



English Translation

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# CDN Scope Service Approach Specifications

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## Chapter 1 General Information

### 1.1 Introduction

The purpose of this document is to define the specifications which enable to receive all or any of IP broadcasting services, VOD services, download services, IP retransmission services of digital terrestrial television broadcasting (in Japan), and IP retransmission services of BS digital satellite broadcasting (in Japan) provided in a CDN (Content Delivery Network), which takes account of the conditions related to video contents delivery such as QoS, by using the IPTV-service-compliant receivers which can receive all or any of above IPTV related services. For the specifications on the respective services (IP broadcasting service, VOD service, download service, IP retransmission service of digital terrestrial television broadcasting, and IP retransmission service of BS digital satellite broadcasting), see IPTVFJ STD-0004 "IP Broadcasting Specifications", IPTVFJ STD-0002 "VOD Specifications", IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" and IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting".

This document defines the communication specifications such as the communication protocol commonly used for CDN scope services including IP broadcasting services, VOD services and download services, the specifications to set the configuration for IPTV-service-compliant receivers for desired service providers, the multimedia coding specifications (BML specifications for IPTV) used for portals that provide service navigation, as well as the operational specifications that are specific to CDN scope service implementation, using IPTVFJ STD-0004 "IP Broadcasting Specifications", IPTVFJ STD-0002 "VOD Specifications" and download specifications. The CDN scope services also include IP retransmission services of digital terrestrial television broadcasting and the IP retransmission services of BS digital satellite broadcasting, but this document only describes the specifications required for the operation of receivers that can receive IP broadcasting services and VOD services by default, and IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting as option. The specifications of IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting, including the above-mentioned communication specifications and the receiver setting specifications, are described in IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" and IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting".

The details of the download service, including consistency between the CDN scope and other specifications, are yet to be discussed (TBD) and are not discussed in this version. In this document, IP broadcasting services and VOD services refer to those operated in the CDN scope unless otherwise stated.

## 1.2 References Cited

Table 1-1 References Cited

Classification	Item	Standard
Monomedia	Video MPEG-2	ISO/IEC 13818-2   ITU-T Rec. H.262
	Video H.264   MPEG-4 AVC	ISO/IEC 14496-10   ITU-T Rec. H.264
	Audio MPEG2 AAC	ISO/IEC 13818-7
	Audio MPEG1	ISO/IEC 11172-3
	Caption	ARIB STD-B24 "Data Coding and Transmission Specification for Digital Broadcasting"
Multiplex format	MPEG-2 TS	ISO/IEC 13818-1   ITU-T Rec. H.222.0
	TTS	ARIB STD-B24 "Data Coding and Transmission Specification for Digital Broadcasting"
Encryption algorithm	AES	FIPS publication 197 "Advanced Encryption Standards (AES)"
Streaming transmission	RTP, RTCP, RTSP	RFC3550 "RTP: A Transport protocol for Real-Time Applications" RFC2250 "RTP Payload Format for MPEG1/MPEG2 Video" RFC2326 "Real Time Streaming Protocol (RTSP)"
Multicast	IGMPv2	RFC2236 "Internet Group Management Protocol, Version 2" RFC3228 "IANA Considerations for IPv4 Internet Group Management Protocol (IGMP)"
	MLDv2	RFC3810 "Multicast Listener Discovery Version 2 (MLDv2) for IPv6"
FEC	Pro-MPEG	RFC2733 "An RTP Payload Format for Generic Forward Error Correction" "Pro-MPEG Code of Practice #3 release 2"
URI	URI	RFC3986 "Uniform Resource Identifier (URI): Generic Syntax" RFC1738 "Uniform Resource Locators (URL)" RFC2396 "Uniform Resource Identifiers (URI): Generic Syntax" RFC2397 "The 'data' URL Scheme "
HTTP	HTTP	RFC2616 "Hypertext Transfer Protocol -- HTTP/1.1"
Secure communication	SSL/TLS	RFC2246 "The TLS Protocol Version1.0" RFC2818 "HTTP Over TLS"

Communication protocol	UDP, TCP	RFC768 "User Datagram Protocol" RFC793 "Transmission Control Protocol" RFC1323 "TCP Extensions for High Performance (TCP Window Scale etc.) " RFC2018 "TCP Selective Acknowledgment Options (SACK)"
	IP, ICMP	RFC791 "Internet Protocol" RFC792 "Internet Control Message Protocol"
	IPv6, ICMPv6	RFC2460 "Internet Protocol Version 6 (IPv6) Specifications" RFC2461 "Neighbor Discovery for IPv6 (NDP) " RFC2462 "IPv6 Stateless Address Autoconfiguration" RFC4443 "Internet Control Message Protocol (ICMPv6) for the Internet protocol Version 6 (IPv6) Specifications" RFC4291 "IP Version 6 Addressing Architecture"
	DHCP	RFC2131 "Dynamic Host Configuration Protocol (DHCPv4)" RFC3315 "Dynamic Host Configuration Protocol for IPv6 (DHCPv6) " RFC3646 "DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)" RFC3736 "Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6"
	DNS	RFC1034 "Domain Names – concepts and facility (DNS)" RFC1035 "Domain Names – implementation and specification (DNS)" RFC3596 "DNS Extensions to Support IP Version 6" RFC2181 "Clarifications to the DNS Specifications" RFC2671 "Extension Mechanisms for DNS (EDNS0)"
SNTP		RFC4330 "Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI"

Digital broadcasting related		<p>ARIB STD-B1 "Digital Receiver For Digital Satellite Broadcasting Services Using Communication Satellites"</p> <p>ARIB STD-B5 "Data Multiplex Broadcasting for the Conventional Television Using the Vertical Blanking Interval"</p> <p>ARIB STD-B10 "Service Information for Digital Broadcasting System"</p> <p>ARIB STD-B20 "Transmission and Operation Conditions for BS Digital Broadcasting"</p> <p>ARIB STD-B21 "Receiver for Digital Broadcasting"</p> <p>ARIB STD-B24 "Data Coding and Transmission Specification for Digital Broadcasting"</p> <p>ARIB STD-B25 "Conditional Access System Specifications for Digital Broadcasting"</p> <p>ARIB STD-B31 "Transmission System for Digital Terrestrial Television Broadcasting"</p> <p>ARIB STD-B32 "Video Coding, Audio Coding and Multiplexing Specifications for Digital Broadcasting"</p> <p>ARIB STD-B38 "Coding, Transmission and Storage Specifications for Broadcasting System Based on Home Servers"</p> <p>ARIB TR-B14 "Operational Guidelines for Digital Terrestrial Television Broadcasting"</p> <p>ARIB TR-B15 "Operational Guidelines for Digital Satellite Broadcasting"</p> <p>ARIB TR-B27 "Digital Broadcasting System based on Home Servers"</p>
CAS/DRM related	Marlin	<p>Marlin IPTV End-point Service Specification Version 1.0.2(or later version)</p> <p>Marlin Trust Management Document – for IPTV-ES Version 1.3(or later version)</p> <p>Marlin IPTV-ES/J Specific Compliance Rules for VoD Version 1.2(or later version)</p> <p>Marlin IPTV-ES/J Specific Compliance Rules for IP Multicast Version 1.3(or later version)</p>
High-speed digital interface related	DTCP	<p>"DLNA Networked Device Interoperability Guidelines", Digital Living Network Alliance</p> <p>"Digital Transmission Content Protection Specifications Volume 1", Digital Transmission Licensing Administrator</p> <p>"DTCP Volume 1 Supplement E Mapping DTCP to IP", Digital Transmission Licensing Administrator</p>
Browser related		<p>RFC1123 "Requirements for Internet Hosts - Application and Support"</p> <p>RFC1036 "Standard for interchange of USENET messages"</p> <p>RFC2965 "HTTP State Management Mechanism"</p>

## 1.3 Glossary

Table 1-2 Glossary

Terms	Description
8-bit character code	A code system that requires a lower overhead for switching between character sets than 7-bit code, which increases character transmission efficiency.
ADTS	Audio Data Transport Stream
ARIB	Association of Radio Industries and Business: An organization which standardizes the technologies that are related to radio utilization in Japan, whose members consist of broadcasters, telecommunication companies and manufacturers.
Aspect ratio	The ratio of the horizontal dimension to the vertical dimension of a television. In BS digital broadcasting, the aspect ratio is 16:9 or 4:3.
Audio mode	The format that is used to process audio signals including monaural, stereo, multi-channel stereo, dual audio and multi audio modes.
AV player	An application to provide playback control functions for the contents delivered by VOD services.
Basic registration	To register a user with a service provider as a customer and allow the user to apply for the use of services provided by service providers.
BCD	Binary Coded Decimal
Best effort	The state or type of service provisioning in which Quality of Service (QoS) is not guaranteed when a communication network is used.
BIT	Broadcaster Information Table: In IP broadcasting, BIT indicates a table containing IP broadcaster configuration information. BIT lists services provided by IP broadcasters and links to their portals.
BML	Broadcast Markup Language: The XML application language defined in ARIB STD-B24 Volume 2
CA replacement service	CA replacement service is a service that directs users to the "information channels" that are operated by broadcasters when users select a scrambled channel of a broadcaster they do not subscribe to.
CAS	Conditional Access System: CAS is a system to control viewing and listening of services (service channels) and events (programs). Essential for pay-TV.
CAS/DRM client	A function entity in a receiver to obtain and manage licenses and supply content keys when contents are used.
CAS/DRM operator	An entity that operates CAS/DRM. A CAS/DRM operator provides CAS/DRM functions for service providers, where a platform is regarded as the minimum collective unit.
CAS/DRM server	A server that performs operations such as issuing and managing licenses.
CDN	An IP communication network that takes account of the conditions such as QoS defined in this document and enables direct connection with home reception environments through an access network.
Communication network	A network that provides bidirectional transmission channels for receivers.
Content download service	A type of IPTV service that delivers contents by downloading and storing contents in the storage media of receivers before playback. This version does not cover content download services.
Content key	A content-specific key to encrypt the VOD service contents.

Content playback control metafile	A file that contains data, such as ERI, LLI, and NCI, for controlling or displaying, which is used when contents are played back. A content playback control metafile is regarded as part of the content.
Contents	Contents are provided in stream format, and comprised of video, audio, and other data to be viewed by users. In some cases, contents mean those provided through VOD services. In this document, "IPTV contents" is also used as a synonym.
CRID	Content Reference Identifier
d button	A button used to display the IP broadcasting program link information screen (the portal service screen that shows IP broadcasts in the subscreen)
Default gateway	A device that serves as an entrance/exit used to access outside a network.
DHCP	Dynamic Host Configuration Protocol: The protocol to allocate IP addresses automatically
Direct channel selection	A method for selecting a channel on a receiver. A service is selected by directly specifying a service ID using the numeric buttons on a remote controller of a receiver.
DNS	Domain Name Service [RFC1034, RFC1035]: The protocol used for the services that map host names and IP addresses on a network
Download	To transfer files that are stored on a server to a receiver via a communication network. This version does not cover this feature.
DTS	Decoding Time Stamp: Time control information for stream decoding
ECG	A resident application on a receiver that aims to provide a means to navigate contents for VOD streaming services across service providers.
ECG metadata	An XML document used for ECG, describing attribute information related to contents, packages and licenses.
ECG metadata server	A server that provides ECG metadata.
ECM	Entitlement Control Message: ECM is defined as the common information that includes the Scramble Key(Ks) which is encrypted with the Work Key(Kw).
EIT	Event Information Table : EIT is defined as the table in which program related information such as program titles, broadcast dates and times and brief program descriptions is described.
Entity	A data set that is handled as one unit. A device or equipment that provides functions.
EPG	Electronic Program Guide : A resident application of a receiver that aims to provide program information for IP broadcasting services such as program tables.
ERI	Entry Resource Information: Information for identifying the entry resources of per-use contents.
ES	Elementary Stream : ES is defined as the coded video, audio or independent data in PES packet. One ES is carried in a sequence of PES packets with the same stream ID.
FEC	Forward Error Correction: Technology to correct an error in real time by sending a data packet and redundant packet together.
Home network	A network that connects devices in a household. An IP network is assumed.
HTTP	Hypertext Transfer Protocol [RFC2616]: The application layer protocol used for data transfer on the World Wide Web.
IGMPv2	The standard multicast control protocol for IPv4 networks (RFC2236).

