id" and "event_id" for the event constituting move source.
- Event relay to other network
  For the event constituting relay source, place the relative descriptor including "original_network_id", "transport_stream_id", "service_id" and "event_id" of the relay destination.
- Event movement from other network
  For the EIT of the event constituting move destination, place the relative descriptor and describe "original_network_id", "transport_stream_id", "service_id" and "event_id" of the event constituting move event relay source.

[Transmission Operating Rule]

◎ **This descriptor is transmitted if necessary.**

The Transmission Operating Rule for each field are shown in Table 31-76.

Table 31-76 Transmission Operating Rule of Event Group Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xD6”.
descriptor_length	Describe the length of the Event Group Descriptor. Do not define the maximum value.
group_type	Describe the group type.
event_count	Describe the loop count for the subsequent "event_id" loop. Set to “0x0” if "group_type" is set to “0x4” or “0x5”.
original_network_id	Describe the assigned original network identifier.
transport_stream_id	Describe the assigned transport stream identifier.
service_id	Describe the assigned service identifier.
event_id	Describe the assigned event identifier.
[private_data_byte]	Do not describe.

[Rules for Reception Processing]

◎ **Judge that the event related to the relative event exists and use the event (Event Common, event relay, event movement, event relay to other network and event movement from other network).**

The Rules for Reception Processing for each field are shown in Table 31-77.

Table 31-77 Rules for Reception Processing for Event Group Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xD6”: Judge that the relative descriptor is the Event Group Descriptor.
descriptor_length	Judge as the end of data described in this descriptor.
group_type	Judge as the group type.
event_count	Judge as the loop count for the subsequent "event_id" loop.
original_network_id	Judge as the assigned original network identifier.
transport_stream_id	Judge as the assigned transport stream identifier.
service_id	Judge as the assigned service identifier.
event_id	Judge as the assigned event identifier.
[private_data_byte]	Ignore any value described.

[Special Remarks]

For the details of Event Group Descriptor, see Chapter 17 (Event Common) and Chapter 24 (Event Relay).

(Operation of Event Movement)

Event movement is used when the service (service channel) for the scheduled program is changed in the same media type of service group in the same terrestrial broadcaster. The change is made by using the relative descriptor to describe "service_id" and "event_id" for the originally scheduled event (event constituting move source) in the EIT for the changed event (event constituting move destination). However, the event is not changed to broadcast earlier than the originally scheduled time.

(Example)

- Original schedule

  September 20 15:00 service_id=A event_id=01 "Academy Award"
- Changed schedule

  September 20 15:00 service_id=A event_id=02 "plenary debates in the Diet"

  September 20 15:00 service_id=B event_id=03 "Academy Award"

In this case, the relative descriptor including the event constituting move source (15:00 service_id=A event_id=01 "Academy Award") is placed in the event constituting move destination (15:00 service_id=B event_id=03 "Academy Award").

To implement an event movement, comply with the following Transmission Operating Rule:

- The start time of event constituting move destination is the same as the originally scheduled time or later.
- The event constituting move destination and Event Group Descriptor including the event constituting move source should be described in the EIT for the event constituting move destination at least 1 hour and 30 seconds before the originally scheduled start time.
- To move the event for Event Common, describe all events constituting move source for Event Common in the Event Group Descriptor for the event constituting move destination.

  However, if the event constituting move destination is shared, describe the event descriptor where "group_type" is set to '0x3' or '0x5' only in the "referred to" (event constituting reference destination).

  (Example)

  ○ Event constituting move source

  – 1, 2 and 3 channels at A station

  – Event Common where channel 1 is the "referred to" (event constituting reference destination)

network=TS=A station, service_id=1, event_id=1 ("referred to")

[Event Group Descriptor] (Event Common)

(service_id=1, event_id=1), (service_id=2, event_id=2), (service_id=3, event_id=3)

network=TS=A station, service_id=2, event_id=2

[Event Group Descriptor] (Event Common) service_id=1, event_id=1

network=TS=A station, service_id=3, event_id=3

[Event Group Descriptor] (Event Common) service_id=1, event_id=1

The above event is moved to the event below, then;

○ Event constituting move destination

4, 5 and 6 channels at B station

Event Common where channel 4 is the "referred to" (event constituting reference destination)

○ How to describe the Event Group Descriptor in the event constituting move destination

network=TS=B station, service_id=4, event_id=4 ("referred to")

[Event Group Descriptor] (Event Common)

(service_id=4, event_id=4), (service_id=5, event_id=5), (service_id=6, event_id=6)

[Event Group Descriptor] (Event moved from other network)

(original_network_id=A station, TS_id=A station, service_id=1, event_id=1),

(original_network_id=A station, TS_id=A station, service_id=2, event_id=2),

(original_network_id=A station, TS_id=A station, service_id=3, event_id=3)

network=TS=B station, service_id=5, event_id=5

[Event Group Descriptor] (Event Common) service_id=4, event_id=4

("Move" is a "referred from" for Event Common; therefore, it is not described.)

network=TS=B station, service_id=6, event_id=6

[Event Group Descriptor] (Event Common) service_id=4, event_id=4

("Move" is a "referred from" for Event Common; therefore, it is not described.)

31.3.2.9 Component Group Descriptor

[Use]

Define and identify the component combination in the event. It is used in Multi-view Television (MVTV), etc.

[Syntax]

The structure of Component Group Descriptor is shown in Table 31-78.

Table 31-78 Structure of Component Group Descriptor

Data structure	bit	Identifier
component_group_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
component_group_type	**3**	**uimsbf**
total_bit_rate_flag	**1**	**uimsbf**
num_of_group	**4**	**uimsbf**
for (i = 0;i< num_of_group ;I++) {		
component_group_id	**4**	**uimsbf**
num_of_CA_unit	**4**	**uimsbf**
for (i = 0;i< num_of_CA_unit ;i++) {		
CA_unit_id	**4**	**uimsbf**
num_of_component	**4**	**uimsbf**
for (i = 0;i< num_of_component ;i++) {		
component_tag	**8**	**uimsbf**
}		
}		
if (total_bit_rate_flag==1){		
total_bit_rate	**8**	**uimsbf**
}		
text_length	**8**	**uimsbf**
for (i = 0;i< text_length ;i++) {		
text_char	**8**	**uimsbf**
}		
}		
}		

[Semantics of Each Field]

The definitions of each field are shown in Table 31-79.

Table 31-79 Definitions of Component Group Descriptor

Definitions	
component_group_type	This 3-bit field indicates the component group type. ‘000’: Multi-view Television service ‘001’ - ‘111’: Reserved for the future
total_bit_rate_flag	It refers to the description state of total bit rate in the component group during the event. ‘0’: The total bit rate field in the component group does not exist in the relative descriptor. ‘1’: The total bit rate field in the component group exists in the relative descriptor.
num_of_group	It refers to the number of component groups in the event.
component_group_id	It refers to the component group identifier. The identification values are as follows: “0x0”: Main group “0x1”-“0xF”: Sub-group
num_of_CA_unit	It refers to the number of chargeable/free units in the component group.
CA_unit_id	It refers to the chargeable unit identifier the component belongs to. The identification values are as follows: "0x0": Free unit group "0x1": Chargeable unit group including the default ES' "0x2-0xF": Chargeable unit group except the above
num_of_component	It refers to the number of components that belong to the relative component group and chargeable/free unit shown in the last "CA_unit_id".
component_tag	It refers to the tag value that belongs to the component group.
total_bit_rate	It refers to the total bit rate of component in the component group.
text_length	It refers to the byte length of the subsequent component group description.
[text_char]	It refers to the description of the component group.

[Transmission Operating Rule]

◎ **This descriptor including "component_group_type"='000' should be transmitted if the Multi-view Television service is provided.**

The Transmission Operating Rule for each field are shown in Table 31-80.

Table 31-80 Transmission Operating Rule of Component Group Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to "0xD9".
descriptor_length	Describe the length of the relative descriptor. Do not define the maximum value.
component_group_type	Describe the component group type. '000': Multi-view Television
total_bit_rate_flag	='0': All of the total bit rates in the group during the event is within the default range specified in Section 21.3.1. ='1': Any of the total bit rates in the group during the event exceeds the default range specified in Section 21.3.1.
num_of_group	Describe the number of component groups in the event. For MVTV, set to 3 at maximum.
component_group_id	Describe the component group identifier. Set the main group to "0x0". For each sub-group, the broadcasting companies assign the identifier that is unique in the event.
num_of_CA_unit	Describe the number of chargeable/free units in the component group. The maximum value is 2. Set to "0x1" if any chargeable component is not included in the relative component group.
CA_unit_id	Describe the chargeable unit identifier. The broadcasting companies assign the identifier that is unique in the event.
num_of_component	Describe the number of components that belong to the relative component group and chargeable/free unit shown in the last "CA_unit_id". The maximum value is 15.
component_tag	Describe the tag value that belongs to the component group.
total_bit_rate	Describe the total bit rate of component in the component group. Set to "0x00" if it is within the default range.
text_length	Describe the byte length of the subsequent component group description. The maximum value is 16 bytes (8 standard size characters).
[text_char]	The description of the component group should be described. The default character string is not provided. Do not use APR code at operation position codes.

[Rules for Reception Processing]

○ Judge that the Multi-view Television service is provided in the relative event by placing the Component Group Descriptor where "component_group_type" is set to '000' and use for every component group.

The Rules for Reception Processing for each field are shown in Table 31-81.

Table 31-81 Rules for Reception Processing for Component Group Descriptor

Rules for Reception Processing for each field	
descriptor_tag	="0xD9": Judge that the relative descriptor is the Component Group Descriptor.
descriptor_length	Judge as the length of the Component Group Descriptor.
component_group_type	'000': Judge as the Multi-view Television service.
total_bit_rate_flag	='0': The total bit rate in the group during the event is not described in the relative descriptor. ='1': The total bit rate in the group during the event is described in the relative descriptor.
num_of_group	Judge as the number of component groups in the event. If the maximum value is set and a value exceeds the maximum value, the value may be regarded as the maximum value.
component_group_id	="0x0": Judge as the main group. ≠"0x0": Judge as the sub-group.
num_of_CA_unit	Judge as the number of chargeable/free units in the component group. If the value exceeds the maximum value, it may be regarded as 2.
CA_unit_id	"0x0": Judge as the free unit identifier. "0x1": Judge as the chargeable unit identifier including the default ES'. Others: Judge as the chargeable unit identifier except the above.
num_of_component	Judge as the number of components that belong to the relative component group and chargeable/free unit shown in the last "CA_unit_id". If the value exceeds the maximum value, it may be regarded as 15.
component_tag	Judge as the tag value that belongs to the component group. It can be used in response to the component tag for stream identifier in PMT.
total_bit_rate	Judge as the total bit rate of component in the component group. If it is set to "0x00", judge that it is within the default range.
text_length	<=16 (8 standard size characters): Length of component group description. >16 (8 standard size characters): Ignore the part exceeding the maximum component group description length, 16 bytes (8 standard size characters).
[text_char]	Judge as the description of the component group.

[Special Remarks]

○ The default ES' for each group should be described in the component loop where "CA_unit" loop is placed at the first.

○ In the main group ("component_group_id"="0x0"):

- If the default ES' in the group is a free service, then set to "free_CA_mode"='0', and do not set for the component loop where "CA_unit_id"="0x1".
- If the default ES' in the group is a chargeable service, then set to "free_CA_mode"='1', and set and describe the component loop where "CA_unit_id"="0x1".

○ When the subgroup is set as component_group_id>0x0:

- For subgroups, only the same chargeable unit as that for main group or free unit can be specified.
- If the default ES' in the group is a free service, then set and describe the component loop where "CA_unit_id"="0x0".
- If the default ES' in the group is a chargeable service, then set and describe the component loop where "CA_unit_id"="0x1".

31.3.2.10 Series Descriptor

[Use]

Identify the series programs.

[Syntax]

The structure of the Series Descriptor is shown in Table 31-82.

Table 31-82 Structure of Series Descriptor

Data structure	bit	Identifier
series_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
series_id	**16**	**uimsbf**
repeat_label	**4**	**uimsbf**
program_pattern	**3**	**uimsbf**
expire_date_valid_flag	**1**	**uimsbf**
expire_date	**16**	**uimsbf**
episode_number	**12**	**uimsbf**
last_episode_number	**12**	**uimsbf**
for(i=0; i< N; i++) {		
series_name_char	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

The definition of each field are shown in Table 31-83 and program patterns (program_pattern) are shown in Table 31-84.

Table 31-83 Definitions of Each Field for Series Descriptor

Definitions	
series_id	Identifier to identify the unique series. An unique identifier is assigned in multiple services that belong to the same media type in the same terrestrial broadcaster in the BIT.
repeat_label	Number of repeating times. If the broadcasting period of the series program overlaps the repeating period, set "repeat_label" to "0x1". If an additional repeating exists, set "repeat_label" to "0x2". During the same period, the broadcasting and repeating of the same series consisting of up to 15 programs can be provided. Set the broadcasting service to "0x0". The number does not have the specific meaning but it provides the label to identify the program.
program_pattern	It indicates the program pattern of the series program. This shows when the next event belonging to the series appears.
expire_date_valid_flag	Flag to indicate whether the subsequent value in "expire_date" is valid or not. If the end of the series is valid, set to ‘1’.
expire_date	It indicates the valid period of the series. The date is shown in the MJD format. Even when the last event cannot be identified due to any reason, the receiver unit recognizes that the series program has ended after the date.
episode_number	It indicates the number of episodes of the program specified in this descriptor. It can be set from 1 to 4095. If it exceeds 4095, separately defined the new series. Set to "0x000" if the number of episodes of a serial program cannot be determined.
last_episode_number	It indicates the total number of the relative series programs. It can be set from 1 to 4095. If it exceeds 4095, separately defined the new series. Set to "0x000" if the last episode is not determined.
series_name_char	Character code to indicate the series name.

Table 31-84 Program Pattern (program_pattern)

program_pattern	Program patterns
0x0	Irregular (Others than those set to "0x1" to "0x7")
0x1	Across-the-board (including everyday, from every Mon. to Fri., Sat. and Sun. only, etc.) and several times in a week
0x2	Weekly (including every Tuesday, etc.)
0x3	Monthly
0x4	Multiple episodes in a day
0x5	Division of long-time program
0x6-0x7	reserved

[Transmission Operating Rule]

◎ **Only one descriptor can be placed for one event.**

The Transmission Operating Rule for each field are shown in Table 31-85.

Table 31-85 Transmission Operating Rule of Series Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0xD5”.
descriptor_length	Describe the length of the Series Descriptor.
series_id	Describe the series identifier. Assign a unique identifier in the services that belong to the same media type in the same terrestrial broadcaster. It is recommended not to assign the same series identifier to another series within 100 days after the series ends.
repeat_label	Describe the label of the repeating program of the series.
program_pattern	Describe the program pattern of the series event.
expire_date_valid_flag	If the value in "expire_date" is valid, set to ‘1’.
expire_date	Describe the valid period of the series in the MJD format.
episode_number	Describe the number of the series events in the binary mode. It is usually equal to the number of episodes. If the series program cannot determine the number of episodes, set to "0x000".
last_episode_number	Describe the total number of series programs (last episode number) in the binary mode. If the total number is not determined, set to "0x000".
series_name_char	Describe the series name within 48 bytes or 20 standard size characters. Do not use APR codes. If "series_name_char" does not exist, the event name is used as the series name.

[Rules for Reception Processing]

◎ **To use to identify the series programs of the relative programs.**

The Rules for Reception Processing for each field are shown in Table 31-86.

Table 31-86 Rules for Reception Processing for Series Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0xD5”: Judge that the relative descriptor is the Series Descriptor.
descriptor_length	Judge as the length of the relative descriptor.
series_id	Judge as the series identifier. (Unique identifier in the services that belong to the same media type in the same terrestrial broadcaster)
repeat_label	Judge as the repeating group out of series that are broadcasted during the same period.
program_pattern	Judge as a guide of program pattern for the relative series.
expire_date_valid_flag	‘0’ = Judge that the subsequent value in "expire_date" is invalid. ‘1’ = Judge that the subsequent value in "expire_date" is valid.
expire_date	If the value in this field is valid, judge that the series has ended after the date.
episode_number	Judge as the number of episodes of the relative events in the series.
last_episode_number	Judge as the total number of series programs. If the value in "episode_number" is equal to that in "last_episode_number", judge that the event ends at the value in "repeat_label" for the relative series.
series_name_char	Judge as the series name. If no name is described, judge that the program title in the Short Event Descriptor for the relative event is the series name.

[Special Remarks]

For the operation of the series, see Chapter 18 of this document.

31.3.2.11 Extended Event Descriptor

[Use]

Describe the detailed textual information on events.

[Syntax]

The structure of Extended Event Descriptor is shown in Table 31-87.

Table 31-87 Structure of Extended Event Descriptor

Data structure	bit	Identifier
extended_event_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
descriptor_number	**4**	**uimsbf**
last_descriptor_number	**4**	**uimsbf**
ISO_639_language_code	**24**	**bslbf**
length_of_items	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
item_description_length	**8**	**uimsbf**
for (j = 0;j< N;j++) {		
item_description_char	**8**	**uimsbf**
}		
item_length	**8**	**uimsbf**
for (j = 0;j< N;j++) {		
item_char	**8**	**uimsbf**
}		
}		
text_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
text_char	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.7 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **Transmit multiple descriptors voluntarily (Maximum: 16)**

The Transmission Operating Rule for each field are shown in Table 31-88.

Table 31-88 Transmission Operating Rule of Extended Event Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x4E”.
descriptor_length	Describe the length of the Extended Event Descriptor. Do not define the maximum value.
descriptor_number	Describe the Extended Event Descriptor number if the information is divided into several pieces and each descriptor is described. - When the information is described by items - When 220-byte or longer item name is described In those cases, the next field should be transmitted without initializing.
last_descriptor_number	Described the last Extended Event Descriptor number for the related descriptors.
ISO_639_language_code	Set to “jpn (“0x6A706E”)”.
length_of_items	Describe the length of item.
[item_loop]	
item_description_length	Describe the length of item name within 16 bytes (8 standard size characters). If the item description exceeds 220 bytes, it can be described using 2 Extended Event Descriptors. However, item_description_length=0 shall be applied to the item name length of the second descriptor. In other words, item_description_length=0 shall only be permitted in the second descriptor of when splitting and transmitting the item description of a single item name in two parts. Refer to (Operation of Item Description) for details.
[item_description_char]	Describe the item name within 16 bytes (8 standard size characters). If the item description exceeds 220 bytes, it can be described using 2 Extended Event Descriptors. However, no item name shall be described in the second descriptor. Moreover, it shall be necessary to describe the item names in all other cases. Refer to (Operation of Item Description) for details.
item_length	Describe the length of item description within 220 bytes.
[item_char]	Describe the item description within 220 bytes.
text_length	Set to “0x00”.
[text_char]	Do not describe.

[Rules for Reception Processing]

◎ **Judge as the detailed textual information on events and display as necessary.**

The Rules for Reception Processing for each field are shown in Table 31-89.

Table 31-89 Rules for Reception Processing for Extended Event Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x4E”: Judge that the relative descriptor is the Extended Event Descriptor.
descriptor_length	Judge as the length of the relative descriptor.
descriptor_number	Compare with the last Extended Event Descriptor number and judge if it is the end of information.
last_descriptor_number	Judge as the last Extended Event Descriptor number.
ISO_639_language_code	Even if it is set to any other than “jpn (“0x6A706E”)”, the character code placed later is regarded as ”jpn”.
length_of_items	Judge as the length of item.
[item_loop]	
item_description_length	=<16 bytes (8 standard size characters): Judge as the length of item name. >16 bytes (8 standard size characters): Judge that the part of the item name exceeding 16 bytes (8 standard size characters) is invalid. If it is set to '0', judge that the item description in the descriptor of the previous "descriptor_number", is continuously described.
[item_description_char]	Judge as the item name.
item_length	=<220byte: Judge as the length of item description. >220byte: Judge that the part of the item description exceeding 220 bytes is invalid. If "item_description_length" is set to '0', judge that the item description in the descriptor of the previous "descriptor_number", is continuously described. The information in those two fields is processed as the serial character string including Designation/Call function. In this case, the field should not be initialized.
[item_char]	
text_length	
[text_char]	Judge as invalid.

[Special Remarks]

None

(Operation of Item Description)

The maximum length of item description is 220 bytes. If the length of item description exceeds 220 bytes, two Extended Event Descriptors with two serial "descriptor_number" assigned can be used. (Up to two descriptors can be used for the same item name.) In this case, do not describe the item name in the second descriptor and transmit by simply dividing by byte unit. The Designation/Call state of the item description in the first descriptor will be succeeded by the character string of the second item description. Therefore, at maximum, the item description can have 440-byte character string. When the item description is divided into

two descriptors, the maximum number of characters in one item description is not defined. However, the total length of two item descriptions is 200 standard size characters and 440 bytes or less.

In consideration of search and display functions, it is recommended to transmit in the following ways:

Describe in order of importance.

1) Transmit on the assumption that the information is expressed based on 20-character width.
2) Limit the item names described in "item_description_char" to four items: "cast", "original story/script", "direction" and "music", and describe the item description based on the following rule:

- Use the combinations shown in Table 31-91 with brackets for the item names such as host used in the item description, and do not use these codes for other purposes. Do not apply the double usage and nested description for the brackets used for this purpose.
- For distinguishing the name used in the item description, use ‘, ’ or ‘、’ specified in Table 31-90. Do not use these codes for other purposes.
- Use "carriage return (CR)" and "space □" to express the displaying intention of broadcasting station.

Ex) 【Host】Hanako Yamada, Taro Yamada (CR)
□□□Jiro Yamada

Table 31-90 Definitions of Codes: ‘, ’ and ‘、’

Character	Collection of character code	GL	GR
,	Kanji plane 1	0x21,0x24	0xA1,0xA4
	Alphanumeric (1-byte code)	0x2C	0xAC
、	Kanji plane 1	0x21,0x22	0xA1,0xA2
	Katakana (1-byte code)	0x7D	0xFD
	Hiragana (1-byte code)	0x7D	0xFD

Table 31-91 Character Codes Used for Bracketing Items Described in Item Description

Left bracket	Collection of character code	GL	GR	Right bracket	Collection of character code	GL	GR
《	Kanji plane 1	0x21,0x54	0xA1,0xD4	》	Kanji plane 1	0x21,0x55	0xA1,0xD5
【	Kanji plane 1	0x21,0x5A	0xA1,0xDA	】	Kanji plane 1	0x21,0x5B	0xA1,0xDB

(Operation of Item Names (Reservation term))

For one Extended Event Descriptor, describe only one item.

The maximum length of the item name is 8 standard size characters or 16 bytes. If a character code such as "Notice" shown as reservation term in [Appendix C] is inserted, the

receiver unit can use freely the Reservation term including converting into a pictogram. In addition, other item names (free description item) than those provided in [Appendix C] are also available. The item name in the item name field is also coded as character string.

(Operation of Extended Description)

Fix the extended description length ("text_length") to '0' since the extended description is not used.

31.4 TOT (Time Offset Table)

31.4.1 Structure and Use of TOT

[Use]

Transmit the JST, date and time offset value used when summer time is applied.

[Syntax]

The structure of TOT is shown in Table 31-92.

Table 31-92 Structure of TOT (Time Offset Table)

Data structure	bit	Identifier
time_offset_section(){		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
JST_time	**40**	**bslbf**
reserved	**4**	**bslbf**
descriptor_loop_length	**12**	**uimsbf**
for (i = 0;i< N;i++) {		
descriptor()		
}		
CRC_32	**32**	**bslbf**
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.9 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **Only one table should be transmitted to one TS.**

○ For retransmission cycle, follow Section 12.4 of this document.

The Transmission Operating Rule for each field are shown in Table 31-93.

Table 31-93 Transmission Operating Rule of TOT

Transmission Operating Rule for each field	
table_id	Set to “0x73”.
section_syntax_indicator	Set to ‘0’.
section_length	Describe the section length of TOT. Since the maximum length of all sections is 1024 bytes, this value should be 1021 at maximum.
JST_time	When the receiver unit receives, adjust the time for transmission so that it can be JST±500ms.
descriptor_loop_length	
[descriptor_loop]	

[Rules for Reception Processing]

◎ **If the relative table is not in the TS, use the internal clock in the receiver unit until the TOT is received.**

The Rules for Reception Processing for each field are shown in Table 31-94.

Table 31-94 Rules for Reception Processing for TOT

Rules for Reception Processing for each field	
table_id	= “0x73”: Judge that the relative table is TOT.
section_syntax_indicator	=‘0’: Judge that the relative section is valid. =‘1’: Judge that the relative section is invalid.
section_length	=<1021: Judge as section length >1021: Judge that the relative section is invalid.
JST_time	
descriptor_loop_length	
[descriptor_loop]	

[Special Remarks]

○ Japan Standard Time (JST) is defined as "UTC (Universal Time Coordinated) + 9".

○ The changing time of Modified Julian Day is based on "UTC + 9".

○ When the receiver unit receives, adjust the time for transmission so that the error margin can be within ±500ms respect to JST. However, for a few minutes before/after the insertion of leap seconds when the leap second is applied, the maximum allowable difference from JST is 1.5 second.

○ For the process in 2038 or later, see Section 16.3.

31.4.2 Descriptor Inserted into TOT

31.4.2.1 Local Time Offset Descriptor

[Use]

It is used to provide the certain offset value between the actual time (UTC + 9 hours) and displayed time when the summer time starts.

[Syntax]

The structure of Local Time Offset descriptor is shown in Table 31-95.

