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Association of Radio Industries and Businesses

General Notes to the English translation of ARIB Standards and Technical Reports

3. The ARIB Standards and ARIB Technical Reports are usually written in Japanese and approved by the ARIB Standard Assembly. This document is a translation into English of the approved document for the purpose of convenience of users. If there are any discrepancies in the content, expressions, etc., between the Japanese original and this translated document, the Japanese original shall prevail.
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   http://www.arib.or.jp/english/index.html

Preface

The Association of Radio Industries and Businesses (ARIB) works with manufacturers of broadcast equipment , broadcasters, manufacturers of radio equipment, telecommunications carriers and end users to produce standard specifications and technical documents constituting the basic technological requirements of various different forms of radio equipment and systems.

ARIB technical documents provide the industry with specifications designed to ensure the quality and compatibility of radio equipment, particularly with regards to measurement and operational methods, based on "standard specifications" derived from technical standards released by the national government as well as voluntary standards used in the industry.

The current document sets out guidelines for the operation of BS and CS digital broadcasting stations and function specifications for BS satellite digital broadcast receivers and joint BS and CS satellite digital broadcast receivers. The document has been prepared by the ARIB Standards and Specifications Committee through a fully inclusive process involving close consultation with a range of interests, including manufacturers of radio equipment and devices, telecommunications carriers, broadcasters and end users, in order to guarantee proper levels of fairness and transparency.
This document consists of the following sections:

Part 1 Operational Guidelines for BS Digital Broadcasting
- Volume 1 BS digital broadcasting — Operational guidelines for downloading
- Volume 2 Function specifications for BS digital satellite receivers
- Volume 3 BS digital broadcasting — Operational guidelines for datacasting
- Volume 4 BS digital broadcasting — Operational guidelines for PSI/SI
- Volume 5 BS digital broadcasting — Operational guidelines and reception specifications for Conditional Access System (CAS)
- Volume 6 BS digital broadcasting — Operational guidelines for interactive systems
- Volume 7 BS digital broadcasting — Operational guidelines for transmission
- Volume 8 BS digital broadcasting — Content protection regulations

Part 2 Operational guidelines for CS digital broadcasting and function specifications for joint BS and CS satellite digital broadcast receivers
- Volume 1 CS digital broadcasting — Operational guidelines for downloading
- Volume 2 Function specifications for joint BS and CS satellite digital broadcast receivers
- Volume 3 Operational guidelines for datacasting to joint BS and CS satellite digital broadcast

receivers

Volume 4 CS digital broadcasting — Operational guidelines for PSI/SI

Volume 5 CS digital broadcasting — Operational guidelines and receiver specifications for Conditional Access System (CAS)

Volume 6 CS digital broadcasting — Operational guidelines for interactive systems

Volume 7 CS digital broadcasting — Operational guidelines for transmission

Volume 8 Content protection regulations for joint BS and CS satellite digital receivers

This technical document has been produced for the benefit of manufacturers of radio equipment and devices, broadcasters and end users.

Table of Contents

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Part 1

Operational Guidelines for BS Digital Satellite Broadcasting

Volume 4

BS digital satellite broadcasting

Operational guidelines for PSI/SI

Contents

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Operation in General

1 Introduction

1.1 Preface

The Electronic Program Guide (EPG) service in digital satellite broadcasting is provided in accordance with the ordinances and announcements of the Ministry of Internal Affairs and Communications and the provisions of the Association of Radio Industries and Business (hereafter referred to as ARIB) Standard, "Service Information for Digital Broadcasting System" (ARIB STD-B10). However, for extensive and wide-range utilization of this Standard, more detailed provisions have been required separately. Hence this volume "Operational Guidelines for Digital Satellite Broadcasting PSI/SI" has been established.

The standards for sending transmission control information specified in this document are designed to ensure the flexibility of program schedule for each trusted broadcaster and the expandability towards the future development of broadcasting services.

Trusted digital satellite broadcasting companies are required to send PSI/SI in accordance with the provisions defined in this document.

BS digital broadcast receivers are required to have an ability to receive signals sent in accordance with this document. In addition, enough care should be taken so that a malfunction will not occur due to signals that are not specified in this document.

1.2 Purpose

This volume defines the standards for transmission in digital satellite broadcasting in compliance with the ARIB Standard STD-B10 "Service Information for Digital Broadcasting System".

1.3 Scope

These provisions apply to the structures of PSI and SI, signal types, basic data structures, the use of identifiers and transmission standards used in digital satellite broadcasting.

These provisions have binding force, as described below:

[Receiving end]

This provision document defines the specifications for PSI/SI transmission operation in digital satellite broadcasting and it does not force receivers to be implemented in compliance with this operation. However, if the receiving end demands operations that are not specified in this document, there is no guarantee that entrusted broadcast companies respond to the demand.

[Sending end]

These provisions are basically not enforceable on the sending end, either. However, if transmission is not performed in accordance with these provisions, normal operation in receivers is not guaranteed.

2 Related Documents

This volume defines detailed provisions for operations in digital satellite broadcasting, based on ARIB STD-B10 "Service Information for Digital Broadcasting System".

Related documents are listed below:

MPEG Standard

- ○ ISO/IEC 13818-1 MPEG-2 Systems Standard

ARIB Standard

- ○ ARIB STD-B5 "Data Multiplex Broadcasting System for The Conventional Television Using The Vertical Blanking Interval"
- ○ ARIB STD-B10 "Service Information for Digital Broadcasting System"
- ○ ARIB STD-B32 "Video Coding, Audio Coding and Multiplexing Specifications for Digital Broadcasting"
- ○ ARIB STD-B24 "Data Coding and Transmission Specification for Digital Broadcasting"
- ○ ARIB STD-B25 "Conditional Access System Specifications for Digital Broadcasting"

3 Definition of Terms

Table 3-1 gives the descriptions of terms.

Table 3-1 Definitions of Terms

8-bit character code set	8-bit coded character code set is a code system that has lower overhead for switching character code sets, compared with 7-bit code set. 8-bit code set has higher character transmission efficiency.
ARIB (Association of Radio Industries and Business)	Association of Radio Industries and Business. Organization that standardizes the techniques regarding the domestic use of radio waves, with the participation of broadcasting companies, telecommunication carriers and manufactures.
BAT (Bouquet Association Table)	BAT describes the Bouquet name and information on the included service channels. BAT is not used in digital satellite broadcasting for the time being.
BCD (Binary Coded Decimal)	Binary-coded decimal number
BIT (Broadcaster Information Table)	BIT describes broadcaster configuration information. SI transmission parameters for commonly operated SI and each SI are described.
CA system (Conditional Access)	Conditional access system. System that controls the viewing of services (service channels) or events (programs). Essential for chargeable broadcasting.
CAT (Conditional Access Table)	Conditional access table. CAT specifies the packet ID of the TS packet that transmits individual information out of the related information comprising conditional access broadcasting.
CA alternate service	When a viewer selects a scrambled channel and he/she is not a subscriber, the CA alternate service directs the viewer to the "information channel".
CC (continuity_counter)	Continuity index. A 4-bit field that is incremented for each TS packet with the same PID
CRC (Cyclic Redundancy Check)	Cyclic error detection code. CC is a cyclic redundancy check code used to verify the validity of data.
DMF	Field that indicates display mode at reception, such as forced display or selective display.
DRCS (Dynamically Redefinable Character Sets)	DRCS transmits external characters (Gaiji) in patterns. DRCS is used in the character coding standards for text/data broadcasting.
DTCP	Abbreviation for Digital Transmission Content Protection. DTCP is the standard for secure content transmission and recording control scheme using authentication and encryption in the digital interface.
DTS (Decoding Time Stamp)	Decoding time stamp. Time management information for stream decoding.
ECM (Entitlement Control Message)	Common information that consists of program information (program-related information and descramble key) and control information (forced on/off of the decoder's scrambling function)
EIT (Event Information Table)	Event information table. EIT describes program-related information such as program name, airdate and program content.
EMM (Entitlement Management Message)	Individual information including a work key to decipher contract information of each subscriber and common information
EMM message	Individual or common message transmitted by EMM.
EPG (Electronic Program Guide)	Electronic program guide. EPG is program information configured by a receiver using the SI sent from the broadcast station. EPG is used for program selection.

ERT (Event Relation Table)	This table describes the relationship between an event and a local event.
ES (Elementary Stream)	Elementary stream. ES is coded video, audio or independent data in a PES packet. One ES is carried in a sequence of PES packets with the same stream ID.
EWS	Emergency warning signal
FEC (Forward Error Correction)	Error correction
GOP (Group Of Pictures)	A frame structure in MPEG video. A coding unit into which one I picture and multiple P and B pictures are grouped.
IEC (International Electrotechnical Commission)	International Electrotechnical Commission
ISO (International Organization for Standardization)	International Organization for Standardization
ISO-639-language-code	Used to indentify the language designated for components and characters. 8-bit code into which each 3-character code defined in ISO639 Part 2 is coded (Example: "jpn" → "0x6A706E")
ITT (Index Transmission Table)	ITT describes offset information between the time information described in LIT and PTS to enable accurate synchronization of program components within an intra-program index.
JST (Japan Standard Time)	Japan standard time (Defined as "UTC + 9 hours" in ARIB STD-B10 standard)
JTC (Japan Time Code)	BCD coding for JST
LIT (Local Event Information Table)	This table contains all the descriptions regarding local events of a single program.
MJD (Modified Julian Date)	Modified Julian Date. MJD is the number of days since 0:00 on November 17th, 1858 (UT).
MPEG (Moving Pictures Expert Group)-2	MPEG-2. Audio and video-included data compression and coding technology (ISO/IEC 13818) standardized by International Organization for Standardization
NIT (Network Information Table)	Network information table. NIT describes all service channel ID numbers included in a single distribution system. NIT is used to transmit information that associates transmission path information (such as frequency) with service channels.
NVOD (Near Video On Demand)	Near video on demand. NVOD provides the same service at different times.
PAT (Program Association Table)	Program association table. PAT specifies the packet ID of the TS packet that transmits PMT.
PCAT (Partial Content Announcement Table)	PCAT is the table that includes the announcement of content difference distribution and transmission schedule information in stored type data broadcasting.
PCR (Program Clock reference)	Program clock reference
PES (Packetized Elementary Stream)	Packetized stream. PES is video, audio and independent data packetized with variable length.
PID (Packet Identifier)	Packet ID (identifier). PID is 13-bit stream identification information that indicates the attribute of each individual stream in the relevant packet.

PMT (Program Map Table)	PMT specifies the packet ID of the TS packet that carries coded signals comprising a program and the packet ID of the TS packet that carries conditional access broadcasting-related information which is common information.
PNG (Portable Network Graphics)	Graphics file format as a successor of GIF. PNG, pronounced as "ping", is a lossless compression format and there is no problem with patent. This file format consists of an 8-byte signature followed by a sequence of chunks.
PSI (Program Specific Information)	Program-specific information. PSI is information required to select a specific program. This information consists of four tables: PAT, PMT, NIT and CAT. PSI is defined by the MPEG system standard and the ordinances of the Ministry of Internal Affairs and Communications.
PTS (Presentation Time Stamp)	Presentation time stamp. PTS is information that manages presentation output time.
RST (Running Status Table)	Running status table. RST indicates the running status of the program at the current time. Not used in digital satellite broadcasting.
SDT (Service Description Table)	Service description table. SDT describes information regarding a service channel such as service channel name and trusted broadcasting company name.
SDTT (Software Download Trigger Table)	SDTT sends schedule information for software download and the differential data for stored type data broadcasting.
SI (Service Information)	Service information. SI is various information defined for easy program selection. It is defined by the ordinances of the Ministry of Internal Affairs and Communications, and its contents are specified as ARIB standards. In addition to ARIB standard-specific expansion, MPEG-2 PSI is also included.
SI collection/delivery system	This system collects SI from each trusted broadcasting company and configures commonly operated EPG information to transmit commonly operated SI. It also delivers information common among each station, such as NIT.
SI transmission parameter	Retransmission interval value for each interval group. Described in the SI transmission parameter descriptor.
ST (Stuffing Table)	Stuffing table. ST invalidates a table.
STC (System Time Clock)	Reference clock for 27MHz timing in encoders and decoders.
STD (standard)	Standard
TDT (Time and Date Table)	Time and date table. TDT indicates the current date and time. This is not sent in digital satellite broadcasting.
TMCC (Transmission and Multiplexing Configuration Control)	Transmission control signal that carries information such as transmission method, frame structure and TS_id
TOT (Time Offset Table)	TOT indicates the current date and time and specifies the time difference between the actual time and displayed time when the summer time starts. (In digital satellite broadcasting, only TOT is sent and not TDT).
TS (Transport Stream)	Transport stream defined by MPEG system standard (ISO/IEC 13818-1). In digital satellite broadcasting, multiple TSs are included in one transponder and each TS is identified by TMCC signal.
TS_id	Identifier assigned to each TS. This identifier is unique within a network.
UTC (Universal Time Coordinated)	Universal Time Coordinated. UTC is the time commonly used around the world. Defined based on the international agreement.

actual (actual TS, EIT actual)	Actual TS. Table to be sent by actual TS.
basic (schedule basic)	Program information based on the information in commonly operated SI.
bouquet	Bouquet. A collection of services (service channels) provided by a single or multiple trusted broadcasting companies
bslbf (bit string, left bit first)	A bit string in which the leftmost bit is the first bit.
component	Component. An element that comprises an event (program), such as video, audio, text and various data.
component tag	Label that identifies a component stream
current_next_indicator	Current/next indicator. Used for numbering to indicate whether each section is valid "'currently" or valid "in the future.
descriptor	Descriptor. A description area in a table that is used to describe various information.
event	Event. A collection of streams with determined start and end time within the same service (service channel), such as news and drama.
event_id	Event identifier. Event identification number uniquely assigned within a service
extended (schedule extended)	Program extended information based on the transmission information in individually operated SI
following (EITp/f)	EITp/f is chronological information regarding the current event and the next event. The former is called 'present' and the latter is called 'following'.
free_CA_mode	1-bit field that identifies whether the program is "chargeable" of "free". When this bit is 1, it indicates "chargeable" broadcasting. Free_CA_mode has a different meaning in ARIB STD-B10.
index	(Program) index. Added information associated with a program to be used for digest reception and multi-scenario reception, etc.
network	Network. A collection of multiplexed MPEG-2 TSs transmitted by a single delivery system
network_id	Network identification value. One network_id is assigned to BS digital broadcasting.
original_network_id	Original network identification. Identifier unique to each network.
other (other TS, EIT other)	Other TS. Table to be sent by other TS.
payload	Payload. A stream of bytes following the header bytes in a packet.
present (EITp/f)	EIT[p/f] is chronological information regarding the current and next events. The former is called 'present' and the latter is called 'following'.
program_number	Broadcast program number identification. Program_number is equal to service_id.
reserved	Undefined. Indicates that the relevant coded bit stream may possibly be defined by ISO for extension in the future. All reserved bits should be set to "1" unless otherwise defined in the ARIB Standard.
reserved_future_use	Undefined. Indicates that the relevant code bit stream may possibly be defined by ARIB Standard for extension in the future. All reserved_future_use bits should be set to "1" unless otherwise defined.
rpchof (remainder polynomial coefficients, highest order first)	Coefficients of a remainder polynomial. Highest order first.
running status	Indicates the progress of an event, such as "running" or "under suspension".

schedule (EITschedule)	Schedule information regarding events. Arranged in chronological order.
section	A syntax structure used to map SI into the TS packet
section_number	Section number. Enables decoders to rearrange the sections in a given table in original order. In the ARIB Standard, section_number is assigned to each sub-table.
segment	An EITschedule syntax structure consisting of up to 8 sections. A segment contains information on events that will start within 3 hours
service	Service (service channel). A series of scheduled broadcast programs organized by each trusted broadcasting company.
service_id	Service identification. Identifier that identifies each individual service in a network
sub_table	Sub-table. A collection of sections with the same table ID (identifier) and the same table identifier extension.
table	Table. A table consists of multiple sub-tables with the same table ID (identifier).
table_id	Table ID (identifier). table_id defines the table to which the relevant section belongs.
table_id_extension	Table ID (identifier) extension. Used to identify a sub-table.
uimsbf (unsigned integer, most significant bit first)	Unsigned integer whose first bit is the most significant bit
version_number	Version number. When information in a table is changed, a sub-table with the next version number is sent to indicate that new PSI/SI data including updated information is sent.
Adaptation field	Field that has the information (such as PCR) transmission function and stuffing function.
Event relay	Event relay is the function to enable continuous viewing of a program by relaying it among different services.
Event sharing	Event sharing is to specify the same ES_PID for PMTs of multiple services to share the same event among different services.
Free program with content protection	Free program that transmits its contents securely in broadcast signals without customer management, for the purpose of content right protection
Service type	Service type, such as digital TV, digital audio, data broadcasting, and special service
Service list	A list of services with service identification and service type
Sequence header	The sequence header indicates the start of the highest layer (sequence layer) that comprises an MPEG video coded stream.
Series	A collection of programs of the same nature. For example, a series is defined for a collection of drama programs that are separated into multiple events.
Single shift (Character coding control)	Single shift control temporarily calls a single code following this control into the 8-bit code table.
Stuffing	Stuffing is to stuff the remaining part in a TS packet with 0xFF.
Slot	TS and modulation system selection unit. It is an absolute allocation position in a TS compound frame. The position of a slot specifies TS and a modulation system. A slot consists of 204 bytes including the MPEG signal TS packet (188 bytes) and Reed-Solomon error correction code (16 bytes).
Section	Section
Segment	Segment
Chunk	A chunk of data. PNG files take this chunk structure. A chunk consists of data length, data name, data and CRC.

Tier	System in which a contract is made on a basis of an individual program or program group and viewers pay for the program or program group they subscribe to.
Default ES/Default ES group	A component or a group of components that is presented first when a service is selected. The default ES/default ES group is defined with a component tag value.
Transport stream	TS
Partial transport stream	A bit stream obtained by excluding the transport packets which are not related to specially selected one or more programs from the MPEG transport packet
Parental rating	Parental lock based on age. Viewer-recommended minimum age.
Flat	System in which a contract is made on a basis of a service channel and viewers pay for the service channel they subscribe to.
Broadcaster	A trusted broadcasting company or a collection of broadcasting companies operated under a common operation system
Payload	Payload
Pointer field	Field that exists in the payload in a TS packet. This field indicates the number of bytes to the first byte in the first section.
Macro code (Character coding control)	A single code that has an ability to process a sequence of code strings consisting of codes and control codes on behalf of them.
Multi-section	A system to transmit a single TS packet with two or more sections inserted in it.
Multi-view television	A system that transmits multiple video and audio components within a single service and enables switching on a basis of combinations of video and audio components grouped by the broadcasting station.
Locking shift (Character coding control)	Locking shift control calls a collection of codes into the 8-bit code table and constantly keeps it in the table until the collection of codes is replaced by another locking shift.
Temporary storage	Temporarily stores contents on a storage medium for the purpose of time shift viewing.
Layered modulation	Transmission system in which a transmission system that allows transmission of mass data (such as TC8PSK) is used in combination with a transmission system that allows reception even in low C/N (such as QPSK or BPSK)
Individually operated SI	Program information to transmit actual station’s information only in an actual station TS in accordance with the ARIB-SI standard.
Related service	Service system in which programs associated with each other are broadcast in multiple different services
Descriptor	Descriptor
Common fixed color	Color defined as common on the receiver color palette, such as color for logo display
Emergency warning signal	EWS. Signal that is transmitted to assist the reception of disaster-related broadcasting
Emergency broadcasting cut-in	Cut-in news. In emergency situations, the program currently on the air is suspended and a news or relevant program is transmitted instead.
Conditional access broadcasting	Broadcasting using the conditional access system descriptor. Conditional access broadcasting includes chargeable programs, broadcasting using EMM messages, and free programs with content protection.
Empty section	Section in which CRC32 follows the section header and no descriptor is described
Call control (Character coding control)	In 8-bit character coding control, call control calls G0, G1, G2 or G3 to GL or GR.

High layer	In transmission using multiple modulation systems, the high layer uses a modulation system whose multiplicity is high (vulnerable to disturbance). In digital satellite broadcasting, this layer is transmitted in TC8PSK.
Re-transmission interval	Time interval at which the same table is sent repeatedly regardless of whether the content is updated or not
Specification control (Character coding control)	In 8-bit character control, specification control specifies one code set out of a collection of code sets as G0, G1, G2 or G3.
Caption	Video-content related service that superimposes text by laying it over a video broadcast on TV
Identifier	Assigned ID that keeps its uniqueness in a certain range. This is a value that identifies an element within a table or descriptor.
Interval group	A collection of tables transmitted at the same interval. Tables are grouped by table type and EIT[schedule] are further grouped by information span layer.
Output protection	Gives protection to high-speed digital interface output of the contents for which "copy is allowed unconditionally".
Commonly operated SI	Program information to transmit commonly operated information in all TSs in the network simultaneously in compliance with ARIB-SI standard
Transmission frequency	Re-transmission interval
Across-the-board program	Program organized with the same schedule over consecutive days
Single shot program	Program that is not organized as a series or an across-the-board program. Irregular program.
Area code	Code that indicates the area to be placed in the emergency information descriptor for emergency warning broadcasting (ARIB STD-B10 Appendix D)
Low layer	In transmission using multiple modulation systems, the low layer uses a modulation system where the multiplicity is low (robust for disturbance).
Special symbol	So-called Gaiji (external characters). Additional codes placed in a different location from Kanji and alphanumeric characters. The special symbols include signs and composite characters.
Program extended information	Detailed information included in program information that is basically sent in commonly operated SI
Program group index	Provides broadcast program grouping information. The grouping information assists series definition and search.
Program caption	Information or service that supplements program audio with text.
Intra-program index	Provides information to assist selection or search of part of a broadcast program (intra-program event).
Service information	SI
Text superimpose	Caption service provided asynchronously with the main video and audio data, such as flash news, changes in airtime and time tone.
Undecided event	Event whose broadcasting schedule is not decided and content is not fixed. Event for which both start_time and duration are set to all 1.
Chargeable program	Program in which default ES group is subject to be charged.
Reserved word	Fixed terms used in descriptions regarding a program, such as "main cast", "producer" and "story".
Special service	Service provided to be temporarily broadcast in a different channel from the regular service channel. A special service is provided temporarily without the broadcast of the regular service.

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 defined in Part 2 of Volume 1 of ARIB STD-B24 "Data Coding and Transmission Specification for Digital Broadcasting". However, because of the nature of program information, there may be cases where characters that need rights-related and global considerations (such as personal name, place name, and original program title) have to be expressed in EPG or other information disply. JIS level 1 and level 2 defined in ARIB STD-B24 Kanji Set cannot not sufficiently deal with this problem and have a significant disadvantage even for paper media. Hence, a character set with more character types has been demanded. In digital satellite broadcasting, the implementation of features must be defined in accordance with ARIB STD-B24 while taking account of sharedness, compatibility and expandability with receivers that do not support JIS level 3 and 4 (JIS X0213: 2004). Whether receivers should be equipped with JIS levels 3 and 4 Kanji is left as a product planning matter.

In addition, it is decided not to use external characters that ues DRCS because the operation of external characters that use DRCS will be inevitably complicated. Complication is due to the facts that program information of all stations must be simultaneously transmitted in commonly operated TS as commonly operated SI, and that EPG is presentation-free.

4.1 Character Set

The character sets used in SI are as follows. G0, G1, G2 and G3 are called into the 8-bit code table (GL or GR) by call control. In addition, one code set out of a collection of code sets is specified as G0, G1, G2 and G3 by specification control of code sets.

Table 4-1 lists the character sets used in SI.

Table 4-1 Character Sets Used in SI (Code Set)

Character code set	
JIS compatible Kanji Plane 1 (2-byte code)	See "Appendix E". *1
JIS compatible Kanji Plane 2 (2-byte code)	See "Appendix E".
Alphanumeric (1-byte code)	ARIB STD-B24
Hiragana (1-byte code)	ARIB STD-B24
Katakana (1-byte code)	ARIB STD-B24
Special symbol (2-byte code)	See "Appendix E".

*1 Because ARIB STD-B24 allows Kanji set to be allocated on this plane even when JIS X0213:2004 is not used, the Kanji set is set on this plane. However, the additional symbols traditionally defined in sections 90 to 94 should not be allocated on this plane.

* DRCS code set

Not used.

* Macrocode set

Not used.

4.2 Control Code

Table 4-2 lists control codes used in each character string field in a descriptor, and Table 4-3 shows call control. Table 4-4 shows code specification control.

Table 4-2 Control Codes Used in SI

APR	Line feed at operation position
LS1	Call code set 1 (locking shift)
LS0	Call code set 0 (locking shift)
SS2	Call code set 2 (single shift)
ESC	Extended code system
SS3	Call code set 1 (single shift)
SP	Space
MSZ	Specifies middle size (half-width). However, only alphanumeric characters (1-byte codes and 2-byte codes defined in Table 8-2 of ARIB STD-B5) and space (section 1 point 1 0x2121 and 0x20) can be specified.
NSZ	Specifies standard size (full-width)
XCS(CSI)	Defines alternate code string (*1)

*1 XCS is alternate-code-string definition defined as the CSI extended control code (ARIB STD-B24 Volume 1). Essentially, XCS is used to display an alternative when DRCS cannot be displayed. However, if a receiver does not support JIS level 3 and level 4 and cannot display a JIS level 3 or level 4 Kanji code, the receiver displays a code string in the sequence placed immediately after the Kanji code. When displayed normally, the code string from the start to the end of the definition will be ignored.
If a code that is not defined in Table 4-1 or a level 3 or level 4 kanji code is to be sent, an alternate code string defined with XCS must be sent immediately after each character. Therefore, the receiver, displays the alternate character placed immediately after an unsupported character code without displaying the code. At the end of transmission, the transmitting side should restore the original code set.

Code sequence: CSI P1 I1 F

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

Table 4-3 Call Control

		Control details		
Call control	Coding	Code set	Destination	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 Specification Control

Coding	Control details	
	Type of character code set	Specification destination
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**

Table 4-5 lists the termination codes.

Table 4-5 Type and F (Termination Code) of Code Set

Type of code set	Character code set	Termination code (F)
G set	JIS compatible Kanji Plane 1	**03/9**
	JIS compatible Kanji Plane 2	**03/10**
	Alphanumeric	**04/10**
	Hiragana	**03/0**
	Katakana	**03/1**
	Additional symbol	**03/11**

4.3 Initialization

Table 4-6 defines the initialization of each string field in a descriptor for code specification control and call control. Note that item description in an extended event descriptor must be in accordance with the decision below. When item_description_length is 0, it is assumed that the item description of the item name for the previous descriptor_number is continuing, and these two items are not initialized as consecutive strings.

Table 4-6 Initial State of Each Character String Field

Specification	G0	JIS compatible Kanji panel 1
	G1	Alphanumeric character set
	G2	Hiragana set
	G3	Katakana set
Call	**GL**	LS0(G0)
	GR	LS2R(G2)
Character size	–	NSZ

4.4 Use of External Characters (Gaiji)

External characters are not used.

4.5 Maximum length of String

Table 4-7 shows the maximum length of each string field.

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

Field name	Descriptor	Maximum length
Network name	Network descriptor	10 2-byte characters or less and 20 bytes or less
Broadcaster name	Broadcaster name descriptor	10 2-byte characters or less and 20 bytes or less
Company name	Service 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
Fee name	CA contract information descriptor	10 2-byte characters or less and 20 bytes or less
Program name(Note 1)	Short event descriptor	40 2-byte characters or less and 80 bytes or less
Program description	Short event descriptor	80 2-byte characters or less and 160 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 audio type - When two audio types exist per ES, a total of 33 bytes or less with 1 line feed code inserted between audio type names (8 2-byte characters each).
Contents description	Data contents descriptor	Pursuant to the description in Part 1 Volume 3 "Data Broadcasting Operational Guidelines".
Series name	Series descriptor	20 2-byte characters or less and 40 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	100 2-byte characters or less and 200 bytes or less per descriptor. Up to 2 descriptors can be placed for each item name.
Move confirmation message	Link descriptor	80 2-byte characters or less and 160 bytes or less

(Note 1) The program name should be "program title + program subtitle". For long-hour programs, it is strongly recommended to display the program name within 40 characters. However, taking into account that there may be cases where only up to 20 characters can be used due to display limitations, the transmitting side should make arrangements such as putting titles in order of precedence. In addition, for programs shorter than 30 minutes, the program name should be basically displayed within 20 characters.

5 Definition of Tables/Descriptors

Each trusted broadcasting company sends PSI and SI as signals compliant with ARIB STD-B10 in transport streams, which are their broadcasting signals. This document refers to ARIB STD-B10 and MPEG-2 Systems (ITU-T H.222.0, ISO/IEC 13818-1, hereafter referred to as ISO/IEC 13818-1) when necessary.

5.1 Table Types and Identifications

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

PSI uses the following tables specified by ministerial ordinances. They 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 BS Digital Broadcasting

Table name	Functional overview
Program association table PAT (Program Association Table)	Specifies the PID of the TS packet that carries PMT related to each program.
Conditional access table CAT (Conditional Access Table)	Specifies the PID of the TS packet that carries information related to conditional access broadcasting.
Program map table PMT (Program Map Table)	Specifies the PID of the TS packet that carries coded signals comprising each broadcast program.
Network information table NIT (Network Information Table)	Carries information to associate transmission path information (such as modulation frequency) with broadcast programs.

The SI tables are described in 4.1 of Part 1 of ARIB STD-B10, and out of those tables, the ones used in digital satellite broadcasting are listed in Table 5-2.

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

Table name	Functional overview
SDT (Service Description Table)	Carries service-channel related information, such as service channel name and broadcaster name.
EIT (Event Information Table)	Specifies program-related information such as program name, airdate/time and program content description.
TOT (Time Offset Table)	Specifies the current date/time, and the time difference between the actual time and the displayed time when the summer time starts.
ST (Stuffing Table)	Invalidates a table.

* In digital satellite broadcasting, TDT and RST are not sent.

* Information related to BAT, LIT, ERT, ITT and PCAT will be revised in relevant provision documents when a possibility of their use arises in the future .

In digital satellite broadcasting, tables specified in ARIB STD-B10 are used in addition to SI tables. Table 5-3 lists these tables.

Table 5-3 Tables used in BS Digital Broadcasting (Other than SI tables)

Table name	Functional overview
SDTT (Software Download Trigger Table)	Specifies notice information regarding downloaded software, such as service ID, schedule information and the type of the receiver to be updated. See Volume 1 of Part 1 for details.

In digital satellite broadcasting, a broadcaster definition table that is not defined by ARIB STD-B10 is also used. Table 5-4 shows this table.

Table 5-4 SI Table Used in BS Digital Broadcasting (Specific to digital satellite broadcasting)

Table name	Functional overview
BIT (Broadcaster Information Table)	Specifies the broadcaster unit in SI and SI transmission parameters for each broadcaster unit.

Table 5-5 shows the PID values of the transport stream packets that carry PSI/SI sections.

Table 5-5 Assignment of PID to PSI/SI

PID	Table
0x0000	PAT
Indirect specification with PAT	PMT
0x0001	CAT
0x0010	NIT, ST
0x0011	SDT, ST
0x0012	EIT, ST
0x0014	TOT, ST
0x0023	SDTT
0x0024	BIT

Out of the values (table_id) specified in 5.2 of Part 1 of ARIB STD-B10, the ones shown in Table 5-6 are used for values assigned to identify PSI and SI tables used in digital satellite broadcasting.

Table 5-6　Assignment of table_id

table_id	Table
0x00	PAT
0x01	CAT
0x02	PMT
0x40	NIT[actual]
0x42	SDT[actual]
0x46	SDT[other]
0x4E	EIT[p/f actual]
0x4F	EIT[p/f other]
0x50-0x57	EIT[schedule actual basic]
0x58-0x5F	EIT[schedule actual extended]
0x60-0x67	EIT[schedule other basic]
0x68-0x6F	EIT[schedule other extended]
0x72	ST
0x73	TOT
0xC4	BIT
0xC3	SDTT

* For more information on the types of EIT[schedule], see Chapters 10 and 3.

5.2　Descriptor Types and Identifications

The descriptors used in PSI and SI are the ones defined by ministerial notices and the ones defined in 4.2 of Part 1 of ARIB STD-B10. These descriptors are listed in Table 5-7.

Table 5-7　Descriptors Used in BS Digital Broadcasting (Ones defined in ARIB STD-B10)

Descriptor name	Functional overview
Conditional Access Descriptor	Describes the conditional access system and the PID that transmits its ECM/EMM (Indicates information on EMM when placed in CAT, and information on ECM when placed in PMT).
Network Name Descriptor	Describes the network name.
Service List Descriptor	Describes a list of service channels and their identifications.
Stuffing Descriptor	Reserves descriptor space and invalidates descriptors.
Satellite Delivery System Descriptor	Describes physical conditions for a satellite transmission path.
Service Descriptor	Describes the service channel name and its broadcaster name.
Linkage Descriptor	Describes a linkage with other service channels.
Short Event Descriptor	Describes a program name 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 the identifier of each component.
Content Descriptor	Describes the program genre.
Parental Rate Descriptor	Describes the age limit for viewing.
Local Time Offset Descriptor	Describes the time difference between the actual time (UTC+9 hours) and the displayed time when the summer time is practiced.
Layered Transmission Descriptor	Describes the relationship between layered streams in layered transmission.

Digital Copy Control Descriptor	Describes information that controls copy generations in digital recorders and the maximum transmission rate.
Audio Component Descriptor	Describes audio-component related parameters.
Hyper Link Descriptor	Describes links to other programs, the inside of a program, and program-related information.
Target Area Descriptor	Describes the target area.
Data Contents Descriptor	Describes detailed information on data contents.
Video Decode Control Descriptor	Used to control video decoding at a coding system switching point within the same service_id and identify whether or not image transmission is still performed.
CA EMM TS Descriptor	When EMM is transmitted by a specific TS system, this descriptor indicates that specifc TS.
CA Contract Info Descriptor	Describes the type of the conditional access service of a broadcasting-scheduled program (tier/flat) and whether or not viewing or recording reservation is permitted.
CA Service Descriptor	Describes the broadcaster that provides a service for display of automatic display message.
Series Descriptor	Describes series information across multiple events.
Event Group Descriptor	Describes information on grouping of events with the same content and on links for event relay.
SI Parameter Descriptor	Describes SI transmission parameters (interval group and re-transmission interval, etc.).
Broadcaster Name Descriptor	Describes the broadcaster name.
Component Group Descriptor	Describes the component group in multi-view television (MVTV).
Emergency Information Descriptor	Describes information necessary as an emergency warning signal and relevant functions.
Data Component Descriptor	Identifies the data coding system.
Download Content Descriptor	Describes attribute information such as size, type and download ID of content to be downloaded. Descriptor defined in ARIB STD-B21.
System Management Descriptor	Identifies broadcasting/non-broadcasting.
Content Availability Descriptor	Describes control information related to storage and output.

* Out of descriptors defined in ARIB STD-B10, Copyright Descriptor, Country Availability Descriptor, NVOD Reference Descriptor, Time Shifted Service Descriptor, Mosaic descriptor, CA Identifier Descriptor, Partial Transport Stream Descriptor, Network identification Descriptor and Partial Transport Stream Time Descriptor are not be used.

* Descriptors that are not included in Table 5-7 will be revised in relevant provision documents when a possibility of using them in the future arises.

Tag values (descriptor_tag) assigned to descriptors should be in accordance with the provisions in 5.3 of Part 1 of ARIB STD-B10. See Table 5-8.

Table 5-8 Assignment of Tag Values to Descriptors

Tag value	Descriptor name
0x09	Conditional access descriptor
0x40	Network name descriptor
0x41	Service list descriptor
0x42	Stuffing descriptor
0x43	Satellite delivery system 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
0x55	Parental rate descriptor
0x58	Local time offset descriptor
0xC0	Hierarchical transmission descriptor
0xC1	Digital copy control descriptor
0xC4	Audio component descriptor
0xC5	Hyperlink descriptor
0xC6	Target region descriptor
0xC7	Date content descriptor
0xC8	Video decode control descriptor
0xC9	Download content descriptor(Note1)
0xCA	CA_EMM_TS descriptor
0xCB	CA contract information descriptor
0xCC	CA service descriptor
0xFC	Emergency information descriptor
0xFD	Data component descriptor
0xFE	System management descriptor
0xD6	Event group descriptor
0xD7	SI parameter descriptor
0xD8	Broadcaster name descriptor
0xD9	Component group descriptor
0xD5	Series descriptor
0xDE	Content availability descriptor

1: Descriptor defined in ARIB STD-B21

5.3 Use of Identifiers

Table 5-9 shows assignment of various identifiers (uniqueness).

Table 5-9 Use of Identifiers

Identifier	Use (uniqueness)
network_id	One network_id is assigned to BS digital broadcasting. Unique within Japan.
transport_stream_id	Assigned to each TS. Unique within a network.
service_id (=program_number)	Assigned to each service channel. Unique within a network. For more information on the uniqueness of assignment in time direction, see 29.1.
event_id	Assigned to each event. Unique within a service. For more information on the uniqueness of assignment in time direction, see 8.2.1.
broadcaster_id	Assigned to a broadcaster. Unique within an original network.
series_id	Assigned to a series of programs. Unique within a service group that belongs to the same media type within a broadcaster.
component_tag	Assigned to each ES (component). Unique within a service. For more information on the use of component_tag, see Chapter 14.
PID	Assigned uniquely within a TS. Note that a fixed PID value is assigned to PSI/SI other than in PMT (see Table 5-5).

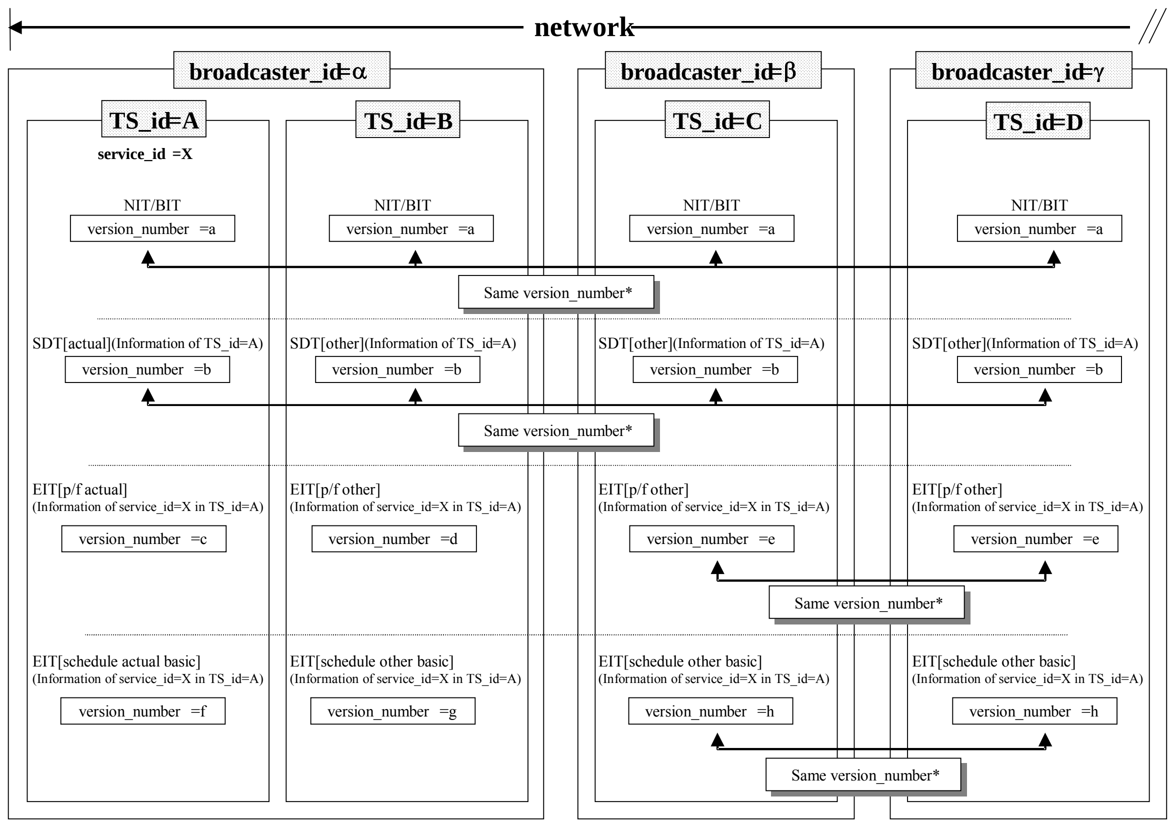
6 Use of Items Common to All Tables

6.1 Use of version_number

6.1.1 Assignment of version_number and Securement of Uniformity

version_number is assigned independently to each sub-table.

NIT, BIT, SDT, EIT[p/f other], and EIT[schedule other] tables sent by each TS are given the same version_number in all TSs as long as these tables' table_id and table_id_extension are the same. However, if multiple TSs are used in the same broadcaster, the version_number of EIT[p/f other] and EIT[schedule other] in a TS in the broadcaster differs from version_number of EIT[p/f other] sent by other TSs. This is because descriptors may be inserted to individually operated SIs, or the transmission spans may differ within the same broadcaster. On the other hand, the version_number of EIT[p/f actual] and EIT[schedule actual] tables is assigned regardless of "other" tables described above.



* The update timing of version_number may differ slightly among TSs due to collection/delivery traffic.

Figure 6-1 version_number between TSs Transmitted Simultaneously

6.1.2 Timing of Update

The update of "other" tables sent by other TSs may be delayed from "actual" tables sent by actual TSs. (This occurs due to the SI collection/delivery transaction time and SI delivery processing time at each trusted broadcasting company. At this moment, the delay time is assumed to be approximately 1 minute.)

○ When SDT is updated

The update of SDT[other] is always delayed from SDT[actual].

○ When EIT is updated

Normally, EIT[actual] and EIT[other] are updated simultaneously, but when the description content is updated due to flexible schedule or other reasons, the update of EIT[other] is delayed.

6.1.3 Change of Version

When version_number is updated or changed, it is incremented by 1. However, version_number may be incremented by 2 or a larger number due to special circumstances such as equipment failure. Also, there is a case where the version is updated even though the content is not changed due to special circumstances such as equipment failure. For EIT[p/f other], version_number may not be incremented even though the content has been changed (See Section 19.2.1).

6.1.4 Version Management for Section

The same version_number is assigned to the sections with the same table_id and table_id_extension within a TS. version_number should not differ among the sections with the same table_id and table_id_extension.

6.2 Use of current_next_indicator

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

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

6.3 Use of running_status

running_status in SDT and EIT should be set to "undefined" (0x0) and sent.

If it is sent with a value other than "undefined" (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 for all the bits.

The receiving end ignores these items regardless of the value of the item.

6.5 Scrambling

In digital satellite broadcasting, all the tables defined in this document should not be scrambled.

7 Change of SI

Each broadcaster can change SI as needed. However, the following points should be taken into consideration because improper change to information that has been sent once may confuse viewers.

- asically, information related to recording and viewing control in EIT should not be changed once it has been defined. This is because the recording function may face some trouble if the status of the receiver at reservation time differs from that at broadcasting time.
- Basically, information related to recording and viewing control in SDT should not be changed because it is used in conjunction with EIT. When this information needs to be changed, it has to be changed so that changed information is consistent with information in EIT[schedule].
- Preferably, information to help viewers understand the content of a program, such as program name and program description should not be changed once it has been defined.

8 Definition of Services and Events

8.1 Definition of Services and Service Types

A service is the so-called programmed channel and defined as a "sequence of programs under the control of a broadcaster which can be broadcast as part of a schedule" (ARIB STD-B10, 3.1).

A service shall be interpreted as defined at the time its service_id is written in the NIT's service list descriptor. The service written in the NIT's service list descriptor should be also written in the SDT. Therefore, if there is a service that is written in the NIT's service list descriptor but not in the SDT, this service can be interpreted as being in the middle of transition such as deletion or addition. Note, however, that this service should also be regarded as a selectable service.

It is possible to transmit a program for which no service is defined on the NIT. In this case, the program not defined by the NIT is registered on the PAT. Furthermore, this program is not regarded as a selectable service. A program for which no service is defined on the NIT is, for example, a test broadcast or a service that can only be selected through a link that has been created with the selected service. In other words, this program cannot be selected through direct operation such as entering a channel number.

Each service must be assigned one service_type to indicate its type. In digital broadcasting, the following service_types should be used:

○ Digital TV

A service that contains at least one video stream and constantly realizes stable reception of programs even on receivers that are not equipped with data broadcasting support functionality.

○ Digital Audio

A service that contains at least one audio stream and constantly realizes stable reception of programs other than digital TV services even on receivers that are not equipped with data broadcasting support functionality.

○ Data Broadcast

A service that is neither a digital TV service nor a digital audio service.

○ Special Service (special video service, special audio service, or special data service)

A service prepared for special broadcasting through a channel other than the scheduled programmed channel. This service is neither used in normal operation nor presented to the viewers.

○ Engineering Service

A service for making corrections to the receiver's software. The coverage of this service ranges from bug-fixes, correction of problems caused by the differences in interpretation with respect to operation between the transmission side and the receiver, the improvement of screen display, to the improvement of response time and operability. It also updates data common to all receivers, such as broadcaster logo data, program genre code list, program property code list, and reserved words. For details, refer to Part 1, Volume 1.

(For the definitions of video and audio streams, refer to Transmission Operation Standard.)

○ Prestorage Data Service

A data broadcasting service designed for prestorage.

For details, refer to Part 1, Volume 3.

○ Bookmark List Data Service

A service for displaying bookmark information saved in the receiver's NVRAM.

For details, refer to Part 1, Volume 3.

8.2 Definition of Events

An event is defined as a "group of elementary broadcast streams with a defined start and end time belonging to a common service, i.e., an individual program such as news and drama," or as "part of a program depending on the operation necessity." (ARIB STD-B10, 3.1) Because the definition of "program" does not exist, events to be defined for broadcast content are left to the judgement of each broadcaster.

An event is interpreted as being set when its event_id appears on the event loop in the EIT. In BS digital broadcasting, multiple EITs exist for all-station SI and each-station SI. An event is enabled at the time when it is written in any one of these EITs.

The following shows the basic principles for setting events.

- ○ Events should not be set to time periods during which a service is not transmitted. This makes it possible to cause all events in a digital TV service to have at least one video stream and one audio stream, and to casue each digital audio service to have at least one audio stream.
- ○ It is not necessary to set continuous events for all the time periods in which a service is transmitted. Even during the transmission of a service (that is, when components exist in the relevant program), it is possible to set a time period in which no event exists.
- ○ It is not possible to set events whose transmission times overlap each other in the same service.
- ○ The specifiable duration of an event shall be 48 hours at maximum and 1 minute at minimum. However, the minimum duration could be less than one minute due to inevitable reasons. However, even in such a case, it is preferable that the events be programmed so that they meet the minimum duration requirement. This can be realized by integrating an event into the neighboring events or by setting the duration of an event as a time period in which no event exists.
- ○ Unlike in CS digital broadcasting, the programmed event schedule is frequently changed due to sudden incidents or accidents in BS digital broadcasting(refer to Chapter 19 "Changing the Event Schedule"). In BS digital broadcasting, flexible program scheduling is therefore prerequisite. To be specific, the program schedule is changed in such a way that the start_time and duration of an event is changed and that an event becomes undecided. The program schedule should be reflected in the EIT immediately after the schedule is determined, but depending on the situation, the event schedule may

be left unfixed for a long period of time.

To set events, the following point should be considered:

Setting an event means not only specifying the broadcasting channel and time and assigning an event_id, but also setting the "broadcast content" of the event. From the viewers' stand point, it can be said that the program content itself, which is assumed from the program title and description, is set to the event. Therefore, transmission of a program with the same event_id but with different content should be avoided as much as possible.

However, each broadcaster should decide how events shall be assigned by referring to the basic principles for defining and setting events (For example, when broadcasting movie programs of the same series with the same event_id in the regular time slot for movie broadcasting).

8.2.1 Reuse of an event_id (uniqueness in the time direction)

The same event_id values should not be assigned to different events nor described in the EIT that is being transmitted within a service. This rule applies even after an event_id value assigned to an event disappears from the EIT when the event description disappears due to event completion or cancellation. This event_id value should not be assigned to another event and written into the EIT for 24 hours after the event end time, which can be calculated from the start_time and duration of the original event described in the EIT (If the start_time and duration of the original event is affected by the change in the previous event caused by flexible program scheduling, the event end time shall be the latest of all possible end times of the original event - the end times before change, during change, and after change.)

Explanation:

The event_id values written into the EIT cannot overlap each other in the same service because each event_id is unique in the service_id of that service. However, it becomes possible after a certain period of time to assign the same value to another event once the previous event has been transmitted and its end time has passed. This is because the event_id value assigned to the event disappears from the EIT. Note that although the event_id diappears from the EIT, if the same event_id is immediately assigned to another event, it becomes difficult for the receiver side to judge whether the original event has been completed normally or become undecided. In the above case, particularly when the previous event (original event) has not been broadcast and has been canceled, reuse of it's the same event_id after an insufficient time interval will result in the malfunction of reserved operations. To prevent such an error, we have set the above rules.

The following describes actual examples.

[Case 1]

Suppose that Event A has the following values: event_id = 0x0010, start_time = August 20 19:00, and duration = 1 hour. This event has been written into the EIT[schedule] since Ausut 13. For Event A, the program will normally start at 19:00 on August 20 and end at 20:00, which is one hour later. The description of Event A will disappear from both EIT[p/f] and EIT[schedule] at the above end time. After the disappearance of the description, the same event_id (0x0010) cannot be used for Event B until 20:00 on August 21. This is because it is prohibited to write the description of Event B on the EIT for 24 hours after the end time of Event A if Eevent B needs to use the same event_id. The point to be considered here is that it becomes possible to write the information of Event B into the EIT at or after 20:00 on August 21 regardless of the start_time and duration of Event B.

[Case 2]

Under the same condition as in Case 1, suppose that Event A disappers from the EIT[schedule] on August 16, which is 4 days prior to the scheduled date without broadcast. Because the end time expected for Event A is used as the reference time, Event B with the same event_id value cannot be written into the EIT until 20:00 on August 21, just as in Case 1.

[Case 3]

Under the same conditions as in Case 1, suppose that the start_time and duration are changed for Event A and these changes are added to the EIT due to flexible program scheduling. The reference time shall be the latest of all possible end times - the end times before change, after change and during change (if the end time is changed multiple times). For example, where Event A changes:

start_time = 19:00 on August 20 and duration = 1 hour

↓

start_time = 20:00 on August 20 and duration = 2 hours

↓

start_time = 20:00 on August 20 and duration = 1 hour

"start_time = 20:00 on August 20 and duration = 2 hours" is the latest of all possible end times. In reality, Event A will end at 21:00 on August 20, but it is not possible to write Event B into the EIT before 22:00 on August 21, which is 24 hours after 22:00 on August 20.

9 BS Digital Broadcasting Transmission Models and Broadcasters

9.1 Network Configuration

Figure 9-1 illustrates an example of TS configuration in the network in BS digital broadcasting.

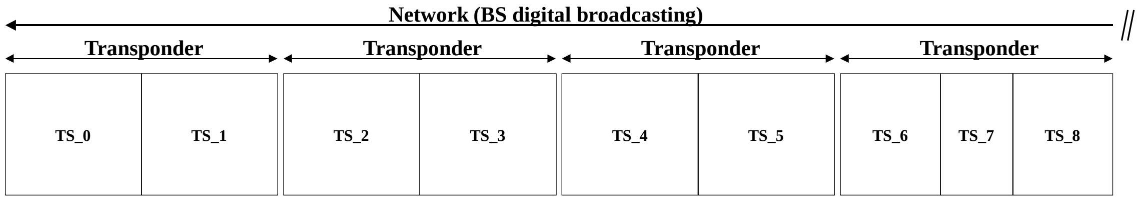


Figure 9-1 Example of TS allocation in the network

According to ARIB STD-B10, a network shall be defined for a group of multiplexed MPEG-2 TSs that are defined for a single distribution system. The network in BS digital broadcasting is identified with the network_id given to BS digital broadcasting.

Each of the transponders operated in the network can transmit multiple transport streams (TSs). Figure 9-1 illustrates an example of a single transponder transmitting two or three TSs.

In a discussion of one particular TS, this TS shall be called "actual TS" (actual_TS) and other TSs in the network shall be called "other TSs" (other_TS). During SI transmission, different table_ids are assigned to the SDTs or EITs (which will be described later) of actual_TS and other_TS. Therefore, SDTs and EITs are transmitted with different table_ids based on whether these tables are included in the currently transmitted TS.

9.2 Media Types

The band for audio and data service transmission is relatively smaller than the band for TV service transmission. Considering the restraints of the transmission bands, operation based on a service_type is required to transmit SI (EIT[schedule]) so as to minimize an impact on the band for SI transmission (refer to Section 13.2). However, since it is undesirable to newly add a service group that performs a separate operation each time a new service_type is introduced in the future, the concept of "media type" that gathers multiple service_types together is introduced in BS digital broadcasting.

There are three media types in BS digital broadcasting. Table 9-1 shows the correspondences between media types and service_types.

Table 9-1 Correspondence table between media types and service_types

Media Type		Corresponding service_type	
Value	Meaning	Value	Meaning
1	TV type	0x01	Digital TV service
		0xA1	Special video service
2	Audio type	0x02	Digital audio service
		0xA2	Special audio service
3	Data type	0xC0	Data service
		0xA3	Special data service
		0xA8	Prestorage data service
		0xAA	Bookmark list data service

Every service_type should belong to only one media type. When a new service_type is added in the future, it shall be added as a service_type that corresponds to any one of the three media types in the above table. Because the above table is not transmitted as a parameter in SI, it is not possible for receivers that have no information of a new service_type to receive SI related to the service of that service_type. But this situation is permitted because inability to receive SI for the relevant service will not pose any problem assuming that the viewers will never access, including selecting, the service of the service_type they have no knowledge of.
It is possible for receivers developed after the addition of a new service_type to receive SI for the relevant service because they have information of the correspondence between the media type and the new service_type. Note that the already defined correspondence will never be changed.

This "media type" concept is introduced to help receivers present program information and perform service selection. In other words, the above media types can be used when receivers perform the so-called media-by-media (video/audio/data) processing. In other words, when a new service_type is defined, it should be categorized into a proper media type according to its media.

9.3 Operation of Broadcasters

A "broadcaster" is a unit of operation for services of individual media types (TV type/audio type/data type) in accordance with the common operation specifications.

In principle, one broadcaster is assigned on one broadcasting company (for operational reasons, the same broadcaster may be assigned to multiple broadcasting companies).

Table 9-2 shows an example of the relationship between broadcasters and TSs

Table 9-2 Example of the relationship between broadcaster and TS

Broadcaster	Media_type			TS
	TV	Radio	Data	
Broadcaster_0	Yes	Yes	Yes	TS_0
Broadcaster_1	Yes	Yes	Yes	TS_1
Broadcaster_2	Yes	Yes	Yes	TS_2
Broadcaster_3	Yes	Yes	Yes	TS_3
Broadcaster_4	Yes	Yes	Yes	TS_4
Broadcaster_5	Yes	Yes	Yes	TS_5
Broadcaster_6	Yes		Yes	TS_6
Broadcaster_7	Yes		Yes	TS_7 / TS_8
Broadcaster_8		Yes	Yes	TS_6
Broadcaster_9		Yes	Yes	TS_6
Broadcaster_10			Yes	TS_6
Broadcaster_11			Yes	TS_6

In the example of Table 9-2, Broadcaster_0 to Broadcaster_5 are broadcasters that operate services of three media types, i.e. TV type, audio type, and data type, and they are assigned different TSs respectively. Broadcaster_6 and Broadcaster_8 to Broadcaster_11 are assigned the same TS, whereas Broadcaster_7 is assigned two TSs.

Each broadcasting company can carry out event-sharing, flexible program scheduling, and series operation for a media type within its broadcaster. For interoperation among services such as event relay, seamless viewing can be realized for services in a broadcaster by associating events in the related services through SI.

A broadcaster can operate one or multiple TSs. A broadcaster can also operate services of different media types.

Receivers can provide broadcaster-specific viewing selection functions by identifying services operated by the broadcaster. They can also provide broacaster-specific viewing selection functions by a media type.

Regarding Table 9-2, Figure 9-2 illustrates a conceptural diagram of broadcasters in relation to TSs. Figure 9-3 also illustrates a conceptual diagram of broadcasters in relation to media types.

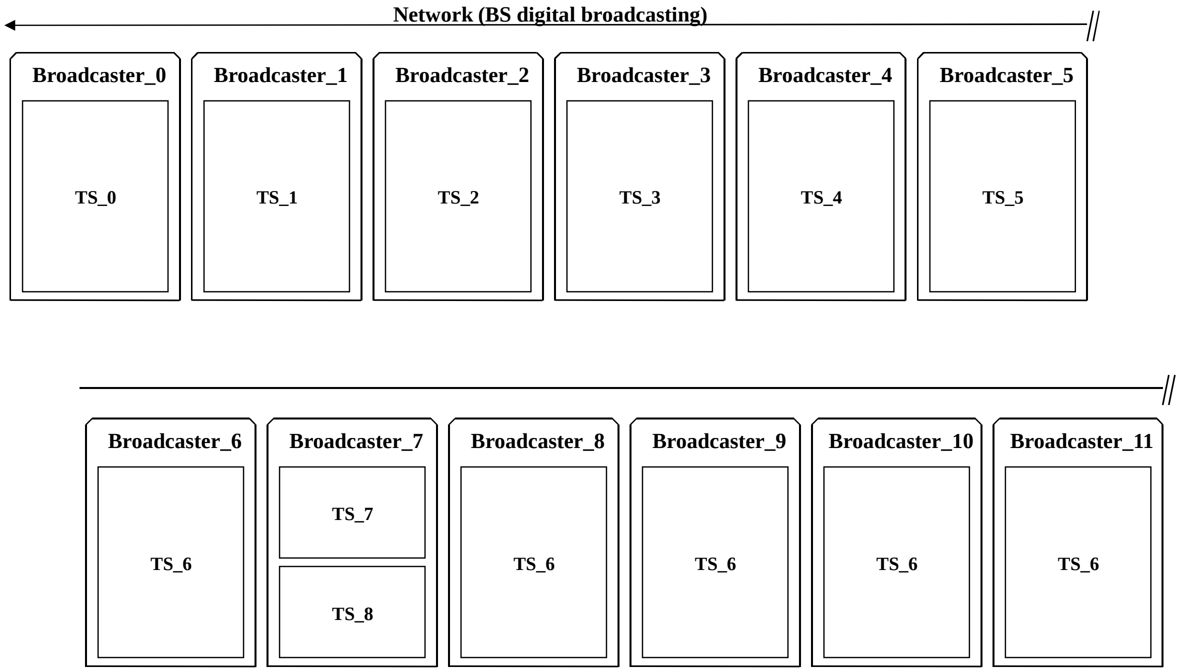


Figure 9-2 Broadcasters and TSs

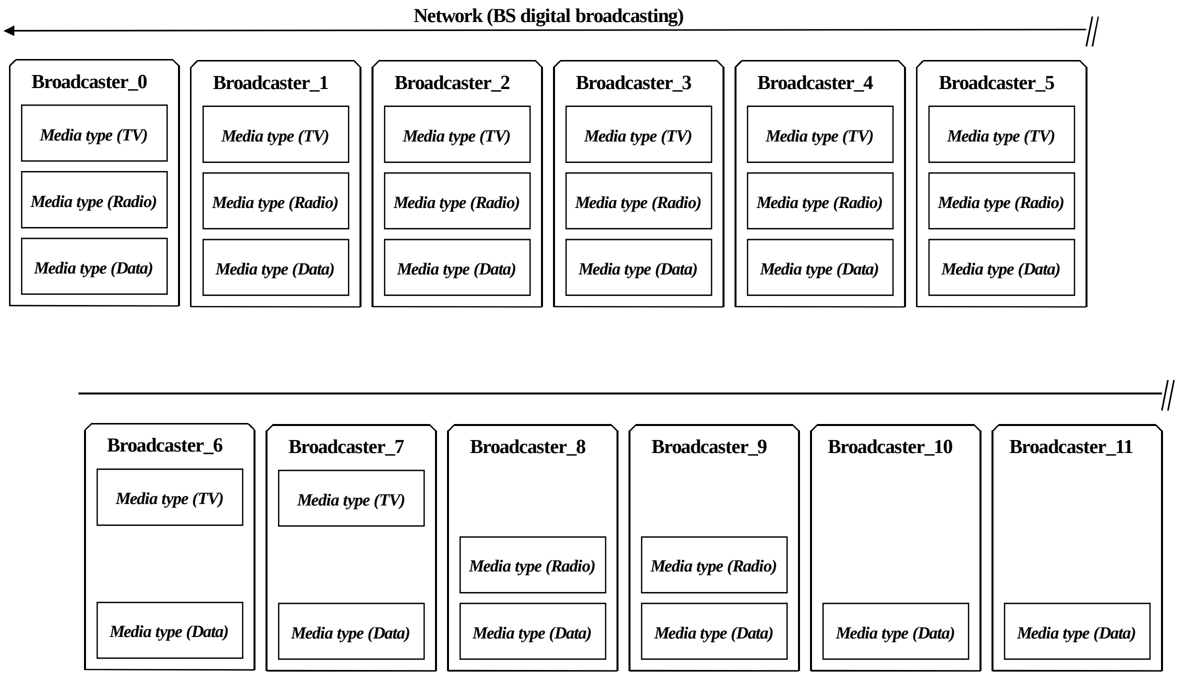


Figure 9-3 Broadcasters and media types

Services operated in a broadcaster constitute groups by media type.

Figure 9-4 shows the relationship between services operated in a broadcaster and media types.

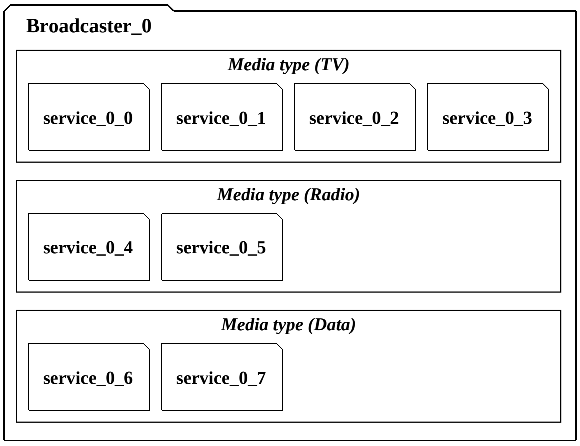


Figure 9-4 Relationship between services operated in a broadcaster and media types

Events are specified for programs within services. According to ARIB STD-B10, an event is defined as a "group of elementary broadcast streams with a defined start and end time belonging to a common service." Figure 9-5 shows an example of events within services.

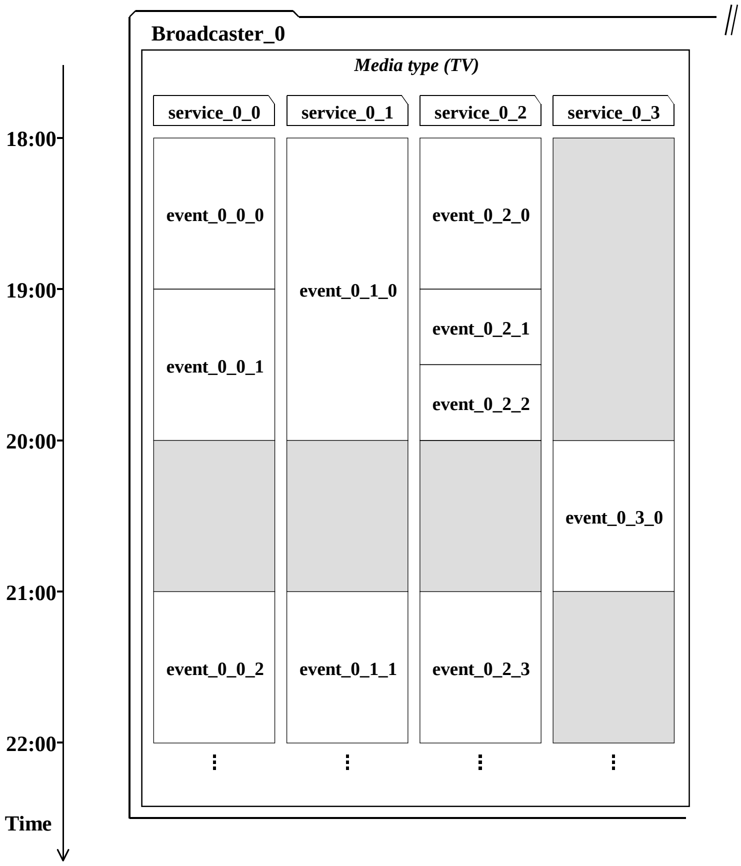


Figure 9-5 Events in a broadcaster

An event can be identified with its event_id uniquely assigned within a service. An event on air at a specific time of day is called "present event" and an event to 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 in ARIB STD-B10 only one present event exists at any given time. In other words, multiple events never run at the same time of day in a single service.
Note that an event may not exist, i.e. the present event or the following event may not exist, in a service. For example, between 20:00 and 21:00 in the above figure, the present event in service_0_0 does not exist, and the following event is event_0_0_2.

As shown in Figure 9-5, in the mono-media type services operated by a broadcaster, if the service in which an event exists differs depending on the time of day, it is possible for receivers to present the information of and provide the selection function of an individual broadcaster. In addition, it is possible to realize service interoperation processing such as event relay between the mono-media type services within a broadcaster.

10 All-Station SI and Each-Station SI

10.1 Concept of All-Station SI and Each-Station SI

[All-Station SI]

PSI/SI transmission operation in digital broadcasting shall comply with ARIB STD-B10 (hereafter referred to as B10), Volume 2, Section 5.1.3.

If each TS transmits only the SI that is specified in B10 as mandatory, the program array information only includes the following: the service information to be operated within a TS, and information about the present and following events to be transmitted in each service.

A receiver cannot obtain information of TSs other than the one it is receiving. In order to obtain information of all the services in BS digital broadcasting, the receiver must receive every TS that transmits services. This operation requires the viewer to stop viewing while the receiver receives eash TS. Therefore, for the receiver to obtain SI of all the services without stopping the viewer from viewing, SI of other TSs in the network should be transmitted to every TS.

For the above reason, in BS digital broadcasting, information of all the services transmitted by the TSs in BS digital broadcasting shall be transmitted as SI so as to constatntly provide the viewer with information of the services and events transmitted by every TS. This SI is defined as All-Station SI.

The same information should be transmitted as All-Station SI, so that the type and quantity of information to be received do not vary depending on the TS that transmits All-Station SI. (Depending on whether the services described in SI are operated by the TS that transmits the SI or by other TSs, the table_id of the table that describes the content becomes different even though the content is the same.)

In order to realize stable reception of information regardless of the TS from which information is obtained, SI should be transmitted at the same table-transmission cycle in all the TSs.

A receiver can obtain information of all services operated in BS digital broadcasting with no regard to which TS it receives. Moreover, All-Station SI can be obtained without interrupting program viewing on the viewer side.

For presentation of event schedule information to the viewers and operation such as reserved viewing and programmed recording, the programs to be described in All-Station SI shall be those to be transmitted during the schedule range, which will be specified separately. In principle, for All-Station SI, broadcasing companies operating BS digital broadcasting shall determine the information of the programs during the schedule range before its transmission.

Note that for the time being, the following specifications shall apply to the operation of SI for independent data broadcasting.

- ○ SI is used as All-Station SI, but participation in such operation is left to the decision of broadcasting companies.
- ○ The EIT_present_following_flag and EIT_schedule_flag of the SDT shall be added correctly according to the actual operation ('1' for enabling the service, and '0' for disabling the service).
- ○ SI can be operated on an individual-service-basis.

[Each-Station SI]

The program array information transmitted by All-Station SI needs to be transmitted in all TSs. Therefore, information to be described should be restricted in size to the minimum because there is a limit on the quantity of information that can be transmitted. On the other hand, it is possible for a broadcasting company to use SI to transmit information of the services it operates using the available space in the band.

It is possible to describe additional information to the target programs described in All-Station SI in Each-Station SI. It is also possible to describe information of the programs to be broadcast for a maximum 32 days after the schedule range in All-Station SI.

A broadcasting company can transmit Each-Station SI of any type and any quantity. However, if the same broadcasting company frequently changes the information to be transmitted due to its broadcasting conditions, such changes not only make it difficult for receivers to operate stably but also confuse the viewers. Therefore, it is mandatory for broadcasting companies to stably operate Each-Station SI.

It is possible that the type and quantity of information to be transmitted may be different among broadcasting companies. It is also possible that TSs may be transmitted at different transmission cycles because a broadcasting company can transmit TSs at transmission cycles of different SI tables in its broadcaster (refer to Section 9.3). Difference in described information in each received TS or service and significant difference in transmission cycles may make it difficult for receivers to maintain stability of operation processing and may hinder viewer convenience. Therefore, it is necessary for receivers to provide information as seamlessly as possible, and it is also necessary for the transmission side to realize stable operation of Each-Station SI.

Broadcasting companies should maintain consistency in their descriptions about a program when writing the information into both All-Station SI and Each-Station SI. Broadcastering companies should also maintain consistentency when copying the information about the target program in Each-Station SI into All-Station SI after a certain period of time.

10.2 Tables and Descriptors Used for All-Station SI

Figure 10-1 shows tables that are used for All-Station SI.

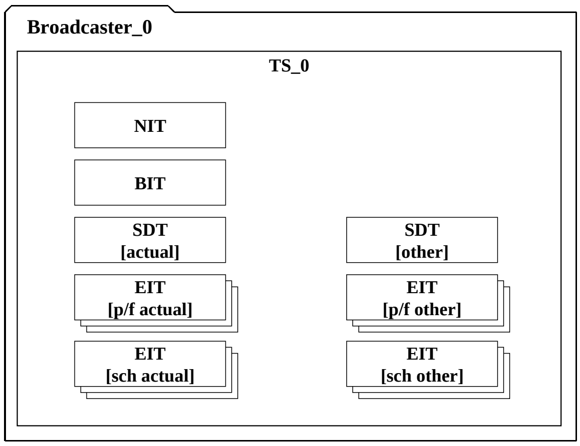


Figure 10-1 Tables Used for All-Station SI

When operating multiple TSs, a broadcasting company should transmit All-Station SI to each TS. Figure 10-2 illustrates an example.

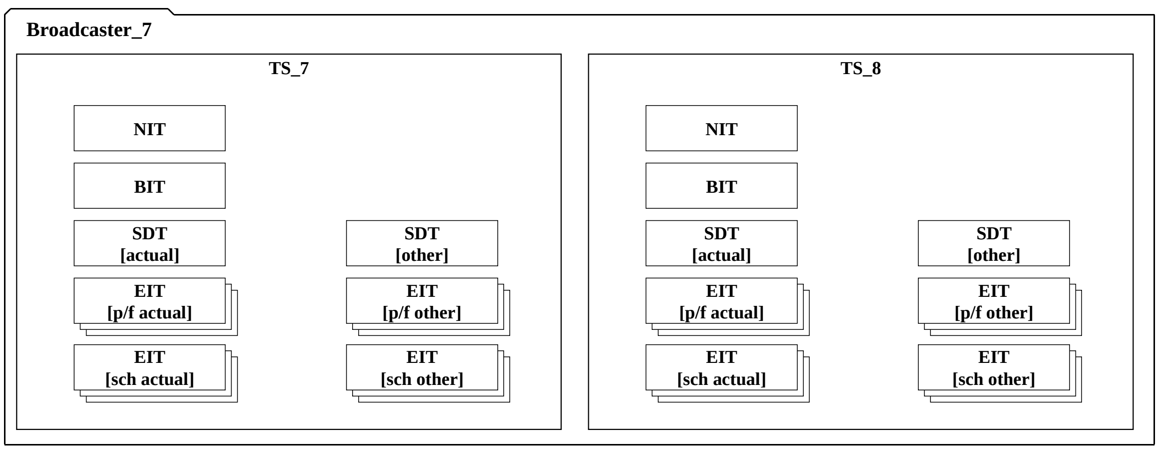


Figure 10-2 Tables Used for All-Station SI (when a broadcasting company operates multiple TSs)

For All-Station SI, its services and event information are transmitted with different table_ids depending on the TS that transmits All-Station SI. However, the content of SI is the same so that identical All-Station SI can be obtained on the receiver side regardless of which TS is received.

Table 10-1 shows tables transmitted in PSI and All-Station SI. Table 10-2 shows descriptors that are placed in tables transmitted in PSI and All-Station SI.

The tables transmitted in All-Station SI include NIT, BIT, SDT, and EIT.

NIT[actual] is described for the BS digital broadcasting network, and only one such table is used in the network. NIT[actual] transmitted by each TS is identical.

BIT is a table where the broadcasters operated in BS digital broadcasting are described, and only one such table is described for the BS digital broadcasting network. Like NIT, all the tables that are transmitted as BIT by TSs are identical.

SDT is a table where the services operated in BS digital broadcasting are described, and the number of this tables is equal to the number of TSs. The table_id for the table where the services operated in the TS that transmits the SDT are described (SDT[actual]) is different from the table_id for the table where other services are described (SDT[other]). However, the content described for each service shall be the same regardless of whether the TS transmits the SDT.

EIT is a table where the events contained in the services that are operated in BS digital broadcasting are described. The number of such tables is equal to the number of services. Like SDT, the table_id for the table where the events that are operated in the TS that transmits the EIT are described (EIT[actual]) is different from the table_id for the table where other events are described (EIT[other]). Like SDT, the content described for each service shall be the same regardless of the TS that transmits EIT.

In addition, the table_id for the table where the present event or the following event is described as the target event (EIT[p/f]) is different from the table_id for the table where the events to be transmitted within a certain period of time are described (EIT[schedule]).

The schedule of the events to be described in EIT[schedule] is expected to vary with the media type. However, for the same media type, the events to be described are the same across TSs.

Table 10-1　Tables transmitted in PSI and All-Station SI

Table_id	Table	Transmission level
0x00	PAT	⦿
0x01	CAT	○
0x02	PMT	⦿
0x40	NIT[actual]	⦿
0x42	SDT[actual]	⦿
0x46	SDT[other]	⦿
0x90	BIT	⦿
0x4E	EIT[p/f actual]	⦿
0x4F	EIT[p/f other]	⦿
0x50 - 0x57	EIT[schedule actual basic]	⦿(Note 1)
0x58 - 0x5F	EIT[schedule actual extended]	×
0x60 - 0x67	EIT[schedule other basic]	⦿(Note 1)
0x68 - 0x6F	EIT[schedule other extended]	×
0x73	TOT	⦿

Transmission level: ⦿: Always transmit
○: Transmit as needed
×: Never transmit

(Note 1) Schedule range is specified for each media type by the SI transmission parameter descriptor placed in BIT (1st_loop) (Chapter 12, D1 to D2, schedule_range field in SI transmission parameter descriptor [refer to Section 31.2.2.1]).

Table 10-2 Descriptors placed in tables that are transmitted in PSI and All-Station SI

Table_id	**Table**	**Descriptor**	**Transmission level**
0x01	CAT	Conditional access descritpor	◎(Note 2)
		CA service descriptor	○(Note 2)
0x02	PMT (1st_loop)	Conditional access descritpor	○(Note 2)
		Digital copy control descriptor	○
		Emergency information descriptor	○
		Content availability descriptor	○
	PMT (2nd_loop)	Conditional access descritpor	○(Note 2)
		Stream identifier descriptor	◎
		Hierachical transmission descritpor	○
		Digital copy control descriptor	○
		Target area descriptor	○
		Video decode control descriptor	○(Note 1)
		Data encoding method descriptor	○
0x40	NIT[actual](1st_loop)	Network name descriptor	◎
		CA_EMM_TS descriptor	○(Note 2)
		System management descriptor	◎
	NIT[actual](2nd_loop)	Service list descriptor	◎
		Satellite distribution system descriptor	◎
0x42 0x46	SDT[actual] SDT[other]	Service descriptor	◎
		Digital copy control descriptor	○
		CA contract info descriptor	○(Note 2)
		Link descriptor	○
0x90	BIT (1st_loop)	SI transmission parameter descriptor	○(Note 2)
	BIT (2nd_loop)	Broadcaster name descriptor	◎
		Service list descriptor	◎
		SI transmission parameter descriptor	○(Note 2)
0x4E 0x4F	EIT[p/f actual] EIT[p/f other]	Short event descriptor	◎
		Component descriptor	◎(Note 3)
		Content descriptor	○
		Parental rate descriptor	○
		Digital copy control descriptor	○
		Audio component descriptor	◎(Note 4)
		Data contents descriptor	○(Note 2)
		CA contract info descriptor	○(Note 2)
		Event group descriptor	○(Note 5)
		Component group descriptor	○
		Series descriptor	○
0x50 - 0x57 0x60 - 0x67	EIT[schedule actual basic] EIT[schedule other basic]	Short event descriptor	◎
		Component descriptor	◎(Note 3)
		Content descriptor	○
		Parental rate descriptor	○
		Digital copy control descriptor	○
		Audio component descriptor	◎(Note 4)
		Data contents descriptor	○(Note 2)
		CA contract info descriptor	○(Note 2)
		Event group descriptor	○(Note 5)
		Component group descriptor	○
		Series descriptor	○

Note. Staff descriptor is placed as needed.

Transmission level: ⦿: Always place
○: Place as needed
×: Never place

(Note 1) May not be placed depeding on the media type.

(Note 2) Multiple descriptors can be placed.

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

(Note 4) At least one must descriptor be inserted for a TV type service or audio media type service.

(Note 5) Multiple descriptors can be placed. However, only one descriptor should be placed within a single event if the group_type value is the same.

10.3 Tables and Descriptors Used for Each-Station SI

Figure 10-3 gives an overview of tables used for Each-Station SI.

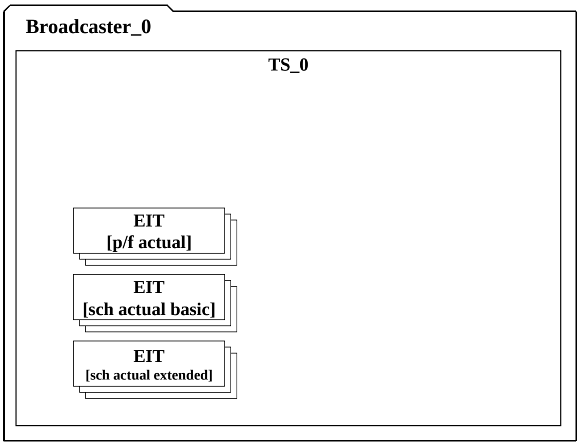


Figure 10-3 Tables used for Each-Station SI

When operating multiple TSs, a broadcaster can transmit information of other TSs that are contained within the broadcaster. Figure 10-4 illustrates an example.

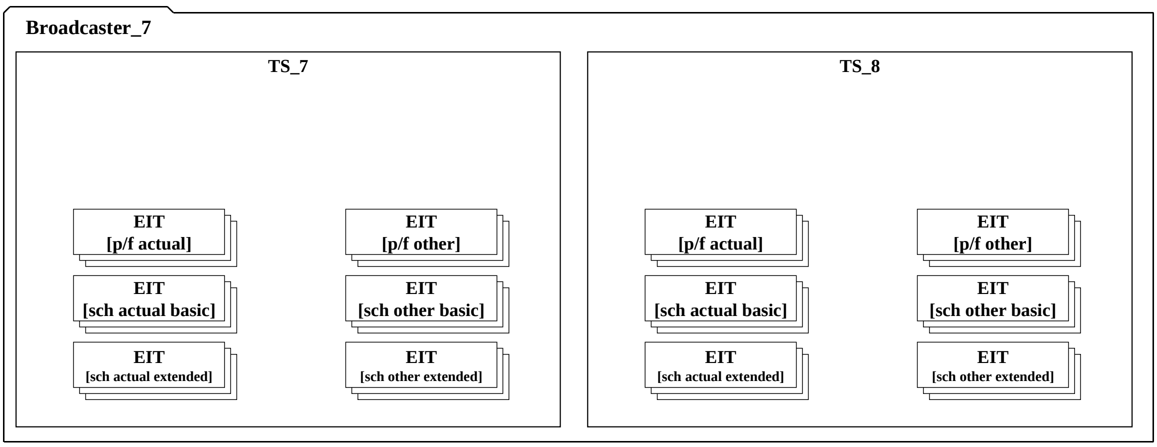


Figure 10-4 Tables Used for Each-Station SI (when a broadcaster operates multiple TSs)

Each-Station SI represents service-related information to be transmitted within a broadcaster.

The following two types of information exist:

1) Supplemental information regarding the events described in All-Station SI
2) Supplemental information regarding events that are not described in All-Station SI

Information 1) should be described in such a way that it is consistent with the descriptions in All-Station SI. Information 2) should be also described so that it is consistent with the descriptions in All-Station SI. In addition, only definitive information should be described in Each-Station SI in order to avoid inconsistency that might arise when the information in Each-Station SI becomes a part of All-Station SI events as time elapses. Uncertain information, which is expected to change as time elapses before being fixed, should not be described.

Each-Station SI can be used to describe and transmit program-related information about services that are contained in the same broadcaster even if they are transmitted in different TSs.

Table 10-3 shows tables transmitted in Each-Station SI. Table 10-4 shows descriptors that are placed in tables transmitted in Each-Station SI.

Table 10-3 Tables transmitted in Each-Station SI

Table_id	**Table**	**Transmission level**
0x4E	EIT[p/f actual]	○(Note 1)
0x4F	EIT[p/f other]	○(Note 2)
0x50 - 0x57	EIT[schedule actual basic]	○(Note 3)
0x58 - 0x5F	EIT[schedule actual extended]	○(Note 3)
0x60 - 0x67	EIT[schedule other basic]	○(Note 2) (Note 3)
0x68 - 0x6F	EIT[schedule other extended]	○(Note 2) (Note 3)

Transmission level: ⊙: Always transmit
○: Transmit as needed
×: Never transmit

(Note 1) This table is always transmitted in All-Station SI, but descriptors in Each-Station SI are placed as needed.

(Note 2) When a group of services that belong to the same media type in a broadcaster is operated across multiple TSs, only the EIT for that group is transmitted. To be exact, the EIT to be transmitted is EIT[p/f(schedule) other_TS actual_broadcaster actual_mediatype].

(Note 3) Schedule range is specified for each media type by the SI transmission parameter descriptor placed in BIT (2nd_loop) (Chapter 12, D4 to D9, schedule_range field in SI transmission parameter descriptor [refer to Section 31.2.3.3]).

Table 10-4 Descriptors placed in tables that are transmitted in Each-Station SI

Table_id	Table	Descriptor	Transmission level
0x4E 0x4F	EIT[p/f actual] EIT[p/f other]	Extended event descriptor	○
		Hyperlink descriptor	○(Note 1)
0x50 - 0x57 0x60 - 0x67	EIT[schedule actual basic] EIT[schedule other basic]	Short event descriptor	○
		Component descriptor	⊙(Note 2)
		Content descriptor	○
		Parental rate descriptor	○
		Digital copy control descriptor	○
		Audio component descriptor	⊙(Note 3)
		Data contents descriptor	○(Note 1)
		CA contract info descriptor	○(Note 1)
		Event group descriptor	○(Note 4)
		Component group descriptor	○
		Series descriptor	○
0x58 - 0x5F 0x68 - 0x6F	EIT[schedule actual extended] EIT[schedule other extended]	Extended event descriptor	○
		Hyperlink descriptor	○(Note 1)

Note. Staff descriptor is placed as needed.

Transmission level: ⊙: Always place
○: Place as needed
×: Never place

(Note 1) Multiple descriptors can be placed.

(Note 2) At least one descriptor must be inserted for a TV media type service.

(Note 3) At least one descriptor must be inserted for a TV type service or audio media type service.

(Note 4) Multiple descriptors can be placed. However, only one descriptor can be placed within a single event if the group_type value is the same.

10.4 Relationship between All-Station SI and Each-Station SI

Figure 10-5 illustrates the relationship between All-Station SI and Each-Station SI.

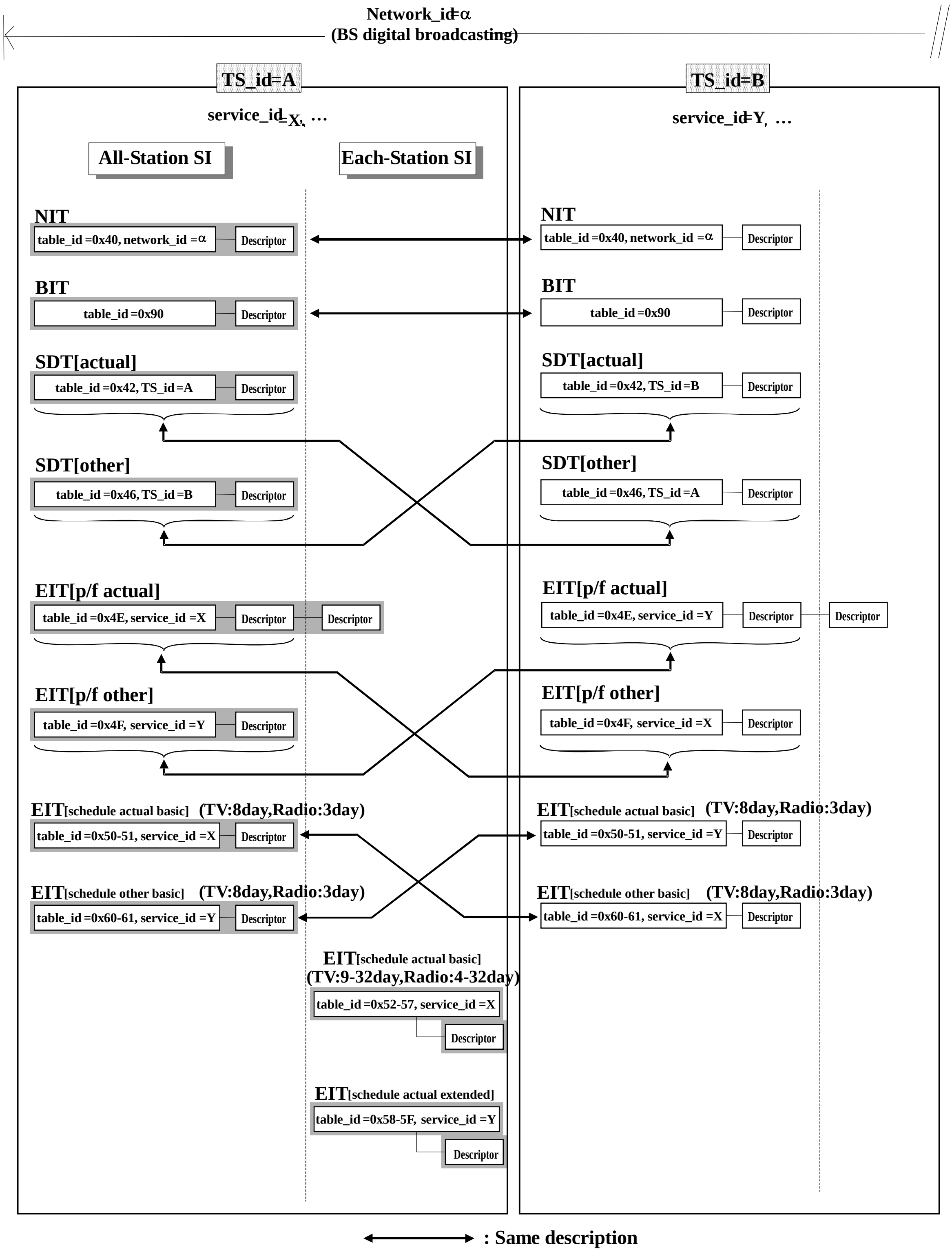


Figure 10-5 Relationship between All-Station SI and Each-Station SI

Figure 10-5 illustrates the case in which there is no other broadcasters involved between the services contained in TS_id=A and TS_id=B.