IP	Internet Protocol: The network layer protocol that defines the addressing mechanism of the Internet and transmits data (RFC791).
IP address	An ID number of a device that is connected to an IP network.
IP broadcasting service	A broadcasting service with program scheduling that enables content delivery using an IPTV service. Delivered using multicast streaming.
ip_broadcaster_id	An identifier to distinguish broadcasters uniquely within a network. Unique IDs are allocated to broadcasters.
IPTV service	A generic term to indicate services that deliver contents using IP networks which are implemented according to the IPTV standards.
IPv4	The international standard protocol used as the basis of the current LAN and Internet.
IPv6	The protocol succeeding IPv4. The protocol has additional features such as extension of address parts and security functions.
JST	Japan Standard Time (Defined as "UTC + 9 hours" in the ARIB STD-B10 standard)
Letter box	The system to place black areas to the top and bottom of the screen when video with an aspect ratio of 16:9 is displayed on a screen with an aspect ratio of 4:3.
License	The copyright data that indicates the right to use and conditions for contents use with the CAS-DRM method and contains a decryption key for the contents. Licenses are identified by license IDs.
License ID	An identifier to specify a license across the entire service platform that conforms to the specifications in this document.
LLI	License Link Information: Information used to refer to a license of per-use contents.
MC license	The main license in the 2-level license method used for IP broadcasting services.
MJD	Modified Julian Date: Total number of days since 0:00 of November 17, 1858.
MLDv2	The standard multicast control protocol for IPv6 networks (RFC3810). Reception can be controlled not only with <u>group_address</u> but also with <u>source_address</u> .
MPEG-2	Moving Pictures Expert Group-2: The compressed encoding technology for data containing video and audio, which was standardized by International Organization for Standardization (ISO/IEC 13818).
MPEG-2 TS	Transport stream defined by the MPEG system standard (ISO/IEC 13818-1).
Multicast	To specify multiple IP addresses on a communication network and transmit the same data. In a single data transmission, the data is duplicated by a router in the communication channel according to destinations. When access is concentrated, load on the network can be reduced by using multicast.
Mutual authentication	To mutually verify the validity of each component based on PKI.
NAT	Network Address Translation: The technical method that transparently interconverts between a single global IP address and shared multiple local IP addresses.
NCI	Network content Control Information: Information related to use of streaming services when the content delivery type that is defined in Chapter 5 "Content Playback Control Metafiles" of IPTVFJ STD-0002 "VOD Specifications" is streaming.
network	A group of multiplexed MPEG-2 TS that is transmitted by a distribution system. In IP broadcasting, a network indicates a platform that implements IP broadcasting.

NIT	Network Information Table: A table that carries information associating transmission path information such as frequency and service channels, and lists all service channel ID numbers included in a distribution system.
One-touch channel selection	A method to select a channel on a receiver. Certain services (or providers) are preassigned to certain buttons, and pressing the buttons enables direct selection of the preassigned services (or providers).
Package	Content billing unit. A package can indicate one or multiple contents sets. Also, "package" is used to indicate the contract unit such as monthly. Packages are identified using purchase identifiers(PurchaseID).
Parental lock	A mechanism to restrict information to be displayed for broadcast programs and contents with user age restriction, which also allows users to lock/unlock restriction using pin numbers.
Parental rate	Viewing restrictions based on age. Recommended user minimum age.
payload	Payload is an array of bytes that follows the header byte in a packet.
PCR	Program Clock Reference.
PES	Packetized Elementary Stream: Packetized video, audio, independent data, etc. of variable length.
PKI	Public Key Infrastructure.
Platform operator	A platform operator manages service providers collectively as a group. A platform operator also provides information such as platform configuration information and SI information.
PMT	Program Map Table: PMT specifies the packet ID of the TS packet that transmits common information among related information in conditional access broadcasting and the packet ID of the TS packet that transmits coded signals comprising a program.
PNG	Portable Network Graphics: A graphics file format that succeeds GIF. PNG is pronounced as "ping" and provides lossless compression without patent issues. The file is comprised of an 8-byte signature followed by a series of chunks.
Portal	Entrance to a service
Portal server	A Web server on which BML contents are placed to provide portal services.
Portal service	A Web service that is operated by an IPTV service provider whose main objective is to enable content navigation for IPTV services.
PPPoE	PPP over Ethernet: A protocol for utilizing the functions of PPP (Point to Point Protocol) on Ethernet.
Profile	Classification to limit the functions to be used in the MPEG2 coding method.
Protocol	Communication procedures and communication specifications.
Protocol stack	A stack of protocols that are required for processing on communication networks to describe the functions.
PSI	Program Specific Information: Information required to select a specific program, consisting 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: Information that manages the presentation output time.
Public key certificate	The data that is used for certifying that a specific key belongs to a specific entity. A signature is assigned to a public key certificate.
Receiver	A receiver is connected to an IP network and has access to IP broadcasting services and VOD services.

reserved	Undefined. "Reserved" indicates that a specific coding bit stream may be defined in the ISO standard for future extension. All the bits that are not defined in the ARIB standard should be set to "1".
Resident application	A component in a receiver used by an end user, which performs no secure processing such as creation of program tables.
RFC	Request For Comments: Technical information that is published for the Internet community by the Network Working Group.
RMPI	Rights Management and Protection Information: Conditions for use of contents.
RTSP	Real Time Streaming Protocol: The protocol for delivering video and audio in real time over the TCP/IP network.
SAC	Secure Authenticated Channel: An encrypted channel based on mutual authentication.
Scramble key	A key to encrypt IP broadcasting contents. Scramble keys are renewed regularly.
SDP	Session Description Protocol: Session information that is notified when a multimedia session is started.
Sequence	The processing procedures that are communicated between terminalreceivers and servers.
Service	Service (service channel) is defined as a series of scheduled broadcasting programs that are organized by a commissioned broadcaster.
Service application	A user signs up with a service provider to use a specific service. This allows the user to use the service and view the contents within the scope of the contract. A synonym for package purchase.
Service provider	An entity that provides content delivery services.
service_id	ID allocated to each service
Session	A series of processes that are performed by a user.
SI	Service Information: Various information defined to improve the convenience of program selection. SI is defined by the ordinances of the Ministry of Internal Affairs and Communications and its details are defined by the ARIB standard. SI also includes MPEG-2 PSI information in addition to the expanded portion of the ARIB standard.
Side Panel	The system to place black areas on both sides of the screen when video with an aspect ratio of 4:3 is displayed on a screen with an aspect ratio of 16:9
SI-exclusive stream TS	A special transport stream that does not contain video and audio signals but contains SI only. Service is not defined, so PAT and PMT are not multiplexed. In IP broadcasting, SI-exclusive streams TS is used to transmit the EIT schedule for all channels collectively and effectively.
SSL	Secure Socket Layer: A socket-level security protocol. SSL is positioned between the TCP layer and application layer and provides encryption/decryption and authentication.
STD	Standard
Streaming	The viewing method in which data is played back in real time as a user receives the data.
Subscriber management server	A server that is used for registration of information such as user name, address and means of billing/settlement as well as issue of information such as user ID and password.
Subtitle	The service of superimposing video-related text on TV broadcast video.
Superimpose	The service to provide captions that are asynchronous to the main video, audio and data. It is used for up-to-the-minute news, changes in the program schedule, time signals, etc.

Tier bit array	The array of tier bits corresponding to the contracts (tiers) that are included in the MC license. The tier bit array indicates whether there are multiple contracts for the MC license.
TLS	Transport Layer Security: The security protocol that is standardized based on SSL. In particular, changes have been made to hash processing.
TOT	Time Offset Table: TOT specifies the current date and time, and the time difference between the actual time and the displayed time when the summer time is applied. In IP broadcasting, TOT and TDT are not transmitted.
TS	Transport Stream: The transport stream defined by the MPEG system standard (ISO/IEC 13818-1). In BS digital broadcasting, one transponder contains multiple TSes that are identified by TMCC signals.
TTS	The time-stamped TS format with time stamps defined in ARIB STD-B24 Volume 2.
UNI	User Network Interface: The specifications for the interface between user networks and telecommunication companies' networks.
Unicast	To specify a single IP address on the communication network and communicate with a specific user.
Up/down channel selection	A method for selecting a channel using the up/down cursor keys on a remote controller to switch between services in the order of service_id.
URI	Uniform Resource Identifier: The description method to indicate where information is located. URI includes URL.
UTC	Universal Time Coordinated: Time commonly used around the world that is determined based on international agreement.
Video contents server	A server that provides contents.
VOD service	The on-demand unicast streaming service that delivers contents as an IPTV service.
XML	Extensible Markup Language: One of the markup languages and a metalanguage. XML version 1.0 is used in this document.

## Chapter 2 Overview

### 2.1 Basic Requirements for CDN Scope Service

CDN scope service is defined as a service that provides all or any of IP broadcasting services, VOD services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting, which is available for use on a receiver that can receive all or any of these services. The following sections describe the basic requirements for CDN scope service. For the requirements for respective services, see IPTVFJ STD-0004 "IP Broadcasting Specifications", IPTVFJ STD-0002 "VOD Specifications", IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" and IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting".

#### 2.1.1 Network Environment

##### 2.1.1.1 CDN/Access Line

This document assumes a network environment that has a high-speed IP network/access line using such media as optical fiber to enable stable video delivery from a server to a network termination unit using multicast or unicast. In order to enable stable video delivery at a high rate, the specifications in this document assume, for example, that the IP network/access line equipment is managed by a single company, that it is operated based on the circumstances of the users, and that communication packets containing video are controlled with higher priority, even on a best-effort network. In this document, this type of IP network is called CDN (Contents Delivery Network) and is distinguished from the Internet. Figure 1 shows the assumed network configuration. Servers that comply with the specifications in this document are connected on a CDN, and a receiver is connected to the access line via a home network. Basically, it is assumed that a single contract unit (household, etc.) is connected to a single CDN.

A CDN that provides IP retransmission services of digital terrestrial television broadcasting must provide a function to restrict the transmission area. For more information, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 0, Chapter 4 "Requirements for IP Retransmission Service".

##### 2.1.1.2 Home Environment for IPTV

- Establishment of high-speed connection with a CDN  
Installation and setting of the receiver equipment that is provided by a CDN operator may be required. Also, in order to implement UDP and streaming reception using multicast, a home gateway supporting these features is required (for example, a function to communicate across NAT for IPv4 networks). Consideration must be given to prevent confusion among the users in regard to the implementation and setting up of home network equipment.
- IPTV-service-compliant receivers  
Connection is required among receivers compliant with CDN scope services and

compliant with the specifications in this document, the above mentioned receiver equipment and a home gateway using Ethernet, etc.

➤ Other

Building a home network and connecting multiple receivers that are compliant with CDN scope services also enables common use of services.

An ISP contract is not necessarily required to use a CDN scope service that complies with the specifications in this document.

For more information, see Chapter 4 "Network Connection and Communication Protocol".

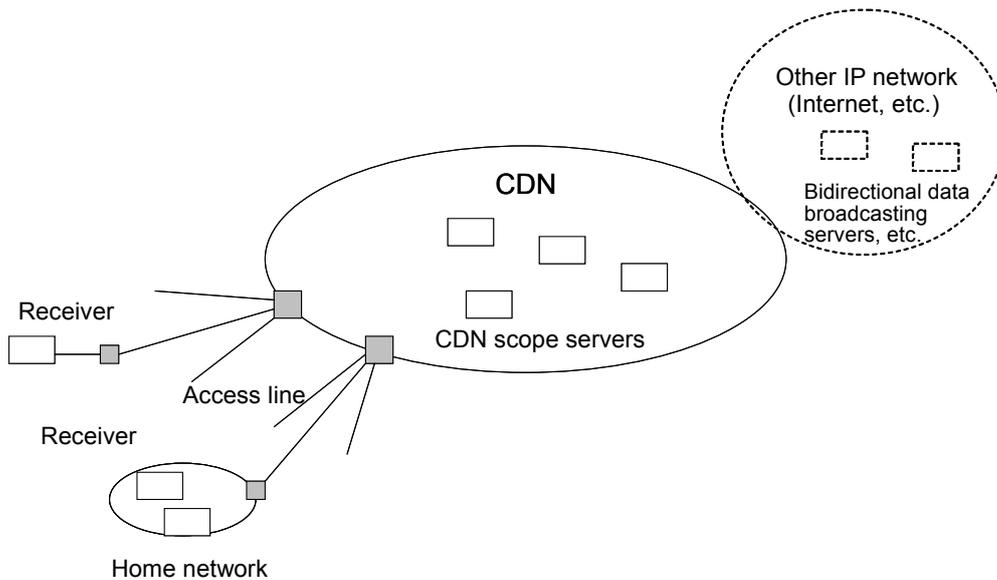


Figure 1 Network Configuration

### 2.1.2 Business Operator Model

Mainly, three layers of business operators are assumed as described below. These business operators are defined to be used as models and do not set restrictions, for example, for a service provider who also serves as a platform operator.

- Service provider  
A service provider sells and offers contracts for all or any of IP broadcasting services, VOD services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting. A service provider can provide IP broadcasting/VOD services independently.
  - CDN operator  
A CDN operator is a network company that manages a CDN and provides a physical delivery infrastructure.
  - Platform operator
- (1) IP broadcasting/VOD  
An IP broadcasting/VOD platform operator manages service providers collectively as a group. An IP broadcasting/VOD platform operator also provides such information as

platform configuration information and SI information, and CAS/DRM functions for these service providers as a CAS/DRM operator or by cooperating with a CAS/DRM operator.