Table 31-95 Structure of Local Time Offset Descriptor

Data structure	bit	Identifier
local_time_offset_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
country_code	**24**	**bslbf**
country_region_id	**6**	**bslbf**
reserved	**1**	**bslbf**
local_time_offset_polarity	**1**	**bslbf**
local_time_offset	**16**	**bslbf**
time_of_change	**40**	**bslbf**
next_time_offset	**16**	**bslbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.25 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **This descriptor is not inserted into the TOT unless summer time is applied. If it is applied, only one descriptor can be inserted from January 1st of the year when summer time starts.**

◎ **If this descriptor is inserted, its description should be unified in all networks.**

○ The descriptor should be transmitted 32 days before the offset time is changed ("time_of_change"). In addition, the set value in "next_time_offset" should be moved to "local_time_offset" for transmission within 7 days after 48 hours has passed since the summer time is changed.

The Transmission Operating Rule for each field are shown in Table 31-96.

Table 31-96 Transmission Operating Rule of Local Time Offset Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x58”.
descriptor_length	Describe the length of the Local Time Offset Descriptor.
[loop]	Set the loop count to '1'.
country_code	Set to “JPN (“0x4A504E”)”.
country_region_id	Set to all ’0’
local_time_offset_ polarity	Specify if the time is set to "JST_time" + offset time or "JST_time" - offset time.
local_time_offset	Describe the current offset time for "JST_time" in the BCD hours:minutes format.
time_of_change	Describe the date and time when it is changed to offset time in the MJD+BCD hours:minutes:seconds format.
next_time_offset	Describe the offset time used after the date and time specified in "time_of_change" in BCD hours:minutes format.

[Rules for Reception Processing]

◎ **Judge that the summer time is not applied if this descriptor is not placed.**

The Rules for Reception Processing for each field are shown in Table 31-97.

Table 31-97 Rules for Reception Processing for Local Time Offset Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x58”: Judge that the relative descriptor is the Local Time Offset Descriptor.
descriptor_length	Judge as the length of Local Time Offset Descriptor.
[loop]	If the loop count is above 2, ignore the second and later loop.
country_code	= Other than “JPN”: Judge that this descriptor is invalid.
country_region_id	= Other than all ’0’: Judge that this descriptor is invalid.
local_time_offset_ polarity	=’0’: Judge that the time is advanced for the offset time from "JST_time". =’1’: Judge that the time is delayed for the offset time from "JST_time".
local_time_offset	Judge as the current offset time for "JST_time".
time_of_change	Judge as the date and time when the offset time is changed.
next_time_offset	Judge as the offset time used after the date and time specified in "time_of_change".

[Special Remarks]

None

31.5 ST (Stuffing Table)

31.5.1 Structure and Use of ST

[Use]

Disable tables.

[Syntax]

The structure of ST is shown in Table 31-98.

Table 31-98 Structure of ST (Stuffing Table)

Data structure	bit	Identifier
stuffing_section(){		
table_id	**8**	**uimsbf**
section_syntax_indicator	**1**	**bslbf**
reserved_future_use	**1**	**bslbf**
reserved	**2**	**bslbf**
section_length	**12**	**uimsbf**
for (i = 0;i< N;i++) {		
data_byte	**8**	**uimsbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 5.2.10 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

◎ **The Transmission Operating Rule for each field are shown in Table 31-99.**

Table 31-99 Transmission Operating Rule of ST

Transmission Operating Rule for each field	
table_id	Set to “0x72”.
section_syntax_indicator	Set to ‘0’.
section_length	
[data_byte]	Set to all ‘1’.

[Rules for Reception Processing]

The Rules for Reception Processing for each field are shown in Table 31-100.

Table 31-100 Rules for Reception Processing for ST

Rules for Reception Processing for each field	
table_id	="0x72": Judge that the relative table is the ST.
section_syntax_indicator	= Other than '0': Judge that this table is invalid.
section_length	
[data_byte]	Ignore any value.

[Special Remarks]

None

31.6 Descriptor Undefined in Each Table

31.6.1 Stuffing Descriptor

[Use]

Used when disable the previously coded descriptor or insert dummy descriptor for table stuffing.

[Syntax]

The structure of Stuffing Descriptor is shown in Table 31-101.

Table 31-101 Structure of Stuffing Descriptor

Data structure	bit	Identifier
stuffing_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
stuffing_byte	**8**	**bslbf**
}		
}		

[Semantics of Each Field]

For the definition of each field, comply with the provisions in 6.2 of Part 1 and the definitions in 6.2.17 of Part 2 in ARIB STD-B10.

[Transmission Operating Rule]

The Transmission Operating Rule for each field are shown in Table 31-102.

Table 31-102 Transmission Operating Rule of Stuffing Descriptor

Transmission Operating Rule for each field	
descriptor_tag	Set to “0x42”.
descriptor_length	Describe the length of the Stuffing Descriptor.
[loop]	
stuffing_byte	Set to all ’1’.

[Rules for Reception Processing]

◎ **When any relative descriptor is included, ignore without any process.**

The Rules for Reception Processing for each field are shown in Table 31-103.

Table 31-103 Rules for Reception Processing for Stuffing Descriptor

Rules for Reception Processing for each field	
descriptor_tag	= “0x42”: Judge that the relative descriptor is the Stuffing Descriptor.
descriptor_length	Judge as the length of the relative descriptor.
[loop]	
stuffing_byte	Ignore any value.

[Special Remarks]

None

32 Description

32.1 Description of frequency to NIT in the event of MFN

In the case of MFN, all transmission frequencies used by the transmission equipment transmitting the relevant TS are supposed to be described in the Terrestrial Delivery System Descriptor of NIT. However, the frequency information described in NIT and the actual transmission frequencies may not fully match if the relevant TS is transmitted by the auxiliary equipment due to reasons such as addition of transmitting stations, frequency repacking, disasters, etc. For this reason, it shall be desirable that the receiver uses the frequency described in NIT only as reference information (i.e. not as absolute information).

On the other hand, some receivers whose receivable channels could change dynamically (such as in-vehicle receivers) can scan frequencies efficiently by utilizing the frequency information described in NIT. Therefore, in the events of addition of transmitting stations, frequency repacking, etc., the broadcaster will not be able to prevent some discrepancy to occur between the actual frequency usage timing and the NIT update timing such as when updating NIT while the broadcast is not in service. However, it shall be desirable that the broadcaster describes all transmission frequencies in NIT as promptly as possible; and all transmission frequencies must be described in NIT in regular conditions. Moreover, a receiver utilizing the frequency information described in NIT shall need to be able to perform station selection in the relevant network even if the received frequency and the frequency described in NIT do not match, considering that the frequency information and the actual transmission frequencies do not fully match in some cases.

It is conceivable that, in cases such as the frequency conversion pass-through retransmission in CATV, the frequencies described in NIT and those received by the receiver will always be different regardless of broadcasters.

<Intentionally blank>

[Section 4] Appendix

[Appendix A] Genre code table for Initial Stage of Broadcasting ("content_nibble")

The program categories are based on the following categories. If it is difficult to categorize the program, specify "others" so that it is regarded as "undefined". The fields from "content_nibble_level_1"="0xC " to "content_nibble_level_1"= "0xD" refer to additional spare areas.

Set the extension to "0xE" and define as a designation category (designate the program characteristic code table type) to enable "user_nibble" to be refered.

The codes described in the genre code table are commonly managed among BS digital broadcasting, wideband CS digital broadcasting and Digital Terrestrial Television Broadcasting. If new codes are defined and used in the future, they are not used with the different definitions even by other media. (They can be used with the same definitions or are not used as undefined.)

[Large Category]

0	1	2	3	4	5	6	7	8	9	A	B	C D	E	F
News	**Sports**	**Information /Tabloid show**	**Drama**	**Music**	**Variety show**	**Movie**	**Animation/ Special effects**	**Documentary / Literacy**	**Play/ Performance**	**Hobby/ Education**	**Welfare**	**Additional**	**Extended**	**Others (Undefined)**

The following table lists the large categories, middle categories and their descriptions:

Content_nibble_level_1 (Large Category)	Content_nibble_level_2 (Middle Category)	Description
0x0	*	**News**
0x0	0x0	Regular/General
0x0	0x1	Weather
0x0	0x2	Special topic/documentary
0x0	0x3	Politics/diet
0x0	0x4	Economy/market
0x0	0x5	Overseas
0x0	0x6	Commentary
0x0	0x7	Discussion/meeting
0x0	0x8	Special news report
0x0	0x9	Local
0x0	0xA	Traffic
0x0	0xB	
0x0	0xC	
0x0	0xD	

Content_nibble_level_1 (Large Category)	Content_nibble_level_2 (Middle Category)	Description
0x0	0xE	
0x0	0xF	Others
0x1	*	**Sports**
0x1	0x0	Sports news
0x1	0x1	Baseball
0x1	0x2	soccer
0x1	0x3	Golf
0x1	0x4	Other ball games
0x1	0x5	Sumo/fighting sports
0x1	0x6	Olympic/international games
0x1	0x7	Marathon/field and track/swimming
0x1	0x8	Motor sports
0x1	0x9	Marine/winter sports
0x1	0xA	Horse race/public sports
0x1	0xB	
0x1	0xC	
0x1	0xD	
0x1	0xE	
0x1	0xF	Others
0x2	*	**Information/tabloid show**
0x2	0x0	Show business/tabloid show
0x2	0x1	Fashion
0x2	0x2	Life/residence
0x2	0x3	Health/medical care
0x2	0x4	Shopping/catalog shopping
0x2	0x5	Gourmet/cooking show
0x2	0x6	Events
0x2	0x7	Promotion/information
0x2	0x8	
0x2	0x9	
0x2	0xA	
0x2	0xB	
0x2	0xC	
0x2	0xD	
0x2	0xE	
0x2	0xF	Others
0x3	*	**Drama**
0x3	0x0	Japanese drama
0x3	0x1	Overseas drama
0x3	0x2	Historical drama
0x3	0x3	
0x3	0x4	
0x3	0x5	
0x3	0x6	
0x3	0x7	
0x3	0x8	
0x3	0x9	
0x3	0xA	
0x3	0xB	
0x3	0xC	
0x3	0xD	
0x3	0xE	
0x3	0xF	Others

Content_nibble_level_1 (Large Category)	Content_nibble_level_2 (Middle Category)	Description
0x4	*	**Music**
0x4	0x0	Japanese rock/pops
0x4	0x1	Overseas rock/pops
0x4	0x2	Classical/opera
0x4	0x3	Jazz/fusion
0x4	0x4	Japanese popular song/ballad (Enka)
0x4	0x5	Live show/concert
0x4	0x6	Ranking/Request show
0x4	0x7	Karaoke/singing contest
0x4	0x8	Folk/Japanese music
0x4	0x9	Children's song
0x4	0xA	Ethnic/world music
0x4	0xB	
0x4	0xC	
0x4	0xD	
0x4	0xE	
0x4	0xF	Others
0x5	*	**Variety show**
0x5	0x0	Quiz
0x5	0x1	Game
0x5	0x2	Talk show
0x5	0x3	Comedy
0x5	0x4	Musical variety show
0x5	0x5	Travel variety show
0x5	0x6	Cooking variety show
0x5	0x7	
0x5	0x8	
0x5	0x9	
0x5	0xA	
0x5	0xB	
0x5	0xC	
0x5	0xD	
0x5	0xE	
0x5	0xF	Others
0x6	*	**Movie**
0x6	0x0	Overseas movie
0x6	0x1	Japanese movie
0x6	0x2	Animation movie
0x6	0x3	
0x6	0x4	
0x6	0x5	
0x6	0x6	
0x6	0x7	
0x6	0x8	
0x6	0x9	
0x6	0xA	
0x6	0xB	
0x6	0xC	
0x6	0xD	
0x6	0xE	
0x6	0xF	Others
0x7	*	**Animation/special effects**
0x7	0x0	Japanese animation
0x7	0x1	Overseas animation
0x7	0x2	Special effects program

Content_nibble_level_1 (Large Category)	Content_nibble_level_2 (Middle Category)	Description
0x7	0x3	
0x7	0x4	
0x7	0x5	
0x7	0x6	
0x7	0x7	
0x7	0x8	
0x7	0x9	
0x7	0xA	
0x7	0xB	
0x7	0xC	
0x7	0xD	
0x7	0xE	
0x7	0xF	Others
0x8	*	**Documentary/literacy**
0x8	0x0	Social/topical news
0x8	0x1	History/travel
0x8	0x2	Nature/animal/environment
0x8	0x3	Universe/science/science of medicine
0x8	0x4	Culture/traditional culture
0x8	0x5	Literature/liberal arts
0x8	0x6	Sports
0x8	0x7	General documentary
0x8	0x8	Interview/discussion
0x8	0x9	
0x8	0xA	
0x8	0xB	
0x8	0xC	
0x8	0xD	
0x8	0xE	
0x8	0xF	Others
0x9	*	**Play/performance**
0x9	0x0	Modern play
0x9	0x1	Musical
0x9	0x2	Dance/ballet
0x9	0x3	Comic monologue (Rakugo)/ entertainment
0x9	0x4	Kabuki/classical play
0x9	0x5	
0x9	0x6	
0x9	0x7	
0x9	0x8	
0x9	0x9	
0x9	0xA	
0x9	0xB	
0x9	0xC	
0x9	0xD	
0x9	0xE	
0x9	0xF	Others
0xA	*	**Hobby/education**
0xA	0x0	Travel/fishing/outdoors
0xA	0x1	Gardening/pet/ handicraft
0xA	0x2	Music/art/ artifice
0xA	0x3	Japanese go/chess (Shogi)
0xA	0x4	Mah-jong/Pachinko
0xA	0x5	Automobile/motorcycle
0xA	0x6	Computer/TV game

Content_nibble_level_1 (Large Category)	Content_nibble_level_2 (Middle Category)	Description
0xA	0x7	Conversation/language
0xA	0x8	Infants/primary school students
0xA	0x9	Junior/senior high school students
0xA	0xA	College/preparatory students
0xA	0xB	Lifelong education/qulification
0xA	0xC	Educational problem
0xA	0xD	
0xA	0xE	
0xA	0xF	Others
0xB	*	**Welfare**
0xB	0x0	Aged persons
0xB	0x1	Handicapped person
0xB	0x2	Social welfare
0xB	0x3	Volunteers
0xB	0x4	Sign language
0xB	0x5	Texts (caption)
0xB	0x6	Audio commentary
0xB	0x7	
0xB	0x8	
0xB	0x9	
0xB	0xA	
0xB	0xB	
0xB	0xC	
0xB	0xD	
0xB	0xE	
0xB	0xF	Others
0xC	*	**(Spare area)**
0xC	0x0	
0xC	0x1	
0xC	0x2	
0xC	0x3	
0xC	0x4	
0xC	0x5	
0xC	0x6	
0xC	0x7	
0xC	0x8	
0xC	0x9	
0xC	0xA	
0xC	0xB	
0xC	0xC	
0xC	0xD	
0xC	0xE	
0xC	0xF	
0xD	*	**(Spare area)**
0xD	0x0	
0xD	0x1	
0xD	0x2	
0xD	0x3	
0xD	0x4	
0xD	0x5	
0xD	0x6	
0xD	0x7	
0xD	0x8	
0xD	0x9	
0xD	0xA	

Content_nibble_level_1 (Large Category)	Content_nibble_level_2 (Middle Category)	Description
0xD	0xB	
0xD	0xC	
0xD	0xD	
0xD	0xE	
0xD	0xF	
0xE	*	**(Extended area) [Program characteristic code table/type designation]**
0xE	0x0	Program attachment information for BS digital broadcasting*1
0xE	0x1	Extended information for wideband CS digital broadcasting
0xE	0x2	
0xE	0x3	
0xE	0x4	
0xE	0x5	
0xE	0x6	
0xE	0x7	
0xE	0x8	
0xE	0x9	
0xE	0xA	
0xE	0xB	
0xE	0xC	
0xE	0xD	
0xE	0xE	
0xE	0xF	
0xF	*	**Others (undefined)**
0xF	0x0	
0xF	0x1	
0xF	0x2	
0xF	0x3	
0xF	0x4	
0xF	0x5	
0xF	0x6	
0xF	0x7	
0xF	0x8	
0xF	0x9	
0xF	0xA	
0xF	0xB	
0xF	0xC	
0xF	0xD	
0xF	0xE	
0xF	0xF	Others

(Note) All blank fields are undefined.

*1 Digital Terrestrial Television Broadcasting is based on "program attachment information for BS digital broadcasting".

[Appendix B] Digital Program Characteristic Code Table (Operation of "user_nibble")

In the Content Descriptor, if "content_nibble" is set to ”0xE0”, "user_nibble" item is coded based on the following code table and managed as "Program Attachment Information for BS Digital Broadcasting" used commonly by BS digital broadcasting, wideband CS digital broadcasting and digital terrestrial television broadcasting. If the new codes are defined and used by any media in the future, they are not used with the different definitions even by other media. (They can be used with the same definitions or are not used as undefined.)

Table B-1 Program Attachment Information for Digital Terrestrial Television Broadcasting

<table>
<tr><th rowspan="2">Lower 4 bit for user_nibble</th><th colspan="4">Upper 4 bit for user_nibble</th></tr>
<tr><th>0x0
attachment information for changeable program scheduling</th><th>0x1
Digital program characteristic information</th><th>0x2 - 0xE</th><th>0xF</th></tr>
<tr><td>0x0</td><td>Possible to be cancelled</td><td>News break</td><td rowspan="7">Reserved</td><td rowspan="8">Undefined</td></tr>
<tr><td>0x1</td><td>Possible to be extended</td><td>Special service related to the relative event exists</td></tr>
<tr><td>0x2</td><td>Possible to be interrupted</td><td rowspan="6">Reserved</td></tr>
<tr><td>0x3</td><td>Another episode of the same series may be broadcasted</td></tr>
<tr><td>0x4</td><td>Undefined frame</td></tr>
<tr><td>0x5</td><td>Possible to be moved forward</td></tr>
<tr><td>0x6 - 0xE</td><td>Reserved</td></tr>
<tr><td>0xF</td><td>Undefined</td><td>Undefined</td><td>Undefined</td></tr>
</table>

If "user_nibble" is set to "0x2X " to "0xFX" (X=0 to F), the relative content loop is invalid for the present. However, loops may be added in the future.

B.1 Transmission Operating Rule of Program Attachment Information (user_nibble)

”0x00” to ”0x0F” for "user_nibble" refers to " Attachment Information for changeable program scheduling" area, and ”0x10” to ”0x1F” refers to "Digital Broadcasting Program Characteristic Information" area. The detailed operation of each code is as follows:

“0x00”: Possible to be cancelled

It is used to inform viewers that the relative event in a sports program may be cancelled due to rainout and alternative program with the different event_id may be broadcasted. To inform the detailed reasons for the cancellation and alternative event, it is recommended to describe in "Notice", the reservation term of the Extended Event Descriptor.

“0x01”: Possible to be extended
It is used to inform viewers that, when a live sports program (including Sumo, baseball and soccer) is expected to extend, the next events may be affected.

“0x02”: Possible to be interrupted
It is used when an event-interruption may be occurred in the program. (See Section 19.5.4.)

“0x03”: Another episode of the same series may be broadcasted
It is used when the relative episode is broadcasted ahead of the original schedule and another episode of the same series may be broadcasted. When the relative episode is scheduled as an alternative program to be broadcasted when a sports program is cancelled due to rainout before the start time of the event where the relative Content Descriptor is placed, and the sports program is actually cancelled, it occurs.

“0x04”: Undefined frame
It is used when the event is not defined at the time when "event_id" for the relative program is defined and transmitted and it may be decided a several days before the broadcasting day.
In case of "undefined frame", assume as follows:

- ○ The broadcasting time frame is determined but the contents of event are not defined; therefore, the temporary value for "event_id" is set, and the Short Event Descriptor includes the title, "broadcast not defined". When the contents of event are determined later, the relative event is deleted and the completely different contents may be set. At this time, the temporary value for "event_id" may remain in the newly determined event or it may be replaced with new "event_id". (In some cases, there are multiple events).

“0x05”: Possible to be moved forward
It is used to inform viewers that the start time of events may be moved forward due to cancellation of an originally scheduled earlier event. To inform the detailed reasons for the cancellation, it is recommended to describe in "Notice", the reservation term of the Extended Event Descriptor. Generally the start time can be moved forward within 1 hour from the original start time. It cannot be used in the case of date of the serial drama is moved forward due to cancellation of sports program, etc.

“0x06” - ”0x0E”: Reserved
Area obtained for adding new attachment information for changeable program scheduling in the future.
Do not specify any value at the initial stage of broadcasting.

“0x0F”: Undefined
Do not specify any value at the initial stage of broadcasting.

“0x10”: News break
A news break is originally scheduled in the relevant event, and "event_id" for the news is not assigned.

“0x11”: Special service related to the relevant event exists
It is used when the special service related to the relevant event is scheduled.

“0x12” - ”0x1E”: Reserved
Area obtained for adding new program characteristic information for digital broadcasting in the future.
Do not specify any value at the initial stage of broadcasting.

B.2 Receiver Process Standard for Program Attachment Information (user_nibble)

If the content loop where "content_nibble"=”0xE0” and "user_nibble"=”0x00” to ”0x1F”, exists in the Content Descriptor, receiver units can judge as "Program Attachment Information" on program scheduling, etc. and can display the information as guidance for viewers.

The following are display examples. However, it is recommended to display according to each receiver unit's functions since the information can be generally displayed based on presentation free.

When “0x00” is set:
"This program may be cancelled.", etc.

When “0x01” is set:
"This program may be extended.", etc.

When “0x02” is set:
"This program may be interrupted.", etc.

When “0x03” is set:
"This program may be cancelled.", etc.
It can be also used to recommend series reservation.

When “0x04” is set:
"This program is not defined yet and will be determined later.", etc.
Also, it is prohibited to reserve (for recording) an event in the relative program. However, if a Series Descriptor exists, it can be used to recommend series reservation.

When “0x05” is set:
"The start time of this program may be moved forward.", etc.
If reservation support moving forward of event, it can be used to judge necessity of checking time. For checking time, the receiver units check the start time of the relevant event again 1 hour before the start time specified at the reservation time.

When “0x06” to ”0x0E” or ”0x0F” is set:
Ignore the relative content loop for the present.

When “0x10” is set:
"News break will be provided", etc.

When “0x11” is set:
"This program provides a related program on another channel.", etc.

When “0x12” to ”0x1E” or ”0x1F” is set:
Ignore the relative content loop for the present.

[Appendix C] List of Reservation term For Initial Stage of Broadcasting

With regard to the item titles of Extended Event Descriptor, the list of reservation term for the initial stage of broadcasting is shown in Table C-1. To use the reservation term, the character codes shown below should be described in the item_description_char fields.

The reservation terms are commonly managed among BS digital broadcasting, wideband CS digital broadcasting and digital terrestrial television broadcasting. If the new reservation terms defined and used by any media in the future, they are not used with the different definitions even by other media. (They can be used with the same definitions or are not used as "undefined".)

Table C-1 Reservation term and Character Code For the Initial Stage of Broadcasting

Item titles (Japanese)	Item titles (English)	Character Codes (for Japanese characters)
おしらせ	Notice	0xAA,0xB7,0xE9,0xBB
番組内容	Program Contents	0x48,0x56,0x41,0x48,0x46,0x62,0x4D,0x46
出演者	Cast	0x3D,0x50,0x31,0x69,0x3C,0x54
原作・脚本	Original story/script	0x38,0x36,0x3A,0x6E,0xFE,0x35,0x53,0x4B,0x5C
監督・演出	Direction	0x34,0x46,0x46,0x44,0xFE,0x31,0x69,0x3D,0x50
音楽	Music	0x32,0x3B,0x33,0x5A
制作	Production	0x40,0x29,0x3A,0x6E

[Appendix D] Estimation Examples of SI Data Amount

This appendix shows the estimation example of H-EIT[schedule] that is assumed to be stored into the receiver unit memory while PSI/SI is transmitted in Digital Terrestrial Television Broadcasting. The values shown here are only examples calculated based on the premise; therefore, the actual SI data amount may vary depending on the descriptor, number of programs and data amount of programs used by each broadcaster. The premise used in this appendix are determined on the assumption that slightly higher amount of data is used than that generally used by broadcasters; therefore, the values can be used for reference when designing receiver units. The values used here are not the maximum values based on the assumed data amount. Accordingly, it is recommended to use them by adding some margin to the calculated amount. In addition, although the memory storage amount depends on the receiver units, if the broadcaster transmit much higher amount of SI information than the provided example, it is necessary to recognize that it may not be stored in the receiver unit memory.

<Estimation Target>
H-EIT[schedule] capacity for all services per TS

<Premise>
The following premises are assumed:

1) The number of services that transmit H-EIT is 3 for digital TV service in the fixed reception layer and 1 for data service. H-EIT is not transmitted for the services in the partial reception layer and mobile reception layer.
2) Regarding the digital TV service, there are 8 programs for 1 segment (3 hours) in 1 service. 4 of them are for event common.
3) Event common is only available for the pattern where three services (SV1, SV2, SV3) are shared. (SV2 and SV3 refer to SV1.)
4) Regarding the data service, there is 1 program for 1 segment (3 hours).
5) 24-hour broadcasting (there are the above number of programs in all segments). Empty section is not transmitted.
6) The delivering range is 8 days for digital TV service and 2 days for data service.
7) The length of Short Event Descriptor is 257 bytes. (Considering the maximum length of program title and description, it will be 6+96+1+192=295 bytes; therefore, it will be above 257 bytes, that is the maximum value per descriptor.)
8) The Extended Event Descriptor is placed for all events. Each event includes 4 16-byte item titles and 200-byte item description for each item title.
9) 1 Component Descriptor and 2 Audio Component Descriptors are placed for all events in the digital TV service. The text areas for both descriptors are not used.