As shown in the figure, compared with EIT[p/f other], EIT[p/f actual] is transmitted with several descriptors added from Each-Station SI. For example, it is possible to place the extended event descriptor into EIT[p/f actual], not into EIT[p/f other].

For EIT[schedule actual basic], the schedule for 8 days from the present day (the default value for the digital TV service) and the schedule for 3 days from the present day (the default value for the digital audio service) are transmitted in All-Station SI, and the same information is also transmitted from other TSs as EIT[schedule other basic]. However, the schedule after 9 days from the present day (digital TV service) and the schedule after 4 days from the present day (digital audio service) are transmitted only in the local broadcaster as Each-Station SI. Such information is not transmitted by TSs occupied by another broadcaster.

If services of the same media type in the same broadcaster are defined across multiple TSs, Each-Station SI for the services is transmitted in any of these TSs. In other words, EIT[other] is transmitted as Each-Station SI in any of these TSs for which such services are defined (EIT of the relevant services only).

11 TS Packetization and Transmission Rules

This chapter describes the rules to observe when packetizing the sections of PSI/SI and transmitting them as TS packets.

11.1 Detailed Rules for Placement of Sections in TS Packets

Sections should be directly inserted to transport stream packets (TS packets). When a new section starts in a TS packet, its start position may not be the top of the payload in that TS packet because where to start is indicated by the pointer field. The standard specifies that no space is permitted between sections in a TS packet, so it is possible to identify the start position of a new section in a TS packet by measuring the length of the previous section’s continued part counted from the top of that part in the packet. Therefore, only one pointer field is allowed to be used in a TS stream packet.

In TS packets with one PID value, one section should be completed before the start of the next section is granted. Otherwise, it becomes impossible to identify which section header the relevant data belongs to. When the section is completed before the relevant TS packet ends and if it is not convenient to start another section, the stuffing function is used to fill the remaining empty space.

Stuffing is performed by filling the remaining bytes in the TS packet with "0xFF." Therefore, the value "0xFF" should not be used for table identification. If the byte that comes immediately after the last byte of a section is the value "0xFF," the remaining bytes in the TS packet should be filled with bytes consisting of "0xFF." These bytes can be discarded during decoding. Stuffing can also be peformed through the adaptation field function.

For more information on the procedure and function, refer to ISO/IEC 13818-1(5), especially Section 2.4.4 and Annex C.

The above rules are extracted from ARIB STD-B10, Volume 2, Section 5.1.2. They shall be observed also in BS digital broadcasting. Additionally, the following rules shall apply.

[Send operation rules]

○ A section header should not be described over adjacent TS packets.

A section header refers to the first 8 bytes of a section defined in the MPEG2 extended section format. However, uniquely extended section headers are used for each table in SI sections. When a new section is placed into a TS packet, it can be placed continuously immediately after the last byte of the current section. In such a case, the operation rule is such that the part of a new section that includes the extended section header is not described over adjacent TS packets.

The following describes the section header lengths of tables in PSI/SI.

Table 11-1 Section header lengths of tables in PSI/SI (byte)

PAT	PMT	CAT	NIT	BIT	SDT	EIT
8	8	8	8	8	11	14

For example, when placing an EIT section into a TS packet and if 14 or more bytes of space cannot be secured as the remaining area in the TS packet, stuffing should be performed on that area (which is smaller than 14 bytes in size) without placing an EIT section.

11.1.1 Multi-section transmission

A TS packet may be transmitted with two or more inserted sections. (This transmission type is called "multi-section transmission.") As it is clear from the fact that the method to identify the start position of a new section in a TS packet is described in the packetization rules, multi-section transmission is a transmission method within the MPEG system standard. However, because it may require special processing on the receiver side, clarification is made below regarding this method.
Multi-section transmission is not necessarily the operation to be always performed, but from the viewpoint of higher transmission efficiency, that method shall be used for transmission.

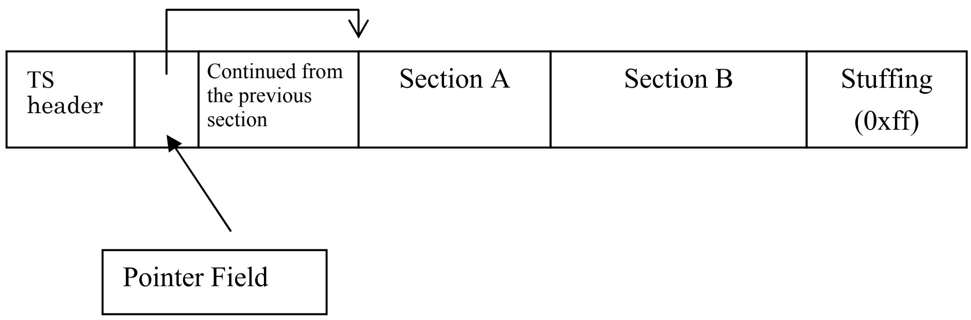


Figure 11-1 Example of placement of sections in TS packet during multi-section transmission

Furthermore, the following rules should apply.

[Send operation rules]

- ○ The tables specified in this standard can be all sent through multi-section transmission. However, the standard does not make multi-sectionalization mandatory for transmission of tables. Note that the multi-section method does not apply to PAT and CAT (their sub-tables do not consist of multiple sections).
- ○ During multi-section transmission, the general packetization rules previously described shall be observed. The pointer field indicates the header of a new section in a TS packet. No space should exist between the end of one section and the beginning of the next section. The header of a section should

not be described over adjacent TS packets. In addition, stuffing is performed on the remaining part at the end of a TS packet as needed.

- A maximum of ten sections can be inserted into a single TS packet for multi-section transmission. (For PMT, since a maximum of four programs can be assigned the same PID [refer to Section 30.1.1], a maximum of four sections can be inserted into a single TS packet.)
- Multi-section transmission can be used for each interval group as needed. For information on interval groups, refer to the descriptions in Section 12.3.
- Multi-sectionalization shall not be performed over two interval groups.
- For the sections of the same sub-table, their total size allowed to be transmitted through multi-sectionalization (sections continuously placed into TS packets) shall be 4KB at maximum. Therefore, for example, it is possible to operate in such a way that sections can be jointed based on "present" and "following" in EIT[p/f] or based on the segment of EIT[schedule]. For the above reason, in BS digital broadcasting, the sections of the same sub-table should not be transmitted at a time interval of 25ms or more. For details on the send operation rules set to ensure receivers' stable reception processing, refer to the descriptions in Section 11.2.

11.2 Details on TS Packet Transmission

In order to stably receive each section data in PSI/SI, transmission shall be based on the following send operation rules at the level of TS packets.

[Send operation rules]

1) For transmission of sections, six or more TS packets with the same PID shall not be sent continuously. This is the rule when all the TS packets, including audio and video, are multiplexed on the transport stream. This rule is applicable regardless of the band for the transport stream itself.
2) For all the TS packets that transmit SI sections, their total size shall not exceed 1Mbit per second. The above size refers to a total size of tables in All-Station SI and Each-Station SI that exist in the same transport stream. Specifically, the SI sections mean NIT, BIT, SDT, EIT, and TOT. This rule does not apply to other tables because no clear operation rule is specified for them at the moment. Whether to include any of such tables in this operation rule or to specify a separate transmission standard shall be determined when its use is finalized.
3) For TS packets that transmit PSI sections with the same PID, their total size shall not exceed 320Kbit per second.
4) For transmission of sections, TS packets with the same PID shall be sent in a range of 4KB plus or minus 100% per 32ms. 4KB per 32ms is a more detailed rule made by redefining the rule of 1Mbit per second for a single PID. This rule presents the model for reception of sections that this standard is based

on. It requires a processing speed at which the 4KB reception buffer and 4KB received section data at maximum can be processed within 32ms. In addition, 4KB plus or minus 100% means that a maximum of 8KB can be transmitted (It is clear that it is a temoporary state considering that the above condition 2) shall be ensured at the same time). Data contained in PSI and SI typically require simultaneous reception processing of multiple data sets. However, by incorporating the reception model described here, it is possible to make the reception settings that suit the reception capability of each receiver.

In BS digital broadcasting, the transmission standard relating to TS packets that transmit PSI/SI tables includes the above four rules only. Receivers shall be designed so as not to have any problem (at least, for processing reception at the level of TS packets) as long as transmission is carried out by observing the above four rules.

11.3 Continuity Counter

The Continuity Counter is normally incremented by one , but its incrementation might be discontinued in the event of a failure. Receivers are required to be capable of handling such a situation during operation.

12 Table (Section) Transmission Operation

This chapter describes the details of table (section) transmission operation.

In Sections 12.1 and 12.2, the general rules of section configuration are described. In Section 12.3 and after, the send operation rules at the level of tables (sections) are described based mainly on the concept of intervals.

12.1 Division into Sections

The following principles shall apply when dividing SI into sections.

[Send operation rules]

- ○ Sections in a sub-table shall be placed in sequence starting from section number 0 up to the section that is designated by the last section number without omission. However, this rule does not apply to EIT[schedule]. In EIT[schedule], all of its segments are described in sequence without omission, whereas for sections that constitute segments, only the necessary ones shall be described in the table. Note that the length of each section in a sub-table is variable.
- ○ For PAT, PMT, and CAT, None of their sub-tables can be divided into multiple sections. In other words, both their section_number field and last_section_number field shall be always be 0 . For NIT and BIT, the table can be divided into multiple sections. For division, the 1st descriptor loop (network loop) shall only be described in the section with section_number=0, and the descriptor loop length shall be 0 in all the other sections.
- ○ If a loop such as a descriptor loop is contained in a table, the loop cannot be divided into sections. For example, EIT can be divided into sections according to each loop containing an event_id field.

12.2 Placement of Descriptors into a Section

The following principles shall apply to the placement of descriptors into an SI/PSI section.

Basically, descriptors can be placed in any order within a descriptor loop. However, the placement rules shall be set only in the following cases.

[Send operation rules]

- ○ When placing multiple identical descriptors, make sure that they are placed in sequence.
- ○ When placing a stream identifier descriptor in PMT, make sure that the descriptor is placed at the top of the descriptor loop.
- ○ When placing multiple extended event descriptors in EIT, make sure that they are placed in order of descriptor numbers. Descriptor numbers should be serialized without omission up to the last descriptor number. The descriptor number always starts from 0x0 in a descriptor loop of EIT.

○ For sub-tables with "other" (SDT[other], EIT[p/f other], and EIT[schedule other basic]) in All-Station SI, the order of descriptors placed in a descriptor loop shall be the same across TSs. However, the order of placement may change between different versions (regardless of whether the content is changed).

12.3 Definition of Interval Groups and Re-transmission Intervals

An interval group is a collection of information transmitted at the same re-transmission interval in each table contained in PSI or SI. Normally, different interval groups are set for each table based on its PID value or table_ids. However, the setting operation is different for EIT[schedule]. For the setting of interval groups for EIT[schedule], refer to Section 13.2.

An interval can be set to each repetition group, and transmission through multi-sectionalization is operated independently based on an individual interval. (For the relationship between units of multi-section transmission and interval groups, refer to 11.1.1.)

A re-transmission interval defined for each interval group views an interval group as a unit. A re-transmission interval does not strictly match the interval at which each section is re-tranmitted. For details, refer to the descriptions in Section 12.6.
The re-transmission interval for an interval group is changeable depending on the change in service configuration. However, for the tables of PSI (PAT, PMT, and CAT), the interval shall not be changed. For details, refer to the descriptions in Section 12.4.
The re-transmission interval may be adjusted when the quantity of data changes (only for inevitable reasons). For details, refer to the descriptions in Section 12.5.
Note that re-transmission interval adjustment and re-transmission interval change require different operations during reception processing.

The subsequent sections describe the operation of interval groups in BS digital broadcasting for PSI, All-Station SI, and Each-Station SI, respectively.

Note that it is assumed that SDTT is operated at the fixed transmission cycle of up to ten minutes.

12.3.1 Interval groups in PSI

For PSI, interval groups are configured for each table.

Table 12-1 Interval groups in PSI

Unit of interval group
PAT
PMT
CAT

12.3.2 Interval groups in All-Station SI

For All Sation SI (including NIT), interval groups are configured for each table. However, separate interval groups are assigned for EIT[schedule]. For the details of the setting of interval groups for EIT[schedule], refer to Section 13.2.

Table 12-2 Interval groups in All-Station SI

Unit of interval group					Parameter (Transmission range)
NIT					
BIT					
SDT	actual				
	other				
EIT	EIT[p/f]	actual			
		other			
	EIT[schedule]	actual	TV type	Basic interval group	D1 (days)
				Extended interval group 1	S1 (segments)
				Extended interval group 2	S2 (segments)
			Audio type	Basic interval group	D2 (days)
				Extended interval group 1	S3 (segments)
			Data type	Basic interval group	D3 (days)
				Extended interval group 1	S4 (segments)
		other	TV type	Basic interval group	D1 (days)
				Extended interval group 1	S1 (segments)
				Extended interval group 2	S2 (segments)
			Audio type	Basic interval group	D2 (days)
			Data type	Basic interval group	D3 (days)
TOT					
SDTT					

(Note) The TV type, Audio type, and Data type in the above table indicate media types.
For information on media types, refer to the descriptions in Section 9.2.
For information on the definitions of interval groups for EIT[schedule], refer to Section 13.2.

Table 12-3 Meaning of parameters (transmission ranges) for interval groups in All-Station SI

Parameter	Meaning
D1	Shows the number of days in TV type, All-Station EIT[schedule].
D2	Shows the number of days in Audio type, All-Station EIT[schedule].
D3	Shows the number of days in Data type, All-Station EIT[schedule].
S1	Shows the number of segments per service that are covered by extended interval group 1 in TV type, All-Station EIT[schedule]. The range covered by extended interval group 1 consists of segments (the number of the segments is represented by S1) including the one that corresponds to the present time.
S2	Shows the number of segments per service that are covered by extended interval group 2 in TV type, All-Station EIT[schedule]. The range covered by extended interval 2 consists of segments (the number of the segments is represented by S2) starting from the next segment from the last segment of extended interval group 1.
S3	Shows the number of segments per service that are covered by extended interval group 1 in Audio type, All-Station EIT[schedule]. The range covered by extended interval group 1 consists of segments (the number of the segments is represented by S3) including the one that corresponds to the present time.
S4	Shows the number of segments per service that are covered by extended interval group 1 in Data type, All-Station EIT[schedule]. The range covered by extended interval group 1 consists of segments (the number of the segments is represented by S4) including the one that corresponds to the present time.

(Note) As it can be judged from the parameter settings, the same parameters are used in both "actual" and "other" tables for each media type when the ranges of interval groups are specified in All-Station EIT[schedule].

12.3.3 Interval groups in Each-Station SI

Basically, interval groups are configured for each table in Each Sation SI. However, separate interval groups are assigned to EIT[schedule]. For details on the setting of interval groups for EIT[schedule], refer to Section 13.2.

Table 12-4 Interval groups in Each-Station SI

<table>
<tr><th colspan="4">Repetition rate group</th><th>Parameter (Transmission range)</th></tr>
<tr><td rowspan="9">EIT[schedule]</td><td rowspan="3">basic</td><td colspan="2">TV type</td><td>D4 (days)</td></tr>
<tr><td colspan="2">Audio type</td><td>D5 (days)</td></tr>
<tr><td colspan="2">Data type</td><td>D6 (days)</td></tr>
<tr><td rowspan="6">extended</td><td rowspan="2">TV type</td><td>Basic interval group</td><td>D7 (days)</td></tr>
<tr><td>Extended interval group 1</td><td>S5 (segments)</td></tr>
<tr><td rowspan="2">Audio type</td><td>Basic interval group</td><td>D8 (days)</td></tr>
<tr><td>Extended interval group 1</td><td>S6 (segments)</td></tr>
<tr><td rowspan="2">Data type</td><td>Basic interval group</td><td>D9 (days)</td></tr>
<tr><td>Extended interval group 1</td><td>S7 (segments)</td></tr>
</table>

Table 12-5 Meaning of parameters (transmission ranges) for interval groups in Each-Station SI

Parameter	Meaning
D4	Shows the number of days in TV type, Each-Station EIT[schedule basic].
D5	Shows the number of days in Audio type, Each-Station EIT[schedule basic].
D6	Shows the number of days in Data type, Each-Station EIT[schedule basic].
D7	Shows the number of days in TV type, Each-Station EIT[schedule extended].
D8	Shows the number of days in Audio type, Each-Station EIT[schedule extended].
D9	Shows the number of days in Data type, Each-Station EIT[schedule extended].
S5	Shows the number of segments per service that are covered by extended interval group 1 in TV type, Each-Station EIT[schedule extended]. The range covered by extended interval group 1 consists of segments (the number of the segments is represented by S5) including the one that corresponds to the present time.
S6	Shows the number of segments per service that are covered by extended interval group 1 in Audio type, Each-Station EIT[schedule extended]. The range covered by extended interval group 1 consists of segments (the number of the segments is represented by S6) including the one that corresponds to the present time.
S7	Shows the number of segments per service that are covered by extended interval group 1 in Data type, Each-Station EIT[schedule extended]. The range covered by extended interval group 1 consists of segments (the number of the segments is represented by S7) including the one that corresponds to the present time.

12.4 Interval Change and Default Re-transmission Interval

The re-transmission intervals for each interval group in All-Station SI may be reviwed when the configurations of services are significantly changed (which is rare) such as when the BS-5 service launches. For Each-Station SI, each broadcaster shall be allowed to change re-transmission intervals according to its own transmission band (which also rarely happens). In order to allow the changes described above, the current re-transmission intervals for each interval group shall be transmitted as SI data (SI transmission parameter descriptor in BIT). (For details, refer to "SI transmission descriptor" in Sections 31.2.2.1 and 31.2.3.3.)

The following describes the range of interval change for each interval group in SI and default intervals. The range of interval change means an allowed range in which the interval value can change. This rage is assigned to each interval group. Each interval group must be always transmitted within this interval range. The defaut re-transmission intervals in All-Station SI are defined as of now to support BS digital broadcasing when it starts. These default re-transmission intervals have influence on how SI parameter transmission descriptors are described in BIT (for details, refer to Section 31.2.2.1). The default re-transmission intervals in Each-Station SI should be understood as recommended values that are most likely to be used. Each broadcaster can freely set the re-transmission intervals in Each-Station SI.

Table 12-6 Ranges of interval change for each interval group and default intervals in All-Station SI

<table>
<tr><th colspan="4" rowspan="2">Interval group</th><th rowspan="2">Parameter</th><th colspan="2">Range of interval change</th><th rowspan="2">Default interval (sec.)</th></tr>
<tr><th>Min. (sec.)</th><th>Max. (sec.)</th></tr>
<tr><td colspan="4">NIT</td><td></td><td>5</td><td>20</td><td>10</td></tr>
<tr><td colspan="4">BIT</td><td></td><td>5</td><td>20</td><td>10</td></tr>
<tr><td colspan="4">SDT[actual]</td><td></td><td>1</td><td>5</td><td>3</td></tr>
<tr><td colspan="4">SDT[other]</td><td></td><td>5</td><td>20</td><td>10</td></tr>
<tr><td colspan="4">EIT[p/f actual]</td><td></td><td>1</td><td>3</td><td>3</td></tr>
<tr><td colspan="4">EIT[p/f other]</td><td></td><td>5</td><td>20</td><td>10</td></tr>
<tr><td rowspan="12">EIT[schedule]</td><td rowspan="7">actual</td><td rowspan="3">TV type</td><td>Basic interval group</td><td>D1</td><td>60</td><td>360</td><td>180</td></tr>
<tr><td>Extended interval group 1</td><td>S1</td><td>5</td><td>20</td><td>10</td></tr>
<tr><td>Extended interval group 2</td><td>S2</td><td>10</td><td>30</td><td>10</td></tr>
<tr><td rowspan="2">Audio type</td><td>Basic interval group</td><td>D2</td><td>60</td><td>360</td><td>180</td></tr>
<tr><td>Extended interval group 1</td><td>S3</td><td>5</td><td>20</td><td>20</td></tr>
<tr><td rowspan="2">Data type</td><td>Basic interval group</td><td>D3</td><td>60</td><td>360</td><td>360</td></tr>
<tr><td>Extended interval group 1</td><td>S4</td><td>5</td><td>20</td><td>20</td></tr>
<tr><td rowspan="5">other</td><td rowspan="3">TV type</td><td>Basic interval group</td><td>D1</td><td>60</td><td>360</td><td>180</td></tr>
<tr><td>Extended interval group 1</td><td>S1</td><td>5</td><td>20</td><td>10</td></tr>
<tr><td>Extended interval group 2</td><td>S2</td><td>10</td><td>60</td><td>20</td></tr>
<tr><td>Audio type</td><td>Basic interval group</td><td>D2</td><td>60</td><td>360</td><td>180</td></tr>
<tr><td>Data type</td><td>Basic interval group</td><td>D3</td><td>60</td><td>360</td><td>360</td></tr>
<tr><td colspan="5">TOT</td><td>5</td><td>5</td><td>5</td></tr>
<tr><td colspan="5">SDTT</td><td></td><td></td><td>600</td></tr>
</table>

Table 12-7 Paramters indicating ranges covered by interval groups in All-Station EIT[schedule].

Parameter	Allowed range of parameter change		Default
	Minimum	Maximum	
D1	8 days	8 days	8 days
D2	2 days	8 days	3 days
D3	2 days	8 days	2 days
S1	3 segments	3 segments	3 segments
S2	0 segment	21 segments	13 segments
S3	0 segment	24 segments	8 segments
S4	0 segment	24 segments	0 segment

(Note) If the media type is TV, the number of days shall be fixed at eight, and the number of segments shall be fixed at three for extended interval group 1. The number of segments is fixed at three because it is preferable to shorten the acquisition time of program information that is existent within nine hours. This allows the program schedule list to display necessary program information.

Table 12-8 Ranges of interval change for each interval group and default intervals in Each-Station SI

Interval group				Parameter	Range of interval change		Default interval (sec.)
					Min. (sec.)	Max. (sec.)	
EIT[schedule]	basic	TV type		D4	60	360	180
		Audio type		D5	60	360	180
		Data type		D6	60	360	360
	extended	TV type	Basic interval group	D7	60	360	180
			Extended interval group 1	S5	10	30	20
		Audio type	Basic interval group	D8	60	360	180
			Extended interval group 1	S6	10	30	20
		Data type	Basic interval group	D9	60	360	360
			Extended interval group 1	S7	10	30	20

Table 12-9 Paramters indicating ranges covered by interval groups in Each-Station EIT[schedule].

Parameter	Allowed range of parameter change		Default
	Minimum	Maximum	
D4	Setting ranges for Each-Station EIT[schedule basic] are made into patterns. For D4 (TV), 15 days/22 days/32 days For D5 (Audio), 8 days/15 days/22 days/32 days For D6 (Data), 8 days/15 days/22 days/32 days Choice is made broadcaster by broadcaster. Refer to sections 31.2.3.3 and 13.2.2.		
D5			
D6			
D7	Setting ranges for EIT[schedule extended] are made into patterns. The same as the ranges for All-Station EIT[schedule] (D1, D2, and D3), or the same as the ranges for Each-Station EIT[schedule] (D4, D5, and D6). Choice is made broadcaster by broadcaster. Refer to sections 31.2.3.3 and 13.2.2.		
D8			
D9			
S5	0 segment	24 segments	3 segments
S6	0 segment	24 segments	3 segments
S7	0 segment	24 segments	0 segment

(Note) Each broadcaster can independently configure Each-Station EIT[schedule]. However, multiple patterns are defined for parameter ranges to ensure consistency among broadcasters. These patterns must be used. In other words, broadcasters are not allowed to freely specify the above parameters. For details, refer to Section 13.2.2.

Note that , intervals shall not be changed in PSI. The following shows the re-transmission intervals for tables in PSI.

Table 12-10 Re-transmission intervals in PSI

Interval group	Re-transmission interval (sec.)
PAT	0.1
PMT	0.1
CAT	10

12.5 Interval Adjustment

Normally, tables in PSI/SI are transmitted at re-transmission intervals defined for interval groups. However, the re-transmission intervals may need to be slightly adjusted in order to handle changes in data quantity, which may occur depending on the time of a day. (Typically, the SI data quantity must be carefully specified when the data is created. This prevents the data quantity from varying devepnding on the time of a day. Nevertheless, data quantity may vary for inevitable reasons. For example, it may vary if the data quantities of events are different from one another in EIT[p/f], or when the event schedule is altered.)

The following describes adjustment ranges for re-transmission intervals in the above cases. Receivers must observe the send operation rules described below and should be designed to avoid any reception problems in the above cases.

[Send operation rules]

- ○ The re-transmission intervals set for each interval group can be adjusted within 10% above or below the current value in tables defined in PSI or SI. For example, if the re-transmission interval is set to 3 seconds in EIT[p/f actual] due to the factors such as the transmission data quantity the interval can be adjusted from 2.7 to 3.3 seconds as needed.
- ○ Interval adjustment shall be always performed separately for each interval group. For details, refer to the descriptions in Section 12.7.

12.6 Transmission Interval in Units of Sections

Re-transmission intervals set for each interval group only cover a wider range. These intervals do not respresent the transmission intervals of individual sections in interval groups. The transmission interval of an identical section may vary significantly due to reasons such as fluctuated transmission in an interval group (for details on SI transmission in an interval group, refer to the descriptions in Section 12.7) and behaviors when data is updated. Note that transmission intervals of sections, which affect a receiver’s timeout setting and are thus important, shall be operated according to the following rules:

[Send operation rules]

- ○ A tansmission interval of a section shall be at maximum twice the length of the re-transmission interval set for each interval group. The transmission interval of a section can be used for the timeout setting for receivers because it can be considered to be the period of time the transmission of the desired section is secured. For example, a section belonging to an interval group whose re-transmission interval is set to 10 seconds will be certainly transmitted in 22 seconds (calculated by adding 10% to the re-transmission interval and then multiplying it by 2).

12.7 Details of SI Transmission in an Interval Group

Within the range of a re-transmission interval set for each inerval group, SI shall be transmitted according to the following rules and guidelines.

[Send operation rules]

- ○ In an interval group, its re-transmission interval shall not be changed individually (for each sub-table, for example). When the re-transmission interval needs to be changed for adjustment by adding or subtracting 10%, the re-transmission interval shall not be independently adjusted for each sub-table, but it shall be collectively adjusted based on interval groups.

[Send operation guidelines]

- ○ In an interval group, section data shall be transmitted after it is distributed within the range of the set interval. In an interval group, sections of the same sub-table up to 4KB can be transmitted through multi-section packets. Therefore, section data is not always distributed evenly within a section. However, it is preferable to transmit section data after it is distributed evenly within a section when the size of a multi-section is at maximum (4KB).
- ○ Multiple sections that constitute a sub-table shall be always re-transmitted in the same order within an interval group. For example, suppose that a sub-table consists of four sections from section number 0 to 3. If the sections are transmitted in order of 1, 3, 2, and 0, they shall be re-transmitted next time in order of 1,3,2, and 0. The follwing figure shows this operation:

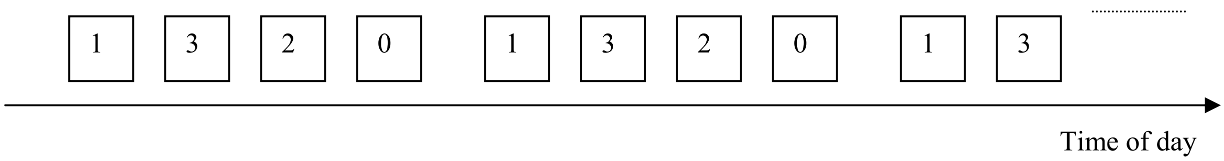


Figure 12-1 Example of section_number transmission operation (sequence) in an interval group

However, this re-transmission order may not be strictly followed when the placement of sections is updated in interval groups in EIT[schedule], or when other data is updated. When reception operation is performed based on the order of transmission of sections in an interval group, receivers must be able to handle this possbile order discrepancy.

In principle, the transmission operation shall be performed in increasing order of the section number. However, reception operation assuming such a rule shall be avoided because the transmission order may not be always strictly followed (the above figure shows an example where this rule is not observed).

12.8 Sub-Table Update Rules

The following rules shall be observed when updating sub-tables. Detailed transmission methods other than described below depend on the transmission system.

[Send operation rules]

- New and old versions should not be mixed together. After one section in the same sub-table is updated, sections of the old version in that sub-table will not be transmitted. This rule applies when sections are used by more than one different repetition rate groups in the same sub-table such as EIT[schedule].
- Updating in the middle of a re-transmission interval is possible. In such a case, the transmission interval of an identical section may become shorter than the re-transmission interval.
- When the sub-table is updated, the tansmission interval of an identical section (section with the same section number) shall not exceed the interval that is twice the length of the re-transmission interval.

The following figure is an example when a sub-table is updated, showing that during update of a sub-table that is composed of four sections from section 0 to 3, it is possible to start transmitting a sub-table of the new version before completion of transmission up to section 3. In this case, section 0 and 1 are transmitted at an interval shorter than the re-transmission interval. Section 2 and 3 are transmitted at an interval longer than the re-transmission interval. The last send operation rule described above means that even in this situation, the transmission interval of section 2 or 3 shall not exceed the interval that is twice the length of the re-transmission interval.

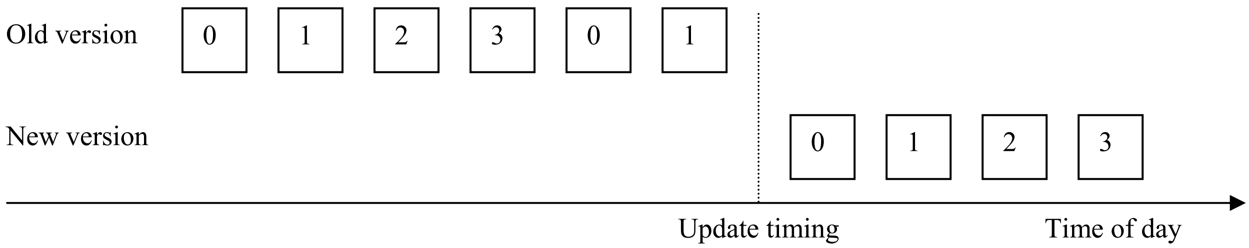


Figure 12-2 Example of section_number transmission operation when a sub-table is updated

12.9 Updating Tables

Table 12-11 shows update factors and update schedules for tables.

Table 12-11 Update factors and update schedules for tables

Table	Major update factors	Update schedule	Notes
PAT	- Broadcasting of a service stopped/resumed	Irregular	PID for PMT hardly changed.
PMT	- Component configuration changed - Copy control/conditional access changed - When hierarchical transmission is performed (hierachical transmission descriptor) - When Emergency Warning Signal is broadcast (emergency information descriptor)	Irregular Frequent updates may happen at the level of an individual event or lower.	
CAT	- CA system added/deleted - PID for the stream to transmit EMM/EMM message changed.	Nearly no update.	Can be triggered by auto-display messages.
NIT	- Service added/deleted/moved - TS configuration changed	Nearly no update.	
BIT	- Service added/deleted/moved	Nearly no update.	Tables are not updated, but addition/deletion on a sub-table basis may happen that is triggered by addition/deletion of a broadcaster. (Very rare)
SDT	- Service added/deleted/moved - Service name/service broadcasting company name changed	Nearly no update.	For SDT, the update frequency can become higher due to the operation of a special service (EIT[p/f] flag turned ON/OFF). The frequency depends on the operation by each broadcasting company.
EIT [p/f]	- When an event starts/ends. - When a programmed schedule of events is changed.	Basically updated on an event basis.	
EIT [schedule]	- At 00:00 every day. - When a programmed schedule of events is changed. - When other information is changed.	Basicaly updated once every day.	Assumed that the closer to 00:00 the present time is, the higher the update frequency will be.

13 EIT Transmission Operation

13.1 Basic Model for EIT Transmission Operation

Unlike CS digital broadcasting, BS digital broadcasting does not involve subcontracted common operation for concentrating the transmission of EITs for all events across all services on the specific TS (promo-transponder). In principle, each broadcasting company shall transmit SI information for its own broadcasting services to its actual TS.

However, viewer convenience must also be ensured through functions such as stable EPG display and reservation operation on the receiver. Therefore, SI information regarding each other's services is transmitted equally to all the TSs as All-Station SI, even though that is operated in a certain framework. (For details, refer to Section 10.1.)

The so-called Distribution Center to collectively manage All-Station SI is operated so as to realize stable transmission of All-Station SI. However, to ensure that the responsibility for the content of information to be transmitted rests on the broadcasting company that created such content, its operation is based on the following principles.

- ○ Each broadcasting company shall create its local information on its own (up to the level of section format).
- ○ Information shall never be modified by Distribution Center or others.

Figure 13-2 illustrates a flow of EIT including Distribution Center as a model. Note that this figure is a conceptual diagram intended to describe EIT transmission operation, and not a figure that describes the configuration of the actual transmission facility.

The setting conditions for Figure 13-2 are as follows:

- ○ Broadcaster-0 is composed of broadcasting company-A only, and broadcasting company-A operates a digital TV service and a data service by using the two TSs: TS-0 and TS-1.
- ○ Broadcaster-1 is composed of broadcasting company-B and broadcasting company-C, and they operate an audio service together by using TS-0.

13.1.1 Distribution Center

From the program schedule information database, Distribution Center generates EITs for All-Station SI to be broadcast via its local broadcaster.

To be specific, Distribution Center generates EIT[p/f other] and EIT[schedule other basic]. EIT[p/f other] describes programs with the start time included in a period of 24 hours on the following day. EIT[schedule other basic] describes programs with the start time tat is included in the time frame from 00:00 on the following day to the last day of the time period specified for each media type (TV type: D1, Audio type: D2, and Data type: D3).

Each broadcaster performs the following before the end of day.

- Sends generated EIT for All Sation SI to Distribution Center through the network.
- After the EITs of all broadcasters are collected in Distribution Center, receives all of them from Distribution Center.

13.1.2 EIT[p/f] transmission operation

As long as services exit, EIT[p/f] is always transmitted for each service, except of special services and services whose media type is data.

Data type services include services that transmit EIT[p/f] and services that do not transmit it, and that is the same as for the EIT[schedule basic] transmission operation. From the EIT_present_following_flag in SDT, it is possible to identify whether a service is the one that transmits EIT[p/f]. Once the service is determined as the one that transmits EIT[p/f], it stably transmits EIT[p/f]. Each table in EIT[p/f] is composed of a single section. Except for inevitable reasons such as interruption by an emergency program, it correctly describes information of the present/following programs.

When a service is not transmitted, both "present" and "following" sections may be empty. An empty section is a section in which CRC32 comes after its 14-byte section header and no descriptor is placed. "Duration" may be undefined for "present" and either of "start_time" and "duration" or both may be undefined for "following". When both "start_time" and "duration" are undefined, the event becomes undecided. Such an undecided event shall be transmitted only in EIT[following other] of the event whose broadcaster is the same as the one in EIT[following actual] (refer to Section 19.1.1 Undecided events). Because undecided events are not sent to Distribution Center, they never occur in EIT[following other] of another broadcaster's event.

The operation of EIT[p/f] over no-program-transmission hours, such as after midnight, is explained by using Figure 13-1. It illustrates an example where the next scheduled program Program-B starts from 02:00 after Program-A ends at 01:00. The basic operation involves writing information about Program-B in EIT[f] while Program-A is transmitted (Pattern 1). However, depending on the transmission facility, EIT[f] may become an empty section (Pattern 2). In Pattern 2, EIT[f] for no-program-transmission hours remains as an empty section. However, information about Program-B must be described in EIT[f] at least 30 seconds before the start time of Program-B and then transmitted.

Note that the off-air hours described above do not necessarily mean no-transmission of audio/video components.

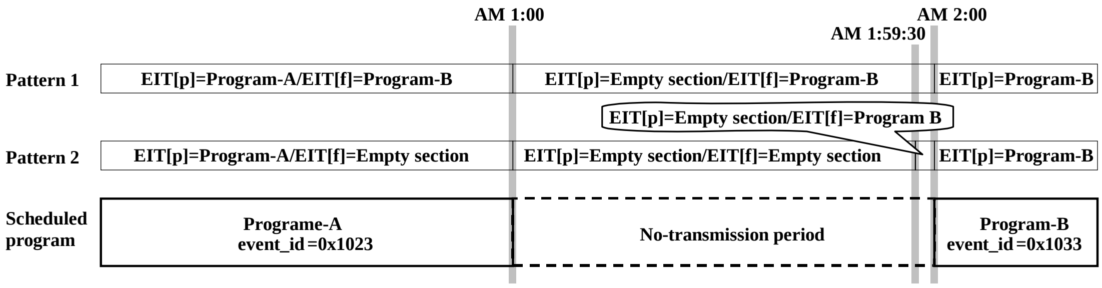


Figure 13-1 Transmission operation of EIT[p/f] including no-program-transmission hours

EIT[p/f actual] is program information for the services defined in the relevant TS. It is generated by setting both the descriptors for All-Station SI (refer to Table 10-2) and the descriptors for Each-Station SI (refer to Table 10-4) regarding the events to be broadcast by the local broadcaster in its own TS.

When EIT[p/f actual] is transmitted, it forms a single interval group regardless of its media type. The re-transmission interval for the above group shall be uniformly operated across all the TSs.

EIT[p/f other] is program information the services defined in other TSs. It can be classified into two types: EIT[p/f other] for the events to be broadcast by the local broadcaster in another TS it operates, and EIT[p/f other] for the events to be broadcast by other broadcasters. The former is generated only when a broadcaster operates multiple TSs. Because it is generated without using Distribution Center, like EIT[p/f actual], both the descriptors for All-Station SI (refer to Table 10-2) and the descriptors for Each-Station SI (refer to Table 10-4) can be set to the former EIT[p/f other]. Only the descriptors for All-Station SI (refer to Table 10-2) can be set to EIT[p/f other] for the events to be broadcast by other broadcasters.

When EIT[p/f other] received from Distribution Center is used, its update is delayed when flexible program scheduling is performed.

When EIT[p/f other] is transmitted, it forms a single interval group regardless of its media type. The re-transmission interval for the above group shall be uniformly operated across all the TSs.

The running status shall be all set to "undefined (0x0)" in EIT[p/f].

13.1.3 EIT[schedule basic] transmission operation

13.1.3.1 Transmission operation common to All-Station/Each-Station EIT[schedule basic]

Classification of EIT[schedule basic] can be made from the following two standpoints:

One is classification into All-Station EIT (EIT commonly operated across all TSs) and Each-Station EIT (operated differently depending on the TS). EIT[schedule basic] shall be based on All-Station operation. The other is classification into EIT[schedule actual basic] (program information for the services defined in one TS) and EIT[schedule other basic] (program information for the services defined in other TSs).

When transmitted, EIT[schedule basic] shall be transmitted in an interval group for each media type (TV type, Autio type, and Data type) in addition to the classification between actual/other.
EIT[schedule basic] uses a table consisting of a maximum of eight sections in every three hours (segment). The EIT[schedule basic] whose transmission started once (transmission started after the end of day, such as the schedule on the 8th day) shall be defined as being initial. In principle, the descriptors that may affect reserved operation, such as copy control descriptor, parental rate descriptor, and CA access information descriptor, should not be changed in the initial EIT[schedule basic]. However, the short event descriptor and extended event descriptor may be changed for inevitable reasons such as an error in a person’s name.

EIT[schedule basic] for a program with either "start_time" or "duration" or both undefined shall not be transmitted, and the running status shall be all set to "undefined (0x0)".

13.1.3.2 Tansmission operation of EIT[schedule basic] in the All-Station EIT range

EIT[schedule basic] in the All-Station EIT range covers the period of D1 days (default: 8 days) for a digital TV service, D2 days (default: 3 days) for a digital audio service, or D3 days (default: 2 days) for a data service, starting from the present day. With the exception of EIT[schedule basic] whose media type is a data service, EIT[schedule basic] should be always transmitted. Data type services include services that transmit EIT[schedule basic] and services that do not transmit it, and this is the same as for the EIT[schedule p/f] transmission operation. From the EIT_schedule_flag in SDT, it is possible to identify whether the relevant service is the one that transmits EIT[schedule basic]. Once the service is determined as the one that transmits EIT[schedule basic], it stably transmits EIT[schedule basic]. However, only the EIT[schedule basic] for and after the segment that contains the present time of the present day shall be transmitted. As the time elapses, transmission of EIT[schedule basic] that passed the present time shall be stopped on a segment basis.
When All-Station EIT is operated with values other than the default ones, parameters should be set to BIT (1st Loop) before it is transmitted.
The re-transmission interval defined for each interval group shall be uniformly operated across all TSs. The details of interval goups for EIT[schedule] are explained in Section 13.2.

EIT[schedule other basic] in the All-Station EIT range can be classified into two types: EIT[schedule other basic] for the events to be broadcast by the local broadcaster in another TS it operates, and EIT[schedule other basic] for the events to be broadcast by other broadcasters. The former is generated only when a broadcaster operates multiple TSs. However, some transmission facility receives EIT[schedule other basic] from Distribution Center and uses it as it is. In this case, the operation of EIT[schedule other basic] for the local broadcaster becomes the same as the operation of EIT[schedule other basic] for other broadcasters. Only the descriptors in All-Station SI (Table 10-2) can be set to EIT[schedule other basic] for the events to be broadcast by other broadcasters. This EIT[schedule other basic] should be obtained from Distribution Center. When EIT[schedule other basic] received from Distribution Center is used, its update is delayed when flexible program scheduling is performed.

13.1.3.3 Tansmission operation of EIT[schedule basic] in the Each-Station EIT range

EIT[schedule basic] in the Each-Station EIT range covers the period of D1 days plus 1 day to D4 days for a digital TV service, D2 days plus 1 day to D5 days for a digital audio service, or D3 days plus 1 day to D6 days for a data service. Transmission of EIT[schedule basic] depends on the broadcaster's decision. Transmission of Each-Station EIT[schedule basic] is based on patterns. An operation pattern can be selected for each media type in a broadcaster. From the last_table_id value and the last_section_number value of a service, it is possible for a receiver to detect whether the broadcaster transmits Each-Station EIT[schedule basic] for each media types, and which operation pattern is used. This detection can also be performed from the SI transmission parameter descriptor in BIT (2nd Loop) (refer to Section 31.2.3.3). If the parameter whose table_id is 0x50 is not defined in the the SI transmission parameter descriptor in BIT (2nd Loop), no information beyond the All-Station SI transmission range is transmitted as EIT[schedule basic] for the media types in the relevant broadcaster.

EIT[schedule other basic] in the Each-Station EIT range is generated only when a broadcaster operates multiple TSs, and only the information about the events to be broadcast by the local broadcaster in another TS it operates can be transmitted.

Note that the local broadcaster does not transmit Each-Station EIT[schedule other basic] of the media type that is not broadcast in the TS that the broadcaster operates. For example, if Broadcaster-0 in Figure 13-2 does not operate a data service in TS-1, Each-Station EIT[schedule other basic] for the data service in TS-0 is never transmitted in TS-1.

13.1.4 EIT[schedule extended] transmission operation

Due to its characteristics intended for operation of All-Station EIT, EIT[schedule basic] shall be operated with minimum necessary information in it. The program description is therefore restiricted to 80 characters or 160 bytes that can be written in a short event descriptor (the average number of characters actuall transmitted becomes smaller due to the restriction on the total size of information to be transmitted in All-Station SI). To cope with such restrictios, more detailed, extended program information can be transmitted as EIT[schedule extended]. The descriptors to be set are those described in Table 10-4.

EIT[schedule extended] is never operated as an All-Station EIT, but is operated only as an Each-Station EIT.
In addition, depending on the TS configuration, this EIT can be classified into EIT[schedule actual extended]

and EIT[schedule other extended]. The latter is transmitted only when a broadcaster operates multiple TSs. However, there is no distinction between "actual" and "other" when it is transmitted. These tables are transmitted in different interval groups depending on their media types. The transmission range of EIT[schedule extended] can be identified from the last_table_id and the last_section_number of a service. Defined patterns are available for the transmission range and description ratio. Each broadcaster can select an operation pattern based on media types. Which pattern is used by each broadcaster for the operation of the above EIT is described in BIT (2nd Loop) (for details, refer to Section 31.2.3.3).
Note that the local broadcaster does not transmit EIT[schedule extended] of the media type that is not broadcast in the TS it operates. For example, if Broadcaster-0 in Figure 13-2 does not operate a data service in TS-1, Each-Station EIT[schedule extended] for the data service in TS-0 is never transmitted in TS-1.

EIT[schedule extended] for a program with either "start_time" or "duration" or both undefined shall not be transmitted, and the running status shall be all set to "undefined (0x0)".

The following should be observed for transmission of EIT[schedule extended].

- An event that is not defined in EIT[schedule basic] should not be defined in EIT[schedule extended].
- The same event_id should be specified in EIT[schedule basic] and EIT[schedule extended] for the same program.
- The same start_time, duration, and free_CA_mode should be specified in EIT[schedule basic] and EIT[schedule extended] for the same event_id.

If the parameter whose table_id is 0x58 is not defined in the the SI transmission parameter descriptor in BIT (2nd Loop), the receiving side judges that no extended program information is transmitted as EIT[schedule extended] for the media types in the relevant broadcaster.

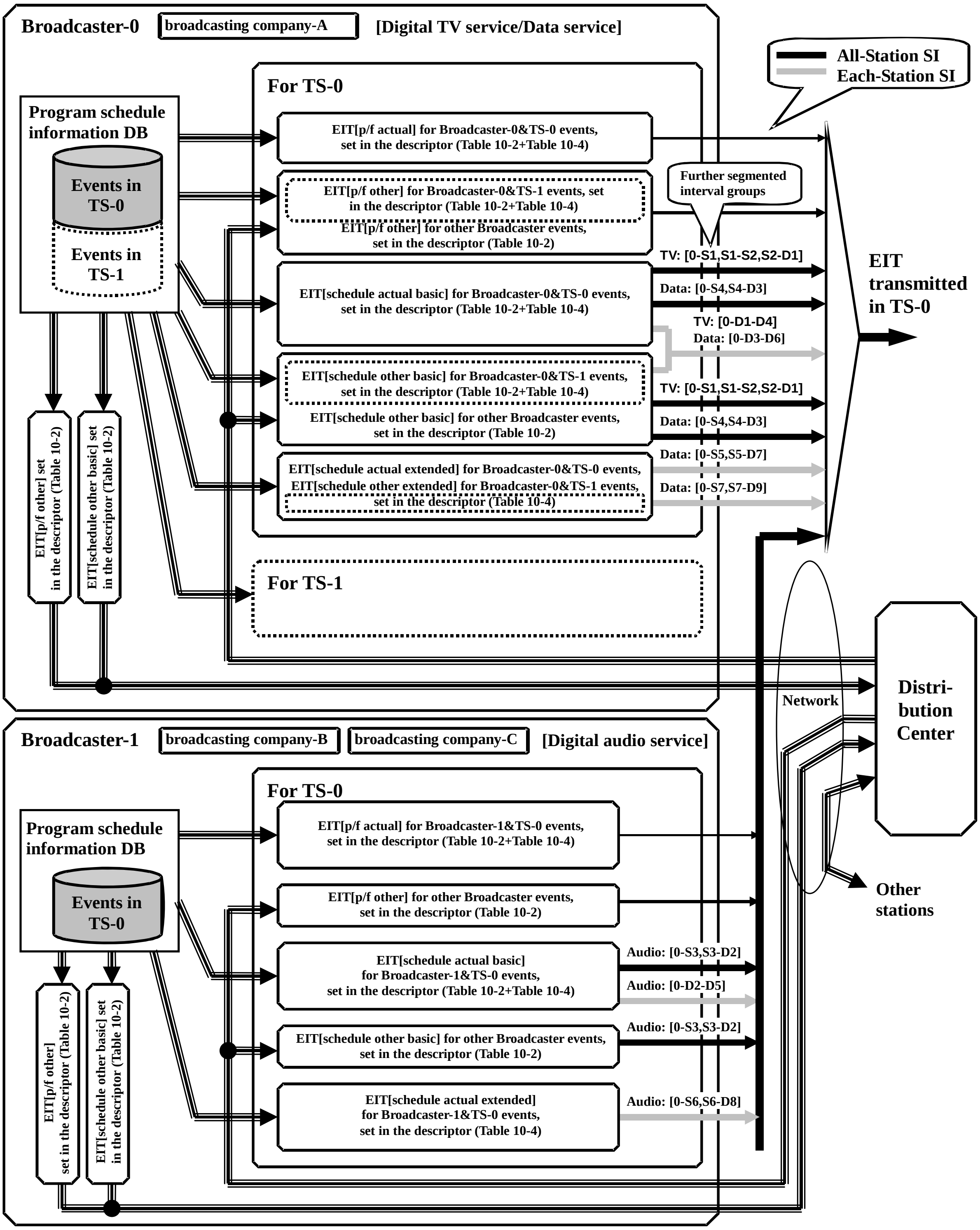


Figure 13-2　Conceptual diagram of EIT transmission operation

13.2 Interval Group Setting in EIT[schedule]

EIT[schedule] identifies a unit of program information by integrating multiple tables, and contains a significantly large quantity of information compared with other SI information. Therefore, its interval group setting shall be made different from the ordinary ones (configured by PID and table_id). This section describes the concept of the interval group setting in EIT[schedule] in details.

First of all, note that EIT[schedule] for All-Station is completely different from EIT[schedule] for Each-Station. Transmission parameters in All-Station EIT[schedule] may be reviewed when the number of services in the whole network increases. When this happens, new parameters shall be added by using the SI transmisiion parameter descriptor placed in the first descriptor loop of BIT. On the other hand, transmission parameters in Each-Station EIT[schedule] are managed by individual broadcasters, and new parameters are added by using the SI transmission parameter descriptor placed in the second descriptor loop (the loop managed by individual broadcasters) of BIT.

Interval groups for EIT[schedule] can be divided into basic interval groups and extended interval groups.
Since EIT[schedule] in BS digital broadcasting is likely to be used after being stored in a receiver, it is transmitted at a very wide interval. An interval group for which only a basic re-transmission interval setting is performed based on this reciever’s storage operation is called a basic repetition group. In order to secure some receiver operations even when EIT[schedule] is not stored, such as when the receiver starts up, a interval group with an increased re-transmission interval may be set for EIT[schedule]. This interval group is called an extended interval group.
Basic interval groups and extended interval groups are set for each table in EIT[schedule]. The number of these interval groups for each table is fixed, but the transmission parameters for each interval group are changeable.
Basic interval groups and extended interval groups are related in the following ways when they are set for tables in EIT[schedule], (when viewed as a unit of service):

- ○ The re-transmission interval of basic interval groups are wider than those of extended interval groups in all tables.
- ○ Extended interval groups are described in choronological order on EIT[schedule]. The earlier the time of day set to an interval group is, the narrower the re-transmission invertal of that group will be.
- ○ An extended inter group with the narrowest re-transmission interval always contains the present moment segment.

The operation of EIT[schedule] shall be defined for each media type (refer to Section 9.2). If the media type differs, so does the number of days for event information to be transmitted as EIT[schedule]. In addition, each re-transmission interval shall be set separately.

Table 13-1 shows whether EIT[schedule] is transmitted for each service_type.

Table 13-1 Whether EIT[schedule] is transmitted for each service_type

Media Type		Corresponding service_type		
Value	Meaning	Value	Meaning	EIT[schedule] transmission
1	TV type	0x01	Digital TV service	⦿
		0xA1	Special video service	×
2	Audio type	0x02	Digital audio service	⦿
		0xA2	Special audio service	×
3	Data type	0xC0	Data service	○
		0xA3	Special data service	×
		0xA8	Prestorage data service	○
		0xAA	Bookmark list data service	○

Transmission level: ⦿: AMandatory

○: Service with EIT[schedule] transmission and service without EIT[schedule] transmission exist together

×: Never transmit

Note that the above table, showing the relationship between media type and service type, includes special services in which EIT[schedule] is not transmitted. It is because service (channel) selection operation based on media types is considered. Therefore, as far as reception of EIT[schedule] is concerned, special services can be ignored.

13.2.1 All-Station EIT[schedule]

Since All-Station EIT[schedule] is used after it is stored in a receiver, this table is transmitted at a very wide re-transmission interval (basic interval group). However, since quicker response is needed when a receiver starts up, and the frequency of updates due to an event schedule change needs to be high, All-Station EIT[schedule] is transmitted at an increased re-transmission interal for segments close to the present time. If the access frequency to the event information of a service that is being selected is expected to be high, separate re-transmission intervals (extended interval groups) can be set for actual and other. Furthermore, as explained in the previous section, the operation of All-Station EIT[schedule] can be changed individually for each media type.

As explained above, different interval groups can be set in All-Station EIT[schedule] depending on the difference in time of day, the difference in attributes (actual or other), and the difference in media type. Note that different interval groups can be set for actual/other within the same media type. However, interval groups cannot be switched between services.

When an extended interval group is set, the number of segments that indicate the corresponding times of day shall be specified. Within a service, the number of segments means the total number of segments contained in such an interval group for that service. This number of segments shall be made changeable to a certain extent.

Section 12.3.2 describes interval groups that are set in All-Station EIT[schedule] and the parameters that indicate their ranges. As described above, interval groups are set for actual/other in each media type. Within a media type, one basic interval group and multiple extended interval groups exist. The number of extended interval groups is fixed: 2 for TV media type and 1 for "actual" and 0 for "other" for audio media type and date media type.

13.2.2 Each-Station EIT[schedule]

Each-Station EIT[schedule] is uniformly operated based on a media type in a broadcaster.

Each-Station EIT[schedule] can be individually operated by a broadcaster. A broadcaster can even choose whether to operate Each-Station EIT[schedule]. However, it is undesirable to leave everything about operation to a broadcaster, considering the burden of receiver development and the uniformity of information presentation to the viewers. Therefore, multiple usage patterns shall be made available in advance, so that each broadcaster can select one of them.

As usage patterns, the following types exist:

1) Not operating Each-Station EIT.
   →A only in Figure 13-3.
2) Adding "extended" to events for α days (the same schedule range in All-Station EIT[schedule])
   →A+B in Figure 13-3.
3) Sending information of "basic" from α plus 1 days up to β days.
   →A+C in Figure 13-3.
4) Adding "extended" to events for α days. Then sending information of "basic" from α plus 1 days up to β days.
   →A+B+C in Figure 13-3.
5) For both "basic" and "extended", sending information for up to β days.
   →A+B+C+D in Figure 13-3.

Note that α is the same as the schedule range in All-Station EIT[schedule], which is by default 8 days for TV media type (D1), 3 days for Audio media type (D2), or 2 days for Data media type (D3).

β is a schedule range if information is transmitted as Each-Station EIT beyond the schedule range in All-Station EIT[schedule]. It is defined for each media type as follows:

- For TV media type (D4): 15 days, 22 days, or 32 days
- For Audio media type (D5): 8 days, 15 days, 22 days, or 32 days
- For Data media type (D6): 8 days, 15 days, 22 days, or 32 days

For information on D1 to D6 described above, refer to Section 12.3.

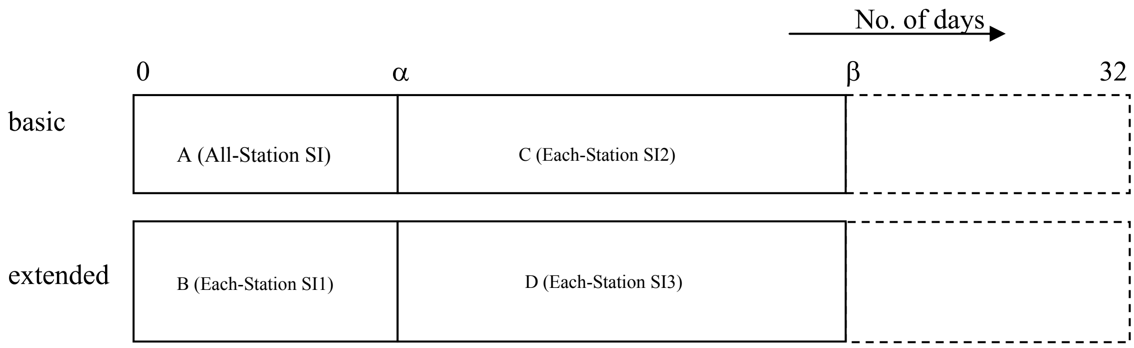


Figure 13-3 EIT[schedule] operation pattern diagram

From the SI transmission parameter descriptor placed in the second descriptor loop of BIT, it is possible to identify which of the above usage patterns is chosen by each broadcaster for each media type.

(1) When neither 0x50 nor 0x58 is described for table_id, it is the usage pattern 1) .

(2) When 0x50 is not described but 0x58 is described for table_id, it is the usage pattern 2) .

(3) When 0x50 is described but 0x58 is not described for table_id, it is the usage pattern 3) .

(4) When both 0x50 and 0x58 are described for table_id, and if the value in the schedule_range field for 0x58 is equal to the schedule range in All-Station EIT[schedule] (the value in the schedule_range field of the SI transmission parameter descriptor in the first descriptor loop of BIT), it is the usage pattern 4) .

(5) When both 0x50 and 0x58 are described for table_id, and if the value in the schedule_range field for 0x58 is equal to the value in the schedule_range field for 0x50, it is the usage pattern 5).

Each-Station EIT[schedule] is transmitted for each media type. In other words, when services of a certain media type are transmitted in a TS, Each-Station EIT[schedule] for all the transmitted services of the media type in the relevant broadcaster is also transmitted in that TS. Interval groups in Each-Station EIT[schedule] are also configured based on a media type in a broadcaster.

13.2.2.1 Each-Station EIT[schedule basic]

Whether to operate Each-Station EIT[schedule basic] can be decided for each media type in a broadcaster.

When operated, Each-Station EIT[schedule basic] belongs to the same interval group (basic interval group) based on its media type. This interval group has the schedule range (days) and re-transmission interval

(seconds) of EIT[schedule basic] as its parameters. In this case, the schedule range is set as explained in the previous section. This transmitter parameters are described in the SI transmission parameter descriptor in BIT. For details, refer to Section 31.2.3.3.
Normally, the basic interval groups for EIT[schedule basic] shall have the same re-transmission intervals as the basic interval groups for EIT[schedule].

For transmission of Each-Station EIT[schedule], operation patterns that indicate the "program occupancy" level shall be defined. For Each-Station EIT[schedule basic], there are two operation patterns: the same level as All-Station EIT[schedule] (programs shall be defined to almost entirely occupy EIT) and the level at which programs shall be described to partially occupy EIT as needed. Note that any of these operation patterns is indicated by the pattern field in the SI transmission parameter descriptor. For details, refer to Section 31.2.3.3.

13.2.2.2 Each-Station EIT[schedule extended]

Whether to operate Each-Station EIT[schedule extended] can be decided for each media type in a broadcaster. When operated, Each-Station EIT[schedule extended] shall be uniformly operated and transmitted based on its media type in a broadcaster.
Since Each-Station EIT[schedule extended] is also used after it is stored in a receiver, wide re-transmission intervals are assigned to this table’s basic interval groups are wide. However, unlike All-Station EIT[schedule] it is not possible to predetermine the storage capacity. Therefore, it is necessary to make the re-transmission intervals narrower to a certain degree so that receivers that have not stored EIT[schedule extended] can appropriately handle EIT[schedule extended].
Therefore, in addition to basic interval groups, extended inter groups can also be set. Like the interval group setting for All-Staion EIT[schedule], interval groups can be divided according to the time of day. An interval group that corresponds to the latest time of day is the basic interval group. Other interval groups shall be transmitted at narrower re-transmission intervals than the basic interval group. Only one extended interval group can be associated with each media type at maximum.
In addition, like Each Station EIT[schedule basic], the schedule range in Each Station EIT[schedule extended] is the same as described in Section 13.2.2. When Each Station EIT[schedule extended] is transmitted, its schedule range is equal to either the schedule range in All-Station EIT[schedule] or the one in Each Station EIT[schedule basic].
For transmission of Each-Station EIT[schedule], operation patterns that indicate the "program occupancy" level shall be defined. For Each-Station EIT[schedule extended], there are four operation patterns. They include:

0: A few programs at most per week

1: A few programs at most per day

2: Approximately 1/4 to 1/2 of all the programs (approximately 10 programs per day)

3: More than a half of all the programs

One of the above shall be defined.

Note that any of these operation patterns is described in the pattern field in the SI transmission parameter descriptor. For details, refer to Section 31.2.3.3.

13.2.3 Summary of the interval group setting in EIT[schedule]

Figure 13-4 describes a summary of the concept of the interval group setting in EIT[schedule].

Figure 13-4 shows the following:

- ○ For All-Station EIT, the interval groups in "actual" are different from the interval groups in "other".
- ○ For All-Station EIT[schedule] and EIT[schedule extended] each, multiple interval groups are set.
- ○ For All-Station EIT, the ranges for the interval groups in "actual" are the same as the ranges for the interval groups in "other".
- ○ The interval groups for All-Station EIT are different from the interval groups for Each-Station EIT.
- ○ For Each-Station EIT, regardless of whether it is "actual" or "other", interval groups are configured for each broadcaster (if further segmented, they are actually configured for each media type in each broadcaster).
- ○ Each-Station EIT can be independently operated in each media type.
- ○ Each-Station EIT for the broadcaster that exists in the actual TS shall be transmitted, but Each-Station EIT for broadcasters whose services do not exist in the actual TS shall not be transmitted.

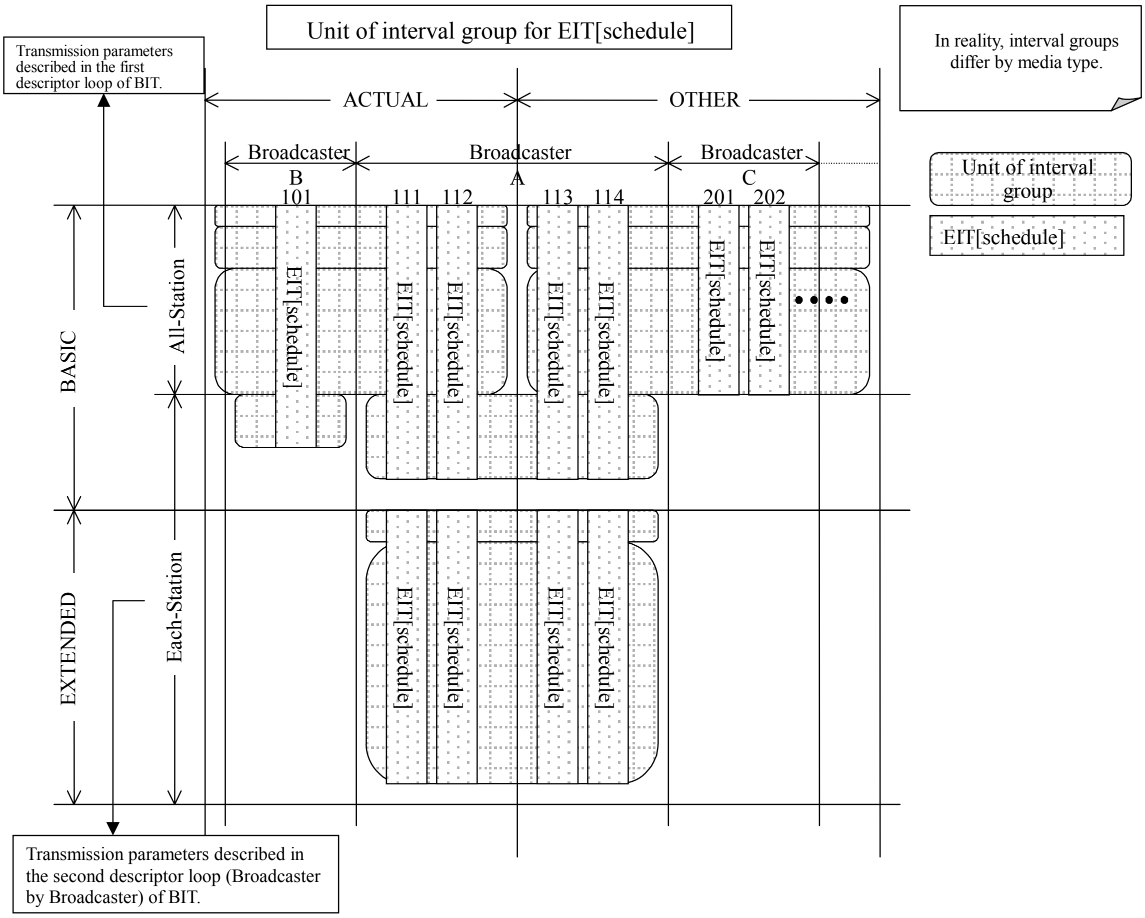


Figure 13-4 Conceptual diagram of interval groups for EIT[schedule]

13.3 Assignment of table_id and section_number in EIT

13.3.1 EIT[p/f]

Table 13-2 shows table_id and section_number for EIT[p/f]. Sub-tables are formed by service_id, and basically, it is mandatory to transmit EIT[p/f] for all the services. However, whether EIT[p/f] is transmitted for the relevant service can be judged from the EIT_present_following_flag in a service loop in SDT that is transmitted in the TS of that service. Although last_section_number is basically fixed as 0x01, the possibility of operating sections from 0x02 is not ruled out.

In the above case, the implementation regarding last_section_number shall be such that a receiver processes 0x00 and 0x01 normally but ignores sections from 0x02.

Table 13-2 Assignment of table_id and section_number in EIT

	table_id		section_number	Description
	actual	other		
EIT [p/f]	0x4E	0x4F	0x00	Present program (present)
	0x4E	0x4F	0x01	Following program (following)

13.3.2 EIT[schedule basic]

As shown in Table 13-3 to 13-8, in assignment of table_id and section_number in EIT[schedule basic], the distinction is made between All-Section SI and Each-Section SI and interval groups are configured differently depending on the media type among three media types and depending on whether EIT[schedule basic] is "actual" or "other" (note that regarding interval groups for Each-Station EIT[schedule basic], there is no distinction between "actual" or "other". They are treated simply as Each-Station Eit[schedule basic]). Sub-tables are formed by service_id, and except for special services, it is mandatory to transmit EIT[schedule basic] for All-Station EIT. However, whetherEIT[schedule basic] is transmitted for the relevant service can be judged from the EIT_schedule_flag in a service loop in SDT that is transmitted in the TS of that service.

A day is divided into every three hours, and by using tables of a maximum of 8 sections each, program information shall be described for separate periods (segments): 00:00 to 03:00, 03:00 to 06:00, …21:00 to 24:00. As the number of the last section in a segment is described in the segment_last_section_number field, section_numbers can be omitted if all of the eight sections are not used due to the amount of information. If there is no event that starts within the period of time assigned to a segment, an empty EIT table should be transmitted in the top section_number of the relevant segment.

Unlike the standards of DVB and ARIB STD-B10, last_table_id covers the ranges described in tables, and it is possible to detect the range transmitted by each EIT[schedule basic] from the last_table_id value and last_section_number value. However, as a unified operation policy, for the transmission range of All-Station EIT and its interval groups, the values described in the first loop of BIT are uniformly applied over the entire network. For the transmission range of Each-Station EIT and itsinterval groups, the values described in the second loop of BIT are uniformly applied in the relevant broadcaster.

Table 13-3 Assignment of table_id and section_number in TV type, EIT[schedule actual 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
Present day	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

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

Range: S1(3) segments including the present one
Rate: G1(10) seconds

Range: Subsequent S2(13) segments
Rate: G2(10) seconds

Range: Up to D1(8) days and other than the above
Rate: G2(180) seconds

Mandatory transmission range (All-Station EIT tables)

Range: D1+1(9) days to D4(15 or 32) days
Rate: G2(180) seconds
(Note) Interval groups are the same as the ones for EIT[schedule other basic] of a digital TV service

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

Table 13-4 Assignment of table_id and section_number in Audio type, EIT[schedule actual 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
Present day	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

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

Mandatory transmission range (All-Station EIT tables)

Range: S3(8) segments including the present one
Rate: G1(20) seconds

Range: Up to D2(3) days and other than the above
Rate: G(180) seconds

Range: D2+1(4) days to D5(8) days
<8, 15, or 32 days possible for D5>
Rate: G(180) seconds
(Note) Interval groups are the same as the ones for EIT[schedule other basic] of a digital audio service

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

Table 13-5 Assignment of table_id and section_number in Data type, EIT[schedule actual 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
Present day	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

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

All-station transmission range (All-Station EIT tables)

Range: S4(1) segments including the present one
Rate: G1(20) seconds

Range: Up to D3(2) days and other than the above
Rate: G'(360) seconds

Range: D3+1(3) days to D6(8) days
<8, 15, or 32 days possible for D6>
Rate: G'(360) seconds
(Note) Interval groups are the same as the ones for EIT[schedule other basic] of a data service

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

Table 13-6 Assignment of table_id and section_number in TV type, EIT[schedule other 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
Present day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
Next day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
3rd day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
4th day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
5th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
6th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
7th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
8th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
9th day	table_id	0x62	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:						:			
13th day	table_id	0x63	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:						:			
17th day	table_id	0x64	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:						:			
21st day	table_id	0x65	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:						:			
25th day	table_id	0x66	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:						:			
29th day	table_id	0x67	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:						:			
32nd day	table_id	0x67	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

Range: S1(3) segments including the present one
Rate: G1(10) seconds

Range: Subsequent S2(13) segments
Rate: G2(20) seconds

Range: Up to D1(8) days and other than the above
Rate: G(180) seconds

Mandatory transmission range (All-Station EIT tables)

Range: D1+1(9) days to D4(15 or 32) days
Rate: G(180) seconds
(Note) Interval groups are the same as the ones for EIT[schedule actual basic] of a digital TV service

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

Table 13-7 Assignment of table_id and section_number in Audio type, EIT[schedule other 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
Present day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
Next day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
3rd day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
4th day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
5th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
6th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
7th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
8th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
9th day	table_id	0x62	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
13th day	table_id	0x63	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
17th day	table_id	0x64	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
21st day	table_id	0x65	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
25th day	table_id	0x66	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
29th day	table_id	0x67	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
32nd day	table_id	0x67	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

Mandatory transmission range (All-Station EIT tables)

Range: Up to D2(3) days and other than the above
Rate: G(180) seconds

Range: D2+1(4) days to D5(8) days
<8, 15, or 32 days possible for D5>
Rate: G(180) seconds
(Note) Interval groups are the same as the ones for EIT[schedule actual basic] of a digital audio service

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

Table 13-8 Assignment of table_id and section_number in Data type, EIT[schedule other 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
Present day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
Next day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
3rd day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
4th day	table_id	0x60	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
5th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
6th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
7th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
8th day	table_id	0x61	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
9th day	table_id	0x62	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
13th day	table_id	0x63	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
17th day	table_id	0x64	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
21st day	table_id	0x65	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
25th day	table_id	0x66	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
29th day	table_id	0x67	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
32nd day	table_id	0x67	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

All-station transmission range (All-Station EIT tables)

Range: Up to D3(2) days and other than the above
Rate: G'(360) seconds

Range: D3+1(3) days to D6(8) days
<8, 15, or 32 days possible for D6>
Rate: G'(360) seconds
(Note) Interval groups are the same as the ones for EIT[schedule actual basic] of a data service

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

13.3.3 EIT[schedule extended]

As shown in Table 13-9 to 13-11, in assignment of table_id and section_number in EIT[schedule extended], interval groups are configured differently depending on the media type among three media types. Unlike the standards of DVB and ARIB STD-B10, last_table_id covers the ranges described in tables, and it is possible to detect the range transmitted by each EIT[schedule extended] from the last_table_id value and last_section_number value. However, as operation based on patterns is defined for the transmission range and description ratio, it is necessary to detect the operation of each broadcaster (especially, information about whether EIT[schedule extended] is transmitted) from the parameters described in the second loop of BIT.
A day is divided into every three hours, and by using tables of a maximum of 8 sections each, program information shall be described for separate periods (segments): 00:00 to 03:00, 03:00 to 06:00, …21:00 to 24:00. As the number of the last section in a segment is described in the segment_last_section_number field, section_numbers can be omitted if all of the eight sections are not used due to the amount of information. If there is no event that starts within the period of time assigned to a segment, an empty EIT table should be transmitted in the top section_number of the relevant segment.

EIT[schedule extended] shall not be operated to transmit information of all the programs scheduled for broadcasting. The level of information to be transmitted can be defined by media type for each broadcaster and shall be described in the pattern parameter in the second loop of BIT. In an extreme case, if there is no event that starts within the period of time assigned to any segments within the range of all the relevant tables up to the last_section_number field described in a sub-table specified by last_table_id, an empty EIT table should be transmitted from the top section_number of the relevant segment. For example, regarding tables with some service_id (table identifier extended) for EIT[schedule actual extended], if 0x5E is assigned to last_table_id and if 0xE8 is assigned to last_section_number in a sub-table with table_id 0x5E, all the segments within a period of "27 days + 18 hours" from the segments 00:00 to 03:00 on the present day up to 15:00 to 18:00 on 28th day ((27 X 8) + 6=222 segments) shall be transmitted. If there is no information in the relevant segments, an empty section shall be transmitted.

Table 13-9 Assignment of table_id and section_number in TV type, 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
Present day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
Next day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
3rd day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
4th day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
5th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
6th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
7th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
8th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
9th day	table_id	0x5A/0x6A	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
13th day	table_id	0x5B/0x6B	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
17th day	table_id	0x5C/0x6C	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
21st day	table_id	0x5D/0x6D	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
25th day	table_id	0x5E/0x6E	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
29th day	table_id	0x5F/0x6F	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
32nd day	table_id	0x5F/0x6F	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

Range: S1(3) segments including the present one
Rate: G1(20) seconds

Range: Up to D7(D1 or D4) days and other than the above
<Range for D1(8) days shown in the figure>
Rate: G(180) seconds

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

Table 13-10 Assignment of table_id and section_number in Audio type, 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
Present day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
Next day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
3rd day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
4th day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
5th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
6th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
7th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
8th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
9th day	table_id	0x5A/0x6A	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
13th day	table_id	0x5B/0x6B	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
17th day	table_id	0x5C/0x6C	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
21st day	table_id	0x5D/0x6D	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
25th day	table_id	0x5E/0x6E	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
29th day	table_id	0x5F/0x6F	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
:					:				
32nd day	table_id	0x5F/0x6F	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

Range: S6(3) segments including the present one
Rate: G1(20) seconds

Range: Up to D8(D2 or D5) days and other than the above
<Range for D2(3) days shown in the figure>
Rate: G(180) seconds

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

Table 13-11 Assignment of table_id and section_number in Data type, 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
Present day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
Next day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
3rd day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
4th day	table_id	0x58/0x68	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
5th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
6th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x40-0x47	0x48-0x4F	0x50-0x57	0x58-0x5F	0x60-0x67	0x68-0x6F	0x70-0x77	0x78-0x7F
7th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0x80-0x87	0x88-0x8F	0x90-0x97	0x98-0x9F	0xA0-0xA7	0xA8-0xAF	0xB0-0xB7	0xB8-0xBF
8th day	table_id	0x59/0x69	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF
9th day	table_id	0x5A/0x6A	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
	:					:			
13th day	table_id	0x5B/0x6B	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
	:					:			
17th day	table_id	0x5C/0x6C	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
	:					:			
21st day	table_id	0x5D/0x6D	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
	:					:			
25th day	table_id	0x5E/0x6E	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
	:					:			
29th day	table_id	0x5F/0x6F	←	←	←	←	←	←	←
	section_number	0x00-0x07	0x08-0x0F	0x10-0x17	0x18-0x1F	0x20-0x27	0x28-0x2F	0x30-0x37	0x38-0x3F
	:					:			
32nd day	table_id	0x5F/0x6F	←	←	←	←	←	←	←
	section_number	0xC0-0xC7	0xC8-0xCF	0xD0-0xD7	0xD8-0xDF	0xE0-0xE7	0xE8-0xEF	0xF0-0xF7	0xF8-0xFF

Interval group range at 04:00 pm.

Range: 0:00 to previous segment
Rate: Not transmit

Range: S7(1) segments including the present one
Rate: G1(20) seconds

Range: Up to D9(D3 or D6) days and other than the above
<Range for D3(2) days shown in the figure>
Rate: G'(360) seconds

Selective transmission range (Each-Station EIT tables)

Default value in brackets ( ).

last_table_id covers all this range

13.4 EIT[schedule] Transmission Operation With Elapsing Time

Transmission of sub-tables that became information of the past as the time elapsed shall be stopped "segment by segment". For example, transmission of the segments in which information of programs starting between 15:00 and 18:00 is described shall be stopped at 18:00,. Therefore, for a program spreading over adjacent segments, EIT[schedule] about the currently transmitted program may not be transmitted for a certain period of time (this program information is described only in EIT[p/f]).

In addition, the schedule for the last day in the schedule range defined by media type (8 segments) is added once a day, at 00:00 when a new day starts. Both table_id and section_number are also updated at the same time. Because transmission stops segment by segment and starts daily, the number of segments to be transmitted decreases by one every three hours until the time a new day starts, and eight segments are added once a new day starts.

For hierachical transmission cycles (transmission by changing the intervals depending on the time span from the present time), transmission shall be performed by shifting the mode of the cycles to "transmission by segment". For example, the transmission cycle defined for program information for a period of 48 hours from the present time shall be at any time a "cycle of transmission for program information of 16 segments including the segment the present time belongs to".

Example) Where the present time is 19:30 on 15th, information to be transmitted at the "cycle of transmission for a period of 48 hours from the present time" is information of programs that start between 18:00 on 15th and 18:00 on 17th (not including information of programs that start at 18:00 on 17th).

13.5 Daily Update Operation Rules

All EIT[schedule] is always updated at 00:00 every day because of its structure. The update rules are set as follows:

1) No daily update before 00:00.
2) A transition period shall be set for 30 seconds from 00:00 sharp.
3) After the transition period, EIT[schedule] of the old version (the previous day) shall never be transmitted.

During the transition period, transmission of the old version (tables of the previous day) shall be stopped, and transmission of a new version (tables of the present day) shall be started. However, the details of these transmission operations shall be left to the decision of each broadcasting station. Note that the following rules shall apply.

1) Even during the transition period, transmission shall be completed section by section.
2) Different versions should not exist at the level of sub-tables. If just one of the sections that constitute the same sub-table is updated, sections of the older version in that sub-table shall not be transmitted thereafter.
3) The update timing (new version transmission start timing) during the transition period is random. Transmission of sections of a new version may be started while sections of the older version are still transmitted. The update timing is also random among sub-tables.

This rule shall apply to all EIT[schedule] contained in All-Station SI and Each-Station SI.

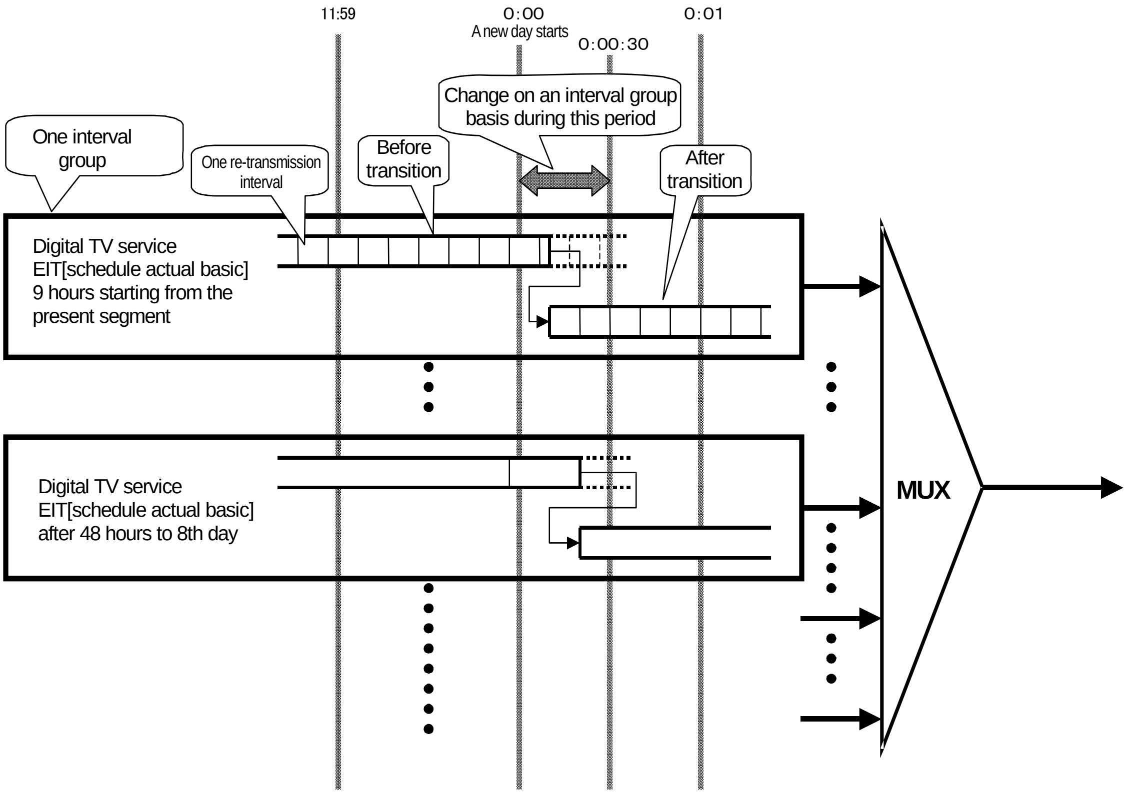


Figure 13-5 End of day and EIT[schedule] update

There is no rule specified for reception of EIT[schedule] by receivers, but the following can be assumed.

1) Normal reception is possible because sections are not changed to a new version before 00:00. Make sure that a reception process to be executed will not extend over 00:00.
2) Since transmission is stabilized after the transition period, processing such as collective reception should be performed after transmission is stabilized. Note that even if program information obtained in the form of older version is stored, it will not always become useless because the content of program information may not be changed.
3) The segment positions will be certainly changed after 00:00 when the transition period ends. During the transition period, transmission of segments that have existed before the change should not be expected. Especially, care should be taken when obtaining segments in a period spreading over 00:00.
4) For example, when the segment setting needs to be obtained to monitor the update of the program schedule display range, the version_number value of a new segment postion may be known in advance. In this case, the segment position can be changed at 00:00 sharp and information about the segment setting can be obtained based on the new version_number. (If the timeout setting for the processing is required, the duration of the transition period should be added to the timeout setting.) Even if the version_number value is not known in advance, it is possible to know whether the version is old or new

by the relationship between the obtained segment and the program start time. However, if there is no event (in case of an empty section), the above is not possible. In this case, it is necessary to wait until the transition period ends.

14 Operation of component_tag

It is mandatory to set component_tag values (placement of stream indentifier descriptors) to all the ESs defined in PMT. This chapter describes how to operate component_tag and PID for ES.

14.1 The Concept of component_tag and PID

For both channel selection and program reservation, the user selects ES from SI. The role of component_tag, which associates the user interface with ES, is therefore important. At channel selection, a receiver selects ES based on component_tag, finds its PID, and then demultiplexes and decodes that ES from TS. For the ES currently selected (displayed), other ES with the same component_tag will be continuously decoded. For example, when ES with component_tag="0x11" is displayed, regardless of whether it is during an event or between events, other ES with "0x11" shall be continuously decoded as long as the viewer does not perform any other operation. For that reason, if the component_tag being selected and received disappears, a receiver shall start to select new component_tag again. This operation is the same as the one performed at channel selection.

This rule of continous decoding of ES with the same component_tag value is observed even when the value of the PID having that component_tag value is changed. However, if the ES_PID information defined in PMT is changed, the receiver performs PID filtering control. This leads to an operation that is the same as channel selection operation on display. In other words, it is very likely that video or audio decoding will be interrupted temporarily. Therefore, when it is desired to continuously display some ES on the receiver, change of the relevant PID value in the middle of display should be avoided.

Components (ES) may be increased or decreased during an event and between events, but the default ESs never cease to exist. (For a digital TV service and digital audio service)

14.2 Assignment of component_tag values

As described above, in order to realize continuous display on the receiver, the relevant component_tag value should not be changed.

In BS digital broadcasting, based on the concept in Section 14-1, the assignment range of component_tag values is defined for each component type as shown in Table 14-1, and a fixed value is assigned to each default ES in particular.