(2) IP retransmission of digital terrestrial television broadcasting

A platform operator for IP retransmission of digital terrestrial television broadcasting receives digital terrestrial television broadcasts and provides a platform to retransmit the received signals using an IP network. A platform operator for IP retransmission of digital terrestrial television broadcasting provides a platform to enable IP retransmission services of digital terrestrial television broadcasting for multiple service providers. Also, a platform operator for IP retransmission of digital terrestrial television broadcasting provides such features as CAS functions as a CAS operator or by cooperating with a CAS operator.

(3) IP retransmission of BS digital satellite broadcasting

A platform operator for IP retransmission for BS digital satellite broadcasting receives BS digital satellite broadcasts and provides a platform to retransmit the received signals using an IP network. A platform operator for IP retransmission of BS digital satellite broadcasting provides a platform to enable IP retransmission services of BS digital satellite broadcasting for multiple service providers. Also, a platform operator for IP retransmission of BS digital satellite broadcasting provides such features as CAS functions as a CAS operator or by cooperating with a CAS operator.

In this document, it is assumed that multiple platform operators are managed by a CDN operator and that multiple service providers are managed by a platform operator. Also, it is assumed that new service providers join an existing platform operator, and that new platform operators join an existing CDN operator taking multiple new service providers as the occasion demands. However, as the number of platform operators, including service providers who are operating IP broadcasting services, increases on one CDN, the number of channels also increases. Therefore, consideration must be given on how to prevent network switching from becoming complicated.

Figure 2 shows an example of the assumed business operator model for IP broadcasting services/VOD services. For a description of the business operator model for IP retransmission services of digital terrestrial television broadcasting, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 0, Chapter 4 "Requirements for IP Retransmission". For a description of the business operator model for IP retransmission services of BS digital satellite broadcasting, see IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting" Volume 0, Chapter 4 "Requirements for IP Retransmission of BS Digital Satellite Broadcasting".

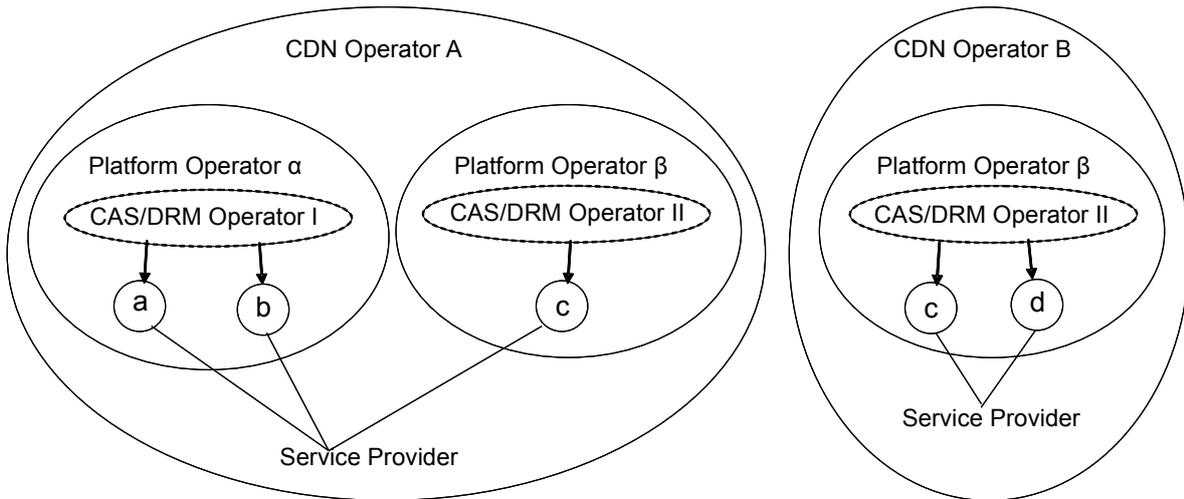


Figure 2 Example of Business Operator Structure for IP Broadcasting/VOD Service

The Platform Operator  $\beta$  expands the same kind of business operations on the network of the CDN Operator A and on the network of the CDN Operator B. The Service Operator c expands the same kind of business operations on the network of the CDN Operator A and on the network of the CDN Operator B, using the platforms of the Platform Operator  $\beta$ . However, it is not assumed that a service provider provides similar services in the same CDN using different platforms provided by different platform operators. Only one CAS/DRM operator is allowed on each platform, but like the CAS/DRM Operator II in this example, a CAS/DRM operator can conduct the same kind of business operations using separate platforms that are provided by the same platform operator: for example, in this case, the Platform Operator  $\beta$  which is using different networks provided by the CDN Operator A and the CDN Operator B, respectively.

When IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting are provided in addition to IP broadcasting/VOD services, the same service provider operates across the IP broadcasting/VOD platform, IP retransmission platform of digital terrestrial television broadcasting and IP retransmission platform of BS digital satellite broadcasting(Figure 3).

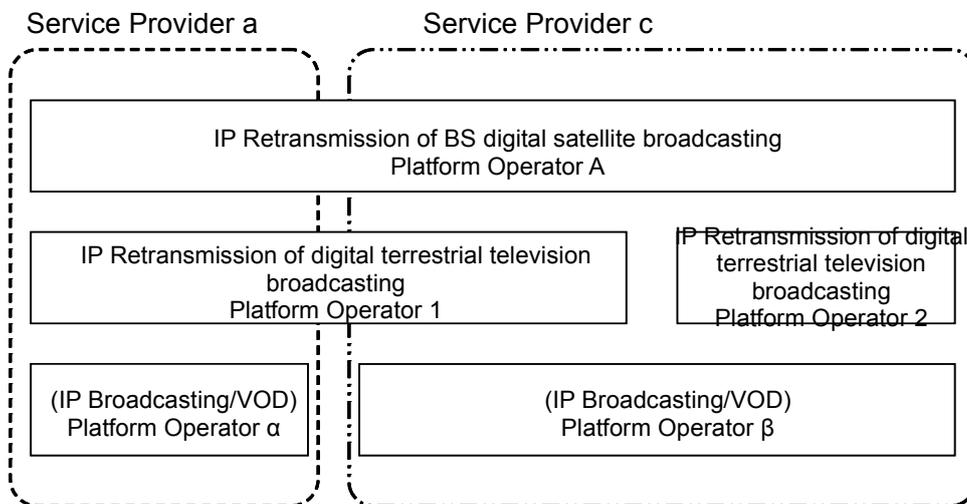


Figure 3 Example of Business Operator Structure for CDN Scope Service

### 2.1.3 Service Subscription Model

A user concludes a contract by phone or over the window with a desired service provider who provides CDN scope services on a CDN, to which a compliant receiver is connected to receive CDN scope services. Then, the IPTV-service-compliant receivers are configured so that it can receive services from the service provider based on the contract. For more information, see Chapter 5 "Service Entry and Related Specifications".

## 2.2 Overview of CDN Scope Service

This section describes details of the CDN scope services, mainly concerning IP broadcasting/VOD services. For the specifications of IP retransmission services of digital terrestrial television broadcasting, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 0, Chapter 5 "Service Model for IP Retransmission of Digital Terrestrial Television Broadcasting". For the specifications of IP retransmission services of BS digital satellite broadcasting, see IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting" Volume 0, Chapter 5 "Service Model for IP Retransmission of BS Digital Satellite Broadcasting".

### 2.2.1 Content Delivery Service

A content delivery service is classified into IP broadcasting and VOD service. All content delivery services basically deliver video contents only. In any types of content delivery services, signals in video contents consist of the basic components: 1 channel of video supporting both HDTV and SDTV resolutions and up to two channels of audio. A content delivery service can also provide captions.

#### 2.2.1.1 IP Broadcasting Service

An IP broadcasting service is a broadcasting service based on the concept of channels that are programmed in accordance with the time axis to enable an audio-visual type that is similar to those of BS digital satellite broadcasting, CS digital satellite broadcasting, and digital terrestrial television broadcasting, etc.

The assumed operation type is shown in Figure 4, in which a content provider outside the CDN transmits service streams sent on a dedicated line, etc. as an IP broadcasting service using multicast through an IP broadcasting service transmission server that is managed by a service provider. The service provider providing IP broadcasting services can also create streams and send them to the CDN directly from the server using multicast.

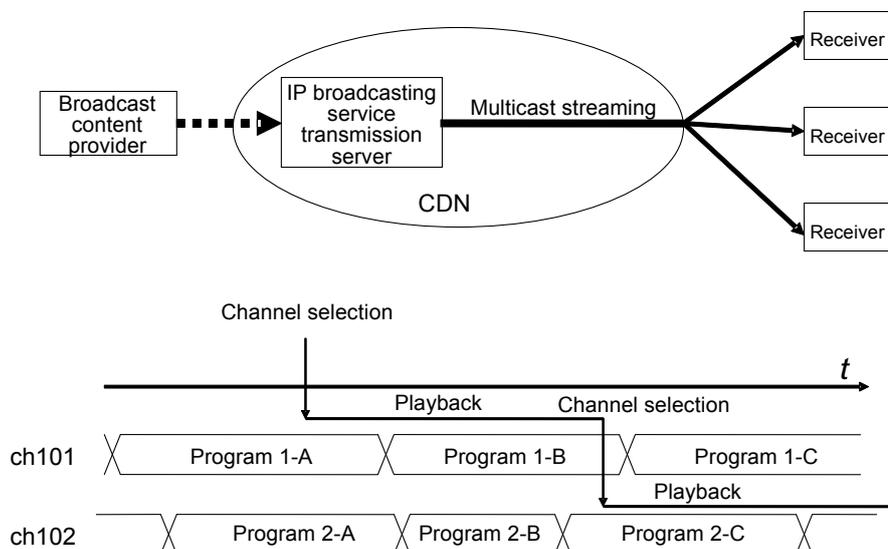


Figure 4 Example of IP Broadcasting Service Operation

IP broadcasting services are classified into unencrypted promotion services that are used mainly for promotion and encrypted services that provide the contents of pay services, etc.

It is assumed that a promotion service becomes viewable when the connection is established with a CDN with the primary aim of directing users to basic registration and promoting purchase of contents (addition of new channels). Operations such as using the *d* button of a remote controller while viewing a service and displaying portal service screens showing videos in a subscreen enable promotion of basic registration and purchase of contents (Similar functions can also be provided using the encrypted service).

An encrypted service becomes viewable when a user completes basic registration with a service provider as well as the service subscription (package purchase). It is assumed that sales of pay services are mainly based on a flat-rate system such as a flat-rate system based on monthly contracts.

The assumed channel selection method is to switch networks, for example, by using a remote controller, and selecting "IP broadcasting *x*" from digital terrestrial television broadcasting, BS digital satellite broadcasting, CS110 digital satellite broadcasting, and IP broadcasting (IP broadcasting 1, IP broadcasting 2...) to determine a channel group, from which a desired channel can be selected. The number of channel groups corresponds to the number of platform operators operating IP broadcasting services on the CDN, with whom the users conclude contracts. This number may increase or decrease in the future.

The following selection methods are assumed.

- Direct selection and up/down channel selection  
When "IP broadcasting *x*" is selected using the network switching button of a remote controller, the user selects a desired channel directly by entering the channel number using the number button, or selects a desired channel by pressing the up/down button until the desired channel is chosen by going through the channels sequentially. Application of one-touch channel selection can also be assumed.
- Channel selection using EPG  
When "IP broadcasting *x*" is selected using the network switching button of a remote controller, the user uses the EPG button to display the EPG screen. In the EPG screen, the user selects a desired channel by choosing a channel (program). Alternatively, the user can select a specific program and perform scheduled channel selection.
- Channel selection using a portal  
The user selects a desired channel by accessing the portal of a specific provider to display the portal screen and selecting a channel (program) in the channel selection/program selection screen of the IP broadcasting service, which is created by the provider in multimedia format.

2.2.1.2 VOD Service

A VOD service enables viewing of a program (contents) from the beginning (or any time points) based on requests from users. In the assumed operation type, contents are streamed from the beginning (or a specified point) from a video content server using unicast in response to the play request that was sent from a receiver to the server when the contents were selected by a user from the content list on the screen of the receiver. The assumed trick playback in regard to content playback includes variable speed playback with several speed settings (fast-forward playback, fast-rewind playback, etc.), pause, resume, and other functions such as chapter jump playback that is set into contents.