10) All events in the data service refer to 1 video and 1 audio component. (1 Component Descriptor and 1 Audio Component Descriptor are placed.) The text areas for both descriptors are not used.
11) 1 Data Contents Descriptor is placed for all events. The length of the Data Contents Descriptor is assumed to be 40 bytes since it can be big increased/decreased depending on the operation situation.
12) The Digital Copy Control Descriptor is placed for all events and the values are set as follows:
    "maximum_bit_rate_flag" = ‘1’
    "component_control_flag" = ‘0’
13) For all events, the CA Contract Info Descriptor and Component Group Descriptor are not placed.
14) The length of Series Descriptor is assumed to be 58 bytes (48 bytes or 20 wide characters for series name). It is assumed that the descriptor is used only in the digital TV service and placed only for the event common programs.
15) The Content Descriptor is placed for all events, and the loop count for "content_nibble" is 2.

<Estimation>

Note:”x” is used for arithmetic operation of multiplication.

(1) Data amount of H-EIT[schedule basic] for digital TV service:

+ Header	14 bytes	
+ Event loop		
+ Event loop header	12bytes	
+ Descriptor loop		
+ Short Event Descriptor	257 bytes	
+ Component Descriptor	8 bytes	
+ Content Descriptor	6 bytes	
+ Digital Copy Control Descriptor	4 bytes	
+ Audio Component Descriptor (1)	11 bytes	
+ Audio Component Descriptor (2)	11 bytes	
+ Data Contents Descriptor	40 bytes	
+ Event Group Descriptor*	15 bytes	(event common/reference destination: SV1)
	7 bytes	(event common/reference source: SV2, SV3)
+ Series Descriptor*	58 bytes	
+CRC	4 bytes	

*: It is placed only for the event common programs (see requirements).

Data amount of SV1 per segment:

14 (Header) + (12+410) x 4 (event common)

+ (12+337) x4 (No event common) + 4 (CRC) = 3,102 bytes

Data amount of SV2 and SV3 per segment:

14 (Header) + (12+7) x4 (event common) + (12+337) x4 (No event common)

+4 (CRC) = 1,490 bytes

Therefore, the data amount of H-EIT[schedule basic] for digital TV service per segment:

SV1+SV2+SV3 = 3,102 + 1,490 + 1,490

= 6,082 bytes

Data amount of H-EIT[schedule basic] for digital TV service for 8 days:

(SV1+SV2+SV3)/segment x 8 segments/day x 8 days = 6,082 x 8 x 8

= 389,248 bytes

(2) Data amount of H-EIT[schedule extended] for digital TV service:

+Header	14 bytes	
+Event loop		
+Event loop header	12 bytes	
+ Descriptor loop		
+ Extended Event Descriptor	904 bytes	(4 descriptors)
+CRC	4 bytes	

Data amount of SV1 per segment (2 sections):

{14 (Header) + 4 (CRC) } x 2 + (12+904) x 8 = 7,364 bytes

Data amount of SV2 and SV3 per segment:

14 (Header) + (12+904) x4 (No event common) +4 (CRC) = 3,682 bytes

Therefore, the data amount of H-EIT[schedule extended] for digital TV service per segment:

SV1 + SV2 + SV3 = 7,364 + 3,682 + 3,682

= 14,728 bytes

Data amount of H-EIT[schedule extended] for digital TV service for 8 days:

(SV1+SV2+SV3)/segment x 8 segments/day x 8 days = 14,728 x 8 x 8

= 942,592 bytes

(3) Data amount of H-EIT[schedule basic] for data service:

+Header	14 bytes
+Event loop	
+Event loop header	12 bytes
+ Descriptor loop	
+ Short Event Descriptor	257 bytes
+ Component Descriptor	8 bytes
+ Content Descriptor	6 bytes
+ Digital Copy Control Descriptor	4 bytes
+ Audio Component Descriptor	11 bytes
+ Data Contents Descriptor	40 bytes
+CRC	4 bytes

Data amount per segment:

14 (Header) + (12+326) x1 + 4 (CRC) = 356 bytes

Therefore, the data amount of H-EIT[schedule basic] for 2 days:

356 bytes/segment x 8 segments/day x 2 days = 5,696 bytes

(4) Data amount of H-EIT[schedule extended] for data service:

+ Header	14 bytes	
+ Event loop		
+ Event loop header	12 bytes	
+ Descriptor loop		
+ Extended Event Descriptor	904 bytes	(4 descriptors)
+CRC	4 bytes	

Data amount per segment:

14 (Header) + (12+904) x1 + 4 (CRC) = 934 bytes

Therefore, the data amount of H-EIT[schedule extended] for data service for 2 days:

934 bytes/segment x 8 segments/day x 2 days = 14,944 bytes

<Results of Estimation>

Thus, the data amount of digital TV service for 8 days and data service for 2 days per TS is as follows:

Size of H-EIT[schedule basic] for digital TV service: 389,248 bytes
Size of H-EIT[schedule extended] for digital TV service: 942,592 bytes
Size of H-EIT[schedule basic] for data service: 5,696 bytes
Size of H-EIT[schedule extended] for data service: 14,944 bytes

Total size of H-EIT[schedule basic/extended] for all services per TS is as follows:

Size of H-EIT[schedule basic] per TS: 389,248 + 5,696 = 394,944 bytes
Size of H-EIT[schedule extended] per TS: 942,592 + 14,944 = 957,536 bytes

[Appendix E] Character Set Used in SI

The following six character sets (collection of codes) are used in characters in the SI transmitted in Digital Terrestrial Television Broadcasting.

○ JIS-compatible Kanji plane 1 (two-byte code)
○ JIS-compatible Kanji plane 2 (two-byte code)
○ Alphanumeric code (one-byte code)
○ Hiragana (one-byte code)
○ Katakana (one-byte code)
○ Additional symbol (two-byte code)

For alphanumeric code, Hiragana and Katakana, comply with Tables 7-5, 7-7 and 7-6 of Part 2 in Vol. 1 of ARIB STD-B24.

Other three character sets are provided here.

E.1 Operation of JIS 3rd and 4th Level Kanji

JIS 3rd and 4th level Kanji sets are not used at the initial stage of Digital Terrestrial Television Broadcasting.

With the mounting situation of JIS 3rd and 4th level character ROM into the receiver units, JIS 3rd and 4th level character codes are sequentially operated under each broadcaster's decision. However, if JIS 3rd and 4th level Kanji sets are used, careful transmission is required so that the receiver units without JIS 3rd and 4th level character ROM can smoothly display the JIS 3rd and 4th level characters under the definitions of External Character Set (XCS: See Section 4.2.). If any JIS 3rd and 4th level character is included in the Additional symbols, use the Additional symbol.

E.2 JIS-Compatible Kanji Plane1(two-byte code table)

At the initial stage of Digital Terrestrial Television Broadcasting, the characters defined in the 1st to 84th row, which are included in the Kanji set provided in ARIB STD-B24, are defined here without changing the code points. If JIS 3rd level Kanji will be used in the future, the characters, which are defined in Kanji plane1 in JIS X0213: 2004, are defined here without changing the code points.

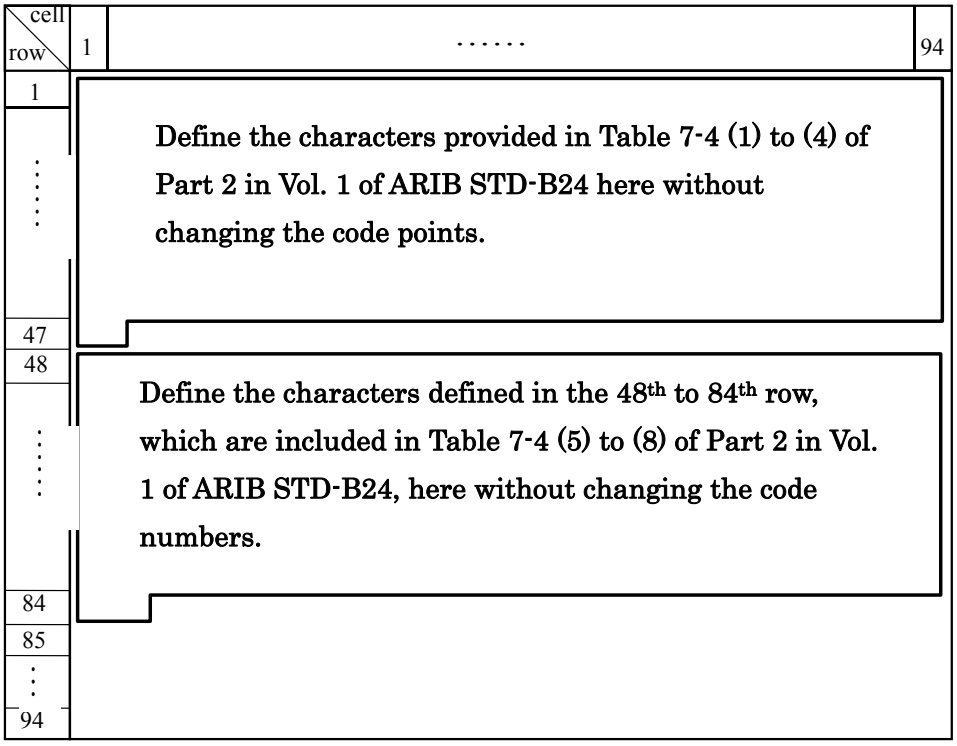


Figure E-1 Kanji Plane1 Code Table (JIS 3rd level not used)

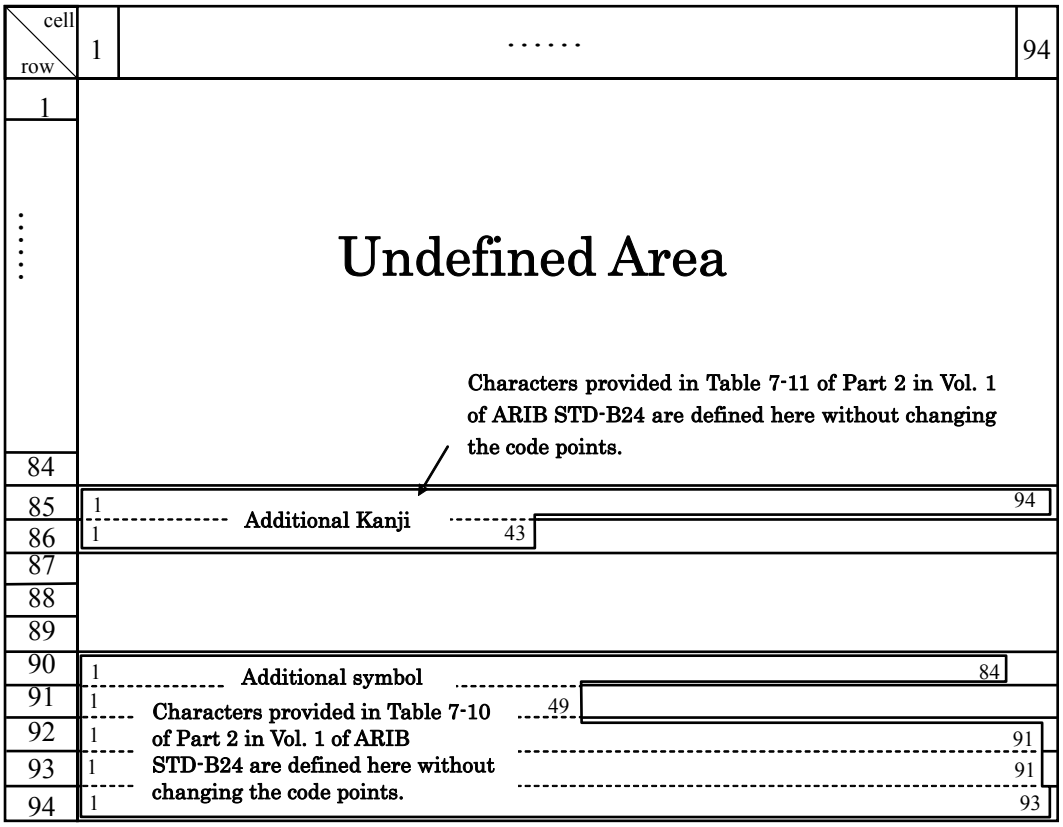
E.3 JIS-Compatible Kanji Plane2 (two-byte code table)

The Kanji plane2 is the plane (code table) used when JIS 4th level Kanji will be used in the future. The character sets and code points are defined here without changing the codes according to the characters defined in Kanji plane2 in JIS X0213: 2004.

E.4 Additional Symbol (two-byte code table)

On the Additional symbol plane, the Additional symbols used in the existing text broadcasting and FM multiplex broadcasting, and new Additional symbol and Kanji that will be required as program information are defined.

The Additional symbols provided in Table 7-10 of Part 2 in Vol. 1 of ARIB STD-B24 and additional Kanji provided in Table 7-11 of Part 2 in Vol. 1 of ARIB STD-B24 are defined on this plane without changing the code points.



* For the details of VICS symbols, it is recommended to comply with Appendix (3) of ARIB STD-B3. The fonts in the 90th row (excluding 45 to 63 and 66 to 84 cell) and 91st row were proposed by Vehicle Information and Communication System Center (VICS Center).

Figure E-2 Additional Symbol Code Table

[Appendix F] Unified Operations and Display Requests

- Describe the program title and sub-title as a program title in "event_name_char" transmitted by the EIT Short Event Descriptor.
- The maximum value of the program title is 40 wide characters (or 96 bytes).
- For 30-minute or shorter programs, use 20 wide characters or less generally.
- Describe the brief description on program in the program description, "text_char".
- The maximum value of the program description is 80 wide characters (or 192 bytes).
- Do not use linefeed codes for program titles and series names ("series_name_char").
- The Series Descriptor is used according to "Provisions for PSI/SI Operations". Therefore, the program title can be same as the series name.
- The program titles and series names may be used with Additional symbols such as 🅝, 🈚, 🈡, and 🈢. Whether those symbols are used or not depends on each broadcaster. Therefore, when the Additional symbols 🅝, 🈚, 🈡, and 🈢 are used as a search key to search a program attribute, the selected program may not have the attribute at all stations or cross-sectionally. It is recommended to use the information in other descriptors to judge the attribute.
- How to place program titles (title and sub-title) and program descriptions are decided by broadcasters; therefore, they may include "Notice", "Program Contents", "Cast", "Segment Name", etc.

(Display Requests)

- Display "program title" exactly as possible.
- Use "..." to show there is more information clearly to viewers if it is difficult to display the whole list on the screen. Provide such design that the complete program titles can be displayed when selecting.
- Additionally, it is requested to display "program description" following "program title".

[Appendix G] Assumed Item Titles

Item Titles (Reservation term)

Item titles (reservation term)	Assumed contents
Notice	Information including alternative program, cancellation, interruption, extension and changed schedule, notification of open program and panelist offering, inquiry, special information, etc.
Program Contents	Synopsis, series commentary, theme, segment, subject, matter special topic, match-up schedule, contest name, tournament name, highlight, subject, announcement, etc.
Cast	Cast, host, newscaster, reporter, analyst, commentator, announcer, play-by-play commentator, narrator, voice-over, interpreter, guests, etc.
Original Story/Script	Original story, script, serial magazine, scenario, translation, etc.
Direction	Director, technical director, editorial supervisor, producer, composition writer, CG staff, research staff, etc.
Music	Song title, music, singer, lyrics writer, composer, player, conductor, orchestra, theme song, insert song, theme music, etc.
Production	Production copyright, production cooperation, production year, production country, production place, research period, research location, location site, event place, event site, theater, playing field, etc.
Free Description • Keyword • Notice of gifts • Hot information • Inside story of program • Message from producer • Others	Others

[Appendix H] Rules on Use of Network Name, TS Name and Service Name

	Rules on use
Network Name	Describe the network name to identify the radio transmitter (transmission master) according to the following rules. - Describe the area name in "region ID" and value in " region broadcaster ID" in wide characters. - For "region ID" and " region broadcaster ID", see Vol. 7 of ARIB TR-B14. One network name corresponds to one network ID; therefore new network name is specified for CATV retransmission. It is not assumed that the receiver units present to viewers. Ex 1: In case of Kanto region (large area), Broadcaster A specifies as "Kanto area: 0" and Broadcaster M as "Kanto area: 12". Ex 2: In case of Hokkaido (prefectural area), Broadcaster B specifies as "Hokkaido (Sapporo): 1" for Sapporo and "Hokkaido (Hakodate): 1" for Hakodate.
TS Name	Describe the brand name or well-known service name so that the viewers can recognize who provides the TS service they are receiving. It is assumed that the TS name is displayed when the viewers identify the TS on the receiver units (ex. selecting a service falling on three-digit-number in the fringe area or checking the transmission TS in EMM); therefore, set to such name that the viewers can judge the target service area of receiving TS. If the two TS have the different TS-IDs, do not place the same TS name. Ex) NHK Sogo (Kanto), TV Asahi
Service Name	Describe the service channel name. It is assumed that the channel names are displayed on the channel list by the receiver units. Do not assume that the receiver units display the combinations with TS names; therefore, place the service name that can be recognized by itself. The same service name can be used in the multiple services with the same TS. (Same in BS) Ex) NHK-Hi, TV Asahi [1]

* The maximum length of the above three fields is 10 wide characters (or 20 bytes).
* Changing the transmitted names may cause confusion for viewers. The transmitted names should not be changed unless absolutely necessary.
* The above examples are only for reference. They are determined by broadcasters.

[Section 5] Reference Material – PSI/SI Receiver Unit Guideline

A Mandatory Process of PSI/SI

Since whether to use PSI/SI completely depends on the manufacturers, strictly, there is no mandatory process of PSI/SI. However, if the receiver units are designed for using PSI/SI, there are the rules that should be complied with to avoid malfunctions. This chapter explains the rules that should be followed on the assumption that the receiver units use the PSI/SI.

(1) The basic selection functions shall not be interrupted when any error occurs in SI.

Viewers should be always able to select the desired service using PSI only including NIT. Any error in SI should not interrupt channel selection using the PSI only. Channel selection using PSI only means that the viewers can select at least services (including switching TS) and the default components can be presented in the service.

The SI is not always transmitted in the same layer as that for the service; therefore, a part of SI may not be received when the service is received. Also, moving the mobile unit may cause SI not to be obtained. In this case, it is necessary to concern the same thing.

(2) Multi section transmission shall be supported.

Even when multi section PSI/SI is transmitted, the receiver units should be able to process all sections placed in the TS packet in accordance with the transmission rule.

(3) Discontinuous version numbers shall be able to follow

The receiver units should be able to judge as updated when the version number of sub-table is changed even if the version numbers are not serial. It is not necessary to detect immediately after the number is changed but it is required to be able to follow functionally.

(4) The transmitted information shall not be used for the different purpose from the transmission intention.

SI is transmitted for each purpose. Since the SI is presentation free, how it is used or presented to viewers depends on each manufacturer. But the users should use the SI according to each purpose.

(5) No malfunction shall be caused when the area obtained for future extension is used.

This rule is essential to extend the PSI/SI specifications smoothly in the future. To comply with the rule, there are two patterns of fields in syntax.

a Fields the receiver units cannot refer to:

Fields where the receiver units cannot process using any value. The following are examples:

- "reserved" and "reserved_future_use" fields in section syntax.
- "running_status" field in EIT and SDT

- "ISO_639_language_code" excluding Audio Component Descriptor

b Fields the receiver units should judge as invalid if other value than the specified value is described

In such fields, the values are provided in the current transmission operating rule, and it is possible that other values will be used in the future. If these fields are extended in the future, it is assumed that the receiver units before extention cannot use the fields. Conversely, the current receiver units should not specify the usage and cause any malfunction subsequently.

The following table shows how each field should become invalid.

Fields	Invalid range
current_next_indicator	If it is not set to '1', invalidate the received section itself.
service_type	The service with "service_type" that is not self-supported should not be presented to viewers. Accordingly, channel selection and displaying program table should not be available.
content_nibble user_nibble	If any value that is not self-supported is set, ignore the value only. However, if it is known in the large category only, it can be used in the large category only. If unsupported extension area is set, do not refer to "user_nibble" field.
stream_type	Do not select (present) the component in "stream_type" that is not self-supported.
stream_content	If any value that is not self-supported is described, ignore the value only. Therefore, do not present the existence of the described component.
component_type	
data_component_id	If "data_component_id" that is not self-supported exists, do not present the existence of the relative data component.
table_id	Do not use any table with "table_id" that is not self-supported. Even if the table (or sub-table) is self-supported, do not use the table that is not specified to transmit by the received TS in the operation rule. (Note)
descriptor_tag	If any value that is not self-supported is described, do not use the descriptor itself. Even if the descriptor is self-supported, do not use the descriptor placed in other descriptor loop than those specified to place the relative descriptor in the operation rule.

(Note) Other tables in NIT, SDT and EIT are not used in Digital Terrestrial Television Broadcasting. Ignore the sections with their "table_id". Ignore other transport streams than the relative TS and sub-tables for other services than those used in the relative TS if any. They can be usually recognized by the NIT transmitted by the TS.

(6) Characters shall be correctly displayed according to the binary code where the character codes are described.

Controls codes such as linefeed code should be correctly interpreted based on the rules on transmission. Do not modify the contents for the receiver unit's convenience. Regarding the character string length, it is possible to add linefeeds based on the display area, cut the character string and add some characters to show "continued".

B Rules for Reception Processing for Each Table and Error Process

B.1 Common Rules (Section Header and Descriptor Header)

With regard to receiving PSI/SI sections, it is important to interpret section headers correctly. At the stage of receiving the section correctly with the section header, the analysis process for the internal section can be performed. Normally, a descriptor loop exists in the section and descriptor also has the descriptor header syntax; therefore, there is a common rule on receiving process.

The Rules for Reception Processing (especially error process) for section header and descriptor header are shown below:

Rules on Error Process for Section Header	
table_id	If any value that is not self-supported is described, do not use the received section. Even if the value in "table_id" is self-supported, do not use the section that is not specified to transmit by the received TS in the operation rule.
section_syntax_indicator	If it is not set to '1' in the MPEG extended section, do not use the section itself.
section_length	If the value is not within the range limited by syntax structure for each "table_id" and operation, do no use the section itself. If the value is not correct, normally an error occurs during the CRC check.
table_id_extension	Regarding this field, a purpose of use is determined for each table type; therefore, for the rule on error process, see the chapter for each table.
version_number	
current_next_indicator	If it is not set to '1', do not use the section itself.
section_number	
last_section_number	

Rules on Error Process for Descriptor Header	
descriptor_tag	If any value that is not self-supported is described, do not use the relative descriptor for any purpose. Even if the value in "descriptor_tag" is self-supported, do not use the descriptor received by other descriptor loop than those specified to place the relative descriptor in the operation rule.
descriptor_length	It is possible to cut the byte sequence of the descriptor using the value in this field but this process should be performed comparing with the length of descriptor loop in the section syntax.

[Process Rule on Section]

The analysis process for internal section can be performed after the bit sequence received according to "section_length" field is cut, CRC check is performed, all fields are checked for each table, then it is confirmed that the section is valid. For judging if the section is valid, see the chapter for each table.

If the section is invalid, do not use the section for any purpose as if the section is never received. For example, if PAT is received and "section_syntax_indicator" is set to '0', discard the received PAT immediately and judge that the PAT has never been received.

The analysis process of the receiver unit is performed not by section unit but by slightly bigger semantically-group unit. The bigger unit usually refers to sub-table, but it is segment in case of H-EIT[schedule]. When the semantically-group unit is not completely obtained, it should be safe to discard the process for the whole unit. For example, when NIT is received, the section where "section_number"='1' is not correctly received while "last_section_number"='1'. In this case, all sections including the section where "section_number"='0' should be discarded. However, in case of EIT, etc., the partially received sections can be used. In this case, care should be taken not to influence other processes.

The following are the filed to be referred to constitute a sub-table for each table type. The sections with the same fields described below belong to the same sub-table. (The sub-tables for PAT, PMT and CAT*1 are constituted by 1 section.)

* Sub-table for CAT does not exist since CAT is private section type; therefore, sub-table = table.

For TOT, there is no conception of sub-table (since section type is different).

Table type	Fields to identify sub-tables
PAT	table_id / transport_stream_id / version_number
PMT	table_id / program_number / version_number
CAT	table_id / version_number*1
NIT	table_id / network_id / version_number
BIT	table_id / original_network_id / version_number
SDT	table_id / transport_stream_id / original_network_id / version_number
EIT*2	table_id / service_id / transport_stream_id / original_network_id / version_number

*1 In CAT, the whole table is regarded as one sub-table.

*2 The EITs with the same "table_id" can transmit the different information using the different PID; therefore, it is necessary to check the PID before processing.

[Process Rule on Descriptor]

The descriptor is identified by descriptor header, and the bit sequence in the descriptor loop is cut. The bit sequence is cut based on the value in "descriptor_length" field. Even if the different value from the "descriptor_length" value assumed based on the descriptor syntax is described, cutting should be performed based on the described value. In this case, check the length of the relative descriptor loop (assumed for each section syntax), and do not exceed the length when cutting. Such case occurs only at an abnormal state, but it is still a required process to avoid influencing out of the descriptor loop.

It is required to analyze the descriptor in each syntax defined for each descriptor tag. At this time, an invalid or abnormal state may occur due to the description in each field.

The invalid state occurs when the value that is not self-supported is described in the field. In this case, do not analyze the descriptor itself as if the descriptor does not exist. In consideration of the future extension, this case can easily occur; therefore, it is necessary to try not to recognize for the unsupported receiver units.

The error state occurs when the described bit sequence is not compatible with the syntax structure after the descriptor is recognized and it is analyzed based on the syntax. The error is caused when the descriptor length is inconsistent with the length in the descriptor syntax. In this case, ignore the contents of the relative descriptor, and consider to provide functional limitations as necessary. However, these limitations should not influence the function of channel selection.