Table 14-1 Assignment of component_tag

Component type	component_tag value
Video*1	0x00 - 0x0F Note that 0x00 shall be assigned to the default ES.
Audio*1	0x10 - 0x2F Note that 0x10 shall be assigned to the default ES.
Others*2	0x30 - 0x7F Note that 0x40 shall be assigned to the default ES for data broadcasting. And 0x30 to be assigned to subtitles main, 0x31 to 0x37 to be assigned to subtitles sub, 0x38 to be assigned to telop text main, and 0x39 to 0X3F to be assigned to telop text sub.
Reservation	0x80 - 0xFF

*1: Video and audio streams defined in BS Digital Broadcasting Transmission Operation Standard. Video and audio streams assigned with component_tag values in those ranges become a target of a receiver ‘s individual component selection.

*2: Video and audio components other than *1 can be included. However, video and audio streams assigned with component_tag values in those ranges do not become a target of a receiver ‘s individual component selection.

For video ES and audio ES, if ES with the same component_tag value as the one being decoded disappears from PMT, both video ES and audio ES shall be changed to the default.

14.2.1 ES priority

When multiple video or audio ESs with the same stream_type are defined in one PMT, or when multiple component descriptors (audio component descriptors) are placed in EIT, ES (component) with a smaller component_tag value should take higher priority. In other words, the default ES takes the highest priority. As the component_tag value increases, the priority assigned to ES decreases. These priorities can be used when displaying a list of streams on EPG or when setting the order of display when the stream switch button is pressed. The default ESs in each component group in MVTV are ESs that have the smallest component_tag values by stream type in the component_tag values described in the component groups in the component_group_descriptors. The main group (main channel) should always contain the default ESs (component_tag="0x00" and "0x10") for the entire MVTV service (See related descriptions in Chapter 20, Section 5 and Chapter 25).

14.3 Assignment of PID

Assignment of PID to ES is not specially defined. However, as described in Section 14.1, PID change during transmission of a program and at the time of program switching is equal to channel selection for receivers. Therefore, it is desirable to avoid PID change as much as possible, and it is desirable especially not to change the PID of the default component.

The following is a summary of PID change possibility on the transmission side.

[PID change during transmission of an event]

Basically not permitted. However, the PID value may change due to encoder changeover when the component_type (video/audio mode) changes during transmission of a program or when an error occurs in the transmission system.

[PID change following event switching]

When event sharing is performed for HD transmission, PID may be changed following changeover from HD transmission to SD transmission (and vice versa). Therefore, this should be considered as a normally occurring phenomenon.

15 Definition of a Service on Air/off Air

PSI/SI operation related to a service on air/off air shall be as follows:

○ Valid PAT and PMT should be transmitted for a service on air.

○ Description of a service in SDT shall not be changed depending on the on air/off air status.

○ For Audio and Data media types, PMT_PID should be described in PAT, but PMT does not need to be transmitted.(This operation is a deviatation from the MPEG standard.)

○ When a service is on air/off air, the service status must be one of the combinations in Table 15-1.

Table 15-1 Status types during on air/off air

Status	NIT in TS	Description in NIT 's service list	Description of the service in PAT	PMT for the service	Remarks
On air	Exists	Exists	Exists	Exists	On air normally
Off air	Exists	Exists	None	–	Off air normally
	Exists	Exists	Exists	None	Limited to a service whose media type is Audio or Data type.
No signal	None	None	None	None	RF only

('–' means that the table is invalid even if transmitted)

Any combination other than the above means a transition state, and the previous state shall be displayed.

The above combinations can be interpreted as follows in a receiver 's operation:

○ Services should be interpreted as on air if valid PAT and PMT exist.

○ If PAT is empty, all the services in a TS should be interpreted as off air. This interpretation shoud not be applied to other PSI/SI.

○ Services should be interpreted as off air (*) if PMT does not exist although valid PAT exists when the services' media types are the audio type or data type.

○ SDT shall not be used for judgment of on air/off air.

(*) If a service that uses hierachical modulation and a service that does not use the modulation exist in a single TS, PAT of the latter service may be obtained, but PMT may not be obtained if rain attenuation occurs while the service is on air. For information on receiver's messages in each reception condition, refer to Volume 2 (4.14 Error messages) in this standard.

In MPEG-Systems specifications, a service is judged abnormal if PMT specified by PMT_ID does not exist although the PMT_PID is described in PTA. However, in BS digital broadcasting, this situation shall be judged as an off air state that can normally occur. The following describes the reason why PAT should be operated as fixed without changing its descriptions as needed depending on whether PMT is transmitted.

In BS digital broadcasting, programs are multiplexed (primary multiplexing) into TSs at multiple locations, and these TSs are gathered at one location. Then re-multiplexing devices generate TSs to be finally broadcast out of these TSs, . Furthermore, the TSs output by these re-multiplexing devices will be gathered at an uplink station, so that they are broadcast through frame multiplexing.

In the above case, the PMTs created by the primary multiplexer may be passed to the uplink station as it is without being reconfigured by the re-multiplexing devices. On the other hand, the PATs are essentially transmitted from the re-multiplexing devices because a TS always contains only one PAT. In this configuration, PATs should be steadily transmitted with predetermined PMT_PIDs regardless of whether transmission of programs contained in TSs output from multiple locations (primary multiplexing) is in progress or stopped. This operation simplifies the management of the re-multiplexing devices and realizes stable operations. If PMT is not present although it is described in PAT, it takes some time for receivers to judge that the service of the PMT is off air. However, because PMT‘s re-transmission interval is 100ms, timeout processing for the PMT does not take too much time. It has been determined that this duration is within the bearable limits of the viewer. Therefore, the duration is considered inevitable.

Re-multiplexing devices basically exist in the broadcasting system of a broadcasting company that carries out digital TV services (there are some exceptions). Only this broadcasting company can control the re-multiplexing devices in detail from the upper transmission system. Therefore, the basic rule shall be such that while digital TV services are off air, their descriptions shall be deleted from PAT.

16 Use of Time Information

Present date and present time information (JST_time) is transmitted by TOT. This time is defined as "UTC (Coordinated Universal Time) + 9 hours" in ARIB STD-B10. This time does not change throughout the year even if the summer time system is introduced. A receiver can use TOT to calibrate its internal clock and use it as a time reference for time display and presentation of synchronization. Time and date information is expressed in a 40-bit field consisting of encoded MJD lower 16 bits (year, month, day) and JTC 24 bits (hour, minute, second), which is JST time encoded in BCD (binary-coded decimal) notation in 6 units of 4 bits.
(Refer to ARIB STD-B10, Volume 2, Annex C)

16.1 Relationship between TOT and Program Presentation and Recording Delay

- ○ TOT shall be sent so that it synchronizes with JST time when it is input to the receiver. Its accuracy shall be within a tolerance of puls or minus 500ms.
- ○ It is necessary to consider a delay caused by different transmission media between when program source signals are transmitted from a VTR or camera in a broadcasting station and when they are presented to a receiver. Because some channels or programs are transmitted across (simulcast) terrestrial broadcasting (analog) and BS analog broadcasting, if the same program source is used, there will be a delay of approximately 1.3 seconds between the two media.

Table 16-1 Propagation delay and processing delay

Transmission medium	Propagation delay	Delay in encoding/decoding, multiplexing/ demultiplexing, etc
Terrestrial broadcasting	≈0	≈0
BS analog broadcasting	300ms	≈0
BS digital broadcasting	300ms	Assumed as approx. 1,000ms

- ○ In BS digital broadcasting, a time difference of 1.3 seconds could occur between JST time and program start time/end time. When a maximum time difference generated between TOT and JST prior to that occurrence is added, the time difference could be 1.8 seconds.

16.2 Time/Date Information Encoded in SI

Table 16-2 shows a list of time/date information encoded in SI.

Table 16-2 Time/date related information encoded in SI

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

For any of the three types of date and time information contained in the above table (JST_time in TOT, start_time in EIT, and time_of_change in the local time offset descriptor), "UTC (Universal Coordinated Time) + 9 hours" shall apply to encoding regardless of whetherthe summer time system is introduced.

16.3 MJD in Year 2038 and After

The lower 16 bits of MJD (Modified Julian Day) will become all ‘1’s on a certain day in year 2038. They will become all ‘0’s on the next day. If the conversion formula in ARIB STD-B10, Part 2, Annex C is used, the day expressed in all ‘0’s goes back to 1800s. Therefore, operation in BS digital broadcastion shall be performed as follows:

- ○ The conversion formula defined in ARIB STD-B10, Part 2, Annex C shall be also used as it is after 2038 up to February 28, 2100. The lower 16 bits of the converted MJD value shall be transmitted.
- ○ On the receiver side, a date such as its shipment date shall be stored in it memory. If information with a date apparently older than it is transmitted, the date should be calculated with an assumption that ‘1’ is assigned to the 17th bit.
- ○ In year 2100 and afterwards, it is necessary to re-define the MJD conversion formula. The actual formula is undecided at the moment.

Details of Operation

17 Event Sharing

17.1 Overview of Event Sharing

When the same ES_PID is described in PMTs of multiple services, the viewer can watch the same event while any of these services is selected. Figure 17-1 shows an example.

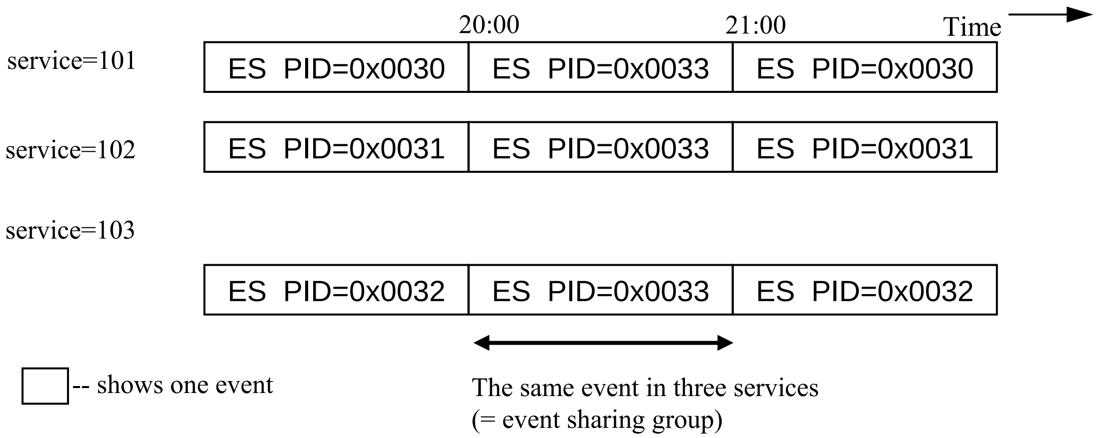


Table 17-1 Event change example

As shown above, when an event is broadcast, the same ES_PID can be set to PMTs of multiple services. A type of transmission that enables the viewer to view the same event in any of multiple services is defined as "event sharing". A group of services that broadcast the same event through event sharing is defined as an "event sharing group" as a unit. The following describes the operation for the above.

17.2 Event Sharing Operation Rules

The following rules shall be observed for event sharing.

1) Event sharing shall be operated within a broadcaster and within a TS.
2) Service_id numbers for an event sharing group shall be basically adjacent to each other (serialized), but some exceptions are also permitted.
3) Event sharing must not be started or ended, an event sharing group must not be changed during transmission of an event.
4) For event sharing, the same component_tag value and the same ES_PID shall be described in all the services that share an event that are described in PMT. There should no differences among these services.
5) If the program start time or duration needs to be changed for a reason such as flexible program scheduling, the same changes shall be made for all the services that share the event.

6) All the piecies of event information to be described in EIT must be the same across the services except for service_id and event_id.

17.3 Description into EIT

When event sharing is performed, event information to be described in EIT becomes the same across the services except for event_id. Describing such information in EITs of multiple services as it is wastes a receiver 's storage capacity. Viewed from a different angle, if a receiver is capable of recognizing that the events actually the same in multiple services, such a waste can be avoided. This enables efficient program schedule display and user interface design.

For the above reason, when event information for an event sharing group is to be described in EIT, the reference destination/reference sources shall be set first and then the descriptors that become common information shall be placed only in the reference destination to reduce the transmission size of SI. In addition, the above event sharing group and reference destionation/reference sources shall be described in event group descriptors.

The following describes the rules of description into EIT for event sharing.

1) One of the services in an event sharing group shall be set as reference destination.
2) Services other than the reference destination shall become reference sources.
3) One reference destination can be set for each event group.
4) After being described in EAT, the reference destination shall not be changed within its event sharing group.
5) An event group descriptor shall be placed in the event loop of EIT in which an event for an event group is described. The rules for placement of event group descriptors are as follows:
   - group_type shall be "Event Common ("0x01")".
   - The char area shall not be used.
   - All the service_id and event_id in the event group, including the ones for the reference destination event, shall be described in the reference destination.
   - Only the service_id / event_id of the reference destination shall be described in each reference source.
6) For event sharing, charging-related judgment including free_CA_mode shall be made all based on descriptions in the reference destinations.

All the descriptors to be described shall be written into the event loop of the reference destination. On the other hand, descriptors shall be omitted in a reference source in accordance with the rules for EIT[p/f], EIT[schedule basic], and EIT[schedule extended]. The omitted descriptors shall be obtained from the reference destination. The rule for omission is shown in the following section by table type.

Whether the relevant service is a reference destination or source destination shall be judged by the existence of its own service_id and event_id in the event group descriptor in its EIT. In other words, if information about a service is described in its own event group descriptor, the service can be judged as a reference destination. On the other hand, if information about a service is not described in its own event group descriptor, the service can be judged as a reference source. The service_id and event_id described in its event group descriptor shall be judged as the reference destination.

17.4 Operation Rules and Operation Examples by Table Type

17.4.1 EIT[p/f]

When an event to be shared is described in EIT[p/f], the following rules shall apply.

- Event group descriptors shall be described in all the event loops involved with event sharing.
- The descriptors for All-Station SI shall be placed in all EITs[p/f] regardless of whether EIT[p/f] belongs to a reference destination or reference source.
- The descriptors for Each-Station SI shall be placed only in the reference destination. Reference sources shall refer to such descriptors.

These rules are illustrated in Figure 17-2. The figure shows an example of an event sharing group configured in the three services: service_id=101, 102, and 103, for the HD transmission program "Baseball Game Coverage: 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 three services in the figure should be defined as a reference destination. In the figure, the event loop service_id=101/event_id=3251 is a reference destination. On the other hand, the remaining two event loops (service_id=102 / event_id=8381 and service_id=103 / event_id=64) become reference sources.

All the service_ids and event_ids that consititute an event sharing group are described in the event group descriptor of the reference destination. On the other hand, only the reference destination (service_id=101/event_id=3251) is described in the event group descriptor of each reference source.

In EIT[p/f], the same descriptors for All-Station SI are placed in each of the three event loops. The descriptors for Each-Station SI are only placed in the reference destination .

When information for All-Station SI such as a program title is needed, it is possible for receivers to use any EIT[p/f] regardless of whether it belongs to a reference destination or refence source. When information for Each-Station SI is needed, the EIT[p/f] of the reference destination shall be used.

Although the descriptors for All-Station SI to be described are the same, reduction in transmission size through application of the reference system will not be performed for All-Station SI in EIT[p/f]. It is because if the reference system is applied, it takes too much time to obtain information, and that can result in trouble when changes need to be made urgently for reasons such as flexible program scheduling. However, for the descriptors for Each-Station SI, application of the reference system will not pose any problem because its usage is different. Therefore, the reference system is used.

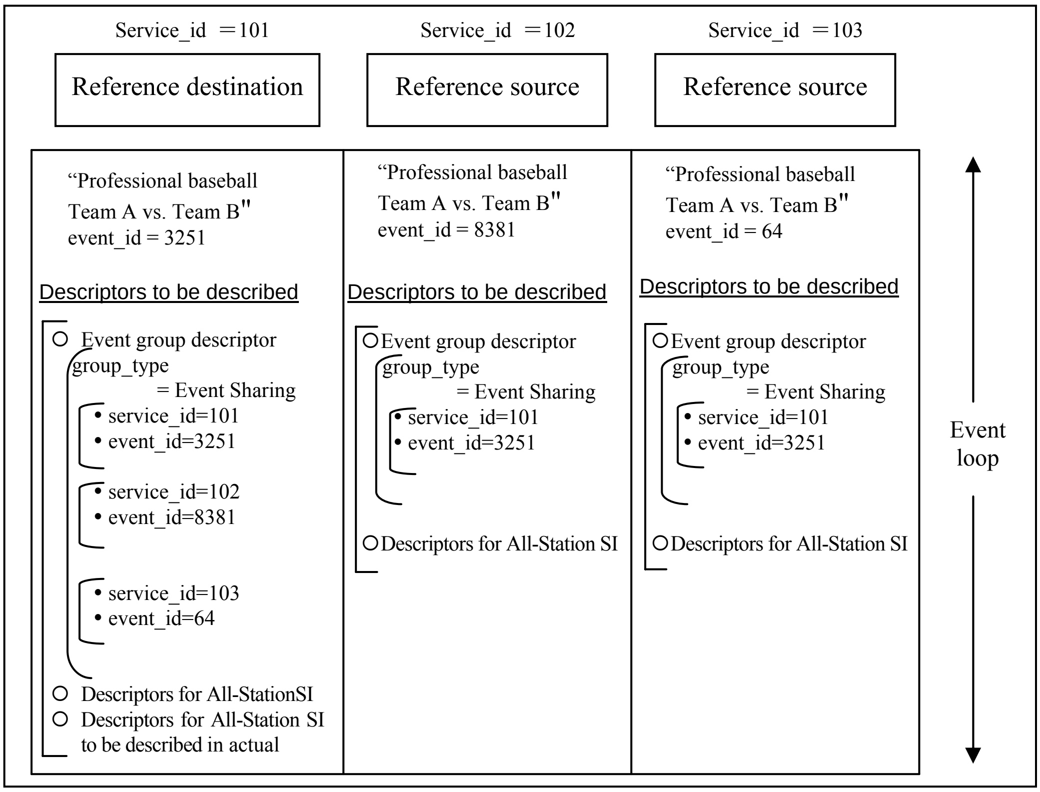


Table 17-2　Example of description into EIT[p/f]

17.4.2 EIT[schedule basic]

When an event to be shared is described in EIT[schedule basic], the following rules shall apply.

- ○ Event group descriptors shall be described in all the event loops involved with event sharing.
- ○ All the descriptors to be described as EIT[schedule basic] shall be placed in the reference destination.
- ○ Descriptors other than an event group descriptor shall not be placed in each destination source.

These rules are illustrated in Figure 17-3. The figure illustrates a case of EIT[schedule basic] for the same event sharing group as in Figure 17-2 for EIT[p/f]. The descriptors to be normally described shall be only described in the reference destination, and descriptors other than an event group descriptor shall not be placed in a destination source. All the service_ids and event_ids in the event sharing group shall be described in the event group descriptor of the reference destination. Only the service_id and event_id of the reference destination shall be described in the event group descriptor of a reference source.

Like EIT[p/f], a receiver shall judge whether the relevant service is a reference destination or source destination from an event group descriptor. When a reference source needs information of descriptions in

EIT[schedule basic], it shall refer to the descriptors in the EIT[schedule basic] that belongs to the event loop of the reference destination, which can be recognized from the service_id / event_id described in the event group descriptor of the reference source.

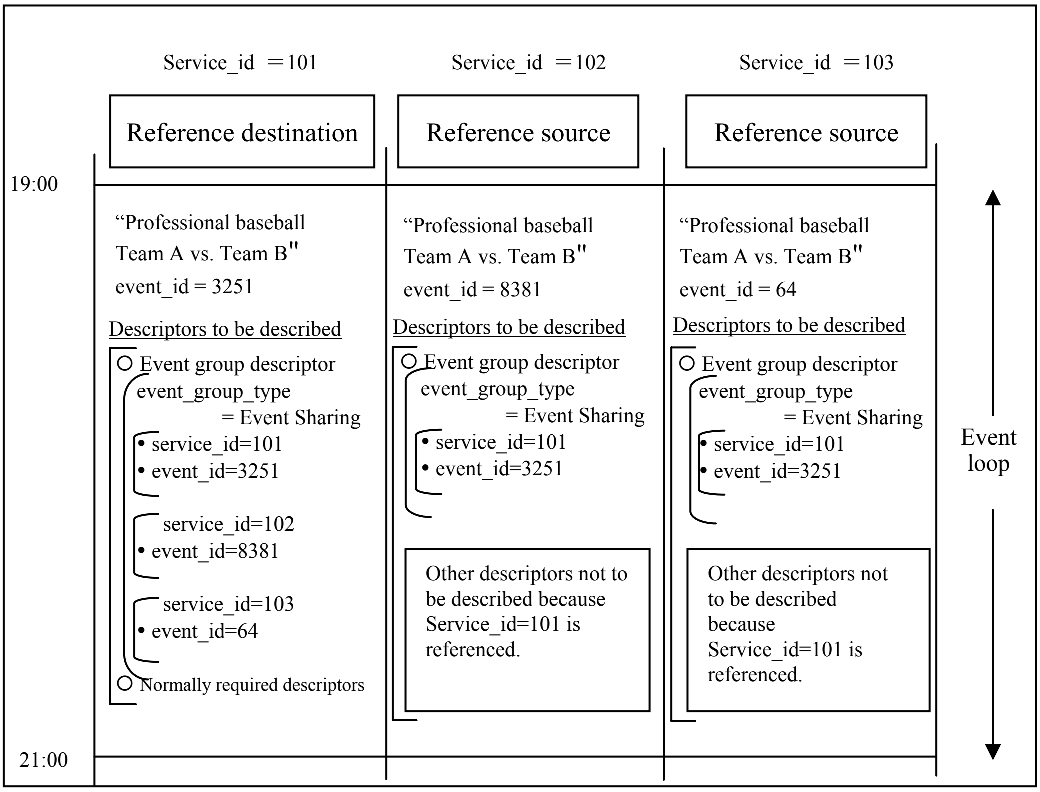


Figure 17-3 Example of description into EIT[schedule basic]

17.4.3 EIT[schedule extended]

The following is the rules for describing an event that belongs to an event sharing group in EIT[schedule extended].

- The descriptors to be described in EIT[schedule extended] shall be placed in the reference destination. Note that if there is no need to place descriptors in EIT[schedule extended], event loops can be omitted by following the operation rules for EIT[schedule extended].
- The event loop of a reference source shall not be described. (The event loop itself does not exist.)
- Regarding an event sharing group and reference destination/reference source, judgment shall be made by referring to EIT[schedule basic].

These rules are illustrated in Figure 17-4. The figure illustrates a case of EIT[schedule extended] for the same event sharing group as in Figure 17-2 for EIT[p/f]. Descriptors to be normally described shall be only described in the reference destination and an event loop itself shall not be placed in a destination source.

When a receiver refers to information in EIT[schedule extended] for the event for which an event group is formed, it shall obtain the EIT[schedule extended] of the reference destination. Judgment of whether a service is a reference destination or reference souce shall be based on an event group descriptor in EIT[schedule basic] in which the same event is described. Supposedly, the necessity of information in EIT[schedule extended] arises with the processing of EIT[schedule basic], and there is no possibility of such necessity arising independently. Therefore, it is not necessary to place an event group descriptor in EIT[schedule extended], nor to describe an event loop itself in the EIT[schedule extended] of a reference source because information about an event sharing group and reference destination/reference source can be obtained by referring to EIT[schedule basic].

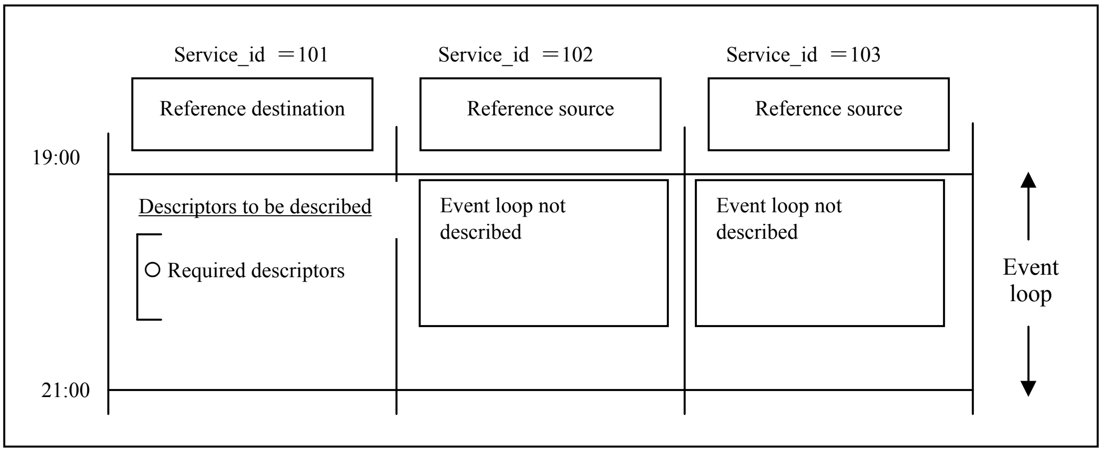


Figure 17-4 Example of description into EIT[schedule extended]

18 Series Event Operation

One of the applications to treat programs as a group may be an application that performs reserved recording of serial drama as a series.

The following describes series event operation.

18.1 Descriptors to Be Used

- ○ A series descriptor shall be used to define a series.
- ○ Series descriptors placed in EIT shall be transmitted as All-Station SI.
- ○ Series descriptors will not necessarily be placed for all events.
- ○ Even if a series descriptor is placed in EIT, its title may not be described. In that case, a receiver shall interpret a program title described in the short event descriptor as a series title. If it is desired to name a title different from a program title, a series title should be desribed in the series descriptor.

18.2 Value Assignment

1) series_id is uniquely assigned in multiple services of the same media type in the same broadcaster that is described in BIT.
   - ○ Events that belong to the same series may be broadcast across multiple services of the same broadcasting company. A range in which some series_id can be defined for one specific series shall be restricted to multiple services of the same media type in the same broadcaster, to which a service containing events of such a series belongs to. Within services of the same media type in the same broadcaster, multiple events with series descriptors whose service_ids match each other shall be recognized as events that belong to the same series even if they are operated across services. A series should not be defined across multiple broadcasters, or across multiple media types even in the same broadcaster.
   - ○ For 100 days after the day the last event belonging to some series is broadcast, the value for that series should not be assigned to a different series as its service_id. An event broadcast with the same series_id within the 100-day-period means that it belongs to the same series.
2) repeat_label
   - ○ Already-broadcast programs of some series may be repeated during the scheduled period for initial transmission of programs of that series. For example, this situation arises when a weekday serial drama series is scheduled to be initially transmitted every morning and then repeated every afternoon.
   - ○ In such a case, repeat_label=0 shall be assigned to programs scheduled to be initially transmitted, and repeat_label=1 shall be assigned to the ones to be repeated. For another repeat (for example, a program repeated in the evening in another service channel), repeat_label=2 shall be assigned. In the

same scheduled period, it is possible to distinguish a maximum of 15 scheduled repeats from the initially-scheduled broadcasts. The repeat_label value itself has no meaning. It is simply used for distinction of groups of scheduled programs. In other words, repeat_label=1 does not mean the first repeat. Even if a value does not suggest order of repeat transmission, different repeat_label apparently shows that it is a repeat based on a different schedule.

- With series_id and repeat_label, distinction can be uniquely made also with respect to repeat transmission. In principle, if reserved recording is made for a series based on its initial broadcasting schedule, initially broadcast programs should be a target of the reserved recording. Likewise, if reserved recording is made for a series based on its repeat transmission schedule, repeated programs should be a target of the reserved recording. However, since it is possible to recognize that the program content is the same by identical series_id, if the reserved recording overlaps reserved recording of another program, repeat_label can be used in such a way that reserved recording is made for the same desired episode based on another schedule (repeat transmission schedule) as an alternative.
- Even when a series is repeat transmission of a series already broadcast in the past, if there is no overlapping of schedules, it may be treated as a series of initial transmission (repeat_label=0 can be given).

3) program_pattern

- Shows a scheduling pattern for a program series. This value provides information on when the next event belonging to a series appears.

4) expire_date_valid_flag

- 0 shall be set to this valule if the expected end date of a series is undecided.

5) expire_date

- A date when the validity period of a series expires shall be described by using MJD. Even when the last episode event cannot be recognized for some reason, a receiver shall recognize that the series has come to an end beyond this date.
- This date shall not necessarily match the date for transmission of the final episode. The former can be after the latter.

6) episode_number

- The episode_number has a value between 0x000(0) and 0xFFF(4095).
- 0x000 is used when an episode number cannot be defined such as news programs.
- A receiver shall not recognize muliple events assigned with 0x000 as the same episodes.
- For repeat transmission of an episode in a series, the same episode number should be assigned.

7) last_episode_number

- The last_episode_number has a value between 0x000(0) and 0xFFF(4095).

- 0x000 is used when the last episode number (the total number of episodes) is undecided.
- An event whose last_episode_number is not 0 and matches espisode_number shall be the last episode in the series.

A series with more than 4,095 episodes shall be divided into separate series.

18.3 End of a Series

The end of a series is recognized in any of the following conditions:

1) When an event whose last_episode_number is not 0 and matches espisode_number came to an end.
2) When the current date passed the date described in expire_date.
3) When the next event that belongs to a series with undecided expire_date has not been received for 100 days since the last event in that series was received.

18.4 Operation Examples

18.4.1 General example

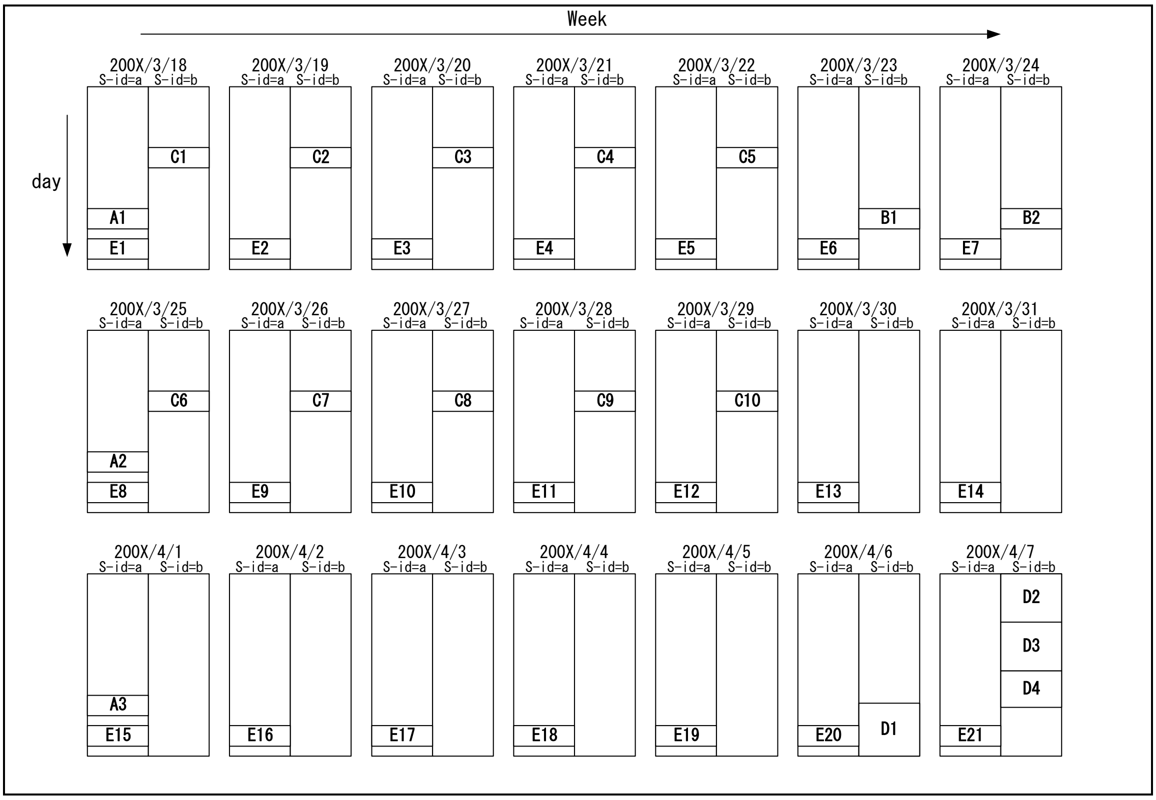


Figure 18-1 Series operation example (1)

Table 18-1 Example of placement of series descriptors for Figure 18-1

Event		series_ id	repeat_ label	episode_ no	last_episode_ no	pgm_ptn	expire_ date
A1	Weekly scheduled drama series with 12 episodes	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	2-consecutive night drama series	101	0	1	2	0	200X/3/24
B2		101	0	2	2	0	200X/3/24
C1	Weekday serial drama	102	0	51	60	1	200X/3/31
...							
C10		102	0	60	60	1	200X/3/31
D1	24-hour 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 (No. of broadcasts undecided)	109	0	0	0	1	********
...		...	...	...	...	...	
E21		109	0	0	0	1	********

Figure 18-1 and Table 18-1 show an example of a series.

Services with service_id=a and b belong to the same media type in the same broadcaster.

- Programs A1 to A3 show an example of a weekly-scheduled drama series with 12 episodes.The series comes to an end on June 30, 200X at latest. This example is applicable to a weekly-scheduled drama, music program, and variety program.
- Programs B1 and B2 consitute a series of the first and last parts (totally two parts) within the same service.
- Programs C1-C10 are a series of serial drama programs that are broadcast on weekdays. This example shows that the 60th episode, which is the last episode, is scheduled for broadcasting on March 31, 200X.
- Programs D1 to D4 shows an example of a 24-hour program. They should be merged into one event, but they are split into several events. This type of program lacks the concept of episode numbers.
- Programs E1 to E21 show an example of a series of regular-hour programs whose total number is undecided. As long as its expected end date is undecided, the date in expire_date is described as not valid. ("********" in the table means that the date is not valid.)

18.4.2 Repeat Transmission Examples

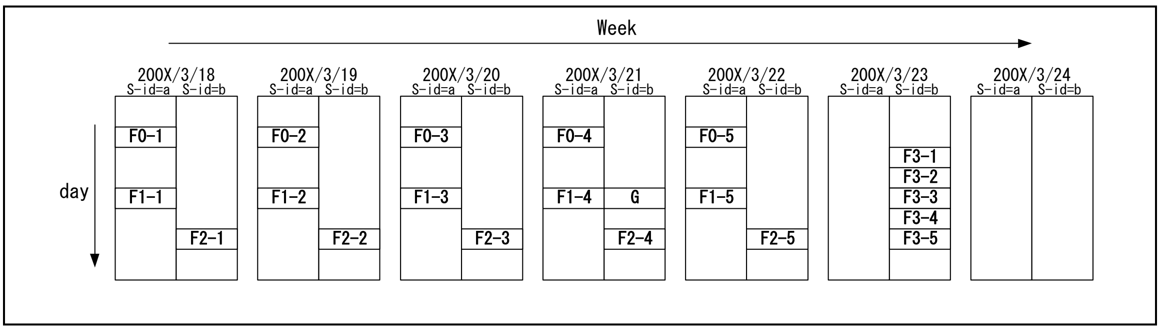


Figure 18-2 Series operation example (2)

Table 18-2 Example of placement of series descriptors for Figure 18-2

Event		series_ id	repeat_ label	episode_ no	last_episode_ no	pgm_ ptn	expire_ date
F0-1	Initial transmission of weekday across-the-board drama	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
F05		110	0	55	55	1	200X/3/22
F1-1	Repeat of F0 on the same day, at a different hour	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
F15		110	1	55	55	1	200X/3/22
F2-1	Repeat of F0 on the same day, in a different channel	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
F25		110	2	55	55	1	200X/3/22
F3-1	Weekend collective broadcasting of F0	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
F35		110	3	55	55	4	200X/3/23

Figure 18-2 and Table 18-2 show an example of repeat transmission of a series.

Services with service_id=a and b belong to the same media type in the same broadcaster.

- Programs F0-1 to F0-5 are initially broadcast, daily-scheduled serial programs.
- Programs F1-1 to F1-5 are repeats to be broadcast in the same service channel as initially broadcast programs but at different hours on the same day.
- Programs F2-1 to F2-5 are repeats to be broadcast in a service channel other than the one in which initial transmission was made and at different hours on the same day.
- Programs F3-1 to F3-5 are repeats to be collectively broadcast in a service channel other than the one in which initial transmission was made and on a different day.
- While the recording of program G is reserved, if the reserved recording of a series is performed on programs F1-1 to F1-5, the recording of program F-14 cannot be reserved because the transmission hour of program G overlaps that of program F1-4. However, since it is possible to recognize that programs F0-4 and F2-4 have the same content as program F1-4 , the above recording can be processed in such a way that the recording of either of them is reserved instead.

19 Change of Event Schedule

This chapter describes the rules on and the concept of updating SI (mainly, EIT[p/f]) when initial broadcasting schedule is changed (mostly urgently).

19.1 Undecided state

As a way to handle an urgent event schedule change and show the status of the actual operation at a station, the "schedule undecided state" can be defined.

There are two types of schedule undecided states: One is "event-undecided state" where the event is not fixed and the other is "time-undecided state" where the event time is not fixed though the event has been fixed.

19.1.1 Undecided Event

"Undecided event" indicates the state that the broadcasting schedule is no decided and its content is not fixed. When event schedule is urgently changed, an "undecided event" can be defined only in EIT[p/f].

An undecided event is identified with the start_time and duration fields in an EIT. In other words, when both the start_time and duration of an event are set to all 1, the event is an "undecided event". In this case, event_id has no meaning.

Undecided events can exist only in "following" of EIT[p/f].

19.1.2 Undecided Time

When an event is changed urgently, the start_time and duration of the event can be defined as "undecided" only in EIT[p/f]. When either of start_time and duration is set to all 1, it means that the relevant time information is "undecided". When both start_time and duration is set to all 1, it indicates an undecided event.

Even if "undecided time" is set for an event, the event_id of the event is valid.

If "undecided time" is set, the event should be recognized as follows:

○ When start_time is undecided

This state indicates that the event is scheduled to be broadcast as the next program but the precise start time is undecided because the ending time of the current program on air is undecided. This state can occur only in "following" of EIT[p/f].

○ When duration is undecided

This state indicates that there is a possibility that the initially set duration of time will be changed in the event currently being broadcast or suspended. This state can occur in "present" and "following" of EIT[p/f].

19.2 Principles on Event Schedule Change

- Once the start time of an event has been defined, it should not be sent at an earlier time.
- EIT[p/f actual] reflects the changes of event schedule in most reliable manner.
- Basically, EIT[p/f actual] should be sent with the corrected contents at least 30 seconds before update. This duration should be used as the time limit to be placed on normal operation ensurance in recorders and other devices. Even if such transmission is impossible, the content should be fixed at least 15 seconds before the transmission. However, this rule may not be met due to unavoidable circumstances. For example, there may be cases as described below:

1) When a program registered in "following" is replaced with another program immediately before the broadcast start time (3 seconds before at the shortest)
2) When a program suddenly appears in "present" without appearing in "following" and the broadcasting of the program starts
3) When the "present" program is extended without updating "present/following" and the start of the "following" event is delayed
4) When "present/following" is updated at the time as describedeven though the broadcasting of the "present" program is extended and the start time of the "following" program is delayed
5) When a program (for example, a extensive live program) that was initially set out as a single event is once suspended due to an "emergency news" cut-in or other reasons then is restarted

19.2.1 Content Change without Version Number Change

With the change of event schedule, there may be a rare case where the content of EIT[p/f other] is changed even though the version number is unchanged. Its reasons are as follows:

Each table in commonly operated SI is given version_number at the table generation source (program broadcasting source), distributed to the transmission system of each TS through the SI collection/delivery center, and transmitted (broadcast). EIT[p/f other] tables do not communicate with the collection/delivery center every time an event is switched. The EIT[p/f other] tables to be sent for a certain time period (e.g. for 1 day) are delivered to the transmission system of each TS in a batch. (the version_number values are incremented by 1 and set beforehand at a batch delivery.) At this time, the timestamps indicating the time at which each EIT[p/f other] should be transmitted are delivered together. Based on these timestamps, each EIT[p/f other] table is transmitted from each TS. Therefore, unless event schedule is changed, version_number is incremented at accurate time without fail and transmitted.

For example, it is initially decided that version_number of "present" is incremented from "0x2" to "0x3" at 19:00:00. However, at 18:59:30, the program broadcasting source decides to change the content of the program that has been scheduled to start at 19:00:00 and changes EIT[p/f actual] immediately before. In the EIT[p/f actual] of the broadcasting source, version_number changes from "0x2" to "0x3" at 18:59:30 and then changes to "0x4" at 19:00:00 (versions are not always identical between "actual" and "other", but they are assumed to be identical for the sake of simplicity). If the time lag (network delay, section processing delay, etc.) is 1 minute, the section "0x3" sent from the broadcasting source at 18:59:30 reaches the transmission system of other_TS at 19:00:30. The transmission system of other_TS naturally starts to transmit "present" of "0x3" at 19:00:00, as specified by the timestamp. Then, at 19:00:30, the section with the same version_number "0x3" but with the changed content reaches and the transmission system starts to transmit it. At this time, the table content might be different even though the version number is the same.

This problem does not always occur when event schedule is changed. If change is fixed at 18:58:00, the transmission system of each TS receives section "0x3" at 18:59:00 that should have been started at 18:58:00 and section "0x4" to be started at 19:00 together (including p/f to be broadcast subsequently). Therefore, the above problem does not occur.

It was considered that version_number should always be incremented by "2". However, it has been finally concluded that it would be a problem to increment version_number always by "2" because the problem rarely occurs. In the view of the complexity of delivery systems, it has been also concluded that judging the increment based on the change of event schedule should be avoided.

In the case of [actual] tables, they are given a version_number immediately before being sent; therefore, the continuity is maintained unless an accident occurs at the sending side. Even if an accident occurs, version_number is changed when the content is changed. In the case of [other] tables, there is usually no need for the receiving end to always monitor version_number and reflect the change of version_number immediately when it is changed. The receiving end only needs to obtain version number as required or check for a change of version_number occasionally. Also, even if version_number is not changed (this rarely happens), it has almost no effect on the operation of receivers. Based on this idea, such operation has been permitted. It has been concluded that such operation enables version_number values to be kept identical among "other" tables and the load of sending equipment to be reduced as well.

Nevertheless, the broadcaster should make efforts to send schedule change as soon as possible. However there may be cases where it is impossible to do so. Therefore, it is not guaranteed that this problem does not occur.

19.3 Basic Rules on Event Progress

The progress of an event is indicated by EIT[p/f]. In order to know precise progress, EIT[p/f actual] should be obtained. Three parameters are provided in EIT[p/f] to indicate the progress of an event as listed below:

- Placement of an event in "present/following"
- start_time of an event
- duration of an event

running_status in EIT is provided fundamentally to indicate the progress of an event, but in digital satellite broadcasting, running_status is always set as undefined and is not used.

- Judgment of "ongoing"/"ended"

Whether the event is ongoing or has ended can be judged based on whether or not the event is placed in "present" in EIT[p/f]. In other words, when an event is placed in "present", the event is judged as "being broadcast". Likewise, when an event that has been placed in "present" disappears from EIT[p/f], the event is judged as "ended".

- Judgment of "started"

Whether an event has started is judged based on start_time in "following" in EIT[p/f]. In other words, when the time indicated by start_time in "following" is reached, the event is judged as "started". Note that EIT is not always be updated at the time indicated by start_time because of a problem associated with EIT cycles. In the case of EIT[p/f actual] tables, they are always updated within 3 cycles after the start_time in "following". If it is not updated within 3 cycles, an abnormal state is assumed. Only during this 3-cycle period, there is a state where an event judged as "being broadcast" based on "present" is judged as "started" based on "following" at the same time .

- Judgment of "suspended"

Whether an event is being suspended is judged by comparing start_time of "following" in EIT[p/f] and the current time. Note that when an event is going to be suspended soon, the times in "present" and "following" may overlap each other. To suspend 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 state). To restart an event, the content of "following" should be placed in "present" without changing "start_time". An event is judged as "restarted" when the event is placed in "present" of EIT[p/f]. This is because the restart time cannot be described because "start_time" of a suspended event ("following") should no be changed.

- Judgment of "cancelled"

An event is judged as "cancelled" when the event is not described in commonly operated SI within 3 hours after the initially scheduled start time. Therefore, if an event is changed to be broadcast the next day or later with the change of event schedule, EIT[schedule] needs to be updated within 3 hours.

Basically, these judgments apply to both actual and other of EIT[p/f]. However, in the case of "other", there is a possibility that update is delayed with the change of event schedule. If precise progress needs to be known for recording control, for example, the progress should be judged based on the status of EIT[p/f actual].

Table 19-1 shows the progress of events that can be judged from start_time and duration in EIT[p/f actual].

Table 19-1 start_time and duration Values in EIT[p/f actual] and the Status Indicated by Each Value

	start_time	duration (end_time)	Status
present	Before the current time	Before the current time	Program in progress (during the transition period) (Note 1)
	Before the current time	After the current time	Program in progress
	Before the current time	Undecided	Program in progress and the end time is not decided. (Very likely to transition to "early ending", "extended", etc.)
	Undecided	Any	Abnormal state
	After the current time	Any	Abnormal state
following	Any	Before the current time	Abnormal state
	Before the current time	After the current time	Program is suspended. Scheduled to end at the end time indicated by the "duration" value including the suspended period (Note 1).
	Before the current time	Undecided	Program is suspended. The scheduled end time is not decided.
	After the current time	After the current time	Scheduled to be broadcast as the next program.
	After the current time	Undecided	Scheduled to be broadcast as the next program. However, the end time is not decided.
	Undecided	Other than "Undecided"	Scheduled to be broadcast as the next program but the scheduled broadcasting start time is not decided. The value of duration is valid.
	Undecided	Undecided	The next program is undecided. The described event is meaningless.

(Note 1) Within a 3-cycle period after start_time in "following", there is a possibility that update of EIT[p/f actual] is delayed. For example, if start_time in "following" is before the current time and duration is after the current time, the program can be judged as "suspended" as shown in the above table. However, if the current time is very close to start_time (within 3 cycles), the update of EIT[p/f actual] may have been delayed. Therefore, the program should be regarded as "in progress" in recording control or other devices

19.4 Consistency between EITs

The EITs included in commonly operated SI are divided into three types: EIT[p/f actual], EIT[p/f other] and EIT[schedule basic]. Usually, the same information is described in these tables. However, if event schedule is changed, their consistency may not be maintained.

19.4.1 Consistency between EIT[p/f actual] and EIT[p/f other]

Usually EIT[p/f other] is updated properly in accordance with the event start time in the same manner as for EUT[p/f actual]. However, if an emergent change of event schedule occurs, the reflection of the change into EIT[p/f other] may be delayed. This delay may be existent between "actual" and "other" as well as between different "other" tables.

Basically, information in "actual" is updated earliest and is most accurate, but if the event is moved to other TS, "other" has to be obtained.

In this case, operation can be performed based on the following concepts:

1) When checking the status (start time, etc.) of a specific event in reservation processing or other processing:
   - Because early sending of an event is basically prohibited, the obtained information is valid even if the obtained start time is later than the previously obtained start time.
   - If the obtained start time is "undecided", the currently held time should not be erased.
2) When obtaining information of a non-specific event
   - Basically, operation can be performed assuming that the obtained information is correct.

Care should be taken when an event is suspended. If only EIT[p/f other] is obtained when a suspended event is moved to other TS, it is impossible to judge whether update is delayed or the event has been restarted from the suspended state. Currently, there is no solution for this case.

In the case of version number, the same version number is used between TSs of EIT[p/f other]. The version numbers of TSs are unrelated between EIT[p/f actual] and EIT[p/f other].

19.4.2 Consistency between EIT[p/f] and EIT[schedule]

EIT[p/f] is given a higher priority than EIT[schedule] and update information is reflected accurately to EIT[p/f].

In addition, because transmission of EIT[schedule] is stopped on a segment basis as time passes, there is a possibility that information on the program being broadcast will not be able to be obtained. Information on the program being broadcast is always described in EIT[p/f] but information of only up to 2 programs can be described.

As a result, when a receiver needs to create an event list in chorological order starting from the currently broadcast event, the EIT[p/f] and EIT[schedule] need to be merged.

Under normal conditions, these tables can easily be merged because they are consistent with each other. However, if a change is made to event schedule, information becomes inconsistent between EIT[p/f] and EIT[schedule].

The guidelines for receivers to merge EIT[p/f] and EIT[schedule] are given below:

- "present" events indicated in EIT[p/f] should be preferentially merged.
- When the duration of a "present" event is undecided, it should be merged so that it overlaps an event including the current time in EIT[schedule].
- When a "following" event indicated in EIT[p/f] is fixed (in other words, it is not in the "undecided" state), the "following" event should be preferentially merged. In this case, the event in EIT[schedule] that overlaps the "following" event can be presented as a frame starting from the end time of the "following" event (Note that change of an event start time should be avoided).
- When a "following" event is "undecided", EIT[schedule] should take precedence. In other words, events after the "present" event should be presented based on EIT[schedule].

19.5 Guidelines for Transmitting the Changes of Event Schedule

Guidelines for transmitting the changes of event schedule are provided below. In actual stations, the operation described below is not always guaranteed because actual operation at each station may differ (for example, an undecided event or undecided time may be sent before schedule change is fixed). Therefore, these guidelines should be considered as basic concepts.

Note that the following guidelines describe schedule changes of events to be described on SI and do not determine management units such as programs within a station. Each broadcaster should decide how to allocate events to management units within a station based on the definitions of events.

19.5.1 Event Extension

To extend an event (To broadcast a program beyond the scheduled end time), the EIT should be changed as described below.

At least 30 seconds before the end time of the event, "duration" in "present" of EIT[p/f actual] should be changed. In this case, the "duration" value should be changed to the correct value after extension or it should be set to "undecided". At the same time, start_time in "following" should be changed for consistency. It is prohibited to set up times in "present" and "following" in a way they overlap each other. The minimum extension time is 1 minute.

Changed information should be reflected to EIT[p/f other] promptly (however, reflection may be slightly delayed due to system configuration).

Changed information should also be reflected to EIT[schedule] as quickly as possible. However, "undecided time" should not be described in EIT[schedule].

EIT can be updated repeatedly to extend an event. For example, when a baseball game program is extended, EIT is updated for 10-minute extension tentatively and can be updated again for further extension according to the situation.

Note that even after an EIT is sent with "undecided time", it is desirable to update the EIT accordingly as soon as the extension schedule is fixed.

19.5.2 Early Ending of an Event

To end a program earlier than the scheduled end time, the relevant EITs should be changed as described below:

When it is decided that an event needs to end earlier, the EIT[p/f actual] should be transmitted promptly based on the new schedule. In this case, the duration value in "present" should be smaller than the original value. It is desirable that the fixed EIT[p/f actual] be transmitted at least 30 seconds before the actual early end time. Note that a receiver should regard a program as having ended when the program description disappears from EIT[p/f].

Changed information should be reflected also to EIT[p/f other] and EIT[schedule] as soon as possible.

How to describe EIT after an event ends earlier is up to each broadcaster. However, a broadcast of an event at a time earlier than the initially defined start time should be avoided.

19.5.3 Event Delay

To delay the start time of an event (to start an event later than the scheduled time), the relevant EITs should be changed as described below:

When it is decided that an event needs to be started later than the scheduled start time, the EIT[p/f] should be updated and transmitted promptly if necessary (if it is expected that the change will have a further effect). In this case, the start_time should be delayed for a required duration from the original value. In addition, the fixed EIT[p/f actual] should be transmitted at least 30 seconds before. EIT[p/f other] should also be transmitted as soon as possible.

Even if the delay of an event will not influence EIT[p/f], the fixed information should be reflected to EIT[schedule] promptly. In this case, event information including the newly fixed broadcasting time should be described within 3 hours after the initially scheduled start time. If it takes more than 3 hours to fix the broadcasting time, a receiver should determine that the event has been cancelled.

19.5.4 Event Suspension

To suspend an event (stop a program for some reason and broadcast another program), the relevant EITs should be changed as follows:

When the suspension time comes, the "present" event in the EIT[p/f actual] should be immediately described in "following". In this case, start_time and duration should not be changed (when it is clear that the duration will be changed because of the event suspension, only duration should be changed). The description of the "present" event can be determined according to the content of the program to be broadcast. Then EIT[p/f other] should be updated promptly.

It is allowed to suddenly place (one or more) events (such as "information") in "present" during suspension, but an event previously defined in EIT[schedule] or other tables should not be placed.

To restart an event, the event should be placed in "present" again at the restart time.

To end a suspended event without restarting it, the description of the suspended event should be erased from EIT[p/f actual] (another event should be described in "following").

How to reflect information on a suspended event to EIT[schedule] is up to each broadcaster. However, the following should be preserved:

- ○ The same event should not be described more than once.
- ○ Event times should not be described in a way they overlap each other in a sub-table.
- ○ Undecided time should not be described in EIT[schedule].

One of the options is to avoid making any change to EIT[schedule] during suspension.

During suspension, times in "present" and "following" may overlap each other.

19.5.5 Cut-in of an Event

To cut in an event (to insert a program suddenly during broadcasting), the relevant EITs should be changed as follows:

If prior arrangements can be made, a cut-in event should be described in "following" of EIT[p/f actual] by 30 seconds before cut-in. If prior arrangements cannot be made, a cut-in event should be described directly in "present" of EIT[p/f actual]. A new event ID needs to be assigned to a cut-in event according to the event ID assignment rules. The same ID must not be assigned twice.

To suspend the event being broadcast when another event cuts in, EIT[p/f actual] should be changed according to the description in Section 19.6.4. In addition, EIT[p/f other] should also be updated promptly.

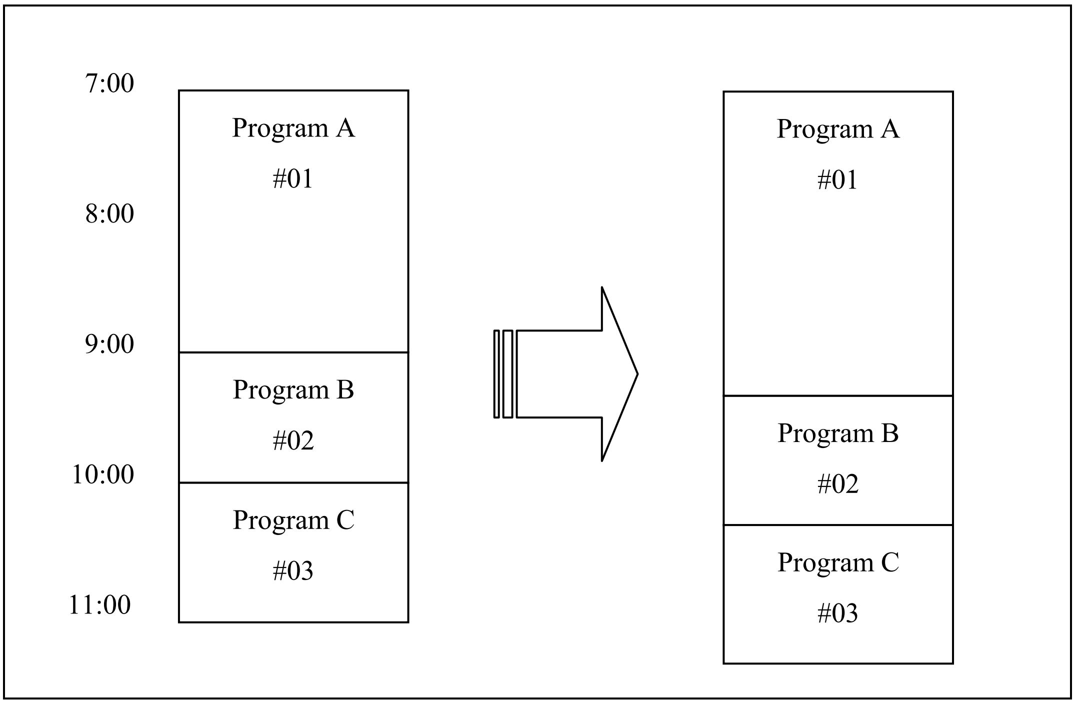
19.6 Examples of EIT transmission at Event Schedule Change

The following shows examples of EIT[p/f actual] transmission at event schedule change according to each case.

Tables may not always be transmitted as described in the following examples. However, these examples will be useful to know how to use "undecided" times and "undecided" events.

19.6.1 Case of Event Extension

As the end time of Program A is changed from 9:00 to 9:20, the start times of Programs B and C are delayed 20 minutes.



[Initial schedule]

	present				following			
Time	Program name	event_id	start	duration	Program name	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]

○ An event is extended repeatedly based on the fixed content.

Ten-minute extension is fixed for the event first (at 8:55). Then another 10-minute extension is fixed for the event (at 9:05).

	present				following			
Time	Program name	event_id	start	duration	Program name	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

○ An undecided event is used and the content is fixed promptly.

As a possibility of extension arises (at 8:55), the subsequent programs are set to "undecided". When the extension time is fixed (at 9:15), the EIT is fixed.

	present				following			
Time	Program name	event_id	start	duration	Program name	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

○ "Undecided" events are used and decision is delayed. (1)

As a possibility of extension arises (at 8:55), the subsequent programs are changed to "undecided". However, the decision of the undecided event is delayed (at 9:30). Program B starts suddenly (at 9:20).

	present				following			
Time	Program name	event_id	start	duration	Program name	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

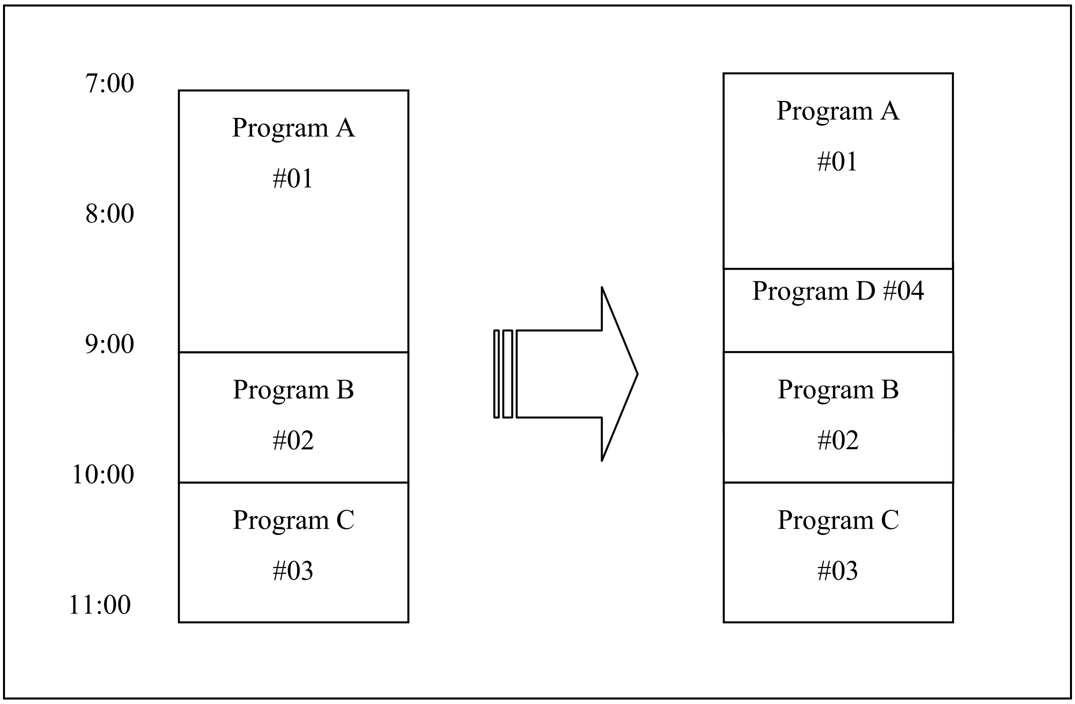
○ "Undecided" events are used and decision is delayed. (2)

As a possibility of extension arises (at 8:55), the subsequent programs are changed to "undecided". However, the decision of the undecided event is delayed (at 9:30). Program B starts suddenly (at 9:20). The cancellation of Program A is not decided at this point (at 9:20).

	present				following			
Time	Program name	event_id	start	duration	Program name	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 Early Ending of an Event

As Program A ends 20 minutes earlier than the initial schedule, new Program D is broadcast for 20 minutes. Program B and subsequent programs are broadcast as scheduled.



[Initial schedule]

	present				following			
Time	Program name	event_id	start	duration	Program name	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]

○ The event schedule is changed based on the fixed schedule.

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 name	event_id	start	duration	Program name	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

○ "Undecided" events are used and the content is fixed promptly.

As a possibility of early ending becomes high (at 8:30), the subsequent programs are changed to "undecided". Then before the early end time (at 8:40), the next program is fixed (at 8:35).

	present				following			
Time	Programname	event_id	start	duration	Programname	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

○ "Undecided" events are used and decision is delayed. (1)

As a possibility of early ending becomes high (at 8:30), the subsequent programs are changed to "undecided". Then information cannot be updated by the actual early end time (at 8:40). (Information is actually updated at 8:50).

	present				following			
Time	Program name	event_id	start	duration	Program name	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

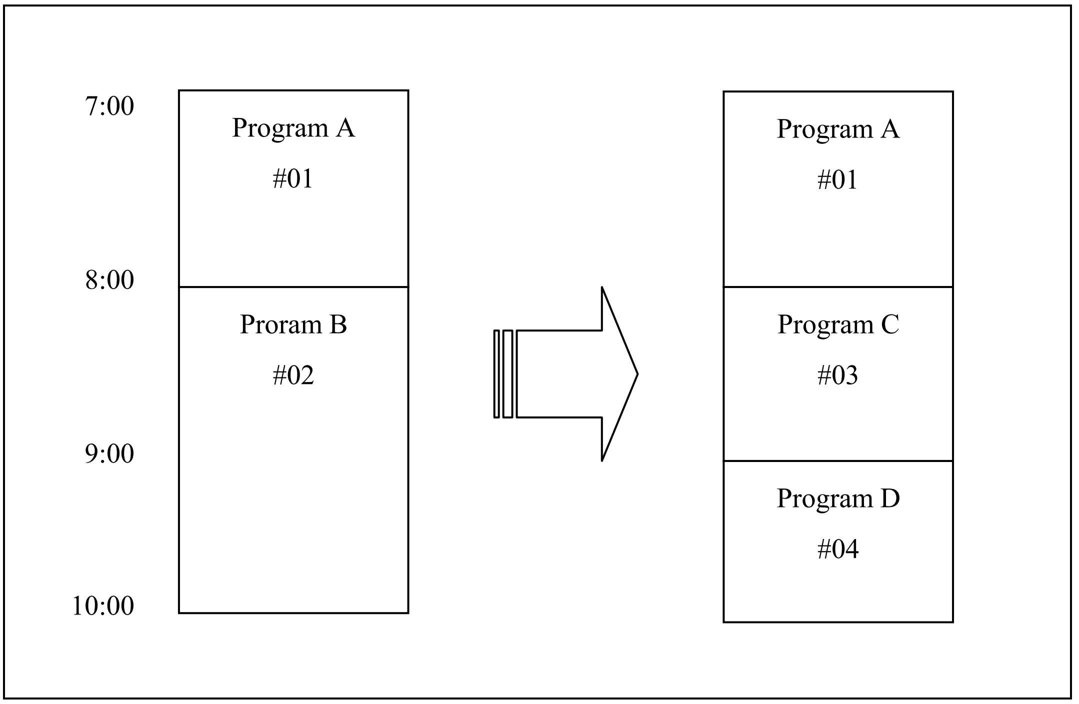
○ "Undecided" events are used and decision is delayed (2)

As a possibility of early ending becomes high (at 8:30), the subsequent programs are changed to "undecided". Then information cannot be updated by the actual early end time (at 8:40). (Information is actually updated at 8:50.) (Program A remains in "following" at 8:40).

	present				following			
Time	Program name	event_id	start	duration	Program name	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

The scheduled program, Program B, is cancelled and Programs C and D are broadcast instead.



[Initial schedule]

	present				following			
Time	Program name	event_id	start	duration	Program name	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	2:00

[Examples of schedule change]

○ Changes are made based on the fixed schedule.

At 7:40, the cancellation of Program B and the broadcasting of Programs C and D are fixed.

	present				following			
Time	Program name	event_id	start	duration	Program name	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

○ "Undecided" events are used and the content is fixed promptly.

As a possibility of canceling Program B becomes high (at 7:20), the subsequent programs are changed to "undecided". Then when the cancellation is fixed (at 7:40), Programs C is described as the following program.

	present				following			
Time	Program name	event_id	start	duration	Program name	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

○ "Undecided" events are used and decision is delayed. (1)

As a possibility of canceling Program B becomes high (at 7:20), the subsequent programs are changed to "undecided". Then the cancellation is fixed and the broadcasting of Program C starts (at 8:00), but information cannot be updated in time (until 8:10).

	present				following			
Time	Program name	event_id	start	duration	Program name	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	04	8:00	1:00	Program D	04	9:00	1:00

○ "Undecided" events are used and decision is delayed. (2)

As a possibility of canceling Program B becomes high (at 7:20), the subsequent programs are changed to "undecided". Then the cancellation is fixed and the broadcasting of Program C starts (at 8:00), but information cannot be updated in time (until 8:10). (Program A remains in "following" at 8:00).

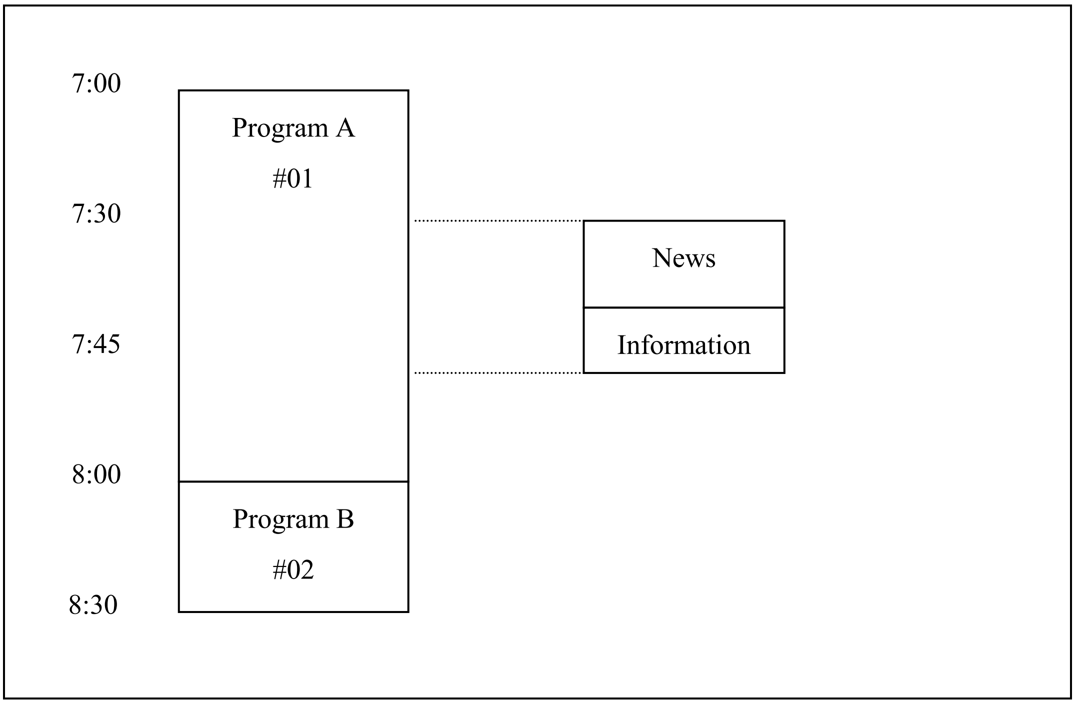
	present				following			
Time	Program name	event_id	start	duration	Program name	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	2:00
7:20	Program A	01	7:00	Undecided	Undecided	Any	Undecided	Undecided
8:00	Program C	03	8:00	Undecided	Program A	01	7:00	Undecided
8:10	Program C	04	8:00	1:00	Program D	04	9:00	1:00

19.6.4 Program Cut-in (1)

While Program A is being broadcast, an emergency news or another program is inserted.

After the news, a filler or information is broadcast.

Then, Program A is restarted.



[Initial schedule]

	present				following			
Time	Program name	event_id	start	duration	Program name	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30

[Examples of schedule change]

○ Changes are made based on the fixed content.

	present				following			
Time	Program name	event_id	start	duration	Program name	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	Informa-tion	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.

○ Information is updated after being changed to the "undecided" state.

	present				following			
Time	Program name	event_id	start	duration	Program name	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	Informa-tion	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

○ Dealing with the changes by changing the event name without changing the event

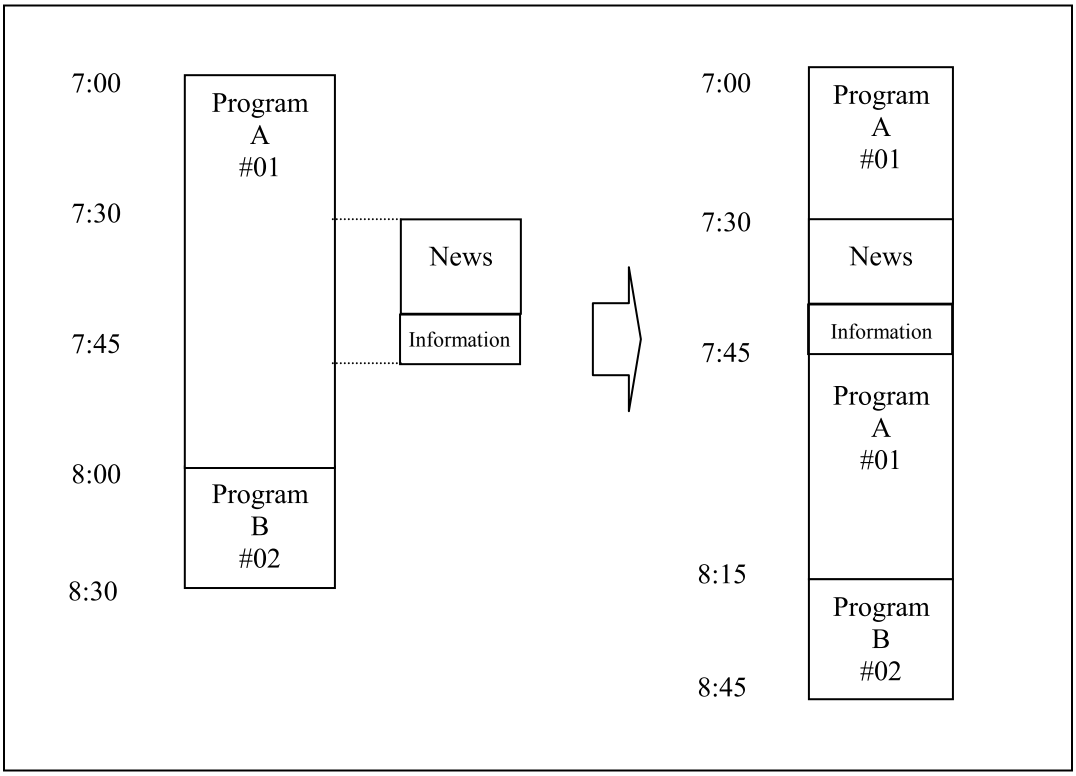
	present				following			
Time	Program name	event_id	start	duration	Program name	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30
7:30	News	01	7:00	1:00	Undecided	Any	Undecided	Undecided
7:40	Informa-tion	01	7:00	1:00	Undecided	Any	Undecided	Undecided
7:45	Program A	01	7:00	1:00	Program B	02	8:00	0:30

19.6.5 Program Cut-in (2)

While Program A is being broadcast, an emergency news or another program is inserted.

After the news, a filler or information is broadcast.

Then, Program A is restarted from the point it was interrupted. Therefore, the end time of Program A is also delayed.



[Initial schedule]

	present				following			
Time	Program name	event_id	start	duration	Program name	event_id	start	duration
7:00	Program A	01	7:00	1:00	Program B	02	8:00	0:30

[Examples of schedule change]

○ Change based on the fixed schedule

	present				following			
Time	Program name	event_id	start	duration	Program name	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	Informa-tion	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.

○ Updating after changing to "undecided"

	present				following			
Time	Program name	event_id	start	duration	Program name	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	Informa-tion	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

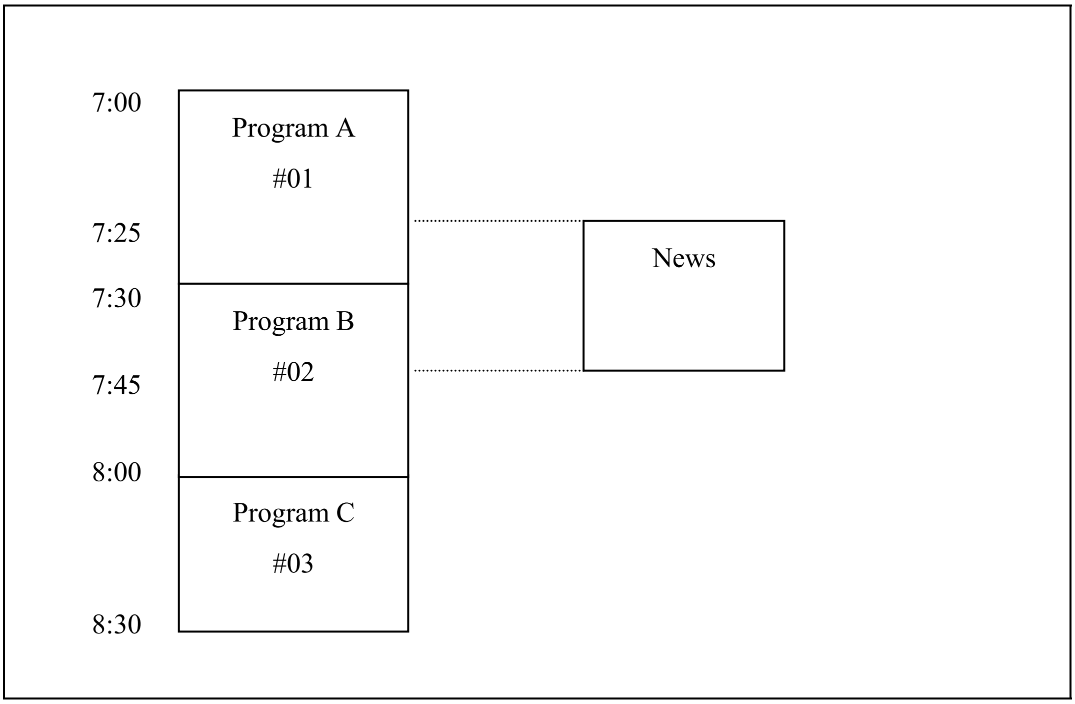
○ Dealing with the changes by changing the event name without changing the event

	present				following			
Time	Program name	event_id	start	duration	Program name	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	Informa-tion	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)

An emergency news is inserted during broadcasting of Program A and ends during broadcasting of Program B.

Then, Program B is restarted (started).



[Initial schedule]

	present				following			
Time	Program name	event_id	start	duration	Program name	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]

○ Change an event based on the fixed schedule.

	present				following			
Time	Program name	event_id	start	duration	Program name	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	01	7:45	0:15	Program C	03	8:00	0:30

* It is possible to suddenly make changes at 7:25 without making changes at 7:20.

○ Updating an event after changing it to "undecided"

	present				following			
Time	Program name	event_id	start	duration	Program name	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

○ Dealing with the changes by changing the event name without changing the event

	present				following			
Time	Program name	event_id	start	duration	Program name	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

○ Changing the "following" to "undecided" temporarily

	present				following			
Time	Program name	event_id	start	duration	Program name	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

20 Limited Reception

For limited reception broadcasting, keep the following items in mind to create and send PSI/SI.

20.1 EMM Stream Specification

In the limited reception broadcasting (chargeable broadcasting), EMM streams (EMM or EMM messages) should always be sent. In addition, if free programs with contents protection are broadcast, EMM streams may be sent. If EMM streams are transmitted, a limited reception method descriptor should always be placed in CAT within the same TS and sent. This descriptor specifies EMM streams for the target limited reception method. Only one EMM stream can be specified for a single limited reception method within the same TS. For more information about sending EMM streams when free programs with contents protection are broadcast, see Part 1 Section 5.

Note that EMM may need to be transmitted through a specific TS, although this situation rarely arises. For example, this operation is necessary when the encryption keys of all receivers need to modified simultaneously because a malicious individual attempts to illegally acquire the encryption keys. In this case, place the CA_EMM_TS descriptor in the first loop of NIT for a certain period and send it, and specify the power retention time after the power off operation between the transmission TS and the receiver. Note that in the specified TS, CAT is sent and the target EMM stream is specified as in usual operations. For more information about this operation, see Part 1 Section 5.

20.2 Billing Unit Setting for Programs

The following shows the billing unit setting and the relationship among the billing unit, ECM, and scramble.

○ Billing Unit Setting

- The default ESs are a single billing unit or non-billing target.
- Even if the default ESs are the billing targets, ES other than the default ESs can be non-billing target.

○ Relationship between Billing Target and ECM

- The billing unit and ECM have one-to-one correspondence.
- For free programs with contents protection, a single ECM corresponds to a non-billing target ESs. However, in this case, all ESs within the non-billing target ESs do not necessarily correspond to ECM, and some ESs may not actually correspond to ECM.

  For example, the following case may exist even for free programs with contents protection.

Default ESs:	Supported by ECM.
Other than default ESs:	Not supported by ECM.

○ Relationship between ECM and Scramble

- ES that is supported by ECM is scrambled.

However, in case of transient response between programs on the sender side or filler insertion, the ES is not necessarily scrambled even if it is supported by ECM. Whether the component is scrambled is indicated in the transport_scrambling_control field in the TS packet header.

In addition, programs are defined and classified in terms of billing targets as follows.

○ Free Program: A program whose default ESs are the non-billing target.

○ Chargeable Program: A program whose default ESs are the billing target.

  - The same billing unit (ECM) should be set up at least for the default ESs.
  - Components other than the default ESs can be the non-billing target.

Note that default ESs in the limited reception broadcasting are defined for each service type (see Table 31-16) in consideration of the billing target. They are shown in Table 20-1.

Table 20-1 Default ESs in Limited Recept

service_type	Contents	Default ESs
0x01	Digital TV service	Video, audio
0x02	Digital audio service	Audio
0xC0	Data service	Data (entry component)
0xA1	Temporary video service	Video, audio
0xA2	Temporary audio service	Audio
0xA3	Temporary data service	Data (entry component)
0xA8	Data service for accumulation beforehand	Data
0xAA	Bookmark list data service	Data (entry component)

20.2.1 PMT

For PMT, in case of billing components within a program or scrambling for free programs with contents protection, place the limited reception method descriptor and specify a valid ECM. The placement rule is as follows.

1) In case of placing the descriptor in the first loop, the corresponding ECM is applied to all components within the program.
2) In case of placing the descriptor in the first and the second loops, the ECM application described in the second loop is valid.
3) ECM_PID=0x1FFF can be specified only for the limited reception method descriptor for PMT. This ID means that the component is the non-billing target and that the corresponding ECM is not transmitted.
4) In case of free programs with contents protection, place a limited reception descriptor only in the first loop of PMT. This descriptor must include the PID of the ECM that holds a broadcasting company identifier that is commonly used for right protection. For information on values assigned to of each broadcasting company identifier that is commonly used for right protection, see Part 1 Section 8.
5) If there is a component for which a valid ECM is specified in the first loop and the component is not scrambled within the program, place the ECM_PID=0x1FFF limited reception descriptor in the corresponding second loop to explicitly indicate that it is not scrambled.

For example, if ECM_PID＝0x000A is specified in the first loop, ECM_PID＝0x000A is applied for components for which the corresponding descriptor is not placed in the second loop. If ECM_PID＝0x1FFF is specified in the second loop for a component, it means that the component is not scrambled and non-billing target.

Based on the above rules, the following operation is recommended in this specification document, .

- ○ Free Program
  - In the first loop of PMT, a valid limited reception method descriptor is placed only for free programs with contents protection. In this case, a broadcasting company identifier commonly used for right protection is specified for the broadcasting company identifier. For more information, see Part 1 Section 5.
  - If a component that is not scrambled exists in free programs with contents protection, the ECM_PID=0x1FFF limited reception method descriptor is placed in the second loop of PMT to explicitly indicate that it is not scrambled.
- ○ Chargeable Program
  - In the first loop of PMT, a valid limited reception method descriptor in which an ECM with a

broadcasting company identifier unique to each broadcasting company should always be placed.

- Only if a non-billing target component exists, the ECM_PID=0x1FFF limited reception method descriptor is placed in the second loop of PMT to explicitly indicate that it is a non-billing target.

Here, a valid limited reception method descriptor means a limited reception method descriptor for which other than ECM_PID=0x1FFF is specified.

20.2.2 SDT/EIT

For SDT/EIT, in consideration of convenience for program reservation and other operations, the free_CA_mode field is used as follows to distinguish between free programs and chargeable programs in this specification document.

0: Free program

1: Chargeable program

The setting rule is as follows.

1) In SDT, specify the default identification value for free programs/chargeable programs regarding general programs transmitted within the service channel.
2) In EIT, specify the identification value for free programs/chargeable programs for each program.
3) If the identification value in SDT does not match that in EIT, the setup is performed on the assumption that the identification value in EIT has the priority for the receiver.

For example, for flat/tier contract service channels that broadcast chargeable programs, the corresponding field in SDT is set up as "1" and the value "1" remains unchanged even if free programs are broadcast within the service channel for some period or time zone. On the other hand, the corresponding field in EIT is set up as "1" for chargeable programs and "0" for free programs for each program within the service channel.

Therefore, this field in SDT only reflects the operational characteristics that broadcasting companies assume for the service channel. It should be assumed that the receiver consistently judges whether the program is a free program or a chargeable program based on the value in EIT.

20.3 Viewing (Record) Reservation Check Information Setting

Before the viewer set viewing (recording) reservation of a program with billing target components, in order to present information such as whether it is viewable, and whether it is recordable to viewers, the CA contract information descriptor is used. This descriptor should be described in consideration of the following items.

○ CA_unit_id should be allocated uniquely within the event for each different billing unit. However, 0x0 should not be used for billing units because it is used for grouping for non-billing target components. 0x1 should always be allocated only for billing units that include default ESs.

○ Billing target components should be included in either of the billing units with no overlaps.

Component tag values should not be described in multiple CA contract information descriptors within the same event.

The CA contract information descriptor is placed in SDT or EIT. The placement rule is as follows.

1) This descriptor is described keeping in mind the following points:
   - ○ In case of free_CA_mode=0, the corresponding descriptor of CA_unit_id=0x1 should not be placed.
   - ○ In case of free_CA_mode=1, the corresponding descriptor of CA_unit_id=0x1 should always be placed.
2) In SDT, the default contract verification information regarding general programs transmitted within the service channel is described.
3) In EIT, the contract verification information for each program is described.
4) However, in EIT, The CA contract information descriptor can be omitted only if it is free_CA_mode=1 and contains the same information described in the descriptor(s) placed in SDT.
5) If the placement and the described contents in SDT does not match those in EIT, the setup is performed on the assumption that the placement and the described contents in EIT have the priority for the receiver.

The judgment criteria used in the receiver are as follows.

1) The described contents in SDT are invalid if either of the following is true.
   a) The corresponding descriptor with free_CA_mode=0 and CA_unit_id=0x1 exists
   b) The corresponding descriptor with free_CA_mode=1 and CA_unit_id=0x1 does not exist
2) The described contents in EIT are invalid if either of the followings is true.
   a) The corresponding descriptor with free_CA_mode=0 and CA_unit_id=0x1 exists
   b) A corresponding descriptor with free_CA_mode=1 and CA_unit_id=0x1 does not exist, except for cases where the described contents in SDT is free_CA_mode=1 and a valid corresponding descriptor is placed (that is, except for cases where the CA contract information descriptor in EIT is omitted because it is the same as that in SDT)
3) If the described contents in EIT are valid and different from those in SDT, those in EIT have the priority.
4) If the described contents in EIT are invalid, reservation is not allowed.
5) In case of event sharing, the billing judgment including free_CA_mode should be all performed by the description of the reference destination.

In addition, the sent verification information should not be changed if possible because it may cause malfunction when the program reservation is executed in the receiver.

20.4 Parental Rate Setting

Only broadcasting companies can specify the parental rates. The parental rate indicates the minimum age recommended for viewers in the 8bit field as shown in Table 20-2. Using ARIB STD-B10 broadcasting company definitions, the age up to 20 can be specified.

Table 20-2 Parental Rate

Age Limit Rate	Definition
0x00	Not defined (no specification)
0x01 to 0x11	Minimum age=rating+3
0x12 to 0xFF	Specified by broadcasting companies (not used at the moment)

Note that the setting unit for the parental rate is a program. It should not be set up for components.
In this specification document, the parental rate control is performed according to the following 1) and 2).

1) The parental rate should only be described in the first byte of the private_data_byte area of the limited reception method descriptor placed in the first loop of PMT.
2) The parental rate should be described in the rating field of the parental rate descriptor placed in EIT. However, the same parental rate descriptor should be also placed in all of the corresponding program's EIT[p/f actual], EIT[p/f other], EIT[schedule actual basic], and EIT[schedule other basic].

In addition, parental rate settings that have already been sent should not be changed if possible.

20.5 Billing Unit Setting in Multi-View TV

The multi-view TV (MVTV) groups components within the event to use groups as the presentation unit. In the billing setting in the MVTV event, the following items should be considered with the group unit in mind.

- ○ The billing unit may go across groups.
- ○ The same billing unit should always be set for default ESs within the group as for the normal events according to Table 20-1.
- ○ The default ESs in the main group are those in the whole MVTV event.The setup should be performed first with the billing unit including these ESs as the whole event.
- ○ Within the group, the setup should be performed on the assumption that the billing unit including the default ESs is first purchased.

In MVTV, the component_group_type="0" component group descriptor is placed in EIT. The description rule is as follows.

1) The default ESs for each group should always be described in the component loop placed at the beginning of the CA_unit loop.
2) In the main group (component_group_id=0x0)
   - ○ If the default ESs in the group are non-billing targets, set free_CA_mode=0, and the CA_unit_id=0x1 component loop should not be set up.
   - ○ If the default ESs in the group are billing targets, set free_CA_mode=1, and the CA_unit_id=0x1 component loop should always be set up and described.
3) In the subgroup (component_group_id>0x0)
   - ○ If the default ESs in the group are non-billing targets, the CA_unit_id=0x0 component loop should be set up and described.
   - ○ If the default ESs in the group are billing targets, the CA_unit_id≠0x0 component loop should be set up and described.
   - ○ In the case that the CA_unit_id=0x1 component loop is not described in the main group, the component loop should not be described.