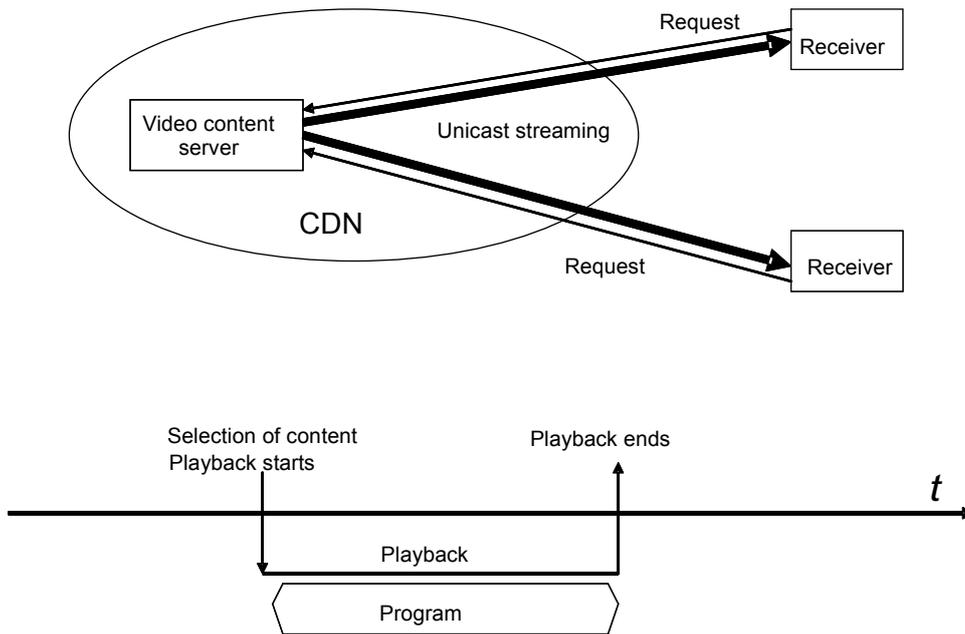


Figure 5 Image of VOD Service

VOD service contents are divided into unencrypted contents that are mainly used for promotion and encrypted contents that are mainly used for pay services.

Unencrypted contents become available for viewing when a user connects to a CDN, and it is assumed that the user views these contents by performing playback operations in portal screens provided by each service provider.

Encrypted contents become available for viewing when a user completes basic registration with a service provider as well as service subscription(package purchase). Various pay-service sales types are assumed from rate systems based on content use to flat-rate systems based on monthly contracts.

The following methods for starting content playback are assumed.

- Starting playback from a portal  
A user starts content playback by accessing a portal of a specific provider to display the portal screen and selecting the desired content from a content list, etc. created in multimedia format by the provider.
- Starting playback using the ECG  
A user starts content playback by displaying the ECG screen, searching and displaying the desired content using the ECG buttons of the remote controller, and selecting the content.

## 2.2.2 Content Navigation Service

Content navigation service is a general term used to indicate services and reception functions that provide a means to select programs (contents) and channels when using content delivery services. The means available in IP broadcasting/VOD services are portal services, EPG and ECG. The following section describes the assumptions for remote controllers that are mainly used for content navigation, which is followed by a section describing each navigation service.

### 2.2.2.1 Remote Controller

Remote controllers differ depending on receiver manufacture specifications. The following is a list of buttons that are generally available on a remote controller and their functions. Only the remote controller buttons that are assumed to be used for IP broadcasting/VOD services are listed here.

- Number buttons
  - Used to enter numbers for direct channel selection for IP broadcasting services
  - Used to enter numbers for portal services
- UP/DOWN buttons
  - Used for direct channel selection for IP broadcasting services
- Network switching buttons
  - Used to select an IP broadcasting service among others such as digital terrestrial television broadcasting and BS digital satellite broadcasting.
- Arrow buttons, Enter button and color buttons
  - Used to select a function on the screen of a receiver
  - Used to select a function for a portal service
- EPG button
  - Used to display EPG
- ECG button
  - Used to display ECG
- Portal button
  - Used to display the list of service provider portals
- Play button, Stop button, Pause button, Fast-forward button, Fast-rewind button, Skip-forward button and Skip-backward button
  - Provide playback control when VOD services are received

- Back button
  - Used to move to the previous screen (receiver)
  - Used to move to the precious screen (portal)
- *d* button
  - Used to display the IP broadcasting program link information screen (the portal service screen that shows IP broadcasts in the subscreen)
- Audio switching button
  - Used to switch between audios (bilingual mode, etc.) for IP broadcasting services, VOD services, etc.
- Caption switching button
  - Used to turn on/off captions and switch between caption languages for IP broadcasting services, VOD services, etc.

#### 2.2.2.2 Portal Service

It is assumed that each service provider manages a portal service. A portal service basically provides a type of service similar to Web services provided on the Internet. The difference from the existing Web services is that a portal service provides a presentation function that is similar to a TV screen as with data broadcasting for digital broadcasting and a control function that is related to IP broadcasting/VOD services. Hyperlinks within a portal site and between portal sites are also provided, but links to general Web sites on the Internet are not assumed. Also, Web security is implemented by the server authentication function and encrypted communication using TLS/SSL. The CAS/DRM client identifier (DRM\_ID), an ID that is unique to a receiver, can be used to identify the receiver, by posting the identifier that is linked to a user. A simple receiver authentication function with an authentication key can also be used. Also, for R20 contents, the show/hide mode (e.g. package information) and content playback restriction status can be switched by setting the parental function to ON/OFF. For other contents with viewing restrictions, parental controls based on age confirmation and password authentication are available for thumbnail image displays and content playback.

The main functions provided by a portal service are as follows:

- Basic registration
 

Provides users with opportunities to complete basic registration with the service provider who is managing the portal so that the users can use the basic services. The assumed procedure is to register personal information with a subscriber management server, etc. through off-line communications, for example, over the phone or over the service counter, and link a receiver and a user by sending a CAS/DRM client identifier (DRM\_ID).
- Service subscription (purchase of package)
 

A user concludes a monthly service contract or purchases a content package which consists of one or more contents. After a receiver is identified through DRM\_ID transmission and, if necessary, personal authentication is performed using information such as user ID and password, the information on the service subscription target is sent to the server.
- Service promotion
 

Promotes services and contents using advanced multimedia data such as L-shaped display showing promotional VOD contents.

- Content navigation  
Lists contents and content packages. Content navigation also includes the conditional search and sort function. Also, it is assumed that functions to display information such as availability/use conditions, detailed description of contents, and content preview are provided.
- Starting/finishing contents  
Selected contents are started through content navigation. It is also assumed that a function is provided to return to execution of the BML document of a specified portal service after contents are finished.
- Selection of IP broadcasting service  
A broadcasting service that is specified in the IP broadcasting service list is selected.
- Other  
General Web service functions such as shopping and provision of information that is not directly related to content delivery.

The following methods are assumed to enter a portal service.

- Selection from a portal list  
Users can display the top page of a service provider's portal by using the Portal button of a remote controller, which displays the portal list screen showing a service provider name list, etc., and enables users to select a service provider.
- Relevant operations performed when viewing an IP broadcasting service  
When viewing an IP broadcasting service, users can display the portal screen of the service provider using the *d* button of a remote controller.
- Jump from other pages  
It is assumed that hyperlinks from portal pages of other service providers are used to enter a portal service. It can also be assumed that users enter a portal from hyperlinks from data broadcasts of digital terrestrial television broadcasting services, etc. This method is not defined in this document.

### 2.2.2.3 EPG

EPG provides program information for IP broadcasting services. Basically, functions that are similar to EPG of the existing digital broadcasting, such as digital terrestrial television broadcasting and BS digital satellite broadcasting, are assumed. A portal service can also provide functions equivalent to those of EPG used in IP broadcasting services. However, EPG is different from a portal service, as EPG can provide information about the entire CDN comprehensively across service providers as a receiver function.

The EPG functions vary depending on receivers. The following functions are assumed.

- Presentation of weekly program table  
Displays a program table and program descriptions for IP broadcasting channels for an 8-day period including the current day.
- Service channel selection  
Performs channel selection in which a user selects a desired channel from a weekly program table, etc.

- Program scheduling

Schedules viewing and recording of a desired program from a weekly program table.

In IP broadcasting services, it is assumed that all channels belonging to the CDN are not listed in the program table and that listed channels are limited to those of the service providers with whom users have completed basic registration (program tables of promotion services can be viewed before completing basic registration). Also, users can switch the show/hide status of the program tables for adult-themed video service channels rated R20 by setting the parental function to ON/OFF.

It is assumed that users enter EPG by setting the network to IP broadcasting using the network switching button of a remote controller and then pressing the EPG button.

#### 2.2.2.4 ECG

ECG provides program (content) information for VOD services. A portal site can also provide similar functions. ECG is different from a portal service in that ECG can provide information about the entire CDN across service providers as a receiver function. Furthermore, ECG that is integrated in content delivery services other than VOD services can be provided depending on receivers. However, this function is optional in CDN scope services.

The ECG functions vary depending on receivers. The following functions are assumed.

- Presentation of a content package list and purchasing

The list of content packages (billing units) that are comprised of content groups is displayed. Selecting a content package displays details of the content package such as the contents included in the content package and price. A user can perform the purchasing operation by displaying relevant pages in the portal page for purchasing, which allows the user to purchase the content package online. The list of purchased content packages can be used as the entrance to playback navigation after the purchase.

- Presentation of a contents list and playback

Various content list display methods can be assumed. For example, the assumed display methods include displaying a list of purchased and available contents, a list of all contents regardless of availability, a content list of search results based on the keyword input by a user, and a content list that is filtered using the user preference information. In any of these methods, selecting a content displays a description of the selected content and the information such as performer names, time, viewing availability and viewing conditions as content detail information. It is also assumed that features such as use of thumbnail images and preview video are provided. The purchased contents are received and played back by the playback operation. It can also be assumed that selecting an unpurchased content displays a content package list including the contents to promote purchase of the package.

In CDN scope services, it is assumed that all contents in the CDN are not displayed in ECG and that contents displayed in ECG are limited to those provided by the service providers with whom users completed basic registration. Also, for R20 contents, users can switch the show/hide mode and content playback restriction status of package information, etc. by setting the parental function to ON/OFF. For other contents that have viewing restrictions, age confirmation and password authentication should be used to display thumbnail images and play back the contents.

It is assumed that users enter ECG by pressing the ECG button of a remote controller.

## 2.2.3 Basic Registration and Service Subscription

### 2.2.3.1 Basic Registration

Basic registration is a procedure in which an IP broadcasting/VOD service user is registered as a customer of a service provider to allow the user to submit a service subscription to use the services that are provided by the service provider. It is assumed that all the services and content information become available to view in a portal service, EPG and ECG using a receiver when the user completes basic registration.

Registration of user information such as address and telephone number is required for the user to sign up with the service provider. However, many receivers are not equipped with a user interface that supports online registration of such information. Therefore, it is assumed that the contract is made off-line, over a phone or via the service window. However, the information obtained from the contract should be linked to a receiver. The link should be established by making the user perform a minimum online operation after completing the contract. For example, the service provider can send a post card, etc. including the registration number issued for each user to the address registered as the reception location, and the user can operate the resident application installed on the receiver to specify the service provider and process basic registration in the portal to which the user is connected. Through this procedure, DRM\_ID of the receiver is sent to and registered with a subscriber management server of the service provider. Also, identification information for the service provider with whom basic registration has been completed is recorded on the receiver. Based on this information, the receiver filters and displays only the services and contents of the service provider with whom basic registration has been completed.

### 2.2.3.2 Service Subscription (Purchase of Content Package)

Service subscription is a procedure in which an IP broadcasting/VOD service user signs up for a specific service of a service provider to view the service/contents based on the scope of the contract. In order to submit a service subscription, basic registration should be completed. In pay services, it is assumed that the billing/settlement process is performed when service subscription is completed.

Several sales types are assumed for IP broadcasting services in which channels are packaged for sale. The assumed general billing period is monthly, where the contract is automatically renewed every month unless the user requests otherwise.

The assumed four types of content package sales for VOD services, which are provided based on service subscription, are as follows:

(1) Single content

A package that includes a single content only. For example, a package is sold with a viewing period of three days and two nights. In this case, the content can be played back for three days from the point when a user purchases the package in the portal.

(2) Pack

A package that includes a fixed set of multiple contents. For example, a package is sold

and is available for eight days and seven nights. In this case, the viewing period of eight days and seven nights applies to all contents that are included in the package, and the contents can be played back for eight days from the point when a user purchases the package in the portal.

(3) Select (with upper subscription limit)

A type of package that enables a user to view up to a specified number of contents that are selected from a superset of contents within a given period. For example, a user can select up to two contents from 1,000 contents per month, and the selected contents can be viewed for three days and two nights. The contents are not displayed as available unless the user selects the contents in the portal. In this example, the user loses the right to view contents in the same month once two contents, the set upper limit, have been selected, viewed, and held for three days and two nights. The user is billed monthly, and it is assumed that the contract is automatically continued unless the user cancels the contract. The number and details of the contents included in the superset are subject to change (basically, contents are added). A single provider can offer multiple select packages.