Additionally, the error state occurs, for example, when there is the overlapping time between "start_time" and "duration" after "start_time" and "duration" of the events that belong to the same sub-table are interpreted. Accordingly, the error state occurs if there is any difference among the fields that are correlated.

Character string fields often exist in descriptors. If the length of character string exceeds the maximum length (number of characters or bytes) provided in the operation rule, ignore the part exceeding the maximum length. In other words, if the length of the character string field exceeds the maximum number of bytes or characters, the character string can be cut at the stage of processing and displaying. However, do not perform any process that may influence other information. It means that the whole descriptor unit should be processed as normal.

The following chapters explain the receiving/storing process guideline and analysis process guideline focusing on error process by tables.

B.2 PAT

B.2.1 Purpose of Use

- It is used to obtain PMT PID for the target services.
- It is used to understand the currently being broadcasted services in the selected TS.

B.2.2 Receiving/Storing Process

The PAT for the receiving TS should always receive the latest information. "version_number" field can be used to judge if the contents are updated. If the value in "version_number" does not change while observing, it can be judged that the contents in the PAT are not changed. However, the values in "version_number" may not be serial due to failure at the playout systems; therefore, care should be taken to avoid that the PAT cannot be received after the failure.

However, since the PAT is not transmitted in the partial reception layer, the receiver units such as portable receiver units that can receive in the partial reception layer only cannot use the PAT to obtain "PMT_PID". "PMT_PID" for the services transmitted in the partial reception layer is identified by "service_id" since the rule on the relationship with "service_id" is provided. (For the detailed rule, see "5.2.9 Operation of Partial Reception" in Vol. 7.) However, if the receiver units such as fixed receiver units can receive in the partial reception layer and other layers, the PAT can be used since the partial reception service is described in the PAT.

B.2.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
PAT	0x0000	table_id	0x00
		section_syntax_indicator	1
		current_next_indicator	1
		section_number	0

In addition, if the value in "section_length" is not correct from the view of the syntax structure, the received section should be also discarded and processed as if the section cannot be received. If the PAT cannot be obtained or the section is not valid, judge that the relative frequency cannot be received at the time. Therefore, there is no need to decode all services transmitted with this frequency.

However, if the partial reception layer exists in the relative TS, the services transmitted in the partial reception layer may be received even though the PAT cannot be obtained. In this case,

decode the services transmitted in the partial reception layer.

Even if the description is not compatible with that in the NIT, it is not regarded as error. During the off service, the service described in the NIT may not exist in the PAT. Or if the service not described in the NIT exists in the PAT (usually, this case does not occur), it is safe to ignore.

B.3 PMT

B.3.1 Purpose of Use

- It is used to decode the components for the selected services.

B.3.2 Receiving/Storing Process

The PMT for the selecting service should always receive the latest information. "version_number" field can be used to judge if the contents are updated as well as PAT. However, the values in "version_number" may not be serial due to failure at the playout systems; therefore, care should be taken to avoid that the PMT cannot be received after the failure. If the latest PMT for the selecting service is cached in the receiver unit before using, the response rate such as switching components can increase. It is not necessary to receive/analyze the PMT for the services that are not selected.

There is no direct relationship between updating PMT and event segment. For example, the PMT can be updated during the event, or PMT may not be updated among the events. If the process requires the event segment, EIT[p/f] should be used. The PMT should be updated without relation to the events.

The PAT is not transmitted in the partial reception layer. If the receiver units can receive only in the partial reception layer, "PMT_PID" is identified by "service_id". (For the detailed rule, see "5.2.9 Operation of Partial Reception" in Vol. 7.)

Since the repetition rate for the services transmitted in the partial reception layer is 500ms which is longer than that for other layers and it takes more time to decode low-frame-rate and low-resolution pictures, it is recommended to store the PMT as much as possible and reduce the time taken to present video. To use the stored PMT, there is the limitation on the PID operation of elementary stream for the service. For the details, see Vol. 7.

B.3.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
PMT	PAT indirect designation	table_id	0x02
		section_syntax_indicator	1
		program_number	Value described in the PAT as "program_number" for the relative PID
		current_next_indicator	1
		section_number	0

After it is confirmed that the section is correctly received, the received section is analyzed. When analizyng the PMT section syntax except for the section headers, care should be taken for following:

- "stream_type" field

  If the value that is not self-supported is described in "stream_type", do not interpret the relative loop. Skip the descriptor loop according to the value in "ES_info_length".

- "program_info_length" and "ES_info_length" field

  If the values in "program_info_length" and "ES_info_length" are not compatible with that in "section_length", judge that the received section has error. Accordingly, process as if the PMT cannot be received.

- Number of second descriptor loops of PMT

  If the described number of the second descriptor loops of PMT is above the upper limit of elememtary stream count, the elementary stream with the upper limit value or lower should be normally processed in order of description.

If the PMT cannot be received more than 1000ms (services transmitted in other layers than partial reception layer)/2000ms (services transmitted in the partial reception layer), or the valid section cannot be received, judge that the relative service is off service or unreceivable. Therefore, there is no need to decode the relative service.

[Descriptor]

When analyzing the descriptor fields for the PMT, care should be taken for the following:

■ Process for Descriptor Placed in the First Descriptor Loop of PMT

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Conditional Access Descriptor	Decoding of the selecting program can be stopped.
Digital Copy Control Descriptor	Contents can be outputted for copying on the assumption that the descriptor does not exist. Do not influence the decoding process for the selecting program. Since the Content Availability Descriptor functions only in combination with the Digital Copy Control Descriptor, ignore the Content Availability Descriptor.
Content Availability Descriptor	Process can be performed on the assumption that the descriptor does not exist.
Emergency Information Descriptor	It can be judged that emergency warning broadcasting or emergency warning signal test is not broadcasted.

■ Process for Descriptor Placed in the Second Descriptor Loop of PMT

The process should be implemented so that it cannot influence out of the relevant elementary stream, basically.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Conditional Access Descriptor	Decoding of the relative component can be stopped.
Stream Identifier Descriptor	Process can be performed on the assumption that the Stream Identifier Descriptor does not exist. It may not be able to relate the EIT. If the relationship between the values in "component_tag" and "stream_type" is different from that provided, the same process should be performed.
Digital Copy Control Descriptor	Content can be outputted for copying on the assumption that the descriptor does not exist. Do not influence the decoding process for the selecting component.
Video Decode Control Descriptor	Process can be performed on the assumption that the descriptor does not exist.
Data Component Descriptor	Process can be performed on the assumption that the descriptor does not exist. Accordingly, there is no need to decode the data broadcasting service.

B.4 CAT

B.4.1 Purpose of Use

The CAT is used for the following purposes:

- Obtain "EMM_ PID" transmitted in the TS.
- Obtain the display control information on Automatic display of message for the services in the TS.

B.4.2 Receiving/Storing Process

The CAT is not the type of table where the contents are often changed, but it is still recommended to receive the latest CAT as long as the CAT is transmitted to the TS for the selected station. In this case, "version_number" field can be used to judge if the contents are updated. However, as well as other tables, the values in "version_number" may not be serial due to failure at the playout systems; therefore, care should be taken to avoid that the CAT cannot be received after the failure.

The PID for EMM stream in the TS is not generally changed; therefore, the received information can be stored in the receiver units by TS to use. It means it is possible to receive the EMM stream directly without waiting for the CAT reception. However, it is required to obtain the latest CAT and check if the contents are not changed.

It is also possible that some chargeable broadcasters may use the Automatic display of messages for their own services. In this case, the receiver units need to obtain the display control information when selecting the target service and judge if the determined message display is enabled/disabled from the connection with the IC cards. The display control information is designed for daily use, and the contents and placement are not often changed, but it is still required to obtain the latest CAT and check if the contents are changed.

B.4.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
CAT	0x0001	table_id	0x01
		section_syntax_indicator	1
		current_next_indicator	1
		section_number	0

[Descriptor]

When analyzing the descriptor fields for the CAT, care should be taken for the following:

■ Process for Descriptor Placed in the CAT Descriptor Loop

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Conditional Access Descriptor	Process can be performed on the assumption that the descriptor does not exist. Therefore, there is no need to obtain the EMM stream.
CA Service Descriptor	Process can be performed on the assumption that the descriptor does not exist. Therefore, do not start displaying the Automatic display of messages in the target services.

B.5 NIT

This section is related to Appendix B in Vol.2 as well as this document.

B.5.1 Purpose of Use

The NIT is used for the following purposes:

- Identify the networks for Digital Terrestrial Television Broadcasting.
- Identify the networks and TS uniquely.
  It can be used to identify the same network when the same network is received by the multi-frequency of MFN
- Obtain the TS structure in the network and service structure for each TS.
- Obtain the area code for the relative network.
- Obtain, for each received network, the TS name, remote control key identifier, number of transmission layers, transmission parameter type for each layer and service structure within each layer.

B.5.2 Receiving/Storing Process

B.5.2.1 Receiving/Storing Process by Fixed Receiver Unit

In Digital Terrestrial Television Broadcasting, the network is defined every master unit; therefore, the different NIT is placed in each master. In addition, since the networks do not transmit other networks' information including NIT, it is necessary to scan and obtain all frequencies for Digital Terrestrial Television Broadcasting to obtain all receivable NIT.

The receiver units usually scan all frequencies to obtain and store the NIT in the receivable networks at the initial presetting stage. At this time, some networks such as MFN transmit the information with the same network and TS; therefore, it is recommended to judge if the networks are same from the value in "network_id" to avoid storing the same NIT over again.

Since a network does not transmit other networks' information, it is recommended to store and manage the NIT in the receivable networks into the non-volatile memory and create the service list of the receivable networks in the receiver units.

Since the NIT information such as service structure may be changed, it is recommended to keep the NIT latest by scanning the frequencies for the receivable networks regularly. It is not necessary to scan all frequencies but to scan only for the receivable networks preset in the receiver units.

Furthermore, even if the radio or NIT cannot be obtained, do not remove the network from the list of receivable networks. This is because the network may be suspended by accident. Addition/deletion of network should be performed after the viewers are informed about re-scan to avoid their confusions. While rare, when "Type a" is broadcasted during accidents and disasters, the modulation system may be changed from “64QAM” to “16QAM”. In this case, the description in the TS Information Descriptor will be properly changed so that the receiver units can judge accidents and disasters broadcast is broadcasted in the services because of “Type a” with “16QAM”.

The NIT cycle is described by SI transmission parameters of the first loop in BIT (all-station applied transmission parameter). It means the NIT cycle cannot be found until the BIT is obtained. However, the NIT cycle is common in Digital Terrestrial Television Broadcasting except for the change period of all-station applied transmission parameter and is rarely changed. Accordingly, in a network, if the all-station applied transmission parameter is obtained from the BIT, it can be used to obtain the NIT for other networks. However, it does not mean the NIT cycle is never changed, and the all-station applied transmission parameter for a network can be different from those for another network. Therefore, it is required to adjust so that the NIT can be obtained even when the all-station applied transmission parameter are different between networks.

The NIT is not the type of table where the contents are often changed. But if the power has not been on for long time, or it has been on for long time and received the specific network only, the stored NIT can be very old. Therefore, it is recommended to obtain the NIT to keep latest when moving to another network such as tuning to a service. In this case, whether the NIT is latest or not should not be judged from "version_number" since it may finish one cycle and return. To know if the NIT is latest, check the contents of the NIT.

Even during tuning to the network, the NIT may be changed including the service structure and layers. It is not necessary to observe full-time but to often check if the contents are updated. If the value in "version_number" is not changed, it can be judged that the contents of NIT are not changed, but if it is changed, it does not mean that the contents are changed. In this case, check the contents. Also, the values in "version_number" may not be serial due to failure at the playout systems; therefore, care should be taken to avoid that the NIT cannot be received after the failure.

B.5.2.2 Receiving/Storing Process by Mobil Receiver Unit

In the mobile receiver units, the process is generally same as that by the fixed receiver units. The difference is that, since the services are updated more often in the mobile receiver units, it is not very effective to scan the receivable network first, comparing to the fixed receiver units. Accordingly, in the mobile receiver units, implementation without initial scanning or automatic scanning depending on the radio situation may be possible.

B.5.2.3 Receiving/Storing Process by Portable Receiver Unit

In the portable receiver units, the process is generally same as that by the mobile receiver units. However, since the portable receiver units can receive only the services transmitted in the partial reception layer, it is recommended to remove other services than those transmitted in the partial reception layer from the list of receivable services.

B.5.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
NIT	0x0010	table_id	0x40
		section_syntax_indicator	1
		network_id	Same value as "TS_id" obtained from PAT
		current_next_indicator	1
		section_number	<= last_section_number

For a safe process, note that the NIT is not valid until all sections structuring sub-table are received. If one or more of the sections structuring sub-table (from the section where "section_number" = '0' to the section indicated by "last_section_number") is not received, the process should be performed on the assumption that the relative sub-table for NIT cannot be received.

In this case, it is recommended to use the already stored old information to do everything. Normally, the assignments of frequencies and TS, and locations of services and layers are not often changed. In consideration of the above natures, it is recommended to switch the network and TS based on the (old) NIT in the meantime and judge the included services using the PAT. At the time, if there is any inconsistency between the NIT and PAT, set the compatible services to be selectable. The NIT can directly influence the channel selection function. If the sub-table cannot be structured as mentioned above, the corrected contents may be transmitted immediately; therefore, it is recommended to obtain the updated NIT as soon as possible.

If the NIT has not been received and stored, judge that the relative network cannot be received. In this case, there is no need to decode all services within the network.

When analyzing the NIT section syntax except for the section headers, care should be taken for the following:

- "network_id", "original_network_id" and "TS_id" fields

  In Digital Terrestrial Television Broadcasting, the values in "network_id", "original_network_id" and "TS_id" fields should be same. If they are different from the value in "TS_id" obtained from the PAT, it is recommended not to process the TS for the relative network.

- "length" fields

  If there is an inconsistency between the values in "network_descriptor_length", "transport_stream_loop_length" and "transport_descriptors_length", and the value in "section_length", judge that there is an error in the received section. Thus, since the sub-table cannot be completed, the process should be performed on the assumption that the relative sub-table of the NIT cannot be received.

[Descriptor]

When analyzing the descriptor fields for the NIT, care should be taken for the following:

■ Process for Descriptor Placed in the First Descriptor Loop of NIT

It is generally allowed that the whole network may be influenced, but the influence should be limited within the descriptor as possible.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Network Name Descriptor	Mandatory descriptor. The influence should be limited to the extent that the network names become unavailable.
System Management Descriptor	Mandatory descriptor. Since the relative network cannot recognize Digital Terrestrial Television Broadcasting, judge that the relative network cannot be received. There is no need to decode all services within the network.

■ Process for Descriptor Placed in the Second Descriptor Loop of NIT

The process should be implemented so that its influence can be limited within the relative TS.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Service List Descriptor	Mandatory descriptor. There is no need to receive the relative TS itself. (Process should be performed on the assumption that no services exist in the relative TS.)
Terrestrial Delivery System Descriptor	Mandatory descriptor. But since it is not sufficiently meaningful, there is no need to use this descriptor for processing.
TS Information Descriptor	Mandatory descriptor. There is no need to receive the relative TS itself. (Process should be performed on the assumption that no services exist in the relative TS.)
Partial Reception Descriptor	It is not known if the partial reception layer exists; therefore, if the receiver units can receive only in the partial reception layer, there is no need to receive the relative TS itself. Care should be taken not to cause an error by receiving the relative TS.

B.6 BIT

B.6.1 Purpose of Use

The BIT is used for the following purposes:

- Obtain the relationship between services and Terrestrial broadcasters in order to implement the functions by Terrestrial broadcaster unit. The function include series and EPG using individually operated SI which is a type of Basic delivering EIT type.
- Obtain the affiliation id required for data broadcasting and serial reception of the fringe area by mobile receiver units.
- Obtain the all-station/each-station applied transmission parameter.

B.6.2 Receiving/Storing Process

B.6.2.1 Receiving/Storing Process by Fixed Receiver Units

The BIT has the different sub-tables for each network as well as NIT. In addition, since the cycles, etc. required to obtain SI are described, it is recommended to obtain other SI after the BIT is obtained when moving to other network. On the other hand, since the BIT is not the table that is often updated, the receiver units can store and manage information into the non-volatile memory to use.

The cycle parameters such as all-station/each-station applied transmission parameter required to obtain SI are described. Since they may be changed, it is preferable to keep the BIT latest by scanning the receivable networks regularly as well as NIT.

The BIT cycle is described by the all-station applied transmission parameter for BIT as well as NIT; therefore, the transmission cycle is not known until the BIT can be received. In this case, also like NIT, the all-station applied transmission parameter for the BIT received by other networks can be used. However, since the BIT cycle may be changed or there may be a difference of parameter between networks, it is necessary to adjust so that the BIT can be obtained by the different cycle from the all-station applied transmission parameter received by other networks.

The BIT is not the type of table where the contents are often changed. But if the power has not been on for long time, or it has been on for long time and received the specific network only, the stored BIT can be very old. Therefore, it is recommended to obtain the BIT to keep latest when moving to another network such as tuning to a service. In this case, whether the BIT is latest or not should not be judged from "version_number" since it may finish one cycle and return. To know if the BIT is latest, check the contents of the BIT.

Even during tuning to the network, the BIT may be changed including the SI transmission parameters. It is not necessary to observe full-time but often if the contents are updated. If the value in "version_number" is not changed, it can be judged that the contents of BIT are not

changed, but if it is changed, it does not mean that the contents are changed. In this case, check the contents. Also, the values in "version_number" may not be serial due to failure at the playout systems; therefore, care should be taken to avoid that the BIT cannot be received after the failure.

B.6.2.2 Receiving/Storing Process by Mobile Receiver Unit

In the mobile receiver units, the process is generally same as that by the fixed receiver units. The difference is that, since the receivable networks are updated more often in the mobile receiver units, it is not very effective to scan regularly, comparing to the fixed receiver units. Accordingly, in the mobile receiver units, implementation without regular scanning may be possible.

B.6.2.3 Receiving/Storing Process by Portable Receiver Unit

In the portable receiver units, the process is same as that by the mobile receiver units.

B.6.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
BIT	0x0024	table_id	0xC4
		section_syntax_indicator	1
		original_network_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT
		current_next_indicator	1
		section_number	<= last_section_number

For a safe process, note that the BIT is not valid until all sections structuring sub-table are received. If one or more of the sections structuring sub-table (from the section where "section_number" = '0' to the section indicated by "last_section_number") is not received, the process should be performed on the assumption that the relative sub-table for BIT cannot be received. In this case, it is recommended to use the already stored old information to do everything. In some cases the selection station function is influenced by the table. If the sub-table cannot be structured as mentioned above, the corrected contents may be transmitted immediately; therefore, it is recommended to obtain the updated BIT as soon as possible.

If the BIT has not been received and stored, it is inevitable that the SI transmitted by the relative network cannot be obtained or the services such as data broadcasting using the terrestrial broadcaster identifier or affiliation id cannot be decoded.

After it is confirmed that the section is correctly received, the section is analyzed. When analyzing the BIT section syntax except for the section header, care should be taken for the following:

- Second descriptor loop count

  The second descriptor loop count is always 1. Ignore the second and later loop.

- "broadcaster_id" field

  It is not used in Digital Terrestrial Television Broadcasting (fixed value). Ignore this field.

- "length" fields

  If there is an inconsistency among the values in "first_descriptors_length" and "broadcaster_descriptors_length" and the value in "section_length", judge that there is an error in the received section. Thus, since the sub-table cannot be completed, the process should be performed on the assumption that the relative sub-table of the BIT cannot be received.

[Descriptor]

When analyzing the descriptor fields for the BIT, care should be taken for the following:

■ Process for Descriptor Placed in the First Descriptor Loop of BIT

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
SI Parameter Descriptor	Even if an only part of syntax has an error, the descriptor itself should not be interpreted. In the worst case, it is inevitable that the SI used by the all-station applied transmission parameter including the commonly operated SI cannot be received. But it is recommended to receive the SI using the stored SI Parameter Descriptor or under the default setting, provided that a fatal situation should not be caused by the different transmission from the assumed one.

■ Process for Descriptor Placed in the Second Descriptor Loop of BIT

The process should be implemented so that its influence can be limited within the relative terrestrial broadcaster.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
SI Parameter Descriptor	Even if an only part of syntax has an error, the descriptor itself should not be interpreted. It is inevitable that the SI used by the each-station applied transmission parameter of the relative Terrestrial broadcaster cannot be received. It is possible to try to receive the SI using the stored SI Parameter Descriptor, provided that a fatal situation should not be caused by the different transmission from the assumed one.
Extended Broadcaster Descriptor	Mandatory descriptor. It is inevitable that the functions used by Terrestrial broadcaster unit or affiliation id unit (series function, data broadcasting, etc.) become unavailable.

B.7 SDT

B.7.1 Purpose of Use

The SDT are used for the two main purposes.

- Present the service name and logo.
- Refer to the default values for viewing/recording limitations for each event.

The latter purpose is important to the receiver units that support the reservation by event unit. (The viewing/recording limitations for channel selection are described in PMT.) Therefore, it is recommended that the receiver units that support the reservation by event unit can handle the SDT.

The SDT is also used for recognizing what type of EITs (H-EIT, M-EIT and L-EIT) is transmitted for each service, whether EIT[p/f] of basic delivering EIT type is transmitted, and whether EIT[schedule] (H-EIT[schedule]) is transmitted.

The EIT[p/f] of basic delivering EIT type is generally transmitted by all broadcasters, however, some of them may not be transmitted due to facility maintenance or special services. Thus, it is required to handle the EIT[p/f] correctly in accordance with the flag indicating whether EIT[p/f] of basic delivering EIT type is transmitted.

Transmission of EIT[schedule] (H-EIT[schedule]) depends on the layer in which the service is transmitted and service type. It is also required to handle the EIT[schedule] (H-EIT[schedule]) correctly in accordance with the flag indicating whether EIT[schedule] (H-EIT[schedule]) is transmitted.

B.7.2 Receiving/Storing Process

B.7.2.1 Receiving/Storing Process by Fixed Receiver Unit

The SDT has a sub-table for each TS. In Digital Terrestrial Television Broadcasting, one network has one TS; therefore, only one sub-table is transmitted from one SDT every network. To obtain all SDT for all services, as well as NIT and BIT, it is necessary to scan and obtain all of the receivable networks.

The receiver units, in consideration of the non-volatile memory size for storage and installed functions, obtain and store the SDT for the networks as necessary. However, since the transmission information on EITs, EIT[p/f] and EIT[schedule] is described in the SDT and the contents are not often changed, in order to reduced the time to obtain EIT, it is recommended to store and maintain the SDT for all receivable networks with NIT and BIT if the receiver units move to other network to obtain the EIT.

The contents of SDT are not often changed, but they may be changed when the service

structure and the layer structure within the TS are changed. In this case, the NIT is changed at the same time. Thus, when the changed service structure and layer structure of the NIT is detected, it is preferable to obtain the SDT at the same time. However, note that the NIT and SDT may not be compatible during transition before/after a change is made. Under such situation, it is still necessary to use the NIT information for the service structures within the TS.

In addition, the SDT may be updated when the extended delivering EIT type starts/stops transmitting, or logo is changed. In such case, the influence on the receiver units is not bigger, comparing to the case that the NIT is updated at the same time. However, it is still recommended to obtain the latest SDT as soon as possible to reflect the transmission intention from the broadcaster.

B.7.2.2 Receiving/Storing Process by Mobile Receiver Unit

In the mobile receiver units, the process is generally same as that by the fixed receiver units. The difference is that, since the receivable networks are updated more often in the mobile receiver units, it may not be very effective to obtain and store the SDT for all receivable networks at some point, comparing to the fixed receiver units.

However, the time to obtain the EIT may be reduced by storing and managing the obtained SDT.

B.7.2.3 Receiving/Storing Process by Portable Receiver Unit

In the portable receiver units, the process is same as that by the mobile receiver units. However, since the portable receiver units can receive only the services transmitted in the partial reception layer, there is no need to store the information on other services than those transmitted in the partial reception layer.

B.7.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
SDT	0x0011	table_id	0x42
		section_syntax_indicator	1
		transport_stream_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT.
		current_next_indicator	1
		section_number	<= last_section_number
		original_network_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT.

For a safe process, note that the SDT is not valid until all sections structuring sub-table are received. If one or more of the sections structuring sub-table (from the section where "section_number" = '0' to the section indicated by "last_section_number") is not received, the process should be performed on the assumption that the relative sub-table for SDT cannot be received.

If the SDT is not received, it is recommended to display the service list and program table using the stored SDT information if any.

If the SDT has not been stored, however, it is inevitable that, regarding the services within the relative TS, the program table present function using the EIT becomes unavailable since the EIT within the relative TS cannot be received.

Even though the SDT cannot be received and has not been stored, the channel selection function should not be influenced.

After it is confirmed that the section is correctly received, the received section is analyzed. When analizyng the SDT section syntax except for the section headers, care should be taken for following:

- "service_id" field

  "service_id" field correlates with the service list described in the NIT. Although the service where "service_type" = "0xA4" (engineering service) is not described in the SDT, other services are described in the SDT; therefore, it can be judged that the SI information on the incompatible service is invalid. However, the functions such as channel selection should be performed in accordance with the NIT.

- Transmission flags for EIT[p/f], H-EIT[schedule] and EIT type delivering flag ("EIT_present_following_flag", "EIT_schedule_flag", "H-EIT_flag", "M-EIT_flag", and "L-EIT_flag" fields)

  The transmission flags for EIT types, EIT[p/f] and H-EIT[schedule] are related to the layer information on the services described in the NIT. A unique basic delivering EIT type is defined based on the transmission parameter type of the service described in the NIT, then transmission of the EIT type is mandatory. Accordingly, if the transmission flag for EIT[p/f] ("EIT_present_following_flag") is set to ’1’, the flag for the basic delivering EIT type should be also set to ’1’. If they are not compatible, judge that the EIT for the relative service is invalid (not transmitted).