The CA contract information descriptor needs to be placed according to the billing unit. This operation is the same as for normal events.

For more information about the MVTV operation, see Chapter 25.

20.6 Display Control Setting in Automatic Display Message

Broadcasting companies may use automatic display messages. When using automatic display messages, place the CA service descriptor in CAT of TS that includes the target service in order to send messages. Display control parameters are set up for each broadcasting company within TS. In consideration of this, keep the following items in mind when describing the CA service descriptor.

- ○ All services that are display control targets in the broadcasting company within TS should be described.
- ○ If the broadcasting company goes across multiple TSs to use automatic display messages, the corresponding descriptor should be placed in CAT of each TS for sending.
- ○ If multiple broadcasting companies use automatic display messages within the same TS for the same period, the corresponding descriptor should be placed in CAT for each broadcasting company for sending.

Note that a receiver can display messages only if they exist in the CA service descriptor when the viewer selects a service. Broadcasting companies should keep this in mind when transmitting messages. For more information about automatic display messages, see Part 1 Section 5.

20.7 Setting of Link to CA Alternative Service

In BS digital broadcasting, a viewer may not be able to watch a program if the viewer selects a chargable program that the viewer is not subscribed to. This may also occur if the viewer selects a free program with contents protection, and the receiver is unable to receive Kw because of the protection. In these cases, the receiver uses the link descriptor in order to switch to an alternative service (CA alternative service) that differs from the main service. In the link descriptor, messages may be described in order to present them to the viewer when directing the viewer to selecting alternative services.

When linking to CA alternative services, a link descriptor whose linkage_type is "0x03" needs to be placed in SDT. The description rule is as follows.

1) Describe transport_stream_id, original_network_id, and service_id of the linked service for sending. The linked service is not scrambled as long as the link descriptor is described in SDT.
2) If messages are described in the link descriptor, the following conditions should be met.

- ○ Describe the message number on the first byte of private_data_byte. The message number is an 8bit field that contains a value between 21 and 40. The message number is unique within the network of the BS digital broadcasting. The receiver may regard the contents of the message body as the same if the message number described in the link descriptor is the same among different services.
- ○ Describe the message number on the second and subsequent bytes of private_data_byte.
- ○ If the same message number is specified within the sub tables, the message body can be omitted. However, the message body described at the beginning within the sub tables can not be omitted even for the same message number.

For more information about the CA alternative service operation, see Part 1 Section 3 and Part 1 Section 5.

20.8 Exceptional Operation Before Introducing Free Programs with Contents Protection

In introducing "Free programs with contents protection," for a certain period before starting the operation, a test broadcasting is assumed for the purpose of "preliminary verification for Kw write."

In this test broadcasting, the following exceptional operation may be performed.

1) The default ESs are not scrambled, and ES other than default ESs are scrambled with the broadcasting company identifier commonly used for right protection.

   In this case, the limited reception descriptor is not placed in the first loop of PMT, but in the second loop of PMT. This descriptor should include PID of ECM that holds a broadcasting company identifier commonly used for right protection.

2) ESs that are supported by ECM with the broadcasting company identifier commonly used for right protection need to be scrambled even if transient response between programs or filler insertion is performed on the sender side.

   However, even in this case, the transport_scrambling_control field in the TS packet header should be set properly.

For more information about the test broadcasting operation, see Part 1 Section 8.

21 Digital Copy Control

The digital copy control descriptor and the content availability descriptor are used for the broadcasting station to send information related to recording and copying of programs and the program transmission rate to the digital recording devices.

The digital copy control descriptor can be placed in the PMT first/second loops, SDT, EIT[p/f], and EIT[schedule]. The basic copy control conforms to ARIB STD-B10 Appendix F, but the detailed operation is explained in the descriptor section. In addition, content availability descriptor can be placed in the first loop of the PMT.

21.1 Information Priority

The information of the digital copy control descriptor described in PMT and EIT[p/f] is used to actually record programs or prepare for recording. However, if no descriptor is placed in EIT[p/f] and the descriptor is placed in SDT, the contents of the descriptor in SDT have the priority.

If the descriptor is described in the PMT first and second loops, the contents of the second loop have the priority for a component only if the component has a component tag whose value is between 0x40 and 0x7F. In other cases , the contents of the first loop have the priority.

In addition, for the analog video output and digital audio output controls, the contents of the descriptor in the PMT first loop have the priority. For the fast digital interface output control, the contents of the component with the strictest copy control specification in output components (components that remain after the deletion if specific components are deleted from received services) have the priority. For information about the specific levels regarding the copy control, see the section about the digital copy control descriptor.

The final recording control is performed by giving priority to the contents described in PMT. If copy controls other than the default (see the next section) are executed, the descriptor should always be placed in PMT.

The information of the digital copy control descriptor placed in SDT and EIT[schedule] is used for performing the recording reservation of events. If the copy control information regarding the whole service is specified, the digital copy control descriptor is placed in SDT. If the copy control information specific to each event is specified, the digital copy control descriptor is placed in EIT. If the descriptor is described in both SDT and EIT, the contents in EIT have the priority.

21.2 Default Digital Copy Control Information

The default digital copy control information when no digital copy control descriptor is described in any table in PMT, SDT, and EIT is equivalent to "available for copy without restriction" (specifically, copy_control_type=‘01’ and digital_recording_control_data=‘00’ for digital TV and temporary video services, copy_control_type=‘11’ and digital_recording_control_data=‘00’ for digital audio and temporary audio services, and copy_control_type='01/11' and digital_recording_control_data='00' for data service, temporary data service and bookmark list data services).

As described above, The final recording control is performed by giving priority to the contents described in PMT. Therefore, the final recording control becomes "available for copy" unless a digital copy control descriptor whose value indicates "available for copy without limitation" is inserted in PMT. This situation arises even if EIT and SDT contain digital copy control information. However, in principal, there should be no consistency between the information in SI (SDT or EIT) and that in PSI (PMT).

21.3 Maximum Transmission Rate Information

Approximate maximum values rounded up in units of 1/4Mbps for each event are described in the maximum transmission rate information (maximum_bit_rate). For the variable transmission rate, the maximum value is described. The maximum value is also described in PMT, and the value is not changed in real time as the actual transmission rate changes.

The broadcasting station should describe the transmission rate information (maximum_bit_rate) by placing the digital copy control descriptor if the maximum bit rate for the sent service exceeds or is significantly less than the value shown in Table 21-1-1 and 21-1-2 in the following section, or it is not specified.

21.3.1 Maximum Bit Rate When Maximum Transmission Rate Is Not Described

For information about this section, see "5.2.6 Default Maximum Bit Rate" in Part 1 Section 7. Specific numeric values are shown in Table 21-1-1 and Table 21-1-2. The information about describing the maximum bit rate is described in detail in the "Digital Copy Control Descriptor" section in Part 3 Table Operation Detail of the Edition.

Table 21-1-1 Default Maximum Bit Rate for each Component

Video	0x00 to 0x0F	1080I	16 to 22Mbps
		720P	12 to 22Mbps
		480P	6 to 12Mbps
		480I	4 to 8Mbps
Audio	0x10 to 0x2F	Standard stereo	to 144kbps
		High-quality sound stereo	to 256kbps
		5.1 channel stereo	to 384kbps
Added Data	0x40 to 0x7F	4Mbps	
Caption	0x30 to 0x37	256kbps	
Superimposed Text	0x38 to 0x3F	256kbps	

Table 21-1-2 Default Maximum Bit Rate for each Service

Digital TV service	1080I	24Mbps
	720P	24Mbps
	480P	12Mbps
	480I	11Mbps
	Multiview	24Mbps
Digital audio service	1.1Mbps	
Data service	2.2Mbps	

21.3.2 Method for Specifying Maximum Transmission Rate in Multi-View TV

To specify the maximum transmission rate for each event and for each component, the digital copy control descriptor is used. However, the component group descriptor is used for the maximum transmission rate in multi-view TV. Therefore, if component_group_type='000' (MVTV) is specified and total_bit_rate for each component group is specified in an event for which the component group descriptor is placed, the total bit rate described in the component group descriptor is preferentially referred.

21.4 Changing Copy Control Information

Copy control information of an event that is once defined should not be changed. It is because if the copy control state is changed from "available for copy" to "copy prohibited," the recording is cancelled at the stage of actual recording of events that was thought to be available for recording at the stage of reservation. For events that can be "copy prohibited," it is perferable to describe "copy prohibited" by placing the digital copy control descriptor when sending event information for the first time. If it is confirmed that the program can be copied, send the "available for copy" information.

For the same reason, the contents of the copy control information described in SDT should not be changed. It is because if the digital copy control descriptor is not placed in EIT, the information described in SDT may be used to make recording reservation. If the copy control information described in SDT is to be changed, it is necessary to place the digital copy control descriptor in EITs of all new programs up to N days before the time of change (when information for N days are sent for each station SI). It is also necessary to ensure that no program to be reserved with the copy control information in SDT exists, and then change the copy control information in SDT.

21.5 Contents Output Control

For broadcasting stations to send information regarding the control of the output from the receiver for programs, the encryption_mode of a content use descriptor is used. The content use descriptor can be placed in the PMT first loop. In addition, the contents output control is possible only for services stipulated in Section 5.4 of Part 1 Section 8.

21.5.1 Output Control Default

The content use descriptor is used in combination with the copy control information of the digital copy control descriptor. If the content use descriptor or digital copy control descriptor is not placed in the PMT first loop, the default is encryption_mode=1 (output protection is not performed).

21.5.2 Output Protection

encryption_mode is valid for output from the high-speed digital interface if copy_control_type of the digital copy control descriptor is "01", and digital_recording_control_data is "available for copy without restriction." The digital copy control descriptor can also be placed in the PMT second loop, but encryption_mode is valid if all components that are included in the high-speed digital interface output are "available for copy without restriction." In other words, encryption_mode is valid if the following conditions are met: copy_control_type of the digital copy control descriptor placed in the PMT first loop is "01"; digital_recording_control_data is "available for copy without restriction"; and no copy control information other than "available for copy without restriction" is described in the PMT second loop.

For more information about operating encryption_mode, see Part 1 Section 8 and DTCP specifications.

21.6 Temporary Accumulation of Contents

Even if the copy control information is "copy prohibited," temporary accumulation can be performed for up to the allowed temporary accumulation time. The digital copy control descriptor can be placed in the PMT second loop, and if any of the components to accumulate is "copy prohibited," the contents become the temporary accumulation target.

The allowed temporary accumulation time that can be used is only "one hour and a half" (retention_mode="0", retention_state="111") although ARIB STD-B10 stipulates multiple types of time.

For more information about the temporary accumulation, see Part 1 Section 8.

21.7 Quantity Restriction Copy

When the digital copy control information for PMT’s digital copy control descriptor is “Copying is allowed for the first generation only”, it is possible to specify whether to enable “Quantity Restriction Copy Permitted” using copy_restriction_mode of the content availability descriptor. (See 30.3.2.4)

The digital copy control information descriptor for which the digital copy control information is “Copying is allowed for the first generation only” is placed in PMT, and when the content availability descriptor is not placed, “Quantity Restriction Copy Permitted” is enabled (default value). Therefore, when “Quantity Restriction Copy Permitted” is not enabled, it is necessary to place both the digital copy control descriptor and the content availability descriptor. In addition, copy_restriction_mode of the content availability descriptor is meaningful only when the digital copy control descriptor for which the digital copy control information is

“Copying is allowed for the first generation only” is placed in the first loop and/or the second loop of the PMT.

The digital copy control descriptor can be placed in both the first loop and the second loop of the PMT; while the content availability descriptor is placed in the first loop only. When "Copying is allowed for the first generation only” is specified for the said component by the digital copy control descriptor of the second loop of the PMT, whether to enable “Quantity Restriction Copy Permitted” is in accordance with the content availability descriptor of the first loop of the same PMT. When the content availability descriptor is not placed in PMT, the component is the default “Quantity Restriction Copy Permitted”.

For details of “Quantity Restriction Copy”, see Volume 8 of Part 1.

22 PSI/SI Operation in Layered Modulation

BS digital broadcasting can send in multiple (up to 4) modulation methods simultaneously to one carrier, so the layered modulation can be performed by applying multiple modulation methods to one TS.
However, the operation should be adjusted among multiple broadcasting companies (TSs) that share one carrier.
In transmission using multiple modulation methods, the layer where information is transmitted through 8PSK is called high layer, and the layer where the modulation method has the lower multi-value layer (resistant for interference) is called low layer. In addition, only up to two types of modulation methods including 8PSK can be used at one time, and this upper limit should not be exceeded (see BS digital broadcasting – sending operation specification document). For sending operation of PSI/SI in the layered modulation, the followings are stipulated.

- PSI(PAT,PMT,CAT) and NIT should be transmitted at the low layer.

However, if there are services that perform the layered modulation and do not perform layered modulation at the same time within a single TS, PMT of services that do not perform the layered modulation (services whose components to be referred to are transmitted only at the high layer, and whose the layered transmission descriptor is not described in PMT) can be transmitted at the high layer.

- SI is transmitted at the high layer.

In addition, the following two conditions should be met in transmission.

1) Until one section completes the transmission for sub tables with the same PID, the next section should not be sent.
2) It is not allowed to send one section across multiple layers.

The layered transmission descriptor indicates the interrelation between layered streams when elementary streams are layered and transmitted in order to resist transmission deterioration or differentiate information qualities. It is assumed that streams whose layer is modulated are transmitted within the same TS in order to improve the SItransmission efficiency and the response performance when a view selects a service. The layered transmission descriptor is described in the PMT second loop. If streams are transmitted at two layers, the low layer streams and the high layer streams refer to each other’s PID.

In addition, when placing the layered transmission descriptor and defining the reference relationship, follow the rules described below:

- The layered transmission descriptor should always be placed in components transmitted at the low layer.
- stream_type for the referenced ES should be the same as that for the referencing source.

- If the referenced destination does not exist, the null packet PID (0x1FFF) is used.
- It is not allowed to specify multiple referenced destinations for a single ES.

The receiver refers to the layered transmission descriptor based on signals detected in the physical layer such as deterioration of C/N or increase in error rate

Specific Example

For the layered modulation, the following four types of components can be considered.

a. High-layer ES without the layered transmission descriptor
b. High-layer ES with the layered transmission descriptor that has the referenced destination
c. Low-layer ES with the layered transmission descriptor that does not have the referenced destination
d. Low-layer ES with the layered transmission descriptor that has the referenced destination

ES other than the above are not sent. a) is utilized when no low-layer ES exists, and the receiver does not switch ES automatically during C/N deterioration. b) is utilized when a low-layer ES exists, and the receiver automatically switches to the referenced low-layer ES during C/N deterioration. c) is a low layer ES that the receiver can always decode regardless of C/N deterioration. When the broadcasting station wants to send the same material both at the high layer and at the low layer, c) is used to send at the low layer from the beginning. When the receiver uses this ES, the receiver does not need to switch ES according to the change of the C/N level. d) is an ES to be decoded only in C/N deterioration, and is the referenced destination from b). At the time of C/N restoration, it is switched to the original high-layer ES or referenced ES.
a), b), and c) are described in the EIT component descriptor, the audio component descriptor, and the data contents descriptor, but d) is not described. d) cannot be the default component or the entry component. As a rule, the receiver should not switch to d) when switching components. d) can not be the target for component selection such as reservation recording.

Examples of ES switching at the time of C/N deterioration and restoration are shown in Figure 22-1 to 22-6.

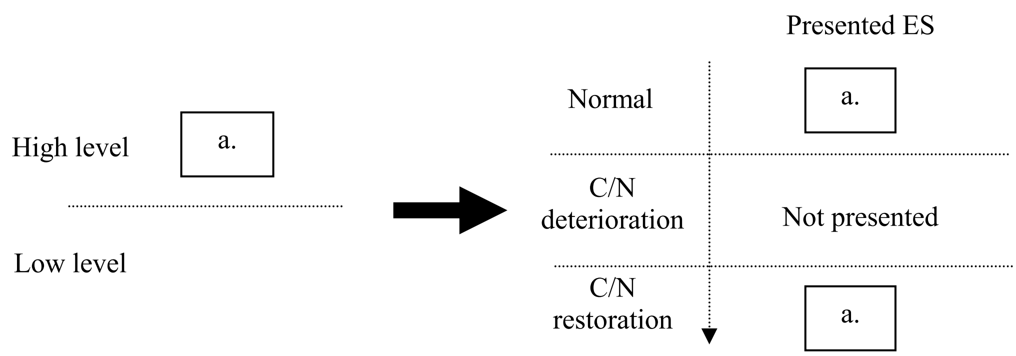


Figure 22-1　Layered Modulation Pattern

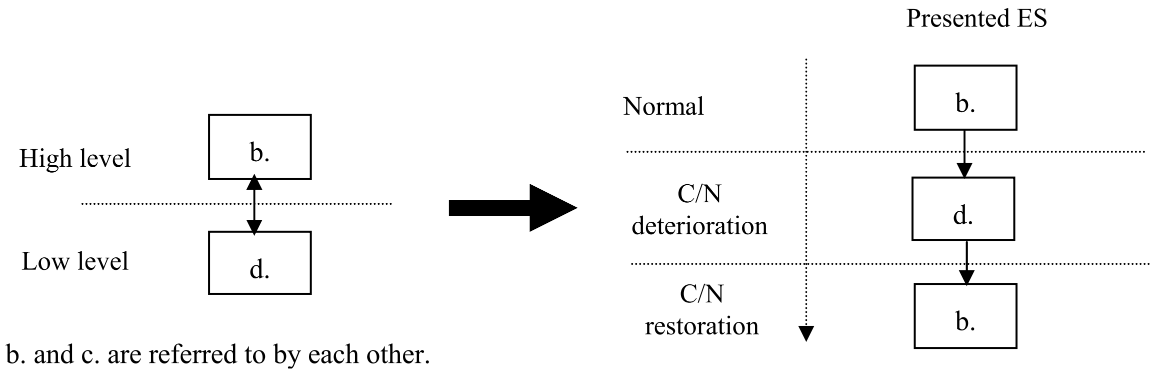


Figure 22-2 Layered Modulation Pattern 2

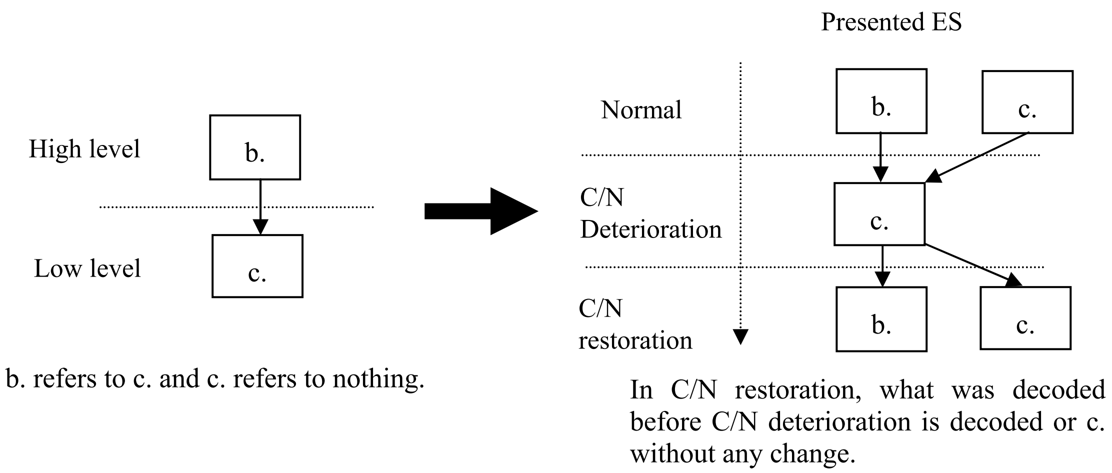


Figure 22-3 Layered Modulation Pattern 3

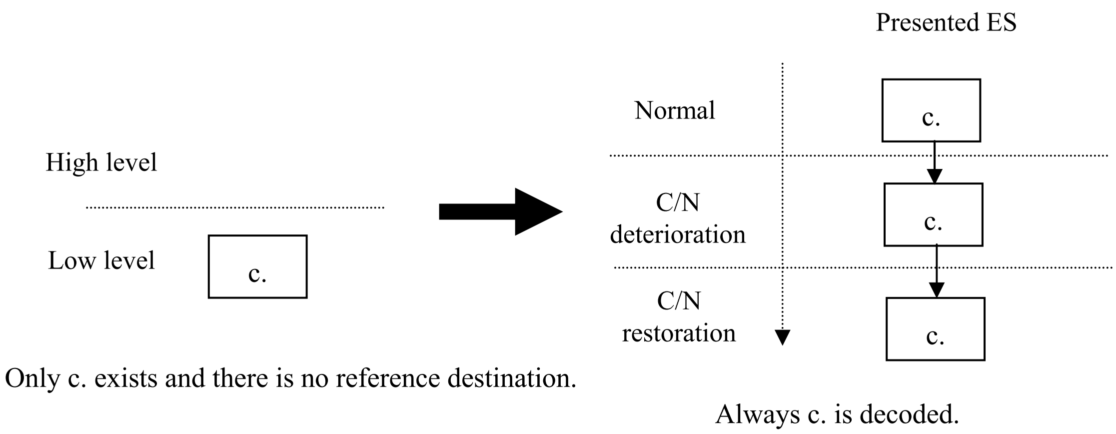


Figure 22-4 Layered Modulation Pattern 4

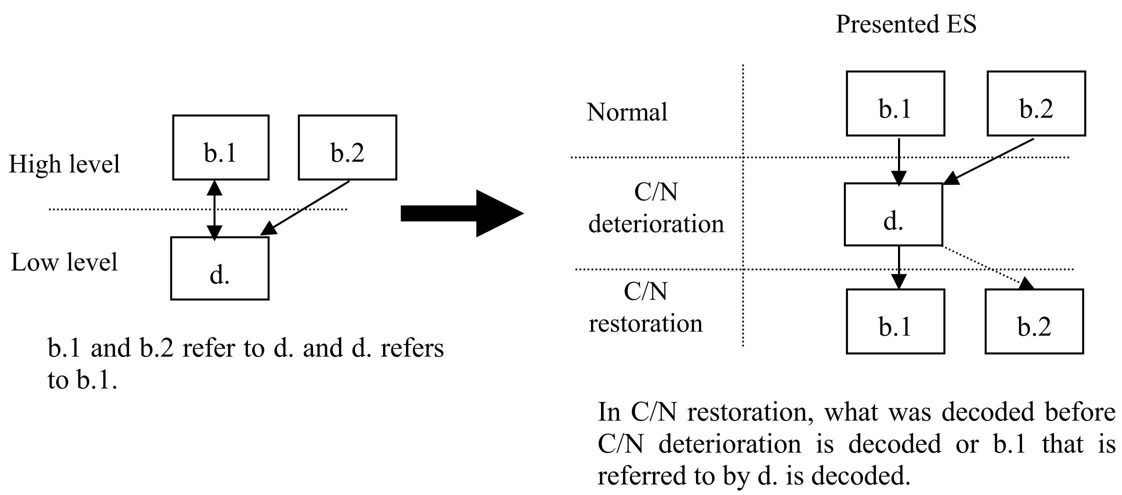


Figure 22-5 L ayered Modulation Pattern 5

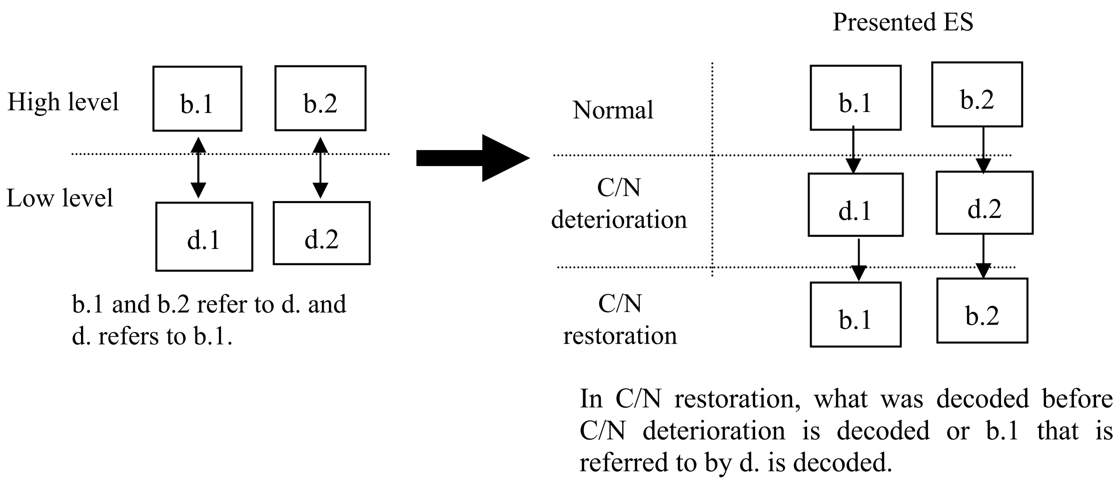


Figure 22-6 Layered Modulation Pattern 6

Note on pattern 4: At the time of C/N deterioration, the receiver can not switch components. In addition, if services are selected at the time of C/N deterioration, the low-layer ES referred to by the default component (high layer) is decoded, and other low-layer ESs cannot be selected nor decoded.

23 Special Service

23.1 Definition of Special Service

Special services are defined as services whose service_type described in the service list descriptor in NTT and the service descriptor in SDT is set as "Special Video Service," "Special Audio Service," or "Special Data Service" in Table 23-1. These services are neither performed on a regular basis nor scheduled and performed only a few times per month at most. Hereinafter, in this chapter, these services are collectively called "special services." Normal services are called regular services against special services. Regular services are those that are almost always performed except for maintenance and deactivation at midnight.

Table 23-1 Special Service serviceType

service_type	Meaning
0xA1	Special video service
0xA2	Special audio service
0xA3	Special data service

23.2 Sending Operation for Special Service

- Even if a special service is not broadcast, NIT must include service_type for one of the special services shown in Table 23-1 by using the service list descriptor. In addition, the service_type of the special service must be described in the service descriptor of the current service in the SDT of TS where the special service is transmitted. While the special service is not broadcast, no TS packet for the special sercie video/audio ES is sent, no PMT-PID for the service is described in PAT, and no PMT is sent.
- When broadcasting a special service, start sending TS packets for the video/audio ES. At the same time, start describing the PMT-PID of the special service in PAT and start sending its PMT. The start time and end time of the special service do not need to match the event start and end times of the regular service.
- For special service program information, only EIT[p/f] may be sent. In this case, EIT_present_following_flag regarding the corresponding service in SDT is set to ‘1.’When EIT[p/f] is sent, it is possible to check that special services exist in EPG.
- Special services are not scheduled in advance (at least for viewers) and EIT[schedule] for special services is not sent. These are services that viewers can not tell when they appear, and they are not a target for reservation viewing and reservation recording. If an indication of the special service existence is described in the program description of an event for a regular service that exists at the same time when the special service appears, it may cause confusion because viewers can not reserve it in advance. The broadcasting station should consider the contents of description so that they may not cause confusion among viewers.

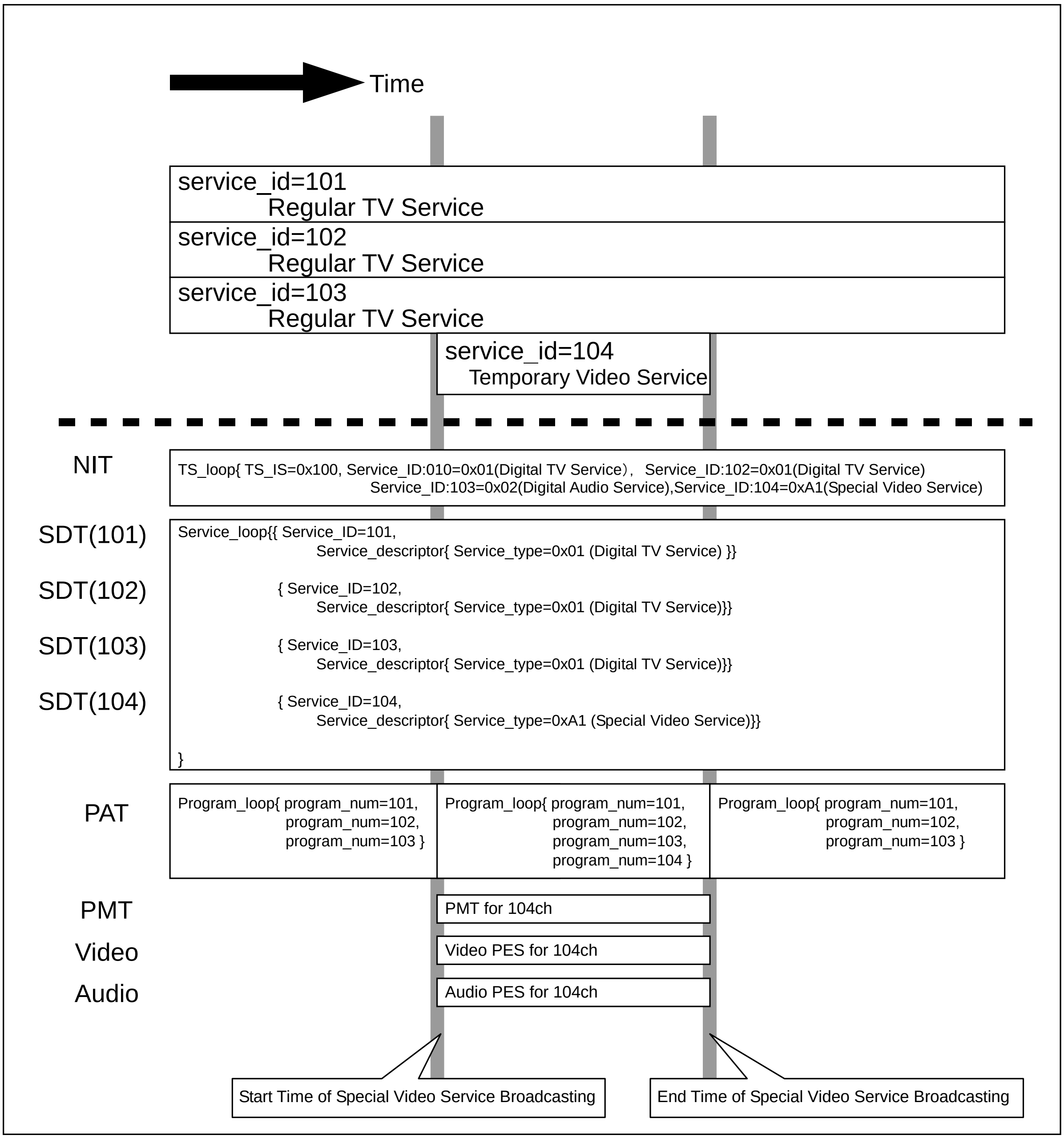


Figure 23-1 Special Service Operation Image Figure

23.3 Assumed Receiver Processing

Services specified with service_type corresponding to special services shown in Table 23-1 do not normally (while not broadcast) perform processing to present the existence of the service with EPG, etc., nor do they present it with up/down selection or one-touch selection. However, it is recommended that PAT for the corresponding TS is once received to check whether PMT-PID for the specified special service is set up or not.

When the PAT version has been updated and PMT-PID corresponding to the special service is set up (that is, the special service is being broadcast), viewers can perform operations to switch to the special service. There is no mechanism that notifies viewers of the fact that the special service is being broadcast, so the broadcasting station needs to notify them of the special service being broadcast with superimposed text or announcement during programs of regular services they have.

However, if EIT[p/f] is sent, the special service appears in EPG while it is being broadcast, which allows viewers to know the existence of the special service. The receiver that can select programs from EPG can select the special service by using the function.

At the end of the special service, when service_id of the special service disappears in PAT, return to service_id of a regular service of either the same TS including the special service or the same media type.

24 Event Relay

The event relay is a program form in which a program is continuously succeeded by another service for broadcasting before the initial service completes, such as the high school baseball program.

24.1 Sending Operation in Event Relay

At the timing when it is decided that a program is broadcast as a event relay, event_group_descriptor for which group_type is the event relay type and the relay destination service and event are described is placed in EIT[p/f] of the program (relay source program). This processing should be performed at least 30 seconds before the program switches to the relayed program. If the event relay is scheduled from the very beginning, event_group_descriptor is placed from the beginning.

The event relay is performed in a service that belongs to the same media type within the same broadcaster defined in BIT. In addition, if relay is performed from Program A to Program B, the broadcasting start time of Program B should match or start before the end time of Program A.

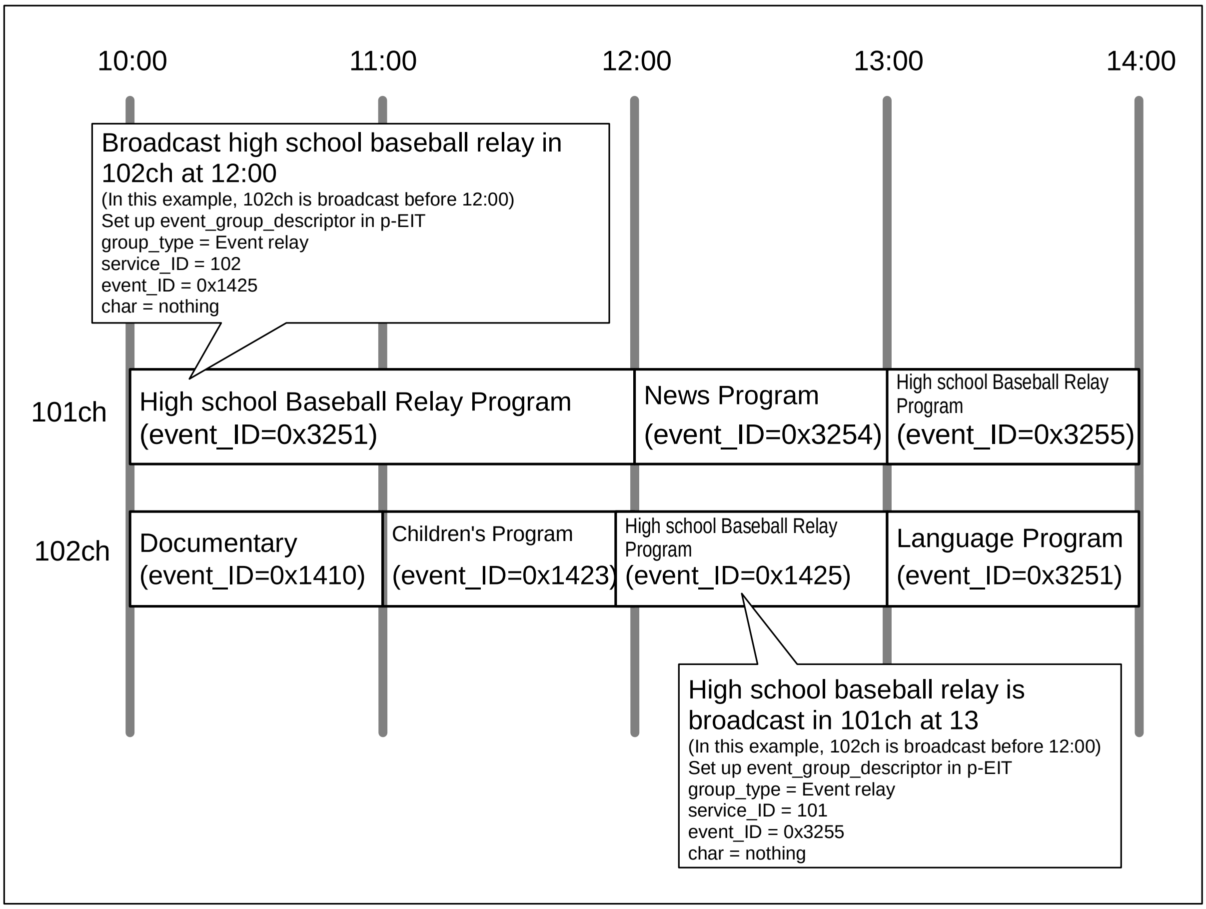


Figure 24-1 Event Relay Operation Image Figure

24.2 Assumed Receiver Processing

If a setting of event_group_descriptor describing the event relay group_type is detected in EIT[p/f] whose images are being received, display that it is succeeded by another service for broadcasting well in advance for the switching time, and perform the switching processing for the specified program at the same time as the relay time by viewer's operation. In case of relaying to another service within the same TS, check that the specified program is being broadcast with EIT[p/f actual] of the relay destination service before switching beforehand. In case of relaying to another TS (only when the service of the same media type in the same broadcaster goes across multiple TS), check with EIT[p/f other].

In case that the relay source program is reserved and the reservation has been executed, the reservation action is executed by automatically switching to the relay destination after the relay source program finishes if an event relay is set up for the program.

24.3 Event Relay to Special Service

The relay destination service may be a special service event. For example, a case is assumed where if a live broadcasting can not finish at the scheduled time a special service other than the Regular Program started after the program is set up so that the live broadcasting can be continued.

In this case as well, the handling is the same as the relay to the regular service.

However, event relays from special services are not operated.

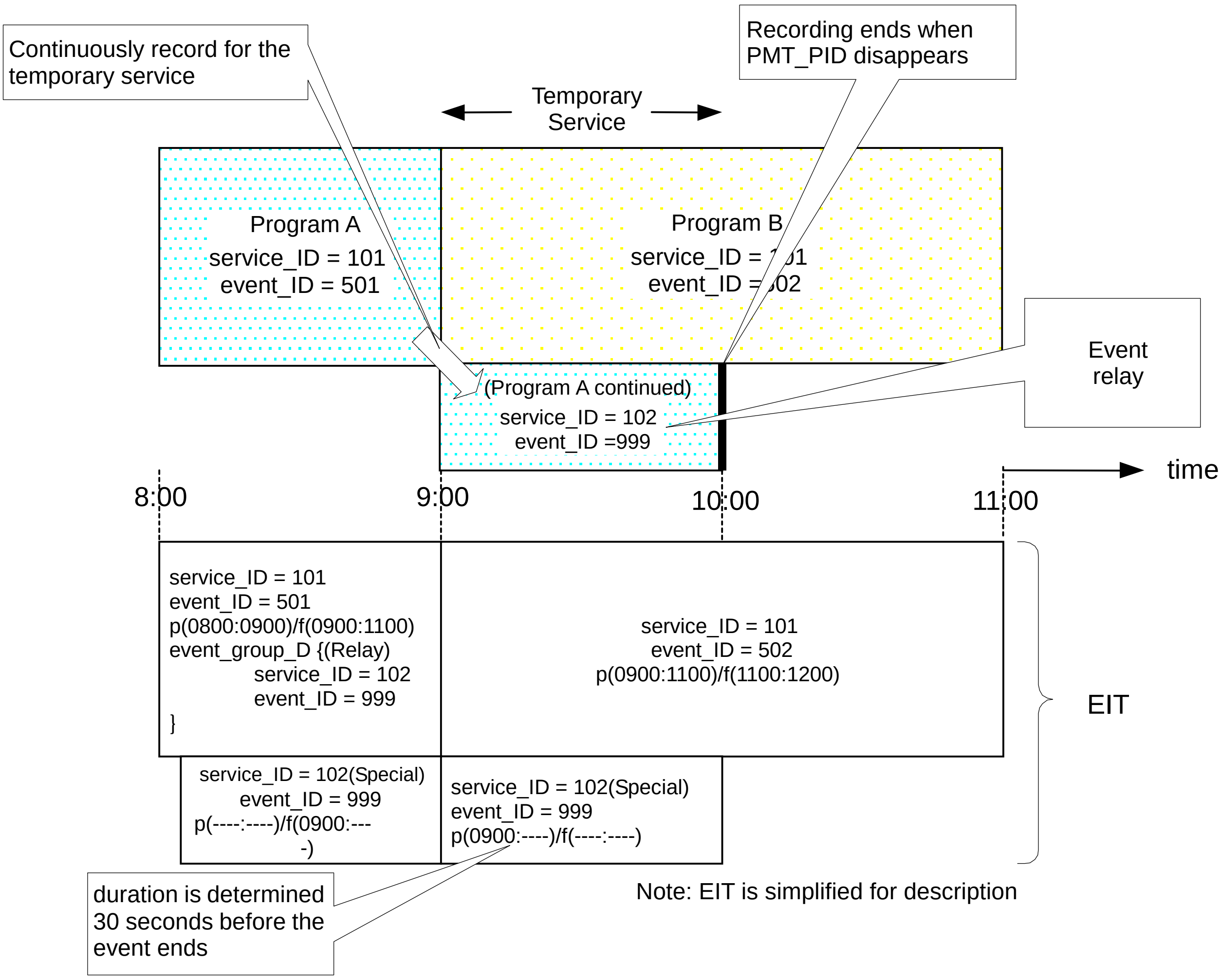


Figure 24-2　Special Service and Event Relay

25 Multi-View TV (MVTV)

MVTV is a broadcasting form in which consigned broadcasters can define the combination of desired multiple (up to 3) videos/audios within a service. In MVTV programs, viewers can select a combination of multiple videos/audios that consigned broadcasters intend to enjoy videos taken by various angles of cameras and the corresponding audios. For example, in broadcasting golf, relay of the final hole broadcasting and the top group broadcasting together with the traditional broadcasting can be considered.

25.1 Sending Operation

To operate MVTV, component_group_descriptor for which EIT[schedule] and EIT[p/f] for the corresponding program are set up as component_group_type='000' (MVTV) is placed. In the descriptor, group components by using component_tag for each component to form component groups. component_group_id is allocated to each component group for identification. CA contract information for each component in the component group is indicated by using CA_unit_id to associate it with the CA contract information descriptor. However, if no component in the program is a billing target, CA_unit_id="0x0" (non billing) is allocated and the CA contract information descriptor is not placed. Description of each component group is indicated with the text_char loop, which can be used for component group selection.

With total_bit_rate_flag ='1,' the total bit rate for each component group is indicated by total_bit_rate. If the total bit rate for component groups is within the default range, total_bit_rate = "0x00" is described. If the total bit rate for all component groups is within the default range, description of total_bit_rate can be omitted by setting total_bit_rate_flag ='0.'(For information about the default bit rate, see the stipulation in Section 21.3.1.)

In addition, when a service broadcasting MVTV is selected, set component_group_id = "0x0" for the main component group (main channel) that is presented first. The whole event default ES (ES with the value of component_tag as "0x00" [video] "0x10" [audio]) is always included in this main component group. There may be multiple ES of the same type for each component group, which are identified by default ESs. The digital TV service has default ESs of video/audio. Default ESs are a group of ES indicated by component_tag that is described as video or audio in the component group descriptor in the ascending order of component_tag. Therefore, in the main component group, the whole event default ES (ES with the value of component_tag as "0x00" [video] "0x10" [audio]) should always be described in ascending order. As with the concept in normal limited reception target events, each component within default ESs has the same billing unit.

Three common sending operation examples are shown below.

25.1.1 MVTV in Free Programs

The MVTV operation image for a free program with all components being non billing targets is shown in Figure 25-1. In the ascending order of video and audio respectively, default ESs for each component group are shown in the shaded areas. For example, the default ESs for sub 1 are V1, A0.

Figure 25-1 shows an operation where all default ESs belong to the same non-billing unit and audio A0 is common with each component group. In case of making only sub 2 a billing target, it is necessary to allocate another audio A1 because the billing target can not be changed with audio A0 allocated to sub 2 due to the principle of the limited reception "Components belong to only one billing unit without duplication."

Place component_group_descriptor in EIT in the MVTV program

(1) component_group_id = “0x0” (main)

CA_unit_id = “0x0” (non-billing): component_tag = V0 : component_tag = A0
text = regular broadcasting

(2) component_group_id = “0x1” (sub1)

CA_unit_id = “0x0” (non-billing): component_tag = V1 : component_tag = A0
: component_tag = A3
text = final hole

(3) component_group_id = “0x2” (sub2)

CA_unit_id = “0x0” (non-billing): component_tag = V2 : component_tag = A0
text = top group

User Presentation Unit	main	golf broadcasting (regular broadcasting)
		video_PID = “0x01”: component_tag = V0 audio_PID = “0x02”: component_tag = A0
	sub1	golf broadcasting (final hole)
		video_PID = “0x03”: component_tag = V1 audio_PID = “0x02”: component_tag = A0
		audio_PID = “0x07”: component_tag = A3
	sub2	golf broadcasting (top group)
		video_PID = “0x05”: component_tag = V2 audio_PID = “0x02”: component_tag = A0

Figure 25-1 Figure of MVTV Operation Image in Free Program

25.1.2 MVTV in Chargeable Program

The MVTV operation image for a chargeable program with all components having the same billing unit is shown in Figure 25-2. As with the operation for free programs, on the condition that components for each default ESs are not duplicate, it is possible to change the billing unit for each default ESs.

Place component_group_descriptor in EIT in the MVTV program

(1) component_group_id = “0x0” (main)

CA_unit_id = “0x1” (billing)	: component_tag = V0 : component_tag = A0
text =“regular broadcasting”	

(2) component_group_id = “0x1” (sub1)

CA_unit_id = “0x1” (billing)	: component_tag = V1 : component_tag = A3
	: component_tag = A3
text = “final hole”	

(3) component_group_id = “0x2” (sub2)

CA_unit_id = “0x1” (billing)	: component_tag = V2 : component_tag = A0
text =“top group”	

User Presentation Unit		
	main	golf broadcasting (regular broadcasting)
		video_PID = “0x01”: component_tag = V0 audio_PID = “0x02”: component_tag = A0
	sub1	golf broadcasting (final hole)
		video_PID = “0x03”: component_tag = V1 audio_PID = “0x02”: component_tag = A0
		audio_PID = “0x07”: component_tag = A3
	sub2	golf broadcasting (top group)
		video_PID = “0x05”: component_tag = V2 audio_PID = “0x02”: component_tag = A0

Figure 25-2 Figure of MVTV Operation Image in Chargeable Program

25.1.3 In Case MVTV by Free Programs Have Common Billing Data (D0)

The MVTV operation image for a chargeable program with common billing data is shown in Figure 25-3. Figure 25-3 shows the same billing unit for default ESs of main and sub 1. The common billing data (D0) exists in all component groups, available for billing. Here as well, it is not possible to allocate sub 2 D0 to CA_unit_id ="0x03" and make only the sub 2 component group the special billing unit.

Place component_group_descriptor in EIT in the MVTV program

(1) component_group_id = “0x0” (main)

CA_unit_id = “0x1” (billing)	: component_tag = V0 : component_tag = A0
CA_unit_id = “0x4” (billing)	: component_tag = D0
text = “regular broadcasting”	

(2) component_group_id = “0x1” (sub1)

CA_unit_id = “0x1” (billing)	: component_tag = V1 : component_tag = A0
CA_unit_id = “0x4” (billing)	: component_tag = D0
text = “final hole”	

(3) component_group_id = “0x2” (sub2)

CA_unit_id = “0x3” (billing)	: component_tag = V2 : component_tag = A2
CA_unit_id = “0x4” (billing)	: component_tag = D0
text = “top group”	

User Presentation Unit	main	golf broadcasting (regular broadcasting)
		video_PID = “0x01”: component_tag = V0 audio_PID = “0x02”: component_tag = A0
		data_PID = “0x07”: component_tag = D0
	sub1	golf broadcasting (final hole)
		video_PID = “0x03”: component_tag = V1 audio_PID = “0x02”: component_tag = A0
		data_PID = “0x07”: component_tag = D0
	sub2	golf broadcasting (top group)
		video_PID = “0x05”: component_tag = V2 audio_PID = “0x06”: component_tag = A2
		data_PID = “0x07”: component_tag = D0

Figure 25-3 Figure of Chargeable Program MVTV + Additional Billing Data Operation Image

25.2 Assumed Receiver Processing

If component_group_descriptor set up as component_group_type =‘000’ (MVTV) is placed in EIT[p] of the program during reception, present the main group while presenting that the corresponding program is an MVTV program. In addition, a list is displayed based on the text_char loop for each component group, and viewers can easily switch component groups with the sub-video button, etc. In switching, first present the default ESs for each component group (ES indicated by component_tag that is described in the component group descriptor in ascending order for video and audio, respectively).

If component_group_descriptor set up as component_group_type =‘000’ (MVTV) is placed in EIT[schedule] in program reservation, present that the corresponding program is an MVTV broadcasting. Especially in recording reservation, viewers can also easily specify the component group they want to record. Then, it is also possible to present whether the program can be recorded or not based on the total bit rate for each component group that is described in the descriptor.

26 Emergency Warning Broadcasting

26.1 Handling TMCC Activation Bit

The activation bit in TMCC performs OR handling only among operators within the corresponding repeater as shown in Figure 26-1.

In addition, for a period when an emergency warning broadcasting is performed, the TMCC activation bit is always ON.

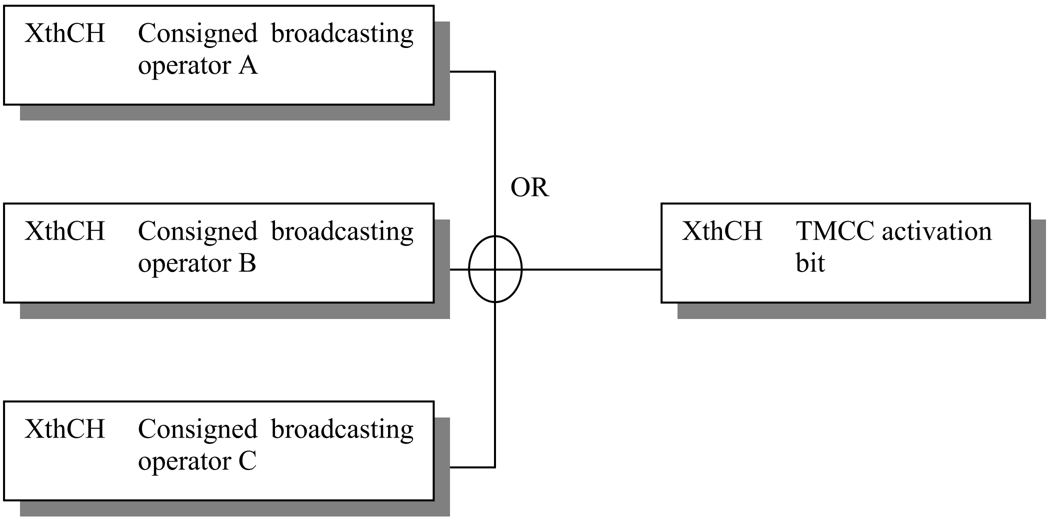


Figure 26-1 TMCC Activation Bit Operation

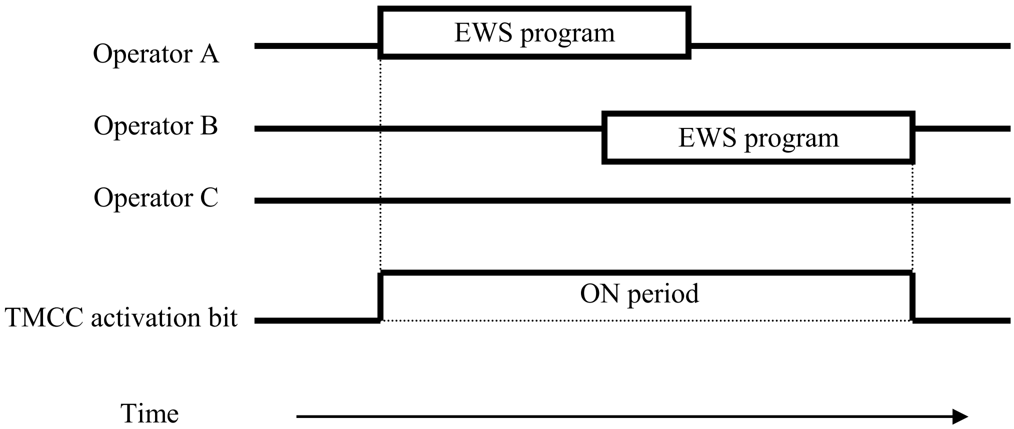


Figure 26-2 Period when TMCC Activation Bit is ON

26.2 Multi-Position for Emergency Information Descriptor

The emergency information descriptor is described in the PMT descriptor area 1 of the operator that performs the corresponding emergency warning broadcasting. Each consigned broadcasting operator judges in which service's PMT the emergency information descriptor is described, but the corresponding descriptor should always be described in PMT of the emergency warning broadcasting service itself in order to explicitly indicate the emergency warning broadcasting end for EWS-enabled receivers.

Table 26-1 PMT where Emergency Information Descriptor is Described

	PMT other than the emergency warning broadcasting	PMT for the emergency warning broadcasting
Description of the emergency information descriptor	Optional	Required

26.3 Multi-Timing and Description Period of Emergency Information Descriptor

The timing when the emergency information descriptor is described in/deleted from PMT does not always have to match the ON/OFF timing for the TMCC activation bit because multiple operators may perform the emergency warning broadcasting at different times as shown in Figure 26-3.

When the emergency broadcasting ends, delete the corresponding descriptor from PMT.

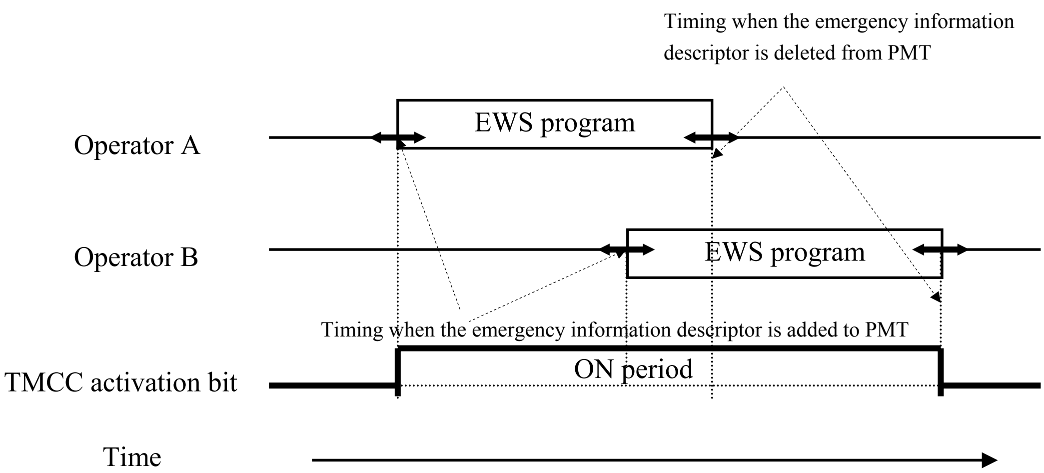


Figure 26-3 Timing of ON/OFF for TMCC Activation Bit and Description/Deletion of Emergency Information Descriptor

26.4 Emergency Warning Signal Test Broadcasting Operation

The emergency warning signal test broadcasting is performed by setting the start_end_flag value of the emergency information descriptor as 0 on the end signal side from the beginning. For the test signal broadcasting period, the corresponding descriptor should remain described in PMT. In addition, because PMT is not changed due to the closing processing in the test broadcasting, the emergency information descriptor should be deleted from PMT when the TMCC bit becomes 0.

27 PSI/SI Operation in Captioned Broadcasting

The captioned broadcasting operation is described in Part 1 Section 3.

28 Summer Time Operation

28.1 Local Time Offset Descriptor Operation

By inserting the local time offset descriptor in TOT when the summer time system is introduced, send the time difference between the actual time (UTC+9) and the displayed time for the human system. Conversely, the local time offset descriptor is not inserted when the summer time system is not introduced, and can be inserted when the date/time when the next offset time is changed becomes clear.

In addition, it should be kept sending at least 32 days before the date/time when the offset time is changed (date/time described in time_of_change). Also, within seven days, at the latest, after the offset time was changed (after time_of_change passed), the offset time set up for next_time_offset up to then should be reset to local_time_offset and sent.

[Description Example of Local Time Offset Descriptor]

(If the displayed system is advanced by an hour between 2 in the morning on April 1 and 2 in the morning on October 1 after the summer time system is introduced in 2003.)

(1) At the latest, from 32 days before the day when the summer time starts (March 1), the following local time offset descriptor is sent.
- local_time_offset_polarity = 0 (offset in the positive direction)
- local_time_offset = 0:00
- time_of_change = 2:00:00, April 1, 2003
- next_time_offset = 1:00

(2) At the latest, within seven days after switching to the summer time (April 1), the local time offset descriptor is rewritten and sent as follows.
- local_time_offset_polarity = 0 (offset in the positive direction)
- local_time_offset = 1:00
- time_of_change = 2:00:00, October 1, 2003
- next_time_offset = 0:00

(3) At the latest, within seven days after returning from the summer time to the normal time (UTC+9) (October 1), the local time offset descriptor is rewritten and sent as follows.
- local_time_offset_polarity = 0 (offset in the positive direction)
- local_time_offset = 0:00
- time_of_change = 2:00:00, April 1, 2004
- next_time_offset = 1:00

(If the summer time start date/time in 2004 is not clear at this point, it is not necessary to send the corresponding descriptor until a month before the day when the summer time starts in 2004)

29 Service/TS Configuration Change

Because the service definition is very important in terms of the interface to viewers, do not perform an operation for which it is easily changed. That is, normally, the service/TS should be almost fixedly defined. However, under conditions such as network reorganization, the following cases may occur.

- ○ Addition/deletion/movement between TS of the service
- ○ Addition/deletion of TS
- ○ Movement of TS between transponders

In addition, the service type for the service should not be changed.

29.1 Addition/Deletion/Movement between TS of Service

Addition/deletion/movement between TS of the service should be judged from the service list descriptor in NIT. That is, at the time of update of NIT, it is the deletion of the service if the service has disappeared from the service list for each TS, and addition of the service if a new service is inserted. The movement of the service between TS is when both of the above are performed at the same time. In other words, the state in which the same service_id is defined in TS that is different from what used to be defined in the updated NIT is considered as the movement of the service between TS.

Because NIT can not always be monitored, under some situation, whether the service was added after deletion or moved may not be judged. In consideration of these cases, when different operators reuse service_id that has been deleted or the same service_id is reused with different types of contents even in the same operator, the service_id should not be defined for 32 days after its deletion (time-series uniqueness of service_id).

At the time of update, related SI information should be updated almost at the same time. Due to difference of transmission cycles, temporary inconsistency in information may occur at the time of update. Here, inconsistency is a state in which SDT or EIT is not transmitted though described in NIT or vice versa. In addition, in the movement of the service between TS, there may arise a state in which SDT or EIT with the same service_id is sent using different TS ID temporarily.
When a service is added, add the service to the NIT service list, add description to SDT, and start transmitting necessary EIT. It is at the discretion of operators how many days before the start of the broadcasting the service is defined.

When a service is deleted, delete the service from the NIT service list, delete the description from SDT, and stop transmitting EIT. It is performed under the service suspension state after stopping the program broadcasting in advance. Event settings after the service deletion time should not be performed.

In the movement of a service between TS, move the service in the NIT service list, change the contents of the description in SDT, and stop transmitting the old EIT and start transmitting the new EIT at the same time. It is performed under the service suspension state after stopping the program broadcasting in advance. Event settings that go across the time of the movement between TS should not be performed. In addition, even if a service moves between TS, the event defined in the service is valid. It is better for the receiver not to refer to transport_stream_id in checking events, etc.

29.2 Addition/Deletion of TS

Addition/deletion of TS should be judged from the NIT TS loop.

When TS is added, there may temporarily arise a state in which no PSI/SI including PAT and NIT is transmitted.

Before TS is deleted, delete or move all services.

29.3 Movement of TS between Transponders

The movement of TS between transponders should be judged from the NIT satellite distribution system descriptor.

It is performed under the service suspension state after stopping the program broadcasting in all services in TS in advance. Event settings that go across the time of the movement of TS between transponders should not be performed.

Details for the use of tables

30 Use of PSI Table

30.1 PAT(Program Association Table)

30.1.1 Structure and Use of PAT

[Usage]

It specifies PID for TS packets, which transmit PMTs related to broadcasting programs.

[Structure]

Table 30-1 shows the structure of PAT.

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**
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 5.2.1, Part 2 of ARIB STD-B10, and Section 2.4.4 of ISO/IEC13818-1.

[Sending Operation Rule]

⊙ **When the transport stream contains a stream, PAT must be sent.**

- ○ One PAT shall be sent from one transport stream.
- ○ With regard to resend interval, the regulation specified in Section 12.4 of this document should be followed.
- ○ With regard to update interval, the regulation specified in Section 12.9 of this document should be followed.
- ○ When specifying the same PMT_PID for different sets of program_number, for example when PMT is defined into multi-sections, the maximum number of program_number for which the same PMT_PID can be specified shall be 4.

Table 30-2 shows the sending operation rule for each field.

Table 30-2 Sending Operation Rule for PAT

Sending operation rule for each field	
table_id	Specify "0x00".
section_syntax_indicator	Specify '1'.
section_length	Specify the section length of PAT. Since the maximum size of the total section length is 1024 bytes, the maximum value for this should be 1021.
transport_stream_id	Specify transport_stream_id for the transport stream which contains the applicable PAT.
version_number	During the normal operation, everytime the contents are updated, a value incremented by one should be specified. However, in the event of abnormal system behavior, it is possible to specify one or more incremented value.
current_next_indicator	Specify '1'.
section_number	Specify "0x00".
last_section_number	Specify "0x00".
[program_loop]	Do not specify the maximum number of loops.
program_number	Specify service_id for the target service. Furthermore, make sure to specify only one program_loop where program_number="0x0000"(PID["0x0010"] for NIT is specified in the subsequent PID field) within PAT.
network_PID	Specify the PID for NIT ("0x0010").
program_map_PID	Specify the PID for PMT. The maximum number of programs (services) for which the same PID value is assigned is 4.

[Reception Processing Criteria]

- ○ If PAT cannot be received, it is determined whether receivable stream does not exist within the transport stream, or the transmission system is not properly working.
- ○ If the information on the services specified in NIT is not specified in PAT, it is determined that the applicable service is dormant.

Table 30-3 shows the reception processing criteria for each field.

Table 30-3 Reception Processing Criteria for PAT

Reception processing criteria for each field	
table_id	= "0x00": It is determined that the applicable table is PAT.
section_syntax_indicator	= "0": It is determined that the applicable section is invalid. = "1": It is determined that the applicable section is valid.
section_length	≤ 1021: Section length. > 1021: It is determined that the applicable section is invalid.
transport_stream_id	It is determined that it is the transport_stream_id for the transport stream which contains the applicable PAT.
version_number	It is determined that the applicable table has been updated if there are any changes.
current_next_indicator	= "0": It is determined that the applicable section is invalid. = "1": It is determined that the applicable section is valid.
section_number	= 0x00: It is determined that the applicable section is valid. ≠ 0x00: It is determined that the applicable section is invalid.
last_section_number	= 0x00: It is determined that the applicable section is valid. ≠ 0x00: It is determined that the applicable section is invalid.
[loop]	
program_number	It is determined that it is the service_id that is included in the target transport stream. Furthermore, the services that are not specified in PAT while specified in NIT show that the applicable services are dormant (See Chapter 15).
network_PID	
program_map_PID	

[Other items that are worth special mention]

None.

30.2 CAT(Conditional Access Table)

30.2.1 Structure and Operations of CAT

[Usage]

It specifies the relationship between CA system (conditional access method) and its EMM stream.

[Structure]

Table 30-4 shows the structure of CAT.

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**
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 5.2.2, Part 2 of ARIB STD-B10, and Section 2.4.4 of ISO/IEC13818-1.

[Sending Operation Rule]

⊙ **When only EMM is sent, only one table within TS must be sent.**

- ○ It should be updated when the PID of the stream that transmits EMM/EMM message for CA system has been changed.
- ○ With regard to resend interval, the regulation specified in Section 12.4 of this document should be followed.
- ○ With regard to the update interval, the regulation specified in Section 12.9 of this document should be followed.

Table 30-5 shows the sending operation rule for each field.

Table 30-5 Sending Operation Rule for CAT

Sending operation rule for each field	
table_id	Specify "0x01".
section_syntax_indicator	Specify ‘1’.
section_length	Specify the section length of CAT. Since the maximum size of the total section length is 1024 bytes, the maximum value for this should be 1021.
version_number	During the normal operation, everytime contents are updated, a value incremented by one should be specified. However, in the event of abnormal system behavior, it is possible to specify one or more incremented value.
current_next_indicator	Specify ‘1’.
section_number	Specify "0x00".
last_section_number	Specify "0x00".
[descriptor_loop]	Do not specify the maximum number of loops.

[Reception Processing Criteria]

○ When CAT is received within the specified send interval, it is determined that EMM/EMM message has been transmitted in the same TS.

Table 30-6 shows the reception processing criteria for each field.

Table 30-6 Reception Processing Criteria for CAT

Reception processing criteria for each field	
table_id	= "0x01": It is determined that the applicable table is CAT.
section_syntax_indicator	= ‘0’: It is determined that the applicable section is invalid. = ‘1’: It is determined that the applicable section is valid.
section_length	≤1021: Section length. >1021: It is determined that the applicable section is invalid.
version_number	It is determined that the applicable table has been updated if there are any changes.
current_next_indicator	= ‘0’: It is determined that the applicable section is invalid. = ‘1’: It is determined that the applicable section is valid.
section_number	= "0x00": It is determined that the applicable section is valid. ≠ "0x00": It is determined that the applicable section is invalid.
last_section_number	= "0x00": It is determined that the applicable section is valid. ≠ "0x00": It is determined that the applicable section is invalid.
[descriptor_loop]	

[Other items that are worth special mention]

None.

30.2.2 Descriptors that are inserted into CAT

30.2.2.1 Conditional Access Descriptor

[Usage]

It specifies a PID for the EMM transmit stream of CA system (Conditional access method).

[Structure]

Table 30-7 shows the structure of Conditional Access Descriptor.

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**
}		
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and Section 2.6.16 of ISO/IEC13818-1.

[Sending Operation Rule]

⊙ **Only one descriptor must be placed for one conditional access method ID.**

○ If there is more than one conditional access method that sends EMM, more than one descriptor must be placed.

Table 30-8 shows the sending operation rule for each field.

Table 30-8 Sending Operation Rule for Conditional Access Descriptor (CAT)

Sending operation rule for each field	
descriptor_tag	Specify "0x09".
descriptor_length	Specify the descriptor length of the applicable descriptor.
CA_system_ID	Specify the conditional access method ID. Conditional access method ID values other than the ones applied to BS digital broadcasting should not be specified.
CA_PID	Specify EMM_PID.
private_data_byte	Do not specify it (it is not operated for the moment).

[Reception Processing Criteria]

- If the CAT, in which descriptors are placed according to the above mentioned send operations rule, cannot be received, it is determined that the transmit stream for EMM/EMM message is invalid.
- If more than one of this descriptor is placed, only the descriptors that have their own corresponding CA_system_ID should be interpreted.

Table 30-9 shows the reception processing criteria for each field.

Table 30-9 Reception Processing Criteria for Conditional Access Descriptor (CAT)

Reception processing criteria for each field	
descriptor_tag	= "0x09": It is determined that the applicable descriptor is Conditional Access Descriptor.
descriptor_length	It is determined that it is the descriptor length of conditional access descriptor.
CA_system_ID	= BS applied ID value: It is determined as the applicable conditional access method ID.*1 = Other values: It is determined that the applicable descriptor is invalid.
CA_PID	It is determined as EMM_PID.
private_data_byte	It is determined as invalid, regardless of the value.

*1 If a value other than the CA_system_ID for its own corresponding conditional access method is specified, it is determined that the applicable Conditional Access Descriptor is invalid.

[Other items that are worth special mention]

For operations of conditional access, see the Volume 5.

30.2.2.2 CA Service Descriptor

[Usage]

It shows an organization channel of a business entity which runs an auto-display message, and describes the display control information for the applicable message.

[Structure]

Table 30-10 shows the structure of CAT Service Descriptor.

Table 30-10　Structure of 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**
}		
}		

[Meaning of Each Field]

Table 30-11 shows the meanings of each field.

Table 30-11　What each field in CA Service Descriptor means

Meaning of Each Field	
CA_system_id	This 16-bit field represents the target conditional access method ID.
CA_broadcaster _group_id	This 8-bit field represents the target business entity ID.
message_control	This 8 bit field represents a grace period in number of days, until the auto-display message that has been pre-embedded onto the IC card for CA is displayed. However, 0xFF specifies that the grace period has not been transmitted (Start of the grace period is on hold). Note that the starting time is the current date of "Command to obtain the information on the auto-display message" listed in ARIB STD B-25. Also, if the lowest bit in message_control is 1, it means that auto-display message is not displayed when the program, which was received and stored with a receiver equipped with store and reception function, is replayed. For more information, see the volume 5 of Part 1.
[service_id]	This 16 bit field represents identifiers of all services within TS, which belong to the above business entity, and for which displaying of the auto-display message is controlled.

[Sending Operation Rule]

⊙ **When controlling the display of the auto-display message in the target services within business entities, one descriptor per business entity should be placed.**

○ When operating more than one conditional access method, the same number of descriptors as the number of conditional access methods can be placed per business entity.

Table 30-12 shows the sending operation rule for each field.

Table 30-12 Sending Operation Rule for CA Service Descriptor

Sending operation rule for each field	
descriptor_tag	Specify "0xCC".
descriptor_length	Specify the descriptor length of the applicable descriptor.
CA_system_id	Specify the target conditional access method ID. ID values other than the ones applied to BS digital broadcasting should not be specified.
CA_broadcaster _group_id	Specify the target business entity ID. ID values other than the ones applied to BS digital broadcasting should not be specified.
message_control	Specify a grace period until the auto-display message is displayed in number of days. 0x0 - 0xFE: A grace period until the auto-display message is displayed (number of days). 0xFF : Start of the grace period is on hold. For more information, see the volume 5 of Part 1.
[service_id]	Specify all the identifiers for the services for which the display is controlled within TS that belongs to the above business entity. Moreover, this field cannot be omitted.

[Reception Processing Criteria]

- ○ If the applicable descriptor exists in CAT, when selecting each service network of the applicable business entity for which displaying is controlled, make sure to transfer CA_broadcaster_group_id and message_control field listed on the applicable descriptor, together with the current year, month and date (MJD lower 16 bits), by using "Command to obtain the information on the auto-display messages" listed in ARIB STD B-25, to obtain the information on the auto-display message for the applicable service. Whether the message, including the display of the auto-display message, is displayed or not should be controlled based on this display information.
- ○ If the applicable descriptor does not exist in CAT, it is determined that the auto-display message is not going to be displayed when each service network of the target business entity is selected.

Table 30-13 shows the reception processing criteria for each field.

Table 30-13 Reception Processing Criteria for CA Service Descriptor

Reception processing criteria for each field	
descriptor_tag	="0xCC": It is determined that the applicable descriptor is CA Service descriptor.
descriptor_length	<6: Invalid. ≥6: It is determined that it is the descriptor length of the applicable descriptor.
CA_system_id	Check if it matches with CA_system_id obtained from IC card for CA, and if it doesn't, ignore the entire descriptor.
CA_broadcaster _group_id	It refers to the business entity ID for the applicable service. It is transmitted to the IC card for CA, as a parameter of "Command to obtain the information on the auto-display message" listed in ARIB STD B-25.
message_control	It refers to the grace period until the auto-display message for the applicable service is displayed. It is transmitted to the IC card for CA, as a parameter of "Command to obtain the information on the auto-display message" listed in ARIB STD B-25. For more information, see the volume 5 of Part 1.
[service_id]	It refers to all the services within the applicable business entities within TS, for which displaying of the auto-display message is controlled. If this field does not exist, it is determined that the applicable descriptor is invalid.

[Other items that are worth special mention]

○ For more information on operating and receiver processing of the auto-display message, see the volume 5 of Part 1.

30.3 PMT(Program Map Table)

30.3.1 Structure and Use of PMT

[Usage]

It specifies PID for TS packets, which transmit each encoding signal that comprises a broadcasting program.

[Structure]

Table 30-14 shows the structure of PMT.

Table 30-14 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**
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 5.2.3, Part 2 of ARIB STD-B10, and Section 2.4.4 of ISO/IEC13818-1.

[Sending Operation Rule]

⊙ **When the transport stream contains a stream, PMT must be sent for each service described in PAT.**

○ With regard to resend interval, the regulation specified in Section 12.4 of this document should be followed.

○ With regard to update interval, the regulation specified in Section 12.9 of this document should be followed.

Table 30-15 shows the sending operation rule for each field.

Table 30-15 Sending Operation Rule for PMT

Sending operation rule for each field	
table_id	Specify "0x02".
section_syntax_indicator	Specify '1'.
section_length	Specify the section length of PMT. Since the maximum size of the total section length is 1024 bytes, the maximum value for this should be 1021.
program_number	Specify service_id for the applicable service.
version_number	During the normal operation, everytime the version is updated, a value incremented by one should be specified. However, in the event of abnormal system behavior, it is possible to specify one or more incremented value.
current_next_indicator	Specify '1'.
section_number	Specify "0x00".
last_section_number	Specify "0x00".
PCR_PID	(The target PCR packet must be sent from the low hierarchical slot when transmitting a hierarchical modulation.)
program_info_length	Specify the loop length of 1st_loop. The maximum value of the loop length is restricted by section_length.
[1st(program) loop]	
[2nd(ES)_loop]	The maximum number of loops is 32.
stream_type	Specify the stream format ID for the target ES. (Defined in Table 30-16)
elementary_PID	It specifies PID for TS packets, which transmit a relevant ES or payload.
ES_info_length	It specifies the length of the subsequent ES descriptor.

Table 30-16 shows the allocation of the stream format ID that is used by BS digital broadcasting.

Table 30-16 Stream format ID that can be specified when BS digital broadcasting is started

stream_type	Allocation
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 (subtitles)
0x0D	ISO/IEC 13818-6 (Data Carrousel)
0x0F	ISO/IEC 13818-7 (MPEG2 AAC)

[Reception Processing Criteria]

○ If the PMT that is related to the services in PAT cannot be received within 1000ms, it is determined that the target service is dormant.

Table 30-17 shows the reception processing criteria for each field.

Table 30-17 Reception Processing Criteria for PMT

Reception processing criteria for each field	
table_id	= "0x02": It is determined that the applicable table is PMT.
section_syntax_indicator	= ‘0’: It is determined that the applicable section is invalid. = ‘1’: It is determined that the applicable section is valid.
section_length	≤1021: Section length. >1021: It is determined that the applicable section is invalid.
program_number	It is determined as service_id for the target service.
version_number	It is determined that the applicable table has been updated if there are any changes.
current_next_indicator	= ‘0’: It is determined that the applicable section is invalid. = ‘1’: It is determined that the applicable section is valid.
section_number	="0x00": It is determined that the applicable section is valid. ≠ "0x00": It is determined that the applicable section is invalid.
last_section_number	= "0x00": It is determined that the applicable section is valid. ≠ "0x00": It is determined that the applicable section is invalid.
PCR_PID	
program_info_length	
[1st(program) loop]	
[2nd(ES) loop]	If the number of the 2nd loop exceeds 32, it is determined that the ES information below that is invalid.
stream_type	If stream_type that is not supported by its own receiver is specified, it is determined that the applicable ES loop is invalid.
elementary_PID	
ES_info_length	

[Other items that are worth special mention]

None.

30.3.2 Descriptors that are inserted into PMT the 1st loop (program loop)

30.3.2.1 Conditional Access Descriptor

[Usage]

It specifies a PID for the ECM transmit stream of CA system (Conditional access method), if the entire service is a target of the conditional access.

[Structure]

See Table 30-7 for the structure of Conditional Access Descriptor.

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and Section 2.6.16 of ISO/IEC13818-1.

[Sending Operation Rule]

⊙ **Only one descriptor must be set for one conditional access method ID.**

If more than one conditional access method is used, one applicable descriptor for each conditional access method ID must be placed.

○ Only fee-based broadcasting businesses are allowed to set a parental rate. The parental rate is specified at the first byte of private_data_byte. When specifying a parental rate for a free of charge program in a broadcasting provided by a fee-based broadcasting business, insert the applicable descriptor specifying CA_PID(ECM_PID)="0x1FFF", and specify the parental rate.

Table 30-18 shows the sending operation rule for each field.

Table 30-18 Sending Operation Rule for Conditional Access Descriptor (PMT the 1st loop)

Sending operation rule for each field	
descriptor_tag	Specify "0x09".
descriptor_length	Specify the descriptor length of conditional access descriptor.
CA_system_ID	Specify the conditional access method ID. Conditional access method ID values other than the ones applied to BS digital broadcasting should not be specified.
CA_PID	Specify ECM_PID. Only when the applicable program is free of charge, specify CA_PID="0x1FFF" (See 20.2.1).
private_data_byte	In the first 1 byte, specify the parental rate, in accordance with rating field of Parental Rate Descriptor. For the moment, the value placed after the 2nd byte is not used. When there is no viewing age limit, the applicable item can be omitted.

[Reception Processing Criteria]

- ○ It is determined that the applicable service is a target of the conditional access.
- ○ If TS packets (ECM) for the PID specified in CA_PID field cannot be received within 2 seconds, even though this descriptor is placed, it is determined that the send system is not properly working (except for the case where CA_PID="0x1FFF" is specified.)
- ○ If more than one of this descriptor is placed, only the descriptors with their own corresponding CA_system_ID should be interpreted.

Table 30-19 shows the reception processing criteria for each field.

Table 30-19 Reception Processing Criteria for Conditional Access Descriptor (PMT the 1st loop)

Reception processing criteria for each field	
descriptor_tag	= "0x09": It is determined that the applicable descriptor is Conditional Access Descriptor.
descriptor_length	It is determined that it is the descriptor length of conditional access descriptor.
CA_system_ID	= BS applied ID value: It is determined as the applicable conditional access method ID.*1 = Other values: It is determined as invalid.
CA_PID	It is determined as ECM_PID. However, if "0x1FFF" is specified, it is determined that this is a free of charge program (ECM of the applicable PID is not transmitted.)
private_data_byte	It is determined that the first byte is a parental rate of the applicable service. If the applicable item is omitted, it is determined that there is no viewing age limit. Any values placed after the 2nd byte are determined as invalid.

*1 If a value other than the CA_system_ID for its own corresponding conditional access method is specified, it is determined that the applicable Conditional Access Descriptor is invalid.

[Other items that are worth special mention]

For operations of conditional access, see the Volume 5.

30.3.2.2 Digital Copy Control Descriptor

[Usage]

It is placed in order to specify the control information regarding digital copies and analog copies or the maximum transmit rate for the applicable entire service.

[Structure]

Table 30-20 shows the structure of Digital Copy Control Descriptor.

Table 30-20 Structure of Digital Copy Control Descriptor

<table>
<tr><th>Data Structure</th><th>bit</th><th>Identifier</th></tr>
<tr><td>digital_copy_control_descriptor () {</td><td></td><td></td></tr>
<tr><td>descriptor_tag</td><td>8</td><td>uimsbf</td></tr>
<tr><td>descriptor_length</td><td>8</td><td>uimsbf</td></tr>
<tr><td>digital_recording_control_data</td><td>2</td><td>bslbf</td></tr>
<tr><td>maximum_bit_rate_flag</td><td>1</td><td>bslbf</td></tr>
<tr><td>component_control_flag</td><td>1</td><td>bslbf</td></tr>
<tr><td>copy_control_type</td><td>2</td><td>bslbf</td></tr>
<tr><td>if(copy_control_type==01||copy_control_type==11)){</td><td></td><td></td></tr>
<tr><td>APS_control_data</td><td>2</td><td>bslbf</td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>else{</td><td></td><td></td></tr>
<tr><td>reserved_future_use</td><td>2</td><td>bslbf</td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>if(maximum_bit_rate_flag == 1) {</td><td></td><td></td></tr>
<tr><td>maximum_bit_rate</td><td>8</td><td>uimsbf</td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>if(component_control_flag ==1){</td><td></td><td></td></tr>
<tr><td>component_control_length</td><td>8</td><td>uimsbf</td></tr>
<tr><td>for(j=0;j<N;j++){</td><td></td><td></td></tr>
<tr><td>component_tag</td><td>8</td><td>uimsbf</td></tr>
<tr><td>digital_recording_control_data</td><td>2</td><td>bslbf</td></tr>
<tr><td>maximum_bitrate_flag</td><td>1</td><td>bslbf</td></tr>
<tr><td>reserved_future_use</td><td>1</td><td>bslbf</td></tr>
<tr><td>copy_control_type</td><td>2</td><td>bslbf</td></tr>
<tr><td>if(copy_control_type==01||copy_control_type==11) {</td><td></td><td></td></tr>
<tr><td>APS_control_data</td><td>2</td><td>bslbf</td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>else{</td><td></td><td></td></tr>
<tr><td>reserved_future_use</td><td>2</td><td>bslbf</td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>if(maximum_bitrate_flag==1){</td><td></td><td></td></tr>
<tr><td>maximum_bitrate</td><td>8</td><td>uimsbf</td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>}</td><td></td><td></td></tr>
<tr><td>}</td><td></td><td></td></tr>
</table>

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and Section 6.2.23, Part 2, and Appendix F.

[Sending Operation Rule]

⊙ **This descriptor must be placed when the applicable service is a digital copy control target or an analog copy control target.**

○ This descriptor must be placed when the maximum transmit rate for the applicable service is outside the default maximum bit rate defined in Table 21-1-1 and Table 21-1-2.

Table 30-21 shows the sending operation rule for each field.

Table 30-21 Sending Operation Rule for Digital Copy Control Descriptor (PMT the 1st loop)

Sending operation rule for each field	
descriptor_tag	Specify "0xC1".
descriptor_length	Specify the descriptor length of Digital Copy Control Descriptor.
digital_recording_control_data	This 2-bit field represents the information that controls the copy generation, and is encoded according to Table X1-Y1, Table X1-Y2 and Table X1-Y3.
maximum_bit_rate_flag	Specify '0' if the maximum transmit rate for the applicable service is not specified. Specify '1' if the maximum transmit rate for the applicable service is specified.
component_control_flag	If '0' is specified, the digital copy control information is defined for the entire program, and the field after the component control length does not exist. Always specify '0' when this descriptor is transmitted in PMT.
copy_control_type	This 2-bit field represents the information that controls the copy generation, and is encoded according to Table X1-Y1, Table X1-Y2 and Table X1-Y3.
APS_control_data	This is the analog output copy control information. This 2-bit field represents the information for which analog output copy is controlled if copy_control_type is '01' or '11', and is encoded according to Table X1-Y1, Table X1-Y2 and Table X1-Y3.
maximum_bit_rate	Specify the maximum transmit rate.

Furthermore, details on each bit are described as follows.

Cautions should be taken, as specifications for controlling each output terminal using Digital Copy Control Descriptor may change depending on the contents of the service.

[Cautions to be taken when using the descriptor (for all services)]

A send operation must not be performed, using a combination that is not defined in Table X1-Y1, Table X1-Y2 and Table X1-Y3.

When copy_control_type is "01" or "11", CGMS-A is copied to the area where digital_recording_control_data and APS_control_data are specified by CGMS-A.

If the applicable descriptor contains the copy control information, it is output after appropriate copyright processing has been performed on the analog video output, the high-speed digital interface output, and the digital sound output. CGMS-A and MACROVISION are used for the analog video output, DTCP is used for high-speed digital interface output, and SCMS is used for digital sound output. For details on the processing, see each specification and regulation document.

When more than one service is output from a high-speed digital interface, the relationship between the copy control (including the output control) specifications for each service is interpreted as follows.

- The output of a stream that includes services where output is prohibited or disallowed is prohibited.
- Output operation of a stream, which includes both service with copy_control_type=01 and service with copy_control_type=11, is prohibited. However, if a service where copying is allowed without any restrictions is included, output operation is allowed.
- With the level of strictness in copy control, it is interpreted that "Copying is prohibited" is the most strict, "copying is allowed for the first generation only" is the second most strict, and "copying is allowed without restrictions" is the least strict.

It is necessary to reflect the information correctly on the copyright display bit of the channel status and the category code, which are specified in IEC 60958.

Note that the category code where Digital Copy Control Descriptor exists is "001_0000L".

Copying is allowed without restrictions: The copyright information bit is 1.

Copying is allowed for the first generation only: The copyright information bit is 0, and L bit in the category code is 0.

Copying is prohibited: The copyright information bit is 0, and L bit in the category code is 1.

If the applicable descriptor is not specified, it is treated as copy free.

Table X1-Y1 Use of descriptors when providing digital TV services and temporary video services

<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_ estriction _mode *6</th></tr>
<tr><td>Copying is allowed without restrictions *5</td><td rowspan="2">Copying is allowed without restrictions.</td><td rowspan="8">01</td><td rowspan="2">0</td><td rowspan="2">Don’t care</td><td>0</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is allowed without restrictions</td><td>1</td></tr>
<tr><td rowspan="2">Copying is prohibited *1</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments.</td><td rowspan="2">11</td><td>0</td><td>Don’t care</td><td>Don’t care</td></tr>
<tr><td>Copying is prohibited. *4</td><td>Other than 00</td><td>Don’t care</td><td>Don’t care</td></tr>
<tr><td>Copying is allowed for the first generation only *2 *7</td><td rowspan="2">Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.</td><td rowspan="4">10</td><td rowspan="2">0</td><td rowspan="2">Don’t care</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only *2</td><td>0</td></tr>
<tr><td>Copying is allowed for the first generation only *2 *7</td><td>Copying is prohibited after making the first generation copy. *4 *8</td><td rowspan="2">Other than 00</td><td rowspan="2">Don’t care</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only *2</td><td>Copying is prohibited after making the first generation copy. *4</td><td>0</td></tr>
</table>

*1: With the high-speed digital interface output, Perform Copy Never processing of Source Function that is defined in DTCP. However, when only a voice stream is output in the format in conformance with IEC60958, perform No More Copies processing.

*2: With the high-speed digital interface output, Perform Copy One Generation processing of Source

Function that is defined in DTCP.

*3: It is applied to the composite output and the component video output. It also includes a case where received video signals are converted into different format and then output. The signals to which Macrovision control is applied are composite signals and component video signals in 480I.