(4) Unlimited (no upper subscription limit)

A type of package by which a user can view all contents of a specific content group freely within a given period. For example, by this type of sales, a user can view 100 contents freely in each month. Generally, the number of contents that are available for unlimited is fixed within a given period (monthly, for example). So, for example, when the month changes, all of the 100 contents that are available for unlimited are displayed as available for viewing. However, the number of contents that are available for unlimited can increase or decrease irregularly (basically contents are added). In this case, viewing availability changes accordingly. The user is billed monthly, and it is assumed that the contract is renewed automatically unless the user cancels the contract. A single provider can offer multiple unlimited packages.

### 2.2.3.3 Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting

#### /Service Registration for IP Retransmission of BS Digital Satellite Broadcasting

Service registration for IP retransmission of digital terrestrial television broadcasting /service registration for IP retransmission of BS digital satellite broadcasting represents a concept to process basic registration for IP broadcasting/VOD services and service subscriptions together for IP retransmission of digital terrestrial television broadcasting/IP retransmission of BS digital satellite broadcasting. Service Registration for an IP retransmission of digital terrestrial television broadcasting /IP retransmission of BS digital satellite broadcasting includes registration of user and receiver information, service subscription (billing/settlement as necessary), and license acquisition to make the IP retransmission of digital terrestrial television broadcasting/IP retransmission of BS digital satellite broadcasting available for use (in order to enable channel selection, reception and playback, the channel selection control information must be obtained after service registration). This function is optional in CDN scope services.

### 2.2.4 IP Broadcasting/VOD Service Flow Model

In IP broadcasting/VOD services, charged contents become available for viewing after several processes are completed including initial connection, basic registration and service

subscription . Basic registration is required for each service provider. This section presents a flow model of a pay service that is provided by a service provider.

Figure 6 shows a conceptual diagram of a service flow.

When a user uses a IP retransmission service of digital terrestrial television broadcasting/IP retransmission service of BS digital satellite broadcasting, service registration for each service should follow this flow. For more information, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" and IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting".

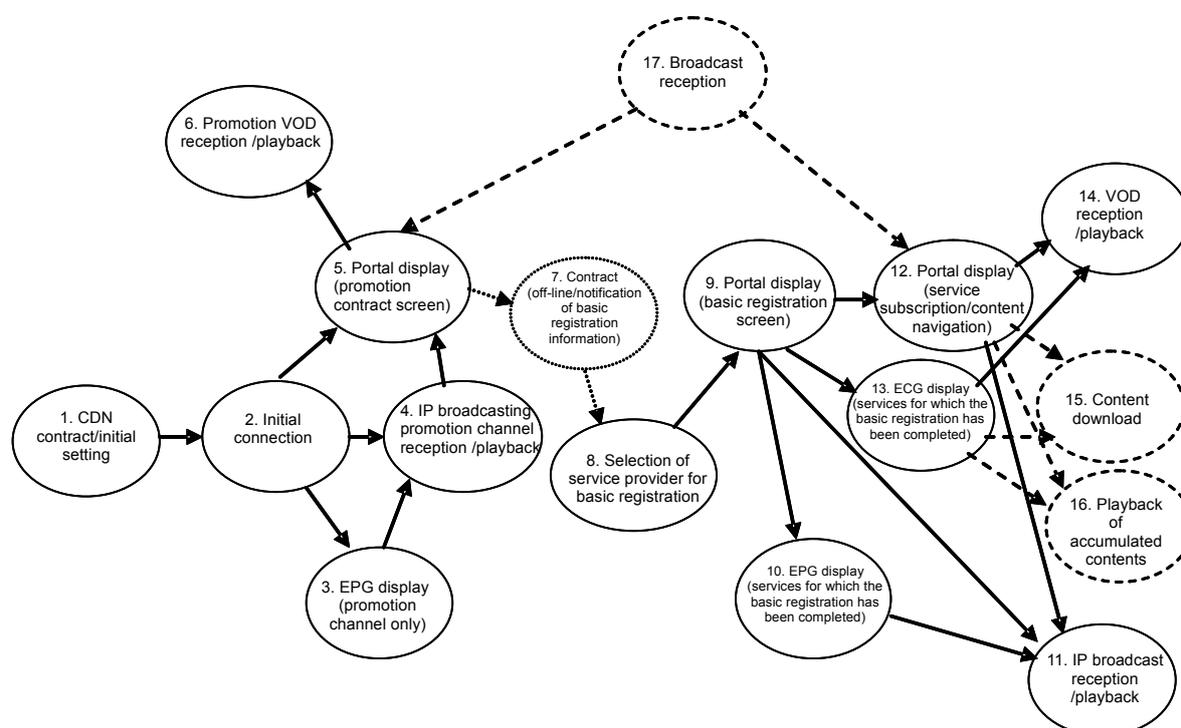


Figure 6 Conceptual Diagram of Service Flow

#### 2.2.4.1 Service Flow before Basic Registration

##### (1) CDN contract and initial setting

The CDN contract is concluded, and the site work up to installation of the receiver equipment is conducted. The user obtains a receiver compliant with CDN scope services, and connection with the receiver equipment is established using Ethernet, etc. Next, the user should enter information to set the IP connection in the initial setting screen, etc. of the receiver. A process that is not too demanding for general TV viewers is desirable.

##### (2) Initial connection

The operation to establish the initial connection to a CDN enables automatic acquisition of the initial information by a receiver. Acquisition of the initial information enables use of all promotional channels in IP broadcasting services on the CDN and all portal services that are provided by service providers. As a result, the following processes become possible.

(3) EPG display

If EPG information is delivered to a receiver before basic registration, weekly program tables such as promotional channels on the CDN are displayed.

(4) Reception/playback of promotional channels

If promotional channels are delivered to a receiver before basic registration, selection, reception and playback of IP broadcasting service promotional channels become possible by the EPG operation described in (3), direct channel selection operation using a remote controller, and the operation in the portal service screen described in (5).

(5) Portal promotion screen display

A list of portals for all service providers on the CDN can be displayed using a resident application function. Selecting a service provider from the portal list displays the service provider's portal service top page in a browser. Also, pressing the *d* button of a remote controller when a promotion channel is received/played back as described in (4) displays the program link page in the portal service of the service provider who operates the promotion channel. It is assumed that portal services at this level mainly deliver promotions to invite users to enter into a contract. For example, a portal service can deliver VOD contents for promotion and display promotional channels described in (4). It is also assumed that a portal displays such information as the telephone number to be used for proceeding with a contract.

(6) Reception/playback of VOD contents for promotion

It is assumed that unencrypted VOD contents for promotion are received/played back based on playback instructions from the portal described in (5).

(7) Contract with service providers (off-line)

A user calls the contact number that is displayed in the portal described in (5) to receive a contract form. The user enters the information such as address and telephone number in the form that is sent on a later date and returns the form to complete the contract process. The service provider's system and the user's receiver should be linked so that the service provider can deliver contents properly to the receiver on which the user wishes to receive the contents after the contract is lodged. Therefore, it is assumed that the service provider sends a postcard or suchlike including such information as the service provider ID and the registration number issued individually for each user so that the information can be used for the following basic registration processes.

#### 2.2.4.2 Service Flow after Basic Registration

(8) Starting basic registration (specifying a service provider)

Based on the information about a service provider notified from the service provider after the contract application in (7), a user can specify the service provider, and the basic registration page in the service provider portal can be displayed in the browser by using a resident application on a receiver.

(9) Basic registration

According to the procedure shown in the basic registration page that is displayed in (8), the user enters the registration number. Since the service provider system can determine that the access is from a registered user's receiver by verifying the number, the system obtains the DRM\_ID from the receiver and registers it with a subscriber management server. It is assumed that typically basic registration and monthly service subscription are submitted at the same time but should be distinguished. Basic registration is a process that registers a user with a service provider as a customer to allow the user to fully use the content

navigation service of the service provider. This enables the processes that follow such as pay service subscription and purchase of content packages.

(10) EPG display (IP broadcasting service for which basic registration has been completed)

It is assumed that once basic registration is completed as described in (9), EPG displays a program table containing encrypted services such as pay broadcasts provided by a service provider. However, it is assumed that the program table of the IP broadcasting channel for which a monthly contract is concluded can also be displayed depending on the implementation status of the receiver in addition to the program table available with basic registration.

(11) Reception/playback of IP broadcasting services

IP broadcasting channels for which a monthly service subscription has been completed can be selected in the EPG screen described in (10), received and played back.

(12) Portal display (service subscription, content navigation)

After the basic registration described in (9) is completed, it is assumed that all functions in a portal of the service provider become available including content package list display, service subscription, content list display, reception/playback of VOD contents, and channel/program information display for IP broadcasting services including pay services.

(13) ECG display

After the basic registration described in (9) is completed, it is assumed that such information as a content package list across providers including the VOD contents of the service provider and a content list can be displayed using ECG. Also, display of such information enables a user to purchase content packages, receive and play back VOD contents.

(14) Reception/playback of VOD contents

VOD contents that are selected in a portal (12) or ECG (13) are received/played back using streaming. It is assumed that the screen display returns to the original portal or ECG after the streaming playback is finished.

## 2.3 CDN Scope Service System Model

Figure 7 shows the relationship between server entities and a receiver, which is required to implement the IP broadcasting/VOD services that are provided as CDN scope services. A service provider provides all or part of CDN scope services using various servers such as those commonly managed as a platform and those that are operated independently. The following section 2.3.1.1 "CDN Configuration Information Server" describes the functions of each server entity. The server entities described in this document are models, and actual physical servers do not necessarily need to correspond to these models.

For IP retransmission services of digital terrestrial television broadcasting, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 0, Chapter 7 "IP Retransmission Service System Models for Digital Terrestrial Television Broadcasting". For IP retransmission services of BS digital satellite broadcasting, see IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting" Volume 0, Chapter 7 "IP Retransmission Service System Models for BS Digital Satellite Broadcasting". When IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting are operated in addition to IP broadcasting/VOD services, a CDN configuration information server is installed as a common server to cover IP broadcasting/VOD services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting. The file format is also unified. For more information, see Chapter 5 "Service Entry and Related Specifications". Also, it is assumed that the service providers who provide IP broadcasting/VOD services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting manage the portal server in an integrated fashion.

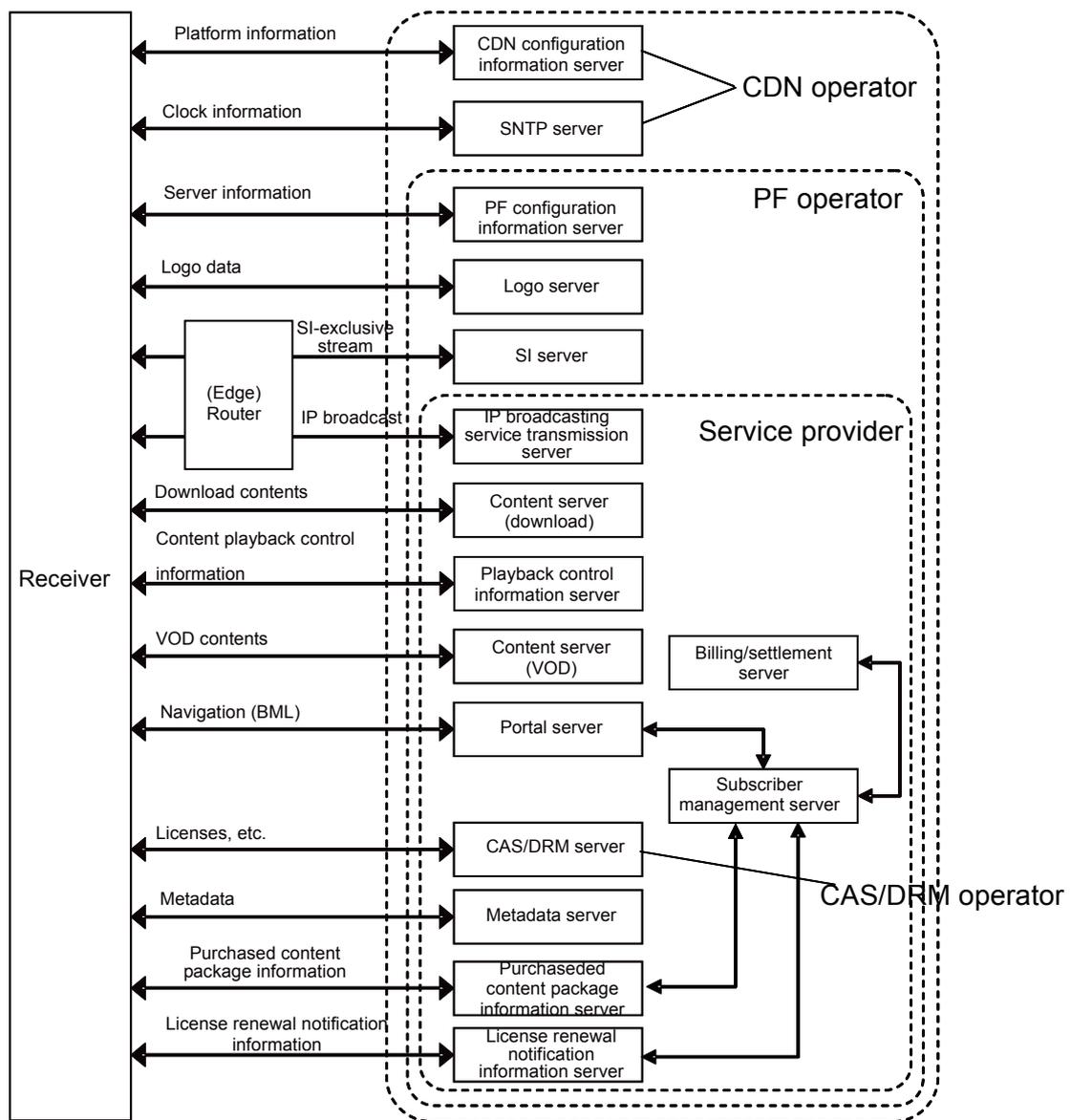


Figure 7 CDN Scope System

An example of a business operator structure for IP broadcasting/VOD services that are provided as CDN scope services and the relationship with server entities are described below in using Figure 8.