  Since the basic delivering EIT type with the higher resistance than that for the service layers are not transmitted, ignore such EITs even though they are set to '1'. Which type of EIT for basic delivering EIT type (H-EIT/M-EIT/L-EIT),is judged from the transmission parameter type of the services described in the NIT.

- "running_status" field

  Ignore this field since it is not used.

- "descriptor_loop_length"

  If the values in "descriptor_loop_length" and "section_length" are not compatible, judge that the received section has any error. Thus, since the sub-table cannot be completed, the process should be performed on the assumption that the relative sub-table of the SDT cannot be received.

[Descriptor]

When analyzing the descriptor fields for the SDT, care should be taken for the following:

■ Process for Descriptor Placed in SDT Descriptor Loop

In general, the process should be implemented so that its influence can be limited within the relative service.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Service Descriptor	Mandatory descriptor. The influence should be limited to the extent that the service names become unavailable.
Digital Copy Control Descriptor	It is inevitable that the functions such as scheduling of recording for all events in the relative service become unavailable.
CA Contract Info Descriptor	It is inevitable that the functions such as program reservation for the events in the relative service become unavailable. However, regarding individual events in the relative service, if CA contract information that is valid to the EIT exists, make efforts to continue the program reservation function.
Logo Transmission Descriptor	There is no need to display the logo of the relative service on the assumption that the descriptor does not exist.
Linkage Descriptor	There is no need to perform CA substitute service on the assumption that the descriptor does not exist.

B.8 EIT

B.8.1 EIT type

B.8.1.1 Relationship among EIT type, EPG Display Type and Receiver Unit Type

In Digital Terrestrial Television Broadasting, there are up to three layers in which the services are transmitted. This causes the EIT not to be transmitted to multiple layers with the same PID; therefore, three EIT types with the different PIDs are transmitted. Since the types of receiver units that receive those EITs are also different, the proper data amount of program contents are transmitted on the assumption of the EPG display appropriate to each receiver unit. The relationship among EIT types, EPG display type and receiver unit type is shown below: (For the details, see 13.1.)

EIT type	EPG display type	Characteristics of EPG display type	Main type of receiver unit (Target receiver unit)
H-EIT	TYPE-H EPG display	Display the program information on all services (all networks) for 8 days. (Image of BS program table) Detailed information is included.	Tabletop televisions for domestic use Indoor portable receiver units (Collectively called, "fixed receiver units")
M-EIT	TYPE-M EPG display	Display the up to 10 program information on services within own network. Detailed information is not included.	Car TV sets PDA (Collectively called, "mobile receiver units")
L-EIT	TYPE-L EPG display	Display the up to 10 program information on services within own network.	Portable terminal (Portable receiver units)

B.8.1.2 Judgement as Receivable EIT type

The transmitted EIT types may vary depending on service units. There are two EIT types: Basic delivering EIT type and for extended delivering EIT type. In case of basic delivering EIT type, if "EIT_present_following_flag" is set to '1', judge that the EIT is surely transmitted and perform the receiving process. The basic delivering EIT type can be found by the transmission parameter type of the service described in the NIT. (See Table 13-2 and 13-3 of Chapter 13.)

What type of EIT is transmitted for each service can be judged from the combinations of EIT type delivering flag (H-EIT_flag / M-EIT_flag / L-EIT_flag) in the SDT and "EIT_present_following_flag".

However, all transmitted EIT types cannot be always received. There are following two cases that the EITs cannot be received:

1) The number of segments/modulation system is not self-supported by the layer in which the EIT is transmitted.
2) The layer in which the EIT is transmitted cannot be demodulated due to the lowered condition of radio or fringe area.

In the case of 1), it is not difficult to judge. The following table shows the relationship among EIT types, transmission parameter type of layers in which the EIT may be transmitted, and obtainable receiver units:

EIT type	Transmission parameter type of layers in which the EIT may be transmitted	Fixed receiver units	Mobile receiver units	Portable receiver units
H-EIT	c, b	R	D	U
M-EIT	b, a	R	R	D
L-EIT	a	D	R	R

R…Receivable

D…Depends on layers in which the EIT are transmitted and receiver unit profile

U…Unreceiveable

Thus, the fixed receiver units can all EIT types, but for the mobile receiver units, it is not known if H-EIT can be received, and for portable, it is not known if M-EIT can be received. In other words, it is not known in which layer each EIT type is transmitted. (The transmission parameter type of the layer in which the EIT type is transmitted is not known.)

According to 2), all EIT types that are surely receivable cannot be always received. Therefore, the unreceivable EIT types can be clearly known but it is not previously known if the receivable EIT types can be surely received. It is necessary to provide such design that the receiver units try to receive the desired EIT types and perform the receiving process if possible.

B.8.1.3 Basic delivering EIT type and for Extended delivering EIT type

In some sevices, the extended delivering EIT type are transmitted and multiple EIT types can be received.

For applying the controls such as start/end of scheduling of viewing/recording and event relay, it is recommended to receive and use the basic delivering EIT type. This is because the basic delivering EIT type are transmitted in the same layer as that for service; therefore, they can be received if the service can be received even under the bad condition of radio or fringe area. On the other hand, the extended delivering EIT type cannot be always received since they are transmitted in the same layer as or layer with the lower resistance than the service.

To display the program table, it is recommended to receive the appropriate EIT type to the display type such as EPG display type.

B.8.1.4 Judgement of SI Transmission Parameter for EIT type

Whether each EIT type is transmitted or not is specified by service unit. However, the SI transmission parameters of EIT types such as transmission range and repetition rate group are same regardless of service, basic delivering EIT type and extended delivering EIT type. Thus, they are determined by EIT type and media type (only for H-EIT) only. The receiver units do not have to care about whether the EIT is basic delivering EIT type or extended derivering EIT type but perform the receiving/storing process for each EIT type and media type.

B.8.2 H-EIT[p/f]

B.8.2.1 Purpose of Use

The H-EIT[p/f] is used for the following purposes:

- Obtain the start and end times of the currently being broadcasted and next events.

  When a change of programming occurs, the change is reflected in H-EIT[p/f] but may not be reflected in H-EIT[schedule]. In such case, H-EIT[p/f] is an mandatory information to the receiver units, especially those that support the recording function for each event.

- Obtain the program information such as program title on the currently being broadcasted and next events.

  In some cases, the program information on the currently being broadcasted event cannot be obtained from the H-EIT[schedule]. It is required to use H-EIT[p/f] to obtain the program information.

  In addition, the H-EIT[p/f] is transmitted with the shorter cycle than that of H-EIT[schedule]. Therefore, it is possible to present the information on the currently being broadcasted and next events even if H-EIT[schedule] has not been stored at the startup of receiver unit, etc.

B.8.2.2 Receiving/Storing Process

(1) Receiving/Storing Process by Fixed Receiver Unit

The H-EIT[p/f] has the following characteristics:

- The H-EIT[p/f] only for service within the selected network is transmitted.
- Repetition rate is short.
- Sub-tables are structured for each service unit and are updated and upgraded at the interval between events or even during the event.

Since the H-EIT[p/f] is often updated, it is necessary to check if the value in "version_number" is changed if it is required to accurately obtain the event information such as program reservation control. Also, the values in "version_number" may not be serial due to failure at the playout systems; therefore, care should be taken to avoid that the H-EIT[p/f] cannot be received after the failure.

If it is required to obtain the latest information on the current event immediately after a channel is selected for the service including the start of reserved program and channel banner, the EIT[p/f] stored in the past cannot be used. Then, by making use of short cycle, it is recommended to wait until the EIT[p/f] is obtained after the channel selection. It is of course possible to obtain the current event information from the stored H-EIT[schedule] until that. But since the information may be changed due to changeable program scheduling, it is required to replace it with the latest EIT[p/f] obtained later.

In addition, since only H-EIT[p/f] for the service within the selected network is transmitted, if the current/next event information related to all receivable networks such as current program list and program table is needed, it is required to scan the networks and obtain the H-EIT[p/f] for each network. If the user scans and obtains the information while viewing a service, it is required to ask the user's confirmation before scanning.

(2) Receiving/Storing Process by Mobile Receiver Unit

Receiving H-EIT[p/f] by mobile receiver units depends on the product planning. If the receiver unit can receive the H-EIT[p/f], perform the same receiving/storing process as that for the fixed receiver unit.

(3) Receiving/Storing Process by Portable Receiver Unit

The H-EIT[p/f] cannot be received by the portable receiver units.

B.8.2.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
H-EIT[p/f]	0x0012	table_id	0x4E
		section_syntax_indicator	1
		service_id	Value in the currently selected TS in the NIT
		current_next_indicator	1
		section_number	0 or 1 and <="last_section_number"
		transport_stream_id	Value equal to TS ID for the currently selected TS
		original_network_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT

For a safe process, note that the H-EIT[p/f] is not valid until all sections structuring sub-table are received. If one or more of the sections structuring sub-table (the sections where "section_number" = '0' and "section_number" = '1') is not received, the process should be performed on the assumption that the relative sub-table for H-EIT[p/f] cannot be received.

If the H-EIT[p/f] is not received, it is allowed that, regarding the relative service, the functions using the H-EIT[p/f] such as performing reserved program/viewing, displaying the channel banner or displaying the program table become unavailable. It is possible to use the stored old information or H-EIT[schedule], but the correct operation is not guaranteed. In this case, it is required to adjust so that other services cannot be influenced.

After it is confirmed that the section is correctly received, the received section is analyzed. When analizyng the H-EIT[p/f] section syntax except for the section headers, care should be taken for following:

- "segment_last_section_number" and "last_table_id" fields
  Ignore this field since it has no meaning.
- Event loop count
  The maximum event loop count is 1. Ignore the loop with the higher count than the maximum.
- "start_time" and "duration" fields
  For the relationship among "start_time", "duration" and the current time, see Chapter 19 of this document. Table 19-1 shows the error conditions. No specific rules on such error process are provided.
- "descriptors_loop_length" field
  If the values in "descriptors_loop_length" and "section_length" are not compatible, judge that there is an error in the received section. Perform the process on the assumption that the H-EIT[p/f] cannot be received since the sub-table is not completed.

In other cases, the errors in consistency or uniqueness with the contents of H-EIT[schedule] stored in the receiver unit may be caused, especially regarding "event_id". Likewise, the inconsistency with the contents of H-EIT[schedule] may be caused regarding "start_time" and "duration".See Section 19.4 of this document.

[Descriptor]

Care should be taken for the following when analyzing the descriptor field of H-EIT[p/f].

■ Process of Descriptor Placed in H-EIT[p/f] Descriptor Loop

In general, the process should be implemented so that its influence can be limited within the relative event.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Short Event Descriptor	Mandatory descriptor. The influence should be limited to the extent that the event names and program descriptions become unavailable.
Component Descriptor	Mandatory descriptor. The influence should be limited to the extent that the component selections/presentations become unavailable.
Audio Component Descriptor	Mandatory descriptor. The influence should be limited to the extent that the component selections/presentations become unavailable.
Content Descriptor	Process should be performed on the assumption that the genre code and event attachment information on the relative event do not exist.
Digital Copy Control Descriptor	It is inevitable that the functions such as scheduling of recording for the relative event become unavailable on the assumption that it is impossible to perform a process for digital copy control correctly.
Series Descriptor	Process should be performed on the assumption that the series do not exist. Its influence should be limited to the extent that the functions by series unit such as series registration and series recording become unavailable.
CA Contract Info Descriptor	It is inevitable that the functions such as program reservation for the relative event become unavailable on the assumption that it is impossible to perform a process for CA correctly.
Event Group Descriptor	Process should be performed on the assumption that the Event Group Descriptor does not exist.
Component Group Descriptor	Process should be performed on the assumption that the Component Group Descriptor does not exist.
Extended Event Descriptor	Process should be performed on the assumption that the Extended Event Descriptor does not exist.
Data Contents Descriptor	It is inevitable that the functions such as displaying data contents at scheduling of recording and recording data elementary stream become unavailable on the assumption that the Data Contents Descriptor does not exist.

B.8.3 M-EIT[p/f] and M-EIT[p/f after]

B.8.3.1 Purpose of Use

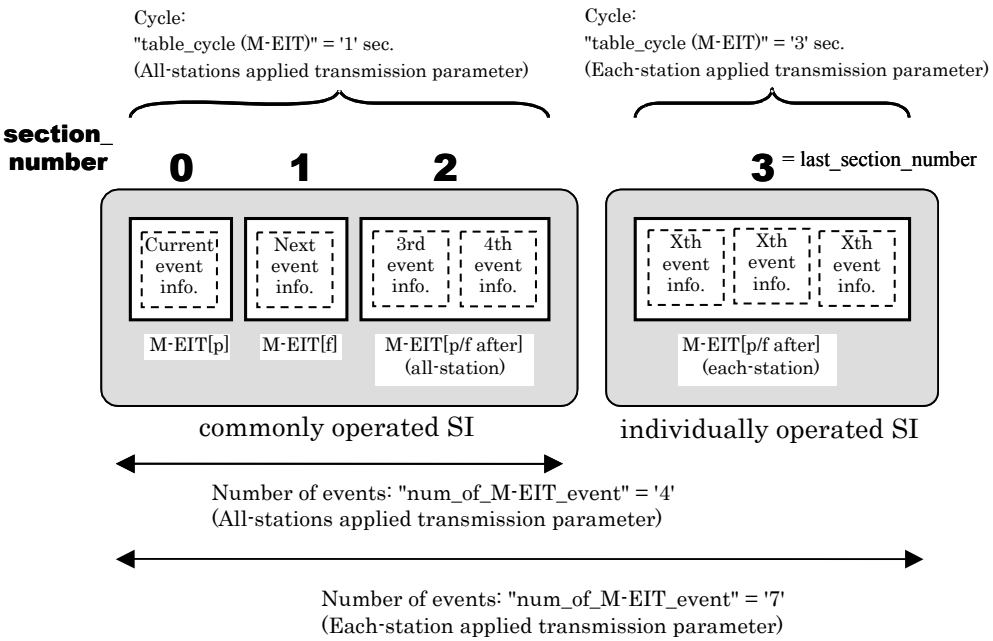
- M-EIT[p/f] is used to obtain the start and end times of the currently being broadcasted and next events as well as H-EIT[p/f].

  When implementing scheduling of viewing/recording, it is recommended to refer to M-EIT[p/f] which is the basic delivering EIT type if the service layer belongs to the transmission parameter type b.
- M-EIT[p/f] and M-EIT[p/f after] are used to obtain the program information on the current and next 9 programs (up to 10 programs including the current program).
- When the H-EIT[p/f] cannot be received, the M-EIT can be merged into the H-EIT[schedule]. However, care should be taken since the data amount of H-EIT[p/f] may be different from that of M-EIT.

B.8.3.2 Receiving/Storing Process

The following figure shows the relationship among the mapping into the sections of M-EIT[p/f] and M-EIT[p/f after], all-station applied transmission parameter, and each-station applied transmission parameter:

Note) The parameters in the following figure are only an example. The figure shows the arrangement in the section in case of such parameter values.



The following is the reference for the receiver units. It is common in both fixed and mobile receiver units.

- The transmission of M-EIT[p/f] is same as that of H-EIT[p/f].

  "section_number" = '0' and '1' always exist. Only one event is described in one section. If the current or next event does not exist (off service), the section is Empty section, it includes section header only.

  The repetition rate is expressed in "table_cycle" (M-EIT) by the all-station applied transmission parameter.

- The M-EIT[p/f after] is transmitted as necessary with "section_number" = '2' to '4', and multiple events can be described in one section.
- The number of events transmitted as commonly operated SI can be judged from the values in "num_of_M-EIT_event" by the all-station applied transmission parameter. However, the number of events described in "num_of_M-EIT_event" is not always transmitted. In some cases, the number of events transmitted by the M-EIT[p/f after] is 0. On the other hand, the number of events does not exceed the number in "num_of_M-EIT_event".
- The events transmitted after the next event as commonly operated SI may be transmitted with "section_number" = '2' in the M-EIT[p/f after] or not. The relationship between the number of events transmitted as commonly operated SI and "section_number" transmitted as commonly operated SI is clearly defined as follows. Refer to the following table for receiving.

num_of_M-EIT_event (all-station applied transmission parameter)	M-EIT[p/f after] transmission
0, 1	Abnormal state. Judge that the M-EIT[p/f after] is not transmitted.
2	The M-EIT[p/f after] as commonly operated SI is not transmitted. (The M-EIT[p/f after] may be transmitted, but the event as commonly operated SI is not included.)
>=3	The M-EIT[p/f after] as commonly operated SI is transmitted with "section_number" = '2'. Even if the number of events transmitted by the M-EIT[p/f after] is 0, "section_number" = '2' is always transmitted (Empty section).

The cycle is longer in the M-EIT as individually operated SI, comparing to M-EIT as commonly operated SI. Thus, if the receiver unit receives the commonly operated SI only by specifying in "section_number", referring to the above rule, the time to receive can be reduced.

- The events exceeding the maximum number of events transmitted as commonly operated SI are judged as those transmitted as indivisually operated SI.

  Whether the events transmitted as indivisually operated SI are transmitted or not depends on whether the value in "num_of_M-EIT_event" by the each-station applied transmission

parameter is larger than that in "num_of_M-EIT_event" by the all-station applied transmission parameter.

Since the last section number of M-EIT[p/f after] can be found only from "last_section_number", it cannot be known before receiving. Thus, the M-EIT[p/f after] as indivisually operated SI cannot be received by specifying in "section_number". However, it is possible if the commonly operated SI with the same value in "version_number" has been received.

- If the cycles of commonly operated SI and indivisually operated SI of M-EIT are same, the events transmitted as commonly operated SI and indivisually operated SI are transmitted in the same section of M-EIT[p/f after]. In this case, it is not required to receive the M-EIT[p/f after] transmitted as indivisually operated SI after receiving the M-EIT[p/f after] as commonly operated SI.

  Whether such events are transmitted in the same section or not (whether it is required to obtain the section of M-EIT[p/f after] again to obtain the event transmitted as indivisually operated SI) can be judged from the value in "last_section_number" in one of already obtained sections.

(1) Receiving/Storing Process by Fixed Receiver Unit

The receiving/storing process for M-EIT by fixed receiver units is optional. The receiving/storing process for M-EIT by fixed receiver unit is the same kind of process as that for H-EIT[p/f], while the above-mentioned care should be taken; therefore, it is recommended to perform the same receiving/storing process as that for H-EIT[p/f].

However, even if the unreceived network's events are obtained and stored, the number of events is only for several, that is, they become invalid as time passes. Accordingly, it is recommended to store the M-EIT for the received networks only. The repetition rate of M-EIT including the indivisually operated SI is short; therefore, it is preferable to receive and use the M-EIT as necessary without storing.

(2) Receiving/Storing Process by Mobile Receiver Unit

In the receiving/storing process for M-EIT by mobile receiver units, also perform the same receiving/storing process as that for H-EIT[p/f]. The mobile receiver units generally display the program table of the currently selected TS only. Thus, it is required to obtain the M-EIT of the received networks only. Storing is not always required, but the response time to display can be reduced by storing.

(3) Receiving/Storing Process by Portable Receiver Unit

If the M-EIT is transmitted in the partial reception layer, etc., the portable receiver units may be able to receive the M-EIT. However, in many cases, they cannot receive it; therefore, it should be considered that they cannot receive the M-EIT.

B.8.3.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
M-EIT	0x0026	table_id	0x4E
		section_syntax_indicator	1
		service_id	Value in the currently selected TS in the NIT
		current_next_indicator	1
		section_number	4 or less and "last_section_number" or less
		last_section_number	1 or higher and 4 or less
		transport_stream_id	Value equal to TS ID for the currently selected TS
		original_network_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT

The transmission and definition of M-EIT can be divided by the following units. Use the following units to analyze.

- M-EIT[p/f]
- M-EIT[p/f after] (Range of all-station applied transmission parameter)
- M-EIT[p/f after] (Range of each-station applied transmission parameter)

If the M-EIT[p/f] is not received, it is allowed that, regarding the relative service, the functions using the M-EIT such as performing reserved program/viewing, displaying the channel banner or displaying the program table become unavailable. It is possible to use the stored old information or M-EIT[p/f after], but the correct operation is not guaranteed. In this case, it is required to adjust so that other services cannot be influenced.

If the M-EIT[p/f after] is not received, it is allowed that the functions using the M-EIT[p/f after] such as displaying the program table (program list) become unavailable. However, it is required to adjust so that functions using M-EIT[p/f] cannot be influenced.

After it is confirmed that the section is correctly received, the received section is analyzed. When analizyng the M-EIT section syntax except for the section headers, care should be taken for the following:

- "segment_last_section_number" and "last_table_id" fields

  Ignore this field since it has no meaning.

- Event loop count

  The maximum event loop count is 1 if "section_number" = '0' or '1'. Ignore the loop with the higher count than the maximum.

- "start_time" and "duration" fields

  For the relationship among "start_time", "duration" and the current time, see Chapter 19 of this document. Table 19-1 shows the error conditions. No specific rules on such error process are provided.

- "descriptors_loop_length" field

  If the values in "descriptors_loop_length" and "section_length" are not compatible, judge that there is an error in the received section.

[Descriptor]

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Short Event Descriptor	Mandatory descriptor. The influence should be limited to the extent that the event names and program descriptions become unavailable.
Component Descriptor	Mandatory descriptor. The influence should be limited to the extent that the component selections/presentations become unavailable.
Audio Component Descriptor	Mandatory descriptor. The influence should be limited to the extent that the component selections/presentations become unavailable.
Content Descriptor	Process should be performed on the assumption that the genre code and event attachment information on the relative event do not exist.
Digital Copy Control Descriptor	It is inevitable that the functions such as scheduling of recording for the relative event become unavailable on the assumption that it is impossible to perform a process for digital copy control correctly.
Series Descriptor	Process should be performed on the assumption that the series do not exist. Its influence should be limited to the extent that the functions by series unit such as series registration and series recording become unavailable.
CA Contract Info Descriptor	It is inevitable that the functions such as program reservation for the relative event become unavailable on the assumption that it is impossible to perform a process for CA correctly.
Event Group Descriptor	Process should be performed on the assumption that the Event Group Descriptor does not exist.
Component Group Descriptor	Process should be performed on the assumption that the Component Group Descriptor does not exist.
Data Contents Descriptor	It is inevitable that the functions such as displaying data contents at scheduling of recording and recording data elementary stream become unavailable on the assumption that the Data Contents Descriptor does not exist.

B.8.4 L-EIT[p/f] and L-EIT[p/f after]

B.8.4.1 Purpose of Use

- L-EIT[p/f] is used to obtain the start and end times of the currently being broadcasted and next events as well as M-EIT[p/f].

  When implementing scheduling of viewing/recording, it is recommended to refer to L-EIT[p/f] which is the basic delivering EIT type if the service layer belongs to the transmission parameter type a.

- L-EIT[p/f] and L-EIT[p/f after] are used to obtain the program information on the current and next 9 programs (up to 10 programs including the current program).
  Especially, they are used to display the program titles, etc. during the time until the video is displayed immediately after the receiver unit selects the channel for the relative TS. This enables viewers to watch the program comfortably and reduces the channel-zapping time. Also, when the H-EIT[p/f] cannot be received, the L-EIT can be merged into the H-EIT[schedule]. However, care should be taken since the data amount of H-EIT[p/f] is very different from that of L-EIT. It is recommended to reflect the available information only such as "start_time" and "duration". Likewise, when M-EIT cannot be received, L-EIT can be merged to complement the M-EIT.

B.8.4.2 Receiving/Storing Process

(1) Receiving/Storing Process by Fixed Receiver Unit

Since the syntax of L-EIT and M-EIT are same, the receiving/storing process for L-EIT is same as that for M-EIT. However, the L-EIT is transmitted until "section_number" is set to '3'. The repetition rate of L-EIT including the individually operated SI is short; therefore, it is preferable to receive and use the L-EIT as necessary without storing.

The fixed receiver units that do not support the services transmitted in the partial reception layer do not need to receive the L-EIT.

(2) Receiving/Storing Process by Mobile Receiver Unit

Perform the same receiving/storing process as that by fixed receiver units. The mobile receiver units generally display the program table of the currently selected TS only. Thus, it is required to obtain the L-EIT of the received network only. Storing is not always required, but the response time to display can be reduced by storing.

(3) Receiving/Storing Process by Portable Receiver Unit

Perform the same receiving/storing process as that by fixed receiver units. However, since the memory size mounted in the portable receiver units may be small, it is preferable to receive the L-EIT as necessary without storing.

B.8.4.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
L-EIT	0x0027	table_id	0x4E
		section_syntax_indicator	1
		service_id	Value in the currently selected TS in the NIT
		current_next_indicator	1
		section_number	3 or less and "last_section_number" or less
		last_section_number	1 or higher and 3 or less
		transport_stream_id	Value equal to TS ID for the currently selected TS
		original_network_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT

Then, perform the same analysis process for M-EIT.

[Descriptor]

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Short Event Descriptor	Mandatory descriptor. The influence should be limited to the extent that the event names and program descriptions become unavailable.
Content Descriptor	Process should be performed on the assumption that the genre code and event attachment information on the relative event do not exist.
Digital Copy Control Descriptor	It is inevitable that the functions such as scheduling of recording for the relative event become unavailable on the assumption that it is impossible to perform a process for digital copy control correctly.
CA Contract Info Descriptor	It is inevitable that the functions such as program reservation for the relative event become unavailable on the assumption that it is impossible to perform a process for CA correctly.