*4: With the analog video output, perform output processing using parameters specified by Macrovision and specified APS_control_data.

*5: In the case of high speed digital interface output, encryption will be performed according to the DTCP specifications. However, when only audio stream is output in IEC60958 conformant format, encryption will not be performed.

*6: When there is no content availability descriptor, both encryption_mode and copy_restriction_mode are determined as ‘1”.

*7: Can be recorded (accumulated) as “Quantity Restriction Copy Permitted”

*8: When the signals are recorded (accumulated) under “Quantity Restriction Copy Permitted”, see 6.8 of Volume 8 in Part 1

[Cautions to be taken when using the descriptor (Digital TV service and temporary video service)]

When service_type is "0x01"(Digital TV service) or "0xA1" (Temporary video service) listed in the service list descriptor of NIT, it must be encoded according to Table X1-Y1.

Table X1-Y2 Use of descriptors when providing digital voice services and temporary voice services

<table>
<tr><th rowspan="2">Digital copy control</th><th rowspan="2">Analog copy control[*4]</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>Copying is allowed without restrictions.[*1]</td><td rowspan="2">Copying is allowed without restrictions.</td><td>01</td><td rowspan="2">00</td><td rowspan="2">Don’t care</td><td rowspan="2">1</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is allowed without restrictions.</td><td>11</td></tr>
<tr><td rowspan="2">Copying is prohibited. [*1, *2]</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments</td><td rowspan="2">01</td><td rowspan="4">11</td><td>00</td><td rowspan="4">Don’t care</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is prohibited [*5]</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copying is prohibited, Output with MPEG_TS is currently disallowed. [*9]</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments</td><td rowspan="2">11</td><td>00</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is prohibited [*5]</td><td>Other than 00</td></tr>
<tr><td>Copying is allowed for the first generation only [*1, *3, *7]</td><td rowspan="2">Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments</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>Copying is allowed for the first generation only [*1, *3]</td><td>0</td></tr>
<tr><td>Copying is allowed for the first generation only [*1, *3, *7]</td><td>Copying is prohibited after making the first generation copy [*5, *8]</td><td rowspan="2">Other than 00</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only [*1, *3]</td><td>Copying is prohibited after making the first generation copy [*5]</td><td>0</td></tr>
</table>

Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *7, *9	Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments	11		00		1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *9						0
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *7, *9	Copying is prohibited after making the first generation copy *5, *8			Other than 00		1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *9	Copying is prohibited after making the first generation copy *5					0

*1: Output is currently prohibited for MPEG-TS in the serial interface of high speed digital interface. The related descriptions can be found in 8.2 Functional Restriction for the Content Protection in Volume 8 of Part 1.

*2: With the high-speed digital interface output, Perform No More Copies processing of AM824 audio Source Function that is defined in DTCP.

*3: With the high-speed digital interface output, Perform Copy One Generation processing of AM824 audio Source Function that is defined in DTCP.

*4: It is applied to the composite output and the component video output. It also includes the case where received video signals are converted into different format and then output. The signals to which Macrovision control is applied are composite signals and component video signals in 480I.

*5: With the analog video output, perform output processing using parameters specified by Macrovision and specified APS_control_data.

*6: When there is no content availability descriptor, both encryption_mode and copy_restriction_mode are determined as ‘1’.

*7: Can be recorded (accumulated) as “Quantity Restriction Copy Permitted”

*8: When the signals are recorded (accumulated) under “Quantity Restriction Copy Permitted”, see

6.8 of Volume 8 in Part 1

*9: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Cautions to be taken when using the descriptor (Digital voice services and temporary voice services)]

When service_type is "0x02"(Digital voice service) or "0xA2" (Temporary voice service) listed in the service list descriptor of NIT, it must be encoded according to Table X1-Y2.

Table X1-Y3 Use of descriptors when providing data services, temporary data services and bookmark listing data services

<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>Copying is allowed without restrictions. *5</td><td rowspan="3">Copying is allowed without restrictions.</td><td>01</td><td rowspan="3">00</td><td rowspan="3">Don’t care</td><td>0</td><td rowspan="3">Don’t care</td></tr>
<tr><td rowspan="2">Copying is allowed without restrictions.</td><td rowspan="2">11</td><td>1</td></tr>
<tr><td>1</td></tr>
<tr><td rowspan="2">Copying is prohibited *1</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments</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>Copying is prohibited *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copying is prohibited, however, output with MPEG_TS is prohibited *10</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments.</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>Copying is prohibited *4</td><td>Other than 00</td></tr>
<tr><td>Copying is allowed for the first generation only *2, *8</td><td rowspan="2">Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.</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>Copying is allowed for the first generation only *2</td><td>0</td></tr>
<tr><td>Copying is allowed for the first generation only *2, *8</td><td>Copying is prohibited after making the first generation copy *4, *9</td><td rowspan="2">Other than 00</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only *2</td><td>Copying is prohibited after making the first generation copy *4</td><td>0</td></tr>
</table>

Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited *8, 10	Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.	11		00		1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited *10						0
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited *8, *10	Copying is prohibited after making the first generation copy *4, *9			Other than 00		1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited *10	Copying is prohibited after making the first generation copy *4					0

*1: With the high-speed digital interface output, perform Copy Never processing of Source Function that is defined in DTCP. However, when only a voice stream is output in a format in conformance with IEC60958, perform No More Copies processing.

*2: With the high-speed digital interface output, perform Copy One Generation processing of Source Function that is defined in DTCP.

*3: It is applied to the composite output and the component video output. It also includes the case where received video signals are converted into different format and then output. The signals to which Macrovision control is applied are composite signals and component video signals in 480I.

*4: With the analog video output, perform output processing using parameters specified by Macrovision and specified APS_control_data.

*5: In the case of high speed digital interface output, encryption will be performed according to the DTCP specifications. However, when only audio stream is output in IEC60958 conformant format, encryption will not be performed.

*6: When there is no content availability descriptor, both encryption_mode and copy_restriction_mode are determined as ‘1”.

*7: For relationship between copy control operation and service form, see “5.4 Operation Rules for

Content Protection" in Volume 8 of Part 1.

*8: Can be recorded (accumulated) as "Quantity Restriction Copy Permitted"

*9: When the signals are recorded (accumulated) under "Quantity Restriction Copy Permitted", see 6.8 of Volume 8 in Part 1

*10: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Cautions to be taken when using the descriptor (Data services, temporary data services and bookmark listing data services)]

When service_type is "0xC0"(Data service) or "0xA3" (Temporary data service) or "0xAA" (Bookmark listing data service) listed in the service list descriptor of NIT, it must be encoded according to Table X1-Y3.

[Reception Processing Criteria]

Table 30-24 shows the reception processing criteria for each field.

Table 30-24 Reception Processing Criteria for Digital Copy Control Descriptor (PMT the 1st loop)

Reception processing criteria for each field	
descriptor_tag	= "0xC1" : It is determined that the applicable descriptor is Digital Copy Control Descriptor.
descriptor_length	It is determined that it is the descriptor length of Digital Copy Control Descriptor.
digital_recording_control_ data	This 2-bit field represents the information that controls the copy generation, and is decoded according to Table X1-Y1, Table X1-Y2 and Table X1-Y3.
maximum_bit_rate_flag	='0': It is determined that the maximum transmit rate for the applicable service is within the default maximum bit rate defined in Table 21-1-1, and Table 21-1-2. ='1': It is determined that the maximum transmit rate for the applicable service is specified below.
component_control_flag	='0': It is determined that the applicable descriptor is valid. ='1': It is determined that the applicable descriptor is invalid.
copy_control_type	This 2-bit field represents the information that is in the format of controlling the copy generation, and is decoded according to Table X1-Y1, Table X1-Y2 and Table X1-Y3.
maximum_bit_rate	It is determined as the maximum transmit rate value for the applicable service.

[Other items that are worth special mention]

The copy control for analog output signals is subject to individual agreement between the applicable broadcasting business and a company such as Macrovision, it seems that careful consideration is required in the future.

If this descriptor is not specified in the 1st loop, and Digital Copy Control Descriptor is specified only in the 2nd loop, the copy control information in the 1st loop should be treated as "Copying is allowed without restrictions".

The reception processings that are not defined in Table X1-Y1, Table X1-Y2 and Table X1-Y3 are as follows:

☐ Digital TV service and temporary video service

When copy_control_type=00/10/11:

- Outputs from the analog video output, the digital video output and the high-speed digital interface output are prohibited.

When copy_control_type=01, digital_recording_control_data=01:

- EMI for the high-speed digital interface is "01". With Other processings, the same processings as when copy_control_type=01, and digital_recording_control_data=11 should be performed.

☐ Digital voice service, temporary voice service, data service, temporary data service, and bookmark listing data service

When copy_control_type=00/10:

- Outputs from the analog video output, the digital sound output and the high-speed digital interface output are prohibited.

When copy_control_type=01, digital_recording_control_data=01 :

- Only EMI for the high-speed digital interface is "01", and with other processings, the same processings as when copy_control_type=01, digital_recording_control_data=11 should be performed.

When copy_control_type=11, digital_recording_control_data=01 :

- The same processings as when copy_control_type=11, and digital_recording_control_data=11 should be performed.

30.3.2.3 Emergency Information Descriptor

[Usage]

It shows that the applicable service is broadcasting an emergency alert broadcasting, or testing an emergency alert signal.

[Structure]

Table 30-25 shows the structure of Emergency Information Descriptor.

Table 30-25 Structure of Emergency Information Descriptor

Data Structure	bit	Identifier
emergency_information_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
service_id_loop{		
service_id	**16**	**uimsbf**
start_end_flag	**1**	**bslbf**
signal_level	**1**	**bslbf**
reserved_future_use	**6**	**bslbf**
area_code_length	**8**	**uimsbf**
area_code_loop{		
area_code	**12**	**bslbf**
reserved_future_use	**4**	**bslbf**
}		
}		
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and definitions in Section 6.2.24, Part 2.

[Sending Operation Rule]

⊙ **If the applicable service is broadcasting an emergency alert or emergency alert signal test, this descriptor must be inserted. If other services are broadcasting an emergency alert or an emergency alert signal test, this descriptor can be inserted optionally.**

Table 30-26 shows the sending operation rule for each field.

Table 30-26 Sending Operation Rule for Emergency Information Descriptor

Sending operation rule for each field	
descriptor_tag	Specify "0xFC".
descriptor_length	Specify the descriptor length of Emergency Information Descriptor.
[service_id_loop]	The number of loops should be 1.
service_id	Specify service_id for the service that is broadcasting an emergency alert or emergency alert signal test.
start_end_flag	Specify '1' when the service is broadcasting an emergency alert, and specify '0' when it is broadcasting a test.
signal_level	It is specified in accordance with Section 6.2.24, Part 2 of ARIB STD-B10.
area_code_length	It is restricted by the maximum value of descriptor_length.
[area_code_loop]	Loop for the same number of times as the number of target area code. Loop for at least once.
area_code	Specify the area code defined in Appendix D, Part 2 of ARIB STD-B10.

[Reception Processing Criteria]

- It shows that the service is broadcasting an emergency alert, or an emergency alert signal test .
- It shows that the service continues to broadcast an emergency alert for the area specified by the area code, during the period where the applicable descriptor with start_end_flag=’1’ has been specified is placed.
- It shows that the applicable service has completed broadcasting an emergency alert, as the applicable descriptor with start_end_flag=’1’ has been specified is not placed any more.
- It shows that an emergency alert signal test is being broadcasted, during the period where the applicable descriptor with start_end_flag=’0’ has been specified is placed.

Table 30-27 shows the reception processing criteria for each field.

Table 30-27 Reception Processing Criteria for Emergency Information Descriptor

Reception processing criteria for each field	
descriptor_tag	= "0xFC": It is determined that the applicable descriptor is Emergency Information Descriptor.
descriptor_length	It is determined that it is the descriptor length of Emergency Information Descriptor.
[service_id_loop]	It is determined that any loops after the first loop are not valid.
service_id	It is determined that this is service_id for a service that is broadcasting an emergency alert or emergency alert signal test.
start_end_flag	‘0’ : It is determined that the applicable service is broadcasting an emergency alert signal test. ‘1’ : It is determined that the applicable service is broadcasting an emergency alert for the area specified by the area code (area_code).
signal_level	It is determined that this is a signal type specified in accordance with Section 6.2.24, Part 2 of ARIB STD-B10.
area_code_length	
[area_code_loop]	It is determined that the same number of area codes that are being looped exist.
area_code	It is determined that this is the area code defined in Appendix D, Part 2 of ARIB STD-B10.

[Other items that are worth special mention]

See Chapter 26.

30.3.2.4 Content Availability Descriptor

[Usage]

It is placed to specify control information on storage or output for the applicable program. It is also placed when specifying whether to enable "Quantity Restriction Copy Permitted” for the said program or the component.

[Structure]

Table 30-27-2 shows the structure of Content Availability Descriptor.

Table 30-27-2 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**
}		
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and definitions in Section 6.2.45, Part 2.

[Sending Operation Rule]

⊙ **This descriptor must be placed when the applicable program is an output protection target.**
The output protection means that a protection is performed against the high-speed digital interface output of the contents where "Copying is allowed without restrictions", by using the output protection bit (encryption_mode) of Content Availability Descriptor.

⊙ When the digital copy control information of the said program or component is “Copying is allowed for the first generation only” and “Quantity Restriction Copy Permitted” is enabled, the descriptor is not placed or it is placed as copy_restriction_mode=’1’.

⊙ When the digital copy control information of the said program or component is “Copying is allowed for the first generation only” and “Quantity Restriction Copy Permitted” is disabled, the descriptor must be placed as copy_restriction_mode=’0’.

Table 30-27-3 shows the sending operation rule for each field.

Table 30-27-3 Sending Operation Rule for Content Availability Descriptor

Sending operation rule for each field	
descriptor_tag	Specify "0xDE".
descriptor_length	Specify the descriptor length of Content Availability Descriptor.
copy_restriction_mode	Described as ‘1’ when “Quantity Restriction Copy Permitted” is enabled;otherwise described as ‘0’ (Be aware the default value when the said descriptor has not been placed shall be ‘1)
image_constraint_token	Specify "1".
retention_mode	Specify "0".
retention_state	Specify "111".
encryption_mode	Specify '0' if the digital copy control information is "Copying is allowed without restrictions", and a protection is performed on high-speed digital interface output.

[Cautions to be taken when using this descriptor]

This descriptor is used in combination with Digital Copy Control Descriptor. When placing the applicable descriptor, Digital Copy Control Descriptor must be placed.

Since the information specified for copy_restriction_mode, image_constraint_token, retention_state and encryption_mode shows the default state when "1" is specified, cautions need to be taken.

[Reception Processing Criteria]

Table 30-27-4 shows the reception processing criteria for each field.

Table 30-27-4 Reception Processing Criteria for Content Availability Descriptor

Reception processing criteria for each field	
descriptor_tag	= "0xDE" : It is determined that the applicable descriptor is Content Availability Descriptor.
descriptor_length	It is determined that it is the descriptor length of Content Use Descriptor.
copy_restriction_mode	=’1’: It is determined that “Quantity Restriction Copy Permitted” is enabled. *3 =’0’: It is determined that “Quantity Restriction Copy Permitted” is disabled. *3
image_constraint_token	It is determined that there is no restriction for the video signal output resolution regardless of the value of this field.
retention_mode	It is determined that temporary storage is allowed, regardless of the value.
retention_state	It is determined that temporary storage is allowed for 1 hour 30 minutes, regardless of the value. *1
encryption_mode	=’1’: If the digital copy control information is "Copying is allowed without restrictions", it is determined that a protection is not performed on high-speed digital interface output. *2 =’0’: If the digital copy control information is "Copying is allowed without restrictions", it is determined that a protection is performed on high-speed digital interface output.

*1: Digital copy control information is meaningful only in the case of “Copying is prohibited”. (For details, see Volume 8 in Part 1)

*2: Digital copy control information is meaningful only in the case of "Copying is allowed without restrictions". (For details, see Volume 8 of Part 1)

*3: Digital copy control information is meaningful only in the case of "Copying is allowed for the first generation only". (For details, see Volume 8 of Part 1)

[Other items that are worth special mention]

If the applicable descriptor is not placed, it is interpreted that each field has the following value:

- copy_restriction_mode = '1'
- image_constraint_token='1'
- retention_mode='0'
- retention_state='111'
- encryption_mode='1'

For details on operations and processing, see 21 and the Volume 8 of Part 1.

Furthermore, the high-speed digital interface should be controlled, in accordance with the regulations in DTCP.

30.3.3 Descriptors that are inserted into PMT the 2nd loop (ES loop)

30.3.3.1 Conditional Access Descriptor

[Usage]

It specifies a PID for the ECM transmit stream of CA system (Conditional access method), if the applicable ES is a target of the conditional access.

[Structure]

See Table 30-7 for the structure of Conditional Access Descriptor.

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and Section 2.6.16 of ISO/IEC13818-1.

[Sending Operation Rule]

⊙ **Only one descriptor must be sent for one conditional access method ID.**

If more than one conditional access method is used, one applicable descriptor for each conditional access method ID must be placed.

Table 30-28 shows the sending operation rule for each field.

Table 30-28 Sending Operation Rule for Conditional Access Descriptor (PMT the 2nd loop)

Sending operation rule for each field	
descriptor_tag	Specify "0x09".
descriptor_length	Specify the descriptor length of conditional access descriptor.
CA_system_ID	Specify the conditional access method ID. Conditional access method ID values other than the ones applied to BS digital broadcasting should not be specified.
CA_PID	Specify ECM_PID. Only when the applicable stream is free of charge, specify CA_PID="0x1FFF" (See 20.2.1).
private_data_byte	Do not specify it (it is not used for the moment).

[Reception Processing Criteria]

○ It is determined that the applicable ES is a target of the conditional access.

○ If TS packets (ECM) for the PID specified in CA_PID field cannot be received within 2 seconds, even though this descriptor is placed, it is determined that the send system is not properly working (except for the case where CA_PID="0x1FFF" is specified).

Table 30-29 shows the reception processing criteria for each field.

Table 30-29 Reception Processing Criteria for Conditional Access Descriptor (PMT the 2nd loop)

	Reception processing criteria for each field
descriptor_tag	= "0x09": It is determined that the applicable descriptor is Conditional Access Descriptor.
descriptor_length	It is determined that it is the descriptor length of conditional access descriptor.
CA_system_ID	= BS applied ID value: It is determined as the applicable conditional access method ID.*1 = Other values: It is determined that the applicable descriptor is invalid.
CA_PID	It is determined as ECM_PID. However, if "0x1FFF" is specified, it is determined that this is a free of charge program (ECM of the applicable PID is not transmitted).
private_data_byte	It is determined as invalid, regardless of the value.

*1 If a value other than the CA_system_ID for its own corresponding conditional access method is specified, it is determined that the applicable Conditional Access Descriptor is invalid.

[Other items that are worth special mention]

For operations of conditional access, see the Volume 5.

30.3.3.2 Stream Identifier Descriptor

[Usage]

It is used to label the applicable ES.

[Structure]

Table 30-30 shows the structure of Stream Identification Descriptor.

Table 30-30 Structure of Stream Identifier Descriptor

Data Structure	bit	Identifier
stream_identifier_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
component_tag	**8**	**uimsbf**
}		

[Meaning of Each Field]

Note that the meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and definitions in Section 6.2.16, Part 2.

[Sending Operation Rule]

⊙ This descriptor must be placed at the start of the 2nd loop of PMT.

Table 30-31 shows the Sending Operation Rule of Stream Identification Descriptor.

Table 30-31 Sending Operation Rule of Stream Identifier Descriptor

Sending operation rule for each field	
descriptor_tag	Specify "0x52".
descriptor_length	Specify the descriptor length of Stream Identifier Descriptor.
component_tag	

[Reception Processing Criteria]

- ○ It is determined that ES loops, for which the same component_tag value as component_tag value in EIT is specified, are supported each other.

Table 30-32 shows the reception processing criteria for each field.

Table 30-32 Reception Processing Criteria of Stream Identifier Descriptor

Reception processing criteria for each field	
descriptor_tag	= "0x52" : It is determined that the applicable descriptor is Stream Identifier Descriptor.
descriptor_length	It is determined that it is the descriptor length of Stream Identifier Descriptor.
component_tag	

[Other items that are worth special mention]

- A unique component_tag value can be assigned to a service.
- For information on the rules for assigning component_tag value, see Section 14.2.

30.3.3.3 Hierarchical Transmission Descriptor

[Usage]

It is used to show the relationship between hierarchical ESs, when the applicable service is transmitted in hierarchy.

[Structure]

Table 30-33 shows the structure of Hierarchical Transmission Descriptor.

Table 30-33 Structure of Hierarchical Transmission Descriptor

Data Structure	bit	Identifier
hierarchical_transmission_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
reserved_future_use	**7**	**bslbf**
quality_level	**1**	**bslbf**
reserved_future_use	**3**	**bslbf**
reference_PID	**13**	**uimsbf**
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and definitions in Section 6.2.22, Part 2.

[Sending Operation Rule]

⊙ **This descriptor must be placed when the applicable ES is a target of hierarchical modulation.**

- ○ This descriptor must be placed in components that are transmitted other than in 8PSK (8 phase modulation).
- ○ If there is an ES in a lower hierarchy to which the applicable ES in a higher hierarchy corresponds, place the Hierarchical Transmission Descriptor which refers to the ES in a lower hierarchy.
- ○ More than one Hierarchical Transmission Descriptor cannot be placed for one ES.
- ○ If the applicable ES is in a lower hierarchy which is intended to be always presented at the receiver, specify it with no reference target ES (Specify a null-packet PID for reference_PID).
- ○ If the applicable ES is in a higher hierarchy, and the applicable ES is specified as a reference target in the hierarchical transmission descriptor which specifies the ES in a lower hierarchy, this ES in the lower hierarchy must be specified as a reference target.
- ○ Do not specify that the ES in a higher hierarchy refers to the ES in a higher hierarchy, or the ES in a lower hierarchy refers to the ES in a lower hierarchy.

○ With component_tag value for an ES in a lower hierarchy, provide a value that is different from the value of other ES in the area of the same media type.

Table 30-34 shows the sending operation rule for each field.

Table 30-34 Sending Operation Rule for Hierarchical Transmission Descriptor

Sending operation rule for each field	
descriptor_tag	Specify "0xC0".
descriptor_length	Specify the descriptor length of Hierarchical Transmission Descriptor.
quality_level	If the applicable ES is transmitted from a higher hierarchy slot: Specify ‘1’. If the applicable ES is transmitted from a lower hierarchy slot: Specify ‘0’.
reference_PID	Specify ES_PID for the reference target ES (on different hierarchy side) stream_type for the reference source ES must be same as that of the reference source. If there is no reference target, specify a null-packet PID (0x1FFF).

[Reception Processing Criteria]

○ It is determined that the applicable ES is a target of hierarchy modulation.

○ In principle, an ES in a lower hierarchy that has a reference target ES is decoded only when a reception becomes unstable with an ES in a higher hierarchy.

○ ES in a lower hierarchy with no reference target should be decoded nomally and treated as one of the options when selecting components.

○ When the ES in a lower hierarchy is decoded and then returned to the ES in a higher hierarchy by following the reference target of Hierarchy Transmission Descriptor from the ES in a higher hierarchy, in principle, it should be returned to the ES in a higher hierarchy which has been decoded before, however, if this is not possible, the reference target specified in Hierarchy Transmission Descriptor for ES in a lower hierarchy is decoded.

○ The ES in a higher hierarchy with no Hierarchy Transmission Descriptor does not have to be switched to ES in a lower hierarchy, even if stable decoding is difficult to achieve.

Table 30-35 shows the reception processing criteria for each field.

Table 30-35 Reception Processing Criteria for Hierarchical Transmission Descriptor

Reception Processing Criteria for the descriptor	
It shows that the applicable ES is a target of hierarchical modulation.	
Reception processing criteria for each field	
descriptor_tag	= "0xC0": It is determined that the applicable descriptor is Hierarchical Transmission Descriptor.
descriptor_length	It is determined that it is the descriptor length of Hierarchical Transmission Descriptor.
quality_level	='1': It is determined that the applicable ES is the one that is sent on the higher hierarchical slot side. ='0': It is determined that the applicable ES is the one that is sent on the lower hierarchical slot side.
reference_PID	It is determined that this is the ES_PID for the reference target ES (on different hierarchy side). If the applicable PID value is "0x1FFF", it is determined that there are no reference targets.

[Other items that are worth special mention]

None.

30.3.3.4 Digital Copy Control Descriptor

[Usage]

It is placed in order to specify the control information regarding digital copies and analog copies or the maximum transmit rate for each ES in the applicable service.

[Structure]

Table 30-36 shows the structure of Digital Copy Control Descriptor.

Table 30-36 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==01||copy_control_type==11)){		
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==01||copy_control_type==11) {		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bitrate_flag==1){		
maximum_bitrate	**8**	**uimsbf**
}		
}		
}		
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and Section 6.2.23, Part 2, and Appendix F.

[Sending Operation Rule]

⊙ **This descriptor must be placed when the applicable service is a digital copy control target or an analog copy control target. However, only the components that can be placed are the one whose component tag value is between 0X40 and 0X7F.**

- ○ This descriptor must be placed when the maximum transmit rate for the applicable ES is outside the default maximum bit rate defined in Table 21-1-1, and Table 21-1-2.

Table 30-37 shows the sending operation rule for each field.

Table 30-37 Sending Operation Rule for Digital Copy Control Descriptor (PMT the 2nd loop)

Sending operation rule for each field<	
Descriptor_tag	Specify "0xC1"
descriptor_length	Specify the descriptor length of digital copy control descriptor.
digital_recording_control_data	This 2-bit field represents the information that controls the copy generation, and is encoded according to Table X2-Y1, Table X2-Y2 and Table X2-Y3.
maximum_bit_rate_flag	Specify '0' if the maximum transmit rate for the applicable ES is not specified. Specify '1' if the maximum transmit rate for the applicable ES is specified.
component_control_flag	If '0' is specified, the digital copy control information is defined for the applicable ES, and the field after the component control length does not exist. Always specify '0' when this descriptor is transmitted in PMT.
copy_control_type	This 2-bit field represents the information that controls the copy generation, and is encoded according to Table X2-Y1, Table X2-Y2 and Table X2-Y3.
APS_control_data	This is the analog output copy control information. This 2-bit field represents the information for which analog output copy is controlled if copy_control_type is '01' and '11',and is encoded according to Table X2-Y1, Table X2-Y2 and Table X2-Y3.
maximum_bit_rate	Specify the maximum transmit rate.

Furthermore, details on each bit are described as follows.

Cautions should be taken, as specifications for controlling each output terminal using Digital Copy Control Descriptor may change depending on the contents of the service.

[Cautions to be taken when using the descriptor (for all services)]

A send operation must not be performed, using combinations that are not defined in Table X2-Y1, Table X2-Y2 and Table X2-Y3.

When copy_control_type is "01" or "11", CGMS-A is copied to the area where digital_recording_control_data and APS_control_data are specified by CGMS-A.

If the applicable descriptor contains the copy control information, it is output after appropriate copyright processing has been performed on the analog video output, the high-speed digital interface output, and the digital sound output. CGMS-A and MACROVISION are used for the analog video output, DTCP is used for the high-speed digital interface output, and SCMS is used for the digital sound output. For details on the processing, see each specification and regulation document.

When more than one component is output from a high-speed digital interface, the relationship between copy control (including output control) specifications for each component is interpreted as follows.

- The operation of the descriptors defined for each service is applied to the descriptors that are specified in the 1st loop and the 2nd loop.
- The output of a stream that includes components where output is prohibited or disallowed is prohibited.
- Output operation of a stream, which includes both component with copy_control_type=01 and component with copy_control_type=11, is prohibited. However, output with IEC 60958 of a copy free component in the digital voice service and temporary voice service, and output with MPEG_TS and IEC60958 of a copy free component in the data service and temporary data service and bookmark listing data service, are allowed.
- With the level of strictness in copy control, it is interpreted that "prohibited from copying" is most strict, "copying is allowed for the first generation only" is the second most strict, and "copying is allowed without restrictions" is the least strict.

It is necessary to reflect the information correctly on the copyright display bit of the channel status and the category code, which are specified in IEC 60958.

Note that the category code where Digital Copy Control Descriptor exists is "001_0000L".

Copying is allowed without restrictions: The copyright information bit is 1.

Copying is allowed for the first generation only: The copyright Information bit is 0, and L bit in the category code is 0.

Copying is prohibited: The copyright Information bit is 0, and L bit in the category code is 1.

Table X2-Y1 Use of descriptors when providing digital TV services and temporary video services

<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 *9</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>Copying is allowed without restrictions *5</td><td rowspan="2">Copying is allowed without restrictions</td><td rowspan="8">01</td><td rowspan="2">00</td><td rowspan="2">Don’t care</td><td>0</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is allowed without restrictions</td><td>1</td></tr>
<tr><td rowspan="2">Copying is prohibited *1</td><td>Copying is prohibited, however, Macro-vision is not added.
Therefore, copying is allowed for only traditional analog input record equipments.</td><td rowspan="2">11</td><td>00</td><td>Don’t care</td><td>Don’t care</td></tr>
<tr><td>Copying is prohibited *4</td><td>Other than 00</td><td>Don’t care</td><td>Don’t care</td></tr>
<tr><td>Copying is allowed for the first generation only *2 *7</td><td rowspan="2">Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.</td><td rowspan="4">10</td><td rowspan="2">00</td><td rowspan="2">Don’t care</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only *2</td><td>0</td></tr>
<tr><td>Copying is allowed for the first generation only *2 *7</td><td>Copying is prohibited after making the first generation copy.*4 *8</td><td rowspan="2">Other than 00</td><td rowspan="2">Don’t care</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only *2</td><td>Copying is prohibited after making the first generation copy.*4</td><td>0</td></tr>
</table>

*1: With the high-speed digital interface output, perform Copy Never processing of Source Function that is defined in DTCP. However, when only a voice stream is output in a format in conformance with IEC60958, perform No More Copies processing.

*2: With the high-speed digital interface output, perform Copy One Generation processing of Source Function that is defined in DTCP.

*3: It is applied to the composite output and the component video output. It also includes the case where received video signals are converted into different format and then output. The signals to which Macrovision control is applied are composite signals and component video signals in 480I.

*4: With the analog video output, perform output processing using parameters specified by Macrovision and specified APS_control_data.

*5: In the case of high speed digital interface output, encryption will be performed according to the DTCP specifications. However, when only audio stream is output in IEC60958 conformant format, encryption will not be performed.

*6: When there is no content availability descriptor, both encryption_mode and copy_restriction_mode are determined as ‘1’.

*7: Can be recorded (accumulated) as “Quantity Restriction Copy Permitted”

*8: When the signals are recorded (accumulated) under “Quantity Restriction Copy Permitted”, see 6.8 of Volume 8 in Part 1

*9: Placed in the first loop of the PMT.

[Cautions to be taken when using the descriptor (Digital TV services and temporary video services)]

When service_type is "0x01"(Digital TV service) or "0xA1" (Temporary video service) listed in the service list descriptor of NIT, it must be encoded according to Table X2-Y1.

Table X2-Y2 Use of descriptors when providing digital voice services and temporary voice services

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control[*4]</th><th colspan="3">Operation of the digital copy control descriptor</th><th colspan="2">Operation of the content availability descriptor[*9]</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_estriction_mode[*6]</th></tr>
<tr><td>Copying is allowed without restrictions.[*1]</td><td rowspan="2">Copying is allowed without restrictions.</td><td>01</td><td rowspan="2">00</td><td rowspan="2">Don’t care</td><td rowspan="2">1</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is allowed without restrictions.</td><td>11</td></tr>
<tr><td rowspan="2">Copying is prohibited[*1, *2]</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments.</td><td rowspan="2">01</td><td rowspan="4">11</td><td>00</td><td rowspan="4">Don’t care</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is prohibited[*5]</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copying is prohibited, however, output with MPEG_TS is prohibited[*10]</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments.</td><td rowspan="2">11</td><td>00</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Copying is prohibited[*5]</td><td>Other than 00</td></tr>
<tr><td>Copying is allowed for the first generation only.[*1, *3, *7]</td><td rowspan="2">Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.</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>Copying is allowed for the first generation only.[*1, *3]</td><td>0</td></tr>
<tr><td>Copying is allowed for the first generation only.[*1, *3, *7]</td><td>Copying is prohibited after making the first generation copy.[*5, *8]</td><td rowspan="2">00 以外</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only.[*1, *3]</td><td>Copying is prohibited after making the first generation copy.[*5]</td><td>0</td></tr>
</table>

Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. [*7, *10]	Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.	11		00		1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. [*10]						0
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. [*7, *10]	Copying is prohibited after making the first generation copy. [*5, *8]			Other than 00		1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. [*10]	Copying is prohibited after making the first generation copy. [*5]					0

*1: Output is currently prohibited for MPEG-TS in the serial interface of high speed digital interface. The related descriptions can be found in 8.2 Functional Restriction for the Content Protection in Volume 8 of Part 1.

*2: With the high-speed digital interface output, perform No More Copies processing of AM824 audio Source Function that is defined in DTCP.

*3: With the high-speed digital interface output, perform Copy One Generation processing of AM824 audio Source Function that is defined in DTCP.

*4: It is applied to the composite output and the component video output. It also include the case where received video signals are converted into different format and then output. The signals to which Macrovision control is applied are composite signals and component video signals in 480I.

*5: With the analog video output, perform output processing using parameters specified by Macrovision and specified APS_control_data.

*6: When there is no content availability descriptor, both encryption_mode and copy_restriction_mode are determined as ‘1’.

*7: Can be recorded (accumulated) as “Quantity Restriction Copy Permitted”

*8: When the signals are recorded (accumulated) under “Quantity Restriction Copy Permitted”, see 6.8 of Volume 8 in Part 1

*9: Placed in the first loop of the PMT.

*10: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Cautions to be taken when using the descriptor (Digital voice services and temporary voice services)]

When service_type is "0x02"(Digital voice service) or "0xA2" (Temporary voice service) listed in the service list descriptor of NIT, it must be encoded according to Table X2-Y2.

Table X2-Y3 Use of descriptors when providing data services, temporary data services and bookmark listing data services

<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[*10]</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_ estriction _mode[*6]</th></tr>
<tr><td>Copying is allowed without restrictions [*5]</td><td rowspan="3">Copying is allowed without restrictions</td><td rowspan="2">01</td><td rowspan="3">00</td><td rowspan="3">Don’t care</td><td>0</td><td rowspan="3">Don’t care</td></tr>
<tr><td rowspan="2">Copying is allowed without restrictions</td><td>1</td></tr>
<tr><td>11</td><td>1</td></tr>
<tr><td rowspan="2">Copying is prohibited [*1]</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments.</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>Copying is prohibited [*4]</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copying is prohibited, however, output with MPEG_TS is prohibited. [*T1]</td><td>Copying is prohibited, however, Macro-vision is not added. Therefore, copying is allowed for only traditional analog input record equipments.</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>Copying is prohibited [*4]</td><td>Other than 00</td></tr>
<tr><td>Copying is allowed for the first generation only.[*2 *8]</td><td rowspan="2">Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.</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>Copying is allowed for the first generation only.[*2]</td><td>0</td></tr>
<tr><td>Copying is allowed for the first generation only.[*2 *8]</td><td>Copying is prohibited after making the first generation copy.[*4 *9]</td><td rowspan="2">Other than 00</td><td>1</td></tr>
<tr><td>Copying is allowed for the first generation only.[*2]</td><td>Copying is prohibited after making the first generation copy.[*4]</td><td>0</td></tr>
</table>

Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *8 *11	Copying is allowed for the first generation only, however, Macro-vision is not added. Therefore, copying is allowed for traditional analog record equipments.			00		1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *11						0
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited.*8, *11	Copying is prohibited after making the first generation copy.*4 *9	11			Don't care	1
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *11	Copying is prohibited after making the first generation copy.*4					0

*1: With the high-speed digital interface output, perform Copy Never processing of Source Function that is defined in DTCP. However, when only a voice stream is output in a format in conformance with IEC60958, perform No More Copies processing.

*2: With the high-speed digital interface output, perform Copy One Generation processing of Source Function that is defined in DTCP.

*3: It is applied to the composite output and the component video output. It also include the case where received video signals are converted into different format and then output. The signals to which Macrovision control is applied are composite signals and component video signals in 480I.

*4: With the analog video output, perform output processing using parameters specified by Macrovision and specified APS_control_data.

*5: In the case of high speed digital interface output, encryption will be performed according to the DTCP specifications. However, when only audio stream is output in IEC60958 conformant format, encryption will not be performed.

*6: When there is no content availability descriptor, both encryption_mode and copy_restriction_mode are determined as '1'.

*7: For relationship between copy control operation and service form, see “5.4 Operation Rules for Content Protection” in Volume 8 of Part 1.

*8: Can be recorded (accumulated) as “Quantity Restriction Copy Permitted”

*9: When the signals are recorded (accumulated) under “Quantity Restriction Copy Permitted”, see 6.8 of Volume 8 in Part 1

*10: Placed in the first loop of the PMT.

*11: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Cautions to be taken when using the descriptor (Data services, temporary data services and bookmark listing data services)]

When service_type is "0xC0"(Data service) or "0xA3" (Temporary data service) or "0xAA" (Bookmark listing data service) listed in the service list descriptor of NIT, it must be encoded according to Table X2-Y3.

[Reception Processing Criteria]

Table 30-40 shows the reception processing criteria for each field.

Table 30-40 Reception Processing Criteria for Digital Copy Control Descriptor (PMT the 2nd loop)

Reception processing criteria for each field	
descriptor_tag	= "0xC1": It is determined that the applicable descriptor is Digital Copy Control Descriptor.
descriptor_length	It is determined that it is the descriptor length of Digital Copy Control Descriptor.
digital_recording_control_ data	This 2-bit field represents the information that controls the copy generation, and is decoded according to Table X2-Y1, Table X2-Y2 and Table X2-Y3.
maximum_bit_rate_flag	='0': It is determined that the maximum transmit rate for the applicable ES is within the default maximum bit rate defined in Table 21-1-1, and Table 21-1-2. ='1': It is determined that the maximum transmit rate for the applicable ES is specified below.
component_control_flag	='0': It is determined that the applicable descriptor is valid. ='1': It is determined that the applicable descriptor is invalid.
copy_control_type	This 2-bit field represents the information that controls the copy generation, and is decoded according to Table X2-Y1, Table X2-Y2 and Table X2-Y3.
maximum_bit_rate	It is determined as the maximum transmit rate value for the applicable service.

[Other items that are worth special mention]

The copy control for the analog output signals is subject to individual agreement between the applicable broadcasting business and a company such as Macrovision, it seems that careful consideration is required in the future.

The reception processings that are not defined in Table X2-Y1, Table X2-Y2 and Table X2-Y3 are as follows:

- ☐ Digital TV service and temporary video service

  When copy_control_type=00/10/11:

  - Outputs from the analog video output, the digital sound output and the high-speed digital interface output are prohibited.

  When copy_control_type=01, digital_recording_control_data=01:

  - EMI for the high-speed digital interface is "01". With other processings, the same processings as when copy_control_type=01, and digital_recording_control_data=11 should be performed.

- ☐ Digital video service, temporary video service, data service, temporary data service, and bookmark listing data service

  When copy_control_type=00/10:

  - Outputs from the analog video output, the digital sound output and the high-speed digital interface output are prohibited.

  When copy_control_type=01, digital_recording_control_data=01 :

  - Only EMI for the high-speed digital interface is "01", and with other processings, the same processings as when copy_control_type=01, digital_recording_control_data=11 should be performed.

  When copy_control_type=11, digital_recording_control_data=01 :

  - The same processings as when copy_control_type=11, and digital_recording_control_data=11 should be performed.

30.3.3.5 Data Encoding Method Descriptor

The send operation of this descriptor is listed in the Volume 3, Part 1.

30.3.3.6 Target Area Descriptor

This descriptor should be placed only for the data broadcasting ES. Therefore, the send operation of this descriptor is listed in the definition of Volume 3, Part 1.

30.3.3.7 Video Decode Control Descriptor

[Usage]

It is used to control video decoding when video encoding methods are changed within the same service_id. It also shows whether the applicable ES is a MPEG I frame still image.

[Structure]

Table 30-41 shows the structure of Video Decode Control Descriptor.

Table 30-41 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**
}		

[Meaning of Each Field]

The meaning of each field should be in accordance with the regulations specified in Section 6.2, Part 1 of ARIB STD-B10, and definitions in Section 6.2.30, Part 2.

[Sending Operation Rule]

This descriptor must be placed when operating a still image, or Seamless (a sending facility that supports switching of video encode formats in ARIB). The use of this descriptor is optional in other situations.

Table 30-42 shows the sending operation rule for each field.

Table 30-42 Sending Operation Rule for Video Decode Control Descriptor<0}

Sending operation rule for each field	
descriptor_tag	Specify "0xC8".
descriptor_length	Specify the descriptor length of Video Decode Control Descriptor.
still_picture_flag	Specify =1 when a new component (*1) is a still image, and specify =0 when a new component is a dynamic image.
sequence_end_code_flag	Specify =1 when an old video component (*2) is sending a sequence end code.
video_encode_format	**Specify the encode format for a new component.** **0000: 1080p** **0001: 1080I** **0010: 720p** **0011: 480p** **0100: 480I** **0101: 240p** **0110: 120p** **1000 - 1111: video_encode_format Extension**

*1: It shows the component after switching.

*2: It shows the component before switching.

[Reception Processing Criteria]

Table 30-43 shows the reception processing criteria for each field.

Table 30-43 Reception Processing Criteria for Video Decode Control Descriptor

Reception processing criteria for each field	
descriptor_tag	= "0xC8": It is determined that the applicable descriptor is Video Decode Control Descriptor.
descriptor_length	It is determined that it is the descriptor length of Video Decode Control Descriptor.
still_picture_flag	It is determined that the image is still when a new component = 1, and the still image decode processing is performed.
sequence_end_code_flag	If =1, as the sequence end code is sent out, it can be used when switching between decoding operations.
video_encode_format	It is used when setting decoding as an encoding format for a new component.

[Other items that are worth special mention]

Video Decode Control Descriptor, in addition to representing a still image, is used in order to inform an operation sequence of the sending side to the receiver when switching between HD and SD should be performed. The receiver, based on the information provided, can perform seamless switching. It is expected that both the sending side and the receiver, based on regulations such as ARIB STD-B32, will be required to have an agreement on detailed operations including accurate timings.

31 All Station SI Table Operation

31.1 NIT (Network Information Table)

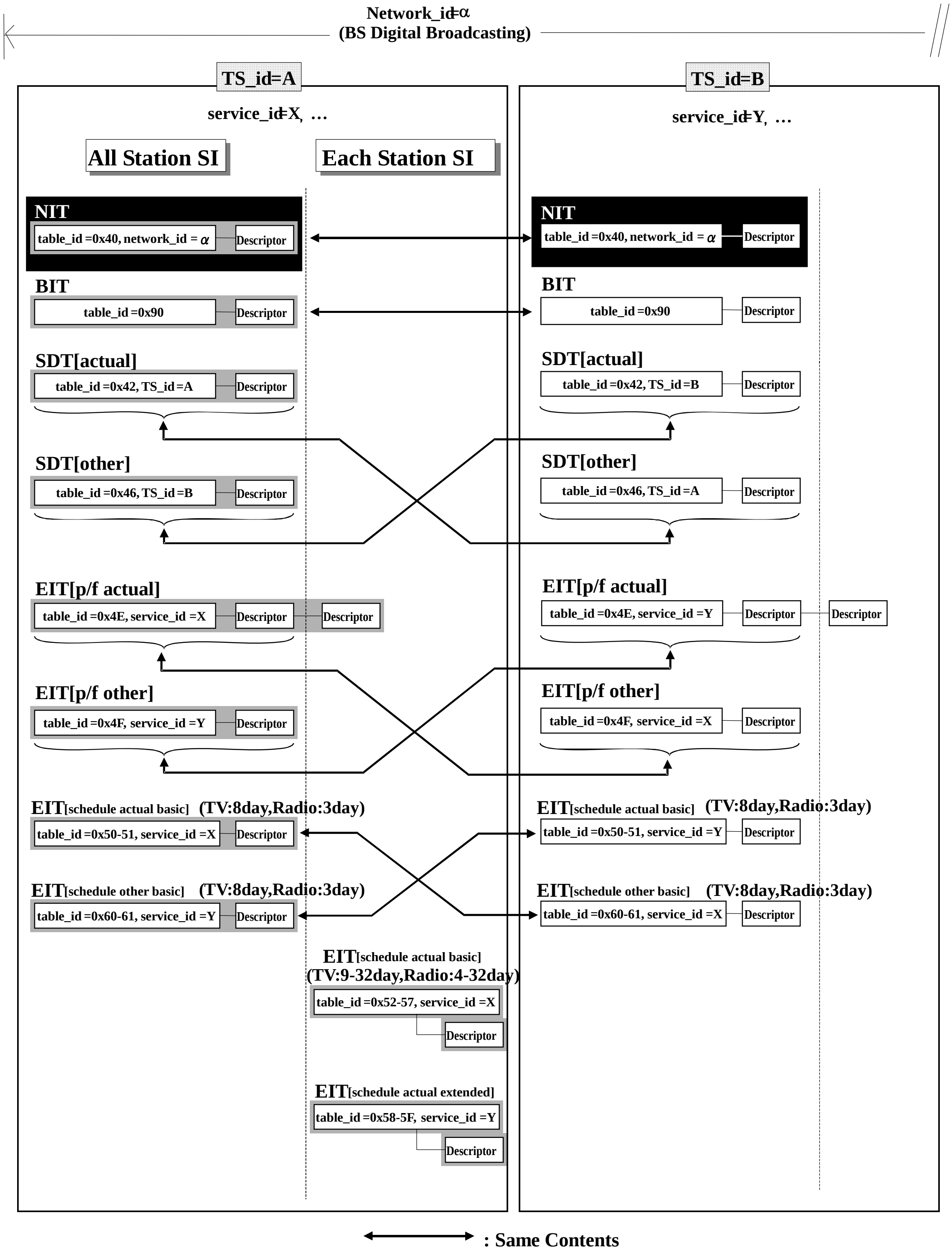


Figure 31-1 Part Described in Section 31.1 (NIT) [outlined part]

31.1.1 NIT Structure and Operation

[Usage]

Transmits information that associates the transmission path information such as the modulation frequency with the broadcasting service. Indicates the service configuration for the whole network.

[Structure]

The structure of NIT is shown in Table 31-1.

Table 31-1 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()		
}	**4**	**bslbf**
reserved_future_use	**12**	**uimsbf**
transport_stream_loop_length		
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**
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 5.2.4 of Part 2 of ARIB STD-B10 is conformed.

[Sending Operation Rule]

⊙ **NIT should always be sent if the transport stream contains the stream.**

- For the resending cycle, Section 12.4 of this specification document is conformed.
- For the update frequency, Section 12.9 of this specification document is conformed.
- Basically, in NIT and SDT, the same service information is described. However, the shift period is excluded.

The sending operation rule of each field is shown in Table 31-2.

Table 31-2 NIT Sending Operation Rule

[Sending Operation Rule for Each Field]	
table_id	Describe "0x40."
section_syntax_indicator	Describe ‘1.’
section_length	Describe the NIT section length. (Max 1021 bytes) The first two bits are always "0x00."
network_id	Describe network_id for the BS digital broadcasting.
version_number	Describe a value that is incremented by 1 for each version update during the normal operation. However, if a system failure occurs, a value incremented by 1 or larger can be described.
current_next_indicator	Describe ‘1.’Operates as the MPEG specifications.
section_number	
last_section_number	
network_descriptor_length	Does not stipulate the maximum number of loops.
[1st_loop]	
[descriptor]	
transport_stream_loop_length	
[2nd_loop]	Describe the information for each transport stream that the target network contains. Does not stipulate the maximum number of loops. The order of describing the transport stream in this loop up to 2007 should not be changed from then on, and transport streams newly added in 2008 or later should be appended to the end of this loop in the starting order.
transport_stream_id	
original_network_id	Describe the same value as network_id.
transport_descriptors_length	Does not stipulate the maximum value.
[descriptor]	

[Reception Processing Criteria]

- Because NIT is not a table that performs frequent upgrades, the receiver performs the reception operation based on the NIT information stored in the nonvolatile memory to reduce the operating time. If NIT can not be received within the stipulated resending cycle, it is judged that there is no stream that can be received in the transport stream or that the sending system does not work properly. If NIT is received, the operation should be performed based on the information.

○ If the contents of service information described in NIT are different from those described in SDT, it is considered to be a shift period.

The reception processing criteria for each field are shown in Table 31-3.

Table 31-3 NIT Reception Processing Criteria

Reception Processing Criteria for Each Field	
table_id	If it is "0x40," the corresponding table is judged as NIT.
section_syntax_indicator	= ‘0’: The corresponding section is invalid. = ‘1’: The corresponding section is valid.
section_length	Judged as the NIT section length.
network_id	Judged as network_id of the target network.
version_number	If it is changed, it is judged that the corresponding table has been updated.
current_next_indicator	= ‘0’: It is judged that the corresponding section is invalid. = ‘1’: It is judged that the corresponding section is valid.
section_number	
last_section_number	
network_descriptor_length	Does not stipulate the maximum number of loops.
[1st_loop]	
[descriptor]	
transport_stream_loop_length	
[2nd_loop]	Indicates the information for each transport stream that the target network contains.
transport_stream_id	
original_network_id	
transport_descriptors_length	
[descriptor]	

[Other Items that are Worth Special Mention]

None.

31.1.2 Descriptors Inserted in NIT First Loop (Network Loop)

31.1.2.1 Network Name Descriptor

[Usage]

Describes the network name.

[Structure]

The structure of the network name descriptor is shown in Table 31-4.

Table 31-4 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.11 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ When NIT is transmitted, it should always be placed.

The sending operation rule of each field is shown in Table 31-5.

Table 31-5 Sending Operation Rule for Network Name Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x40."
descriptor_length	Describe the descriptor length of the corresponding descriptor.
[char]	Up to 10 full-width characters or 20 bytes.

[Reception Processing Criteria]

The reception processing criteria for each field are shown in Table 31-6.

Table 31-6 Reception Processing Criteria for Network Name Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0x40," the corresponding descriptor is judged as the network method descriptor.
descriptor_length	Judged as the descriptor length of the network name descriptor.
[char]	Judged as the network name.

[Other Items that are Worth Special Mention]

None.

31.1.2.2 System Management Descriptor

[Usage]

Used to identify whether the corresponding network is broadcasting or non-broadcasting, and the standard method if it is broadcasting.

[Structure]

The structure of the system management descriptor is shown in Table 31-7.

Table 31-7 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.21 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **When NIT is transmitted, it should always be placed.**

The sending operation rule of each field is shown in Table 31-8.

Table 31-8 Sending Operation Rule of System management Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xFE."
descriptor_length	Describe the descriptor length of the system management descriptor.
[system_management_id]	
broadcasting_flag	Describe ‘00.’(This means broadcasting)
broadcasting_identifier	Describe ‘000010.’(This means the broadcasting method for the BS digital broadcasting)
additional_broadcasting_ identification	Describe "0x01."
[loop]	
additional_identification_ info	Not described.

[Reception Processing Criteria]

○ Judges whether the target network is broadcasting or non-broadcasting, and whether it is the BS digital broadcasting or not if it is broadcasting.

The reception processing criteria for each field are shown in Table 31-9.

Table 31-9 Reception Processing Criteria of System Management Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0xFE," the corresponding descriptor is judged as the system management descriptor.
descriptor_length	Judged as the descriptor length of the system management descriptor.
[system_management_id]	
broadcasting_flag	= ‘00’: It is judged that the corresponding network is broadcasting. ≠ ‘00’: It is judged that the corresponding network is non-broadcasting.
broadcasting_identifier	= ‘000010’: It is judged that the corresponding network is a BS digital broadcasting. ≠ ’000010’: It is judged that the corresponding network is not a BS digital broadcasting.
additional_broadcasting_ identification	Ignored.
[loop]	
additional_identification_ info	Ignored.

[Other Items that are Worth Special Mention]

None.

31.1.2.3 CA EMM TS Descriptor

[Usage]

Specifies TS that transmits the EMM information in emergency, and describes the EMM reception duration time after the power OFF operation in the receiver. Used to urgently change the target conditional access method work key of all receivers at the same time in the event of fraudulent acquisition of the encryption key or tampering.

[Structure]

The structure of CA_EMM_TS descriptor is shown in Table 31-10.

Table 31-10　Structure of CA_EMM_TS Descriptor

Data Structure	bit	Identifier
CA_EMM_TS_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
CA_system_id	**16**	**uimsbf**
transport_stream _id	**16**	**uimsbf**
original_network_id	**16**	**uimsbf**
power_supply_period	**8**	**uimsbf**
}		

[Meaning of Each Field]

The meaning of each field is shown in Table 31-11.

Table 31-11　Meaning of CA_EMM_TS Descriptor Field

Meaning of Each Field	
CA_system_id	This 16bit field indicates the target conditional access method identifier.
transport_ stream_id	This 16bit field indicates the identifier of the transport stream that transmits the EMM information to be received after the power OFF operation in the receiver.
original_network_id	This 16bit field is a label that identifies the network for the source distribution system.
power_supply_period	This 8bit field indicates the power source retention time for which the EMM information is received in minutes after the power OFF operation in the receiver.

[Sending Operation Rule]

⊙ **Placed for a certain period if the operator judges that it is necessary to transmit EMM different from the normal operation, and perform the conduction control reception for all receivers.**

To operate multiple conditional access methods and perform multiple conduction control receptions at the same time, place one corresponding descriptor for each conditional access method identifier.

The sending operation rule of each field is shown in Table 31-12.

Table 31-12 Sending Operation Rule of CA_EMM_TS Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xCA."
descriptor_length	Describe the descriptor length of the corresponding descriptor. Fixed as 7.
CA_system_id	Describe the target conditional access method identifier. Values of identifiers other than those applied to the BS digital broadcasting should not be described.
transport_stream_id	Describe the identifier of TS that transmits the EMM information to be received after the power OFF operation in the receiver.
original_network_id	Describe network_id for the BS digital broadcasting.
power_supply_period	Describe the power source retention time in minutes after the power OFF operation in the receiver. 1~255.

[Reception Processing Criteria]

- ○ If the corresponding descriptor exists in the NIT first loop, try to obtain the corresponding EMM information.
- ○ If the corresponding descriptor does not exist in the NIT first loop, it is judged that the corresponding EMM information is not operated.

The reception processing criteria for each field are shown in Table 31-13.

Table 31-13 Reception Processing Criteria for CA_EMM_TS Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	="0xCA": The corresponding descriptor is judged as the CA_EMM_TS descriptor.
descriptor_length	Judged as the descriptor length of the corresponding descriptor.
CA_system_id	= Identifier value applied to BS: Indicates the corresponding conditional access method identifier.*1 = Other value: Judged as invalid.
transport_stream_id	Indicates the identifier of TS that transmits the EMM information to be received. If the value is the one that is not described in NIT, it is judged as invalid.
original_network_id	Indicates the source network_id. The receiver may ignore this.
power_supply_period	=0: Judged as invalid. ≠0: Indicates the power source retention time for which the EMM information is received (in minutes).

*1 If it is not CA_system_ID of the conditional access method it corresponds to, the corresponding conditional access method descriptor is judged as invalid.

[Other Items that are Worth Special Mention]

For more information about the conditional access operation, see the Volume 5.

31.1.3 Descriptors Inserted in NIT Second Loop (TS Loop)

31.1.3.1 Service List Descriptor

[Usage]

Describes the list of services and service format types in each transport stream.

[Structure]

The structure of the service list descriptor is shown in Table 31-14.

Table 31-14 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.14 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **When NIT is transmitted, it should always be placed for each TS.**

The sending operation rule of each field is shown in Table 31-15. The service_type values are shown in Table 31-16.

Table 31-15 Sending Operation Rule for Service List Descriptor (NIT Second Loop)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x41."
descriptor_length	Describe the descriptor length of the service list descriptor.
[loop]	Describe the loop for each transport stream that the target network contains.
service_id	Describe service_id that the corresponding transport stream contains.
service_type	Describe the service type of the target service. (Stipulated in Table 31-16)

Table 31-16 service_type

service_type	
0x01	Digital TV service
0x02	Digital voice service
0xC0	Data service
0xA1	Temporary video service
0xA2	Temporary voice service
0xA3	Temporary data service
0xA4	Engineering Service(Note 1)
0xA8	Data service for accumulation beforehand
0xAA	Bookmark list data service

* Note that service_type may be added in the future.

Note 1: For more information, see Part 1 Volume 1 of the specification document.

[Reception Processing Criteria]

○ Judged as the information for each transport stream that the target network contains.

The reception processing criteria for each field are shown in Table 31-17.

Table 31-17 Reception Processing Criteria for Service List Descriptor (NIT Second Loop)

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0x41," the corresponding descriptor is judged as the service list descriptor.
descriptor_length	Judged as the descriptor length of the service list descriptor.
[loop]	
service_id	Judged as service_id for the corresponding transport stream.
service_type	Indicates the service type of the target service. (Stipulated in Table 31-16) Service types other than those stipulated in Table 31-16 are judged as invalid.

[Other Items that are Worth Special Mention]

None.

31.1.3.2 Satellite Delivery System Descriptor

[Usage]

Indicates the physical condition for the satellite transmission path.

[Structure]

The structure of the satellite delivery system descriptor is shown in Table 31-18.

Table 31-18 Structure of Satellite Delivery System Descriptor

Data Structure	bit	Identifier
satellite_delivery_system_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
frequency	**32**	**bslbf**
orbital_position	**16**	**bslbf**
west_east_flag	**1**	**bslbf**
polarization	**2**	**bslbf**
modulation	**5**	**bslbf**
symbol_rate	**28**	**bslbf**
FEC_inner	**4**	**bslbf**
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.6 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ When NIT is transmitted, it should always be placed for each TS loop.

The sending operation rule of each field is shown in Table 31-19.

Table 31-19 Sending Operation Rule for Satellite Delivery System Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x43."
descriptor_length	Describe the descriptor length of the satellite delivery system descriptor.
frequency	Describe the frequency.
orbital_position	Describe the satellite orbit position.("110.0")
west_east_flag	Describe the east/west longitude flag for the satellite orbit position.
polarization	Describe the polarization.
modulation	Describe "0x08" (BS transmission method).
symbol_rate	Describe the symbol rate per transponder. ("028.8600")
FEC_inner	Describe "0x8" (BS transmission method).

[Reception Processing Criteria]

The reception processing criteria for each field are shown in Table 31-20.

Table 31-20 Reception Processing Criteria for Satellite Delivery System Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0x43," the corresponding descriptor is judged as the satellite delivery system descriptor.
descriptor_length	Judged as the descriptor length of the satellite delivery system descriptor.
frequency	Judged as the frequency at which the corresponding TS is broadcast.
orbital_position	Judged as the orbit position of the satellite where the corresponding TS is broadcast.
west_east_flag	Judges whether the above orbit position description is in west longitude or east longitude.
polarization	Judged as the polarization of the radio wave where the corresponding TS is broadcast.
modulation	= "0x08": Judged as the BS transmission method. ≠ "0x08": The corresponding TS is judged as invalid.
symbol_rate	
FEC_inner	= "0x8": Judged as the BS transmission method. ≠ "0x8": The corresponding TS is judged as invalid.

[Other Items that are Worth Special Mention]

None.

31.2 BIT (Broadcaster Information Table)

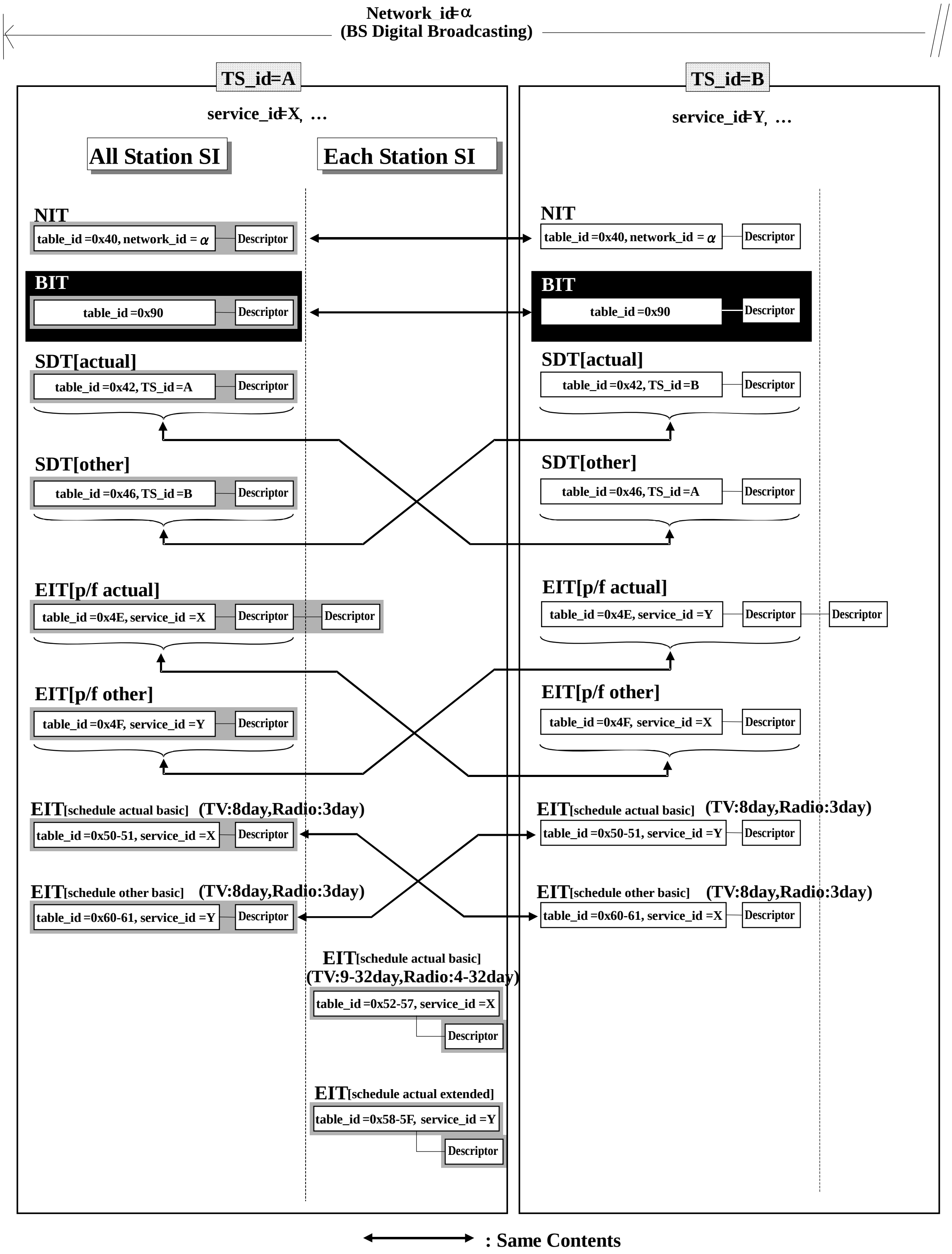


Figure 31-2 Part Described in Section 31.2 (BIT) [outlined part]

31.2.1 BIT Structure and Operation

[Usage]

Used to present the broadcaster information that exists in the network.

At the same time, it describes each transmission parameter for all station SI and each station SI.

[Explanation]

BIT constitutes sub tables for each original network and has an information loop for each broadcaster. In sub tables, the descriptor loop exists for each original network and each broadcaster respectively, in which the respective information can be described.

In the information for each original network, transmission parameters for all station SI are set up by using the SI Parameter Descriptor.

In the information for each broadcaster, the broadcaster name, the list of services that it provides, and transmission parameters for each station SI operated for each broadcaster are set up. The broadcaster name is indicated with the broadcaster name descriptor. To achieve functions for each broadcaster such as presenting the program listing for each broadcaster and selecting the station for each broadcaster, this broadcaster name can be used. The service list is indicated with the service list descriptor. Transmission parameters for each station SI are indicated with the SI Parameter Descriptor.

For more information about broadcasters, see the contents described in Section 9.3.

[Structure]

The structure of BIT is shown in Table 31-21.

Table 31-21 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**
}		

[Meaning of Each Field]

The meaning of each field in BIT is shown in Table 31-22.

Table 31-22 Meaning of Each Field in BIT

Field	Meaning
first_descriptors_length	This 12bit field indicates the description length of the subsequent descriptor fields. It is encoded in 12bit binary. The unit is byte.
broadcaster_id	This 8bit field identifies the broadcaster described in the corresponding loop.
broadcaster_descriptors_length	This 12bit field indicates the description length of the subsequent descriptor fields. It is encoded in 12bit binary. The unit is byte.

[Sending Operation Rule]

⊙ **Required to transmit in the BS digital broadcasting.**

⊙ **Each service should always belong to one broadcaster.**

⊙ **The same contents are transmitted to all TS as all station SI.**

⊙ **Constitute a sub table for each original_network_id.**

- ○ For the resending cycle, Section 12.4 of this specification document is conformed.
- ○ For the update frequency, Section 12.9 of this specification document is conformed.

The sending operation rule of each field is shown in Table 31-23.

Table 31-23 BIT Sending Operation Rule

[Sending Operation Rule for Each Field]	
table_id	Describe "0xC4."
section_syntax_indicator	Describe "1."
section_length	Describe the BIT section length. Because the maximum BIT section length is 1024 bytes, so the maximum value for this is 1021.
original_network_id	Describe network_id for the target network in BIT.
version_number	If the contents of the sub table are changed, a value incremented by 1 is described.
current_next_indicator	Describe "1."
section_number	Describe the section number. The section number of the first section is 0, and each time a section is added, a value incremented by 1 is set up.
last_section_number	Describe the last section number.
first_descriptors_length	Describe the descriptor loop length described later. For section number 1 or larger, 0 is described.
[descriptor loop]	Information valid in the whole network is placed as a descriptor.
[broadcaster loop]	This should be described for all broadcasters that exist in the corresponding network. In addition, in the middle of this loop, the section should not be divided.
broadcaster_id	Describe broadcaster_id for the broadcaster. It is set up uniquely within network_id. The maximum number of broadcasters is not stipulated.
broadcaster_descriptors_length	Describe the broadcaster descriptor length described later.
[descriptor loop]	Information valid for each broadcaster is placed as a descriptor.

[Reception Processing Criteria]

○ Because BIT is not a table that performs frequent upgrades, the receiver performs the reception operation based on the BIT information stored in the nonvolatile memory to reduce the operating time.

The reception processing criteria for each field are shown in Table 31-24.

Table 31-24 BIT Reception Processing Criteria

Reception Processing Criteria for Each Field	
table_id	If the value of this field is "0xC4," the corresponding table is judged as BIT only if this table is received in TS that transmits the BS digital broadcasting (which is judged by original_network_id).
section_syntax_indicator	="0": The corresponding section is invalid. ="1": The corresponding section is valid.
section_length	≤1021: Section length >1021: The corresponding section is invalid.
original_network_id	If this value is the same as the network identifier of the BS digital broadcasting, the table is judged as BIT in the BS digital broadcasting. If an unknown value is described, ignore the corresponding section.
version_number	If this is changed, it is judged that the corresponding sub table has been updated.
current_next_indicator	= "0": The corresponding section is invalid. = "1": The corresponding section is valid.
section_number	≤ last_section_number: Indicates the section number in the corresponding sub table. > last_section_number: The corresponding section is invalid.
last_section_number	Indicates the last section number in the corresponding sub table.
first_descriptors_length	Indicates the subsequent descriptor length. If the value of this field is regarded as abnormal judging from the section_length value, regard the corresponding section itself as invalid. If this value is 0, no descriptor exists in the descriptor loop. For sections whose section number is not 0, this value is 0. If the value is not 0, skip only the descriptor length indicated by this field (that is, skip only contents of the subsequent descriptor loops) and continue with the processing.
[descriptor loop]	In this loop, descriptors valid for the whole network are placed without any space. It should be possible to process only descriptors declared to be placed in this field and skip other descriptors.
[broadcaster loop]	The loop length of the corresponding loop is judged from the section_length value and the first_descriptors_length value for each section. If the whole sub table is received, broadcasters that exist in this loop are all the broadcasters that exist in the network.
broadcaster_id	Indicates the broadcaster described in the corresponding broadcaster loop.
broadcaster_descriptors_length	Indicates the subsequent descriptor length. If this value is 0, no descriptor exists in the descriptor loop. If the value of this field is regarded as abnormal judging from the section_length value, regard the corresponding section itself as invalid.
[descriptor loop]	In this loop, descriptors valid for the corresponding broadcaster are placed without any space. It should be possible to process only descriptors declared to be placed in this field and skip other descriptors.

[Other Items that are Worth Special Mention]

None.

31.2.2 Descriptors Inserted in BIT First Loop (Network Loop)

31.2.2.1 SI Parameter Descriptor

[Usage]

Used to indicate SI transmission parameters.

Indicates transmission parameters for all station SI if placed in the BIT first descriptor loop.

[Structure]

The structure of the SI Parameter Descriptor and the structure of table_description_byte for each table_id are shown in Table 31-25 and 31-26, respectively.

Table 31-25 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**	**uimsbf**
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 31-26 Structure of table_description_byte for each table_id (BIT First Loop)

table_id	table_description_byte	bit	Identifier
0x40 (NIT)	**table_cycle**	**8**	**bslbf**
0xC4 (BIT)	**table_cycle**	**8**	**bslbf**
0x42 (SDT[actual])	**table_cycle**	**8**	**bslbf**
0x46 (SDT[other])	**table_cycle**	**8**	**bslbf**
0x4E (EIT[p/f actual])	**table_cycle**	**8**	**bslbf**
0x4F (EIT[p/f other])	**table_cycle**	**8**	**bslbf**
0x50 (EIT[schedule actual])	**for(;;){**		**uimsbf**
0x60 (EIT[schedule other])	**media_type**	**2**	**uimsbf**
	pattern	**2**	**bslbf**
	reserved	**4**	**bslbf**
	schedule_range	**8**	**bslbf**
	base_cycle	**12**	**bslbf**
	reserved	**2**	**uimsbf**
	cycle_group_count	**2**	
	for(i=0;i<cycle_group_count;i++){		**bslbf**
	num_of_segment	**8**	**bslbf**
	cycle	**8**	
	}		
	}		
0XC3 (SDTT)	**table_cycle**	**16**	**bslbf**

[Meaning of Each Field]

The meaning of each field in the SI Descriptor and table_description_byte is shown in Table 31-27 and 31-28, respectively.

Table 31-27 Meaning of Each Field in SI Descriptor (BIT First Loop)

Field	Meaning
parameter_version	This 8bit field indicates the update number of transmission parameters for all station SI. Each time transmission parameters are updated, a value incremented by 1 is described.
update_time	This 16bit field indicates the year/month/day when the described transmission parameters become valid. The lower 16bit of MJD is described.
table_id	This 8bit field indicates the type of the table described in the subsequent fields.
table_description_length	This 8bit field indicates the description length of the subsequent fields. It is encoded in 8bit binary. The unit is byte.
table_description_byte	This field describes transmission parameters for each type of the table for all station SI.

Table 31-28 Meaning of Each Field in table_description_byte (BIT First Loop)

Field	Meaning
table_cycle	This 8bit field indicates the resending cycle for each table. It is encoded in 2-digit BCD. The unit is second.
media_type	This 2bit field indicates the type of the media described in the corresponding loop.
pattern	This 2bit field indicates the corresponding table type/the pattern of the media type operation.
schedule_range	This 8bit field indicates the transmission range of all station EIT[schedule] It is encoded in 2-digit BCD. The unit is day.
base_cycle	This 12bit field indicates the resending cycle of the basic cycle group for all station EIT[schedule]. It is encoded in 3-digit BCD. The unit is second.
cycle_group_count	This 2bit field indicates the number of extended cycle groups.
num_of_segment	This 8bit field indicates the segment range of the extended cycle group (the number of the segment per one service) in all station EIT[schedule]. It is encoded in 2-digit BCD. The unit is the number of segments.
cycle	This 8bit field indicates the resending cycle of the extended cycle group for all station EIT[schedule]. It is encoded in 2-digit BCD. The unit is second.

[Sending Operation Rule]

⊙ **It should always be placed if transmission parameters for all station SI are changed from the default setting. It should be placed by 8 days before the change.**

- ○ To change transmission parameters for all station SI, the change should be started sharp at 0 o'clock (for all TS at the same time).
- ○ It is possible to omit the description for table types whose default transmission parameters are not changed. (Description is necessary only for table types that are changed.)
- ○ Values outside the predefined range should not be set up for transmission parameters.

○ It is possible to place multiple descriptors with different update_time in the same loop. For example, if parameters are changed in three days at the stage where a descriptor valid at the very moment is placed, multiple descriptors are placed.

The sending operation rule of each field is shown in Table 31-29 and 31-30.

Table 31-29 Sending Operation Rule for SI Parameter Descriptor (BIT First Loop)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xD7."
descriptor_length	Describe the descriptor length (byte) of the corresponding descriptor.
parameter_version	Each time the descriptor is updated, the value is incremented by 1.
update_time	Describe the year/month/day when the corresponding descriptor becomes valid in the lower 16bit of MJD. In the actual SI transmission, transmission should be performed as parameters shown in this descriptor at 0 o'clock of the date indicated by this field.
[table_id loop]	This should always be described for table types whose default transmission parameters are changed. No description is necessary for table types without any change. For information about default transmission parameters, see Section 12.4.
table_id	Describe the representative table identifier for the target table type. For values that can be described, see Table 31-26.
table_description_length	Describe the descriptor length (byte) of the subsequent table_description_byte field.
table_description_byte	Follow the format defined separately for each table type to describe SI Parameters. For the contents described for each table type, see Table 31-26 and 31-28.

Table 31-30　Sending Operation Rule for table_description_byte (BIT First Loop)

table_description_byte: [Sending Operation Rule for Each Field]	
table_cycle	Describe the resending cycle for each table type in seconds.
[media_type loop]	This should always be described for media types whose default transmission parameters are changed in all station EIT[schedule]. No description is necessary for media types without any change.
media_type	Describe the media type for which transmission parameters are described. All media types that transmit all station EIT[schedule] are the target. For information about the correspondence relationship between the value of the media type and the service type, see Table 9-1.
pattern	Describe the operation pattern of all station EIT[schedule]. Always describe 0 here regardless of the media type.
schedule_range	Describe the transmission range of the corresponding media type of all station EIT[schedule] in days. The same value should be described in actual and other. For the range values that can be described, see Section 12.4.
base_cycle	Describe the resending cycle of the basic cycle group in the corresponding media type of all station EIT[schedule] in seconds. For the range values that can be described, see Section 12.4.
cycle_group_count	Describe the number of extended cycle groups in the corresponding media type of all station EIT[schedule]. The number that can be set up differs according to the media type. Up to 2 can be set up for the TV type, and 1 for the voice type and the data type with table_id = 0x50. For the voice type and the data type with table_id = 0x60, the extended cycle group can not be set up, so 0 is described. (See Section 12.3.2.)
[cycle_group loop]	In the loop, extended cycle groups with earlier time should be described earlier. (Describe the extended cycle group 1, and the extended cycle group 2 in this order.)
num_of_segment	Describe the segment range of the extended cycle group described in the corresponding loop (the number of segments per service belonging to the corresponding cycle group). For the range values that can be described, see Section 12.4.
cycle	Describe the resending cycle of the extended cycle group described in the corresponding loop in seconds. A value later than the resending cycle of the basic cycle group indicated in the base_cycle field should not be set up. For the range values that can be described, see Section 12.4.

Meanings of values of the media type are shown in Table 31-31.

Table 31-31　Media Type Definition

media_type	Meaning
1	TV type media type
2	Voice type media type
3	Data type media type

[Reception Processing Criteria]

⊙ **If the corresponding descriptor does not exist in the BIT first descriptor loop, it is judged that all station SI is transmitted as indicated by the default transmission parameters.**

⊙ **The contents described in the corresponding descriptor become valid on 00:00 of the date indicated by the update_time field.**

⊙ **If a valid descriptor does not exist at the very moment even though the corresponding descriptor exists in the BIT first descriptor loop (judged by the update_time field in the descriptor), it is judged that all station SI is transmitted as indicated by the default transmission parameters (at the very moment).**

⊙ **If a description of the table type included in all station SI does not exist in the corresponding descriptor, it is judged that the corresponding table type is operated with the transmission parameters set up by default.**

○ If multiple SI Parameters Descriptors are placed, it is judged that the descriptor with a date/time that is earlier than and the closest to the present time is valid at the very moment.

The reception processing criteria for each field are shown in Table 31-32 and 31-33.

Table 31-32 Reception Processing Criteria for SI Parameter Descriptor (BIT First Loop)

Reception Processing Criteria for Each Field	
descriptor_tag	="0xD7": Judged that the corresponding descriptor is the SI Parameter Descriptor.
descriptor_length	
parameter_version	Can be used as the update number for SI Parameters.
update_time	Used as year/month/date when the transmission parameters described in the corresponding descriptor become valid. The actual change of the transmission parameters becomes valid on 00:00:00 of the corresponding date. It is encoded in the lower 16 bit of MJD, so handling of 2038, etc. conforms the description in TOT.
[table_id loop]	It is judged that table types of all station SI that do not exist in the corresponding loop are operated with the transmission parameters set up by default. If an unknown table type exists, skip the loop itself in order to avoid malfunction. For information about default transmission parameters, see Section 12.4.
table_id	Indicates the table type described in the corresponding loop.
table_description_length	Indicates the descriptor length (byte) of the subsequent table_description_byte.
table_description_byte	The format defined separately for each table type should be followed to make it possible to interpret the SI Parameters.

Table 31-33 Reception Processing Criteria for table_description_byte (BIT First Loop)

table_description_byte: Reception Processing Criteria for Each Field	
table_cycle	The resending cycle for the corresponding table type is described in seconds. If the corresponding table type is received after the date/time indicated by the update_time field of the corresponding descriptor, it is good to perform the reception processing based on the value described in this field. For the range values that can be described, see Section 12.4. If the described value is outside of the range, it is in the abnormal state.
[media_type loop]	It is judged that media types that do not exist in the corresponding loop are operated with the transmission parameters set up by default. If an unknown media type exists, skip the loop itself in order to avoid malfunction. For information about default transmission parameters, see Section 12.4.
media_type	Indicates the media type described in the corresponding loop. For information about the correspondence relationship between the value of the media type and the service type, see Table 9-1.
pattern	This field should not be referred to.
schedule_range	The transmission range of the corresponding media type of all station EIT[schedule] is described in days. For the range values that can be described, see Section 12.4. If the described value is outside of the range, it is in the abnormal state.
base_cycle	The resending cycle of the basic cycle group in the corresponding media type of all station EIT[schedule] is described in seconds. In addition, because a value that is latest of all cycle groups of the corresponding media type is set up for the resending cycle of the basic cycle group, the value in this field can be used for the timeout setting for the table reception of the corresponding media type. For the range values that can be described, see Section 12.4. If the described value is outside of the range, it is in the abnormal state.
cycle_group_count	The number of extended cycle groups of the corresponding media type of all station EIT[schedule] is described. It is the same as the number of the subsequent loops. The value of this field is determined for each table type/media type. See Section 12.3.2. That is, regardless of the table type, up to 2 for the TV type, and up to 1 for the voice type and the data type. If the described value is different from this value, it is in the abnormal state.
[cycle_group loop]	The number of the corresponding loops is the same as the value in the cycle_group_count field.
num_of_segment	The number of segments per service is described as the segment range of the extended cycle group described in the corresponding loop. Because cycle groups with earlier time are described earlier in the corresponding loop, it is possible to judge the start segment of the corresponding cycle group from the total value of the num_of_segment fields in the past loops. In addition, the start segment of the first cycle group in the loop is regarded as a segment that contains the present time. For the range values that can be described, see Section 12.4. If the described value is outside of the range, it is in the abnormal state.
cycle	The resending cycle of the extended cycle group described in the corresponding loop is described in seconds. For the range values that can be described, see Section 12.4. If the described value is outside of the range, it is in the abnormal state.

[Other Items that are Worth Special Mention]

For more information about SI Parameters, see Section 12.3.2, 12.4, and 13.2.

For example, if an operation with the following transmission parameters settings is performed for a TV service of all station EIT[schedule] from January 1, 2010, the encoding is as shown in the table below.

- The description range of all station EIT[schedule]: 8 days
- The resending cycle of the basic cycle group: 360 seconds
- EIT[schedule actual]: 10 seconds (for 3 segments) up to 9 hours, and then 20 seconds (for 16 segments) up to 48 hours
- EIT[schedule other]: 20 seconds (for 3 segments) up to 9 hours, and then 40 seconds (for 16 segments) up to 48 hours

Table 31-34 Description Example of SI Parameter Descriptor (BIT First Loop)

Field	Encoding Value
[SI_parameter_descriptor]	
descriptor_tag	**0xD7**
descriptor_length	**23**
parameter_version	**1**
update_time	**55197**
[table_id loop 1]	
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**
[table_id loop 2]	
table_id	**0x60**
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	**20**
[cycle_group loop 2]	
num_of_segment	**13**
cycle	**40**

31.2.3 Descriptors Inserted in BIT Second Loop (Broadcaster Loop)

31.2.3.1 Broadcaster Name Descriptor

[Usage]

Used to indicate the broadcaster name.

[Structure]

The structure of the broadcaster name descriptor is shown in Table 31-35.

Table 31-35 Structure of Broadcaster Name Descriptor

Data Structure	bit	Identifier
broadcaster_name_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0; i < N ; i++) {		
char	**8**	**uimsbf**
}		
}		

[Meaning of Each Field]

Table 31-36 Meaning of Each Field in Broadcaster Name Descriptor

Field	Meaning
char	In this field, the broadcaster name is described.

[Sending Operation Rule]

⊙ **It should always be placed in all broadcaster loops in BIT.**

- ○ It should be described within 10 characters, 20 bytes.

The sending operation rule for each field is shown in Table 31-37.

Table 31-37 Sending Operation Rule for Broadcaster Name Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xD8."
descriptor_length	Describe the descriptor length of the broadcaster name descriptor.
[char]	This should always be within 10 characters, 20 bytes. Do not use the line feed code.

[Reception Processing Criteria]

- ○ 11th and subsequent characters are ignored.

The reception processing criteria for each field are shown in Table 31-38.

Table 31-38 Reception Processing Criteria for Broadcaster Name

Reception Processing Criteria for Each Field	
descriptor_tag	="0xD8": The corresponding descriptor is judged as the broadcaster name descriptor.
descriptor_length	
[char]	11th character (or 21st byte) and subsequent characters (bytes) are ignored.

[Other Items that are Worth Special Mention]

None.

31.2.3.2 Service List Descriptor

[Usage]

Used to describe the list of services that belong to the broadcaster.

[Structure]

For information about the structure of the service list descriptor, see Table 31-14.

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.14 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **Each service should always belong to one broadcaster and should not belong to multiple broadcasters at the same time.**

⊙ **The placement of services for the broadcaster should not be changed easily.**

The sending operation rule for each field is shown in Table 31-39.

Table 31-39 Sending Operation Rule for Service List Descriptor (BIT)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x41."
descriptor_length	Describe the descriptor length of the service list descriptor.
[loop]	This should be described for each service that belongs to the corresponding broadcaster without fail.
service_id	Describe service_id that the corresponding broadcaster contains.
service_type	Describe the service type of the corresponding service. (Stipulated in Table 31-16) Never fail to describe the same contents as those described in NIT.

[Reception Processing Criteria]

The reception processing criteria for each field are shown in Table 31-40.

Table 31-40 Reception Processing Criteria for Service List Descriptor (BIT)

Reception Processing Criteria for Each Field	
descriptor_tag	="0x41": The corresponding descriptor is judged as the service list descriptor.
descriptor_length	
[loop]	It is judged that services described in the corresponding loop are all the services that belong to the corresponding broadcaster.
service_id	
service_type	It is better not to refer to this field. The service type for a service should be judged from the contents described in NIT.

31.2.3.3 SI Parameter Descriptor

[Usage]

Used to indicate SI transmission parameters.

If it is placed in the BIT second descriptor loop, it indicates transmission parameters for each station SI operated uniquely for each broadcaster.

[Structure]

The structure of the SI Parameter Descriptor is shown in Table 31-41.

Note that the structure is the same as Table 31-25.

Table 31-41 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**	**uimsbf**
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 31-42.

Table 31-42 Structure of table_description_byte for each table_id (BIT Second Loop)

table_id	table_description_byte	bit	Identifier
0x50 (Each station EIT[schedule basic])	**for(;;){**		
0x58 (Each station EIT[schedule extended])	**media_type**	**2**	**uimsbf**
	pattern	**2**	**uimsbf**
	EIT_other_flag	**1**	**uimsbf**
	reserved	**3**	**bslbf**
	schedule_range	**8**	**bslbf**
	base_cycle	**12**	**bslbf**
	reserved	**2**	**bslbf**
	cycle_group_count	**2**	**uimsbf**
	for(i=0;i<cycle_group_count;i++){		
	num_of_segment	**8**	**bslbf**
	cycle	**8**	**bslbf**
	}		
	}		

[Meaning of Each Field]

The meaning of each field in the SI Parameter Descriptor and table_description_byte is shown in Table 31-43 and 31-44, respectively.

Table 31-43 Meaning of Each Field in SI Parameter Descriptor (BIT Second Loop)

Field	Meaning
parameter_version	This 8bit field indicates the update number of transmission parameters for each station SI. Each time transmission parameters are updated, a value incremented by 1 is described.
update_time	This 16bit field indicates the year/month/day when the described transmission parameters become valid. The lower 16bit of MJD is described.
table_id	This 8bit field indicates the type of the table described in the subsequent fields.
table_description_length	This 8bit field indicates the description length of the subsequent fields. It is encoded in 8bit binary. The unit is byte.
table_description_byte	This field describes transmission parameters for each type of the table for each station SI.