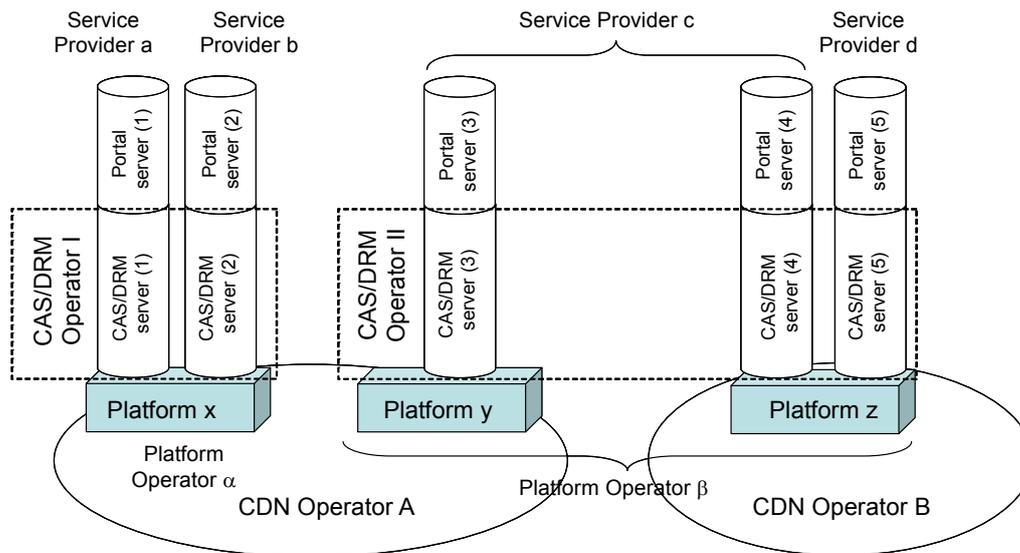


Figure 8 Business Operator Structure and Server Entities (Example)

Platform Operator  $\beta$  expands the same kind of business on the network of CDN Operator A and the network of CDN Operator B, but platform y and platform z are basically treated as separate systems having different server address settings on their respective CDNs.

Service Operator c expands the same kind of business on the platform y and platform z that belong to the networks of CDN Operator A and CDN Operator B respectively, but the portal servers (3) and (4) are basically treated as separate systems on the respective platforms even when they provide the same contents.

CAS/DRM Operator II expands the same kind of business on platform y and platform z that belong to the networks of CDN Operator A and CDN Operator B respectively, but the CAS/DRM servers are basically treated as separate systems on their respective platforms. Also, only one CAS/DRM Operator II can exist on platform z, but CAS/DRM Operator II can have the CAS/DRM servers (4) and (5) for different service providers.

### 2.3.1 Functions of Server Entities

#### 2.3.1.1 CDN Configuration Information Server

A CDN configuration information server is a server that is operated by a CDN operator and is required to provide a CDN scope service. This server provides fixed information (CDN configuration information) in regard to all platform operators on the CDN. A receiver must be connected to a CDN configuration information server during the initial connection and as needed to obtain the required information and renew the information. It is assumed that the URI of this server is embedded in the receiver as a fixed name. For more information, see Chapter 5 "Service Entry and Related Specifications".

### 2.3.1.2 PF Configuration Information Server

A PF configuration information server is a server that is operated by a platform operator and is required to provide a CDN scope service. This server provides fixed information (PF configuration information) in regard to the platform operator and service provider. A receiver must be connected to this server that exists for every platform operator in sequence during the initial connection and as needed based on the information obtained from the CDN configuration information that is provided by a CDN configuration information server, to obtain the required information and renew the information. For more information, see Chapter 5 "Service Entry and Related Specifications".

### 2.3.1.3 SI Server

An SI server is a server that is operated by a platform operator providing an IP broadcasting service and is required when a service provider provides an IP broadcasting service. This server provides the PSI/SI information that is required when a receiver selects an IP broadcasting service and displays the EPG. A receiver must regularly access a multicast address that is obtained from the PF configuration information provided from a PF configuration information server to obtain PSI/SI information. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 2 "Overview".

### 2.3.1.4 CAS/DRM Server

A CAS/DRM server is a server that is operated by a CAS/DRM operator and is required when a service provider provides a CDN scope service. This server issues/manages licenses, establishes secure channels with the CAS/DRM client of a receiver and supplies licenses. The receiver accesses this server to obtain licenses when contents are played back.

For VOD services, the URI of this server is obtained from a content playback control metafile that is provided from a playback control information server when contents are played back. In IP broadcasting services, the CAS/DRM server URI corresponding to the service provider is recorded in the receiver NVRAM during the basic registration process using the basic registration information recording function in the BML document of the service provider portal, so this URI is used. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System" and IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications".

### 2.3.1.5 Portal Server

The portal server is a server that is operated by a service provider, and each service provider should have a portal server to provide a portal service that enables entry to the IP broadcasting/VOD services and navigation. This server promotes IP broadcasting/VOD services and provides a means to navigate contents as a Web service. Also, a portal server can perform various registration screen processes and authentication processes in some cases with a customer/contract management function. It is assumed that a receiver accesses this server as needed according to user operations. The URI of the portal server is obtained from PF configuration information that is provided from a PF configuration information server. Access to the portal server is made according to the specifications in regard to the portal content transition and reference. Comply with the specifications listed in Chapter 6 "Specifications of BML for IPTV".

#### 2.3.1.6 License Renewal Notification Information Server

A license renewal notification information server is a server that is basically operated by a service provider who uses the scheme to renew licenses by notifying a receiver of license renewals for IP broadcasting services. A receiver regularly accesses a license renewal notification information server of the service provider with whom the basic registration has been completed using the server's URI that is obtained from PF configuration information provided from a PF configuration information server, and obtains license renewal notifications. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)".

#### 2.3.1.7 ECG Metadata Server

An ECG metadata server is a server that is basically operated by a service provider who provides ECG metadata. This server provides the metadata that a receiver requires to display ECGs. Receivers with the ECG function access an ECG metadata server of the service provider with whom the basic registration has been completed as needed and obtain/renew the required metadata using unicast. The URI of an ECG metadata server is obtained from PF configuration information that is provided from a PF configuration information server. For more information, see Chapter 7 "Operation of VOD".

#### 2.3.1.8 Purchased Content Package Information Server

A purchased content package information server is a server that is basically operated by a service provider who provides ECG metadata to display purchased content package information in the ECG. Receivers with the ECG function access a purchased content package information server of the service provider with whom the basic registration has been completed as needed, obtains/renews the purchased content package information and displays the information in ECG according to user operations. The URI of a purchased content package information server is obtained from PF configuration information that is provided from a PF configuration information server. For more information, see Chapter 7 "Operation of VOD".

#### 2.3.1.9 Playback Control Information Server

A playback control information server is a server that provides the playback control information required for video content playback. In VOD, only a content playback control metafile is used as the playback control information. The URI of a content playback control metafile is notified by a BML document that is provided from a portal server or an ECG metadata that is provided from an ECG server. The content playback control metafile includes the URI of video contents and the information that are required to obtain a license and an encryption key to decode encrypted video contents. For more information, see IPTVFJ STD-0002 "VOD Specifications", Chapter 5 "Content Playback Control Metafile".

#### 2.3.1.10 Video Content Server for VOD

A video content server for VOD is a server that is operated by a service provider who provides a VOD service. A video content server for VOD is defined as a server that not only provides streaming for contents, but also provides functions such as RTSP sequences for streaming control. Receivers must access a video content server when they receive VOD services. The URI of a video content server for VOD is obtained from the content playback control metafile. For

more information, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4.1.1 "RTSP" and Chapter 5 "Content Playback Control Metafile".

#### 2.3.1.11 IP Broadcasting Service Transmission Server

An IP broadcasting service transmission server is a server that is operated by a service provider who provides an IP broadcasting service. An IP broadcasting service transmission server delivers streaming video to provide IP broadcasting services. It is assumed that an IP broadcasting service transmission server generally relays the video signals of broadcasts sent from the transmission facility of an external content provider and transmits them in multicast. Receivers should access corresponding multicast addresses when an IP broadcasting service is selected. Access to IP broadcasting service streams that are transmitted from an IP broadcasting service transmission server is made using parameters in the NIT of SI information that is obtained from an SI server. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 4 "Video Streaming Protocol".

#### 2.3.1.12 Subscriber Management Server

A subscriber management server provides customer management functions such as user contract management. A subscriber management server manages IDs and CAS/DRM client identifications (DRM\_ID) that accompany basic registration, processes authentication in cooperation with a portal server when receivers connect to the portal server, and manages user purchases, etc. A subscriber management server connects to receivers through a portal server to provide functions and is not directly accessed from receivers.

#### 2.3.1.13 SNTP Server

An SNTP server is used to obtain clock information. Access to an SNTP server is made using the SNTP server address value that is obtained from the CDN configuration information file. For more information, see Chapter 5 "Service Entry and Related Specifications".

#### 2.3.1.14 Logo Server

A logo server is a server that delivers logo data that is used to display the EPG of IP broadcasting services and portal lists on receivers. Access to a logo server is made using the logo server URI value that is obtained from the PF configuration information file. For more information, see Chapter 5 "Service Entry and Related Specifications".

### 2.3.2 Identification Information Related to Business Operator Structure

In order to identify the system elements that are related to the business operator structure, it is assumed that the following IDs are defined and used in IP broadcasting/VOD services. These IDs are managed using different number systems in IP broadcasting/VOD services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting, except for the IDs used to distinguish service providers. For IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" and IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting".

- Platform identification (`platform_name`)  
The `platform_name` is unique in a CDN and assigned to each platform that is operated by IP broadcasting/VOD platform operators. When platforms have different `platform_name` values, receivers treat them as different platforms. For more information, see Chapter 5 "Service Entry and Related Specifications".
- ID to distinguish platforms that provide IP broadcasting (`network_id`)  
A `network_id` is assigned to each platform that provides IP broadcasts to distinguish between existing BS/CS broadcasts and IP broadcasting services, and to distinguish between IP broadcasting services that are provided by different platforms on the same CDN when receivers are connected to the CDN and receive IP broadcasting services. As shown in Figure 2, this enables users to switch between digital terrestrial television broadcasting, BS digital satellite broadcasting, IP broadcasting services of Platform x, and IP broadcasting services of Platform y by switching networks using the remote control of a receiver, given that Platform x and Platform y both provide IP broadcasting services. When an IP broadcasting service that is provided by Platform x is selected, users can receive IP broadcasting services that are provided by Service Provider a and Service Provider b.

The ID system for `network_id` is commonly used in digital terrestrial television broadcasting, BS digital satellite broadcasting, etc. and defined by a standardization organization. It is assumed that the same `network_id` is used when the same platform operator provides services across CDNs.

- ID to distinguish service providers (`ip_service_provider_id`)  
The `ip_service_provider_id` is defined as a unique ID that can be used to distinguish service providers in all environments providing CDN scope services that comply with the specifications in this document. A portal server is installed in each CDN for each `ip_service_provider_id`, and portal services specific to a service provider are operated.

Service providers can operate the same kind of services across multiple CDNs. It is assumed that users must contact their contracted service providers by phone or by other means when they relocate, etc. to continue receiving services. It is desirable that service providers build a system which enables continuous service provision with minimum operation by users. For example, in Figure 2, a receiver is connected to the network of CDN Operator A, is contracted with Service Provider c providing services through Platform Operator  $\beta$  (platform y), and has its basic registration completed for `ip_service_provider_id`. When the receiver is connected to CDN Operator B due to relocation, it acknowledges that the connected CDN has been changed and that Service Provider c, with whom basic registration has been completed, exists on the new CDN by obtaining the new CDN configuration information and PF configuration information and by reconstructing the data of the relationships between server entities in the CDN. It is desirable that users can renew such information as basic registration information stored in the receivers by simple operations.