B.8.5 H-EIT[schedule basic]

B.8.5.1 Purpose of Use

- The H-EIT[schedule basic] transmits the information on the events to be broadcasted for several days from the current time and is used to implement various kinds of functions by event unit such as program table and event search.

B.8.5.2 Receiving/Storing Process

(1) Receiving/Storing Process by Fixed Receiver Unit

The repetition rate is long since the H-EIT[schedule basic] is transmitted based on the stored model. Accordingly, it is recommended to store the H-EIT[schedule basic] into the receiver units as much as possible. For the data capacity required to store, see Appendix D of this Vol. The receiver units that cannot obtain the required capacity should store as much as possible by limiting the number of days, etc.

If a broadcaster transmits more data than that transmitted by other broadcasters, in order to ensure fairness, the stored memory should be fairly used every network. For example, it can be considered that the same amount of memory area is assigned to the receivable TS. However, fringe area can receive many networks, in addition, multiple networks with the same affiliation. Therefore, the duplicate information may be received. In this case, it is not always good that the same amount of memory area should be assigned.

The H-EIT[schedule basic] is, as well as H-EIT[p/f], transmitted for the services within the selected network. Thus, to receive and store the H-EIT[schedule basic] for all services to display the program table, it is required to scan all receivable networks.

In the default setting of extended repetition rate group, 16 segments (for two days) can be transmitted using the short repetition rate in the television services. However, the securely short repetition rate is used and will be used in the future for the extended repetition rate group 1, which has 3 segments (9 hours) only. In other words, since such range of information can be always transmitted with the short repetition rate, it can be used to display the program table when the receiver units are started and the H-EIT[schedule basic] has not been stored. On the other hand, in the radio or data services, it is recommended to use H-EIT[p/f] since the extended repetition rate group may be removed.

In the H-EIT[schedule basic], there are multiple repetition rate groups every media type. The segment range of the extended repetition rate group is defined, and the start segment moves based on the current time. Therefore, to receive by extended repetition rate group unit, it is required to set the section number corresponding to the current time. The section number

moves accurately based on the time, but there is no specific rule on the timing when the segment for the passed time is not sent any more. Thus, the process should be performed on the assumption that the segment is not sent from the moment when the time passes.

The default repetition rate group setting may be changed in the future. If the receiving process for H-EIT[schedule basic] is performed, it is required to refer to the all-station/each-station applied transmission parameter, that is, the SI transmission parameters placed in the first and second loop of BIT. Therefore, if "0x50" is set to "table_id" in the SI Parameter Descriptor, check the value in the relative "table_description_byte". It is described for each media type. If it is not described, the media type is used based on the default repetition rate group setting.

In the H-EIT[schedule basic], the arrangement of event in the section begins with the current day. If the section data is stored and used, care should be taken to access the section data obtained on the previous day. The sub-tables are updated every day, but the event information in the sub-tables is not always changed (In general, it is not changed). Therefore, the data obtained on the previous day is not always invalidated every day. The receiver units should be able to receive the H-EIT[schedule basic] according to their convenience, at the desired timing, and perform the process for event information based on the stored data.

At the switching time (0:00 every day), the old version (previous day) of H-EIT[schedule basic] is replaced with new version (current day). 30 seconds are provided for transition period. During the time, the previous data may be transmitted, the current data may be transmitted, or transmission may be suspended. Therefore, care should be taken during the time and it is recommended not to receive the H-EIT[schedule basic]. See Section 13.17 of this document.

In addition, while rare, the repetition rate group setting for H-EIT[schedule basic] may be changed. Whether the repetition rate group is changed can be judged from the SI Parameter Descriptor placed in the first descriptor loop of BIT. If the SI Parameter Descriptor has been placed before the previous day of the change date, perform the receiving process on the assumption that it is changed at 0:00 of the change date.

However, the SI Parameter Descriptor may be changed without notice at other time than 0:00. In this case, after the changed contents of BIT is detected, it is required to perform the receiving process based on the new SI transmission parameters. From the time when the changed BIT is detected to the time when the receiving process is newly set based on the new cycle and repetition rate group, the receiving process may not be properly performed temporarily such as a lack of received data and incorrect program table display. Therefore, it is recommended to detect the changed BIT as soon as possible and perform the receiving process based on the new parameters.

(2) Receiving/Storing Process by Mobile Receiver Unit

Receiving H-EIT[schedule basic] by mobile receiver units depends on the product planning. If the receiver unit can receive the H-EIT[schedule basic], perform the same receiving/storing process as that for the fixed receiver unit. However, if H-EIT[schedule basic] is transmitted in the transmission parameter type a of layer, etc., the mobile receiver units may not be able to receive the H-EIT[schedule basic] stably. In this case, it can be considered to receive "extended cycle 1" of H-EIT[schedule basic] only since its repetition rate is short.

(3) Receiving/Storing Process by Portable Receiver Unit

The H-EIT[schedule basic] cannot be received by the portable receiver units.

B.8.5.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
H-EIT[schedule basic]	0x0012	table_id	0x50 – 0x57
		section_syntax_indicator	1
		service_id	Value in the currently selected TS in the NIT
		current_next_indicator	1
		section_number	Value in "last_section_number" or less and "segment_last_section_number" or less
		transport_stream_id	Value equal to TS ID for the currently selected TS
		original_network_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT

For a safe process, note that the H-EIT[schedule basic] becomes valid by segment unit within the sub-tables. If one or more of the sections structuring segment is not received, the process should be performed on the assumption that the relative segment of H-EIT[schedule basic] cannot be received. Whether all sections structuring segment are received can be judged from the value in "segment_last_section_number". Thus, if all numbers from the first section number of the segment to the number indicated in "segment_last_section_number" are received without missing any, it is considered that the segment is completed, provided that the values in each "version_number" field are same. If possible, the receiver units can perform the process to validate H-EIT[schedule basic] every event.

After it is confirmed that the section is correctly received, the received section is analyzed. When analizyng the H-EIT[schedule basic] section syntax except for the section headers, care should be taken for following:

- "segment_last_section_number" and "section_number" fields

  "segment_last_section_number" field correlates with "section_number" field. The sections described in both fields belong to the same segment, and "section_number" is equal to or less than "segment_last_section_number". If this correlation is not established, there is an error; therefore, the process should be performed on the assumption that the relative segment cannot be received.

- "last_table_id" field

  "last_table_id" field should indicate the delivering range of H-EIT[schedule basic]. It correlates with the number of transmitted days of all-station/each-station applied transmission parameter. If this correlation is not established, there is an error. It is inevitable that the H-EIT[schedule basic] for the relative service cannot be received correctly, but it is recommended to perform the receiving process based on the value in "last_table_id" since it should be correct.

- "start_time" and "duration" fields

  "start_time" field correlates with the segment arrangement. If this correlation is not correct (if it is judged from the "start_time" field, that H-EIT[schedule basic] is not placed in the correct segment), judge that the relative event is invalid.

  If the events described in "start_time" and "duration" are overlapped within H-EIT[schedule basic], there is an error; therefore, judge that both of the events are invalid. However, the events may be overlapped between H-EIT[schedule basic] and H-EIT[p/f]. It can be caused during transition (change of programming), although this is the correct status. In this case, perform the process on the assumption that the H-EIT[p/f] is correct.

- "event_id" field

  If the values described in "event_id" are duplicated within H-EIT[schedule basic], there is an error; therefore, judge that both of the events are invalid.

- "descriptors_loop_length" field

  If the values in "descriptors_loop_length" and "section_length" are not compatible, judge that there is an error in the received section. Accordingly, perform the process on the assumption that the segment is not completed.

[Descriptor]

Care should be taken for the following when analyzing the descriptor field of H-EIT[schedule basic].

■ Process of Descriptor Placed in H-EIT[schedule basic] Descriptor Loop

In general, the process should be implemented so that its influence can be limited within the relative event.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Short Event Descriptor	Mandatory descriptor. The influence should be limited to the extent that the event names become unavailable.
Component Descriptor	Mandatory descriptor. The influence should be limited to the extent that the component selections/presentations become unavailable.
Audio Component Descriptor	Mandatory descriptor. The influence should be limited to the extent that the component selections/presentations become unavailable.
Content Descriptor	Process should be performed on the assumption that the genre code and event attachment information on the relative event do not exist.
Digital Copy Control Descriptor	It is inevitable that the functions such as scheduling of recording for the relative event become unavailable on the assumption that it is impossible to perform a process for digital copy control correctly.
Series Descriptor	Process should be performed on the assumption that the series do not exist. Its influence should be limited to the extent that the functions by series unit such as series registration and series recording become unavailable.
CA Contract Info Descriptor	It is inevitable that the functions such as program reservation for the relative event become unavailable on the assumption that it is impossible to perform a process for CA correctly.
Event Group Descriptor	Process should be performed on the assumption that the Event Group Descriptor does not exist.
Component Group Descriptor	Process should be performed on the assumption that the Component Group Descriptor does not exist.
Data Contents Descriptor	It is inevitable that the functions such as displaying data contents at scheduling of recording and recording data elementary stream become unavailable on the assumption that the Data Contents Descriptor does not exist.

B.8.6 H-EIT[schedule extended]

B.8.6.1 Purpose of Use

- H-EIT[schedule extended] is used to present detailed information on the events defined in H-EIT[schedule basic].

B.8.6.2 Receiving/Storing Process

(1) Receiving/Storing Process by Fixed Receiver Unit

Whether the H-EIT[schedule extended] is transmitted or not can be judged from the each-station applied transmission parameter. If "table_id" is set to "0x58", judge that the H-EIT[schedule extended] is operated. For the segment number of delivering range, repetition rate and repetition rate group for the H-EIT[schedule extended], refer to the loop where "table_id" = "0x58" in the each-station applied transmission parameter.

Since the H-EIT[schedule extended] is transmitted based on the stored model as well as H-EIT[schedule basic], it is recommended to store as much as possible according to the available memory capacity. For the data capacity required to store, see Appendix D of "Provisions for PSI/SI operations".

The H-EIT[schedule extended] is, as well as H-EIT[schedule basic], transmitted for the services within the selected network. Thus, to receive and store the H-EIT[schedule extended] for all services to display the program table, it is required to scan all receivable networks. If the receiver units with the limited memory capacity store the services within the selected network only, it is not required to scan and store all receivable networks but to receive the H-EIT[schedule extended] for the selected network. Some Terrestrial broadcasters set the extended repetition rate group. Since the cycle of the extended repetition rate group is moderately short, the receiver units that cannot store the H-EIT[schedule extended] can receive only the time span that the extended repetition rate group is set.

How to receive by segments, how to change the transmission parameters and how to receive at the switching time are same as that for H-EIT[schedule basic].

(2) Receiving/Storing Process by Mobile Receiver Unit

While receiving H-EIT[schedule extended] by mobile receiver units depends on the product planning as well as H-EIT[schedule basic], perform the same receiving/storing process as that for the fixed receiver unit. However, if H-EIT[schedule extended] is transmitted in the transmission parameter type a of layer, etc., the mobile receiver units may not be able to receive the H-EIT[schedule extended] stably. In this case, it can be considered to receive "extended cycle 1" of H-EIT[schedule extended] only since it is transmitted with the short repetiton rate.

(3) Receiving/Storing Process by Portable Receiver Unit

The H-EIT[schedule extended] cannot be received by the portable receiver units.

B.8.6.3 Analysis Process

[Section]

Whether the received section is valid or not can be judged based on the following table:

The sections with invalid values for the fields in the following table are invalid. Discard them immediately.

table	PID	Section header field	Field value for section valid
H-EIT[schedule extended]	0x0012	table_id	0x58 – 0x5F
		section_syntax_indicator	1
		service_id	Value in the currently selected TS in the NIT
		current_next_indicator	1
		section_number	Value in "last_section_number" or less and "segment_last_section_number" or less
		transport_stream_id	Value equal to TS ID for the currently selected TS
		original_network_id	Same value as "TS_id" described in PAT, "network_id", "original_network_id" and "TS_id" described in NIT

For a safe process, note that the H-EIT[schedule extended] becomes valid by segment unit within the sub-tables. If one or more of the sections structuring segment is not received, the process should be performed on the assumption that the relative segment of H-EIT[schedule extended] cannot be received. Whether all sections structuring segment are received can be judged from the value in "segment_last_section_number". Thus, if all numbers from the first section number of the segment to the number indicated in "segment_last_section_number" are received without missing any, it is considered that the segment is completed, provided that the values in each "version_number" field are same. If possible, the receiver units can perform the process to validate H-EIT[schedule extended] every event.

After it is confirmed that the section is correctly received, the received section is analyzed. When analizyng the H-EIT[schedule extended] section syntax except for the section headers, care should be taken for following:

- Relationship with H-EIT[schedule basic]

  In general, even if there is any error in the H-EIT[schedule extended], the event should not be judged as invalid. Whether the event is valid or not can be judged only from H-EIT[schedule basic]. Additionally, even if any event is described in the segment of the H-EIT[schedule extended], the event information should not be used unless the relative event is described in the segment of H-EIT[schedule basic].

- "segment_last_section_number" and "section_number" fields

  "segment_last_section_number" field correlates with "section_number" field. The sections described in both fields belong to the same segment, and "section_number" is equal to or less than "segment_last_section_number". If this correlation is not established, there is an error; therefore, the process should be performed on the assumption that the relative segment cannot be received.

- "last_table_id" field

  The operation of "last_table_id" field depends on the broadcaster units, and the value is described in the "last_table_id" field based on the number of transmitted days described in the each-station applied transmission parameter. If the value is different from that described, judge that there is an error, but it is recommended to perform the receiving process based on the value in "last_table_id" since it should be correct.

- "start_time" field

  "start_time" field correlates with the segment arrangement. If this correlation is not correct (if it is judged from the "start_time" field, that H-EIT[schedule extended] is not placed in the correct segment), judge that the H-EIT[schedule extended] for the relative event does not exist. In general, it is recommended not to refer to the value in this field as well as "duration" field. Use the values for H-EIT[schedule basic].

- "descriptors_loop_length" field

  If the values in "descriptors_loop_length" and "section_length" are not compatible, judge that there is an error in the received section. Accordingly, perform the process on the assumption that the segment is not completed.

[Descriptor]

Care should be taken for the following when analyzing the descriptor field of H-EIT[schedule extended].

■ Process of Descriptor Placed in H-EIT[schedule extended] Descriptor Loop

In general, the process should be implemented so that its influence can be limited within the relative event.

The descriptors not described below should not be described. Ignore them if any.

Descriptor	Process for descriptor error/invalidity (including the case that the mandatory descriptors are not placed)
Extended Event Descriptor	Process should be performed on the assumption that the Extended Event Descriptor does not exist.

B.9 TOT

B.9.1 Purpose of Use

- TOT is used to obtain the correct JST and correct the internal clock in the receiver units.
- When the summer time is applied in the future, it is used to obtain the changing date and time and correction time.

B.9.2 Receiving/Storing Process

The receiver units that can mount the internal clock can receive the TOT and perform the correction process as necessary. The receiver units that do not mount the internal clock should receive the TOT any time (as long as necessary) to obtain the current time. However, the repetition rate of the TOT is 5 seconds; therefore, high resolution cannot be expected.

The TOT does not have the version number. As a result, it cannot be judged if other information included in the TOT (Local Time Offset Descriptor) has been changed. The contents of the TOT should be checked.

B.9.3 Analysis Process

The TOT is constantly updated table. If any error occurs at the time when the TOT is obtained, discard it immediately and wait for the next transmission. With regard to the Local Time Offset Descriptor, if any error occurs in the latest information, wait for the next transmission, or maintain and use the stored information.

C Function Guideline for PSI/SI Receiver Units

C.1 Types of Receiver Units

In Digital Terrestrial Television Broadcasting, the following three types of receiver units are assumed. The SI functions should be implemented in the receiver units after careful consideration of each expected characteristic. However, the implementation of SI functions consistently depends on the product planning by receiver units manufacturers, and this does not intend to prohibit the receiver units with the complex functions.

- Fixed Receiver Units
  Receiver units installed in house and office and fixed during receiving. The portable televisions that can be moved and viewed in house are considered as fixed receiver units. (See "13.1.8 Fixed Receiver".) There is the memory to store the SI information such as program guide within the receiver unit.
- Mobile Receiver Units
  Receiver units designed for mounting in vehicles. (See "13.1.9 Mobile Receiver".) If the mobile receiver unit is designed for obtaining the SI when displaying, it is not required to include the memory to store the SI information.
- Portable Receiver Units
  Receiver units intended for exclusive use as partial reception and most of them are portable. (See "13.1.10 Partial (Portable) Receiver".) If the portable receiver unit is designed for obtaining the SI when displaying, it is not required to include the memory to store the SI information.

C.2 Precautions of Obtaining SI

In Digital Terrestrial Television Broadcasting, other tables are never operated. EIT table includes L-EIT[p/f], M-EIT[p/f], H-EIT[p/f], L-EIT[p/f after], M-EIT[p/f after], H-EIT[schedule basic] and H-EIT[schedule extended]. These EIT tables has been increased because the layers transmitted to distinguish the conventional EIT[p/f] and EIT[schedule] are added. The SI has two types: " commonly operated SI" which is assumed that all broadcasting stations transmit, and " individually operated SI" which can be used for individual use. To clarify the transmission/no transmission or transmission cycle, there are "All-stations applied transmission parameter" and "each-station applied transmission parameter". It does not mean that the specific table type always uses the specific SI or transmission parameters, or " commonly operated SI " is used by "All-stations applied transmission parameter" only either. It is required to understand such relationship securely before implementing into the receiver unit. For the details, read "13. EIT Transmission" thoroughly.

C.3 Obtaining Layers, Services, and SI Table Structure within Network

The receiver units can obtain the layers, services and SI table structure within the network on the assumption of the following:

- If one frequency is received, then one complete network and one complete transport stream are constituted.
- One network is never divided by multiple broadcasters.
- "network_id" is provided for each transmission master system.
- If "network_id" is same, the completely same TS is transmitted from the different transmission point.
- In Digital Terrestrial Television Broadcasting, information is transmitted using layers. How many layers are used or what type of layer is used for the service is described in the TS Information Descriptor in the NIT.

C.4 Channel List

The channel list required for the receiver units generally includes receivable services and is created based on the contents described in the NIT (Partial Reception Descriptor, TS Information Descriptor and Service List Descriptor) and SDT (service loop and Service Descriptor).

- Channel number
  It is expressed in three-digit-number used for direct channel selection shown in Section 9.1.3 of Vol. 7.
- Service name
  It uses the service channel name described in the Service Descriptor in the SDT. The broadcaster names in the Service Descriptor are not used in Digital Terrestrial Television Broadcasting.
- When presenting the broadcasting station name by network units:
  It is recommended not to use the Network Name Descriptor in the NIT but use the TS Name Description in the TS Information Descriptor. It is described in the Network Name Descriptor but it is not always easy to understand for viewers. Instead of the Network Name Descriptor, the transport stream name is described.
- Service type, media type and service class
  For the service type, the type described in the Service List Descriptor in the NIT is used. The media type is determined based on the service type. The service class (specified in Vol. 7) is obtained from "service_id". If the service type is special service, it is recommended not to display the service on the channel list normaly. When a special service is broadcasted (an event exists), it may be added to the channel list, and the special service selection function used on the channel list may be added.
- Logo display
  The logo data is obtained and displayed using the Logo Transmission Descriptor in the SDT.

C.5 Program Guide

C.5.1 Order of Channels in Program Guide

The order of channels display in program guide depends on the product planning. In general, it is preferable to display in order of "service_id". If the residential area is specified, it is preferable to display the services for the residential area first using "area identifier" included in "service_id", then other services if they can be received.

C.5.2 Listing of Program Guide

It is the function to list the currently being broadcasted events and following events (10 events or less) for each service. It is the main method of displaying SI in the mobile and portable receiver units. To implement such function, it is recommended to take the following steps:

Obtain the EIT[p/f] and EIT[p/f after] (if transmitted) transmitted for the "service_id" and display it in order of start date and time. If the H-EIT[schedule] is transmitted, the event information included in the H-EIT[schedule] can be used for listing. However, if it is desirable to display the current situation as possible, present the EIT[p/f] and EIT[p/f after] of Basic delivering EIT type first.

"present" in the EIT[p/f] refers to the currently being broadcasted event, and "following" refers to the next event to be broadcasted. If the "present" is empty section, there is no currently being broadcasted event (it may be different from "service suspension"), and if the "following" is empty section, there is no next event (it may appear as time passes). Even if the "following" is not empty section, there may be a certain interval between the end time of "present" event and start time of "following" event. This shows that the "following" event will start after the "present" event ends then some time without any event is finished. Note to perform a correct process in such case that the program description is described in the EIT[p/f after] but the "following" is empty section.

In special case, the event may be interrupted. In this case, the event placed in "present" can be processed as a currently being broadcasted event. With regard to the event placed in "following", judge that the event is currently being interrupted by inserting the "present" event while it is supposed to be broadcasted at the time. Thus, it is preferable to adjust so that such interruption can be informed when presenting the information. No undetermined events can be described in the EIT[p/f after]. The sub-tables consisting of EIT[p/f] and EIT[p/f after] may be divided into the repetition rate group of All-stations applied transmission parameter and that of each-station applied transmission parameter. In this case, the sub-tables transmitted in accordance with All-stations applied transmission parameter are obtained first to reduce the time to present the information included in the All-stations applied transmission.

If the receiver unit has the function to display the program list, it should have the function to present all events transmitted by the EIT[p/f after]. In addition, it should obtain the latest EIT[p/f] and EIT[p/f after] of Basic delivering EIT type before displaying.

If the duration time of the "present" event described in the EIT[p/f] is not determined, or if the "following" event is not determined, it is highly possible that an empty section in the EIT[p/f after] is transmitted or there is an inconsistency with the contents. The receiver unit should not display the contents of EIT[p/f after] or display in consideration that there is an inconsistency with the contents.

C.5.3 Program Guide in Radio/Television Schedule Format of Newspaper (referred to as "radio and TV listings")

If the cross-service program guide is implemented like radio and TV listings, it is recommended to create the program guide based on H-EIT[p/f] and H-EIT[schedule] regardless of commonly operated SI/ individually operated SI. This type of display is positioned as the function of fixed receiver units. Since the number of target programs is very high and it is required to obtain SI from many receivable networks previously, if this format is applied, the receiver units are required to store the program information from H-EIT[p/f] and H-EIT[schedule] as much as possible. With the default setting for commonly operated SI, the event information on the television services for 8 days and data services for 2 days is transmitted. In this case, it is recommended to change the number of days according to the storage capacity of the receiver unit.

In addition, the program guide is presented generally based on the stored information. But it is recommended to use the latest information as possible from the obtainable information being displayed.

C.5.4 Precaution of Adding Information for Individual Use to Radio and TV Listings Format Program Guide

This section explains the precautions when presenting the information by network units in the program guide using the H-EIT[schedule] for individually operated SI.

The unified operation is possible in the H-EIT for individual use every media type within TS, regardless of service layers. There are only four operation models regarding H-EIT[schedule] transmission days in the television service: 1-week model, 2-week model, 3-week model and 1-month model. One model can be selected for each terrestrial broadcaster. However, note that the operation varies depending on the media types in one network.

The operation parameters for the H-EIT for individually operated SI., which exceed the range of the number of days for commonly operated SI, are described in the SI Parameter Descriptor placed in the second descriptor loop of BIT. The above operation models can be obtained from

"schedule_range" field in such parameters. In "pattern" field, the information on the ratio of event description is described. With regard to the H-EIT[schedule basic] for individual use, the frequency of event description exceeding the range of EIT[schedule] for commonly operated SI is indicated. If '1' is described, the H-EIT[schedule basic] for individual use is not comparable in the frequency of event description to the EIT[schedule] for commonly operated SI. (Only required events are described in fragments.) If it is not desirable to display the fragmentary radio and TV listings, it should be used after determining the range of displaying as a program guide.

C.5.5 Obtaining Tables for All Networks

Since "other" information is not transmitted in Digital Terrestrial Television Broadcasting, it is required to store the data previously in order to display the program guide in the radio and TV listings format. It is necessary to scan the receivable networks at least once a day and obtain the SI tables. The method of obtaining and specifications depend on the receiver unit manufacturers. The following is only for reference.

At minimum, it is required to scan and obtain NIT, BIT, SDT, H-EIT[p/f] and H-EIT[schedule]. To obtain the H-EIT, as may be expected, it is necessary to check the NIT, BIT and SDT which are being transmitted at the time.

The H-EIT[schedule] is updated at 0:00 every day. Accordingly, it is preferable to start obtaining after the updating is finished at 0:00. However, if the receiver unit is equipped with only one tuner unit, it cannot scan any table during viewing. In this case, obtain the tables when the receiver unit is turned off or after the user turns it off. If the receiver unit is not turned off, it is not possible to obtain the tables within other networks than the using network. It has no choice but it is still preferable to update the available information within the using network. Additionally, it is preferable to implement the function that can re-obtain the tables within all networks by the viewers' operations.

When scanning the networks, no tables may be obtained at all due to no carrier. In this case, judge that a suspension of program operation temporarily occurs due to maintenance, etc. and restart obtaining the tables after a while.

C.5.6 Information Type Used in Program Guide

The main information presented as a program guide is shown below. Each information is provided by tables such as EIT and descriptors described in the tables. In some cases, the contents of SDT are referred. The following explanation is mainly about H-EIT. There are some differences in program description and descriptor between L-EIT/M-EIT and H-EIT since the assumed receiver units are different each other. However, even if the information is obtained from L-EIT to display, the meaning of each information type is common. Each receiver unit should display the available information.

■ Program title and Program Description

Use the Short Event Descriptor in EIT.