Table 31-44 Meaning of Each Field in table_description_byte (BIT Second Loop)

Field	Meaning
media_type	This 2bit field indicates the type of the media described in the corresponding loop.
pattern	This 2bit field indicates the corresponding table type/the pattern of the media type operation.
EIT_other_flag	This 1bit field indicates whether each station EIT[other] is sent or not if the service group of the corresponding media_type in the corresponding broadcaster goes across multiple TS. In case of '0': Indicates that each station EIT[other] is not sent. In case of '1': Indicates that each station EIT[other] is sent. In addition, the value of the corresponding field for the description with table_id as "0x58" (EIT[schedule extended]) indicates at the same time whether descriptors for each station SI are added or not in EIT[p/f other].
schedule_range	This 8bit field indicates the transmission range of each station EIT[schedule]. It is encoded in 2-digit BCD. The unit is day.
base_cycle	This 12bit field indicates the resending cycle of the basic cycle group for each station EIT[schedule]. It is encoded in 3-digit BCD. The unit is second.
cycle_group_count	This 2bit field indicates the number of extended cycle groups.
num_of_segment	This 8bit field indicates the segment range of the extended cycle group (the number of the segment per one service) in each station EIT[schedule]. It is encoded in 2-digit BCD. The unit is the number of segments.
cycle	This 8bit field indicates the resending cycle of the extended cycle group for each station EIT[schedule]. It is encoded in 2-digit BCD. The unit is second.

[Sending Operation Rule]

⊙ **It should always be placed when each station SI is operated.**

⊙ **It should always be described for table types transmitted as each station SI.**

⊙ **It should be placed by 8 days before the change.**

○ Each station SI transmission parameters should be changed sharp at 0 o'clock.

○ Values outside the predefined range should not be set up for transmission parameters.

○ It is possible to place multiple descriptors with different update_time in the same loop. For example, if parameters are changed in three days at the stage where a descriptor valid at the very moment is placed, multiple descriptors are placed.

The sending operation rule of each field is shown in Table 31-45 and 31-46.

Table 31-45 Sending Operation Rule for SI Transmission Parameter Descriptor (BIT Second Loop)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xD7."
descriptor_length	Describe the descriptor length (byte) of the corresponding descriptor.
parameter_version	Each time the descriptor is updated, the value is incremented by 1.
update_time	Describe the year/month/day when the corresponding descriptor becomes valid in the lower 16bit of MJD. In the actual SI transmission, transmission should be performed as parameters shown in this descriptor at 0 o'clock of the date indicated by this field.
[table_id loop]	This should always be described for table types transmitted as each station SI. Do not describe this for table types that are not yet transmitted.
table_id	Describe the target table type. For values that can be described, see Table 31-42.
table_description_length	Describe the descriptor length (byte) of the subsequent table_description_byte field.
table_description_byte	Follow the format defined separately for each table type to describe SI transmission parameters. For the contents described for each table type, see Table 31-44.

Table 31-46 Sending Operation Rule for table_description_byte (BIT Second Loop)

table_description_byte: [Sending Operation Rule for Each Field]	
[media_type loop]	This should always be described for media types operated in the corresponding table type of each station EIT[schedule].
media_type	Describe the media type for which transmission parameters are described. For information about the correspondence relationship between the value of the media type and the service type, see Table 9-1.
pattern	Describe the operation pattern for each station EIT[schedule basic] in case of table_id = 0x50, and the operation pattern for EIT[schedule extended] in case of table_id = 0x58. For the value to describe, see Table 31-47. This field is used just for guidance by the receiver, so strict consideration is not necessary.

EIT_other_flag	If the service group of the corresponding media_type in the corresponding broadcaster goes across multiple TS, describe '1' with each station EIT[other] sent, and '0' with it not sent. In addition, the value of the corresponding field for the description with table_id as "0x58" (EIT[schedule extended]) indicates at the same time whether descriptors for each station SI are added or not in EIT[p/f other]. Therefore, if EIT[schedule other extended] is not sent, descriptors for each station SI should not be inserted to EIT[p/f other]. If the service group of the corresponding media_type in the corresponding broadcaster does not go across multiple TS, specify '0.'
schedule_range	Describe the transmission range of the corresponding media type of each station EIT[schedule] in days. The operation case of each station EIT[schedule] is predefined, so the value of this field is also determined by the media type and the operation case. In case of table_id = 0x50: For the TV type, describe one of 15, 22, and 32. For the voice type or the data type, describe one of 8, 15, 22, and 32. In case of table_id = 0x58:Describe the same value as the description range (the value of the schedule_range field) in all station EIT[schedule] or the description range (the value of the schedule_range field with table_id = 0x50) in each station EIT[schedule basic]. For more information, see Section 13.2.2.1.
base_cycle	Describe the resending cycle of the basic cycle group in the corresponding table type/media type of each station EIT[schedule] in seconds. The resending cycles that can be set up are determined for each table type/media type. See Section 12.4.
cycle_group_count	Describe the number of extended cycle groups in the corresponding table type/media type of each station EIT[schedule]. Describe 0 if all the corresponding table types/media types are included in the basic cycle group. In case of table_id = 0x50, always describe 0 in this field. In case of table_id = 0x58, describe up to 1 in this field. For more information, see Section 12.3.3 and 13.2.
[cycle_group loop]	In the loop, cycle groups with earlier time should be described earlier.
num_of_segment	Describe the segment range of the cycle group described in the corresponding loop (the number of segments per service belonging to the corresponding cycle group).
cycle	Describe the resending cycle of the cycle group described in the corresponding loop in seconds. A value later than the resending cycle of the basic cycle group indicated in the base_cycle field should not be set up.

Values and their meaning indicated by the pattern field are shown in Table31-47.

Table 31-47 Definition of pattern

table_id	pattern	Meaning
0x50	0	Describe events equivalent to all station EIT (almost no omission)
	1	Describe events if necessary
0x58	0	A few events per week at most
	1	A few events per day at most
	2	1/4 to 1/2 of the total event number (about 10 events per day)
	3	More than half of the total event number

[Reception Processing Criteria]

- ⊙ **If the corresponding descriptor does not exist in the BIT second loop, it is judged that each station SI is not operated in the corresponding broadcaster.**
- ⊙ **The contents described in the corresponding descriptor become valid on 00:00 of the date indicated by the update_time field.**
- ⊙ **If a valid descriptor does not exist at the very moment even though the corresponding descriptor exists in the BIT second descriptor loop (judged by the update_time field in the descriptor), it is judged that each station SI is not operated at the very moment.**
- ⊙ **If a description of the table type included in each station SI does not exist in the corresponding descriptor, it is judged that the corresponding table type is not operated.**
  - ○ If multiple SI transmission parameters are placed, it is judged that the value of update_time of descriptor with a date/time that is earlier than and the closest to the present time is valid at the very moment.

The reception processing criteria for each field are shown in Table 31-48 and 31-49.

Table 31-48 Reception Processing Criteria for SI Parameter Descriptor (BIT Second Loop)

Reception Processing Criteria for Each Field	
descriptor_tag	="0xD7": Judged that the corresponding descriptor is the SI Parameter Descriptor.
descriptor_length	
parameter_version	Can be used as the update number for SI transmission parameters.
update_time	Used as year/month/date when the transmission parameters described in the corresponding descriptor become valid. The actual change of the transmission parameters becomes valid on 00:00:00 of the corresponding date. It is encoded in the lower 16 bit of MJD, so handling of 2038, etc. conforms the description in TOT (see Section 16.3).
[table_id loop]	It is judged that table types of each SI that do not exist in the corresponding loop are not operated.
table_id	Indicates the table type described in the corresponding loop. If an unknown table type exists, skip the loop itself in order to avoid malfunction.
table_description_length	Indicates the descriptor length (byte) of the subsequent table_description_byte.
table_description_byte	The format defined separately for each table type should be followed to make it possible to interpret the SI transmission parameters.

Table 31-49 Reception Processing Criteria for table_description_byte (BIT Second Loop)

table_description_byte: Reception Processing Criteria for Each Field	
[media_type loop]	It is judged that media types that do not exist in the corresponding loop are not operated.
media_type	Indicates the media type described in the corresponding loop. For information about described values and their meanings, see Table 9-1.
pattern	For information about described values and their meanings, see Table 31-47. This field is not strict one but just for guidance for operation patterns. It can be used at one's own discretion only if it is useful even as such information in terms of the design of the receiver.
EIT_other_flag	'0': It is judged that EIT[schedule other] is not sent for the corresponding media type in the corresponding broadcaster. In addition, in case of a description of table_id="0x58" (each station EIT[schedule basic]), it is judged that no descriptor for each station SI is added to EIT[p/f other]. '1': It is judged that EIT[schedule other] is sent for the corresponding media type in the corresponding broadcaster. In addition, in case of a description of table_id="0x58" (each station EIT[schedule basic]), it is judged that descriptors for each station SI are added to EIT[p/f other].
schedule_range	The transmission range of the corresponding media type of each station EIT[schedule] is described in days. This value is determined by the media type and the operation case. See Section 13.2.2.1. If a value that is not stipulated is described, it is in the abnormal state.
base_cycle	The resending cycle of the basic cycle group in the corresponding table type/media type of each station EIT[schedule] is described in seconds. In addition, because a value that is latest of all cycle groups of the corresponding media type is set up for the resending cycle of the basic cycle group, the value in this field can be used for the timeout setting for the table reception of the corresponding media type. The resending cycles that can be set up are determined for each table type/media type. See Section 12.4. If a value outside of the range is described, it is in the abnormal state.
cycle_group_count	The number of the extended cycle groups of the corresponding table type/media type of each station EIT[schedule] is described. The subsequent loop length is also judged based on this field. If the value of this field is 0, it is judged that all EIT[schedule] of the corresponding table type/the corresponding media type are included in the basic cycle group. The number of extended cycle groups is determined for each table type/media type (see Section 12.3.3), and should be as follows: In case of table_id = 0x50: 0 In case of table_id = 0x58: 1 Otherwise, it is in the abnormal state.
[cycle_group loop]	The number of the corresponding loops is judged by the value of the cycle_group_count field.
num_of_segment	The number of segments per service is described as the segment range of the cycle group described in the corresponding loop. Because cycle groups with earlier time are described earlier in the loop, it is possible to judge the start segment of the corresponding cycle group from the total value of the num_of_segment fields in the past loops. In addition, the start segment of the first cycle group in the loop is regarded as the segment number 0.
cycle	The resending cycle of the cycle group described in the corresponding loop is described in seconds.

[Other Items that are Worth Special Mention]

For more information about SI transmission parameters, see Section 12.3 and 12.4.

For example, if an operation with the following transmission parameters settings (this operation corresponds to the operation case (2) in Section 13.2.2) is performed for a TV service of each station EIT[schedule] from January 1, 2010, the encoding is as shown in the table below.

- Each EIT[schedule basic] is not operated
- For each station EIT[schedule extended], the resending cycle of the basic cycle group is 180 seconds, and the resending cycle up to 48 hours from the recent time (16 segments) is 10 seconds

Table 31-50 Description Example of SI Parameter Descriptor (Second Loop)

Field	Encoding Value
[SI_parameter_descriptor]	
descriptor_tag	**0xD7**
descriptor_length	**11**
parameter_version	**1**
update_time	**55197**
[table_id loop]	
table_id	**0x58**
table_description_length	**6**
[table_description_byte loop]	
media_type	**1**
pattern	**0 - 3**
EIT_other_flag	**1**
reserved	**all 1**
schedule_range	**8**
base_cycle	**180**
cycle_group_count	**1**
[cycle_group loop]	
num_of_segment	**16**
cycle	**10**

31.3 SDT (Service Description Table)

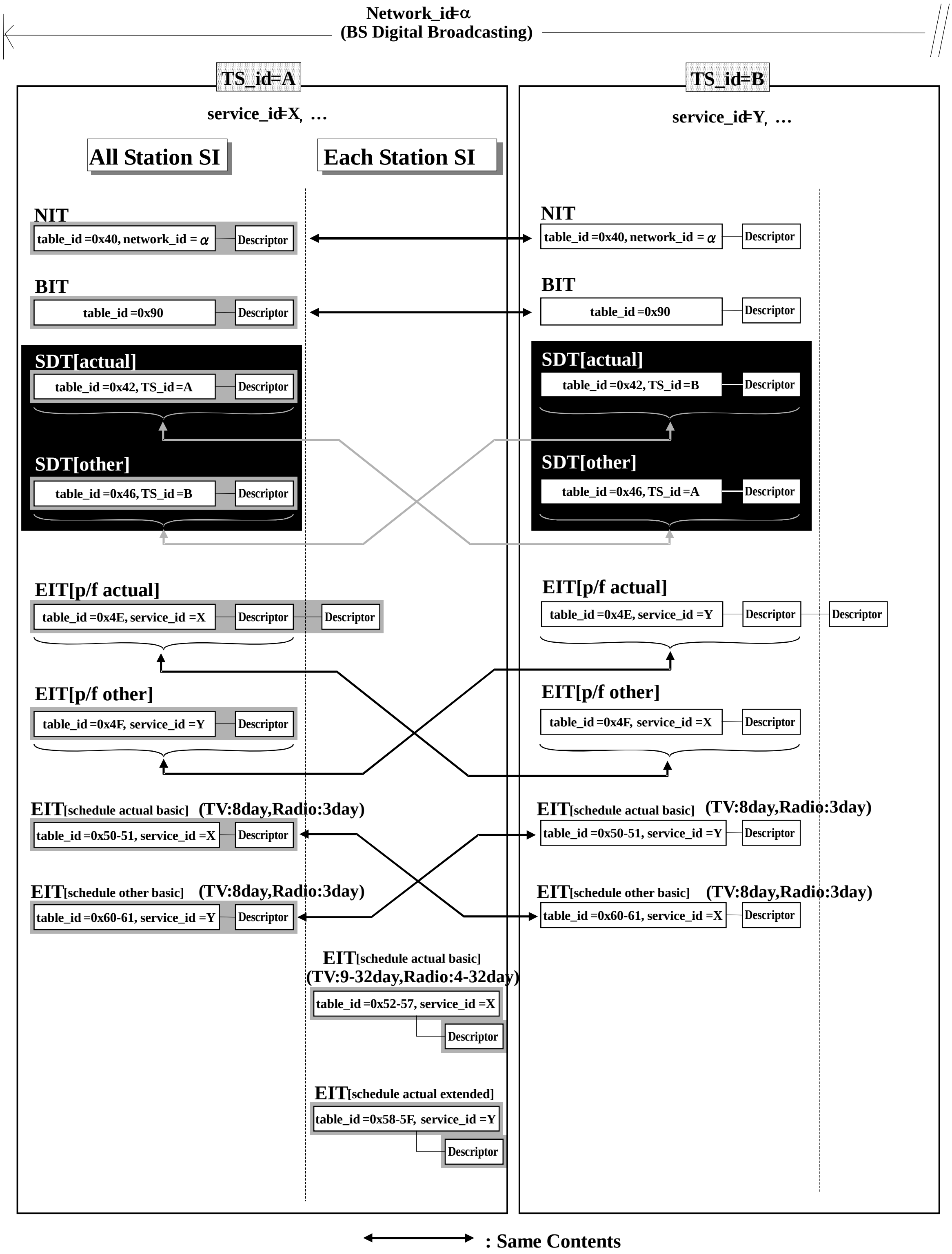


Figure 31-3 Part Described in Section 31.3 (SDT All Station) [outlined part]

31.3.1 SDT Structure and Operation

[Usage]

Describes information related to the organization channel such as the organization channel name and consigned broadcasting operator name.

[Structure]

The structure of SDT is shown in Table 31-51.

Table 31-51 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	**6**	**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**
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 5.2.6 of Part 2 of ARIB STD-B10 is conformed.

[Sending Operation Rule]

⊙ **It should always send information about its own TS in all TS with an actual table.**

⊙ **It should always send information about all other TS in all TS with an other table.**

- All organization channels defined in NIT should always be described.
- Both actual and other tables are updated when description information regarding organization channels is changed.
- For the resending cycle, Section 12.4 of this specification document is conformed for both tables.
- For the update frequency, Section 12.9 of this specification document is conformed for both tables.

The sending operation rule of each field is shown in Table 31-52.

Table 31-52 SDT Sending Operation Rule

[Sending Operation Rule for Each Field]	
table_id	[actual] Describe "0x42." [other] Describe "0x46."
section_syntax_indicator	Describe ‘1.’
section_length	Describe the SDT section length. Because the maximum whole section length is 1024 bytes, so the maximum value for this is 1021.
transport_stream_id	Describe transport_stream_id for the target TS.
version_number	Describe a value that is incremented by 1 for each version update during the normal operation. However, if a system failure occurs, a value incremented by 1 or larger can be described.
current_next_indicator	Describe ‘1.’
section_number	The section number in the corresponding sub table is described.
last_section_number	The last section number in the corresponding sub table is described.
original_network_id	Describe network_id for the target network.
[loop]	The maximum value for loops is not stipulated.
service_id	Describe the service_id (unique in the network) for the target organization channel.
EIT_schedule_flag	If the service is performed, describe '1' (except for Temporary Services).
EIT_present_following _flag	If the service is performed, describe '1.' However, for Temporary Services, describe '1' only if EIT[p/f] of the corresponding service is sent.
running_status	Describe ‘0.’
free_CA_mode	Describe the default value for the target organization channel.
descriptor_loop_length	Describe the subsequent descriptor loop length. The maximum value is 1013.
[descriptor_loop]	The maximum number of loops is not stipulated.

[Reception Processing Criteria]

- The contents described in SDT for the same TS are different between the actual table and the other table, the contents described in the actual table have the priority. However, the contents of the actual table are different from those of the other table only during the time lag (assumed about for a minute)due to transactions in the collecting/distributing center caused when the description contents are changed, so the contents of the actual table and the other table never differ on a regular basis.
- During the normal operation, the same version_number of the other sub table for the same TS is sent between all TS.

The reception processing criteria for each field are shown in Table 31-53.

Table 31-53 SDT Reception Processing Criteria

Reception Processing Criteria for Each Field	
table_id	= "0x42": It is judged that the corresponding table is SDTactual. = "0x46": It is judged that the corresponding table is SDTother.
section_syntax_indicator	= '0': The corresponding section is invalid. = '1': The corresponding section is valid.
section_length	≤1021: Section length. >1021: The corresponding section is invalid.
transport_stream_id	Judged as transport_stream_id for the target TS.
version_number	If it is changed, it is judged that the corresponding table has been updated.
current_next_indicator	= '0': Judged that the corresponding section is invalid. = '1': Judged that the corresponding section is valid.
section_number	≤ last_section_number: Judged as the section number in the corresponding sub table. > last_section_number: Judged that the corresponding section is invalid.
last_section_number	Judged as the last section number in the corresponding sub table.
original_network_id	Judged as network_id of the target network.
[loop]	
service_id	Judged as service_id for the corresponding service.
EIT_schedule_flag	= '0': Judged that the EIT schedule for the corresponding service does not exist within the present TS. = '1': Judged that the EIT schedule for the corresponding service exists within the present TS.
EIT_present_following _flag	= '0': Judged that EITp/f for the corresponding service does not exist within the present TS. = '1': Judged that EITp/f for the corresponding service exists within the present TS.
running_status	= "0x0": Not defined. ≠ "0x0": Handled as "0x0."
free_CA_mode	Indicates the default value for the corresponding service. (Chargeable service/free service)
descriptor_loop_length	≤1013: The subsequent descriptor loop length. >1013: Judged that the corresponding section is invalid.
[descriptor]	

[Other Items that are Worth Special Mention]

○ During the shift period such as addition/deletion of an organization channel, it may not be described in SDT though it is described in NIT. This organization channel should also be the selection target.

31.3.2 Descriptors Inserted in SDT (Service Loop)

The following descriptions for each descriptor are applied to both the actual table and the other table.

31.3.2.1 Service Descriptor

[Usage]

Describe the basic information related to services such as the service name and operator name.

[Structure]

The structure of the service descriptor is shown in Table 31-54.

Table 31-54 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.13 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **Place only one descriptor for the target organization channel.**

The sending operation rule for each field is shown in Table 31-55.

Table 31-55 Sending Operation Rule for Service Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x48."
descriptor_length	Describe the descriptor length of the corresponding descriptor.
service_type	Describe the service format type. For information about the service format type, see Table 31-16.
service_provider_name _length	Describe the operator name length. The maximum value is 20.
[char]	Describe the operator name. Up to 10 full-width characters.
service_name_length	Describe the organization channel name length. The maximum value is 20.
[char]	Describe the organization channel name length. Up to 10 full-width characters.

[Reception Processing Criteria]

- If SDT where the descriptor is placed by following the above sending operation rule can not be received, it is judged that the basic information for the target service is invalid.

The reception processing criteria for each field are shown in Table 31-56.

Table 31-56 Reception Processing Criteria for Service Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	= "0x48": Judged that the corresponding descriptor is the service descriptor.
descriptor_length	Judged as the descriptor length of the service descriptor.
service_type	If it is not the service_type shown in Table 31-16, the corresponding descriptor is judged as invalid.
service_provider_name _length	≤20: Operator name length. >20: The operator name is judged as invalid.
[char]	
service_name_length	≤20: The organization channel name length. >20: The organization channel name is judged as invalid.
[char]	

[Other Items that are Worth Special Mention]

- For information about definitions of each service for each service format type, see Section 8.1.

31.3.2.2 Digital Copy Control Descriptor

[Usage]

Placed to indicate the control information related to the digital copy and the analog copy or to describe the maximum transmission rate for the whole corresponding service.

[Structure]

The structure of the digital copy control descriptor is shown in Table 31-57.

Table 31-57 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==01||copy_control_type==11)){		
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==01||copy_control_type==11) {		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bitrate_flag==1){		
maximum_bitrate	**8**	**uimsbf**
}		
}		
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.23 and Appendix F of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ If the corresponding service is the digital copy control target and the analog copy control target, it should always be placed.

- ○ If the maximum transmission rate of the corresponding service is outside of the default maximum bit rate range stipulated in Table 21-1-1 and 21-1-2, it should always be placed.

The sending operation rule for each field is shown in Table 31-58.

Table 31-58 Sending Operation Rule for Digital Copy Control Descriptor (SDT)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xC1."
descriptor_length	Describe the descriptor length of the digital copy control descriptor.
digital_recording_control_data	This 2bit field indicates the information that controls the copy generation, and is encoded according to Table X3-Y1, X3-Y2, and X3-Y3.
maximum_bit_rate_flag	If the maximum transmission rate of the corresponding service is not described, describe '0.' If the maximum transmission rate of the corresponding service is described, describe '1.'
component_control_flag	Describe ‘0’ (the whole program only).
copy_control_type	This 2bit field indicates the information of the format that controls the copy generation, and is encoded according to Table X3-Y1, X3-Y2, and X3-Y3.
APS_control_data	This is the analog output copy control information. This 2bit field indicates the information that controls the analog output copy when copy_control_type is '01' and '11', and is encoded according to Table X3-Y1, X3-Y2, and X3-Y3.
maximum_bit_rate	Describe the maximum transmission rate.

In addition, each bit is detailed below.

Note that the specifications that control each output terminal with the digital copy control descriptor change according to the service contents.

[Consideration in Operation (Common to Each Service)]

Sending operation should not be performed in the combination that is not stipulated in Table X3-Y1, X3-Y2, or X3-Y3.

For CGMS-A, if copy_control_type is "01" and "11," digital_recording_control_data and APS_control_data are copied to the area specified by CGMS-A.

If the corresponding descriptor has the copy control information, a proper copyright processing is performed on the analog video output, fast digital interface output, and digital voice output in the reception processing for output. CGMS-A and MACROVISION are used for the analog video output, DTCP for the fast digital interface output, and SCMS for the digital voice output. For more information about the processing, see each specification and reference.

If multiple services are output from the fast digital interface, the relationship of the copy control (including output control) specification for each service is interpreted as follows.

- Streams that contain services for which the output is prohibited or not allowed are prohibited.
- Output of streams where services with copy_control_type=01 and copy_control_type=11 exist at the same time is prohibited. However, if a service that can be copied without restriction also exists, output is possible.
- The copy control is interpreted as strict in the order of "copy prohibited," "available for copy only for one generation," and "available for copy without restriction."

It is necessary to reflect the information correctly to the copyright display bit of the channel status specified in IEC 60958, and the category code.

In addition, if there is a digital copy control descriptor, the category code is "001_0000L."

Available for copy without restriction: Set the copyright information bit to 1.

Available for copy only for one generation: Set the copyright information bit and the Lth bit of the category code to 0.

Copy prohibited: Set the copyright information bit to 0 and the Lth bit of the category code to 1.

Note that if the corresponding descriptor is not described, it is treated as copy free.

Table X3-Y1 Operation of Descriptor when Digital TV Service and Temporary Video Service are Performed

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control*3</th><th colspan="3">Operation for Each Descriptor</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th></tr>
<tr><td>Available for copy without restriction</td><td>Available for copy without restriction</td><td rowspan="5">01</td><td>00</td><td>Don’t care</td></tr>
<tr><td rowspan="2">Copy prohibited *1</td><td>Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.</td><td rowspan="2">11</td><td>00</td></tr>
<tr><td>Copy prohibited *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Available for copy only for one generation *2</td><td>Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.</td><td rowspan="2">10</td><td>00</td></tr>
<tr><td>Copy prohibited after copying for one generation *4</td><td>Other than 00</td></tr>
</table>

*1: In case of the fast digital interface output, the Copy Never processing of the Source Function stipulated in DTCP is performed. However, if only voice streams are output in the IEC60958 conformant format, the No More Copies processing is performed.

*2: in case of the fast digital interface output, the Copy One Generation processing of the Source Function stipulated in DTCP is performed.

*3: Applied to the composite and component video outputs. Cases where received video signals are output after the format conversion are also included. The Macrovision control is applied to the 480I composite and component video signals.

*4: In the analog video output, the output processing is performed with parameters specified by Macrovision and specified APS_control_data.

[Consideration in Operation (Digital TV Service and Temporary Video Service)]

If service_type described in the NIT service list descriptor is "0x01" (digital TV service) and "0xA1" (temporary video service), encoding according to Table X3-Y1 should be performed.

Table X3-Y2 Operation of Descriptor when Digital Voice Service and Temporary Voice Service are Performed

Digital Copy Control	Analog Copy Control[*4]	Operation for Each Descriptor		
		copy_control_type	digital_recording_control_data	APS_control_data
Available for copy without restriction. [*1]	Available for copy without restriction	01	00	Don't care
Available for copy without restriction		11		
Copy prohibited [*2, *1]	Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.	01	11	00
	Copy prohibited [*5]			Other than 00
Copying is prohibited, however, output with MPEG_TS is prohibited [*6]	Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.	11		00
	Copy prohibited [*5]			Other than 00
Available for copy only for one generation. [*3, *1]	Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.	01	10	00
	Copy prohibited after copying for one generation [*5]			Other than 00
Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. [*6]	Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.	11		00
	Copy prohibited after copying for one generation [*5]			Other than 00

*1: Output is currently prohibited for MPEG-TS in the serial interface of high speed digital interface. The related descriptions can be found in 8.2 Functional Restriction for the Content Protection in Volume 8 of Part 1.

*2: in case of the fast digital interface output, the No More Copies processing of the AM824 audio Source Function stipulated in DTCP is performed.

*3: in case of the fast digital interface output, the Copy One Generation processing of the AM824 audio Source Function stipulated in DTCP is performed.

*4: Applied to the composite and component video outputs. Cases where received video signals are output after the format conversion are also included. The Macrovision control is applied to the 480I composite and component video signals.

*5: In the analog video output, the output processing is performed with parameters specified by Macrovision and specified APS_control_data.

*6: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Consideration in Operation (Digital Voice Service and Temporary Voice Service)]

If service_type described in the NIT service list descriptor is "0x02" (digital voice service) and "0xA2" (temporary voice service), encoding according to Table X3-Y2 should be performed.

Table X3-Y3 Operation of Descriptor when Data Service, Temporary Data Service, and Bookmark List Data Service are Performed

Digital Copy Control	**Analog Copy Control** [*3]	**Operation for Each Descriptor**		
		copy_control_type	**digital_recording_control_data**	**APS_control_data**
Available for copy without restriction	Available for copy without restriction	01/11	00	Don't care
Copy prohibited [*1]	Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.	01	11	00
	Copy prohibited [*4]			Other than 00
Copying is prohibited, however, output with MPEG_TS is prohibited [*5]	Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.	11		00
	Copy prohibited [*4]			Other than 00
Available for copy only for one generation [*2]	Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.	01	10	00
	Copy prohibited after copying for one generation [*4]			Other than 00

Copying is allowed for the first generation only, however, output with MPEG_TS is prohibited. *5	Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.	11		00
	Copy prohibited after copying for one generation *4			Other than 00

*1: In case of the fast digital interface output, the Copy Never processing of the Source Function stipulated in DTCP is performed. However, if only voice streams are output in the IEC60958 conformant format, the No More Copies processing is performed.

*2: in case of the fast digital interface output, the Copy One Generation processing of the Source Function stipulated in DTCP is performed.

*3: Applied to the composite and component video outputs. Cases where received video signals are output after the format conversion are also included. The Macrovision control is applied to the 480I composite and component video signals.

*4: In the analog video output, the output processing is performed with parameters specified by Macrovision and specified APS_control_data.

*5: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Consideration in Operation (Data SeLLrvice, Temporary Data Service, and Bookmark List Data Service)]

If service_type described in the NIT service list descriptor is "0xC0" (data service), "0xA3" (temporary data service), and "0xAA" (bookmark list data service), encoding according to Table X3-Y3 should be performed.

[Reception Processing Criteria]

The reception processing criteria for each field are shown in Table 31-61.

Table 31-61 Reception Processing Criteria for Digital Copy Control Descriptor (SDT)

Reception Processing Criteria for Each Field	
descriptor_tag	= "0xC1": Judged that the corresponding descriptor is the digital copy control descriptor.
descriptor_length	Judged as the descriptor length of the digital copy control descriptor.
digital_recording_control_data	This 2bit field indicates the information that controls the copy generation, and is decoded according to Table X3-Y1, X3-Y2, and X3-Y3.
maximum_bit_rate_flag	='0': Judged that the maximum transmission rate of the corresponding service is within the default maximum bit rate range stipulated in Table 21-1-1 and 21-1-2. ='1': Judged that the maximum transmission rate of the corresponding service is hereinafter described.

component_control_flag	='0': Judged as valid. ='1': Judged as '0.'
copy_control_type	This 2bit field indicates the information of the format that controls the copy generation, and is decoded according to Table X3-Y1, X3-Y2, and X3-Y3.
maximum_bit_rate	Judged as the maximum transmission rate value for the corresponding service.

[Other Items that are Worth Special Mention]

The analog output signal copy control conforms to separate contracts between the corresponding broadcasting operator and Macrovision, etc., so careful consideration will be necessary in the future as well.

Reception processing that is not stipulated in Table X3-Y1, X3-Y2, or X3-Y3 is shown below.

☐ Digital TV service and temporary video service

In case of copy_control_type=00/10/11:

- Outputs from the analog video output, digital voice output, and fast digital interface output are prohibited.

In case of copy_control_type=01 and digital_recording_control_data=01:

- Perform the same processing as copy_control_type=01 and digital_recording_control_data=11.

☐ Digital voice service, temporary voice service, data service, temporary data service, and bookmark list data service

In case of copy_control_type=00/10:

- Outputs from the analog video output, digital voice output, and fast digital interface output are prohibited.

In case of copy_control_type=01 and digital_recording_control_data=01:

- Set "01" only for EMI of the fast digital interface, and perform the same processing as copy_control_type=01 and digital_recording_control_data=11 for other processing.

In case of copy_control_type=11 and digital_recording_control_data=01:

- Set "01" only for EMI of the fast digital interface, and perform the same processing as copy_control_type=11 and digital_recording_control_data=11 for other processing.

31.3.2.3 CA Contract Information Descriptor

[Usage]

Describes the verification information regarding whether viewing (recording) is available or not in the default program reservation for programs including billing target components within the organization channel.

[Structure]

The structure of the CA contract information descriptor is shown in Table 31-62.

Table 31-62　Structure of CA Contract Information 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**
}		
}		

[Meaning of Each Field]

Meanings of each field are stipulated as follows.

Table 31-63 Meaning of Each Field in CA Contract Information Descriptor

Meaning of Each Field	
CA_system_id	This 8bit field indicates the conditional access method identifier.
CA_unit_id	This 4bit field indicates the billing unit/non-billing unit the component belongs to. However, 0x0 is not used for the corresponding descriptor. 0x0: Non-billing unit group 0x1: Billing unit group including the event default ES group
num_of_component	This 4bit field indicates the number of components that belong to the billing unit specified by the above CA_unit_id.
[component_tag]	This 8bit field is a label that identifies the target component stream within the billing unit specified by the above CA_unit_id. If a stream identifier descriptor exists in PMT, the value is the same as the component tag described here.
contract_verification _info_length	This 8bit field indicates the byte length of the subsequent contract verification information.
[contract_verification _info]	This is an 8bit field. The contract verification information is described with a series of verification information fields.
fee_name_length	This 8bit field indicates the byte length of the subsequent fee name.
[fee_name]	This is an 8bit field. The fee name is described with a series of fee name fields.

[Sending Operation Rule]

⊙ It should always be placed and sent for each different billing unit (ECM).

- ○ In case of free_CA_mode=0, the corresponding descriptor with CA_unit_id=0x1 should not be placed.

In case of free_CA_mode=1, the corresponding descriptor with CA_unit_id=0x1 should always be placed.

- ○ Values should not be changed once they are set up if possible.

The sending operation rule for each field is shown in Table 31-64.

Table 31-64 Sending Operation Rule for CA Contract Information Descriptor (SDT)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xCB."
descriptor_length	Describe the descriptor length of the corresponding descriptor. The maximum value is 209.
CA_system_id	Describe the conditional access method identifier. Values of identifiers other than those applied to the BS digital broadcasting should not be described.
CA_unit_id	Describe the billing unit identifier. The consigned broadcasting operator allocates this uniquely within the default program in the service.
num_of_component	Describe the number of target components for the corresponding billing unit. The maximum value is 12.
[component_tag]	Describe the tag value of the target component for the corresponding billing unit.
contract_verification _info_length	Describe the contract verification information length. The maximum value is 172.
[contract_verification _info]	Describe the contract verification information.
fee_name_length	Describe "0."
[fee_name]	Not used.

[Reception Processing Criteria]

○ If one of the followings is true, it is judged that the contract verification information in SDT is invalid.

- The corresponding descriptor with free_CA_mode=0 and CA_unit_id=0x1 exists.
- The corresponding descriptor with free_CA_mode=1 and CA_unit_id=0x1 does not exist.

The reception processing criteria for each field are shown in Table 31-65.

Table 31-65 Reception Processing Criteria for CA Contract Information Descriptor (SDT)

Reception Processing Criteria for Each Field	
descriptor_tag	= "0xCB": Judged that the corresponding descriptor is the CA contract information descriptor.
descriptor_length	Judged as the descriptor length of the CA contract information descriptor.
CA_system_id	= Identifier value applied to BS: Indicates the corresponding conditional access method identifier. = Other value: Judged as invalid.
CA_unit_id	=0x0: Judged as invalid. =0x1: Judged as the billing unit identifier including the default ES group.
num_of_component	= 0: Invalid ≤12: Indicates the number of target components for the corresponding billing unit. >12: Invalid
[component_tag]	Indicates the tag value of the target component for the corresponding billing unit.
contract_verification _info_length	≤172: Contract verification information length >172: Invalid.
[contract_verification _info]	Indicates the contract verification information.
fee_name_length	Judged as invalid for values other than 0.
[fee_name]	Judged as invalid.

[Other Items that are Worth Special Mention]

○ None

31.3.2.4 Link Descriptor

[Usage]

Describes the link destination to the CA alternative service.

[Structure]

The structure of the link descriptor is shown in Table 31-65-2.

Table 31-65-2　Structure of Link 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.8 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **Only one link descriptor should be placed for a single service.**

The sending operation rule for each field is shown in Table 31-65-3.

Table 31-65-3　Sending Operation Rule for Link Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x4A."
descriptor_length	Describe the descriptor length of the link descriptor.
transport_stream_id	Describe the transport stream identifier that contains the link destination service.
original_network_id	Describe the identifier of the network to which the link destination service is transmitted.
service_id	Describe the service identifier for the link destination.
linkage_type	Describe "0x03" (CA alternative service).
[private_data_byte]	If a message is described, describe the message number in the first byte. The message number should be unique within the BS digital broadcasting network, ranging from 21 to 40 (0x15 to 0x28). The message body is described in the second and subsequent bytes within 160 bytes (80 full-width characters). If the same message number is specified within the sub table, the message body can be omitted. However, the message body described at the beginning within the sub table can not be omitted even for the same message number.

[Reception Processing Criteria]

The reception processing criteria for each field are shown in Table 31-65-4.

Table 31-65-4 Reception Processing Criteria for Link Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0x4A," the corresponding descriptor is judged as the link descriptor.
descriptor_length	Judged as the descriptor length of the link descriptor.
transport_stream_id	Judged as the transport stream identifier that contains the link destination service.
original_network_id	Judged as the identifier of the network to which the link destination service is transmitted.
service_id	Judged as the service identifier of the link destination service.
linkage_type	="0x03": Judged as the CA alternative service. ≠"0x03": Judged as Invalid.
[private_data_byte]	The first byte can be judged as the message number, and the second and subsequent bytes as the message body. The extra message when the message body exceeds 160 bytes (80 full-width characters) is judged as invalid. In addition, if the message number is the same, the contents of the message body can be regarded as the same as well. If the description of the message body for the message number does not exist in the sub table, it can be handled in the same way as when the area itself does not exist. For information about the exception handling, see Part 1 Volume 5.

[Other Items that are Worth Special Mention]

None.

31.4 EIT(Event Information Table)

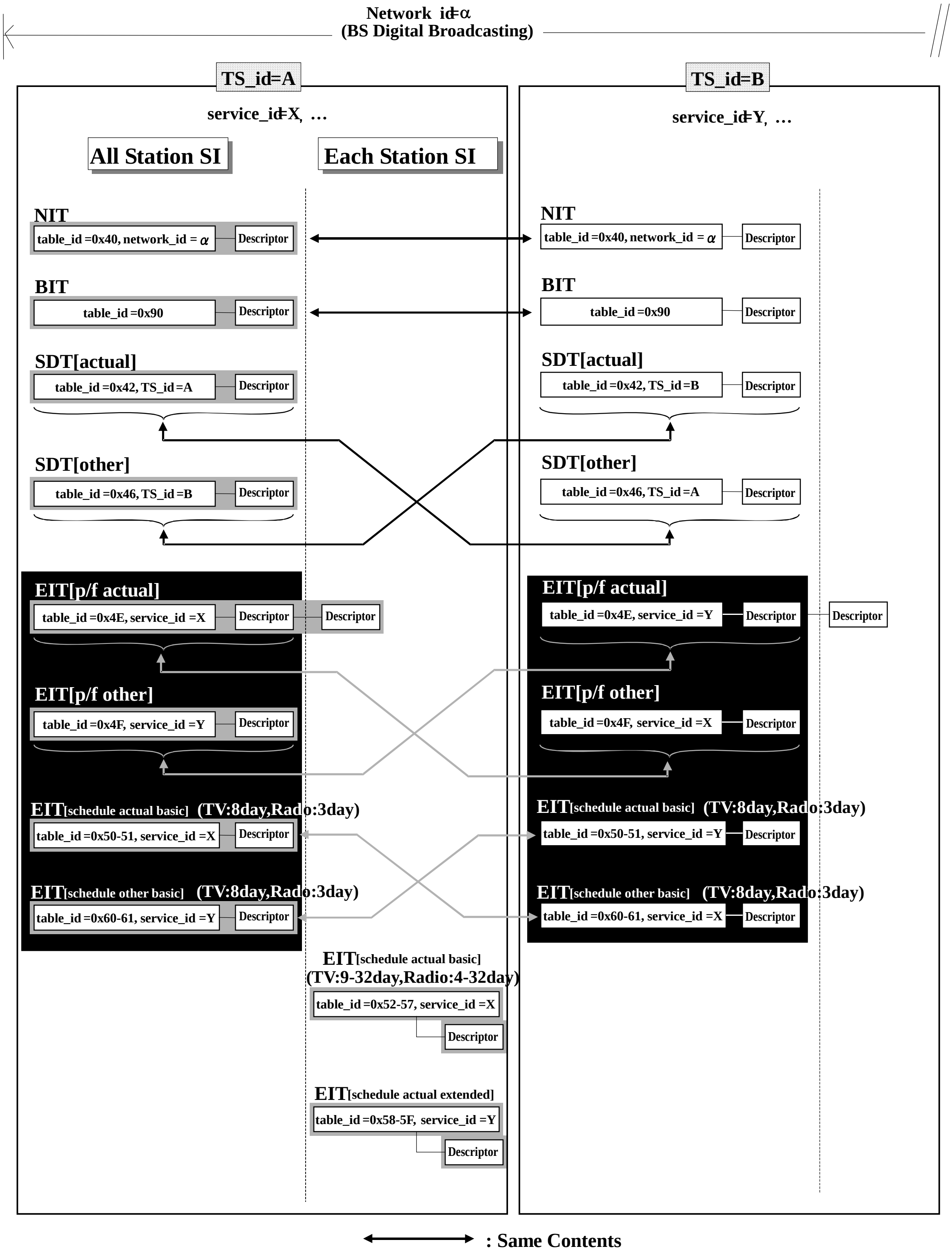


Figure 31-4 Part Described in Section 31.4 (EIT All Station) [outlined part]

31.4.1 Structure of EIT

[Usage]

Specifies information related to programs such as the program name, broadcasting date/time, and description of the contents.

[Structure]

The structure of EIT is shown in Table 31-66.

Table 31-66 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**
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 5.2.7, Part 2 of ARIB STD-B10 is conformed.

[Sending Operation Rule]

⊙ **For services operated in the target network, the range of information for EIT[p/f actual], EIT[p/f other], EIT[schedule actual basic], and EIT[schedule other basic] indicated with D1 (TV type), D2 (voice type), and D3 (data type) in Table 12-6 and 12-7 should always be sent.**

○ For the resending cycle, Section 12.4 of this specification document is conformed.

○ For the update frequency, Section 12.9 of this specification document is conformed.

The sending operation rule for each field is shown in Table 31-67.

Table 31-67 Sending Operation Rule for EIT (All Station)

[Sending Operation Rule for Each Field]	
table_id	Describe according to Table 13-3 to 13-8.
section_syntax_indicator	Describe '1.'
section_length	Describe the EIT section length. Because the maximum whole section length is 4096 bytes, so the maximum value for this is 4093 bytes.
service_id	Describe service_id for the target program.
version_number	Describe a value that is incremented by 1 for each version update during the normal operation. However, if a system failure occurs, a value incremented by 1 or larger can be described.
current_next_indicator	Describe '1.'
section_number	Describe the section number.
last_section_number	Describe the maximum section number. In case of present/following, fixed as 0x01. In case of schedule, describe the last section_number of the last segment.
transport_stream_id	Describe transport_stream_id for the target transport stream.
original_network_id	Describe network_id for the source distribution system.
segment_last_section_ number	In case of present/following, fixed as 0x01 as in last_section_number. In case of schedule, for each segment, describe the last section_number of the section used in it.
last_table_id	Describe the last table_id. In case of present/following, the same as with table_id. In case of schedule, enter the last table_id.
[loop]	The maximum value of the loop is fixed as '1' for present/following, but not stipulated for schedule.
event_id	Describe event_id for the target event. Allocated uniquely within sevice_id. For information about the time-series uniqueness of event_id, see Section 8.2.1.
start_time	Describe the program start time for the target event. MJD+BCD notation (hour/minute/second). Only for following, it can be undefined (all bit '1').
duration	Describe the program duration for the target event. BCD notation (hour/minute/second). Only for present/following, it can be undefined (all bit '1').
running_status	Describe all "0" (undefined).
free_CA_mode	If the corresponding program is a free program, set up '0.' If the corresponding program is a chargeable program, set up '1.' For information about the definition of the free broadcasting and the chargeable broadcasting, see Section 20.2.
descriptors_loop_length	Describe a value that does not exceed the maximum section length.
[descriptor_loop]	
[descriptor]	

[Reception Processing Criteria]

- Indicates information related to programs such as the program name, broadcasting date/time, and description of the contents.

The reception processing criteria for each field are shown in Table 31-68.

Table 31-68 Reception Processing Criteria for EIT (All Station)

Reception Processing Criteria for Each Field	
table_id	=" 0x4E to 0x6F": Judged that the corresponding table is EIT.
section_syntax_indicator	= '0': The corresponding section is invalid. = '1': The corresponding section is valid.
section_length	≤4093: Section length. >4093: The corresponding section is invalid.
service_id	
version_number	A change in this field indicates that the corresponding table has been updated.
current_next_indicator	= '0': The corresponding section is invalid. = '1': The corresponding section is valid.
section_number	In p/f: = '0': Judged that the corresponding section is the information of "present." = '1': Judged that the corresponding section is the information of "following." >'1': Ignore the corresponding section.
last_section_number	
transport_stream_id	
original_network_id	
segment_last_section_ number	
last_table_id	
[loop]	
event_id	
start_time	Only for following, all bit '1' is judged as undefined.
duration	Only for present/following, all bit '1' is judged as undefined.
running_status	= '0': The corresponding event is valid. ≠ '0': Handled as '0.'
free_CA_mode	= '0': Judged that the corresponding program is a free program. = '1': Judged that the corresponding program is a chargeable program. For information about the definition of the free program and the chargeable program, see Section 20.2.
descriptors_loop_length	
[descriptor_loop]	
[descriptor]	

[Other Items that are Worth Special Mention]

- The maximum value of duration is 48 hours.
- The maximum number of events per day is 96 for a service.
- For information about reissuing the same event_id to a different program (the time-series uniqueness), see Section 8.2.1.

31.4.2 Descriptors Inserted in EIT (Event Loop)

Descriptors placed in event loops of EIT (all station SI) are shown in Table 31-69.

Table 31-69 Descriptors Placed in Event Loops of EIT (All Station SI)

Tag Value	Descriptor	EIT[p/f]	EIT[schedule basic]
0x4D	Short event descriptor	◎	◎
0x4E	Extended event descriptor	×*1	×
0x50	Component descriptor	◎*2	◎*2
0x54	Content descriptor	○	○
0x55	Parental rate descriptor	○	○
0xC1	Digital copy control descriptor	○	○
0xC4	Audio component descriptor	◎*3	◎*3
0xC5	Hyperlink descriptor	×*1	×
0xC7	Data contents descriptor	○	○
0xCB	CA contract information descriptor	○	○
0xD6	Event group descriptor	○	○*4
0xD9	Component group descriptor	○	○
0xD5	Series descriptor	○	○
0x42	Stuffing descriptor	○	○

◎ → Always insert in the corresponding descriptor area in the table

○ → Optionally insert in the corresponding descriptor area in the table

× → Not allowed to insert in the corresponding descriptor area in the table

*1: Though not placed as all station SI, this can be additionally placed only in EIT[p/f] as each station SI.

*2: At least one is required for digital TV services.

*3: At least one is required for digital TV services and digital voice services.

*4: If an event_group descriptor specified with group_type="shared event" is placed in EIT[schedule basic] and it is the "reference source" for other service_id, then all descriptors except for the event group descriptor can be omitted. See Chapter 17 (Shared Event).

31.4.2.1 Short Event Descriptor

[Usage]

Describes short character information related to the event name and the event.

[Structure]

The structure of the short event descriptor is shown in Table 31-70.

Table 31-70 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**
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.15 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **Only one should always be sent for a single event except for a special situation (shared event).**

The sending operation rule for each field is shown in Table 31-71.

Table 31-71 Sending Operation Rule for Short Event Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x4D."
descriptor_length	Describe the descriptor length of the short event descriptor. The maximum value is not stipulated.
ISO_639_language_code	Describe the language code "jpn ("0x6A706E")."
event_name_length(Note 1)	Describe a value of 80 bytes (40 full-width characters) or less as the program name length.
[event_name_char]	Describe the program name with 80 bytes (40 full-width characters) or less. Do not use the line feed code. If a series descriptor exists in the same loop and the series name is not described in it, this program name also becomes the series name.

text_length	Describe the program description length with a value of 160 bytes or less.
[text_char]	Describe the program description with 160 bytes (80 full-width characters) or less. There is no limitation for the total number of line feed codes used in the corresponding field, but the usage is limited to the following purposes in order to prevent improper use. - Right before words that you do not want to be wrapped across two lines such as people's name - Break of text, etc.

(Note 1) The program name is "program title + program sub title." We strongly want the 40-character display for long programs. However, in consideration of being cut by 20 characters due to limitation in terms of display, the sender should make efforts such as arranging text in preferential order. In addition, as a rule, the program name is 20 characters or less for programs that last for 30 minutes or less.

[Reception Processing Criteria]

○ It can be judged as the title and sub title for each event, and used for display, etc.

The reception processing criteria for each field are shown in Table 31-72.

Table 31-72 Reception Processing Criteria for Short Event Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0x4D," the corresponding descriptor is judged as the short event descriptor.
descriptor_length	Judged as the descriptor length of the corresponding descriptor.
ISO_639_language_code	For other than "jpn ("0x6A706E")," the character code placed later is handled as "jpn."
event_name_length	≤80 bytes (40 full-width characters): program name length >80 bytes (40 full-width characters): The extra program name when the program name length exceeds 80 bytes (40 full-width characters) can be ignored.
[event_name_char]	Judged as the program name. If a series descriptor exists in the corresponding loop and the series name is not described in it, it is judged that the program name is the series name.
text_length	≤160 bytes (80 full-width characters): program description length >160 bytes (80 full-width characters): The extra program description when the program description length exceeds 160 bytes (80 full-width characters) can be ignored.
[text_char]	Judged as the program description.

[Other Items that are Worth Special Mention]

None.

31.4.2.2 Component Descriptor

[Usage]

Describes information related to video component streams that constitute events.

[Structure]

The structure of the component descriptor is shown in Table 31-73.

Table 31-73 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.3 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **Always send one for all the video components including video components used in the data broadcasting, etc. that events contain.**

○ However, for low hierarchical ES for the purpose of decoding only if it is difficult to stably decode the high hierarchy in the hierarchical transmission, this descriptor is not placed, and it is not the target for the component selection or reservation recording, etc.

⊙ **It is required to send at least one (the default ES) in the digital TV service.**

○ A component_tag value ranging from 0x00 to 0x0F is allocated to video components that can be individually selected, and a value other than the above is allocated to components that are not the target for the individual selection for use in the data broadcasting, etc.

The sending operation rule for each field is shown in Table 31-74.

Table 31-74 Sending Operation Rule for Component Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x50."
descriptor_length	Describe the descriptor length of the component descriptor. The maximum value is not stipulated.
stream_content	Describe "0x01" (video).
component_type	Describe the video component type for the corresponding component. For information about component types, values sent at the beginning of the BS digital broadcasting in Table 6-5, Part 2 of ARIB STD-B10 are shown in Table 31-75.
component_tag	Describe the component tag value that is unique within the corresponding program. For information about allocating the component tag value, see Section 14.2.
ISO_639_language_code	Describe "jpn ("0x6A706E")."
[text_char]	Describe the video type name with 16 bytes (8 full-width characters) or less when multiple video components exist. Do not use the line feed code. If the component description is the default character strings, this field can be omitted. For information about the default character strings, see Section 4.4.1 of the receiver specification document.

Table 31-75 component_type Values that Can be Specified at BS Digital Broadcasting

component_type (Component Type)	Meaning
0x01	Video 480i(525i), aspect ratio 4:3
0x03	Video 480i(525i), aspect ratio 16:9 [Note 1] without pan vector
0x04	Video 480i(525i), aspect ratio>16:9
0xA1	Video 480p(525p), aspect ratio 4:3
0xA3	Video 480p(525p), aspect ratio 16:9 [Note 1] without pan vector
0xA4	Video 480p(525p), aspect ratio>16:9
0xB1	Video 1080i(1125i), aspect ratio 4:3
0xB3	Video 1080i(1125i), aspect ratio 16:9 [Note 1] without pan vector
0xB4	Video 1080i(1125i), aspect ratio>16:9
0xC1	Video 720p(750p), aspect ratio 4:3
0xC3	Video 720p(750p), aspect ratio 16:9 [Note 1]
0xC4	Video 720p(750p), aspect ratio>16:9

Note 1) In the BS digital broadcasting, pan vectors are not operated (see Section 4.1.2 of Part 1 Volume 7).

[Reception Processing Criteria]

- It is possible to judge the video component type that constitutes events, and the component description can be used during the video component selection.
- Only video component whose component_tag value is set up between 0x00 and 0x0F are the individual selection target. Video components whose component_tag value is set up as other than the above are not the individual selection target, and should not be the target for the component selection function, etc.

The reception processing criteria for each field are shown in Table 31-76.

Table 31-76 Reception Processing Criteria for Component Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0x50," the corresponding descriptor is judged as the component descriptor.
descriptor_length	Judged as the descriptor length of the corresponding descriptor.
stream_content	="0x01": Valid (video) ≠"0x01": The corresponding descriptor is invalid
component_type	Judged as the video component type of the corresponding component (for information about the component type, see Table 31-75).
component_tag	This is the component tag value that is unique within the corresponding program, which can be used by relating it to the component tag value of the PMT stream identifier.
ISO_639_language_code	For other than "jpn ("0x6A706E")," the character code placed later is handled as "jpn."
[text_char]	A value of 16 bytes (8 full-width characters) or less is judged as the component description. If this field is omitted, the component description is judged as the default one. For information about the default video type name, see Section 4.4.1 of the receiver specification document.

[Other Items that are Worth Special Mention]

- The component description may not match the actual component due to the mode change during the event.

  (For component_type of this descriptor, the representative component type of the corresponding component is described, and this value should not be changed in real time when the mode is changed during the program.)
- component_type described in this descriptor is referred to in judging the default maximum_bit_rate if the digital copy control descriptor is omitted for the corresponding event (see Section 21.3.1).

31.4.2.3 Audio Component Descriptor

[Usage]

Describes information related to voice component streams that constitute events.

[Structure]

The structure of the audio component descriptor is shown in Table 31-77.

Table 31-77 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.26 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **Always send one for all the voice components including voice components used in the data broadcasting, etc. that events contain.**

⊙ **However, for low hierarchical ES for the purpose of decoding only if it is difficult to stably decode the high hierarchy in the hierarchical transmission, this descriptor is not placed, and it is not the target for the component selection or reservation recording, etc.**

⊙ **It is required to send at least one (the default ES) in the digital TV service and digital voice service.**

○ A component_tag value ranging from 0x10 to 0x2F is allocated to voice components that can be individually selected, and a value other than the above is allocated to components that are not the target for the individual selection for use in the data broadcasting, etc.

The sending operation rule for each field is shown in Table 31-78.

Table 31-78 Sending Operation Rule for Audio Component Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xC4."
descriptor_length	Describe the descriptor length of the audio component descriptor. The maximum value is not stipulated.
stream_content	Describe "0x02" (voice).
component_type	Describe the voice component type for the corresponding component. For information about voice component types, values sent at the beginning of the BS digital broadcasting in Table 6-43, Part 2 of ARIB STD-B10 are shown in Table 31-79.
component_tag	Describe the component tag value that is unique within the corresponding program. For information about allocating the component tag value, see Section 14.2.
stream_type	Describe "0x0F." (ISO/IEC13818-7 voice)
simulcast_group_tag	Describe the simulcast group identifier. The same number is allocated to components with the simulcast.
ES_multi_lingual_flag	Describe the ES multi-language flag. Describe '1' for dual mono and bilingual multiplex.
main_component_flag	Describe the main component flag. If the voice component is the main voice, describe '1.'
quality_indicator	Describe the voice quality display.
sampling_rate	Describe the sampling frequency for the corresponding voice component. For information about the sampling frequency, values sent at the beginning of the BS digital broadcasting in Table 6-45, Part 2 of ARIB STD-B10 are shown in Table 31-80.
ISO_639_language_code	Describe the (primary) voice component language name (ISO639-2/ISO8859-1. See Table 31-82).
ISO_639_language_code_2	Describe the secondary voice component language name in the ES multi-lingual mode (ISO639-2/ISO8859-1. See Table 31-82).
[text_char]	Describe the voice type name with 16 bytes (8 full-width characters) or less. For dual monaural in 1ES, describe the names by inserting 1byte line feed code between each voice type name, with 33 bytes (16 full-width characters) or less in total. e.g.) In baseball relay, "general live[CR]third-base side live" If this description is the default character strings, this field can be omitted. For information about the default character strings, see Section 4.4.1 of the receiver specification document.

Table 31-79 component_type Values Specified at the beginning of BS Digital Broadcasting

component_type (Component Type)	Meaning
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 31-80 sampling_rate Values Specified at the beginning of BS Digital Broadcasting

sampling_rate (Sampling Frequency)	Meaning
101	32kHz
111	48kHz

[Reception Processing Criteria]

- It is possible to judge the voice component type that constitutes events, and the component description can be used during the voice component selection.
- Only voice component whose component_tag value is set up between 0x10 and 0x2F are the individual selection target. Voice components whose component_tag value is set up as other than the above are not the individual selection target, and should not be the target for the component selection function, etc.

The reception processing criteria for each field are shown in Table 31-81.

Table 31-81 Reception Processing Criteria for Audio Component Descriptor

Reception Processing for Each Field	
descriptor_tag	If it is "0xC4," the corresponding descriptor is judged as the audio component descriptor.
descriptor_length	Judged as the descriptor length of the corresponding descriptor.
stream_content	="0x02": Valid (voice) ≠"0x02": Judged that the corresponding descriptor is invalid.
component_type	Judged as the voice component type of the corresponding component (for information about the voice component type, see Table 31-79).
component_tag	This is the component tag value that is unique within the corresponding program, which can be used by relating it to the component tag value of the PMT stream identifier.
stream_type	="0x0F": Valid (ISO/IEC13818-7 voice) ≠"0x0F": Judged that the corresponding descriptor is invalid.
simulcast_group_tag	It is judged that components with the same number perform the simulcast.
ES_multi_lingual_flag	='1': For dual mono, it is judged that bilingual multiplex is performed. ='0': It is judged that bilingual multiplex is not performed.
main_component_flag	='1': It is judged that the voice component is the main voice. ='0': It is judged that the voice component is not the main voice.
quality_indicator	Can judge the voice quality mode.
sampling_rate	Judged as the sampling frequency of the corresponding voice component (for information about the sampling frequency, see Table 31-80).
ISO_639_language_code	Judged as the (primary) voice component language name.
ISO_639_language_ code_2	Judged as the secondary voice component language name in the ES multi-lingual mode.
[text_char]	A value of 33 bytes (16 full-width characters) or less is judged as the voice type name. If it contains a line feed code, it is judged that two voice types are separated and described before and after the line feed code. If it contains multiple line feed codes, it is judged that the second line feed code and the subsequent bytes are invalid. It is judged as "primary voice type name"[CR]"secondary voice type name." If this field is omitted, the voice type name is judged as the default one. For information about the default voice type name, see Section 4.4.1 of the receiver specification document.

[Other Items that are Worth Special Mention]

○ If a component description exists, it has the priority over the language code.

○ When the component type is dual mono, the component description is described with "primary voice" and "secondary voice" in this order.

○ The component description may not match the actual component due to the mode change during the event.

(For component_type of this descriptor, the representative component type of the corresponding component is described, and this value should not be changed in real time when the mode is changed during the program.)

○ For language names described in ISO_639_language_code and ISO_639_language_code_2, one of the values shown in Table 31-82 is set up.

Table 31-82　Language Name Described in ISO_639_language_code and ISO_639_language_code_2 of 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 language - Languages other than the above - Unknown language - In case it is not possible to decide on a language because multiple languages exist at the same time

31.4.2.4 Data Contents Descriptor

The sending operation for the corresponding descriptor is described in Part 1 Volume 3.

31.4.2.5 Content Descriptor

[Usage]

Describes information related to event genres.

[Structure]

The structure of the content descriptor is shown in Table 31-83.

Table 31-83 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**
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.4 of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **Optionally send one content descriptor per program.**

The sending operation rule for each field is shown in Table 31-84.

Table 31-84 Sending Operation Rule for Content Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x54."
descriptor_length	Describe the descriptor length of the content descriptor. Stipulate the maximum loop number as 7 (content_nibble specification: 3, user_nibble specification: 4). That is, the maximum value of the descriptor length is 14 bytes.
[loop]	
content_nibble_level_1	Describe the general category of the program genre. To indicate the program characteristics, specify "0xE."
content_nibble_level_2	Describe the main category of the program genre. In case of content_nibble_level1="0xE," describe the type in the program characteristics code table. See [Appendix A].
user_nibble **user_nibble**	Only if content_nibble_level1="0xE" is specified, describe the program characteristics. Otherwise, specify "0xFF." If content_nibble="0xE0" (program attached information for the BS digital broadcasting) is specified, follow [Appendix B] to describe.

[Reception Processing Criteria]

- ○ It can judge the event genre, and based on the information, it can be used for display/genre search, etc.
- ○ The program characteristics can be obtained.

The reception processing criteria for each field are shown in Table 31-85.

Table 31-85 Reception Processing Criteria for Content Descriptor

<table>
<tr><th colspan="2">Reception Processing Criteria for Each Field</th></tr>
<tr><td>descriptor_tag</td><td>If it is "0x54," the corresponding descriptor is judged as the content descriptor.</td></tr>
<tr><td>descriptor_length</td><td>The end of data described in this descriptor can be judged.
≤14byte: Valid
>14byte: The extra description over 14 bytes can be ignored.</td></tr>
<tr><td>[loop]</td><td></td></tr>
<tr><td>content_nibble_level_1</td><td>Judged as the general category of the program genre, which can be used for search, display, etc. together with the main category of the program genre. However, if this value is "0xE," it is not judged as a genre (judged that some program characteristic is specified in the subsequent user_nibble).</td></tr>
<tr><td>content_nibble_level_2</td><td>Judged as the main category of the program genre, which can be used for search, display, etc. together with the general category of the program genre. In case of content_nibble_level1="0xE," judged as the type in the program characteristics code table (see [Appendix A]).</td></tr>
<tr><td>user_nibble</td><td rowspan="2">Only in case of content_nibble_level1="0xE," judged as the program characteristics.
In case of content_nibble="0xE0," judged as the program attached information for the BS digital broadcasting. For information about the contents of the program attached information, see [Appendix B].
In case of content_nibble_level1≠"0xE," the value in this field is ignored no matter what it may be. If content_nibble_level2 (type in the program characteristics code table) is added for content_nibble_level1="0xE" (program characteristics indication) by way of download, etc., it is judged according to the added program characteristics code table.</td></tr>
<tr><td>user_nibble</td></tr>
</table>

[Other Items that are Worth Special Mention]

None.

31.4.2.5.1 Detailed Operation for Content Descriptor

- The content descriptor indicates the event genre information with content_nibble_level_1 (general category) and content_nibble_level_2 (main category).
- The maximum number of genre code loops is 7 (content_nibble specification: 3, user_nibble specification: 4).
- The genre code table at the beginning of the broadcasting is shown in [Appendix A]. The genre code table may be extended by way of download, etc. in the future, but in that case, the genre contents (description contents) already defined in [Appendix A] are not changed or deleted (the code is not changed as well). In other words, only addition is made, if necessary, to parts where the description contents are blank fields in the genre code.
- With the addition of the genre code, if a situation arises where the receiver knows the genre name in content_nibble_level_1 but does not know the genre name in content_nibble_level_2, it can be judged that only the genre specified in the general category (content_nibble_level_1) is valid.
- In the [Appendix A] table, programs defined as "other" have two meanings for both the general category and the main category: "a program in a different genre that does not apply to prescribed genres" and "a program for which the genre can not be specified clearly with aspects that apply to every genre."
- At the beginning of the BS digital broadcasting, for user_nibble, only the specification of the program attached information of the BS digital broadcasting shown in [Appendix B] is operated. In this case, "0xE0" should be specified for content_nibble.
- If content_nibble_level1 is other than "0xE," both user_nibble should be "0xF." That is, the genre and the program characteristics can not be specified at the same time for one loop.
- Because content_nibble_level1="0xE" is a general category that indicates identifying based on what type of program characteristics table the encoding is performed in the subsequent user_nibble with content_nibble_level2, it is not used as a genre name, and this value should be excluded from the search target for the genre search function, etc. in the receiver.
- In the future, a completely different program characteristics code table may be added for user_nibble. In that case, a category called "0xEX" (where X is 1 to F) to identify the type of the code table is added to content_nibble at the same time. Therefore, at the beginning of the BS digital broadcasting, content_nibble_level2≠"0x0" should not be specified with content_nibble_level1="0xE" (the receiver judges this specification as invalid), but it may be added by way of download, etc. in the future.

31.4.2.6 Digital Copy Control Descriptor

[Usage]

Placed to indicate the control information related to the digital copy and the analog copy or to describe the maximum transmission rate for the whole corresponding service or event.

[Structure]

The structure of the digital copy control descriptor is shown in Table 31-86.

Table 31-86 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==01|| copy_control_type==11)){		
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==01||copy_control_type==11) {		
APS_control_data	**2**	**bslbf**
}		
else{		
reserved_future_use	**2**	**bslbf**
}		
if(maximum_bitrate_flag==1){		
maximum_bitrate	**8**	**uimsbf**
}		
}		
}		
}		

[Meaning of Each Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.23 and Appendix F of Part 2 of ARIB STD-B10 are conformed.

[Sending Operation Rule]

⊙ **If the whole corresponding service or event is the digital copy control target and the analog copy control target at the reservation time, it should always be placed. However, to stipulate for each component, only components with the component_tag value ranging from 0x40 to 0x7F can be placed.**

- ○ If the maximum transmission rate of the corresponding service is outside of the default maximum bit rate range stipulated in Table 21-1-1 and 21-1-2, it should always be placed.

The sending operation rule for each field is shown in Table 31-87.

Table 31-87 Sending Operation Rule for Digital Copy Control Descriptor (EIT)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xC1."
descriptor_length	Describe the descriptor length of the digital copy control descriptor.
digital_recording_control_data	This 2bit field indicates the information that controls the copy generation, and is encoded according to Table X4-Y1, X4-Y2, and X4-Y3.
maximum_bit_rate_flag	If the maximum transmission rate of the corresponding service is not described, describe '0.' If the maximum transmission rate of the corresponding service is described, describe '1.'
component_control_flag	In case of '1,' the field after the component control length becomes valid, and the digital copy control information is stipulated for each component that constitutes the program. In case of '0,' the digital copy control information is stipulated for the whole program, and no field exists after the component control length.
copy_control_type	This 2bit field indicates the information about the format that controls the copy generation, and is encoded according to Table X4-Y1, X4-Y2, and X4-Y3.
APS_control_data	This is the analog output copy control information. This 2bit field indicates the information that controls the analog output copy when copy_control_type is '01' and "11," and is encoded according to Table X4-Y1, X4-Y2, and X4-Y3.
maximum_bit_rate	Describe the maximum transmission rate.

In addition, each bit is detailed below.

Note that the specifications that control each output terminal with the digital copy control descriptor change according to the service contents.

[Consideration in Operation (Common to Each Service)]

Sending operation should not be performed in the combination that is not stipulated in Table X4-Y1, X4-Y2, or X4-Y3.

For CGMS-A, if copy_control_type is "01" and "11," digital_recording_control_data and APS_control_data are copied to the area specified by CGMS-A.

If the corresponding descriptor has the copy control information, a proper copyright processing is performed on the analog video output, fast digital interface output, and digital voice output in the reception processing for output. CGMS-A and MACROVISION are used for the analog video output, DTCP for the fast digital interface output, and SCMS for the digital voice output. For more information about the processing, see each specification and reference.
It is necessary to reflect the information correctly to the copyright display bit of the channel status specified in IEC 60958, and the category code.

In addition, if there is a digital copy control descriptor, the category code is "001_0000L."

Available for copy without restriction: Set the copyright information bit to 1.

Available for copy only for one generation: Set the copyright information bit and the Lth bit of the category code to 0.

Copy prohibited: Set the copyright information bit to 0 and the Lth bit of the category code to 1.

Note that if the corresponding descriptor is not described, it is treated as copy free.

Table X4-Y1 Operation of Descriptor when Digital TV Service and Temporary Video Service are Performed

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control[*3]</th><th colspan="3">Operation for Each Descriptor</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th></tr>
<tr><td>Available for copy without restriction</td><td>Available for copy without restriction</td><td rowspan="5">01</td><td>00</td><td>Don’t care</td></tr>
<tr><td rowspan="2">Copy prohibited[*1]</td><td>Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.</td><td rowspan="2">11</td><td>00</td></tr>
<tr><td>Copy prohibited[*4]</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Available for copy only for one generation[*2]</td><td>Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.</td><td rowspan="2">10</td><td>00</td></tr>
<tr><td>Copy prohibited after copying for one generation[*4]</td><td>Other than 00</td></tr>
</table>

*1: In case of the fast digital interface output, the Copy Never processing of the Source Function stipulated in DTCP is performed. However, if only voice streams are output in the IEC60958 conformant format, the No More Copies processing is performed.

*2: In case of the fast digital interface output, the Copy One Generation processing of the Source Function stipulated in DTCP is performed.

*3: Applied to the composite and component video outputs. Cases where received video signals are output after the format conversion are also included. The Macrovision control is applied to the 480I composite and component video signals.

*4: In the analog video output, the output processing is performed with parameters specified by Macrovision and specified APS_control_data.

[Consideration in Operation (Digital TV Service and Temporary Video Service)]

If service_type described in the NIT service list descriptor is "0x01" (digital TV service) and "0xA1" (temporary video service), encoding according to Table X4-Y1 should be performed.

Table X4-Y2 Operation of Descriptor when Digital Voice Service and Temporary Voice Service are Performed

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control[*4]</th><th colspan="3">Operation for Each Descriptor</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th></tr>
<tr><td>Available for copy without restriction. [*1]</td><td rowspan="2">Available for copy without restriction</td><td>01</td><td rowspan="2">00</td><td rowspan="2">Don’t care</td></tr>
<tr><td>Available for copy without restriction.</td><td>11</td></tr>
<tr><td rowspan="2">Copy prohibited. [*2, *1]</td><td>Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.</td><td rowspan="2">01</td><td rowspan="4">11</td><td>00</td></tr>
<tr><td>Copy prohibited [*5]</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy prohibited. However, MPEG_TS can not be output [*6]</td><td>Copy prohibited. However, the macrovision is not added. Therefore, available for copy only with traditional analog input analog recording devices.</td><td rowspan="2">11</td><td>00</td></tr>
<tr><td>Copy prohibited [*5]</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Available for copy only for one generation.[*3, *1]</td><td>Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.</td><td rowspan="2">01</td><td rowspan="4">10</td><td>00</td></tr>
<tr><td>Copy prohibited after copying for one generation [*5]</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Available for copy only for one generation. However, MPEG_TS can not be output [*6]</td><td>Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.</td><td rowspan="2">11</td><td>00</td></tr>
<tr><td>Copy prohibited after copying for one generation [*5]</td><td>Other than 00</td></tr>
</table>

*1: Output is currently prohibited for MPEG-TS in the serial interface of high speed digital interface. The related descriptions can be found in 8.2 Functional Restriction for the Content Protection in Volume 8 of Part 1.

*2: In case of the fast digital interface output, the No More Copies processing of the AM824 audio Source Function stipulated in DTCP is performed.

*3: In case of the fast digital interface output, the Copy One Generation processing of the AM824 audio Source Function stipulated in DTCP is performed.

*4: Applied to the composite and component video outputs. Cases where received video signals are output after the format conversion are also included. The Macrovision control is applied to the 480I composite and component video signals.

*5: In the analog video output, the output processing is performed with parameters specified by Macrovision and specified APS_control_data.

*6: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Consideration in Operation (Digital Voice Service and Temporary Voice Service)]

If service_type described in the NIT service list descriptor is "0x02" (digital voice service) and "0xA2" (temporary voice service), encoding according to Table X4-Y2 should be performed.

Table X4-Y3 Operation of Descriptor when Data Service, Temporary Data Service, and Bookmark List Data Service are Performed

<table>
<tr><th rowspan="2">Digital Copy Control</th><th rowspan="2">Analog Copy Control*3</th><th colspan="3">Operation for Each Descriptor</th></tr>
<tr><th>copy_control_type</th><th>digital_recording_control_data</th><th>APS_control_data</th></tr>
<tr><td>Available for copy without restriction</td><td>Available for copy without restriction</td><td>01/11</td><td>00</td><td>Don’t care</td></tr>
<tr><td rowspan="2">Copy prohibited *1</td><td>Copy prohibited. However, the macrovision is not added.
Therefore, available for copy only with traditional analog input analog recording devices.</td><td rowspan="2">01</td><td rowspan="4">11</td><td>00</td></tr>
<tr><td>Copy prohibited *4</td><td>Other than 00</td></tr>
<tr><td rowspan="2">Copy prohibited. However, MPEG_TS can not be output *5</td><td>Copy prohibited. However, the macrovision is not added.
Therefore, available for copy only with traditional analog input analog recording devices..</td><td rowspan="2">11</td><td>00</td></tr>
<tr><td>Copy prohibited *4</td><td>Other than 00</td></tr>
<tr><td>Available for copy only for one generation*2</td><td>Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.</td><td>01</td><td>10</td><td>00</td></tr>
</table>

	Copy prohibited after copying for one generation *4			Other than 00
Available for copy only for one generation. However, MPEG_TS can not be output *5	Available for copy only for one generation. However, the macrovision is not added. Therefore, available for copy with traditional analog recording devices.	11		00
	Copy prohibited after copying for one generation *4			Other than 00

*1: In case of the fast digital interface output, the Copy Never processing of the Source Function stipulated in DTCP is performed. However, if only voice streams are output in the IEC60958 conformant format, the No More Copies processing is performed.

*2: In case of the fast digital interface output, the Copy One Generation processing of the Source Function stipulated in DTCP is performed.

*3: Applied to the composite and component video outputs. Cases where received video signals are output after the format conversion are also included. The Macrovision control is applied to the 480I composite and component video signals.

*4: In the analog video output, the output processing is performed with parameters specified by Macrovision and specified APS_control_data.

*5: In the case of IP interface, output is prohibited for MPEG_PS, too.

[Consideration in Operation (Data Service, Temporary Data Service, and Bookmark List Data Service)]

If service_type described in the NIT service list descriptor is "0xC0" (data service), "0xA3" (temporary data service), and "0xAA" (bookmark list data service), encoding according to Table X4-Y3 should be performed.

[Reception Processing Criteria]

The reception processing criteria for each field are shown in Table 31-90.

Table 31-90 Reception Processing Criteria for Digital Copy Control Descriptor (EIT)

Reception Processing Criteria for Each Field	
descriptor_tag	= "0xC1": Judged that the corresponding descriptor is the digital copy control descriptor.
descriptor_length	Judged as the descriptor length of the digital copy control descriptor.
digital_recording_control_data	This 2bit field indicates the information that controls the copy generation, and is decoded according to Table X4-Y1, X4-Y2, and X4-Y3.
maximum_bit_rate_flag	='0': Judged that the maximum transmission rate of the corresponding service is within the default maximum bit rate range stipulated in Table 21-1-1 and 21-1-2. ='1': Judged that the maximum transmission rate of the corresponding service is hereinafter described.

component_control_flag	='0': Judged as no digital copy control for each component. ='1': Judged that the digital copy control for each component is performed.
copy_control_type	This 2bit field indicates the information about the format that controls the copy generation, and is decoded according to Table X4-Y1, X4-Y2, and X4-Y3.
maximum_bit_rate	Judged as the maximum transmission rate value for the corresponding service.

[Other Items that are Worth Special Mention]

The analog output signal copy control conforms to separate contracts between the corresponding broadcasting operator and Macrovision, etc., so careful consideration will be necessary in the future as well.

Reception processing that is not stipulated in Table X4-Y1, X4-Y2, or X4-Y3 is shown below.

□ Digital TV service and temporary video service

In case of copy_control_type=00/10/11:

- Outputs from the analog video output, digital voice output, and fast digital interface output are prohibited.

In case of copy_control_type=01 and digital_recording_control_data=01:

- Set "01" for EMI of the fast digital interface, and perform the same processing as copy_control_type=01 and digital_recording_control_data=11 for other processing.

□ Digital voice service, temporary voice service, data service, temporary data service, and bookmark list data service

In case of copy_control_type=00/10:

- Outputs from the analog video output, digital voice output, and fast digital interface output are prohibited.

In case of copy_control_type=01 and digital_recording_control_data=01:

- Set "01" only for EMI of the fast digital interface, and perform the same processing as copy_control_type=01 and digital_recording_control_data=11 for other processing.

In case of copy_control_type=11 and digital_recording_control_data=01:

- Perform the same processing as copy_control_type=11 and digital_recording_control_data=11.

31.4.2.7 Parental Rate Descriptor

[Usage]

Describes the age limit for viewing the event.

[Structure]

The structure of the parental rate descriptor is shown in Table 31-91.

Table 31-91 Structure of Parental Rate Descriptor

Data Structure	bit	Identifier
parental_rating_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
country_code	**24**	**bslbf**
rating	**8**	**uimsbf**
}		
}		

[Meaning of Field]

For meanings of each field, the stipulation in Section 6.2 of Part 1 and the definition in Section 6.2.12 of Part 2 of ARIB STD-B10 are conformed. However, the encoding of rating is operated in a different way from ARIB STD-B10, so caution should be taken. This is shown in Table 31-92.

Table 31-92 Parental Rate Encoding

Age Limit Rate	Definition
0x00	Not defined (no specification)
0x01 to 0x11	Minimum age = rating + 3
0x12 to 0xFF	Defined by operators

[Sending Operation Rule]

○ Place the corresponding descriptor for programs that you want to set up the parental rate out of programs that chargeable broadcasting operators broadcast.

The sending operation rule for each field is shown in Table 31-93.

Table 31-93 Sending Operation Rule for Parental Rate Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0x55."
descriptor_length	Describe the descriptor length of the parental rate descriptor. The maximum value is not stipulated.
[loop]	Only one loop.
country_code	Describe "JPN("0x4A504E")."
rating	Describe the recommended minimum age of viewers.

[Reception Processing Criteria]

○ It is possible to judge the age limit for viewing the event and limit the viewing with the code number, etc.

The reception processing criteria for each field are shown in Table 31-94.

Table 31-94 Reception Processing Criteria for Parental Rate Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0x55," the corresponding descriptor is judged as the parental rate descriptor.
descriptor_length	Judged as the descriptor length of the corresponding descriptor.
[loop]	Only the first loop is valid. If there exists the second and subsequent loops, they are judged as invalid.
country_code	Other than "JPN" is judged as invalid.
rating	Judged as the recommended minimum age of viewers (see Table 31-92).

[Other Items that are Worth Special Mention]

None.

31.4.2.8 CA Contract Information Descriptor

[Usage]

Describes the verification information related to whether viewing (recording) reservation is available or not, etc. for events that contain billing target components.

[Structure]

For information about the structure of the CA contract information descriptor, see Table 31-62.

[Meaning of Each Field]

For meanings of each field, see Table 31-63.

[Sending Operation Rule]

⊙ **It should always be placed and sent for each different billing unit (ECM).**

However, for EIT, it can be omitted only if it is free_CA_mode=1 and all the same information as the corresponding descriptor(s) placed in SDT is placed.

- ○ In case of free_CA_mode=0, the corresponding descriptor with CA_unit_id=0x1 should not be placed.
- ○ In case of free_CA_mode=1, the corresponding descriptor with CA_unit_id=0x1 should always be placed.
- ○ Values should not be changed once they are set up if possible.

The sending operation rule for each field is shown in Table 31-95.

Table 31-95 Sending Operation Rule for CA Contract Information Descriptor (EIT)

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xCB."
descriptor_length	Describe the descriptor length of the corresponding descriptor. The maximum value is 209.
CA_system_id	Describe the conditional access method identifier. Values of identifiers other than those applied to the BS digital broadcasting should not be described.
CA_unit_id	Describe the billing unit identifier. The consigned broadcasting operator allocates this uniquely within the corresponding event.
num_of_component	Describe the number of target components for the corresponding billing unit. The maximum value is 12.
[component_tag]	Describe the tag value of the target component for the corresponding billing unit.
contract_verification_info_length	Describe the contract verification information length. The maximum value is 172.
[contract_verification_info]	Describe the contract verification information.
fee_name_info	Describe "0."
[fee_name]	Not used.

[Reception Processing Criteria]

- If one of the followings is true, it is judged that the contract verification information in EIT is invalid.
  - A corresponding descriptor with free_CA_mode=0 and CA_unit_id=0x1 exists
  - A corresponding descriptor with free_CA_mode=1 and CA_unit_id=0x1 does not exist, except for cases where the described contents in SDT is free_CA_mode=1 and a valid corresponding descriptor is placed (that is, except for cases where the CA contract information descriptor in EIT is omitted because it is the same as that in SDT)
- If the described contents in EIT are valid and different from those in SDT, those in EIT have the priority.
- If the described contents in EIT are invalid, reservation is not allowed.
- In case of event sharing, the billing judgment including free_CA_mode should be all performed by the description of the reference destination.

The reception processing criteria for each field are shown in Table 31-96.

Table 31-96 Reception Processing Criteria for CA Contract Information Descriptor (EIT)

Reception Processing Criteria for Each Field	
descriptor_tag	="0xCB": Judged that the corresponding descriptor is the CA contract information descriptor.
descriptor_length	Judged as the descriptor length of the CA contract information descriptor.
CA_system_id	= Identifier value applied to BS: Indicates the corresponding conditional access method identifier. = Other value: Judged as invalid.
CA_unit_id	=0x0: Judged as invalid. =0x1: Judged as the billing unit identifier including the default ES group.
num_of_component	=0: Invalid ≤12: Indicates the number of target components for the corresponding billing unit. >12: Invalid
[component_tag]	Indicates the tag value of the target component for the corresponding billing unit.
contract_verification _info_length	≤172: Contract verification information length >172: Invalid.
[contract_verification _info]	Indicates the contract verification information.
fee_name_info	Judged as invalid for values other than 0.
[fee_name]	Judged as invalid.

[Other Items that are Worth Special Mention]

- None.

31.4.2.9 Event Group Descriptor

[Usage]

Describes the grouping information of the same events in shared events, link information in event relay, and movement source information when events are moved across services.

[Structure]

The structure of the event group descriptor is shown in Table 31-97.

Table 31-97 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**
}		
for(i=0 ;i< N ; i++){		
private_data_byte	**8**	**uimsbf**
}		
}		

[Meaning of Each Field]

The meaning of each field in the event group descriptor is shown in Table 31-98.

Table 31-98 Meaning of Each Field in Event Group Descriptor

Meaning of Each Field	
group_type	Indicates the event group type. For information about the type, see Table 31-99.
event_count	The subsequent event_id loop number
service_id	Associated service identifier
event_id	Associated event identifier
[private_data_byte]	Not defined

Table 31-99 Group Types Specified at the beginning of BS Digital Broadcasting

group_type	Type Name
0x1	Shared event
0x2	Event relay
0x3	Event movement

The meanings of service_id and event_id differ for each type as follows.

○ Shared event (a method to group multiple services to one program)

Describe the required number of all other (reference source) service_id including the own service_id for one of multiple services (reference destination) including event_id. Describe service_id and event_id for the reference destination for services handled as the reference source.

○ Event relay (induce an event to another)

Place the corresponding descriptor for which service_id and event_id of the relay destination are described in the relay source service.

○ Event movement (event movement associated with the change of organization channels)

Place the corresponding descriptor in EIT of the movement destination event, and describe service_id and event_id of the movement source event.

[Sending Operation Rule]

⊙ Optionally send it as necessary.

○ It is possible to place multiple event group descriptors. However, if they have the same group_type value, multiple event group descriptors should not be placed within an event.

The sending operation rule for each field is shown in Table 31-100.

Table 31-100 Sending Operation Rule of Event Group Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xD6."
descriptor_length	Describe the descriptor length of the event group descriptor. The maximum value is not stipulated.
group_type	Describe the group type.
event_count	Describe the loop number for the subsequent event_id loop.
service_id	Describe the associated service identifier.
event_id	Describe the associated event identifier.
[private_data_byte]	Not described.

[Reception Processing Criteria]

○ It can be judged that there exists an event related to the corresponding event and it can be used. (Shared event, event relay, event movement)

The reception processing criteria for each field are shown in Table 31-101.

Table 31-101 Reception Processing Criteria for Event Group Descriptor

	Reception Processing Criteria for Each Field
descriptor_tag	If it is "0xD6," the corresponding descriptor is judged as the event group descriptor.
descriptor_length	The end of data described in this descriptor can be judged.
group_type	Can judge the group type.
event_count	Judged as the loop number for the subsequent event_id loop.
service_id	Judged as the associated service identifier.
event_id	Judged as the associated event identifier.
[private_data_byte]	The value in this field is ignored no matter what value it may be.

[Other Items that are Worth Special Mention]

For more information about the event group descriptor, see Chapter 17 (Shared Event) and Chapter 24 (Event Relay).

The event movement describes the originally scheduled service_id and event_id in EIT of the changed event with the corresponding descriptor, if the service to broad cast (organization channel) for a scheduled program is changed within the same media type service group in the same broadcaster before broadcasting. The broadcasting never occurs earlier than the originally scheduled event.

(Specific Example)

○ Original broadcasting schedule

September 20 15:00 service_id=A event_id=01 "Academy Award"

○ Changed

September 20 15:00 service_id=A event_id=02 "Live Diet Broadcasting"

September 20 15:00 service_id=B event_id=03 "Academy Award"

In such a case, a corresponding descriptor for which the movement source event (15:00, service_id=A, event_id=01, "Academy Award") is described is placed in the movement destination event (15:00, service_id=B, event_id=03, "Academy Award").

31.4.2.10 Component Group Descriptor

[Usage]

Defines and identifies the combination of components in the event. Used in multi-view TV (MVTV), etc.

[Structure]

The structure of the component group descriptor is shown in Table 31-102.