The `ip_service_provider_id` is managed using the same number system as service providers who provide IP retransmission services of digital terrestrial television broadcasting or IP retransmission services of BS digital satellite broadcasting.

- ID to distinguish CAS/DRM operators (`drm_provider_id`)

The `drm_provider_id` is defined as an ID that can distinguish CAS/DRM operators uniquely in a specific CAS/DRM method in all environments where CDN scope services complying with the specification in this document are provided. Only one `drm_provider_id` exists on a platform. However, a CAS/DRM server URI can be set for each `ip_service_provider_id`. The CAS/DRM server URI is not included in the PF configuration information and set in receivers during basic registration. Therefore, in the example of a relocation discussed above, the CAS/DRM server URI is not renewed through getting CDN configuration information and PF configuration information and reconstruction of the relationships between server entities in the CDN. The URI must be changed through basic registration information renewal.

The `drm_provider_id` is specified by a `drm_provider_id` element of the PF configuration information. The `drm_provider_id` is independent of the `drm_provider_id` element of the PF configuration information for IP retransmission of digital terrestrial television broadcasting and `drm_provider_id` element of the PF configuration information for IP retransmission of BS digital satellite broadcasting, and generally managed using a different number system.

## Chapter 3 Receiver Specifications

### 3.1 Introduction

This chapter describes the specifications of receivers that are used to receive IP broadcasting services and VOD services. For IP retransmission services of digital terrestrial television broadcasting, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 2, "Receiver Function Specifications". For IP retransmission services of BS digital satellite broadcasting, see IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting" Volume 2, "Receiver Function Specifications". This chapter also describes the functions that are specific to receivers that can receive IP retransmission service of digital terrestrial television broadcasting and IP retransmission service of BS digital satellite broadcasting in addition to IP broadcasting/VOD services.

The following table shows the priorities of function specification items for service operators (Required: A, Option: B, Not provided: -, Item only: blank). The functions related to IP retransmission of digital terrestrial television broadcasting and the functions related to IP retransmission of BS digital satellite broadcasting are optional.

Table 3-1 Priority of Receiver Function

Receiver Functions Described in This Document		Standard Receiver	Remarks
3.3	Requirements for User Interface and Functions of Receiver		
3.3.1	Common		
3.3.1.1	Clock Adjustment	B	
3.3.1.2	Initial Setting		
3.3.1.2.1	Network Interface Configuration	A	
3.3.1.2.2	Parental Control	A	
3.3.1.2.3	Residence Location Configuration	A	
3.3.1.2.4	Receiver Preset Information	A	
3.3.1.2.5	Clearing User Configuration	A	
3.3.1.3	Remote Controller	A	
3.3.1.4	Configuration for Service Activation		
3.3.1.4.1	Initial Configuration Overview	A	
3.3.1.4.2	Basic Configurations	A	
3.3.1.4.3	Management of Basic Registration Information	A	B for IP retransmission
3.3.1.5	Portal Selection	A	
3.3.1.6	Displaying Registration Verification Document	B	
3.3.1.7	Parental Control (Age Restriction)	A	
3.3.1.8	Displaying CAS/DRM Client Identifier(DRM_ID)	A	
3.3.2	IP Broadcasting Service	A	B for program scheduling

3.3.3	VOD Service			
	3.3.3.1	Playback of VOD Contents	A	
	3.3.3.2	ECG	B	
3.3.4	Other			
	3.3.4.1	Requirements for BML Browser for IPTV	A	
	3.3.4.2	Requirements for ECG Metadata Function	B	
	3.3.4.3	Access Control	A	
	3.3.4.4	Content Protection	A	
	3.3.4.5	Recommended Behavior of Receiver and Message to Display on Errors	B	
3.4	Requirements for Hardware and Software			
3.4.1	Front Ends			
	3.4.1.1	IP Front Ends	A	
	3.4.1.2	Satellite/Terrestrial Front End	B	
3.4.2	FEC		B	
3.4.3	TTS/TS Conversion		A	
3.4.4	TS Decoder		A	
3.4.5	Video Decoding and Output		A	
3.4.6	Audio Decoding and Output		A	
3.4.7	Memory			
	3.4.7.1	RAM	A	
	3.4.7.2	NVRAM	A	
3.4.8	Character Encodings		A	
	3.4.8.1	Portal Service	A	
	3.4.8.2	SI/EPG	A	
	3.4.8.3	Metadata/ECG	B	
3.4.9	Receiver Built-in Sound		A	
3.4.10	Communication Function		A	
3.4.11	High-Speed Digital Interfaces		B	
3.4.12	Copy Control		B	* Corresponding copy control must be implemented when each output interface is implemented.
3.4.13	Video Recording Function		B	
3.4.14	Other			
	3.4.14.1	Reset Button	B	
	3.4.14.2	Analog RGB Interface	B	
	3.4.14.3	Digital Visual Interface	B	
	3.4.14.4	High-Definition Multimedia	B	

### 3.2 Receiver Model and Prerequisites

#### 3.2.1 Basic Structure and Functional Overview of Receiver

This section describes the basic structure and functional overview of receivers. For more information on each function and its requirements, see the corresponding chapters and sections.

Functions to be implemented on receivers vary depending on manufacturers and do not restrict the items described below. However, it is assumed that service providers may not be able to support defects that result from the following:

- Defined functions that are not implemented.
- Equivalent functions that are provided in another way.
- Functions that are not defined are provided.
- Functions that are provided outside the basic structure.

##### 3.2.1.1 Reference Model

A reference model of the basic configuration of receivers is shown in Figure 9. Each function element that comprises the reference model is described in the following section.

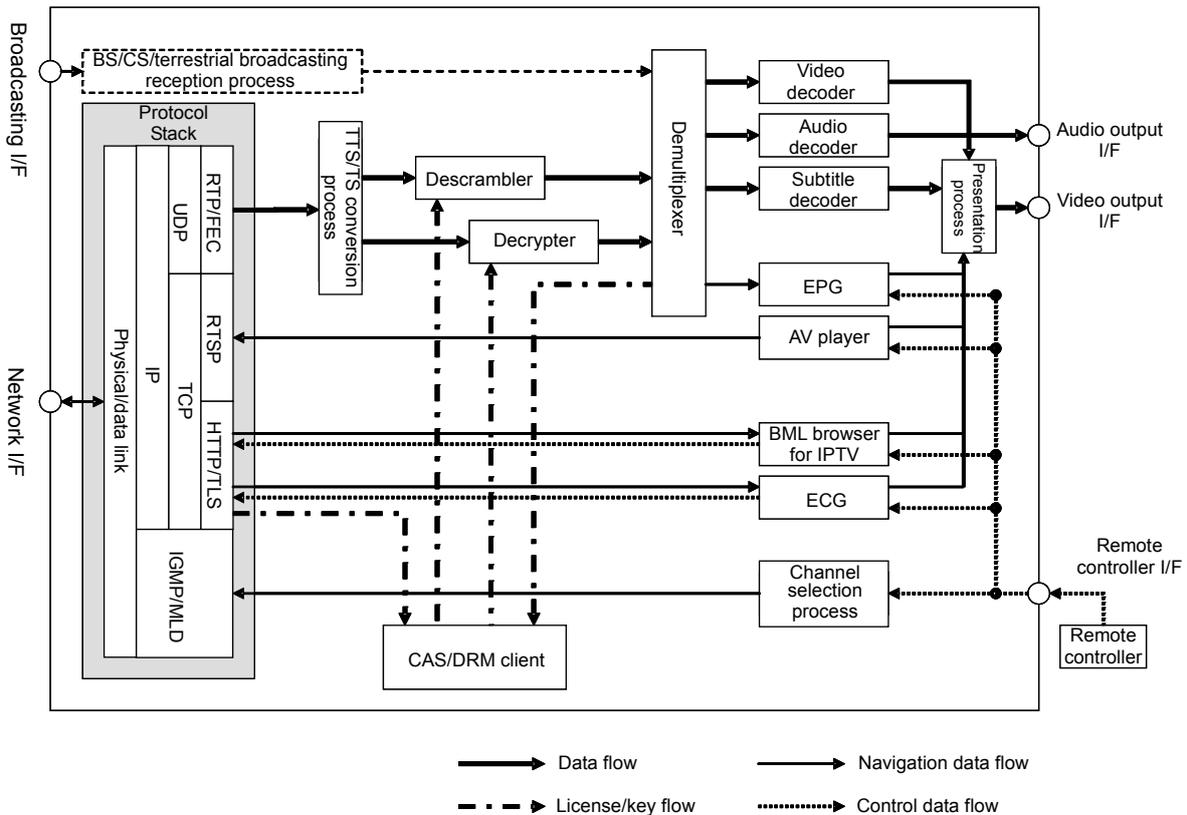


Figure 9 Receiver Reference Model

- **Broadcasting I/F (implementation-dependent)**  
The broadcasting I/F is an interface to receive broadcast signals from digital terrestrial television broadcasting, BS digital satellite broadcasting, CS digital satellite broadcasting, etc. This document does not cover the broadcasting I/F.
- **BS/CS/terrestrial broadcasting reception process (implementation-dependent)**  
The BS/CS/terrestrial broadcasting reception process includes tuners to process the signals received through the broadcasting I/F, descramblers for BS/CS/terrestrial broadcasting, CAS for BS/CS/terrestrial broadcasting, etc. This document does not cover the BS/CS/terrestrial broadcasting reception process.
- **Communication I/F**  
A communication I/F is an interface used to transmit/receive signals from/to communication networks.
- **Communication process**  
In the communication process, the communication protocols are processed including RTP, UDP, HTTP/TLS, RTSP, TCP, IP and IGMP/MLD. Network jitter absorption and FEC processing are performed for the streaming data that is sent using UDP. For information on communication protocols and FEC, see IPTVFJ STD-0004 "IP Broadcasting Specifications" Chapter 4 "Video Streaming Protocol", IPTVFJ STD-0002 "VOD Specifications" Chapter 4 "Video Streaming Protocol", and 5.5 "HTTP", 6.5 "Operation of Network Access to Portal ", Chapter 7 "Operation of VOD" in this document.
- **TTS/TS conversion process**  
In the TTS/TS conversion process, TTS that is output from the communication process is buffered (FIFO), and the MPEG-2 TS stream that is synchronized with 27-MHz clock on the transmitter side is output using the TTS time stamp and 27-MHz receiver automated clock.
- **Descrambler**  
A descrambler decodes scrambled MPEG-2 TS streams using a scramble key that is obtained from a CAS/DRM client.
- **Decrypter**  
A decrypter decodes encrypted MPEG-2 TS streams using a content key that is obtained from a CAS/DRM client.
- **Demultiplexer**  
A demultiplexer splits multiplexed MPEG-2 TS streams into video streams, audio streams, caption, PSI/SI, ECM packets, etc.
- **Video decoder**  
A video decoder decodes video data.
- **Audio decoder**  
An audio decoder decodes audio data.
- **Caption decoder**  
A caption decoder decodes caption data.
- **Channel selection process**  
An application used to select IP broadcasting services. For information on channel

selection, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.7 "Service Channel Selection".

- AV player  
An AV player is an application that provides playback control for VOD contents.
- Presentation process  
In the presentation process, data such as stream data from video decoders, browsers, EPG and ECG are merged to create data that is presented to users.
- Video output I/F  
A video output I/F is an interface used to output video signals to displays.
- Audio output I/F  
An audio output I/F is an interface used to output audio signals to speakers.
- BML browser for IPTV  
A BML browser for IPTV is an application that provides the playback function for BML documents obtained from portal servers. For more information on BML browsers for IPTV, see 3.3.4.1 "Requirements for BML Browser for IPTV".
- EPG  
An EPG extracts SI provided in IP broadcasting services and provides navigation functions including functions to display IP broadcast program lists, program details, etc. For more information on EPG, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.9 "EPG".
- ECG (option)  
An ECG provides navigation functions using metadata that is obtained from an ECG metadata server, including functions to display lists of contents provided in VOD services, purchased content lists and content detail information. For more information on ECG, see 3.3.3.2 "ECG".
- Remote controller I/F  
A remote controller I/F is an interface to receive remote controller signals.
- Remote controller  
A remote controller is used to operate a receiver. For more information on remote controllers, see 3.3.1.3 "Remote Controller".
- CAS/DRM Client  
A CAS/DRM client obtains a license from a CAS/DRM server. When using IP broadcasting services, a CAS/DRM client extracts a scramble key from ECM that is obtained by demultiplexing IP broadcast streams using the license, and provides the scramble key to a descrambler. When using VOD services, a CAS/DRM client provides the content key that is extracted from the license to a decrypter.

### 3.2.1.2 Overview of Additional Functions of Receiver

The following table lists additional functions of receiver that are not illustrated in Figure 9 Receiver Reference Model.