Using the two textual strings provided by the Short Event Descriptor, the program information is provided in the style of newspaper/magazine program guide (radio and TV listings). In the radio and TV listings format, the following textual strings are described:

1) <Title>

Live professional baseball game

2) <Sub-title> Quotation mark, " ", is placed in many cases.

"Tigers vs. Giants 20th game"

3) <Others> Program contents, cast, features, etc.

HANSHIN KOSHIEN STADIUM

Commentator: **

The program title defines individual events using the minimum textual strings. Accordingly, in Digital Terrestrial Television Broadcasting, the program name field in Short Event Descriptor is used to transmit the above 1) and 2). The reason why <Sub-title> is contained in progmam name field is that the event cannot be sufficiently defined by <Title> only as shown above. (Generally, <Title> refers to the frame name.) However, the above example is not always used. There may be no information used for <Title>, or <Title> may be enough to explain the event. As a result, it is required to use the whole textual strings (given as a programname field) as one textual string without regard to the difference between <Title> and <Sub-title> in the receiver units. In addition, <Title> is closely related to the series name (to be mentioned later), but they do not always provide the same textual string. The receiver units should handle them as totally different things.

As mentioned above, the program title refers to the textual string including <Title> and <Sub-title>. As a result, the maximum number of characters as the program title is 40. It is preferable to adjust so that all characters transmitted as a program title can be displayed in the receiver units. However, if all of them cannot be displayed due to the limitation of display area, it is recommended to use "…", etc. to show the program title will be continued and to adjust so that the whole program title may be displayed as a result. In the portable receiver units, it is assumed that approximately 10 characters can be displayed on one line at most. Therefore, if 40 characters are transmitted, it is preferable to apply some way to display the whole program title.

In the radio and TV listings of newspaper/magazine, the special characters are often used. Many of the special characters defined in Digital Terrestrial Television Broadcasting are created based on the radio and TV listings. They are assumed to be used for the program titles.

However, the operation of special characters depends on broadcasters, and it is not unified. (They may be also used for various textual string fields as well as program titles.)

On the other hand, the program description refers to the above 3) <Others>. It includes various kinds of information such as informations, contents, casts, features depending on broadcasters. But most of them are provided for program promotion. The program description is assumed to be displayed following the program title; therefore, it is preferable to present the program description following the program title as long as the display area is obtained. In consideration that many of them include promotional contents, it is preferable to display a list of program description at one time. However, it is clear that the program title is more important. The maximum number of characters as a program description is 80. In L-EIT, the program description can be described, but it is rarely described since high-volume transmission capacity is required. Therefore, it is not essential to display such program description for L-EIT in the receiver units.

It is very difficult to achieve a balance between listing information and data amount of individual events. It is preferable to design in consideration of the above contents.

The textual string transmitted using the Short Event Descriptor is assumed to be used while changing its data amount according to the duration of event. In other words, the longer textual strings to be transmitted are used for the longer events.

■ Scheduled Program Start and End Time

Use "start_time" and "duration" fields in the EIT. The maximum duration of event is 48 hours. Thus, the event end time can be two days later at most. Care should be taken when presenting the information in this case. The minimum duration of event is 1 minute. However, note that the duration of event may be set to below 1 minute due to unavoidable circumstances, and the start time is not always set in every minutes. When the summer time system is applied, it is recommended to display the time added by the offset time using the Local Time Offset Descriptor described in the TOT.

■ Information on Charge/Contract/Restriction to Viewing

Use "free_CA_mode" field and CA Contract Info Descriptor in the EIT. It is also required to refer to CA Contract Info Descriptor in the SDT.

"free_CA_mode" in the EIT is used to distinguish between chargeable and free events. The events in the flat contract channel are judged as chargeable. Note that viewing events by the already contracted viewers does not always result in charges. In other words, whether the event is chargeable or not can be checked by referring to "free_CA_mode" in the EIT, however, to check if the event is available, use the CA Contract Info Descriptor to contact to IC card. When the CA Contract Info Descriptor does not exist in the EIT, use the CA Contract Info Descriptor in the SDT if any.

"free_CA_mode" and the CA Contract Info Descriptor in the SDT are provided only as

characteristics of conditional access broadcasting in the relative service. Note that they cannot be used independently for viewing control and it is required to use them carefully if they are used for displaying information.

■ Information on Recording Control

Use Digital Copy Control Descriptor in the EIT. When the Digital Copy Control Descriptor does not exist in the EIT, use the Digital Copy Control Descriptor in the SDT if any.

In addition, the combination of the Content Availability Descriptor and Digital Copy Control Descriptor can be used as information on recording control. However, since the Content Availability Descriptor is placed in the PMT but not in the SDT/EIT, set the value in “copy_restriction_mode” and "encryption_mode" to undefined until the PMT is received when making reservation/reservation for recording.

■ Information on Component Structure

Use the Component Descriptor and Audio Component Descriptor in the EIT. When multi-view mode is used, use the Component Group Descriptor also.

The textual strings are provided in each descriptor; therefore they can be used for presenting information to view. Even if no textual strings are provided, the determined default texts can be used for presenting. If multiple components exist, it is recommended to display them in ascending order of component tag values.

"component_type" fields of Component Descriptor and Audio Component Descriptor are also used to present the video/audio type.

Care should be taken for the "component_tag" values described in the Component Descriptor and Audio Component Descriptor if the information on component structure is used. Accordingly, the information on any component beyond the range assigned to video and audio in Table 14-1 (video component: "0x00" – "0x0F" and audio component:: "0x10" – "0x2F") should not be presented.

The Component Descriptor and Audio Component Descriptor are not available in the L-EIT since they are not placed.

■ Program Category/Program Characteristic

Use the Content Descriptor in the EIT. The information provided in the Content Descriptor includes the category information on events and attachment information on changeable program scheduling.

Up to 3 category information can be described according to the genre code table in Appendix A of "Provisions for PSI/SI Operations", in which the codes are shown in order of representative genre code. While the large and middle categories are provided in the codes, the code for "others" is always assigned in the middle category. The information is described in "others" when it is difficult to place the event in one middle category, or when all of middle categories are not appropriate to the event. In this case, a correct category code should be indicated at

least in the large category. The code for "others" is also assigned to the large category ("0xF"). This code may be described when all large categories are not appropriate to the event. It is preferable to use "others" as a category code, as well as other large categories. The codes, "0xC" and "0xD" in the large category, are not defined at the initial stage of Digital Terrestrial Television Broadcasting. They are assigned for the future extension; therefore, it is preferable that the receiver units should not use them if they do not support extensions. For category search using the category information, see C.4.

The program characteristic information mainly provides the information on how to announce a change of programming, which is the characteristic of the digital broadcasting and is used to present the information on icons, etc. It can be also used for the recording control.

■ Detailed Event Description

Use the Extended Event Descriptor in the EIT. Multiple item names and item descriptions are provided in the text format. The item names include reservation term whose purposes are predetermined. The detailed event guides can be provided by making use of them well. See Section 31.3.2.11. The Extended Event Descriptor is not available in the M-EIT and L-EIT since it's not placed.

■ Series Information

Use the Series Descriptor in the EIT.

The information on the series name, number of episodes, last episode number, end date of series, programming pattern, etc. can be displayed. See C.10. The Series Descriptor is not available in the L-EIT since it's not placed.

■ Related Data Broadcasting information (including subtitles)

Use the Data Contents Descriptor in the EIT. For the details, see "Specifications for Data Broadcasting Operations".

C.5.7 How to Handle Undefined Event and Undefined Time

The undefined events and time are not defined in the H-EIT[schedule] and EIT[p/f after] but is described in the EIT[p/f] only.

The undefined time includes undefined end time of "present" event and undefined start time of "following" event. During the event suspension, it includes undefined end time of "following" event.

Even if the undefined time is displayed, the currently being broadcasted and next events are determined. Accordingly, when the information is displayed for such purpose (ex. the function to add some meaning to the current and next event in program guide list, etc.), use the contents in the EIT[p/f] as they are and set the time to undefined. If the event information is presented in order of time without caring current/next events, use the contents in the EIT[p/f] in priority to others as long as it is desirable to display the current situation as accurately as possible.

The undefined event is displayed only for "following" events, and it indicates the next event itself to be broadcasted is not defined. It is recommended to show that the next event is undefined when the current/next event information is displayed in the program guide list, etc. If the event information is presented in order of time without caring current/next events in the program guide in the radio and TV listings format, the information on "present" event should be displayed in priority to "following" event, then it is recommended to perform the process (display the event information in the EIT[schedule]) on the assumption that the "following" event (undefined event) does not exist.

C.5.8 Compatibility between EITs

EIT includes L-EIT[p/f], M-EIT[p/f], H-EIT[p/f], L-EIT[p/f after], M-EIT[p/f after] and H-EIT[schedule], and each meaning and operation is different. The receiver units separately obtain and manage each EIT, but still it is inevitable that an inconsistency of information occurs in the receiver units. The inconsistency mentioned here includes the following:

- Overlapping of event times (The events to be broadcasted are overlapped at a certain time.)
- Two events with the same "event_id" exist. (The same event has the two different "start_time".)
- The same event has the two different event names and descriptions.

Such information inconsistency may be caused by the following:

■ Inconsistency between EIT[p/f] and H-EIT[schedule] due to the change of previous event programming

Especially, in EIT[p/f] and EIT[p/f after]of Basic delivering EIT type, the changed event programming is immediately reflected; therefore, such inconsistency is often caused. In addition, if the "undefined" information (undefined time or undefined event) is operated in the EIT[p/f], this is not reflected in the H-EIT[schedule]; therefore, such inconsistency is caused.

Due to such characteristic of the tables, the inconsistency is likely to occur. Accordingly, the receiver units should separately manage EIT[p/f] and EIT[p/f after]of Basic delivering EIT type and H-EIT[schedule] and use them in combination as necessary.

■ Inconsistency due to receiving timing of EIT[schedule basic]

Even if the EIT[schedule basic] is transmitted from the transmission master system without any inconsistency, an inconsistency occurs within the receiver unit if the EIT[schedule basic] is not received collectively by receiving unit.

Especially, note that an inconsistency may occur between sub-tables in the same service if the table is received by sub-table unit, and that an inconsistency (overlap of time) may occur between the old and new versions if the table is received by segment unit. As long as the

EIT[schedule basic] is transmitted from the transmission master system without any inconsistency, no inconsistency is caused at the stage of receiving all of transmitted latest data. Therefore, when receiving the EIT[schedule basic], all tables within the same service should be received and stored at one time if possible.

C.5.9 Event Common

Event Common may be used between the same media type of services within the same TS (= network) only. When the Event Common is used, the event information such as event name is not described in the event constituting the reference source; therefore, it is required to obtain the information from the event constituting the reference destination. To do this, the information should be received and stored collectively by network unit, whether it is for commonly operated SI or individually operated SI, even if all of the H-EIT[schedule] cannot be stored. How to provide the event information when the Event Common is used depends on the receiver units. It is recommended to consider an effective method of providing by making use of the fact, "same event". For example, generally, a frame across multiple services is created in the radio and TV listings when the Event Common is used. Note that the Event Common is not always used for adjacent services.

For the Event Common, see Chapter 17 of "Provisions for PSI/SI Operations", in which the details are described.

C.5.10 Presentation When Summer Time System is Applied

If the function to display the summer time supported time information including event start time is employed before/after the summer time system is applied, it is required to use the Local Time Offset Descriptor in the TOT. Accordingly, interpret the "time_of_change" field to determine if the start_time of the event to be displayed should be before the "time_of_change" field or after. Then add the value in "local_time_offset" or in "next_time_offset" field.

C.6 Detailed Event Information Display

The detailed event information is provided by the Extended Event Descriptor in the EIT[p/f] and H-EIT[schedule extended]. It consists of multiple items, and the information in each item is created on the assumption that the width is 20 characters (two-byte). It is coordinated so that it can be displayed as beautiful as possible in such format. Therefore, care should be taken for this format also when designing the screen of the receiver unit. The receiver units automatically insert the linefeeds according to each display area and display the textual string. At the same time, they should not ignore the transmitted linefeed codes. If the automatic linefeed and transmitted linefeed are overlapped, it is preferable that the receiver unit insert the automatic linefeed, then another linefeed again based on the transmitted linefeed.

The number of lines is not limited. It is preferable to provide the scrolling function to display all texts.

Detailed information is not described for all events. Moreover, since the retransmission cycle for H-EIT[schedule extended] is long, high responsibility is not guaranteed. If the receiver unit tries to receive detailed information provided by all broadcasters, they need to receive almost all TS. Therefore, it is preferable to immediately store the individually operated EIT at least for the being selected TS. However, some TS use the extended repetition rate group for the H-EIT[schedule extended]. In this case, the H-EIT[schedule extended] is transmitted with the normal retransmission cycle.

Whether detailed information exists in an event cannot be known without obtaining the H-EIT[schedule extended]. However, whether the H-EIT[schedule extended] itself is operated or not, or how often it is transmitted if it is used is described in the SI Parameter Descriptor in the second descriptor loop of the BIT. Read Section 13.2.2 of "Provisions for PSI/SI Operations" carefully. The transmission frequency can be used for estimating the data amount or judging whether it should be obtained, but it does not need to be used if it is judged as unnecessary.

With regard to the item names defined as reservation term in the Extended Event Descriptor, their purposes are previously determined. It is required to provide the receiving functions based on such purposes.

- "Notice" mainly provides the description about the change of programming. If this item is described, it is usually prioritized. It is closely related to the event characteristic information.
- "Program contents" refers to detailed information on an event. It is described on the assumption that 20 two-byte characters x 10 lines.
- "Cast", "original story/script" and "director/direction" provides personal names. The method of describing the item descriptions for those items is generally determined. (See Section 31.3.2.11 of "Provisions for PSI/SI Operations".) If the method is used, the person search function, where personal names can be found form the contents described in the receiver unit, may be enabled based on the above. But the further details are beyond the category of this chapter.

The Extended Event Descriptor has the special structure; therefore, care should be taken when analyzing it. The descriptor is extended in "descriptor_number" and "last_descriptor_number" fields. Only one item can be described in one descriptor. The maximum amount of item description for one descriptor is 100 two-byte characters (220 bytes), the maximum for one item is 200 two-byte characters (440 bytes). Thus, two descriptors may be placed for one item. In this case, "descriptor_number" should be continuously assigned to them that placed in the EIT, and the item name is not described in the second descriptor. The

Extended Event Descriptor is interpreted in ascending order of "descriptor_number" (in this case, in order of time placed in the EIT). It is judged that one descriptor is completed if the item name is not defined in the next descriptor. If the item description uses two descriptors, the receiver unit can display them as one textual string. The two fields are simply separated in the binary level. Thus, in this case (second item description field), initialization of textual string to be performed for each field is not applied. The receiver units should add two fields in the binary level and treat as one textual string.

C.7 Event Search

The category search function for broadcasting events can be provided using the H-EIT. The category search of events are enabled based on the information described in the Content Descriptor in the EIT and can be used across the broadcasters since it is provided as a H-EIT. The category information provided in the Content Descriptor includes 16 large categories ("content_nibble_level_1" field) and up to 16 middle categories for each large category ("content_nibble_level_2" field). When the event category search function is employed in the receiver unit, it is recommended to provide the search function that can be searched at least by large category unit. The large category set as "0xF" ("others") is also one of the category codes; therefore, it is recommended that it can be treated the same as other large category codes. ”0xC” and ”0xD” are obtained for the future extension of category codes and should not be used by the receiver units that do not support extension.

In consideration of the retransmission cycle for H-EIT[schedule], it is expected that it takes long time to dynamically obtain the tables during the category search using the operation model. Therefore, it is recommended to consider the storage and management of H-EIT[schedule] mainly before providing such function.

The event search can provide various functions such as search by event name, cast and key word. However, such functions should be reviewed by each manufacturer and shall be beyond the category of this material.

C.8 Event Reservation

The reservation function of broadcasting events can be provided using the H-EIT. The mobile and portable receiver units can provide the event reservation function using the M-EIT and L-EIT, but the reservation period is limited. This section explains such function in consideration of using the H-EIT. The reservation function can be divided into three main functions: reservation registration, reservation check and reservation execution.

C.8.1 Reservation Registration

It is the function to register the event by selecting events from the program guide, etc. by viewers.

When actually registering an event reservation, it is recommended to check if the event can be viewed as follows:

- Check on components that can be displayed
  Check if there are the Component Descriptor and Audio Component Descriptor in the EIT, then if the components are supported by the receiver unit.
- Check for free/chargeable and contracted/not contracted event
  First, use "free_CA_mode" for the relative event to check if the event is free/chargeable. If it is chargeable, check if it can be actually viewed. This can be done only by contacting to IC card using the CA Contract Info Descriptor for the relative event. If the CA Contract Info Descriptor does not exist in the EIT, it is required to use the CA Contract Info Descriptor in the SDT for the service transmitting the relative event.
- Check in case of data event
  The data type of service generally is a data event. In this case, it is recommended to confirm that its system is the supported data broadcasting system by the receiver unit. It is also preferable to refer to the Data Contents Descriptor in the EIT (especially "data_component_id" field). In addition, whether events are viewable or not may be defined every data broadcasting system. Then, comply with the provisions specified for each data broadcasting system.
  What kind of information on other events should be displayed when reserving the events depends on the product planning.

It is recommended to memorize at least the values in "service_id", "event_id" and "start_time" for the events to be reserved when reserving them. Such information will be required for executing reservation. To display the reservation list (reservation confirmation function), it is preferable to memorize the other event information on the relative events than the above as necessary. Usually, the event names, etc. provided in the EIT are memorized. However, if the receiver unit can receive the H-EIT[schedule] in the stable state, the latest stored H-EIT[schedule] can be referred while the reservation list is being presented.

As one of operations performed during reservation registration, it is likely to install the function to check if the broadcasting time of the event overlaps that of the already reserved event. However, such process depends on the receiver units; therefore, it shall be beyond the category of this material.

C.8.2 Reservation Check

The receiver units supporting event reservation should preferably install the function to check the reserved events. If the user interface to check the reserved and registered events is installed, simply display the reservation information stored in the receiver units.

If the receiver unit can receive the H-EIT[schedule] in the stable state, the latest stored H-EIT[schedule] can be referred while the reservation check screen is being presented. Under such implementation, a change before reservation execution (ex. change of start time) can be informed viewers. However, the reserved events may be deleted from the EIT[schedule] once due to the change of programming. In this case, it is not preferable to judge the event is cancelled until the registered "start_time" (until, with regard to the start time, EIT[p/f] of Basic delivering EIT type is obtained). It is required to only display the reservation information stored in the receiver unit and perform the changeable program scheduling around the stored "start_time". Obviously, it may be found that, during the reservation check, the event time was shifted to another time zone. The situation can be obtained by searching the event using "event_id" within the same service. When the situation is obtained, the event can be used on the assumption that the obtained change is correct. The changes such as change of schedule can be informed the viewers based on the obtained new EIT[schedule], and the reserved schedule can be automatically changed.

In addition, while rare, the broadcasting service for the event may be changed. There is no secure system to obtain this situation. The service change is limited within the same terrestrial broadcaster and same media type, and the Event Group Descriptor indicating the original event is placed in the changed event. If the Event Group Descriptor indicating event shift is detected when analyzing the EIT, check if the reserved event is shifted or not, referring to the own reserved event list.

C.8.3 Reservation Execution

It is considered that the reservation execution is the function to announce the viewers that the event reserved at minimum will start. Therefore, it is recommended to select the service for the reserved event around the stored "start_time" and refer to the EIT[p/f] of basic delivering EIT type.

For the event reservation/recording along with channel selection, see C.5.

C.9 Common Range of NVRAM Area Used for Data Contents

The Extended Broadcaster Descriptor includes the event relay between networks, event shift, terrestrial broadcaster identifier indicating the effective range shared by "series_id", and other information indicating that access to NVRAM is allowed.

C.9.1 Affiliation Identifier

The affiliation identifier described in the Extended Broadcaster Descriptor indicates the NVRAM area used for the data contents of the network as well as affiliation identification. Multiple affiliation identifiers can be described in the Extended Broadcaster Descriptor. Since multiple areas are allowed to access, care should be taken for implementing.

C.9.2 "original_network_id" and "broadcaster_id"

The IDs of BS digital broadcasting are described in "original_network_id" and "broadcaster_id" that are described in the Extended Broadcaster Descriptor, which indicates the access to the NVRAM area for the described affiliation identifier is allowed. It is significant to the receiver units that can receive the BS digital broadcasting. "original_network_id" and "broadcaster_id" can be described more than once.

C.10 Series

Various kinds of functions supporting series can be installed using SI. The Series Descriptor is described in the M-EIT and H-EIT.

For the details of series, see Chapter 18 of "Provisions for PSI/SI Operations".

The series functions in Digital Terrestrial Television Broadcasting (as can be judged from the transmission format) are defined, focusing on the broadcasting event. Note that they are not designed in consideration of the series listing function.

C.10.1 Reservation of Series

It is recommended to store at least the value in "terrestrial_broadcaster_id/series_id" when registering the series. At the same time, it is recommended to store other information on series into the receiver units if the receiver units implement the function to present the registration contents including series registration list screen. Especially, it is preferable to store the information on "last_episode_number" and "expire_date" if the receiver units will implement the function to automatically delete the series reservation. The series name is important for the receiver units, and it is described in "series_name_char" field. If the series name does not exist, the event name is used; the same event name is used for all events within the same series. In case of series reservation unlike event reservation, note that the registered series information may not be obtained from the H-EIT[schedule] for a certain period.

To delete the series reservation automatically, it is required to detect the end of series.

In general, judge that the series ends when "expire_date" has passed. However, the "expire_date" may not be operated. In this case, it is required to detect the last episode event based on the "episode_number" defined for each series event. Note that the "episode_number" is provided every "repeat_label". If the last episode event is not detected unfortunately, delete the series reservation when the series event cannot be found for 100 days.

C.10.2 Confirmation of the Series Events

The events included in the series have the same "terrestrial_broadcaster_id" and "series_id" in the Series Descriptor in the EIT. In this case, it is required to search the H-EIT in the receiver unit. The service range of searching covers all services in the same media type within the same terrestrial broadcaster. For example, when the series event confiirmation screen is displayed, it is preferable to search the H-EIT[schedule] stored into the receiver unit to present the relative event list.

To install the automatic reservation function for series, it is required to search the H-EIT[schedule] (at least) regularly. For example, it is preferable to check the series events every time the H-EIT[schedule] is received and stored. It is possible to check the series events based on the information on the programmed pattern provided.

C.10.3 Execution of the Series Reservation

It is generally considered that the series reservation is executed as an event reservation. Thus, every events of a series are checked before the series starts, then reserve as event. There may be such case that the receiver units automatically reserve the series as a set of events, and also such case that the event information included in the series is informed to the viewers then the viewers can select the events to reserve. After the reservation for each event is made, perform the same process as that for normal execution of the event reservation.

If the receiver units install the function to automatically detect the events that belong to the series and reserve (for recording) the event, care should be taken for the following:

In case a live professional baseball game is cancelled due to rainout, the event belonging to the series may suddenly appear . This is the case that the event is indicated on radio and TV listings in newspaper, etc. as a program to be broadcasted when the baseball game is cancelled, and the series event may be also included in those events. Since the cancellation due to rainout may be determined immediately before the start time of the game (in this case, the cancellation may be indicated in the EIT[p/f] only), it is difficult to detect such information by searching the H-EIT[schedule] once a day. If the receiver unit is not always running, there is no other way to detect. To increase the detecting rate, the programmed pattern of series ("program_pattern" field in the Series Descriptor) can be used. Especially, for weekly series, the broadcasting days and times are usually fixed; therefore, it is possible to detect by starting the receiver at the days and times during the series period and checking the EIT[p/f].

C.11 Channel Selection

C.11.1 Basic Operation of Channel Selection

If channel selection defined as selection of the service, and decoding and presenting the components included in the service, the operation of channel selection is enabled based on the following:

C.11.1.1 Basic Operation of Channel Selection Except Portable Receiver Units

(1) Check if the specified service exists, using the NIT.
If the target service does not exist in the NIT, the specified service is not correct. This error may be caused when specifying the channel number with the remote controller. The operation of receiver units in this case is beyond the category of this chapter.
For operation of channel selection, it is required to constantly store the NIT into the receiver units.

(2) Check the service type of service.
If the service type is not supported in the receiver unit, do not select the channel. In this case, perform the same process as that performed when the selected service does not exist. Otherwise, inform that the channel cannot be selected.

(3) Change the TS and receive the PAT if necessary, and obtain the PID of PMT for the relative service.
If the PAT cannot be received, there is no receivable streams within the TS due to transmission system error, etc. perform the same process as that for the case that the service is suspended.
If the target services are not described in the PAT ("program_number"), the service is suspended.

(4) Obtain the PMT for the relative service and check the existing components.
If the PMT described in the PAT cannot be received, it is a reception error. However, in case the media type is data, the broadcast may be suspended. (See C.11.4.)
The PID of PMT is almost operated as fixed number for each service; therefore, it is possible to directly receive the PMT without the process of receiving PAT and increase the response of channel selection if the PID of PMT is stored in the receiver units according to "service_id". However, the receiving process of PAT is performed at the same time and process suitably if any change occurs, it is required to correspond to such situation.

The process to be performed after the PMT is received generally depends on the component structure within the program and should be performed based on the description in the PMT. The following explanation is based on the television service where data components do not exist:

(5) Select the presenting components based on the description in the PMT.