Table 31-102 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_bi t_rate_flag==1){		
total_bit_rate	**8**	**uimsbf**
}		
text_length	**8**	**uimsbf**
for (i = 0;i< text_length ;i++) {		
text_char	**8**	**uimsbf**
}		
}		
}		

[Meaning of Each Field]

The meaning of each field is shown in Table 31-103

Table 31-103 Meaning of Component Group Descriptor

Meaning of Each Field	
component_group_type	This 3bit field indicates the component group type. '000': Multi-view TV service '001'－'111': Reserved for the future use
total_bit_rate_flag	Indicates the description state of the total bit rate in the component group in the event. '0': The total bit rate field in the component group does not exist in the corresponding descriptor. '1': The total bit rate field in the component group exists in the corresponding descriptor.
num_of_group	Indicates the number of component groups in the event.
component_group_id	Describe the component group identifier. The identifier value is as follows: "0x0": Main group "0x1"-"0xF": Sub group
num_of_CA_unit	Indicates the number of billing/non-billing units in the component group.
CA_unit_id	Indicates the billing unit identifier that the component belongs to. The identifier value is as follows: 0x0: Non-billing unit group 0x1: Billing unit group including the default ES group
num_of_component	Indicates the number of components that belong to the corresponding component group and the billing/non-billing units indicated by the previous CA_unit_id.
component_tag	Indicates the value of the component tag that belongs to the component.
total_bit_rate	Indicates the total bit rate of components in the component group.
text_length	Indicates the byte length of the subsequent component group description.
[text_char]	Describe the description about the component group.

[Sending Operation Rule]

⊙ **When a multi-view TV service is provided, always send it with component_group_type=‘000.’**

⊙ **Low hierarchical ES for the purpose of decoding only when it is difficult to stably decode the high hierarchical in the hierarchical transmission should not be placed.**

The sending operation rule for each field is shown in Table 31-104.

Table 31-104 Sending Operation Rule for Component Group Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xD9."
descriptor_length	Describe the descriptor length of the corresponding descriptor. The maximum value is not stipulated.
component_group_type	Indicates the component group type. "000": Multi-view TV
total_bit_rate_flag	=‘0’: All total bit rates in the group in the event are within the default stipulated in Section 21.3.1. =‘1’: One of total bit rates in the group in the event exceeds the default stipulated in Section 21.3.1.
num_of_group	Describe the number of component groups in the event. Up to 3 for MVTV.
component_group_id	Describe the component group identifier. Allocate "0x00" to the main group. The consigned broadcasting operator allocates a value unique within the event to each sub group.
num_of_CA_unit	Describe the number of billing/non-billing units in the component group. The maximum value is 9. If there is no billing component included in the corresponding component group, specify "0x1."
CA_unit_id	Describe the billing unit identifier. The consigned broadcasting operator allocates this uniquely within the event.
num_of_component	Describe the number of components that belong to the corresponding component group and the billing/non-billing units indicated by the previous CA_unit_id. The maximum value is 12.
component_tag	Describe the value of the component tag that belongs to the component group.
total_bit_rate	Describe the total bit rate in the component group. However, in case of the default, describe "0x00."
text_length	Describe the byte length of the subsequent component group description. The maximum value is 16 (8 full-width characters).
[text_char]	Describe the description about the component group. In case of the default display character strings, this can be omitted.

[Reception Processing Criteria]

- By placing the component group descriptor with component_group_type='000,' it is judged that a multi-view TV service is provided in the corresponding event, which can be used for processing for each component group.

The reception processing criteria for each field are shown in Table 31-105.

Table 31-105 Reception Processing Criteria for Component Group Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	= "0xD9": It is judged that the corresponding descriptor is the component group descriptor.
descriptor_length	Judged as the descriptor length of the component group descriptor.
component_group_type	'000': Judged as the multi-view TV service.
total_bit_rate_flag	='0': Judged that the total bit rate of the group in the event is not described in the corresponding descriptor. ='1': Judged that the total bit rate of the group in the event is described in the corresponding descriptor.
num_of_group	Judged as the number of component groups in the event. If the value exceeds the maximum value in case it exists, it may be handled as the maximum value.
component_group_id	="0x00": Judged as the main group. ≠"0x00": Judged as the sub group.
num_of_CA_unit	Judged as the number of billing/non-billing units in the component group. If the value exceeds the maximum value, it may be handled as 9.
CA_unit_id	"0x0": Judged as the non-billing unit group. "0x1": Judged as the billing unit including the default ES group.
num_of_component	Judged as the number of components that belong to the corresponding component group and the billing/non-billing units indicated by the previous CA_unit_id. If the value exceeds the maximum value, it may be handled as 12.
component_tag	Judged as the component tag value that belongs to the component group, which can be used by relating it to the component tag value of the PMT stream identifier.
total_bit_rate	Judged as the total bit rate in the component group. However, in case of "0x00," it is judged as the default.
text_length	≤16 (8 full-width characters): Component group description length >16 (8 full-width characters): If the component group description length exceeds 16 (8 full-width characters), the extra description can be ignored.
[text_char]	Indicates the description about the component group. If omitted, it is judged as the default display character strings. Do not use the line feed code.

[Other Items that are Worth Special Mention]

○ The default ES group for each group should always be described in the component loop placed at the beginning of the CA_unit loop.

○ In the main group (component_group_id="0x0"):

- If the default ES group of the group is a non-billing target, the component loop with CA_unit_id="0x1" should not be set up.
- If the default ES group of the group is a billing target, the component loop with CA_unit_id="0x1" should always be set up and described.

○ In the sub group (component_group_id>"0x0"):

- If the default ES group of the group is a non-billing target, the component loop with CA_unit_id="0x0" should be set up and described.
- If the default ES group of the group is a billing target, the component loop with CA_unit_id≠"0x0" should be set up and described.
- n the case that the CA_unit_id="0x1" component loop is not described in the main group, it should not be described.

31.4.2.11 Series Descriptor

[Usage]

Used to identify the series program.

[Structure]

The structure of the series descriptor is shown in Table 31-106.

Table 31-106 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**
}		
}		

[Meaning of Each Field]

The meaning of each field is shown in Table 31-107.

Table 31-107 Meaning of Each Field in Series Descriptor

Meaning of Each Field	
series_id	Identifier to identify the series uniquely. It is attached so that it is unique within multiple services that belong to the same media type in the same broadcaster in BIT.
repeat_label	Number of rebroadcasting. If the broadcasting period of the series overlaps with that of rebroadcasting it, repeat_label of the rebroadcasting program is set to 0x1. If there is yet another rebroadcasting, set repeat_label to 0x2. Rebroadcasting can be performed in up to 15 organization with the main broadcasting for the same series for the same period. Set 0x0 for the main broadcasting. The figure does not have a specific meaning. It is just a label to distinguish organizations.
program_pattern	Indicates the pattern of organization for the series program. This gives the guidance for when an event that belongs to the series appear next.
expire_date_valid_flag	Flag to indicate that the value of the subsequent expire_date is valid. If the value of the scheduled end day of the series is valid, set this value to '1.'
expire_date	Indicates the time limit until which the series is valid. The year/month/day is represented in MJD. Even if the last event is not recognized for some reason, the receiver recognizes that the series has ended when this date passes by.

episode_number	Indicates the number of episodes in the series for the program indicated by this descriptor. 1st to 4095th episode can be described. If the number of episodes exceeds this number, define another series. 0x000: Set this only if the number of episodes is not able to be defined in a series program.
last_episode_number	Indicates the total number of episodes in the corresponding series program. 1st to 4095th episode can be described. If the number of episodes exceeds this number, define another series. 0x000: Set this if the last episode is not defined.
series_name_char	Character codes to indicate the series name.

Table 31-108 Organization Pattern (program_pattern)

program_pattern	Type Name
0x0	Irregular (other than defined as 0x1-0x7)
0x1	Across-the-board program (every day, every weekday, only Saturdays and Sundays, etc.), organization that is several times a week
0x2	Organization that is once a week (every Tuesdays, etc.)
0x3	Organization that is once a month
0x4	Organization in which multiple episodes exist within a day.
0x5	Long program division
0x6~0x7	reserved

[Sending Operation Rule]

⊙ Place only one for a single event.

The sending operation rule for each field is shown in Table 31-109.

Table 31-109 Sending Operation Rule for Series Descriptor

[Sending Operation Rule for Each Field]	
descriptor_tag	Describe "0xD5."
descriptor_length	Describe the descriptor length of the series descriptor. The maximum value is not stipulated.
series_id	Describe the series identifier. It is attached so that it is unique within the services that belong to the same media type in the same broadcaster. The series identifier should not be allocated to another series for 100 days after the last broadcasting was provided.
repeat_label	Describe the organization class for rebroadcasting for the series.
program_pattern	Describe the organization pattern for the series event.
expire_date_valid_flag	If the value of expire_date is valid, describe '1.'
expire_date	Describe the time limit (year/month/day) until which the series is valid in MJD.
episode_number	Describe the number of episodes in the event series in binary. Normally, the value matches the number of episodes. If the number of episodes can not be defined in a series program, describe 0x000.
last_episode_number	Describe the total number of episodes in the series (the last episode number) in binary. If the total number of episodes is not defined, describe 0x000.
series_name_char	Describe the series name with 40 bytes (20 full-width characters) or less. Do not use the line feed code. If there is no series_name_char, the event name also becomes the series name.

[Reception Processing Criteria]

○ Can be used for the series program identifier for the corresponding program.

The reception processing criteria for each field are shown in Table 31-110.

Table 31-110 Reception Processing Criteria for Series Descriptor

Reception Processing Criteria for Each Field	
descriptor_tag	If it is "0xD5," the corresponding descriptor is judged as the series descriptor.
descriptor_length	Judged as the descriptor length of the corresponding descriptor.
series_id	Judged as the series identifier. (It is unique within the services that belong to the same media type in the same broadcaster.)
repeat_label	Judges the group for rebroadcasting for the series broadcasted during the same period.
program_pattern	Judged as the guidance for the organization pattern for the corresponding series.
expire_date_valid_flag	‘0’ = Judged that the value of the subsequent expire_date is invalid. ‘1’ = Judged that the value of the subsequent expire_date is valid.
expire_date	If the described date is valid, the series is judged as finished if the date has passed by at some point.
episode_number	Judged as the number of episodes for the corresponding event in the series.
last_episode_number	Judged as the total number of episodes in the series. If episode_number matches last_episode_number, the event is judged as the last episode for repeat_label for the corresponding series.
series_name_char	Judged as the series name. If this is not described, it is judged that the program name in the short event descriptor for the corresponding event is the series name.

[Other Items that are Worth Special Mention]

For information about the series operation, see Chapter 18 of this specification document.

32 Using Each station SI Tables

32.1 EIT(Event Information Table)

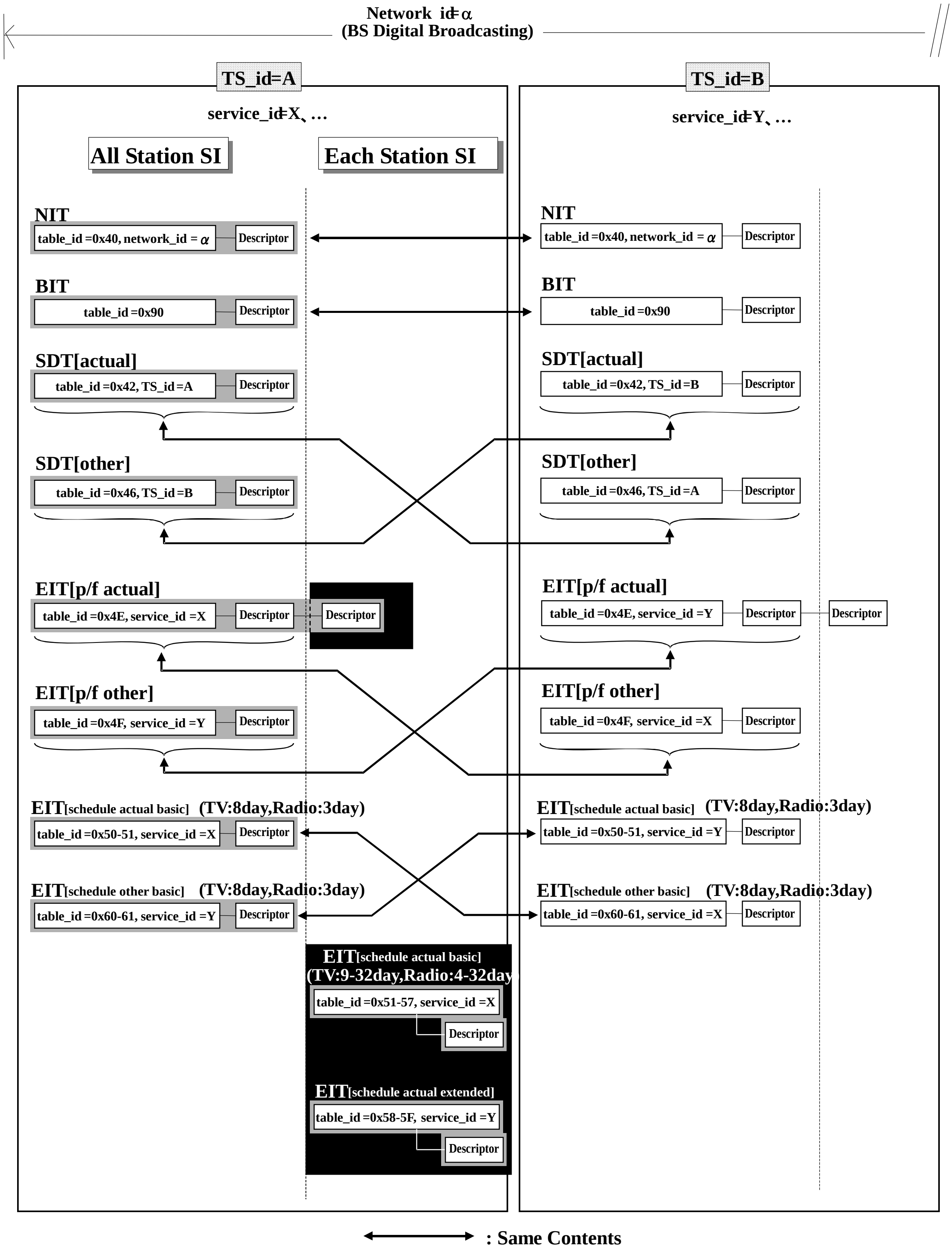


Figure 32-1 Scope of Discussion in Section 32.1 (EIT each station SI)[void part]

32.1.1 EIT[p/f] Structure and Operation

As each station SI, the EIT[p/f] is similar to the EIT in all station SI in is structure and operation. See Section 31.4.1.

32.1.2 Descriptors Placed Additionally in the EIT[p/f] (event loop)

The EIT operations defined in the all station SI are assumed as they are. In addition, the descriptors that are mentioned in this section can be placed additionally as each station SI.

32.1.2.1 Extended Event Descriptor

[Usage]

The Extended Event Descriptor presents detailed textual information about an event.

[Structure]

Table 32-1 describes the structure of the Extended Event Descriptor.

Table 32-1 Extended Event Descriptor Structure

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**
}		
}		

[Meaning of Each Field]

Field definitions follow the specifications of Section 6.2.7, Part 2, ARIB STD-B10 in accordance with the provision of Section 6.2, Part 1.

[Sending Operation Rule]

⊙ **Multiple instances of this descriptor can be optionally transmitted (up to 16).**

Table 32-2 lists the operational rules of field transmission.

Table 32-2 Operational Rules of Field Transmission for the Extended Event Descriptor (local-station EIT[p/f])

Operational rules of field transmission	
descriptor_tag	Write "0x4E."
descriptor_length	Designates an extended event descriptor length. No maximum is prescribed.
descriptor_number	Designates an extended event descriptor number used to split information for description. - Entry by item name - Item name written in excess of 200 bytes. In this case, the next field must be fed without initialization.
last_descriptor_number	Designates the last expended descriptor number of the descriptor associated.
ISO_639_language_code	Write "jpn ("0x6A706E")."
length_of_items	Designates an item length.
[item_loop]	
item_description_length	Write an item name length up to 16 bytes long (8 full-width characters).
[item_description_char]	Write an item name 16 bytes long (8 full-width characters).
item_length	Write an item description length up to 200 bytes long (100 full-width characters).
[item_char]	Write an item description up to 200 bytes long (100 full-width characters).
text_length	Write "0x00."
[text_char]	Not entered.

[Reception Processing Criteria]

○ The Extended Event Descriptor presents detailed textual information about an event and can be displayed as needed.

Table 32-3 describes the field reception processing criteria.

Table 32-3 Extended Event Descriptor (local-station EIT[p/f]) Reception Processing Criteria

Field reception processing criteria	
descriptor_tag	="0x4E": The descriptor is assumed an Extended Event Descriptor.
descriptor_length	Assumed the descriptor length of this descriptor.
descriptor_number	Signifies the end of information in comparison with the last Extended Event Descriptor number.
last_descriptor_number	Assumed the last Extended Event Descriptor number.
ISO_639_language_code	Character code "jpn" is assumed to follow "jpn ("0x6A706E")."
length_of_items	Designates an item length.
[item_loop]	
item_description_length	≤16 bytes (8 full-width characters): Item name length >16 bytes (8 full-width characters): That part of the item name length in exceeds of 16 bytes (8 full-width characters) is assumed invalid. =0: The item description pertaining to the item name with the last value of descriptor_number is assumed to have is assumed continuing.
[item_description_char]	Designates an item name.
item_length	≤200 bytes (100 full-width characters): Item description length >200 bytes (100 full-width characters): That part of the item description length in excess of 200 bytes (100 full-width characters) is assumed invalid.
[item_char]	item_description_length=0: The item description pertaining to the item name with the last value of descriptor_number is assumed continuing and is handled as a continuous character string covering both designation and calling states. In this situation, the field is not initialized.
text_length	
[text_char]	Assumed invalid.

[Other Items that are Worth Special Mention]

None.

32.1.2.1.1 Using Item Descriptions

Item descriptions are limited to a maximum of 100 characters (or 200 bytes). If an item description exceeds 200 bytes, it can be represented in two Extended Event Descriptors that are assigned two consecutive values of descriptor_number (Up to two Extended Event Descriptors can be used for a single item name.) In this case, the item name is not defined in the second descriptor but is simply transmitted, split into bytes. The status of item description specification and invocation in the first descriptor is taken over into strings in the second descriptor. This means that an item description can convey the solid meaning of a string when expressed in a maximum of 200 characters (or 400 bytes).

Compliance with certain rules is recommended in transmitting item descriptions from a receiver search and display viewpoint. These rules are listed below in the descending order of importance.

1) Transmit item descriptions to suit representation in a width of 20 characters.
2) Only if the item names written in item_description_char are "casting," "original and script," "director and direction" and "music," write the item descriptions that following to meet the following rules:
   - ○ Enclose the item names used in the item descriptions, such as "master of ceremony," with a set of parentheses listed in Table 32-5. Do not use these codes for any other purposes. Do not use parentheses double or nested.
   - ○ Use ‘,’ or ‘、’whose code is defied in Table 32-4 to delimit characters used in the item descriptions. Do not use this code for any other purposes.
   - ○ Use "Carriage Return (CR)" and "Space" to represent a broadcasting station’s intention to display.

     Example: [Master of ceremony] Hanako Yamada, Taro Yamada (CR)
     Jiro Yamada

Table 32-4 Code Definition of ‘,’ and ‘、’

Character	Character code set	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 32-5 Character Codes Used to Delimit Items In Item Descriptions

Left parenthesis	Character code set	GL	GR	Right parenthesis	Character code set	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

32.1.2.1.2 Using Item Name (Keywords)

Only one item is allowed per instance of an Extended Event Descriptor.

The item name length maximum is set to 8 characters or 16 bytes. Any character code listed as a keyword in Appendix C, such as "Announcement," may be used so the keyword can be converted to a pictorial character on the receiver or used for other purposes at the receiver’s option. Item names not listed in Appendix C may also be used (free-format description item), in which case an item name is encoded in each item name field as a string.

32.1.2.1.3 Using Extended Descriptions

Extended description lengths (text_length) are fixed at 0; extended descriptions are not used.

32.1.2.2 Hyper Link Descriptor

The scheme of transmitting this descriptor is described in Volume 3, Part 1.

32.1.3 Descriptors Inserted into EIT[schedule] (event loop)

Table 32-6 lists the descriptors that are placed in the EIT[schedule] (each station SI) event loop.

Table 32-6 Descriptors That Are Placed in EIT[schedule] (each station SI) Event Loop

Tag value	Descriptor	EIT[schedule basic] (each station SI description range)	EIT[schedule extended]
0x4D	Short Event Descriptor	⊙	×
0x4E	Extended Event Descriptor	×	○
0x50	Component Descriptor	⊙*1	×
0x54	Content Descriptor	○	×
0x55	Parental Rate Descriptor	○	×
0xC1	Digital Copy Control Descriptor	○	×
0xC4	Audio component Descriptor	⊙*2	×
0xC5	Hyper Link Descriptor	×	○
0xC7	Data Content Descriptor	○	×
0xCB	CA Contract Info Descriptor	○	×
0xD6	Event Group Descriptor	○	×
0xD9	Component Group Descriptor	□	
0xD5	Series Descriptor	○	
0x42	Stuffing Descriptor	○	○

⊙ → Always insert into the descriptor area in the table.

○ → Insert into the descriptor area in the table optionally.

× → Cannot be inserted into the descriptor in the table.

*1: At least one is required for each digital TV service.

*2: At least one is required for each digital TV or digital audio service.

32.1.4 EIT[schedule basic] (Each station SI) Structure and Operation

Information that is entered in the table of EIT[schedule basic] (each station SI) is used (including descriptors) entirely the same way as the EIT[schedule basic] that is transmitted as all station SI (see Section 31.4).

○ The resend cycle follows the specifications of Section 12.4 of this Regulations.

32.1.5 EIT[schedule extended] Structure and Operation

[Usage]

EIT[schedule extended] indicates a program extended information and hyper-link information.

[Structure]

For the EIT structure, see Section 31.4.1.

[Meaning of Each Field]

Field definitions follow the specifications of Section 5.2.7, Part 2, ARIB STD-B10.

[Sending Operation Rule]

⊙ **Program extended information for a maximum of 32 days is optionally transmitted only in the TS that conveys this program.**

- ○ Extended information is entered only for the program defined in an EIT[schedule basic].
- ○ The resend cycle follows the specifications of Section 12.4 of this Regulations.

Table 32-7 lists the operational rules of field transmission.

Table 32-7 Operational Rules of Field Transmission for the EIT[schedule extended]

Operational rules of field transmission	
table_id	Write "0x58" to "0x5F for an EIT[schedule actual extended]. Write "0x68" to "0x6F" for an EIT[schedule other extended].
section_syntax_indicator	Write "1."
section_length	Specify the section length of the EIT. The field is limited to a maximum value of 4,093 bytes, because the maximum total section length is 4,096 bytes.
service_id	Write the service_id of the target program.
version_number	Under normal conditions of operation, write the version number incremented by one every time the version is updated. When a system error is present, however, a version number updated by one or more can be entered.
current_next_indicator	Write "1."
section_number	Write a section number.
last_section_number	Specify the highest section number, or the last section_number of the last segment.
transport_stream_id	Designates the transport_stream_id of the target transport stream.
original_network_id	Specify the network_id of the original delivery system.
segment_last_section _number	Specify the value of last section_number of the section used in each segment.
last_table_id	Specify the last table_id.
[loop]	No maximum loop is prescribed.
event_id	Specify the event_id of the target event. Specify the same value of event_id as specified in the EIT[schedule basic].
start_time	Specify the program start time of the target event in hours and minutes and seconds in the MJD + BCD format. Specify the same value of start_time as specified in the EIT[schedule basic] for the same program.
duration	Specify the program length of the target event in hours and minutes and seconds in the BCD format. Specify the same value of duration as specified in the EIT[schedule basic] for the same program.
running_status	Write all "0s" (undefined).
free_CA_mode	Set ‘0’ if this program is a free program. Set ‘1’ if this program is a pay program. For definitions of free and pay broadcasts, see Section 20.2. Specify the same value of free_CA_mode as specified in the EIT[schedule basic] for the same program.
descriptors_loop_length	Designates a descriptor loop length within the maximum allowable range.
[descriptor_loop]	
[descriptor]	

[Reception Processing Criteria]

Table 32-8 describes the field reception processing criteria.

Table 32-8 EIT[schedule extended] Reception Processing Criteria

Field reception processing criteria	
table_id	="0x58 to 5F": The table is assumed an EIT[schedule actual extended]. ="0x68 to 6F": The table is assumed an EIT[schedule other extended].
section_syntax_indicator	=‘0’: The section is assumed invalid. =‘1’: The section is assumed valid.
section_length	≤4093: Section length. >4093: The section is assumed invalid.
service_id	
version_number	If this value has changed, the table is assumed to have updated.
current_next_indicator	=‘0’: The section is assumed invalid. =‘1’: The section is assumed valid.
section_number	
last_section_number	
transport_stream_id	
original_network_id	
segment_last_section _number	
last_table_id	
[loop]	
event_id	
start_time	If this value differs from that of start_time specified in the EIT[schedule basic] for the same program, the value entered in the EIT[schedule basic] controls.
duration	If this value differs from that of duration specified in the EIT[schedule basic] for the same program, the value entered in the EIT[schedule basic] controls.
running_status	= "0x0": The event is valid. ≠ "0x0": Assume "0x0" for processing.
free_CA_mode	= ‘0’: The program is assumed a free program . = ‘1’: The program is assumed a pay program. For definitions of free and pay programs, see Section 20.2 If this value differs from that of free_CA_mode specified in the EIT[schedule basic] for the same program, the value entered in the EIT[schedule basic] controls.
descriptors_loop_length	
[descriptor_loop]	
[descriptor]	

[Other Items that are Worth Special Mention]

None.

32.1.6 Descriptors Inserted in the EIT[schedule extended] (event loop)

32.1.6.1 Extended Event Descriptor

[Usage]

The Extended Event Descriptor represents detailed character information about an event.

[Structure]

See Table 32-1 for the structure of the Extended Event Descriptor.

[Meaning of Each Field]

Field definitions follow the specifications of Section 6.27, Part 2, ARIB STD-B10 in accordance with the provision of Section 6.2, Part 1.

[Sending Operation Rule]

⊙ **Multiple instances of this descriptor can be optionally transmitted (up to 16).**

Table 32-9 lists the operational rules of field transmission.

Table 32-9 Operational Rules of Field Transmission for the Extended Event Descriptor (EIT[schedule extended])

	Operational rules of field transmission
descriptor_tag	Write "0x4E."
descriptor_length	Designates the length of the Extended Event Descriptor. No maximum is prescribed.
descriptor_number	Designates the Extended Event Descriptor number used to split the description of information. - Split by item name. - Item name in excess of 200 bytes, in which case the next field need be transmitted without being initialized.
last_descriptor_number	Designates the number of the last Extended Event Descriptor associated.
ISO_639_language_code	Write "jpn ("0x6A706E")."
length_of_items	Designates an item length.
[item_loop]	
item_description_length	Designates an item name length with up to 16 bytes long (8 full-width characters).
[item_description_char]	Designates an item name with up to 16 bytes long (8 full-width characters).
item_length	Designates an item description length with up to 200 bytes long (100 full-width characters).
[item_char]	Designates an item description with up to 200 bytes long (100 full-width characters).
text_length	Write "0x00."
[text_char]	Not entered.

[Reception Processing Criteria]

○ The Extended Event Descriptor is assume to convey detailed character information about an event and may be displayed as needed.

Table 32-10 describes the field reception processing criteria.

Table 32-10 Extended Event Descriptor (EIT[schedule extended]) Reception Processing Criteria

Field reception processing criteria	
descriptor_tag	="0x4E": The descriptor is assumed an Extended Event Descriptor.
descriptor_length	Assumed the descriptor length of this descriptor.
descriptor_number	Signifies the end of information in comparison with the last Extended Event Descriptor number.
last_descriptor_number	Assume the last Extended Event Descriptor number.
ISO_639_language_code	Assumed to identify the written language contained in the descriptor.
length_of_items	Designates an item length.
[item_loop]	
Item_description_length	≤16 bytes (8 full-width characters): Item name length >16 bytes (8 full-width characters): That part of an item name that exceeds an item name length of 16 bytes (8 full-width characters) is assumed invalid. If 0, the item description relating to the item name with the most recent value of descriptor_number is assumed continuing.
[item_description_char]	Designates an item name.
item_length	≤200 bytes (100 full-width characters): Item description length >200 bytes (100 full-width characters): That part of an item description that exceeds an item description length of 200 bytes (100 full-width characters) is assumed invalid. If item_description_length=0, the item description relating to the item name with the most recent value of descriptor_number is assumed continuing and is handled as a continuous character string covering both designation and calling states. In this situation, the field is not initialized.
[item_char]	
text_length	
[text_char]	Assumed invalid.

[Other Items that are Worth Special Mention]

32.1.6.1.1 Detailed Uses of the Extended Event Descriptor

This descriptor is similar in its detailed operation to one inserted into an EIT[p/f].

(See Sections 32.1.2.1.1 to 32.1.2.1.3.)

32.1.6.2 Hyper Link Descriptor

The scheme of transmitting this descriptor is described in Volume 3, Part 1.

33 Using Other Tables and Descriptors

33.1 Time Offset Table (TOT)

33.1.1 TOT Structure and Operation

[Usage]

The TOT transmits JST date and time information, along with a time offset value where the daylight-saving time program is in effect.

[Structure]

Table 33-1 describes the structure of the TOT.

Table 33-1 Time Offset Table (TOT) Structure

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**
}		

[Meaning of Each Field]

Field definitions follow the specifications of Section 5.2.9, Part 2, ARIB STD-B10.

[Sending Operation Rule]

⊙ **Only one table is transmitted in a TS.**

- ○ The resend cycle follows the specifications of Section 12.4 of this Regulations.

Table 33-2 lists the operational rules of field transmission.

Table 33-2 Operational Rules of Field Transmission for the TOT

Operational rules of field transmission	
table_id	Write "0x73."
section_syntax_indicator	Write ‘0.’
section_length	Specify the section length of the TOT. The field is limited to a maximum value of 1,021 bytes, because the maximum total section length is 1,024 bytes.
JST_time	Transmitted to hold differences from to ±500 ms or below upon arrival at the receiver.
descriptor_loop_length	
[descriptor_loop]	

[Reception Processing Criteria]

○ If no TOT table is contained in the TS, the receiver’s internal clock is run freely to wait for a TOT to come.

Table 33-3 describes the field reception processing criteria.

Table 33-3 TOT Reception Processing Criteria

Field reception processing criteria	
table_id	="0x73": The table is assumed a TOT.
section_syntax_indicator	=‘0’: The section is assumed valid. =‘1’: The section is assumed invalid.
section_length	≤1021: Section length >1021: Invalid section
JST_time	
descriptor_loop_length	
[descriptor_loop]	

[Other Items that are Worth Special Mention]

○ Japan Standard Time (JST) is defined as UTC (Universal Time Coordinated) + 9 hours (as provided for in ARIB STD-B10.)

○ The modified Julian date change time shall be "UTC + 9" hours in principle.

○ The TOT is transmitted to hold differences from to ±500 ms or below upon arrival at the receiver.

○ The TOT is not transmitted if year 2038 is exceeded as the low-order 16 bits of MJD are transmitted, but processing is carried on by assuming that the virtual 17th bit position is ‘1.’ (See Section 16.3)

33.1.2 Descriptors Inserted in the TOT

33.1.2.1 Local Time Offset Descriptor

[Usage]

The Local Time Offset Descriptor is used to factor some offset into the actual time (UTC + 9 hours) and the time presented to the human system where a daylight-saving time program is in effete.

[Structure]

Table 33-4 describes the structure of the Local Time Offset Descriptor.

Table 33-4 Local Time Offset Descriptor Structure

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**
}		
}		

[Meaning of Each Field]

Field definitions follow the specifications of Section 6.2.25, Part 2, ARIB STD-B10 in accordance with the provision of Section 6.2, Part 1.

[Sending Operation Rule]

⊙ This descriptor must not be into a TOT where the daylight-saving time program is not in effect, but should be allowed in a TOT with effect on January 1 of the year in which the program is introduced. In this case only one instance of this descriptor can be entered in each TOT.

  ○ The descriptor must be transmitted at least 32 days before the date and time at which an offset time changes (as entered in time_of_change). Within seven days after the change, the descriptor must be transmitted with the value of next_time_offset being moved to local_time_offset.

Table 33-5 lists the operational rules of field transmission.

Table 33-5 Operational Rules of Field Transmission for the Local Time Offset Descriptor

Operational rules of field transmission	
descriptor_tag	Write "0x58."
descriptor_length	Specify the descriptor length of the Local Time Offset Descriptor.
[loop]	
country_code	Write "JPN ("0x4A504E")."
country_region_id	Write ‘all 0s.’
local_time_offset_ polarity	
local_time_offset	
time_of_change	
next_time_offset	

[Reception Processing Criteria]

⊙ The daylight-saving time program assumed not in effect if this descriptor is not placed.

Table 33-6 describes the field reception processing criteria.

Table 33-6 Local Time Offset Descriptor Reception Processing Criteria

Field reception processing criteria	
descriptor_tag	="0x58": The descriptor is assumed a Local Time Offset Descriptor.
descriptor_length	Assumed the descriptor length of the Local Time Offset Descriptor.
[loop]	
country_code	The descriptor is assumed invalid if not "JPN."
country_region_id	The descriptor is assumed invalid if not all ‘0’.
local_time_offset_ polarity	
local_time_offset	
time_of_change	
next_time_offset	

[Other Items that are Worth Special Mention]

None.

33.2 Stuffing Table (ST)

33.2.1 ST Structure and Operation

[Usage]

The Stuffing Table nullifies a table.

[Structure]

Table 33-7 describes the structure of the ST.

Table 33-7 Stuffing Table (ST) Structure

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**
}		
}		

[Meaning of Each Field]

Field definitions follow the specifications of Section 5.2.10, Part 2, ARIB STD-B10.

[Sending Operation Rule]

Table 33-8 lists the operational rules of field transmission.

Table 33-8 Operational Rules of Field Transmission for the ST

Operational rules of field transmission	
table_id	Write "0x72."
section_syntax_indicator	Write ‘0.’
section_length	
[data_byte]	To be set to all ‘1s.’

[Reception Processing Criteria]

Table 33-9 describes the field reception processing criteria.

Table 33-9 ST Reception Processing Criteria

Field reception processing standard	
table_id	= "0x72": The table is assumed an ST.
section_syntax_indicator	≠ 0: The table is assumed invalid.
section_length	
[data_byte]	Any value whatsoever is ignored.

[Other Items that are Worth Special Mention]

None.

33.3 Descriptors Not defined in a Table

33.3.1 Stuffing Descriptor

[Usage]

This descriptor is used to invalidate a descriptor that has previously been encoded or to insert a dummy descriptor into a table as stuffing.

[Structure]

Table 33-10 describes the structure of the Stuffing Descriptor.

Table 33-10 Stuffing Descriptor Structure

Data structure	bit	Identifier
stuffing_descriptor () {		
descriptor_tag	**8**	**uimsbf**
descriptor_length	**8**	**uimsbf**
for (i = 0;i< N;i++) {		
stuffing_byte	**8**	**bslbf**
}		
}		

[Meaning of Each Field]

Field definitions follow the specifications of Section 6.2.17, Part 2, ARIB STD-B10 in accordance with the provision of Section 6.2, Part 1.

[Sending Operation Rule]

Table 33-11 lists the operational rules of field transmission.

Table 33-11 Operational Rules of Field Transmission for the Stuffing Descriptor

Operational rules of field transmission	
descriptor_tag	Write "0x42."
descriptor_length	Specify the descriptor length of the Stuffing Descriptor.
[loop]	
stuffing_byte	To be set to all ’1s.’

[Reception Processing Criteria]

○ If this descriptor is encountered, simply ignore it without taking any action.

Table 33-12 describes the field reception processing criteria.

Table 33-12 Stuffing Descriptor Reception Processing Criteria

Field reception processing standard	
descriptor_tag	="0x42": The descriptor is assumed a Stuffing Descriptor.
descriptor_length	Assumed the descriptor length of this descriptor.
[loop]	
stuffing_byte	Any value whatsoever is ignored.

[Other Items that are Worth Special Mention]

None.

Appendixes

[Appendix A] Genre Code Table in the Initial Period of Broadcasting (content_nibble)

Program genres are to be classified as shown below. Programs that hardly fit into a particular genre must be classified as "Others" and handled the same way as being "Undefined." content_nibble_level1="0xC" to "0xD" are used as additional Reserved areas.

Further, "0xE" is an extension and defined as a designation classification (type designation in the Program Characteristic Code Table) to allow reference to user_nibble.

The codes listed in the Genre Code Table are placed under unified management across BS digital broadcasting, broadband CS digital broadcasting and digital terrestrial TV. If a new code is defined and put to use on any media in the future, it may not be used for any other definition on other media. (The code should be used for the same definition or will be put out of use as being "Undefined.")

[Genre Major Categories]

0	1	2	3	4	5	6	7	8	9	A	B	C D	E	F
News and reporting	**Sports**	**Information/ tabloid shows**	**Dramas**	**Music**	**Variety shows**	**Movies**	**Animations and SFX**	**Documentaries and educational programs**	**Theatrical performances**	**Hobbies and leisure**	**Welfare**	**Additional**	**Extended**	**Others**

The general and main categories are listed below.

Content_nibble_level_1 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0x0	*	**News/reporting**
0x0	0x0	Regular and general
0x0	0x1	Weather
0x0	0x2	Features and documentaries
0x0	0x3	Political and Diet
0x0	0x4	Economy and market
0x0	0x5	Overseas and international
0x0	0x6	Commentary
0x0	0x7	Panel discussions and talks
0x0	0x8	Special reports
0x0	0x9	Local and regional
0x0	0xA	Traffic
0x0	0xB	
0x0	0xC	
0x0	0xD	
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 wrestling and martial arts
0x1	0x6	Olympics and international matches
0x1	0x7	Marathon, track, swimming
0x1	0x8	Motor sports
0x1	0x9	Marine and winter sports
0x1	0xA	Horse racing and public gambling
0x1	0xB	
0x1	0xC	
0x1	0xD	
0x1	0xE	
0x1	0xF	Others

Content_nibble_level_1 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0x2	*	**Information/tabloid shows**
0x2	0x0	Show biz and tabloid shows
0x2	0x1	Fashion
0x2	0x2	Living
0x2	0x3	Health and medicine
0x2	0x4	Shopping and catalog shopping
0x2	0x5	Gourmet and cooking
0x2	0x6	Event
0x2	0x7	Program highlights and announcements
0x2	0x8	
0x2	0x9	
0x2	0xA	
0x2	0xB	
0x2	0xC	
0x2	0xD	
0x2	0xE	
0x2	0xF	Others
0x3	*	**Dramas**
0x3	0x0	Domestic dramas
0x3	0x1	Overseas dramas
0x3	0x2	Costume dramas
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 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0x4	*	**Music**
0x4	0x0	Domestic rock and pops
0x4	0x1	Overseas rock and pops
0x4	0x2	Classical and operas
0x4	0x3	Jazz and fusion
0x4	0x4	Japanese pops
0x4	0x5	Live concerts
0x4	0x6	Rankings and requests
0x4	0x7	Karaoke and singing contests
0x4	0x8	Folk and Japanese traditional music
0x4	0x9	Children’s songs and kids
0x4	0xA	Ethnic and world music
0x4	0xB	
0x4	0xC	
0x4	0xD	
0x4	0xE	
0x4	0xF	Others
0x5	*	**Variety shows**
0x5	0x0	Quizzes
0x5	0x1	Games
0x5	0x2	Talk variety shows
0x5	0x3	Laugh-ins and comedies
0x5	0x4	Music variety shows
0x5	0x5	Travel variety shows
0x5	0x6	Cooking variety shows
0x5	0x7	
0x5	0x8	
0x5	0x9	
0x5	0xA	
0x5	0xB	
0x5	0xC	
0x5	0xD	
0x5	0xE	
0x5	0xF	Others

Content_nibble_level_1 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0x6	*	**Movies**
0x6	0x0	Western movies
0x6	0x1	Japanese movies
0x6	0x2	Animations and SFX
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	*	**Animations/SFX**
0x7	0x0	Domestic animations
0x7	0x1	Overseas animations
0x7	0x2	SFX
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

Content_nibble_level_1 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0x8	*	**Documentaries/educational programs**
0x8	0x0	Social and current topics
0x8	0x1	History and travel
0x8	0x2	Nature, animal, environments
0x8	0x3	Outer space, science, medicine
0x8	0x4	Cultures and traditions
0x8	0x5	Literature
0x8	0x6	Sports
0x8	0x7	General documentaries
0x8	0x8	Interview and panel discussions
0x8	0x9	
0x8	0xA	
0x8	0xB	
0x8	0xC	
0x8	0xD	
0x8	0xE	
0x8	0xF	Others
0x9	*	**Theatrical performances/staging**
0x9	0x0	Modern and contemporary dramas
0x9	0x1	Musicals
0x9	0x2	Dances and ballet
0x9	0x3	Rakugo and vaudeville
0x9	0x4	Kabuki and classical staging
0x9	0x5	
0x9	0x6	
0x9	0x7	
0x9	0x8	
0x9	0x9	
0x9	0xA	
0x9	0xB	
0x9	0xC	
0x9	0xD	
0x9	0xE	
0x9	0xF	Others

Content_nibble_level_1 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0xA	*	**Hobbies/education**
0xA	0x0	Travel, fishing, outdoor sports
0xA	0x1	Gardening, pets, handicraft
0xA	0x2	Music, fine arts, craftwork
0xA	0x3	Game of Go and Japanese chess
0xA	0x4	Mahjong and pachinko
0xA	0x5	Cars and motorcycles
0xA	0x6	Computer and video gaming
0xA	0x7	Conversations and languages
0xA	0x8	Kind and elementary school students
0xA	0x9	Junior and senior high-school students
0xA	0xA	Colleges and universities, and entrance examinations
0xA	0xB	Lifelong education and qualifications
0xA	0xC	Educational issues
0xA	0xD	
0xA	0xE	
0xA	0xF	Others
0xB	*	**Welfare**
0xB	0x0	Senior
0xB	0x1	Physically handicapped
0xB	0x2	Social welfare
0xB	0x3	Volunteering
0xB	0x4	Sign language
0xB	0x5	Text (Subtitle)
0xB	0x6	Audio commentary
0xB	0x7	
0xB	0x8	
0xB	0x9	
0xB	0xA	
0xB	0xB	
0xB	0xC	
0xB	0xD	
0xB	0xE	
0xB	0xF	Others

Content_nibble_level_1 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0xC	*	**(Reserved 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	*	**(Reserved area)**
0xD	0x0	
0xD	0x1	
0xD	0x2	
0xD	0x3	
0xD	0x4	
0xD	0x5	
0xD	0x6	
0xD	0x7	
0xD	0x8	
0xD	0x9	
0xD	0xA	
0xD	0xB	
0xD	0xC	
0xD	0xD	
0xD	0xE	
0xD	0xF	

Content_nibble_level_1 (Genre general category)	Content_nibble_level_2 (Genre main category)	Description
0xE	*	**(Extended area) [Program Characteristic Code Table: Type designation]**
0xE	0x0	BS digital broadcasting program auxiliary information
0xE	0x1	Broadband CS digital broadcasting extension information
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**
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

[Appendix B] Program Characteristic Code Table (user_nibble)

If content_nibble="0xE0" is specified in the user_nibble field coded in the Content Descriptor, the content is encoded according to the table below as "BS digital program auxiliary information," which is shared by BS digital broadcasting, broadband CS digital broadcasting and digital terrestrial TV and is placed under unified management. If a new code is defined and put to use on any media in the future, it may not be used for any other definition on other media. (The code should be used for the same definition or will be put out of use as being "Undefined.")

Table B-1 BS Digital Broadcasting Program Auxiliary Information

<table>
<tr><td rowspan="3">Lower
4 bits of
user_nibble</td><td colspan="4">Upper 4 bits of user_nibble</td></tr>
<tr><td>0x0</td><td>0x1</td><td rowspan="2">0x2 - 0xE</td><td rowspan="2">0xF</td></tr>
<tr><td>Flexible programming auxiliary information</td><td>BS digital broadcasting Program characteristic information</td></tr>
<tr><td>0x0</td><td>Cancellation possible</td><td>Interruptive news available</td><td rowspan="8">Reserved</td><td rowspan="9">Undefined</td></tr>
<tr><td>0x1</td><td>Extension possible</td><td>Extraordinary service pertaining to this event available</td></tr>
<tr><td>0x2</td><td>Suspension possible</td><td rowspan="6">Reserved</td></tr>
<tr><td>0x3</td><td>Broadcasting of another episode in the same series possible</td></tr>
<tr><td>0x4</td><td>Undecided programming frame</td></tr>
<tr><td>0x5</td><td>Undefined
(used for digital terrestrial digital TV broadcasting)</td></tr>
<tr><td>0x6 - 0xE</td><td>Reserved</td></tr>
<tr><td>0xF</td><td>Suspension possible</td><td>Undefined</td><td>Undefined</td></tr>
</table>

This content loop will be treated as being invalid for the timing being if user_nibble="0x2X" to "0xFX" (X=0 to F) is specified, though these values may be added in the future.

B.1 Operational Rules of Transmission for Program Auxiliary Information (user_nibble)

The user_nibble values of "0x00" to "0x0F" designate a "Flexible Programming Auxiliary Information" area, and those of "0x10" to "0x1F" designate a "BS Digital Broadcasting Program Characteristic Information" area. Detailed discussions of the operations of these codes follow:

"0x00": Cancellation possible

Used to notify the viewer that the event, typically a sports program, may be canceled due to a rainfall or other adverse conditions and a backup event carrying another value of event_id may broadcast. Use of the "Announcement" field, a keyword for the Extended Event Descriptor, is recommended to state the reason for cancellation or guide on the backup event or the like.

"0x01": Extension possible

Used to notify the viewer that an extension to the program offering a live coverage of a sports game (such as sumo wrestling tournament, baseball or soccer) is anticipated, affecting the scheduling of the succeeding programs.

"0x02": Suspension possible

Used to alert the user to the possibility of an event being suspended (see Section 19.5.4) while the program is in progress.

"0x03": Broadcasting of another episode in the same series possible

Used to indicate that a program having the same episode number in the same series as the event having this Content Descriptor entered, such as a sports event, has been scheduled as a backup program at the time earlier than the scheduled start time of the event to take its place in the event of rainfall or any other adverse conditions. If the sports program is canceled, the program having this episode number broadcasts in its place at its scheduled start time.

"0x04": "Undecided programming frame" assumes the following situation:

Used to indicate that the content of the event is undefined at the point of definition and transmission of event_id for the program; the content event_id will be finalized days before the scheduled date of broadcasting

"Undecided programming frame" assumes the following situation:

○ An event has a broadcasting time frame but has its event content totally undecided and is assigned a provisional value of event_id. The event will be given a title, such as "Broadcasting Undecided," in a Short Event Descriptor. The event is deleted when its content is finalized. The content of broadcasting may be modified drastically at this time. The finalized event may take over the provisional value of event_id or may be assigned a new value of event_id (Sometimes, it may be split into multiple events.)

"0x05" - "0x0E": Reserved

Areas reserved to accommodate additional flexible programming auxiliary information as it arises in the future.

No value is assigned in the initial period of broadcasting.

"0x0F": Undefined

No value is assigned in the initial period of broadcasting.

"0x10": Interruptive news available

An predefined interruptive news exists in this event. No value of event_id is assigned this news.

"0x11": Extraordinary service pertaining to this event available

Used to indicate that an extraordinary service pertaining to this event is scheduled.

"0x12" - "0x1E": Reserved

Areas reserved to accommodate additional BS digital broadcasting program characteristic information as it arises in the future.

No value is assigned in the initial period of broadcasting.

B.2 Program Auxiliary Information (user_nibble) Reception Processing Standard

If a content loop having content_nibble="0xE0" and user_nibble="0x00" to "0x1F" specified exists in the Content Descriptor, receivers can evaluate "Program Auxiliary Information" pertaining to the programming and display a guidance message to the viewer.

Sample displays are given below. Displays are basically presentation-free and should be tailored to meet the specific receiver functionality.

If "0x00" is specified:

A message, such as one saying "This program may be canceled," can be displayed.

If "0x01" is specified:

A message, such as one saying "Broadcasting of this program may be extended," can be displayed.

If "0x02" is specified:

A message, such as one saying "The program may be interrupted halfway," can be displayed.

If "0x03" is specified:

A message, such as one saying "This program may be canceled," can be displayed. This code can also be used to prompt a series reservation.

If "0x04" is specified:

A message, such as one saying "Broadcasting of this program is undecided and its content will be finalized later," can be displayed. An event reservation for this program is essentially prohibited, though, if a Series Descriptor is specified, this code can also be used to prompt a series reservation.

If "0x05" to "0x0E" or "0x0F" is specified:

This content loop is ignored for the time being.

If "0x10" is specified:

A message, such as one saying "Interruptive news available," can be displayed.

If "0x11" is specified:

A message, such as one saying "A relevant program is available on another channel," can be displayed.

If "0x12" to "0x1E" or "0x1F" is specified:

This content loop is ignored for the time being.

[Appendix C] List of Keywords Available at the Start of Broadcasting

Table C-1 lists the keywords, available in the initial period of broadcasting, for the item names appearing in the Extended Event Descriptor. In using any keyword, be sure to enter one of the character codes listed below into the item name field.

Keywords are placed unified management across BS digital broadcasting, broadband CS digital broadcasting and digital terrestrial TV. If a new code is defined and put to use on any media in the future, it may not be used for any other definition on other media (The code should be used for the same definition or will be put out of use as being "Undefined.")

Table C-1 Keywords Available at the Start of Broadcasting and Character Codes Used to Specify Them

Item name	Character code
Announcement	0xAA,0xB7,0xE9,0xBB
Program content	0x48,0x56,0x41,0x48,0x46,0x62,0x4D,0x46
casting	0x3D,0x50,0x31,0x69,0x3C,0x54
Original and script	0x38,0x36,0x3A,0x6E,0xFE,0x35,0x53,0x4B,0x5C
Director and direction	0x34,0x46,0x46,0x44,0xFE,0x31,0x69,0x3D,0x50
Music	0x32,0x3B,0x33,0x5A
Production	0x40,0x29,0x3A,0x6E

[Appendix D] Estimating the Information Load Requirements for All station SI

This estimation document describes the information load calculated out with the assumption of all the servicesof the BS digital broadcasting in 1999.

In BS digital broadcasting, the following kinds of tables will be transmitted to carry all station SI:

- TOT
- BIT
- SDT[actual], SDT[other]
- EIT[p/f actual], EIT[p/f other]
- EIT[schedule actual basic] (eight days for TV services, three days for audio services)

A general measure of the information load for each of the tables above (except for the TOT) is summarized below.

D.1 Assumptions

Assumptions used to work out information load are:

- ○ Number of TSs contained in BS-4b : 9
- ○ Number of services contained in one TS : 16 (TV: 4, audio: 4, data: 8)
- ○ Digital TV services contained in BS-4b : 32 (regularly: 24, emporary: 8)
- ○ Number of digital audio services contained in BS-4b : 23
- ○ Number of data services contained in BS-4b : 77
- ○ Program length per program: : 80 bytes
- ○ Program description length per program : 160 bytes

D.2 BIT

Like the NIT, the BIT covers the complete repertoire of information in BS-4b by itself. A precise estimate of the information load is not feasible, because the operation of each station SI is yet to be finalized, but it should be 1 to 2 Kbytes or so.

D.3 SDT

- Information loads for the Digital Copy Control Descriptor and the CA Contract Info Descriptor have been set aside from the scope of estimation, because their placements are assumed to account for only a small fraction of the total number of services.
  - ● SDT header 11 bytes

- ○ Service loop
  - ● Service loop header 5 bytes
- ○ Descriptor loop
  - ● Service descriptor 37 bytes
  - ● Service loop total 42 × 16 = 672 bytes
  - ● CRC 4 bytes

Number of SDT bytes per TS 11 + 672 + 4 = 687 bytes

Number of SDT bytes across Bs-4b 687 × 9 = 6,183 bytes

D.4 EIT[p/f]

- ○ Information loads for the Parental Rate Descriptor, Digital Copy Control Descriptor, CA Contract Info Descriptor and the Component Group Descriptor have been set aside from the scope of estimation, because their placements are assumed to account for only a small fraction of the total number of events
- ○ Information loads for the Data Content Descriptor and the Hyper Link Descriptor contained in TV and audio services have been set aside from the scope of estimation, because their placements are assumed to account for only a small fraction of the total number of events.
- ○ The Data Content Descriptor contained in data broadcasting services is assumed to have a description length of about 40 bytes, but this length is subject to significant change. The information load for the Hyper Link Descriptor has been set aside from the scope of estimation, because its placement is assumed to account for only a small fraction of the total number of events.

D.4.1 Digital TV Services

- ● EIT header 14 bytes
- ○ Event loop
  - ● Event loop header 12 bytes
  - ○ Descriptor loop
    - ● Short Event Descriptor 247 bytes
    - ● Component Descriptor 8 bytes
    - ● Content Descriptor 6 bytes
    - ● Audio Component Descriptor 11 bytes
    - ● Series Descriptor 10 bytes
    - ● Event Group Descriptor 13 bytes

- Event loop total 12 + 247 + 8 + 6 + 11 + 10 + 13=307 bytes
- CRC 4 bytes

Number of EIT bytes per program	14 + 307 + 4=325 bytes
Number of EIT[p/f] bytes per service	325 × 2 = 650 bytes
Number of EIT[p/f] bytes in the TV services across BS-4b	650 × 24 = 15,600 bytes

D.4.2 Digital Audio Services

- EIT header 14 bytes
- ○ Event loop
  - Event loop header 12 bytes
  - ○ Descriptor loop
    - Short Event Descriptor 247 bytes
    - Content Descriptor 6 bytes
    - Audio Component Descriptor 11 bytes
    - Series Descriptor 10 bytes
- Event loop total 12 + 247 + 6 + 11 + 10=286 bytes
- CRC 4 bytes

Number of EIT bytes per program	14 + 286 + 4=304 bytes
Number of EIT[p/f] bytes per service	304 × 2 = 608 bytes
Number of EIT[p/f] bytes in the audio services across BS-4b	608 × 23 = 13,984 bytes

D.4.3 Data Services

- EIT header 14 bytes
- ○ Event loop
  - Event loop header 12 bytes
  - ○ Descriptor loop
    - Short Event Descriptor 97 bytes
    - Content Descriptor 6 bytes
    - Data Content Descriptor 40 bytes
- Event loop total 12 + 97 + 6 + 40=155 bytes
- CRC 4 bytes

Number of EIT bytes per program	14 + 155 + 4=173 bytes
Number of EIT[p/f] bytes per service	173 × 2 = 346 bytes

Number of EIT[p/f] bytes in the data services across BS-4b	308 × 77 = 23,716 bytes

D.4.4 Total Information Load Requirement for EIT[p/f]

Estimates worked out so far lead to the following calculation:

Information load requirement for EIT[p/f] across BS-4b: 15,600 + 13,984 + 26,642 = 56,226 bytes

D.5 EIT[schedule basic]

The size of information the EIT[schedule basic] transmitted as all station SI can be worked out on the following primary assumptions:

- Due to the anticipated mixed multiple programming of HD and SD broadcasts, the information load per program is difficult to size up.
- As with digital terrestrial broadcasting currently in effect, many diverse program modes are conceivable such that the number of programs per day, relevant descriptors and other requirements are hardly predictable.
- Because all station SI is the kind of information that needs to be transmitted in all TSs, estimating the total information load and the rate of its transmission is of vital importance.

Regardless of the content of information whatsoever, service providers will transmit the EIT[schedule basic] by regulating the total information load to the following limit or below:

Assuming an average of 5 TSPs per service and per segment:

5 × 8 = 40 TSPs (183 × 40 = 7,320 bytes)

With digital TV services, the use of an Event Group Descriptor (event sharing) could result in an increased information load for particular services. Hence, the total information load is regulated across all digital TV services contained in a broadcaster, rather than the information load per service.

Assuming the number of digital TV services contained in a given broadcaster is X, service providers transmit information by regulating the total information load across all the services not to exceed the following limit:

5 × X per broadcaster, per service and per segment = 5 on the average x X(TSP)

If three digital TV services are contained in a given broadcaster, for example, service providers can transmit 120 TSPs of information (183 x 120 = 21,960 bytes) for those three services a day. Consequently, providers can transmit 60 TSPs of information for one of the three services and 30 TSPs each for the remaining two services.

As can be seen, the average information load per service and per segment (three hours) is 5 TSPs (183 × 5 =

915 bytes).

The information load for the entire EIT[schedule basic] can be estimated Pursuant to the total information load regulation worked out above.

D.5.1 Total Information Load on EIT[schedule basic] for Digital TV Services (eight days)

- ch1 (BS Asahi/BS-i)

  120 (TSP) x 8 days × 2 (service provider) = 1920 (TSP) x 183=351,360 (bytes)
- ch3 (BS Japan/WOWOW)

  120 (TSP) x 8 days × 2 (service provider) = 1920 (TSP) x 183=351,360 (bytes)
- ch13 (BS Nippon/BS Fuji)

  120 (TSP) x 8 days × 2 (service provider) = 1920 (TSP) x 183=351,360 (bytes)
- ch15 (NHK[HD/BS1 Simulcast/BS2 Simulcast]/Star Channel)

  NHK (HD) 120 (TSP) x 8 days = 960 (TSP)

  NHK (BS1 Simulcast/BS2 Simulcast)

  40 (TSP) x 2 (service) x 8 days = 640 (TSP)

  Star Channel

  40 (TSP) x 1 (service) x 8 days = 320 (TSP)

  Total 1920 (TSP) = 351,360 (bytes)

○ The total load of information transmitted as EIT[schedule basic] for digital TV services all station SI is:

351,360×4 = **1,405,440 (bytes)**

D.5.2 Total Information Load on EIT[schedule basic] for Digital Audio Services

- ch1 (BS Asahi/BS-i/Music Bird)

  40 (TSP) x 3 days × 8 (service) = 960 (TSP) x 183 = 175,680 (bytes)
- ch3 (BS Japan/WOWOW/St. GIGA/BS-J Radio)

  40 (TSP) x 3 days × 7 (service) = 840 (TSP) x 183 = 153,720 (bytes)
- ch13 (BS Nippon/BS Fuji/JFN)

  40 (TSP) x 3 days × 8 (service) = 960 (TSP) x 183 = 175,680 (bytes)
- ch15

  (No Digital audio services)

○The total load of information transmitted as EIT[schedule basic] for digital audio services all station SI is:

$175{,}680 \times 2 + 153{,}720 = \mathbf{505{,}080}$ **(bytes)**

D.5.3 Total Information Load on EIT[schedule basic] for Data Services

The total information load for data services is not mentioned here, because service providers who take charge of data broadcasting are yet to be identified and the span of transmission and information requirements are not yet specified. At least, the total information load is estimated as being equivalent to that for digital audio services.

D.6 Discussions of Estimation

The results of estimation above are summarized in the table below.

Table D-1 Total Loads of Information Transmitted as All Station SI

Table type	Information load by media type	Total information load across BS-4b
BIT		About 1 to 2 Kbytes
SDT		About 6.2 Kbytes
EIT[p/f]	TV: 15.6 Kbytes	About 56.2 Kbytes
	Audio: 14.0 Kbytes	
	Data: 26.6 Kbytes	
EIT[schedule basic]	TV: 1.41 Mbytes	About 2 Mbytes
	Audio: 0.51 Mbyte	
	Data: About 0.5M byte (assumed equivalent to audio services)	Undecided

As can be seen from the table above, the EIT[schedule basic] accounts for a greater proportion of the program information.

The total load of program information transmitted as all station SI is about 1.5 (Mbyte) for digital TV services and about 0.5 (Mbyte) for digital audio services.

Evidently, from the scheme of estimation calculation discussed above, the load of information increases in proportion to the number of services involved. For example, if BS5 is to be run as the same network as BS-4b and if the total number of services has doubled, then the total load of information transmitted as all station SI also results in a two-fold increase.

[Appendix E] Character Sets Used in SI

The following six character sets (code sets) can be used in the strings that are used in the SI transmitted on BS digital broadcasting:

- ○ JIS Compatible Kanji Plane 1 (2-byte code)
- ○ JIS Compatible Kanji Plane 2 (2-byte code)
- ○ Alphanumeric (1-byte code)
- ○ Hiragana (1-byte code)
- ○ Katakana (1-byte code)
- ○ Additional symbols (2-byte code)

Among these, the alphanumeric, Hiragana and Katakana sets follow the specifications of Tables 7-5 to 7-7, Part 2, Volume 1, ARIB STD-B24, respectively.

The remaining three characters are defined here.

E.1 Operation of JIS Sets 3 and 4

JIS Sets 3 and 4 are not used in the initial period of BS digital broadcasting, but they are to be phased in at each service provider's discretion while observing the status of JIS Set 3 and 4 character ROM mounting. In transmitting JIS Set 3 and 4 characters to a receiver that does not support JIS Set 3 and 4 character ROM, alternate code string definitions (XCS: see Section 4.2) shall be used to ensure that they successfully display on the receiver. If JIS Set 3 and 4 characters are included in the additional symbols set, the corresponding additional symbols shall be used.

E.2 JIS Compatible Kanji Plane 1 Set (2-byte Code Table)

Define here those characters specified in the JIS Compatible Kanji Plane 1 set provided for in ARIB STD-B24, without altering Japanese graphic character codes. If JIS Set 3 is used, define here those characters specified in Kanji Plane 1 provided for in JIS X0213:2004, without altering the Japanese graphic character codes

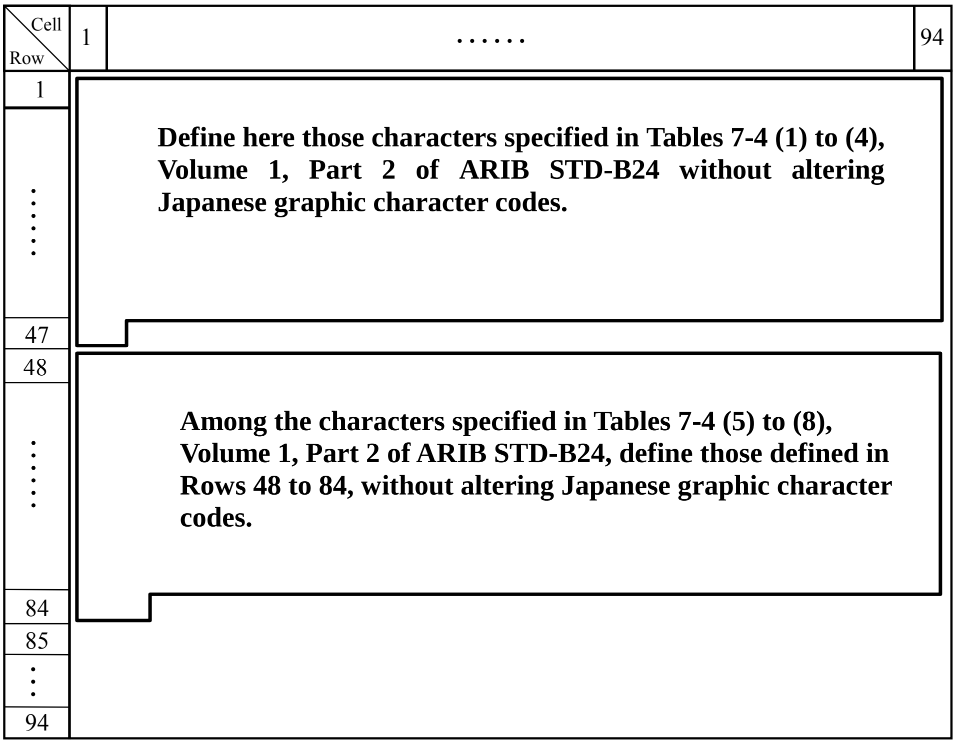


Figure E-1 Kanji Plane 1 Code Table (If JIS Set 3 is not used)

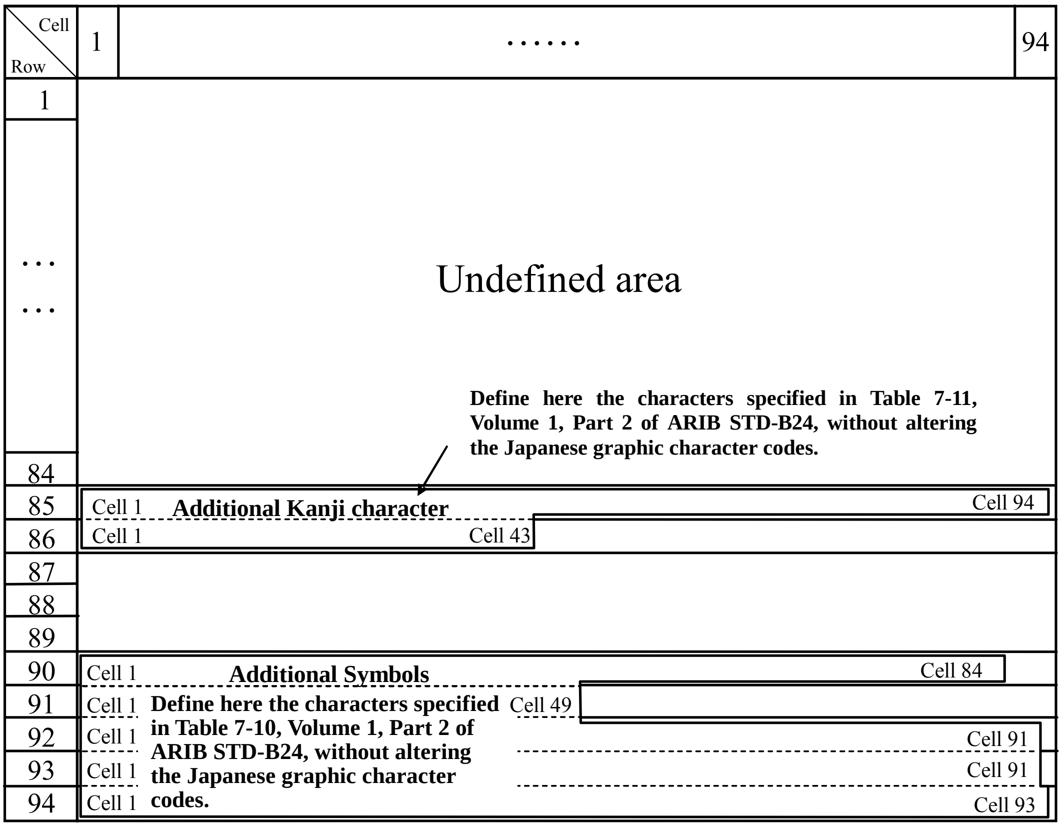
E.3 JIS Compatible Kanji Plane 2 (2-byte Code Table)

Kanji Plane 2 is a plane (code table) used in conjunction with JIS Set 4 as it is specified. Define here those characters specified in the JIS Compatible Kanji Plane 2 set provided for in JIS X0213:2004, without altering the Japanese graphic character codes.

E.4 Additional Symbols (2-byte Code Table)

Define additional symbols as used in existing teletext broadcasting FM multiplex broadcasting, and new additional symbols and additional Kanji characters that are required as program information.

Define in this plane those additional symbols specified in Table 7-10, Volume 1, Part 2 of ARIB STD-B24 and additional Kanji characters specified in Table 7-11, Volume 1, Part 2 of ARIB STD-B24, without altering the Japanese graphic character
codes.



*) I recommended that details of VICS symbols conform to the specifications of Appendix (3), ARIB STD-B3.

The fonts in Row 90 (except for Cells 45 to 63, 66 to 84) and in Row 91 have been proposed by Vehicle Information and Communication System Center [VICS Center]

Figure E-2 Additional Symbols Code Table

[Appendix F] Uniform Operations and Requests for Display (Proposed)

Operations

- Write a program title and a program subtitle as **program name** in the **event_name_char** field that is transmitted by the EIT Short Event Descriptor.
- The maximum program name may not exceed 40 full-width characters (80 bytes).
- If the program lasts 30 minutes or shorter, hold the program name to 20 characters or less.
- Write a summary explanation of the program in the **program description text_char** field.
- The maximum program description may not exceed 80 full-width character (160 bytes).

- Do not use the line feed code in the program name and **series name series_name_char-**.
- Use the Series Descriptor as defined in the PSI/SI Operational Regulations. Hence, it may happen that the program name and series name overlap.
- Special symbols, such as N, 天, 字 and 二, may be used in the program name and series name. Use of special symbols at the service provider's discretion. Accordingly, if any of these special symbols is used as a program attribute search key, programs having the special attribute may or may not be extracted from across the entire spectrum of all stations. Consulting Tabloid shows from other descriptors would be more useful.
- Because how to assign the program name (title, subtitle) and what to state in the program description are also at the service provider's discretion, they may contain announcements, content, cast names or special feature names.

Requests for Display

- "Program name" should be displayed as accurately as possible.
- An expression, such as "………," might be used to expressly alert the viewer to a continuation to program names when the they cannot be comfortably presented under the constraints of screen designs, ease of listing and so on. Program names shall be displayed in their entirety when they are selected.
- Further, it is recommended that "Program name" be followed by a "Program description."

[Appendix G] Assumed Item Names

Item name (Keywords)

Item name (Keyword)	Assumed content
Announcement	Message about a backup program broadcasting in times of rainfall, program cancellation, interruption, extension premature end, timing changes and so on, announcement to prompt program viewing and audience participation, inquiry, remarks and so on.
Program content	Synopsis, series commentary, theme, corners, subject, feature, match, game name, sporting event, topic, notice
Casting	Cast, master of ceremony, caster, reporter, commentator, commentator, announcer, live coverage reporter, narrator, voice appearance, interpreter, guest, etc.
Original and script	Originals, script, serializing magazine, scenario, translation, etc.
Director and direction	Director, direction, supervisor, producer, screenwriter, computer graphics, reporter, etc.
Music	Tunes, music, singers, lyrics, composition, performance, conductor, orchestra, theme songs, feature songs, theme music, etc.
Production	Production copyright, production assistance, production year, producing country, production place, coverage date, coverage place, location place, hosting site, place, theater, stadium
Free description - Keywords - Notice for presents - Hot stuff - Backstage talks - Message from the producer - Others	Others

Attachment
PSI/SI Receiver Guidelines

A PSI/SI Required Processing

Whether to use PSI/SI or not is solely a manufacturer-dependent concern, and in that sense, no required processing exists for PSI/SI processing. For receivers that premise on the use of PSI/SI, however, certain rules exist that must be observed by all means to keep them from malfunctioning. This chapter discusses such prerequisite rules receivers built to use PSI/SI should comply with.

(1) Any error occurring in the SI whatsoever may not impede the receiver's basic service select operation.
    The viewer should be able to select desired services from the PSI alone, including an NIT. Any error occurring in the SI may not impede the process of service selection from the PSI, or the ability to select services at least (including switching the TS) and present the default components in them to the viewer.
    SI is transmitted at such high hierarchy that it may not be received at all during rainfall time. A similar concept would be worthwhile to provide against such a situation.

(2) Ready for multi-section transmission
    Even though PSI/SI is transmitted in a multisection format, receivers shall still be able to process the multiple sections placed across the TS packets according to the relevant rules of transmission.

(3) Capable of tracking discontinuous version numbers
    Receivers shall be capable of assuming that subtables have updated if they have changed, even though their version numbers are discontinuous. Receivers are not necessarily required to detect changes to the subtables the moment they occur, but have only to track them functionally.

(4) Transmitted information may not be used for purposes other than its Use Purposes
    Each piece of SI is sent out with an Use Purpose. Because the SI is presentation-free, how such information will be used and presented to the viewer is manufacturer-dependent, but when the SI is used, it must be used to suit its Use Purposes.

(5) Free from malfunctioning even if an area reserved for future enhancement is used
    Observing this rule is necessary to ensure that future enhancements to the PSI/SI specifications will occur successfully. Two kinds of fields in the section syntax pertain to this rule.

    1) Fields that may not be referenced by receivers
       There are certain fields receivers cannot reference to perform processing, whatever values they may contain. Examples of these fields are as follows:
       - reserved and reserved_future_use fields in the section syntax
       - running_status field in the EIT or SDT
       - ISO_639_language_code field in other than audio component descriptors

    2) Fields that should be invalidated if they contain an undefined value.
       These fields have a certain range of values prescribed under the present rules of transmission but still poses the possibility of using values outside the range. If these fields are to be enhanced in the

future, it is assumed that they will not be available for use by an unenhanced version of receivers. Conversely, these fields may not be specified for use with the present version of receivers and may not cause the receivers to malfunction as a consequence.

The table below summarizes the ways individual fields should be invalidated.

Field	Scope of invalidation
current_next_indicator	The received section is invalidated by itself if this field contains a value other than 1.
service_type	If a service has an unsupported value of service_type, its existence may not be made known to the viewer by itself. This means that neither service selection nor program table display may be carried out.
content_nibble user_nibble	If this field contains an unsupported value, that specification is alone ignored. However, if only a general category is known, the value can be used only within the general category. The user_nibble field may not be referenced if an unsupported extended area is specified.
stream_type	A component having an unsupported value of stream_type may not be selected (displayed).
stream_content	If this field contains an unsupported value, only its entry is ignored. This means that the presence of the component containing that entry may not be displayed.
component_type	
CA_system_id	If this field contains an unsupported value of CA_system_id, the descriptor is ignored as a whole. However, if the PMT provides for a conditional access giving an unsupported value of CA_system_id, that component may not be selected.
data_component_id	If this field contains an unsupported value of data_component_id, the presence of the data component may not be displayed.
table_id	A table having an unsupported value of table_id may not be used. Even though tables (and subtables) are supported, they may still not be used unless the Operational Regulations provides for their transmission in the TS (*1).
descriptor_tag	If this field contains an unsupported value, the descriptor may not be used by itself. Even though the descriptor is supported, it may still not be used if it is located in a descriptor loop other than the descriptor loop specified by the Operational Regulations.

(*1) In BS digital broadcasting, the handling of tables/subtables is dynamically determined by the layout of TSs in the network and by that of services in TSs with distinction between actual and other conditions, which can be normally determined by NIT.

(6) Capable of displaying character codes correctly according to the binary codes specified

Receivers shall decode control codes, including the line feed code, properly according to the relevant rules of transmission, without altering their display just for the sake of their own convenience; provided, however, that receivers are allowed to insert line feeds into a string to fit to a specified display area, cut a string halfway and add a character that designates its continuation to it and otherwise make string manipulations as relevant in the circumstances.

B Receive Processing and Error Handling Standards by Table Type

b.1 Common (Section Headers, Descriptor Headers)

It is important that receivers are able to decode the section headers of PSI and SI sections properly. Only if a receiver successfully receives a section on the basis of its section header, it can proceed with internal section analysis. Normally, a descriptor loop exists in every section, in which the descriptors share a common descriptor header structure and also adhere to a common set of processing standards.

The text that follows focuses on the error handling standards of section and descriptor headers.

Section header error handling standard	
table_id	If this field contains an unsupported value, the received section may not be used. Even though the value of table_id is supported, the section may still not be used unless the Operational Regulations provides for its transmission in the received TS.
section_syntax_indicator	If this field contains a value other than 1 in a section in an MPEG extended section format, the section may not be used by itself.
section_length	The section may not be used by itself in the event of failure to observe the limitations placed by the table_id-specific syntax structure or the operational limitations. A CRC check error would normally occur if this field contains an invalid value.
table_id_extension	Because this field has an Use Purpose defined for each table, see the chapter dedicated to a particular table for the error handling standards.
version_number	
current_next_indicator	The section may not be used by itself if this field contains a value other than 1.
section_number	
last_section_number	

Descriptor header error handling standard	
descriptor_tag	If this field contains an unsupported value, the descriptor may not be used for any purpose. Even though the descriptor has a valid value of descriptor_tag, it may still not be used if it is located in a descriptor loop other than the descriptor loop specified by the Operational Regulations.
descriptor_length	Although the byte string of the descriptor can be cut out by the value of this field, it should require constant verification against the range of the descriptor loop length permitted in the section syntax.

[Section processing standards]

Receivers cannot proceed with internal analysis of a section until they cut out the incoming bit strings according to the section_length field and check the individual fields by table type after CRC checking to verify the validity of the section. For information on how to determine whether a particular section is valid or not, see the chapter dedicated to a particular table.

If a received section is determined invalid, it may not be used for any purpose whatsoever and should be handled as if it had not been received at all. For example, if a PAT received is found to contain section_syntax_indicator = 0, it should be abandoned immediately and the state of no PAT having been received should be assumed.

Receivers' analysis processing is carried out not in sections but rather in multiples of a larger unit of semantic significance, which is normally a subtable, or a segment in the EIT[schedule]. In the event of failure to acquire semantic significance in such units, processing is aborted. For example, if a NIT received is found to contain last_section_number=1 but the section with section_number=1 could not be received properly, all sections are abandoned, including the section with section_number=0.

The table below lists the fields that should be referenced to make up subtables by table type. Those sections that share the same set of fields as listed belong to the same subtable. (The PAT, PMT and CAT have their subtables made up of one section each.)

The TOT does not have the concept of subtables, because it differs in its section format.

Table type	Subtable identification field
PAT	table_id / transport_stream_id / version_number
PMT	table_id / program_number / version_number
CAT	table_id / version_number
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	table_id / service_id / transport_stream_id / original_network_id / version_number

[Descriptor processing standards]

Each descriptor is identified by a descriptor header and is cut out from a bit string in the descriptor loop according to the value of the descriptor_length field. Even if a value different from the value of descriptor_length that is presumed from the descriptor syntax is entered, the descriptor should be cut out according to the value as entered, but not past the descriptor loop length of the descriptor loop (specified for each section syntax). This condition could occur only in an abnormal state, but when it occurs, its impact can be held to within the descriptor loop by this measure.

While each descriptor needs to be analyzed according to the syntax defined for its descriptor tag, it could develop an invalid state or error state depending on the entries of the individual fields.

A descriptor would enter an invalid state if an unsupported field value is encountered. When one does, the descriptor is treated as having been non-existent, instead of being decoded. Because this situation could arise easily in the light of evolving enhancements, the existence of any unsupported receivers should be made unknown by itself.

A descriptor would enter an error state if its existence itself is verified but still lacks consistency between the bit string entered and the syntax structure as a consequence of having decoded it along the syntax. It could typically occur in times of a mismatch between the descriptor length and the length defined by the descriptor syntax.

It would be necessary to explore ways to override such descriptors and limit their functionality as appropriate, to the extent that the performance of service selection and other operations is unaffected.

An error state would also arise if a correlation is found to lack between the fields that are supposed to have an interrelationship according to the operational regulations, e.g., events associated with the same subtable of the EIT[schedule] concur as a result of having decoded their decoding the start_time and duration fields.

String fields often exist in a descriptor. In the event of a breach of the operational regulations for the string maximum length, strings past the maximum length are normally ignored. This means that strings are cut as appropriate for the purpose of decoding the entry. Processing that affects other information may not be carried out. Each individual descriptor must be capable of being processed as being normal.

The sections that follow summarize the guidelines for executing the receive and store operation by table type and those for executing the analysis operation with primary regard to invalid sections.

b.2 PAT

b.2.1 Use Purpose

The PAT is used to acquire the PID of the PMT of the service that is selected.

It may also be used to identify the broadcasting service in the TS selected.

b.2.2 Receive and Store Operation

The PAT must be kept ready to receive the latest information as long as any service in the TS is received, or it should be monitoring changes occurring to the value of the version_number field as it is transmitted.

Because the organization of services in the TS the PID of the PMT of each service essentially remain unchanged, information already received by receivers may be stored in them for reuse. Receivers can thus proceed to receive a PMT directly during service selection, without waiting for the PAT to arrive. Even in this situation, however, an operation would be worthwhile that acquires the latest version of the PAT and checks to see if changes have not occurred to it.

b.2.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is invalid and should be abandoned immediately.

table	PID	Section header field	Field value that validates the section
PAT	0x0000	table_id	0x00
		section_syntax_indicator	1
		transport_stream_id	TS ID of the TS being received
		current_next_indicator	1
		section_number	0

In addition, it is also recommended that the received section be abandoned and that the process suggested for the case of failure to receive a PAT launched when the value of the section_length field is found syntactically invalid.

Mismatches with the entries in the NIT, if any, are not treated as errors, because the transmission of any program not listed in the NIT could happen at any time and that any service listed in the NIT may or may not appear in the PAT while the service is shut down.

b.3 PMT

b.3.1 Use Purpose

The PMT is used to decode components of the service that is selected.

b.3.2 Receive and Store Operation

The PMT must be kept ready to receive the latest information about the service that is selected, or it should be monitoring changes occurring to the value of the version_number field as it is transmitted. Better component selection responsiveness would be yielded by having the latest version of the PMT cached within the receiver while the service is selected. There is no need to receive and analyze the PMT for services that are not selected.

No direct relationship exists between updates to the PMT and events. The PMT might be updated even in the presence of an event, or the PMT might not be updated from one event to another. Operations that require the demarcation of events should use EIT[p/f actual]. These operations should also profit from having an ability to keep track of updates to the PMT, independently of events.

b.3.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is invalid and should be abandoned immediately.

table	PID	Section header field	Field value that validates the section
PMT	PAT indirect specifica-tion	table_id	0x02
		section_syntax_indicator	1
		program_number	Consistency with the entry in the PAT is maintained.
		current_next_indicator	1
		section_number	0

Once the successful reception of a section is verified, the next step is to analyze the section. The following points should deserve special notice in analyzing the structural elements of the section, except for the section header:

- If an unsupported value of stream_type is entered, the descriptor loop may not be decoded. Receivers must be capable of skipping the descriptor loop according to the value of ES_info_length.
- If the value of program_info_length or ES_info_length and that of section_length do not match, the received section is assumed invalid. Processing is carried on by assuming a failure to receive a PMT.
- If the second loop in the PMT is entered past the upper limit to the number of ESs, receivers shall be able to successfully process as many ESs as the upper limit to the number of ESs in the order of entry.

[Descriptors]

The tables below summarize the points to watch in analyzing the descriptor fields in the PMT.

■ Processing of descriptors placed in the PMT first descriptor loop

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Conditional Access	Program decoding may be halted while selecting stations.
Digital Copy Control	Copy output may be generated by assuming that the descriptor does not exist. During service selection, component decoding performance must not be adversely affected. Processing may be pursued by ignoring the Content Availability Descriptor, because it is only meaningful when coupled with a Digital Copy Control descriptor.
Content Availability	Processing may be carried out by assuming that the descriptor does not exist.
Emergency Information	Processing may be carried out by assuming that no emergency alarm exists.

■ Processing of descriptors placed in the PMT second descriptor loop

Essentially, descriptors should be implemented to confine their scope of impact to within the ES.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Conditional Access	Decoding of the component may be halted.
Stream Identifier	Stream identifier processing is carried out by assuming that the descriptor does not exist. Relationship with the EIT may be lost. Execute similar processing also when the relationship between the two values of component_tag and stream_type does not equal the defined value.
Hierarchical Transmission	Hierarchical Transmission processing is carried out by assuming that the descriptor does not exist. Component selection in times of rainfall attenuation does not apply. The same will result when the destination PID is not found.
Digital Copy Control	Copy output may be generated by assuming that the descriptor does not exist. During service selection, component decoding performance must not be adversely affected.
Video Decode Control	Processing may be carried out by assuming that the descriptor does not exist.

b.4 CAT

b.4.1 Use Purposes

The CAT is used for the following purposes:

- To acquire the EMM_PID transmitted on a TS.
- To acquire display control information about automatically displayed messages for services moving on a TS.

b.4.2 Receive and Store Operation

The CAT must be ready to receive the latest information as long as the TS is selected, monitoring to ensure transmission with changing values of the version_number field.

Because the PID of the EMM stream in the TSs is essentially not modified, already received information may be stored in the receiver and used per TS. Receivers can thus proceed to receive an EMM stream, without waiting for the CAT to arrive. Even in this situation, however, an operation would be worthwhile that acquires the latest version of the CAT and checks to see if changes have not occurred to it.

Some entities may use automatically displayed messages to deliver their own services. Receivers should obtain display control information during service selection and work in conjunction with the IC card to determine whether the display of such messages is acceptable or not. Though this display control information is assumed to be operated on a day basis and entries or placements are free from frequent modifications, it still is necessary to implement a process that acquires the latest version of the CAT to check for changes.

b.4.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is invalid and should be abandoned immediately.

table	PID	Section header field	Field value that validates the section
CAT	0x0001	table_id	0x01
		section_syntax_indicator	1
		current_next_indicator	1
		section_number	0

[Descriptor]

The table below summarizes the points to watch in analyzing the descriptor fields of the CAT.

■ Processing of descriptors placed in the CAT descriptor loop

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Conditional Access	Processing is carried out by assuming that the descriptor does not exist, meaning that decoding of the conditional access broadcast in the TS may not have to be started or carried on, since no EMM stream is available.
CA Service	Processing is carried out by assuming that the descriptor does not exist, which means that the display of automatic display messages by the target service may not start.

b.5 NIT

b.5.1 Use Purposes

The NIT is used for the following purposes:

- To identify a network and verify the successful reception of a BS digital broadcast.
- To gain an insight into the configuration of TSs in the network and into the service configuration by TS.
- To use delivery system information to select TSs.
- To acquire EMM information that is transmitted in times of emergencies.

b.5.2 Receive and Store Operation

The NIT is made of a single subtable. Because it is transmitted to all TSs concurrently as all station SI, nothing is considered to hinder its reception.

The NIT resend cycle is subject to change on future service reconfiguration. Since the SI Parameter Descriptor in the BIT first descriptor loop needs to be placed beforehand, it is necessary to decode this descriptor and modify the resend cycle setting for acquiring the BIT according to the date and time of transmission. Because the range of changes to the cycle is predetermined to impose a maximum resend cycle of 20 seconds, this value may be used in a state of inability to determine the validity or invalidity of this descriptor (e.g. after an extended period of power outage). The NIT is about 1 to 2 Kbytes at the most, such that there will no significant impact on the receiver capability even though the resend cycle is not precisely known.

The NIT is a table of primary importance in the execution of a service selection operation but has such a slow resend cycle that it should be kept in nonvolatile memory or else for management purposes. Keeping a constant eye on updates is also necessary to track changes to the configuration of services. Because the version numbers are made uniform across all TSs, whether changes have occurred to the configuration of services or not can be determined by comparing the relevant version numbers (except for certain situations, such as when the receivers have been left powered off for one month).

In times of emergencies, such as wrestling an attempt to illegally acquire an encryption key, a CA_EMM_TS descriptor may be placed, though this is very rare. Receivers should keep a constant eye on updates to acquire the latest EMM information, such as key changes at this time.

b.5.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is invalid and should be abandoned immediately.

table	PID	Section header field	Field value that validates the section
NIT	0x0010	table_id	0x40
		section_syntax_indicator	1
		network_id	network_id, which identifies a BS digital broadcast
		current_next_indicator	1
		section_number	<= last_section_number

Safe processing can be ensured by adhering to the concept that an NIT is not valid until it comes complete with all subtables required. If any single section (from section_number = 0 to last_section_number) that makes up a subtable is wanting, processing is carried out by assuming that the subtable of the NIT could not be received. It is recommended that the operation be carried out to the extent practicable by using older information already stored in the receiver. Normally, frequency or TS assignments are rarely modified, and changes to the existence of services area also seldom. On the basis of this assumption, TS switching should be carried out using an earlier version of NIT to identify what services are contained in the PAT. If a mismatch exists between the NIT and PAT, only the matching service needs to be selected. The NIT directly affects the performance of service selection, such that fixes would be transmitted to it immediately in the event of failure to make up a subtable as described above. Receivers should, therefore, be ready to get upgrades to the NIT promptly as they occur.

Once the successful reception of a section is verified, the next step is to analyze the section. The following points should deserve special notice in analyzing the structural elements of the NIT, except for the section header:

- In BS digital broadcasting, the value original_network_id is transmitted to have the same value as that of network_id. It would be preferred to refrain from processing the TS when the value original_network_id differs.
- If the values of network_descriptor_length, transport_stream_loop_length and transport_descriptors_length and the value of section_length do not match, the received section is assumed invalid. That is, the subtable of the NIT is unavailable for reception, because the subtable is incomplete.

[Descriptors]

The table below summarizes the points to watch in analyzing the descriptor fields of the NIT.

- ■ Processing of descriptors placed in the NIT first descriptor loop

  Essentially, the impact of the descriptors exerted on the network as a whole would be unavoidable but should be limited to within them to the extent possible.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Network Name	Though this is a required descriptor, its impact should be minimized to such extent that the network name is only unavailable.
System Management	Though this is a required descriptor, it is of little significance so that this descriptor is of little significance by itself, so processing may be continued by assuming that it does not exist (that is, a BS digital broadcast has been received).
CA_EMM_TS	Processing is carried out by assuming that the descriptor does not exist, meaning that the acquisition of the EMM information may not have to be started or carried on.

- ■ Processing of descriptors placed in the NIT second descriptor loop

  Essentially, descriptors should be implemented to confine their scope of impact to within the TS.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Service list	Because this is a required descriptor, the TS itself need not be received. (Processing may be carried out by assuming that no service exists in the TS.)
Satellite Delivery System	Required descriptor. If it is not properly written, the TS itself need not be received, because service selection is disabled.

b.6 BIT

b.6.1 Use Purposes

The BIT is used for two broad purposes:

- To implement broadcaster-specific functions, such as series and EPG based on each station SI.
- To acquire transmission parameters, such as the resend cycle for receiving all station SI or each station SI

b.6.2 Receive and Store Operation

Like the NIT, BIT is made of a single subtable. Because it is transmitted to all TSs concurrently as all station SI, nothing is considered to hinder its reception. The BIT resend cycle is subject to change on future service reconfiguration. Since the SI Parameter Descriptor in the BIT first descriptor loop needs to be placed beforehand, it is necessary to decode this descriptor and modify the resend cycle setting for acquiring the BIT according to the date and time of transmission. Because the range of changes to the cycle is predetermined to impose a maximum resend cycle of 20 seconds, this value may be used in a state of inability to determine the validity or invalidity of this descriptor (e.g. after an extended period of power outage). The BIT is about 1 to 2 Kbytes at the most, such that there will no significant impact on the receiver capability even though the resend cycle is not precisely known.

Because the BIT is characterized by a slow resend cycle (depending on the kind of functionality implemented in the receiver), despite the fact that it could be involved in the execution of a service selection or any other operation, it would benefit from being kept in nonvolatile memory or else for management purposes like the NIT. Though it would not be necessary to keep a constant eye on updates, it is still recommended to check for changes at some intervals of time. Because the version numbers are made uniform across all TSs, whether changes have occurred to the configuration of services or not can be determined by comparing the relevant version numbers (except for certain situations, such as when the receivers have been left powered off for one month).

b.6.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is invalid and should be abandoned immediately.

table	PID	Section header field	Field value that validates the section
BIT	0x0024	table_id	0xC4
		section_syntax_indicator	1
		original_network_id	network_id, which identifies a BS digital broadcast.
		current_next_indicator	1
		section_number	<= last_section_number

Safe processing can be ensured by adhering to the concept that an BIT is not valid until it comes complete with all subtables required. If any single section (from section_number = 0 to last_section_number) that makes up a subtable is wanting, processing is carried out by assuming that the subtable of the BIT could not be received. It is recommended that the operation be carried out to the extent practicable by using older information already stored in the receiver. Because the BIT sometimes affect the performance of service selection, such that fixes would be transmitted to it immediately in the event of failure to make up a subtable as described above. Receivers should, therefore, be ready to get upgrades to the BIT promptly as they occur.

Once the successful reception of a section is verified, the next step is to analyze the section. The following points should deserve special notice in analyzing the structural elements of the BIT, except for the section header:

- If the values of first_descriptors_length and broadcaster_descriptors_length and the value of section_length do not match, the received section is assumed invalid. That is, the subtable of the BIT is unavailable for reception, because the subtable is incomplete.

[Descriptor]

The table below summarizes the points to watch in analyzing the descriptor fields of the BIT.

■ Processing of descriptors placed in the BIT first descriptor loop

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
SI Parameter	If the syntax enters an error state at least in part, the decoding of the descriptor itself should be disabled. In the worst case, the failure to receive all station SI itself would be tolerable, but the ability to receive using a stored SI Parameter Descriptor or with the default setting is preferred; provided, however, that no critical condition will result from transmission under undefined conditions.

■ Processing of descriptors placed in the BIT second descriptor loop

Essentially, descriptors should be implemented to confine their scope of impact to within the broadcaster.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
SI Parameter	If the syntax enters an error state at least in part, decoding of the descriptor itself should be abandoned. Failure to receive each station SI on the broadcaster would be tolerable. Reception may be tried using a stored SI Parameter Descriptor ; provided, however, that no critical condition will result from transmission under undefined conditions
Service List	Because this is a required descriptor, the failure to display the broadcaster would be tolerable. The result unavailability of broadcaster-specific functions (such as a series function) would be tolerable.
Broadcaster Name	Though this is a required descriptor, its impact should be minimized to such extent that the broadcaster name is only unavailable.

b.7 SDT

b.7.1 Use Purposes

The SDT is used for two major purpose.

- To display the name of a service.
- To reference defaults for event-specific viewing/videorecording limitations.

Service names can be replaced by channel numbers or logos. The latter purpose, however, is of special significance to receivers that support reservations by event (Limitations on viewing/videorecording during service selection are specified in the PMT.) In that sense, receivers in support of event reservations should be capable of handling the SDT at least.

The SDT has a flag that indicates whether the EIT[p/f] and EIT[schedule] have been transmitted or not. These tables can also be used to receive the EITs. This flag is usually turned on, because the concept of the all station SI requires that the EIT[p/f] and EIT[schedule] be transmitted at all times in the first place. With extraordinary service (extraordinary TV services/extraordinary audio services/extraordinary data services), however, the EIT is normally not used and this flag is mostly likely off. When an extraordinary service is generated, the EIT[p/f] may be transmitted, in which case an SDT with its flag turned on is transmitted. Receivers should be designed to reference the EIT[p/f] flag for the extraordinary service when they receive the SDT and, if the flag is found on, proceed to receive the EIT[p/f]. (For more information about the specifications for receiving extraordinary services, see Section C.9.)

b.7.2 Receive and Store Operation

The SDT is made up of two tables, SDT [actual] and SDT [other]. So is the cycle group. SDT [actual] consists of one subtable, while SDT [other] consist of one subtable for all TSs. Because the SDT is classified as all station SI, the same content is essentially transmitted to all the TSs with the same version number across the TSs, not to mention differences in the cycle group. In a receive operation, changes can be detected with reference to the version number, regardless of the TS.

Receivers may acquire the SDT at their option according to their own capability or requirements for responsiveness, but since the SDT is rarely updated by itself, they may store data, once acquired, in memory or else, so they will check for updates to the data from time to time. The SDT might be received by PID, cycle group, TS or the like, but no noticeable complexities of processing are anticipated.

Whenever updates to the NIT associated with changes to the configuration of services are detected, the associated SDT should be received as promptly as possible. Updates to the NIT and SDT occur virtually concurrently but with some lags. If the SDT becomes inconsistent with the updated version of the NIT, receivers should wait for the upcoming upgrade by presuming a delay in the update to the SDT. Although the placement of services in a TS can be determined from either the NIT or SDT, receivers should act to trust the information found in the NIT.

b.7.3 Analysis Operation

[Section]

Consult the table below to determine whether a received sections is valid or not.

Sections having an invalid value in any field listed are invalid and should be abandoned promptly.

table	PID	Section header field	Field value that validates the section
SDT[actual]	0x0011	table_id	0x42
		section_syntax_indicator	1
		transport_stream_id	Equal to the TS ID of the TS of the present choice.
		current_next_indicator	1
		section_number	<= last_section_number
		original_network_id	network_id, which identifies a BS digital broadcast.
SDT[other]	0x0011	table_id	0x46
		section_syntax_indicator	1
		transport_stream_id	Existing in the description in the NIT, as distinct from the TS ID of the TS of the present choice.
		current_next_indicator	1
		section_number	<= last_section_number
		original_network_id	network_id, which identifies a BS digital broadcast.

A conceptual clue to ensuring safety in processing is to consider that the SDT is not valid until it comes complete with all subtables required. If any one of the sections (from section_number = 0 to last_section_number) that make up a subtable is wanting, processing is carried out by assuming that the subtable of the SDT could not be received. Nothing may be displayed about all services in the TS, or use may be made of old that has already been stored. Either way, the service selection process may not be affected.

Once the successful reception of a section is verified, the next step is to analyze the section. The following points should deserve special notice in analyzing the structural elements of the SDT, except for the section header:

- The service_id field has a correlation with the entry in the NIT and with SDT table_id/transport_stream_id. If the TS arrangement does not match the NIT, the service information may be invalidated. Because this state is more likely to be a state of transition associated with the addition, move or deletion of a service, rather than an error state, consistency might be restored as either the NIT or SDT is updated from now on.
- The running_status field is irrelevant and must be ignored.

- If the value of descriptor_loop_length and the value of section_length do not match, the received section is assumed invalid. That is, the subtable of the SDT is considered unavailable for reception.

Because all station SI is available, both EIT_schedule_flag and EIT_present_following_flag should have been set to 1, except on an extraordinary service, but it is recommended that these fields be basically assumed to contain a valid value in receiving the EIT.

[Descriptor]

The table below summarizes the points to watch in analyzing the descriptor fields of the SDT.

■ Processing of descriptors placed in the SDT descriptor loop

Essentially, descriptors should be implemented to confine their scope of impact to within the service.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Service	Though this is a required descriptor, its impact should be minimized to such extent that the service and the service provider name are only unavailable.
Digital Copy Control	A shutdown of the videorecording and other functions for all events in the service would be tolerable.
CA Contract Info	A shutdown of the reservation and other functions for all events in the service would be tolerable. If a valid CA Contract Info Descriptor exists in the EIT with regard to individual events in the service, however, receivers should try to carry on the reservation function.

b.8 EIT[p/f]

b.8.1 Use Purpose

EIT[p/f] is basically used to acquire information about the present broadcasting event and the next event in sequence. It plays an important role in controlling videorecording operations in association with changes to event programming. The ability to handle the actual section of the EIT[p/f], in particular, is virtually essential to any receivers seeking to implement a videorecording function by event (flexible programming-ready function).

Although information about the broadcasting event may become unavailable from the EIT[schedule], the EIT[p/f] can make up for the wanting information. For BS digital broadcasting, the key concept is to store the EIT[schedule] in the receiver and use information from the EIT[p/f] to correct the information close to the present moment. Even though the EIT[schedule] is not available in a receiver because it has just started up, present and following event information can be presented in a Program Table or else by using the EIT[p/f].

b.8.2 Receive and Store Operation

The EIT[p/f] is characterized by a higher frequency with which it is updated than the rest of the SI tables. It is always updated by event and is also subject to frequent update on flexible programming. Receivers should be responsive to updates to the EIT[p/f actual] in real time particularly when they are keen to control videorecording operations.

EIT[p/f] is made up of two tables, EIT[p/f actual] and EIT[p/f other]. So is the cycle group. As many subtables of the EIT[p/f] exist as there are services. Because the EIT[p/f] is classified as all station SI, the same content is essentially transmitted to all TSs. Descriptions may differ, however, between the TS in which a broadcaster exists and the TS in which no broadcaster exists because of the possible placement of descriptors as each station SI. The same content will be entered in this case as well, except for the descriptors placed as each station SI.

Three major situations in which the EIT[p/f] may have to be received are:

1. Whenever the EIT[p/f] has upgraded on a service basis, receive the table immediately to keep a continuous eye on the status of the viewing service and the reservation service.
2. Acquire the EIT[p/f] for the number of services required at the moment of need, such as presenting a Program Table.
3. Receive the EIT[p/f] and store it in the receiver beforehand to make up for the slow resend cycle of the EIT[p/f other].

EIT[p/f] is at least updated by event, and the timing of its acquisition should be of special concern to receivers that perform operation 3 above. Because EIT[p/f] has only two cycle groups, actual and other, it may be cleverly configured according to the receiver’s capability to get the receive operation easily done.

b.8.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is invalid and should be abandoned immediately.

Table Idendifier	PID	Section field	Field value a valid section should have
EIT[p/f actual]	0x0012	table_id	0x4E
		section_syntax_indicator	1
		service_id	Existing in the TS of the present choice in the description in the NIT.
		current_next_indicator	1
		section_number	0 or 1, and <= last_section_number
		transport_stream_id	Equal to the TS ID of the TS of the present choice
		original_network_id	network_id, which identifies a BS digital broadcast.
EIT[p/f other]	0x0012	table_id	0x4F
		section_syntax_indicator	1
		service_id	Existing in the TS identified by the transport_stream_id field, explained later, in the description in the NIT.
		current_next_indicator	1
		section_number	0 or 1, and <= last_section_number
		transport_stream_id	Existing in the description in the NIT, as distinct from the TS ID of the TS of the present choice.
		original_network_id	network_id, which identifies a BS digital broadcast.

A conceptual clue to ensuring safety in processing is to consider that the EIT[p/f] is not valid until it comes complete with all subtables required. If any one of the sections (sections with section number = 0 and 1) that makes up a subtable is wanting, processing should be aborted by assuming that the subtable of the EIT[p/f] is not receivable. Nothing may be displayed, including an event frame, or use may be made of old that has already been stored or information contained in the EIT[schedule].

Once the successful reception of a section is verified, the next step is to analyze the section. The following points should deserve special notice in analyzing the structural elements of the EIT[p/f], except for the section header :

- The segment_last_section_number field is irrelevant and must be ignored.
- The last_table_id field is irrelevant and must be ignored.
- For how to gain insight into the status of relationship between start_time and duration and the present time, see Chapter 19 of this volume. An error state is defined in Table 19-1. No specific processing standard for this state exists.
- If the value of descriptors_loop_length and that of section_length do not match, the received section is assumed abnormal; that is, the EIT[p/f] cannot be received since the subtable is complete.

In other situations, problems might occur with event_id in particular due to its matching with the contents of the EIT[schedule] stored in the receiver or its uniqueness. Likewise, start_time and duration may not match with the EIT[schedule]. See Section 19.4 of this volume.

[Descriptors]

The table below summarizes the points to watch in analyzing the descriptor fields of the EIT[p/f].

- Processing of descriptors placed in the EIT[p/f] descriptor loop

  Essentially, descriptors should be implemented to confine their scope of impact to within the event.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Short Event	Though this is a required descriptor, its impact should be minimized to such extent that the event name or program description is only unavailable.
Component	Though this is a required descriptor, its impact should be minimized to such extent that component selection and display is only disabled.
Audio Component	Though this is a required descriptor, its impact should be minimized to such extent that component selection and display is only disabled.
Content	To be treated by assuming that no genre code and event auxiliary information exist for the event.
Digital Copy Control	Assuming that valid action for Digital Copy Control is unavailable, a shutdown of the videorecording and other functions for the event in question would be tolerable.
Series	No series should be assumed to exist. The impact of this descriptor should be limited to functions that work on a series basis, such as registration and videorecording of series.
CA Contract Info	Assuming that valid action is unavailable for CA, a shutdown of the reservation and other functions for the event in question would be tolerable.
Parental Rate	Processing should assume that no Parental Rate descriptor exists.
Event Group	Processing should assume that no Event Group descriptor exists.
Component Group	Processing should assume that no Component Group descriptor exists.

b.9 All Station EIT[schedule]

b.9.1 Use Purpose

All station EIT[schedule] carries information about the events to be broadest over upcoming days, and is used to implement a variety of event-based functions, such as a program table and an event search.

b.9.2 Receive and Store Operation

It is recommended that the all station EIT[schedule] be stored for use in the receiver to the extent possible. For the required data storage size, see Appendix D, PSI/SI Operational Regulations. As a rule of thumb, a data size of five TSPs per segment is estimated. For receivers that do not afford the required data storage size, some solution be explored, such as limiting the number of days.

Although the default cycle group setting allows 16 segments of a TV service (two days' supply) to be transmitted in a relatively higher resend cycle, only the future transmission of Extended Cycle Group 1, or three segments (9 hours' supply) is guaranteed. Conversely, information falling in this range is guaranteed to move in a relatively higher resend cycle at al times, such that it can be used as a processing standard relevant to the display of the Program Table or other tables when all station EIT[schedule] is yet to be stored, such as at the startup of a receiver. Combined use with EIT[p/f] is preferred for radio and data services, for which no extended cycle group may be available.

All station EIT[schedule] has multiple cycle groups by media type and by actual/other, so their clever utilization is important.

The simplest implementation convenient for storage in a receiver would be to receive all sections at once in the slowest resend cycle in the available cycle group in association with the PID or table_id. With this method of acquisition, it would inevitably happen that sections that move in a faster resend cycle are received repeatedly. The process of selecting and discarding such repeatedly received sections might be important.

Transmission by cycle group using the same set of transmission parameters makes for a secure, efficient receive operation, as in timeout processing. For example, if a cycle group is used, the interval of time that expires between the instant at which the first arriving section among the subtables in the group is received and the instant at which the same copy of the section is received next time can be thought of as one resend cycle out of the cycle group. Even if multiple subtables exist in a single cycle group, it can be assumed that all the sections belonging to the same group have been received since the first section in that group is received until the same copy of the section is received next time. This does not hold true, however, when updates have occurred by subtable while receiving the sections, which might result in a changing sequence of section transmission not only by subtable but across the entire cycle group.

Segments in an extended cycle group have a fixed sequence, in which the starting segment moves centering on the present time. In executing a receive operation by extended cycle group, therefore, it is necessary to set the segment number to meet the present time. Although segments move accurately on time, the timing at which late segments are no longer transmitted is not prescribed. Processing should be carried out by assuming that segments are no longer transmitted once they are overdue.

Because the default cycle group setting is subject to change, reference should be made to the SI Parameter Descriptor placed in the BIT first loop descriptor group in receiving all station EIT[schedule], or check the contents of table_description_byte if 0x50 is entered in the table_id field in the SI Parameter Descriptor. Media types that are not listed in the descriptor are handled by the default cycle group.

The placement of events in the segments of the EIT[schedule] is supposed to start today. This should be remembered in gaining access to section data that has been acquired earlier than yesterday when the section data is stored and used as it is. Although subtables are updated every day by themselves, the event information entered in the subtables is not necessarily modified (essentially, it is not modified). Therefore, the data acquired on a previous day or earlier is not necessarily invalidated with the coming of a new day. Receivers should be able to receive EIT[schedule] at an optional timing convenient for them and then process event information on the basis of the stored data.

At the turn of each day (0:0 a.m. each day), the EIT[schedule] is updated from the old version (previous day) to the new (today) version, with a transition period of 30 seconds. During this week, data for yesterday may have been transmitted or data for today may have been transmitted, or the transmission may have been paused. It is recommended that the process for receiving the EIT[schedule] be avoided during this time zone. See Section 13.5, PSI/SI Operational Regulations.

Very rarely, changes could occur to the cycle group setting of all station EIT[schedule] (which can be identified by referencing the SI Parameter Descriptor placed in the BIT first descriptor loop), effective exactly at 0 a.m. This should be kept in mind in performing a receive operation at around 0 a.m.

b.9.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is invalid and should be abandoned immediately.

table	PID	Section header field	Field value a valid section should have
EIT[schedule basic actual]	0x0012	table_id	0x50 to 0x57
		section_syntax_indicator	1
		service_id	Existing in the TS of the present choice in the description in the NIT.
		current_next_indicator	1
		section_number	<= last_section_number
		transport_stream_id	Equal to the TS ID of the TS of the present choice
		original_network_id	network_id, which identifies a BS digital broadcast.
EIT[schedule basic other]	0x0012	table_id	0x60 to 0x67
		section_syntax_indicator	1
		service_id	Existing in the TS identified by the transport_stream_id field, explained later, in the description in the NIT.
		current_next_indicator	1
		section_number	<= last_section_number
		transport_stream_id	Existing in the description in the NIT, as distinct from the TS ID of the TS of the present choice.
		original_network_id	network_id, which identifies a BS digital broadcast.

For safe processing's sake, the EIT[schedule] can be considered to take effect on the basis of segments in a subtable. If any one of the sections that make up a segment is wanting, the segment defined in the EIT[schedule] cannot be received.

The segment_last_section_number field is used to identify all the sections that make up a segment. A segment is assumed complete only if all sections, from the first section number in the segment to the last designated by segment_last_section_number, have been received without omission, not to mention the fact that all share the same value of the version_number field. A process may be implemented that validates segments on an event basis if it is compatible with the receiver.

Once the successful reception of a section is verified, the next step is to analyze the section. The following points should deserve special notice in analyzing the structural elements of the EIT[schedule basic], except for the section header:

- A correlation exists between the segment_last_section_number field and the section_number field. The sections that are pointed by the two fields belong to the same segment and have the correlation section_number <= segment_last_section_number. If this correlation is not in place, an error state is suggested, so processing may be carried out by assuming that the segment is not available for reception.
- The last_table_id field should give a correct indication of the transmission period for which the all station EIT[schedule] is defined. If each station EITs [schedule basic] are used by broadcaster, the last_table_id field is entered on the basis of the period of the each station EIT transmitted only on the TS in which a broadcaster exists.
- The start_time field has a correlation with the segment arrangement. If this correlation is invalid (that is, the event is not placed in the segment that is identified by start_time), the event may be invalidated.
- If the value of descriptors_loop_length and that of section_length do not match, the received section is assumed abnormal; that is, the segment is incomplete.

Another error state conceivable is that an problem could result from the description of the start_time and duration fields of an event in violation of the non-overlapping rule. Still another might occur regarding the uniqueness of event_id in connection with the EIT[p/f]. See Chapter 19 of this volume.

[Descriptor]

The table below summarizes the points to watch in analyzing the descriptor fields of the all station EIT[schedule].

■ Processing of descriptors placed in the all station EIT[schedule]descriptor loop

Essentially, descriptors should be implemented to confine their scope of impact to within the event.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Short Event	Though this is a required descriptor, its impact should be minimized to such extent that the event name is only unavailable.
Component	Though this is a required descriptor, its impact should be minimized to such extent that component selection and display is only disabled.
Audio Component	Though this is a required descriptor, its impact should be minimized to such extent that component selection and display is only disabled.
Content	To be treated by assuming that no genre code and event auxiliary information exist for the event.
Digital Copy Control	Assuming that valid action for Digital Copy Control is unavailable, a shutdown of the videorecording and other functions for the event in question would be tolerable.
Series	No series should be assumed to exist. The impact of this descriptor should be limited to functions that work on a series basis, such as registration and videorecording of series.
CA Contract Info	Assuming that valid action is unavailable for CA, a shutdown of the reservation and other functions for the event in question would be tolerable.
Parental Rate	Processing should assume that no Parental Rate descriptor exists.
Event Group	Processing should assume that no Event Group descriptor exists.
Component Group	Processing should assume that no Component Group descriptor exists.

b.10 Each Station EIT[schedule]

b.10.1 Use Purpose

The each station EIT[schedule] is used to implement a function on the basis of information about events beyond the scope of the all station EIT[schedule] and to display more detailed information about an event than that provided by the EIT[schedule basic]. It is transmitted as an each station EIT[schedule basic] in the former case and as an each station EIT[schedule extended] in the latter case.

b.10.2 Receive and Store Operation

Because the each station EIT[schedule] for each service is transmitted only on the TS in which the broadcaster exists, it is necessary to identify the TS to receive an each station EIT[schedule]. The broadcaster defined in each TS can be identified by decoding the BIT to probe into the relationship between the service belonging to the broadcaster and the service placed in the TS entered in the NIT.

Whether to operate an each station EIT[schedule] for each broadcaster or not is optional. When an each station EIT[schedule] is operated, both Basic and Extended may not necessarily be operated and further the entry period and the ratio of events entered are totally broadcaster-dependent. While this status of transmission is of vital importance in the execution of table reception processing, it can be determined by decoding the SI Parameter Descriptor in the BIT second descriptor loop. While various information is entered in the SI Parameter Descriptor, it is important to consult the SI Parameter Descriptor to determine whether each station EITs [schedule] are operated by broadcaster (and further by media type) and, when they are, what the operational kinds are. If no SI Parameter Descriptor is placed or a valid SI Parameter Descriptor is not available at the present moment, it can be assumed that no each station EIT[schedule] is in operation in the broadcaster. If one is placed and it contains the entry table_id = 0x50, an each station EIT[schedule basic] is assumed in operation; if it contains the entry table_id = 0x58, an each station EIT[schedule extended] is assumed in operation.

While the each station EIT[schedule], too, is essentially transmitted on a stored memory basis, some broadcasters apply an extended cycle group to transmitting each station EIT[schedule]. Receivers that do not support a stored memory capability may decode the SI Parameter Descriptor to support the table transmission only during the hours in which the extended cycle group is configured.

A complete equivalent of the processing for all station EIT[schedule] takes place at the turn of each day. See Section b.9.

b.10.3 Analysis Operation

[Section]

Whether a received section is valid or not is determined with regard to the table given below.

A section that has an invalid value in any of the fields listed in this table is assumed invalid and should be abandoned immediately.

table	PID	Section header field	Field value a valid section should have
EIT[schedule basic actual]	0x0012	table_id	0x50 to 0x57
		section_syntax_indicator	1
		service_id	Existing in the TS of the present choice in the description in the NIT.
		current_next_indicator	1
		section_number	<= last_section_number
		transport_stream_id	Equal to the TS ID of the TS of the present choice
		original_network_id	network_id, which identifies a BS digital broadcast.
EIT[schedule basic other]	0x0012	table_id	0x60 to 0x67
		section_syntax_indicator	1
		service_id	Existing in the TS identified by the transport_stream_id field, explained later, in the description in the NIT.
		current_next_indicator	1
		section_number	<= last_section_number
		transport_stream_id	Existing in the description in the NIT, as distinct from the TS ID of the TS of the present choice.
		original_network_id	network_id, which identifies a BS digital broadcast.
EIT[schedule extended	0x0012	table_id	0x58 – 0x5F
		section_syntax_indicator	1

table	PID	Section header field	Field value a valid section should have
actual]		service_id	Existing in the TS of the present choice in the description in the NIT.
		current_next_indicator	1
		section_number	<= last_section_number
		transport_stream_id	Equal to the TS ID of the TS of the present choice
		original_network_id	network_id, which identifies a BS digital broadcast.
EIT[schedule extended other]	0x0012	table_id	0x68 – 0x6F
		section_syntax_indicator	1
		service_id	Existing in the TS identified by the transport_stream_id field, explained later, in the description in the NIT.
		current_next_indicator	1
		section_number	<= last_section_number
		transport_stream_id	Existing in the description in the NIT, as distinct from the TS ID of the TS of the present choice.
		original_network_id	network_id, which identifies a BS digital broadcast.

For safe processing's sake, the EIT[schedule] can be considered to take effect on the basis of segments in a subtable. If any one of the sections that make up a segment is wanting, the segment defined in the EIT[schedule] cannot be received. The segment_last_section_number field is used to identify all the sections that make up a segment. A segment is assumed complete only if all sections, from the first section number in the segment to the last designated by segment_last_section_number, have been received without omission, not to mention the fact that all share the same value of the version_number field. A process may be implemented that validates segments on an event basis if it is compatible with the receiver.

Once the successful reception of a section is verified, the next step is to analyze the section. The points mentioned below should deserve special notice in analyzing the structural elements of the EIT[schedule extended], except for the section header. The EIT[schedule basic] contains an equivalent of the entries in the all station EIT[schedule].

- Basically, no matter how invalid the EIT[schedule extended] is, the event must not be invalidated. Whether the event is valid or invalid depends solely on the EIT[schedule basic]. Further, no matter how many events are entered in a segment in the EIT[schedule extended], that event information must not be used unless the same events are listed in the associated segment of the EIT[schedule basic].
- A correlation exists between the segment_last_section_number field and the section_number field. The sections that are pointed by the two fields belong to the same segment and have the correlation section_number <= segment_last_section_number. If this correlation is not in place, an error state is suggested, so processing may be carried out by assuming that the segment is not available for reception.
- The last_table_id field is operated differently from one broadcaster to another. It is entered on the basis of the transmission period entered in the SI Parameter Descriptor in the BIT second descriptor loop. If this

value is shorter than the entry in the BIT, an error may be assumed. However, if this value is larger than the entry in the BIT, processing must still be executed normally. This field provides a correct indication of the range of transmitted data.

- The start_time field has a correlation with the segment arrangement. If this correlation is invalid (that is, the event is not placed in the segment that is identified by start_time), the each station information about the event is assumed non-existing. The value of this field should essentially better be not referenced. This also applies to the duration field, and rather the associated EIT[schedule basic] should be used.
- If the value of descriptors_loop_length and that of section_length do not match, the received section is assumed abnormal; that is, the segment is incomplete.

[Descriptor]

The table below summarizes the points to watch in analyzing the descriptor fields of the each station EIT[schedule].

■ Processing of descriptors placed in the each station EIT descriptor loop

Essentially, descriptors should be implemented to confine their scope of impact to within the event.

Descriptor	Processing to be carried out when the descriptor is abnormal or invalid (including the case of required descriptors missing)
Short Event	Though this is a required descriptor, its impact should be minimized to such extent that the event name is only unavailable.
Component	Though this is a required descriptor, its impact should be minimized to such extent that component selection and display is only disabled.
Audio Component	Though this is a required descriptor, its impact should be minimized to such extent that component selection and display is only disabled.
Content	To be treated by assuming that no genre code and event auxiliary information exist for the event.
Digital Copy Control	Assuming that valid action for Digital Copy Control is unavailable, a shutdown of the videorecording and other functions for the event in question would be tolerable.
Series	No series should be assumed to exist. The impact of this descriptor should be limited to functions that work on a series basis, such as registration and videorecording of series.
CA Contract Info	Assuming that valid action is unavailable for CA, a shutdown of the reservation and other functions for the event in question would be tolerable.
Parental Rate	Processing should assume that no Parental Rate descriptor exists.
Event Group	Processing should assume that no Event Group descriptor exists.
Component Group	Processing should assume that no Component Group descriptor exists.
Extended Event	Processing should assume that no Extended Event descriptor exists.

b.11 TOT

b.11.1 Use Purpose

The TOT is mainly used to acquire the correct JST and to adjust the receiver internal clock.

The TOT may also be used to obtain the transition date and time and corrective time to allow daylight-saving time when the daylight-saving time program is introduced in the future.

b.11.2 Receive and Store Operation

Receivers that can have an receiver internal clock may execute corrective processing as needed. Those that do not have an internal clock are expected to continue receiving the TOT (as long as they need timing) to know the present time. The TOT, however, has a resend cycle of 5 seconds, so receivers would have a resolution that is no better than that.

The TOT does not have an assigned version number. This is quite natural because it transmits the latest time at all times. Consequently, there would be no telling whether other information (Local Time Offset Descriptor) contained in the TOT has updated since last time or not. The only solution is making a somewhat troublesome practice of checking the descriptor or updating it with the last information at all times.

b.11.3 Analysis Operation

The TOT is constantly updated. If the TOT as received has resulted in an error state, receivers should abandon it and wait for the next batch of transmission. As for the Local Time Offset Descriptor, receivers may choose to wait for the next batch of transmission if the latest information received is in error, or retain and use the stored data.

C PSI/SI Receiver Function Guidelines

c.1 Channel List

A Channel List can be created on the basis of the contents of the SDT.

- Channel number
- Service name
- Service type (media type)

The log that has been stored in the receiver in association with the service ID is used as a service logo.

It is recommended that extraordinary services be normally not displayed in the Channel List. A function might be added to add an extraordinary service to the Channel List when it arises and select it from the Channel List.

c.2 Program Table

c.2.1 Counterprogram Table

This function presents the broadcasting event and the next event on tap. Implementation of this function should be based on these concepts:

The current/following events may be identified from the present time using event information contained in the EIT[schedule]. From a standpoint of presenting the present status as precisely as possible, however, it is recommended that information be displayed from EIT[p/f] alone. The present section of the EIT[p/f] indicates the broadcasting event, and the following section indicates the next event on tap. If the present section is blank, it indicates that there is no broadcasting event (one may be different from service being halted). If the following section is blank, there is no next event on tap (or one may come into existence with the lapse of time). Unless the following section is blank, an interval of time may exist between the end time of the present event and the start time of the following event. This state suggests that the following event is schedule to start upon lapse of a period of the non-existence of an event after the end of the present event.

Rarely, events may be suspended. The event placed in the present section can be operated the same way as a broadcasting event, but the event placed in the following section should be recognized as having been suspended in the wake of the insertion of the present event, though it should be broadcasting by now. Some means of gaining insight into the event status is desired when the information is presented.

c.2.2 All Station Program Table

If a Program Table that sweeps across the complete set of services, such as radio and TV listings, is to be implemented, it is recommended that the Program Table be created on the basis of all station EIT[schedule]. With the response speed of the Program Table taken into account, the all station EIT[schedule] should be stored within the receiver to the extent possible. While, by default, event information is transmitted for eight days for TV services, three days for radio services and two days for data services, the number of days for

which event information is stored may be changed according to the receiver's storage capacity.
As the Program Table is essentially displayed on the basis of stored information, it is important that the latest information be available at last within the range of such display.

c.2.3 Each Station Program Table

Though no definition is available of the term "each station program table," this section explains how to implement program tables by service provider (broadcaster) using each station EIT[schedule].
The each station EIT is used in a uniform manner for each media type in the broadcaster. The EIT[schedule] for TV services has four different transmission period models: the one-week model (all station only), two-week model, three-week model, and one-month model. The transmission period is freely selectable from these four models for each broadcaster, but the selected range of event information is always transmitted for all services of the same media and in the same broadcaster.
The SI Parameter Descriptor placed in the BIT second descriptor loop contains a set of the each station EIT operation parameters, including the schedule_range field, which identifies the operation model as above. The pattern field contains information that designates the ratio of event coverage. With the each station EIT[schedule basic], the pattern field indicates the frequency with which events are entered in excess of the range of the all station EIT[schedule]. A value of 1 indicates that events are not entered at the same level as all station EIT[schedule] (that is, only required parts are stated by bits and pieces). If void radio and TV listings are of concern, event information can be used to establish the range of display in the Program Table.

c.2.4 Kinds of Information Handled in a Program Table

Primary information that may be presented to the viewer in a Program Table is itemized below. Each kind of is provided by the EIT with its descriptors. Sometimes, reference may be made to the contents of the SDT. All is available from all station SI, except for event detail explanation text.

- Program name and program description

  Use the EIT Short Event Descriptor.

  Two string fields in the Short Event Descriptor provide program information similar to that found in the program tables (radio and TV listings) in newspapers and magazines. Normally, strings like these are found in such radio and TV listings:

  1 <Title>
  Live coverage of a professional baseball match
  2 <Subtitle> Often enclosed double quotes (").
  "Tigers vs. Giants, 20th Match"

3 <Others> Program description, casting, special feature name and so on.

Koshien Field

Commentary: □□

Because the program name should use a minimum string to define a particular event, the Program Name Field of the Short Event Descriptor is used to convey 1 and 2 above in BS digital broadcasting. <Subtitle> is contained in the program name to complement the function of <Title> to define an event (<Title> is often the name of a "frame"). Such classifications do not necessarily work in all cases, because some programs lack information that fits into <Title> or do convey enough information with <Title> alone. As a consequence, receivers should be able to treat the incoming string supplied as a program name without being conscious of the difference between <Title> and<Subtitle>. Normally, <Title> and Series name (discussed later) are thought have close bearing on each other, but they should be treated as totally different things in the receiver, because the same string is not necessarily presented in their place.

As a result of having defined a program name as a mix of <Title> and <Subtitle>, a program name has been concluded to require 40 characters at the most. Receivers should be designed to display the string that has been transmitted as a program name as much as possible, but if the program name cannot be displayed in its entirety under the restriction of the display space, something like "…" should be placed at its end to suggest a continuation. Further, some means of displaying the entire program name is desirable.

Special characters are commonly used in the radio and TV listings in newspapers and magazines, and many of the special characters defined for BS digital broadcasting are initially designed to appear in radio and TV listings. They are also estimated to be used for the name of the program. The use of special characters, however, is a service provider-dependent matter and there is no uniform scheme of handling them. (Needless to say, special characters might be used in all string fields, as well as program names.)

A string corresponding to 3 <Others> is entered as a program description. Its use is defined in a service provider-dependent way, such as announcement, content, cast name or special feature name. Essentially, a program description serves to promote a program. Further, because a program description basically appears in the wake of the program name, as long as a required program area is available, it should be presented to follow the program name to the extent possible. Due to its promotional effect, a program description should be displayed concurrently with the program name in a program list. Yet, there is no denying that the program name is of greater significance than the program description. A program description may have up to 80 characters.

Receivers should be designed to reflect this consideration, though it would be a most laborious task to achieve the goals of listing and event-specific information requirements.

The string that is conveyed by the Short Event Descriptor is assumed to vary in length to some extent according to the event duration. The longer an event is, the longer the transmitted string tends to become.

■ Scheduled program start and end times

The start_time and duration fields in the EIT are used. Because the maximum event time length is 48 hours, the event end time may come two days later at the longest. This point should deserve notice in presenting information. Though the minimum time is 1 minute, an event lasting less than 1 minute may be defined for unavoidable reasons. Moreover, the start time is not necessarily set in minutes. If a daylight-saving time program is introduced in the future, time information may be with the offset time being factored into it using the Local Time Offset Descriptor available in the TOT.

■ Accounting/contract/viewing limitation information

Use the free_CA_mode field in the EIT, CA Contract Info Descriptor and the Parental Rate Descriptor. It is necessary to reference the CA Contract Info Descriptor in the SDT as well.

While the value of free_CA_mode in the EIT helps identify between free and pay events, pay events are defined to adhere to the default ES set, so events on a flat contract channel are essentially pay events. Note that viewers already under contract are not necessarily surcharged for viewing events. Viewers can test the free_CA_mode field in the EIT to find out whether the event is a pay event or not, but cannot tell whether they can view that event until they inquire with the IC card based on CA Contract Info Descriptor placed in EIT. If no CA Contract Info Descriptor exists in the EIT but a CA Contract Info Descriptor for the default ES set exists in the SDT, an inquiry must be made to the IC card likewise.

Care should be taken in using the free_CA_mode field in the SDT and the CA Contract Info Descriptor to present information to the viewer, because such information is simply characteristic of the conditional access nature of the service and cannot be used alone for viewing control purposes.

■ Videorecording control information

Use the EIT Digital Copy Control Descriptor, and also the SDT Digital Copy Control Descriptor at the same time.

In addition, the Content Availability Descriptor can be coupled with a Digital Copy Control Descriptor for use as videorecording control information. Since, however, the Content Availability Descriptor is placed in the PMT, not in the SDT/EIT, it is decoded upon reservation/videorecording reservation in the following manners:

○ The Content Availability Descriptor is assumed to have retention_state[*1] set to the default.

*1 For more information about retention_state, see Section 21.6.

○ The values of copy_restriction_mode and encryption_mode shall be handled as uncertain until PMT is received. After PMT is received, the latest PMT shall be always monitored, and the videorecording control shall be performed according to the described value.

○ Other fields may not be decoded as being defaults.

■ Component configuration information

Use the EIT Component Descriptor and Audio Component Descriptor, plus the Component Group

Descriptor if a multiview is used.

Each descriptor comes with a character string for use in offering information to the viewer. Even though a string is not available, the default string is defined for use in notifying the viewer. Where multiple components exist, they may be displayed in the ascending order of their component tag values.

The component_type fields in the Component Descriptor and the Audio Component Descriptor can be used to present the types of video and audio, respectively.

If component configuration information is used, the values of component_tag entered in the Component Descriptor and the Audio Component Descriptor should be noticed. That is, information may not be presented for components outside the ranges of assignment to video and audio in Table 14-1 (0x 00 to 0x0F for video components and 0x10 to 0x2F for audio components).

■ Program genre/Program characteristics

The Content Descriptor in the EIT is used to provide auxiliary information relevant to genre information and flexible programming of events.

Up to three pieces of genre information can be entered on the basis of the genre code table found in Appendix A, PSI/SI Operational Regulations. They are listed in order of typical genre codes. Genre codes are organized into general and main categories. Main categories are each assigned a code that designates "Others." "Others" is used where the genre cannot be defined in a single category or none of the main categories apply, but it indicates a valid genre code at least in the general category specification. General categories, too, are assigned a code that reads "Others" (0xF). It may be used for an event of a genre that fits into none of the general categories. Like other general categories, this should be treated as a single genre code. General categories 0xC and 0xD come blank in the initial period of BS digital broadcasting.

0xC and 0xd are reserved for future genre code extension and may not be used by receivers that do not support extensions. For more information about the genre code search function, see Section c.4.

Program characteristic information consists mainly of information used to make announcements about changes to the programming of events specific to BS digital broadcasting, and can be used to display icons and other information. This information may also be used to control videorecording.

■ Detailed event explanation text

Use the Extended Event Descriptor in each station EIT. Item descriptions associated with multiple item names are displayed as text. Some item names have Use Purposes predetermined as reserved words. Take advantage of these item names to guide events in such details as would not be available with all station EIT. See Section 32.1.2.1, PSI/SI Operational Regulations.

■ Series information

Use the Series Descriptor in the EIT.

Series information might be used to display information about a series, such as the series name, number of volumes in that series, the last volume, the scheduled finish date and programming pattern. See Section c.6.

- Related data broadcasting information (including subtitles)
  Use the EIT Data Content Descriptor. For more details, refer to Data Broadcasting Operational Regulations.

c.2.5 Handling Undecided Events and Undecided Times

Undecided events and times are not defined in the EIT[schedule] but appear in the EIT[p/f] only.

Undecided times include an undecided end time for the present event and an undecided start time for the following event. While an event is suspended, the end time of the following event also exists.

Even while an undecided time is defined, the broadcasting event and the next event on tap are established. If information is to be presented using a function that involves the implications of present/following, as in Counterprogram Table, the contents of the EIT[p/f] may be displayed as they are, with only the time being defined undecided. Even though event information is presented in a time-series sequence, regardless of the distinction between present and following, the contents of the EIT[p/f] should be displayed on a priority basis for the purpose of presenting the present status as precisely as possible.

An undecided event appears only in the following section, indicating that the next event on tap itself is undecided. If the present and following events are to be indicated in a Counterprogram Table or else, receivers should be able to present that the following event is undecided by itself. If event information is to be presented in a time series, regardless of the distinction between present and following, as in the All Station Program Table, the present information should be presented on a priority basis, but the following event (undecided event) may be treated as being non-existent (the event information contained in the EIT[schedule] is presented).

c.2.6 Matching between EITs

EITs are divided into the EIT[p/f], the all station EIT[schedule] and each station EIT[schedule], which vary in significance and operation. While receivers are supposed to acquire and manage these EITs separately, mismatches in information within the receivers would be inevitable. The term "mismatches" refers to the following conditions:

- Events concur in timing (Events scheduled for a given point of time differ.)
- Two or more events share the same value of event_id. (Identical copies of an event differ in start_time.)
- Identical copies of an event differ in their description, such as event name.

Information mismatches can be caused mainly by:

- Mismatches between the EIT[p/f] and EIT[schedule] resulting from recent changes to the programming of events

Such mismatches would be most pronounced in the EIT[p/f actual], because changes to the programming of events are instantly update in it as they occur. Further, if an undecided operation (undecided time or event) is defined in the EIT[p/f], programming changes would not be reflected in the EIT[schedule] when they occur.

This situation is generally likely to occur when the characteristics of both tables are considered. Receivers should be designed to manage EIT[p/f] and EIT[schedule] separately and use them in conjunction with each other as appropriate.

■ Mismatches resulting from the receive timing of the EIT[schedule basic]

Even though a sender has transmitted an event in a mismatch-free fashion, a mismatch would still occur in the receiver's memory if the event is not received in a batch as a receiving unit.

Mismatches between subtables in the same service when the event has been received on a subtable basis and mismatches between an old and a new version (such as overlapping in time) on a segment basis deserve particular notice. As long as a sender transmits, events mismatch-free, mismatches will be resolved when all latest data is received. For this reason, it is recommended that all tables in the same service be received and stored at once when EIT[schedule basic] is received.

c.2.7 Event Sharing

Events can be shared only between services of the same media type residing in the same broadcaster in the same TS. When events are shared, event information, such as event name, is not entered in the source event, so that relevant information must be retrieved from the destination event. For this reason, even though not all information is stored in the EIT[schedule], a receiver and store operation should be carried out in a batch by broadcaster, regardless of the distinction between all and each stations. Because services of the same broadcaster and media type are considered to often reside in the same TS, reception on a TS basis should deserve consideration as a processing standard.

The method of providing event information about shared events is receiver-dependent. It should be worked out to efficiently distribute event information about "identical events." A commonly advocated method would be forming a single framework that spans multiple services in the radio and TV listings when events are shared. Remember that event sharing is not necessarily carried out between adjacent services.

A detailed discussion of the concept of event sharing is found in Chapter 17, PSI/SI Operational Regulations.

c.2.8 Presentation on implementation of Daylight-Saving Time

If a function that displays timing information, such as an event start time, before and after the introduction of a daylight-saving time program, is to be implemented, the TOT Local Time Offset Descriptor should be used as well. That is, the time_of_change field needs to be decoded and incremented by the value of the local_time_offset field or next_time_offset field, depending on whether start_time of the event to be displayed is located before or after the time_of_change field.

c.3 Displaying Detailed Event Information

Detailed event information is provided by the Extended Event Descriptor in the each station EIT. Detailed event information is made up of a number of items, all of which are created in a horizontal size of 20 characters (full-width), or in such format that would make them appear most acceptable. This should deserve full notice in designing receiver screens. While receivers are considered to perform an automatic carriage return on the strings to fit into their display area, they must not override any line feed code that is transmitted to them. If their own automatic line feed and the incoming line feed code coincide, receivers should perform an automatic carriage return and then execute a line feed according to the line feed code.
Because no specific limitation is placed on the number of lines, a scrolling function or the like should be implemented to allow the entire strings to be viewed.

Detailed information is not necessarily listed for all events. The slow resend cycle of each station EIT[schedule extended] would not assure sufficient responsiveness if the acquisition of the table were started after receiving a viewer request. If detailed information that is provided by all broadcasters were to be all received, virtually all TSs would have to be received. It is recommended, therefore, that the each station EIT on the TS being selected be stored as promptly as possible. Some broadcasters, however, may apply an extended cycle group to transmitting the each station EIT[schedule extended], in which case the table would be transmitted in some acceptable resend cycle.
Whether detailed information is available on each event or not cannot be ascertained without acquiring each station EIT[schedule extended], but the SI Parameter Descriptor in the BIT second descriptor loop indicates whether each station EIT[schedule extended] is used and, if it is, to what extent it is used. For more details, see Section 13.2.2, PSI/SI Operational Regulations. The ratio of transmission can be used as an aid in sizing up data requirements or predicting acquisitions, but it need not be used if its use is considered unnecessary.

The Extended Event Descriptor has predetermined Use Purposes for the items names defined as reserved words. Receiver functions consistent with these uses are sought.

- "Announcement" mainly conveys an explanatory text about changes to the programming of an event or the like. Normally, when this item is entered, it has a high order of presentation. It also has a close bearing on event character information.
- "Program description" conveys information about an event. It is assumed to display in 20 full-width characters by 10 lines.
- Personal names are entered in place of "casting" "original and script" and "director and direction." The

method of entering each of these items is more or less predetermined. (See Section 32.1.2.1.1, PSI/SI Operational Regulations.) Using these methods of entry, personal names can be extracted from the information coded in the receiver. Although it appears that the personal search function can be implemented as a receiver feature, further discussions are beyond the scope of this chapter.

The Extended Event Descriptor has a special structure, which dictates special care in its analysis. A descriptor is extended by the descriptor_number and last_descriptor_number fields. Only one item is allowed in each descriptor. While the item description of a descriptor is limited to a maximum of 100 characters, up to 200 bytes long, each item is limited to a maximum of 200 characters, up to 400 bytes. This means that two descriptors may be placed for one item, in which case two instances of descriptor_number are assigned and placed in the EIT in sequence, with the item name being omitted in the second descriptor. Consequently, Extended Event Descriptors are decoded in the ascending order of desctiptor_number (whose order is equal to the order in which the descriptors are placed in the EIT). Whether the description of one item has completed or not is determined by whether an item name is defined in the next descriptor or not. If an item spans two descriptors, receivers should be able to link the two separate fields together to display the item. The two fields are simply split at the binary level. Field-specific string initialization does not apply to the second item description field. Receivers must join paste the two fields simply at the binary level to treat them as one single string.

c.4 Searching for Events

A broadcasting event genre search function can be implemented by using all station SI. Event genre searches can be made on the basis of the information in the Content Descriptor in the EIT, which is made available as all station SI for use across the entire spectrum of service providers. The information contained in the Content Descriptor is organized into 16 general category (content_nibble_level1 field), for which is further organized into maximum 16 main categories (content_nibble_level2 field). If a receiver is to implement an event genre search function, it should at least be capable of launching searches by general category. Considering the fact that the general category defined as 0xF "Others" is also a genre code, it should be operated the same way as other general codes. 0xC and 0xd are reserved for future genre code extension and may not be used by receivers that do not support extensions.

With the resend cycle of all station EIT[schedule] taken into account, an operational model that dynamically acquires tables on genre search is anticipated to take a considerable length of time. Hence, the storage management of all station EIT[schedule] should be highlighted in considering ways to implement this feature.

Various other methods of implementing event searches, as by event name, by casting and by keyword, are conceivable, but these are to be debated at each manufacturer's own discretion using the all station and each station EITs and are set aside from the scope of discussion hereunder.

c.5 Reserving Events

All station SI can be used to implement a broadcasting event reservation capability, which may be broken down into three separate functions: reservation registration, reservation confirmation and reservation execution.

c.5.1 Registering Reservations

This function allows the viewer to register events by selecting from a program table or else.
In registering the reservation of an event, it is recommended to check to see if that event is actually viewable or not. Possible checks that can be made to this end include:

- Check for the presence of components available for presentation
  Scan through the EIT for the presence of Component and Audio Component Descriptors to confirm that the components are supported.

- Identifying between free and pay events and checking for contracts
  The value of free_CA_mode helps identifies between free and pay events. A free event (free_CA_mode = 0) is identified as being free at least for the default component. A pay event requires making an inquiry to the IC card using the CA Contract Info Descriptor in the event to determine whether the viewer can view it or not. If no CA Contract Info Descriptor is found in the event, it may have been defaulted. Use should then be made of the CA Contract Info Descriptor in the SDT in the service that caries the event.

- Checking data events
  Services whose media type is a data type would essentially be data events. It is recommended to ensure that the relevant method of data broadcasting is supported. This can be accomplished by referencing the Data Content Descriptor in the EIT (with particular regard to the data_component_id field). Whether viewers can view particular events of a data type using a specific method of data broadcasting may be defined, but such definition should be governed by the regulations prescribed for that method of data broadcasting.
  What kinds of information receivers should present to events when reserving them is manufacturer-dependent.

In reserving an event, it is recommended to store at least the values of its service_id/event_id/start_time fields. Such information is required for executing the reservation. To be able present a reservation list screen (reservation confirmation function), receivers should store relevant event information as much as is required. Normally, receivers would be storing event names or other information provided via the EIT. Receivers capable of storing the all station EIT[schedule] with stability may reference the latest version of the all station EIT[schedule] when presenting a reservation list screen.

A function that checks newly reserved events to see if they do not overlap with the already reserved events in broadcasting timing when they are registered is mostly likely to be implemented, but this is considered out of the scope of this discussion, because it is a receiver-dependent process.

c.5.2 Confirming Reservations

Receivers supporting event reservations are expected to implement a function of confirming reserved events. If receivers are to support a user interface over which to confirm registered event reservations, they may simply present the reservation information stored in them.

Receivers capable of storing all station EIT[schedule] with stability may reference the latest version of all station EIT[schedule] stored when displaying a reservation confirmation screen. This implementation will make it possible to announce upcoming changes (such as changing start time) to the viewer. However, it may happen that a reserved event is once deleted from EIT[schedule] as a consequence of changes to its programming. It is recommended that the cancellation of the event be not assumed until registered start_time comes (that is, until EIT[p/f actual] at that time is acquired). In this situation, it would be necessary to simply display the reservation information that has been stored in the receiver and then implement flexible programming support around the stored value of start_time. Naturally, the event may have shifted to another time zone by the time its reservation is confirmed. While this state can be detected by making a search through the same service using event_id as a key. If an event shift is detected, this change may be assumed valid at this point of time. The latest version of the EIT[schedule] stored may be used to provide the viewer with new schedule announcements or update the reservation schedule automatically.

Very rarely, the broadcasting service of an event may have changed. No scheme is available that spots such changes with confidence when they occur. Changes occurring to a service are confined to the same broadcaster/media type. When a change occurs to an event, an Event Group Descriptor is placed in the updated version of the event to designate the old version of the event. If an Event All Descriptor that signifies a move of the event is detected while analyzing the all station EIT, it is recommended to check against the reserved event list to make sure that the reserved event has not moved.

c.5.3 Executing Reservations

If executing a reservation is to be viewed as a function of announcing the start of a reserved event to the viewer, it should be operational as described below.

Basically, reference the EIT[p/f] (which may be actual or other depending on the TS being selected at that moment) near the stored the value of start_time. If the EIT[p/f] is other, the event should be basically assumed to start immediately. (This means that an event should start at the scheduled time, regardless of the description in the EIT[p/f other].) However, only if a reserved event is entered in the following section of the EIT[p/f other] and start_time has lagged behind initial schedule, the specification of start_time can be assumed valid. (The same decision can also be made when a similar condition is spotted in the EIT[schedule other].) As a solution, the reservation may be reconfigured with the entered value of start_time.

In a very rare situation, the EIT[p/f other] could be updated without version numbering. If precisely the latest information on other is worthwhile (as in the verification process just before the scheduled start time of an event), receivers should acquire the EIT[p/f other] that has been transmitted in the present TS, without referencing the version number.

For information about making event reservations involving service selection or videorecording, see Section C.5.

c.6 Series

All station SI can be used to implement a variety of functions that target series.

Detailed information about series can be found in Chapter 18, PSI/SI Operational Regulations.

Remember that the series function for BS broadcasting is not laid down to allow for a series list or any other function, because it is defined with emphasis on broadcasting events (as can be seen from the transmission format).

c.6.1 Registering Series

When a series is registered, broadcaster_id/series_id should at least be stored. With receivers that implement a registered information display function, such as a series registration list screen, other series information should also be stored. Particularly, last_episode_number and expire_date should better be stored if an automatic series deletion function is to be implemented. The series name, which is also important to the receiver function, is entered in the series_name_char field in the Series Descriptor. If the series name does not exist, the event name has to be consulted. The same event name is entered in every event that belongs to the series. Note that, as different from the case of registering event reservations, there is a period of time in which no information about the registered series is available from the EIT[schedule] about the registered.

A knowledge of the end of a registered series is necessary to unregister the series automatically.

Basically, the end of a series can be established by ascertaining that the date appointed by expire_date has passed. However, where expire_date is not used, the last episode event must be detected on the basis of the value of episode_number defined for each individual series event. Remember that one value of episode_number is assigned to each value of repeat_label. When the last episode in a series is not detectable, the series may be deleted after 100 days of inability to locate a series event.

c.6.2 Checking for Series Events

Events contained in a series share the same values of broadcaster_id/series_id entered in the Series Descriptor in the EIT. Receivers need to search through the EIT to locate these events. All services of the same media type in the same broadcaster are searched for. For example, the all station EIT[schedule] stored in the receiver might be searched through on the series event confirmation screen to present a list of applicable events.

If an automatic series reservation function is to be implemented, it is necessary to search through all station EIT[schedule] periodically (at least). It is recommended, for example, that series events be identified every time EIT[schedule] is received and stored in the receiver. While programming pattern information is provided along with a series, the method of checking for series events might be varied on the basis of such information.

c.6.3 Executing Series Reservations

Series reservations are basically considered executable as event reservations. A series event is confirmed before it starts, so it is registered as an event reservation. Receivers may automatically reserve individual events contained in a series after its registration or they may present information about the events contained in the series to the viewer and reserve the events subsequently selected by the viewer. Once individual events in the series are reserved, their reservations can be executed the same way as event reservations.

Receivers seeking to implement a function that automatically detects events contained in a series and that reserves them and executes videorecording should take notice of the following:

If a live coverage of a baseball game, for example, is canceled due to a rainfall, an event that belongs to the series could surface abruptly. Such an event is listed as a backup event in the radio and TV listings in general newspapers. Backup events include series events. Because cancelling a program under the influence of a rainfall, for example, often comes as a last-minute decision (appearing only in the EIT[p/f]), several searches through EIT[schedule] made a day are most unlikely to catch the cancellation. Without receivers constantly at work, very few solutions are available to deal with this situation. A better chance of detecting cancellations might be provided by using a series programming pattern (program_pattern field in the Series Descriptor). This method works with a series that is run once each week and that has the day of the week and the time of its broadcasting fixed, whereby the receiver is started anyway on the appointed day of the week and at the appointed time during the period of the series to search through EIT[p/f actual].

c.7 Service Selection

c.7.1 Basic Service Selection Operation

Assuming that the process of service selection is defined as a function of selecting a service and decoding and presenting the components contained in that service, it can be pursued in the following sequence:

1. Verify the presence of the target service in the NIT.

   If the target service does not exist in the NIT, the service specification is incorrect. This could occur when a channel is directly specified from a remote controller. Discussions of the receiver action in this situation are beyond the scope of this chapter.

   The NIT is resent at intervals of a 10-second cycle by default, which would be too slow to fill the need for service selection if the NIT were to be acquired after a service selection request is received. Hence, it is strongly recommended that the NIT be constantly stored in the receiver.
2. Verify the service type of the service.

   If the service has an unsupported service type, service selection may not be carried out. An equivalent of the processing performed in the case of the selection of a non-existing service may be executed. Alternatively, the inability to select the service may be announced.
3. Switch the TS and receive the PAT to acquire the PID of the PMT for the service.

   If the PAT is not available for reception, it means that no receivable stream exists in the TS due, for example, to a transmission system failure. An equivalent of the processing for a paused service may be carried out.

   If there is an entry of the service (program_number) that is subject to service selection in the PAT, the service has paused.
4. Acquire the PMT for the target service and verify components.

   If there is an entry of the service (program_number) that is subject to service selection in the PAT, but the PMT is not available for reception, broadcasting has paused (audio and data type services). However, if a service that involves hierarchical modulation and one that does not involve hierarchical modulation are intermixed in a single TS, it may happen that the service that does not involve hierarchical modulation has access to the PAT, but not to the PMT, during broadcasting. For the receiver messages that are generated under these specific conditions of reception, see Volume 2 (Section 4.14, "Error Messages").

   Because the PID in the PMT is virtually fixed for each service, if it is stored in the receiver in association with each service ID, the receiver can receive the PMT directly without going through a PAT reception sequence, making for enhanced responsiveness in service selection. Even in this case, however, the PAT should be received at the same time to stay responsive to changes in the PAT when they occur.

The sequence of processing that follow the reception of a PMT essentially varies with each configuration of components in the program and should be governed by the descriptions in the PMT. The explanation given below focuses on a TV service having no data component.

5. Select a component as directed in the PMT.

○ If a Conditional Access Descriptor exists in the first descriptor loop in the PMT

If a Conditional Access Descriptor exists in the first descriptor loop in the PMT, the whole service is subject to conditional access broadcasting, and any default on receiving this state during service selection must present the default component. The default component is identifiable from the component tag value (as explained below).

The Conditional Access Descriptor may contain a Parental Rate setting. Receivers should be able to handle any Parental Rate setting higher the limit defined in them as specified.

○ Selecting the default component for normal processing

Essentially, it is recommended that the default component be selected as the first component to be presented upon service selection. Check the component tag values (component_tag field in the Stream Identifier Descriptor) entered in the PMT second descriptor loop and present the component having 0x00 (default video) and 0x10 (default audio). Note that it may not be selected for components outside the ranges of assignment to video and audio in Table 14-1 (0x 00 to 0x0F for video components and 0x10 to 0x2F for audio components).

○ Selecting components on the basis of their reservations

Component reservations are specified from the EIT on the basis of component tags entered in the Component or Audio Component Descriptor. Component tag values entered in the PMT are searched for and, if the matching components are located, they are presented. Since, however, components other than the default component may have their component tag values modified by event, desired components may or may not be available in the service selection stage. In this situation, the default component might be selected to keep an eye on subsequent updates to the PMT.

○ Tracking audio languages automatically

Although a precise implementation of this function is extremely difficult to achieve, it can still be implemented to some extent on the assumption that the EIT is stored in the receiver. Check information about the present event that is running with the service to be selected (as by referencing the start_time field in the event information already stored in the receiver) and search for and present the component tag value on the basis of the language specification of the Audio Component Descriptor contained in that event information. This method may not work in all situations, because the break of each event in EIT is not precisely synchronized with the PMT. As a solution, the actual PMT may be received and checked for the presence or absence of the desired component; if the desired component is not found, the default component or any other component as appropriate in the circumstances may be presented.

6. Test the second descriptor loop in the PMT associated with the selected component to scan for the presence or absence of a Conditional Access Descriptor.
7. If the selected component is subject to conditional access, acquire ECM packets and configure the screen display and the descrambler.
8. Present the selected component.
   Transmission specifications for the component that is transmitted by the PID entered in the PMT and its timeout period are specified in a component-specific manner.
9. Receive the EIT[p/f actual].
   EIT[p/f actual] can also be set concurrently with service selection. Reception of the table may come normally later than the PAT or PMT due to a difference in the resend cycle. In the meantime, the display process may be carried out on the basis of the event information stored in the receiver, such as all station EIT[schedule].

If the Component Group Descriptor exists in the present section of the EIT[p/f actual] and if the group type is multiview, subsequent component selection is carried out by group. If the Component Group Descriptor does not exist, the execution of component selection is governed by the specifications of the Component Descriptor and the Audio Component Descriptor. See Chapter 25.

c.7.2 Tracking Components After Service Selection

Changes occurring to the configuration of the audio and video components on service selection are tracked on the basis of the component tag values in the Stream Identifier Descriptor placed in the PMT. Even though the PMT has updated, if a selected component tag value exists, the component identified by the ES PID may be presented. Component tag values are not modified by event, but the ES PID or mode of the component that is referenced by a component tag value may be modified. Receivers should be able to track such changes automatically. The number of components themselves may also change.

If the component having the component tag value selected is lost as a result of increases or decreases in the number of components in an event or event selection, an alternative component in the same program should be presented promptly. Normally, the default component would be presented (the default component is in no event lost).

c.7.3 Processing on Hierarchical Modulation

Hierarchical modulation aims at enabling receivers to continue with reception against a worsening C/N caused by a low-level ES during rainfall attenuation or under other adverse conditions. During hierarchical modulation, the PAT, PMT (except for services that transmit the PMT at a high-level without hierarchical modulation), NIT and the CAT are transmitted at a low level, but if the C/N has worsened to such extent that receivers cannot acquire these tables, there would be no alternative but to patiently wait for recovery or the receivers would have to perform a error recovery routine in one way or another. The state of a worsening C/N as described below assumes that at least packets transmitted at a low level are available. The SI tables (such as SDT, EIT and BIT) are supposed to be transmitted at a high level only and would not be available in times of a worsening C/N. It is assumed, therefore, that display operations that depend on the information conveyed in the SI tables are carried out using the information that has been acquired and stored so far. Receivers should be disabled from component selection while they are incapable of successful reception at a high level.

There are two ways to transmit ESs at a low level. One is transmitting a high-level ES and a low-level ES in a pair. Normally, receivers decode the high-level ES and switch to the ES transmitted at a low level to continue with reception when they detect a worsening C/N or other adverse conditions. The other is transmitting a low-level ES only to gain added immunity to a worsening C/N. No mating high-level ES exists and no switching caused by a changing C/N or any other adverse condition will occur. While the low-level ES that is transmitted in the former case is decoded only when the C/N or an other relevant condition worsens, the low-level ES transmitted in the later case is treated as an ordinary component, involving a totally different course of receiver processing.

Essentially, transmitters have no prior arrangement on whether transmit tables at a low-level or not, because there should be no need for transmitting tables at a low level while there are no concerns over rainfall attenuation or other adverse conditions. Whether hierarchical modulation is in effect or not is unknown to receivers until they actually receive the PMT. Distinction between a low- and a high-level ES can be made by checking to see if a Hierarchical Transmission Descriptor exists in the PMT second loop or not and, if one is given, checking its entry. The Hierarchical Transmission Descriptor indicates whether the ES is a high- or low-level ES (quality_level) and also it is ES_PID (reference_PID). If a Hierarchical Transmission Descriptor does not exist, the ES is a high-level ES, without a mating low-level, requiring no action on the receivers' part in the presence of a worsening C/N or other adverse conditions. An ES that has a Hierarchical Transmission Descriptor entered and that has quality_level = =1 specified is a high-level ES. It always has a mating reference destination low-level ES entered, so it will automatically switch to that destination low-level ES in the event of a worsening C/N or any other adverse conditions. Every low-level ES has a Hierarchical Transmission Descriptor entered in it. A high-level ES and a low-level ES are identified from each other by quality_level = 0, which designates a low-level ES. Whether a low-level ES has a mating high-level ES or not is determined by checking to see if the reference destination ES_PID is entered in reference_PID. For a low-level ES having no mating high-level ES, component tag values are entered in the component descriptors (Component Descriptor, Audio Component Descriptor, Data Content Descriptor) in the EIT beforehand. Whether the ES having the component tag value entered in the EIT will be transmitted at a high or low level is unknown without referencing the PMT. This means that prior reservations or component selections are processed without distinction between high and low levels. A low-level ES having a mating high-level ES is in no event entered in a component descriptor in the EIT.

Normally, present the default component on service selection (as long as C/N and other conditions are satisfactory). The low-level ES that is paired with the high-level ES is in no event specified in the default component. If a low-level ES does not have a mating high-level ES, the default component may be used. Component selection can be carried out according to the component descriptors found in the EIT, without having to make special distinction between low and high levels.

If the C/N or any other conditions have worsened to impede the stable availability of a high-level ES during service selection, look to the PMT to check for the presence or absence a Hierarchical Transmission Descriptor in the description of the ES for the default component. If no Hierarchical Transmission Descriptor exists, set the ES for the default component to decode and wait for recovery. Messages that may be generated at this time are receiver manufacturer-dependent. If a Hierarchical Transmission Descriptor exists in the default component and it is a low-level description, present the low-level ES. If it is a high-level description, present the low-level ES identified by reference_PID in the descriptor. As recovery comes to stay, switch to the ES for the high-level default component.

If the C/N or any other conditions have worsened to impede the stable availability of a high-level ES during reception, look to the PMT to check for the presence or absence a Hierarchical Transmission Descriptor in the description of the ES being decoded. If no Hierarchical Transmission Descriptor exists, wait for recovery with the ES being decoded left as it is. Messages that may be generated at this time are receiver manufacturer-dependent. If a Hierarchical Transmission Descriptor exists in the description of the ES being decoded and it is a low-level description, presenting the low-level ES. If it is a high-level description, present the low-level ES identified by reference_PID in the descriptor. As recovery comes to stay, switch to the original high-level ES or, if such selection is not feasible, present the reference destination ES entered in the Hierarchical Transmission Descriptor entered in the low-level ES.

Multiple high-level ESs are allowed to share one low-level ES as their reference destination. Decoding of a

high-level ES to a lower-level ES is governed by the reference destination. A single low-level ES is not allowed to multiple high-level ESs as its reference destinations. Only one high-level ES is allowed as a reference destination for a low-level ES that is referenced by multiple high-level ESs. Upon recovery from the worsening C/N or other adverse conditions, receivers would either return to the high-level ES that they had originally been decoding or present the reference destination high-level ES if such return is not practicable. A high-level ES having only a low-level ES that does not have a mating high-level ES as its reference destination is allowed. If the C/N or any other relevant condition worsens while decoding the high-level ES, it is switched to the reference destination low-level ES. When receivers recover from the worsening C/N or other adverse conditions subsequently, they may continue decoding the present low-level ES. If receivers had been initially decoding a low-level ES, they would be decoding it, regardless of a worsening C/N or other adverse conditions.
Multiple low-level ESs in no event share a single high-level ES as their reference destination. The high-level ES that is referenced by a low-level ES always references its low-level ES.

c.7.4 Switching Components

Component selection during service selection is carried out on the basis of the Component Descriptor, Audio Component Descriptor and Component Group Descriptor entered in the EIT[p/f actual].

- If multiple videos exist and are selected individually, use a Component Descriptor. If a selective menu is to be created with OSD, the string available in the descriptor can be used, and information, such as component mode, may be presented as appropriate. If no string is entered in the descriptor, use the default string. A Component Descriptor having its value of component_tag between 0x00 and 0x0F may not be used.
- Where dual mono audio or multiple audio component exist, use an Audio Component Descriptor. In creating selective menus with OSD, use the string in the Audio Component Descriptor and information, such as component mode, may be presented as appropriate. Use the default string if no string is entered in the descriptor.
  An Audio Component Descriptor not having its value of component_tag between 0x10 and 0x2F may not be used.

Both the Component Descriptor and the Audio Component Descriptor are provided with a value of component_tag. The target component can be located by referencing the Stream Identifier Descriptor in the PMT on the basis of this value. Because components of a given component type have a higher order of priority as they have a lower value of component_tag, menus can be displayed or toggled in the ascending order of the values of component_tag.

Component Group Descriptors may be inserted in the EIT, in which case the descriptors need be selected in sets, rather than individually. Selectable sets are identified by the component_group_id field of each Component Group Descriptor. If a selective menu is to be created with OSD, the string in each component set can be used. If selective sets (multiview) exist, selection in sets should first be presented, followed by component selection within a particular set. The operation of multiview TV is detailed in Chapter 25, PSI/SI Operational Regulations.

When components are switched on the basis of component descriptors in the EIT[p/f actual], deviations from the actual component configuration indicated by the PMT may result (at least temporarily), with components other than the default component getting out of existence by themselves. Receivers should be able to present the default component when an SI-based component is not found in the PMT. Further, since the audio or video mode is most likely to contradict the SI information and is hence liable to change during an event, receivers should be able to track changes automatically.

Component switching is not needed in the event of inability to receive the EIT[p/f actual].

c.7.5 Operation While Broadcasting Is Paused

As a result of service selection, it may happen that no entry of the desired service exists in the PAT. Because the broadcasting has paused, processing, such as displaying a message as appropriate, would be worthwhile. Naturally, there may be some other room required on the part of the receiver, such as automatically presenting other running services in the broadcaster.

Broadcasting has also paused if the PMT is not acquired within 1 second after the acquisition of the PAT (audio and data type services). However, if a service that involves hierarchical modulation and one that does not involve hierarchical modulation are intermixed in a single TS, it may happen that the service that does not involve hierarchical modulation has access to the PAT, but not to the PMT, during rainfall attenuation or under other adverse conditions. For the receiver messages that are generated under these specific conditions of reception, see Volume 2 (Section 4.14, "Error Messages").

It could also happen that no PAT exists in the TS under the influence of an accident, for a broadcasting system maintenance period and so on. Similar handling is preferred in this case as well (including the case of failure to acquire a PAT).

c.7.6 Event Relay Operation

An Event Group Descriptor that indicates an event relay may be placed in the EIT[p/f] of the event being selected. The event will continue into another service concurrently with or before the end of the event.

Receivers support event relays may operate as described below.

As soon as the relay destination event entered in the destination EIT[p/f] is verified after the Event Group Descriptor is placed, the occurrence of an event relay is announced to the viewer. Details of such announcement are optional, as long it tells that the event the viewer is currently viewing will broadcast on another channel and when it will. If no relay destination event is encountered (including the case in which no EIT[p/f] has been transmitted) before the end of the event, event relay support should essentially be abandoned. The relay destination may have a different TS, and when it does, the EIT[p/f other] needs to be referenced. The relay destination may be an extraordinary service. Either way, the event relay operation is limited to services residing in the same broadcaster.

Following the announcement to the viewer, certain action, such as selecting the relay destination event, may take place at the event end time (start_time + duration) at the viewer's option.

The relay destination may also be an extraordinary service, which requires no special processing is required.

c.8 Videorecording Events

Receivers that implement a function of videorecording events individually while tracking extensions and other contingent conditions automatically should be designed with certain factors taken into account. These considerations are summarized in this section. Particularly, the handling of the EIT[p/f actual] should deserve notice in considering a function that tracks contingent changes to the programming of events automatically.

If receivers are to track changes to the programming of events automatically as they occur, they are open to certain challenges, such as remaining space on videorecording media and the coordination of overlapping reservation events, but their discussions are beyond the scope of this chapter.

c.8.1 Reservation/Reservation Confirmation Time

The reservation of individual events may be accomplished by making primary use of the EIT.

Because EIT[schedule] covers information about the events on tap, it should be designed to present relevant information to the viewer and thus facilitate the viewer's work of reserving the events.

When reserving the videorecording of events, whether to videorecord an event or and which record mode to use should be decided with reference to the contents of the Digital Copy Control descriptors in the EIT and SDT.

In addition, the Content Availability Descriptor can be coupled with a Digital Copy Control Descriptor for use as videorecording control information. Since, however, the Content Availability Descriptor, is placed in the PMT, not in the SDT/EIT, it is decoded on reservation/videorecording reservation in the following manners:

- The retention_state field[*1] of the Content Availability Descriptor is assumed to be the default.

  *1 For more information about retention_state, see Section 21.6.

- The values of copy_restriction_mode and encryption_mode shall be handled as uncertain until PMT is received. After PMT is received, the latest PMT shall be always monitored, and the videorecording control shall be performed according to the described value.
- Other fields may not be decoded as being defaults

Program characteristic information that is provided by the Content Descriptor in the EIT also aids in making videorecording reservations. Auxiliary information pertinent to flexible programming, in particular, hints possible changes occurring the programming of events and helps impellent functions, such prompting the viewer to select a videorecording action when changes occur.
See Section c.5 (Reserving Events) for information possibly relevant to this situation.

c.8.2 Executing Videorecording

c.8.2.1 Before the Start of an Event

The start of an event is determined by referencing start_time in the following section of the EIT[p/f actual]. Normally, the running event state is established not later than 30 seconds before the value of start_time entered in the following section. This length of time may be used as a measure when starting videorecording an event before its start_time, with some service separation time taken into account. Naturally, viewing/videorecording limitations on the preceding event may not allow component recording during this time zone.
In referencing the EIT[p/f other] on other TS just before starting the event, it would be necessary to switch the TS to actual before the event starts to allow for the following conditions:

1) If the event to be videorecorded is defined with the final value of start_time entered in the following section of the EIT[p/f other] and that value of start_time is equal to or later than the value of start_time stored in the receiver, the former value of start_time should be accepted and the start of videorecording confirmed based on that time.
2) If a target event is entered not in the EIT[p/f other] but in the EIT[schedule other] (i.e., (EIT[schedule other] has been received), the same concept as in (1) may apply. Namely, the event is considered to start after the next program, since its initially scheduled start time has changed.
3) Except for Cases (1) and (2), the TS should be switched on the basis of the initial value of start_time of the event, without putting faith in whatsoever the EIT[p/f other] may state.

Just before the start of the event (30 seconds before), the following cases could arise with the EIT[p/f actual]:

1) The event to be videorecorded does not appear in the EIT[p/f actual].

   A change to the start time of the event and its cancellation are conceivable. The resultant receiver action will be described later in Section c.8.2.4.

2) The event to be videorecorded is placed in the present section of the EIT[p/f actual] (with the expedited time being entered in start_time).

   Events may start broadcasting ahead of schedule for programming reasons, though such broadcasting is normally banned. If a receiver detects the case of an event starting ahead of schedule, it should start video recording promptly. It may happen that an event has been suspended on an extension of this condition, in which case an equivalent of the event running operation should be conducted based on the assumption that the event has already started and has been suspended.

3) The event to be videorecorded is entered in the following section of the EIT[p/f actual] but its values of start_time and duration have changed.

   Where changes to the start and finish times of an event have been decided beforehand, receivers should be able to continue with their videorecording setup process according to the contents of the following section. The value of start_time may have changed to undecided. It is operated the same way as described in Section c.8.2.4.

The status of the EIT[p/f actual] could also change over the period of time from the moment right before the start of an event to its start time. Possible changes are diverse, but, when they occur, should be operated properly according to the contents of Table 19-1 in the PSI/SI Operational Regulations. What is important, even though a videorecording operation has already started, the event must not be regarded as ongoing until its start time. For example, even if the event entered in the following section is removed from both the present and following sections of the EIT[p/f actual] just before it start, it must still not be assumed to have ended. Rather, assume that the event has not started as yet, and that its start time has changed or it has been canceled by itself.

Very rarely, the channel on which an event broadcasts changes. Because such a change is limited to a shift to another service of the same media type and in the same broadcaster, if a scheduled event does not appear in the EIT[p/f] at the scheduled time, a look into the EIT[p/f] for another service of the same media type and in the same broadcaster may be useful. If the event has executed on another service, the Event Group Descriptor should be in place that designates a shift of the event. Changes do not necessarily occur at the same time.

c.8.2.2 Event Running

Receivers that support flexible programming should be capable of detecting momentary changes to the EIT[p/f actual] at all times, taking relevant action in the circumstances.

The following situations could arise if the EIT[p/f actual] is updated for a videorecording event:

1) The value of duration changes abruptly, with the videorecording event being left in the present section of the EIT[p/f actual].

   The event may be expedited (early end) or slowed (extension) or it may become undecided. Whatever the change may be, the videorecording process is being carried on. No matter what other conditions are, videorecording of the event should be continued while its even_id is entered in the EIT[p/f actual].

2) A vide-recording event disappears from the present section of the EIT[p/f actual], with no videorecording event being entered in the following section of the same subtable.

   This is the case of an event having ended, regardless of its end time determined by the initial value of duration. It is recommended that the videorecording process be terminated as soon as the videorecording event is removed from both p/f sections of the EIT[p/f actual], with no regard to any other situation prevailing. In the case of rainfalls, EIT[p/f actual] may not be received, and if so, the end of the event cannot be identified. Whether the videorecording of the event is continued or not during rainfalls is manufacturer-dependent. It is recommended that the end of the event be detected by time when continued.

3) A videorecording event disappears from the present section of the EIT[p/f actual] and is entered in the following section of the same subtable.

   This is the case of an event having been suspended due to an emergency news or the like. When receivers detect a suspended event, they should continue with videorecording or suspend videorecording once and wait until the event resumes. However, videorecording of any event that has broadcast while the event has been suspended is not necessarily possible, because it may or may not have the same viewing/videorecording control information as the suspended event.

c.8.2.3 Event Suspended

While an event is suspended, continued monitoring of the EIT[p/f actual] is preferred, whether the videorecording is suspended or continued. Conceivable cases are as follows:

1) The entry of the suspended event disappears from both p/f sections of the EIT[p/f actual].

   The event has ended. Regardless of any other status, the videorecording process that is continuing or that has been suspended be terminated.

2) The suspended state is entered in the present section of the EIT[p/f actual].

   The suspended event resumes. If the videorecording process has been suspended, it should resume promptly. It will be certain that the leading sequence of the event will be chipped off when it resumes from the suspended state.

EIT[p/f actual] could be updated in various other ways by itself, but should pose no specific problems as long as receivers address the two situations outlined above.

In switching the TS while an event is suspended for reasons, such as the viewer's direction, certain care should be exercised.

Essentially, EIT[p/f other] may or may not follow flexible programming. For example, an event that is shown suspended in the EIT[p/f actual] may be marked running in the EIT[p/f other]. Referencing EIT[p/f other] by switching the TS would not tell whether the event has resumed from a suspended state during the switching or the event has not updated at all. In switching the TS while an event is suspended, receivers should basically be designed to terminate the videorecording process and no longer track the event. Needless to say, the event is defined suspended in the EIT[p/f other] as well right after the TS is switched. The event can be processed properly if its resumption is detected as EIT[p/f other] in the same TS is upgraded. There should be no concern if receivers are designed with this factor taken into consideration.

c.8.2.4 Changing the Start Time of an Event and Cancelling an Event

If an event does not appear in the EIT[p/f actual] at the initially scheduled start time, assume that its start time has changed or it has been canceled by itself. (Alternatively, the event may have already ended since its broadcasting had been expedited, though this is prohibited. This situation may be handled the same way as the event has been canceled.)

Essentially, there is no way of making out the difference without consulting the subsequent update status of the EIT[p/f] or EIT[schedule]. If an event does not appear in the EIT not later than 3 hours after its start time, the event has been canceled; if it does, its start time has changed.

If a receiver were to gain a precise insight into this status, it should monitor EIT[p/f] (plus EIT[schedule basic], if possible) for the service for 3 hours and scan for the appearance of an applicable event and, if no event appears, test every instance of the EIT[schedule basic] in the service 3 hours later to locate the event (with reference to event_id). Once 24 hours expire, however, this event must not be tested, because the same value of event_id would be assigned to another event.

Because EIT[schedule basic] covers the range of information transmitted by each station SI as well, positive execution of such processing is unpredictable (e.g., each SI is not necessarily implemented and the information is not necessary transmitted on all TSs). Consequently, the decision to cancel an event or change its start time rests with the perceiver's process. For example, if the event start time for a TV service is changed 10 days later, receivers that are capable of handling each station SI and that are thus conscious of the status change can announce the change to the viewer. However, receivers incapable of handling each station SI would simply announce the cancellation of the event to the viewer in their own way. (Receivers may announce the failure to broadest events at their initially scheduled times in all cases.)

The failure of an event to appear in the EIT[p/f actual] at the initially scheduled start time may also be accounted for by its shift. Receivers with an extra processing capacity may also check to see if it has not shifted to another service of the same media type and in the same broadcaster.

c.8.2.5 Tracking Event Relay Automatically

An Event Group Descriptor that indicates an event relay may be placed in the EIT[p/f] of an event being videorecorded. The event has shifted to another service concurrently with or before the end of the event.

Receivers that support a function of tracking event relays automatically while videorecording events should behave in the following manners:

- The service that carries the relay destination event acquires the EIT[p/f] about 30 seconds before the scheduled event end time.

  If no relay destination event is encountered (including the case in which no EIT[p/f] has been transmitted) before the end of the event, automatic event relay tracking should essentially be abandoned. The relay destination may have a different TS, and when it does, the EIT[p/f other] needs to be referenced. The relay destination may be an extraordinary service. The operation is completely the same either way, because the event relay operation is limited to services of the same media type residing in the same broadcaster.
- Select the relay destination event at the event end time (start_time + duration).

  The event relay should be triggered by time, as distinct from the normal method of detecting the end of an event, but if the event end time is undecided, there would be no alternative way but to detect the end of the event from its deletion from EIT[p/f actual].

c.9 Extraordinary Services

Extraordinary services are those services that are broadcast only rarely, and it is recommended that EIT[schedule] be neither transmitted nor presented to the viewer under normal conditions. Whether a particular service is an extraordinary service or not can be determined with reference to service_type.

What is most important to a receiver supporting extraordinary services is its ability to select services when their selection is requested by the viewer upon their occurrence. Normally, the occurrence of extraordinary services is announced as part of implementation of non-extraordinary services. The viewer can view these services by selecting them directly by means of the channel section function of a remote controller or any other device. Because precisely detecting whether an extraordinary service has occurred or not is most difficult to achieve without actual, the ability to go to seek the extraordinary services anyhow at the viewer’s request would be preferable. This ability is basically receiver-dependent, but since extraordinary services are normally not presented to the viewer, a discussion of what to do in the absence of extraordinary services (which is determined with reference to actual PAT) might be worthwhile. Such action, for example, might be presenting the next channel automatically in the case of up/down service selection.

Because extraordinary services are liable to extensions of baseball game broadcasts or other contingencies, a function would be useful that present the existence of extraordinary services by means of a Program Table or the like when they arise. Although it is impossible to check the other section and determine that an extraordinary service has been actually broadcast, if the EIT[p/f other] for an extraordinary service has been transmitted and if some event is broadcasting, an extraordinary service may be logically assumed broadcasting. Whether an EIT[p/f other] has been transmitted or not can be determined by referencing the EIT_present_following_flag in the SDT for the service. Note, however, even though an EIT[p/f other] has been transmitted, it may be blank in both the present and following sections. Similar processing is meaningful to the actual section as well, where the PAT is basically used to detect the occurrence of an extraordinary service.

Given a process that checks for the presence or absence of extraordinary services each time the PAT updates, the generation of extraordinary services can be detected immediately as they arise.
Because extraordinary services, unlike ordinary services, are normally not presented, they should be switched to another service when they terminate (as detectable from the PAT). Selection to a service of the same broadcaster and same media type in the same TS is recommended.

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