- When the Conditional Access Descriptor exists in the first descriptor loop of PMT:
  When the Conditional Access Descriptor exists in the first descriptor loop of PMT, the whole service is under conditional access broadcasting.
- When the default components are selected as normal process:
  In general, it is preferable to select the default components as those presented first at selecting. Inspect the component tag value ("component_tag" field in Stream Identifier Descriptor) described in the second descriptor loop of PMT and present the components with "0x00" (default video) and "0x10" or "0x85" (default audio). Since there is one default component for each stream type identifier, only either of "0x10" or "0x85" can exist. If video component and audio component with “0x00”, "0x10" or "0x85" component tag value do not exist, select any video and audio components based on the value in "stream_type".
  Other components than those assigned as video and audio components in Table 14-1 (video: "0x00" – "0x0F" and audio: "0x10" – "0x2F" and "0x84 - 0x86") cannot be selected.
- When selecting based on the components specified at reservation:
  The components are specified for reservation based on the component tag values described in the Component Descriptor and Audio Component Descriptor in the EIT. In this case, search the component tag value described in the PMT and present the relative components if any. However, since the component tag values may be changed by each event except for the default components, the desired components may not exist when the channel is selected. In this case, select the default components, etc., then monitor the PMT update.
- When automatic audio language tracking is performed:
  It is very difficult to enable this function strictly, but it is still possible on the assumption that the EIT is stored. Check the information on the current event (refer to "start_time" field, etc. in the received and stored event information) in the service where the channel is selected, and search the component tag values based on the language specification for the audio component included in the information, and present the relative components. This method sometimes does not work well since the change timing of an event in the EIT is not synchronized with the PMT. In this case, it is recommended to receive the actual PMT and present the default components if the desired components do not exist on the assumption of the above.

(6) Present selected components.
The transmission specification for components transmitted by the packets of the PID described in the PMT and the value of timeout when the transmission is made are determined for each component.

(7) Receive EIT[p/f].
The EIT[p/f] can be also obtained at the same time of channel selection. At the time, it is preferable to obtain the EIT[p/f] of Basic delivering EIT type. It is considered the EIT[p/f] is received later than PAT and PMT due to the difference of retransmission cycle. Until the EIT[p/f] is received, the process can be performed based on the event information on EIT[p/f after], EIT[schedule], etc. stored into the receiver units.

If the Component Group Descriptor exists in the "present" EIT of the EIT[p/f] and the group type is multi-view, the latter components are changed by group units. If it does not exist, the components are changed based on the descriptions in the Component Descriptor and Audio Component Descriptor. See Chapter 25 of this document.

C.11.1.2 Basic Operation of Channel Selection by Portable Receiver Units

(1) Obtaine the selected "PMT_PID".

- In Case of Channel Selection with Service:

1. Check if the specified service exists using the NIT.

   If the target service does not exist in the NIT, the service specification is incorrect. This error may be caused when directly specifying the channel number with the remote controller. In this case, the operation of receiver units is beyond the category of this chapter.

2. Check the service type of service.

   If the service type is not supported in the receiver unit, do not select the channel. In this case, perform the same process as that performed when the selected service does not exist. Otherwise, inform that the channel cannot be selected.

3. Obtain the PID of PMT for the relative service.

   Since the PAT cannot be received by the portable receiver units, use the "PMT_PID" assigned for each service number. (For the details, see "5.2.9 Operation of Partial Reception" in Vol. 7.)

- In Case of Channel Selection with Physical-Frequency:

1. Select the channel with the default "PMT_PID" ("0x1FC8").

   Perform the channel selection by directly specifying the default "PMT_PID" before obtaining the NIT.

2. Check the service and service type when the NIT is obtained.

   After the channel selection, it is required to check if the service with the default "PMT_PID" exists in the NIT and if the service type is supported when the NIT is obtained. If the service does not exist in the NIT, judge that the service is not defined (implemented). If the service type is not supported, stop the channel selection process. Otherwise, perform the same process as that performed when the selected service does not exist, or inform that the channel cannot be selected.

(2) Obtain the PMT for the relative service and check the existing components.

When the PMT cannot be received, the broadcast is suspended. (See C.11.4.)
The process to be performed after the PMT is received generally depends on the

component structure within the program and should be performed based on the description in the PMT.

(3) Select the presenting components based on the description in the PMT.

- When the Conditional Access Descriptor exists in the first descriptor loop of PMT:
  When the Conditional Access Descriptor exists in the first descriptor loop of PMT, display the noncompliant error message and stop the channel selection process.
- When the default components are selected as normal process:
  In general, it is preferable to select the default components as those presented first at selecting. Inspect the component tag value ("component_tag" field in Stream Identifier Descriptor) described in the second descriptor loop of PMT and present the components with "0x81" (default video) and "0x83" or "0x85" (default audio). Since there is one default component for each stream type identifier, only either of "0x83" or "0x85" can exist. If video component and audio component with “0x81”, "0x83" or "0x85" component tag value do not exist, select any video and audio components based on the value in "stream_type". Also, select "0x80" (default data carousel) if any. (For the details, see "4.1.5 Related Receiver Operation " in [Section 4] of Vol. 3.)
  Other components than those assigned as video and audio components for the partial reception layer in Table 14-1 (video: "0x81" – "0x82" and audio: "0x83" – "0x86") cannot be selected.
- When specifying components at reservation:
  Since the Component Descriptor and Audio Component Descriptor are not described in the L-EIT, the portable receiver units cannot specify the components at reservation.
- When automatic audio language tracking is performed:
  Since the Audio Component Descriptor is not described in the L-EIT, the portable receiver units cannot perform the automatic audio language tracking.

(4) Present selected components.

The transmission specification for components transmitted by the packets of the PID described in the PMT and the value of timeout when the transmission is made, are determined for each component.

(5) Receive L-EIT[p/f].

The L-EIT[p/f] can be also obtained at the same time of channel selection. It is considered the L-EIT[p/f] is received later than PMT due to the difference of retransmission cycle. Until the L-EIT[p/f] is received, the process can be performed based on the event information on L-EIT[p/f after] stored into the receiver units.

C.11.2 Component Tracking after Channel Selection

For any changes of component structure of video and audio components after the channel

selection, follow based on the component tag values in the Stream Identifier Descriptor placed in the PMT. Thus, even if the PMT is updated, the components for the described ES PID can be presented if the selected component tag value exists. The component tag values are not changed by event units. When the ES PID and mode of the components referred by the component tag values are changed, it is required to automatically follow such changes. In addition, the number of components may be also changed. It is preferable to continue to present the components even when the component shifts the layer.

If the component with the selected component tag value is deleted when the number of components is increased/decreased within the event or the event is switched, another component within the same program should be immediately presented. Normally, the default component is presented. (The default component is never deleted except the case of data service transmitted in the partial reception layer.)

C.11.3 Component Switching

The component is switched during the channel selection based on the Component Descriptor, Audio Component Descriptor and Component Group Descriptor described in the EIT[p/f].

- The Component Descriptor is used to switch video if there are more than one video. If the OSD is used to create a select menu, use the textual string in the Component Descriptor and present the information on component mode, etc. as necessary. If there is no textual string described, use the default texts.
  Do not use the Component Descriptor if its "component_tag" value is not within "0x00" - "0x0F".
- The Audio Component Descriptor is used to switch audio if there are dual mono audio components and more than one audio component. If the OSD is used to create a select menu, use the textual string in the Audio Component Descriptor and present the information on component mode, etc. as necessary. If there is no textual string described, use the default texts.
  Do not use the Audio Component Descriptor if its "component_tag" value is not within "0x10" - "0x2F" and "0x84" – "0x86".

Since the "component_tag" values are provided for both Component Descriptor and Audio Component Descriptor, the relative component can be found by referring to the Stream Identifier Descriptor in the PMT based on the component tag values. In addition, the components are prioritized in ascending order of "component_tag" values within the same component type; therefore, it is recommended to display the menu and switch the toggle in ascending order of "component_tag" values.

The Component Group Descriptor may be inserted into the EIT. In this case, it is required to switch components by group instead of switching individually. The switching group is shown in

"component_group_id" in the Component Group Descriptor. If the OSD is used to create a select menu, use the textual string provided for each component group. If the group switching is performed (multi-view), present the group switching first, then component switching within the group. For the operation of multi-view television, refer to Chapter 25 of "Provisions for PSI/SI Operations".

If the components are switched based on the component-related descriptor in the EIT[p/f], the switched component structure may be (temporarily) different from actual component structure indicated in the PMT. While the default components always exist, other components may disappear. If the components selected based on the SI are not found in the PMT, it is preferable to adjust so that the default components can be presented. Especially, it is highly likely that the video and audio modes are different from those in the SI. And they can be changed even during the event. Therefore, it is preferable that the receiver units can automatically track the information.

When the EIT[p/f] cannot be received or there is no description in the EIT[p/f], it is preferable to judge the ES described in the PMT from "stream_type" and "component_tag" (If "stream_type"=“0x02”, then ”0x00” - ”0x0F”; if "stream_type"=”0x1B”, then ”0x81” - ”0x82”; if "stream_type"=”0x0F”, then “0x10” - ”0x2F” and ”0x84” - ”0x86” for other receiver units than portable receiver units, and ”0x83” - ”0x86” for portable receiver units) to enable component switching.

C.11.4 Operation during Suspension of Broadcasting

After the channel selection, the desired service entry may not exist in the PAT. In this case, the broadcast is suspended; therefore, it is recommended to display the message, etc. as necessary. According to the circumstances, the receiver units can automatically present other services running within the terrestrial broadcaster.

If the PMT cannot be obtained after the PAT is obtained (cannot be obtained for more than 2 seconds in case of partial reception layer; and more than 1 second in case of other layers), it can be unconditionally judged that the broadcast is suspended in the portable receiver units, and provided that no packet error occurs in other receiver units. In the services that media type is not data type services, the above condition is abnormal, but it is still preferable to handle in the same way as above.

In addition, the PAT may not exist in the TS due to accident or maintenance of broadcasting system. When such situation is detected (when the PAT cannot be received), handle in the same way as above. However, since the portable receiver units cannot receive the PAT, judge that the broadcast is suspended only when the PMT cannot be received.

C.11.5 Operation of Event Relay

The Event Group Descriptor indicating the event relay may be placed in the EIT[p/f] of the selected event. In this case, the event will continue in another or same service at the time when

the event ends or before. The service constituting the relay destination can be a special service. The event constituting the relay destination may be one in the same network (same TS) or in another network in the same terrestrial broadcaster. This can be judged from "group_type" in the Event Group Descriptor. In either case, if the relative network, service or event does not exist in the terrestrial broadcaster, or if the media type is different, the event relay should not be operated.

Perform the following operation if the receiver unit provides the event relay function:

If the event relay is implemented in a service within the same network, after the Event Group Descriptor is placed, announce the viewers that the event relay is implemented at the time when it is confirmed that the event constituting the relay destination is described in the EIT[p/f] which is the relay destination. The contents of the announce should include the fact that the currently being viewed event will be broadcasted in another channel and the date and time, while they are arbitrary. If no description about the event constituting the relay destination is described until the event ends (including the case that the EIT[p/f] has not been sent), in general, the event relay cannot be implemented.

If the event relay is implemented in a service within another network, the description in the EIT[p/f] of the event constituting the relay destination cannot be checked, but it is also preferable to announce the viewers and promote selecting the event constituting the relay destination.

After the announcement to the viewers, for example, select the channel of the event constituting the relay destination at the end time of the event ("start_time" + "duration") according to the viewer's selection.

No special process is required if the service constituting the relay destination is the special service.

If the event relay is implemented in a service within another network, multiple relay destinations may be described in the Event Group Descriptor. In this case, if any network is assigned to the remote control key by the viewer, set such network to the relay destination. If no network is assigned, select a relay destination from the channels preset in the receiver unit. If multiple networks are assigned, prioritize the network with the same area identifier in "service_id" as that specified in the receiver unit.

C.11.6 Fringe Area

In the fringe area, multiple TS with the same network ID may be received. When it becomes difficult to receive the TS being received during shifting between areas, receiving the TS with the same network ID is easier and can provide the viewers with the continuous video and audio. If there is no TS with the same network ID, which makes easier to receive, receiving the TS with the same affiliation may be able to provide the continuous video and audio. Use the

affiliation identifier ("affiliation_id") described in the Extended Broadcaster Descriptor in the BIT for judging the affiliation. Note that some TS has multiple affiliation identifiers. In this case, the affiliation identifier that has been described first in the Extended Broadcaster Descriptor for the original TS should be prioritized and continuously used as an affiliate identifier. The channel constituting the continuance destination should be the prime service in the receiving layer (service ID described first by the "service_id" loop in the layer and in the TS Information Descriptor).

C.12 Event Recording

In order to provide the receiver units with the function to record by event while automatically tracking the extension, etc., it is recommended to design as follows. Especially, if they include the function to automatically track the emergent change of programming, care should be taken for handling the EIT[p/f].

To realize this automatic tracking function to track the change of programming as a function of the receiver units, there are still some issues on remaining capacity in the recording media, overlap of reserved events, etc., but those are beyond the category of this chapter.

C.12.1 Reservation/Reservation Check

It is recommended to mainly use the EIT for reservation functions by event.

The information on events to be broadcasted in the future is described in the H-EIT. It is recommended to provide such design that any information can be presented to viewers based on this information, and the reservation process can be smoothly performed.

It is also recommended to judge if recording is enabled/disabled or which recording mode is used for recording according to the contents in the Digital Copy Control Descriptor described in the EIT and SDT.

In addition, as an effective information for recording reservation, the program characteristic information is provided in the Content Descriptor in the EIT. Especially, the attachment information related to the changeable program scheduling shows the possibility of event program change; therefore, this can provide the function where the viewers can select the recording operation when the event program is actually changed.

Refer to C.8 (Event Reservation) which can be applied here.

C.12.2 Reservation Execution

If it is necessary to refer to the EIT, refer to the EIT[p/f] of Basic delivering EIT type.

C.12.2.1 Before Event Start

The start of event is judged from "start_time" of "following" in the EIT[p/f]. Normally, the event proceeding is determined 30 seconds before "start_time" of "following"; therefore, it is recommended to consider the above time if it is desired to start recording slightly before the event starts. However, it may not be possible to record the components before the event starts, due to viewing/recording limitation of the previous event.

When other networks are being received, obtaining the EIT[p/f] for the relative event is disabled. Therefore, the network should be switched to the one for the relative event before the event starts.

Immediately before the event starts (30 seconds before), the following may occur in the EIT[p/f]:

(1) The event to be recorded does not appear in the EIT[p/f].
The possible causes include the change of event start time and cancellation of event. The operation of receiver units for this case will be mentioned later in C12.2.4.

(2) The event to be recorded is described in "present" in the EIT[p/f] (the earlier time than the original start time is described in "start_time").
This occurs when the event started broadcasting earlier than the expected time. It is usually prohibited but occurs due to inevitable circumstances in programming. When the receiver unit detects such case, it should immediately perform the recording process (unless there is any problem on charges). It also may be in the status of event-interupption. In this case, it should be judged that the event has already started and is being interrupted; therefore, it is preferable to perform the appropriate process after the example of the process performed when the event is being progressed.

(3) The event to be recorded is described in "following" in the EIT[p/f] but the values in "start_time" and "duration" have been changed.
This occurs when the change of event start/end time has been previously determined. It is preferable that the receiver units perform the recording preprocess according to the contents described in "following”. In this case, the "start_time" may be changed to "undefined". This case will be also mentioned later in C12.2.4.

During the period from the time immediately before the event starts to the start time, the contents in the EIT[p/f] may be changed. There are various kinds of changes, but in any case, it is required to perform the appropriate process according to Table 19-1 in "Provisions for PSI/SI Operations". The important thing is that the event should not be judged as progressing until the start time of the event. For example, even if the event described in "following" is deleted from both "present" and "following" immediately before the event starts, it should not be judged that the event ended. Always judge that the event has not started, and the start time was changed or event was cancelled.

In addition, while rare, the channel to broadcast the event may be changed. This occurs only when the service moves to another service of the same media type within the same terrestrial broadcaster. If the scheduled event does not appear in the EIT[p/f] at the scheduled time, check other services of the same media type in the same terrestrial broadcaster. If the service is implemented in another service, the Event Group Descriptor indicating event shift is described. The service is not always changed at the same time.

C.12.2.2 Event Progressing

It is preferable that the receiver units supporting changeable program scheduling always

detect a change of EIT[p/f] during recording and perform the appropriate process to the change.

While the EIT[p/f] is updated regarding the event being recorded, the following may occur:

(1) The value in "duration" suddenly changes while the event being recorded is described in "present" in the EIT[p/f].
In this case, the "duration" may be changed to earlier time (early end), delayed time (extension) or "undefined". In any case, the event being recorded is still progressing. It is preferable to continue to record the event under any situation if the "event_id" for the event being recorded is described in the EIT[p/f].

(2) The event being recorded disappears from "present" in the EIT[p/f], and it is not described in "following" in the same sub-table.
In this case, the event ends regardless of the end time in original "duration". It is preferable to end recording, regardless of other conditions, if the event being recorded is deleted from both p/f in the EIT[p/f].
The EIT[p/f] may be unreceivable. In this case, it cannot be judged as event end. Whether to continue the event recording or not depends on the product planning, but it is still recommended to detect the event end based on time.

(3) The event being recorded disappears from "present" in the EIT[p/f] and is described in "following" in the same sub-table.
This occurs when the event is interrupted by emergency news, etc. It is preferable that the receiver units continue to record or suspend temporarily and wait for restart if they detect the event interruption. However, the viewing/recording control information of the event broadcasted during the interruption is not always same as that of the original event; therefore, the event broadcasted during the interruption may be disabled to record.

C.12.2.3 Event Interruped

It is preferable to keep monitoring the EIT[p/f] when the event is being interrupted, whether the receiver unit continues to record or not. During the time, the following may occur:

(1) The event being interrupted disappears from both “present” and “following” in the EIT[p/f].
This occurs when the event ends. It is preferable to end recording process that is continued or suspended, regardless of other conditions.

(2) The event being interrupted is described in "present" in the EIT[p/f].
This occurs when the event being interrupted restarts. If the receiver units suspended recording, immediately perform the recording restart process. Since the restart of event cannot be known until such condition is caused, restarting after suspension will always cause the beginning of the event to be cut.

While there are more possible ways to update the EIT[p/f], if the receiver units can correspond to the above two cases, there will be no problem.

During the event interruption, if the network is switched to another network due to any reason such as designation by viewer, care should be taken for the following:

While other network is being received, the EIT[p/f] for the relative event cannot be obtained. Therefore, the state of the relative event cannot be known, and it cannot be judged whether the interrupted event restarted or still being interrupted.

C.12.2.4 Event Start Time Change and Event Cancellation

If the event does not appear in the EIT[p/f] at the originally scheduled start time, the start time of event is changed or the event is cancelled. (The event may start broadcasting earlier than the start time and already end although it is generally prohibited. In this case, perform the same process as that for event cancellation.)

There is no method of judging which case of the above two is caused. It should be judged by comparing the updated EIT[p/f], EIT[p/f after] and H-EIT[schedule]. For example, if the event does not appear in the EIT for more than three hours from the originally scheduled start time, the event is cancelled. Otherwise, the start time of the event is changed. To understand this situation accurately by the receiver units, they keep monitoring the EIT[p/f] for the relative service (EIT[p/f after] and H-EIT[schedule basic] also if possible) for three hours and inspect the appeared event. If the event does not appear, they inspect all EIT[p/f after] or H-EIT[schedule basic] for the relative service three hours later to check if the relative event exists or not (search by "event_id"). If 24 hours passes, the same "event_id" will be assigned to another event; therefore, the relative event should not be inspected.

However, the EITs for other networks are not transmitted, and the H-EIT[schedule basic] includes the range transmitted as individually operated SI. Accordingly, the above process is not guaranteed. (The process related to individually operated SI is not always implemented.) As a result, the judgment whether the event cancellation occurs or the event start time change occurs depend on the receiver units. For example, suppose that the event start time is changed in the television service 10 days later. If the receiver unit can handle the individually operated SI and detect the change, it can inform the viewers about the changed event start time. However, if the receiver unit cannot handle the individually operated SI, it will inform the viewers that the event is cancelled. (The method of announcing can be voluntarily determined. In all cases, the announcement can be that the event is not broadcasted at the originally scheduled start time.)

In addition, if the event does not appear in the EIT[p/f] at the originally scheduled start time, the event may be moved. If possible, it is recommended that the receiver units perform the same process as the above for other services in the same terrestrial broadcaster and with the same media type to check if the event is moved, in addition to the above process.

C.12.2.5 Event-forwarding

The Content Descriptor indicating that the event is moved forward may be placed in the EIT for the event. This case indicates that the event may be broadcasted earlier than the originally scheduled start time. If the event is moved forward, the moved start time is generally determined 1 hour and 30 seconds before the originally scheduled start time.

If the function to automatically track the event-forwarding during event recording is installed into the receiver unit, the operation of the receiver unit is as follows:

- If the event that may be moved forward is reserved, move to the TS for the service 1 hour and 30 seconds before the original start time and obtain the latest EIT to check the event program. If an event in other TS is being viewed or recorded at this time, the receiver unit cannot move to the relative TS; therefore, it cannot check if the event is moved forward. Whether the receiver unit can check or not after viewing or recording is dependent on the product planning.
- If it is found that the event is moved forward by searching the EIT[p/f], EIT[p/f after] and EIT[schedule], change the reservation contents to the latest. How the process is performed when the reserved event time is overlapped with another event time depends on the product planning. If the reserved event has already started according to the latest information, immediately execute the reservation.
- If the event is moved forward more than 1 hour, it is inevitable that the receiver unit cannot track since it is impossible to trace.

C.12.2.6 Automatic Tracking to Event Relay

The Event Group Descriptor indicating the event relay may be placed in the EIT[p/f] for the event being recorded. In this case, the event will be continued in the same or another service at the same time or before the event end.

If the function to automatically track to the event relay during the event recording is installed into the receiver unit, the operation of the receiver unit is as follows:

- If the event relay is implemented to a service within the same network, obtain the EIT[p/f] for the service that transmits the event constituting the relay destination 30 seconds before the event end time.
  If no description of the event constituting the relay destination is described at this time (including the case the EIT[p/f] is not transmitted), the receiver unit generally stops automatic tracking. The service constituting the relay destination can be the special service. In any case, the service constituting the relay destination is limited to services within the same terrestrial broadcaster and with the same media type. Thus, the operation is completely same in both cases.

- If the event constituting the relay destination is checked, or if the EIT[p/f] for the event constituting the relay destination cannot be obtained due to the event relay within another network, select the channel for the event constituting the relay destination at the same time of the event end time ("start_time" + "duration").
  In this case, it is preferable to operate based on time, but if the event end time is undefined, the event constituting the event destination can be detected only when the event is deleted from the EIT[p/f].

C.13 Special Service

The special services are not transmitted in the partial reception layer.

The special services are broadcasted in very rare cases. The EIT[p/f after] and EIT[schedule] are not transmitted. It is preferable not to present the viewers under normal condition. Whether the service is the special service or not can be judged from "service_type".

The most important thing in the receiver units supporting the special services is to provide such design that the viewers can view the special service when they select the channel during the special service occurring. Generally, the announcement of special service is performed in other services than special services, and the viewers can view the special service by selecting the channel directly with their remote controllers, etc. Since it is difficult to detect if the special service is being broadcasted unless the receiver units are in the same network as that of the special service. It is preferable that the receiver units can select the special service as soon as the viewers are desired. In consideration of the fact that the special services are not usually presented to the viewers, it is recommended to examine the process performed when no special services occur (can be judged from the PAT), while such process generally depends on the product planning. For example, the up/down channel selection automatically selects the next channel.

Since the special services include the extension of baseball game program, it would be effective to show that the special service exists in program guide, etc. when the special service occurs. When receiving other networks, it cannot be judged that the special service is actually being broadcasted. In general, in the network being received, the special service is detected from the PAT. Check if any special service exists every time the PAT is updated, then the special service can be quickly detected.

Unlike other normal services, the special services are not displayed under normal condition. Therefore, it is preferable to switch to another service when the special service ends (can be detected from the PAT). It is recommended to switch to a service within the same terrestrial broadcaster and with the same media type in the same TS.

C.14 Layer Shift of Service

In general, the service does not move to another layer after the service starts broadcasting. However, while rare, the service may temporarily move to another layer with higher resistance in the event of a natural disaster, etc. so that more receiver units can receive the service. Also, when the broadcaster intends to change an object of service contents, the service may move to another layer.

In which layer the service is broadcasted can judged from the TS Information Descriptor in the NIT. It is required to keep monitoring the NIT to detect the layer shift of service and immediately respond if the layer shift is detected.

When the layer shift of service occurs, care should be taken for the handling of EIT. Since the layer shift changes the basic delivering EIT type, EIT type and PID to be transmitted are changed. For example, suppose that the service where the basic delivering EIT type is the H-EIT moves to another layer where the basic delivering EIT type is the M-EIT. In this case, the M-EIT that has never been transmitted becomes the required EIT, and the H-EIT that has been the required EIT is voluntarily transmitted now. The type of the required EIT can be judged from the SDT. At this time, if the H-EIT is not transmitted, its reliability is lowered. Therefore, the obtained data of H-EIT which received before should not be used.

If the layer is temporarily shifted in the event of a natural disaster, etc., the SI (except the NIT) may not be correctly transmitted. Even in such case, the receiver units should display the video, audio and data correctly.

C.15 Process Performed when SI Transmission Parameters are Changed

When the SI transmission parameters are changed, in general, the SI Parameter Descriptor including the change date is previously placed, and the parameters are changed at 00:00 of the change date. It is recommended that the receiver units track the change of SI transmission parameters based on the description in the previously obtained SI Parameter Descriptor and time information.

However, the SI Parameter Descriptor may not previously placed and may be placed with the new contents in the BIT at the same time when the SI transmission parameters are changed. In this case, it is also recommended that the receiver units track the change of SI transmission parameters based on the description by constantly monitoring the BIT.

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