Table 3-2 Overview of Additional Functions of Receiver

Function	Overview
Initial setting	A function to enable users to set information required to establish connection between a receiver and network and information required to perform parental lock.
Configuration information process	A function to obtain CDN configuration information and PF configuration information and process information of CDN operators, PF operators and service providers as initial connection information.
MC license renewal	A function to instruct CAS/DRM clients to obtain/renew MC licenses that are stored in the NVRAM of receivers based on information such as MC license renewal start date and time and license renewal notification information. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 6.3.3 "License Renewal Processing".
Portal selection	A function to enable users to select a portal of a service provider to display portal documents of the service provider in a BML browser for IPTV.
Registration verification	A function to enable users to specify a service provider to obtain the registration verification document of the specified service provider and display it in a BML browser for IPTV.

### 3.2.2 Outline of Data Handled by Receiver

The following table describes an outline of data that is handled by receivers.

Table 3-3 Data Handled by Receivers

Data	Outline
Content	Video data, audio data, caption data, etc. for viewing. Provided by VOD services and IP broadcasting services.
BML document	Contains information required to implement portal services such as a navigation tool to use contents, basic registration and license acquisition. For more information, see Chapter 6 "Specifications of BML for IPTV".
ECG metadata	Contains bibliographic information of VOD contents that are used for implementing ECG. For more information, see Chapter 7 "Operation of VOD".
SI data	Contains IP broadcast programming information that is used for displaying EPG. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 7 "PSI/SI".
License	Data containing the Rights Management and Protection Information (RMPI) for target contents and a decryption key used to decrypt encrypted contents. There are MC licenses for IP broadcasting services and VOD licenses for VOD services. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and IPTVFJ

	STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications".
CDN configuration information URI	URI that is used to obtain the CDN configuration information.
CDN configuration information	Information used to obtain the PF configuration information of platform operators which is available on the CDN that users connect to. For more information, see 5.1.1 "CDN Configuration Information File".
PF configuration information	Information related to platform operators such as portal server addresses and SI stream addresses that are provided by the platform operators. For more information, see 5.1.2 "PF Configuration Information File".
Logo ID management information	Information that is used to coordinate logo ID with service ID, service provider ID and network ID. For more information, see 5.4.4 "Specifications for Logo ID Management File".
Logo data	Contains information for a logo image that is defined for each channel and service provider and is used to display channel selection banners, EPG, etc. For more information, see 5.4.3 "Logo Data Definition".
License renewal notification information	Provides information on whether there is an MC license renewal or not to facilitate prompt MC license renewals. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)".
Purchased content package information	Provides information on purchased content packages to display purchased content information in ECG. For more information, see 7.8.1 "Purchased Content Package Information File".
Playback control information	Information that is required for VOD content playback control and composed of ERI, LLI and NCI. For more information, see IPTVFJ STD-0002 "VOD Specifications", Chapter 5 "Content Playback Control Metafile".
User residence location information	Information in regard to location of residence (prefecture) and postcode of users.
Parental control information	Information including the parental level (minimum age for viewing) and parental password (code number) that are set by users to implement parental control.
Network interface configuration information	Configuration information such as IP address that receivers need to connect to communication networks and receive various services.
Basic registration information	Information in regard to service providers with whom basic registration has been completed, including service provider ID, information on authentication key, and CAS/DRM server URI.

### 3.2.3 Receiver Data Flow

The following section illustrates an example of data flow for a receiver in a general service scenario using a receiver reference model.

#### 3.2.3.1 Data Flow of IP Broadcasting Service

See IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.1.2 "Receiver Data Flow".

#### 3.2.3.2 Data Flow of VOD Service

See IPTVFJ STD-0002 "VOD Specifications", 3.1.2 "Receiver Data Flow".

#### 3.2.3.3 Data Flow of Portal Service

Figure 10 shows the data flow when a portal service is used.

When a portal is started using a remote controller, a browser accesses a portal server using the HTTP/TLS protocol to obtain a BML document. The obtained BML document is rendered by the browser, and video/audio signals are output.

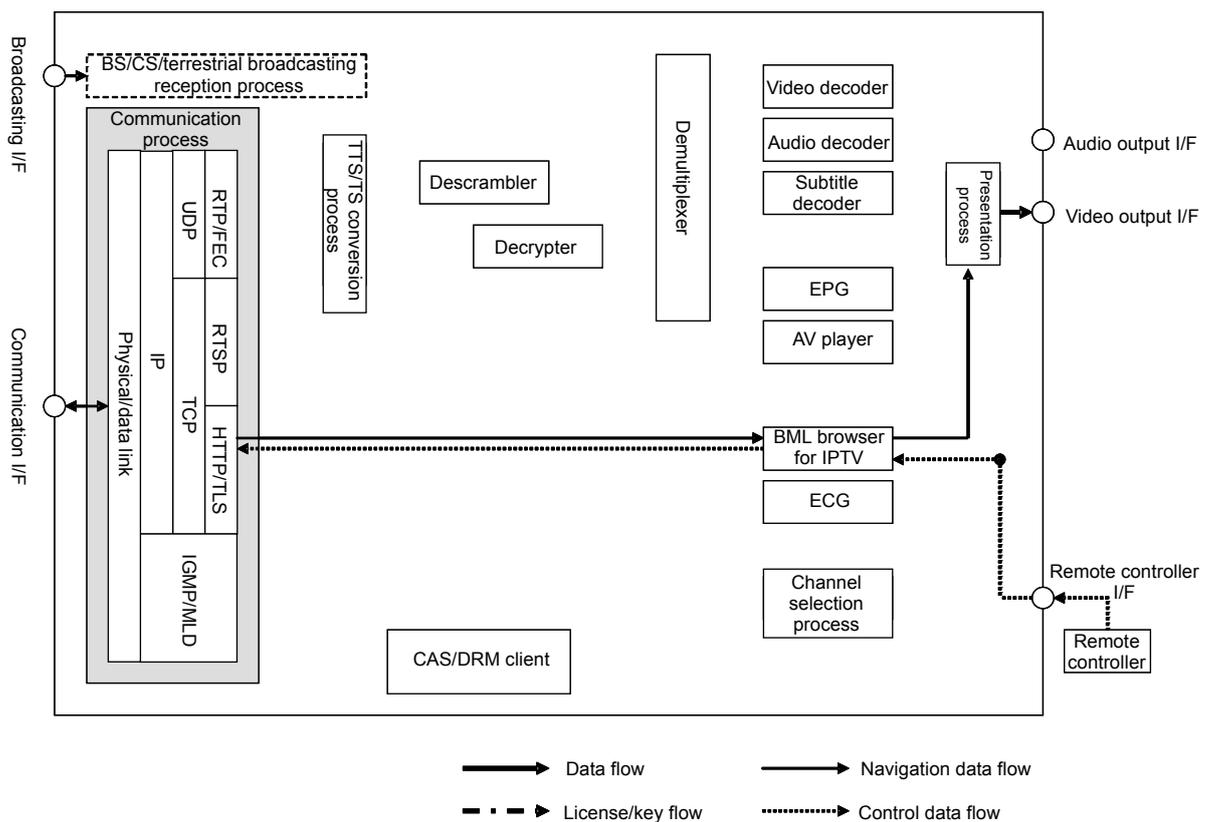


Figure 10 Data Flow of Portal Service

### 3.3 Requirements for User Interface and Functions of Receiver

#### 3.3.1 Common

##### 3.3.1.1 Clock Adjustment

Receivers should obtain Japan Standard Time using SNTP according to 5.3 "Clock Adjustment". For clock display, a method other than SNTP may be used to obtain Japan Standard Time.

##### 3.3.1.2 Initial Setting

###### 3.3.1.2.1 Network Interface Configuration

Table 3-4 lists the items that require to be configured in a screen among the configurations that a receiver needs in order to connect to communication networks and receive various services. Figure 11 shows an example of screen for the network interface configuration. It is recommended that receivers provide a screen in which automatically acquired network interface configuration can be confirmed.

Table 3-4 Requirements for Network Interface Configuration

Requirement level A: Required B: Option

Classification	Category	Sub-category	Requirement level	Remarks
IPv4/IPv6 operation	Dual/operation specification (IPv4/IPv6)		B	
IPv6	NW address setting	Automatic (RA)	A	Default = Automatic
		•IP address		
		•Subnet mask		
		•Default gateway		
	Manual			
	•IP address			
•Subnet mask				
•Default gateway				
DNS	Automatic		A	Default = Automatic
		Manual		
IPv4	NW address setting	Automatic (DHCP)	A	Default = Automatic
		•IP address		
		•Subnet mask		
		•Default gateway		
	Manual			
	•IP address			
•Subnet mask				
•Default gateway				
DNS	Automatic		A	Default = Automatic
		Manual		

Network setting screen	
IPv4/IPv6	<input checked="" type="checkbox"/> Dual
Operation switching	<input type="checkbox"/> IP-v4 <input type="checkbox"/> IP-v6
IPv4	
	<input checked="" type="checkbox"/> Automatic (DHCP)
	<input type="checkbox"/> Fixed
	IP address <input type="text" value="192.168.1.2"/>
	Subnet mask <input type="text" value="255.255.255.0"/>
	Default gateway <input type="text" value="192.168.1.1"/>
DNS	Primary <input type="text" value="*** ** * ** * **"/>
	Secondary <input type="text" value="*** ** * ** * **"/>
IPv6	
	<input checked="" type="checkbox"/> Automatic (RA)
	<input type="checkbox"/> Fixed
	IP address <input type="text" value="3FFE:501:422:1000:A00:46FF:FE18:13C6"/>
	Subnet mask <input type="text" value="FFFF:FFFF:FFFF:FFFF:0000:0000:0000:0000"/>
	Default gateway <input type="text" value="3FFE:501:422:1000:0000:0000:0000:0001"/>
DNS	Primary <input type="text" value="****:****:****:****:****:****:****:****"/>
	Secondary <input type="text" value="****:****:****:****:****:****:****:****"/>

Figure 11 Example of Screen for Network Interface Configuration

**Supplementary Information:**

It is desirable that network configuration that can be obtained through DHCP and DHCPv6 is not stored on receivers.

The default setting of IPv4/v6 switching shall be dual operation. Considering cases in which user operability is reduced in receiver operations, etc. depending on the network environment, it is desirable to enable independent operation configurations.

#### 3.3.1.2.2 Parental Control

- The following three functions should be configurable in the menu screen of receivers.
  - Parental level (minimum age for viewing)  
The minimum age is set between 4 and 20. Programs, contents, etc. with a parental-rating exceeding the set value are not displayed.
  - Parental password (code number)
  - Parental control ON/OFF
- It is desirable that the initial setting is not to display R20 programs (equivalent to parental control = ON, parental level = 19).

#### 3.3.1.2.3 Residence Location Configuration

(1) Prefectural code

In order to provide services that correspond to user's residence location, prefectural codes should be configurable. For more information, see ARIB STD-B10 Appendix G "Region designator for prefecture designation for target region descriptor".

(2) Postcode (7-digit)

In order to provide services that correspond to user's residence location, 7-digit post codes should be configurable.

#### 3.3.1.2.4 Receiver Preset Information

The receiver preset information includes items that are preset in receivers and that receivers require to receive various services.

For information on the URL from which the CDN configuration information is obtained, see 5.2.2 "Getting CDN Configuration Information".

#### 3.3.1.2.5 Clearing User Configuration

In order to support handover and disposal of receivers, receivers should provide an initialization function to clear personal information that is stored in the NVRAM of receivers. In addition, receivers should provide a function to clear personal information that users have set such as user setting information and company-specific area information and a function to restore factory settings. In order to prevent operation mistakes by users, it is desirable to take measures to prevent erroneous operation by, for example, placing this function in a deeper layer of the operation menu.

#### 3.3.1.3 Remote Controller

It is desirable that the main functions of receivers can be controlled by remote controller (hereinafter abbreviated as "RC") operations. For convenience of users, it is desirable to standardize RC buttons to match the specifications defined in ARIB TR-B14 and ARIB TR-B15. This section provides an example of recommended RCs. However, the physical buttons described in the following section are not required and do not restrict installation of other buttons.

### 3.3.1.3.1 Common Operations

#### (1) Basic operation

- Power button  
A button used to switch between full-power-on mode and stand-by mode.
- Arrow buttons  
Buttons to move the cursor up/down/left/right. Other devices such as a joystick are also acceptable.
- Enter button  
A button used to confirm selection of items that are indicated by the cursor.

#### (2) Browser operation

- Portal button  
A button used to display the service provider portal selection screen.  
  
For information on portal selection/display, see 3.3.1.5 "Portal Selection". For information on browsers, see 3.3.4.1 "Requirements for BML Browser for IPTV".
- Buttons used in a browser  
The following buttons are used in a browser:  
  
*d* button, arrow buttons, Enter button, ten keys, color buttons and Back button.  
  
Color buttons must be placed in the order of blue, red, green and yellow from left to right with corresponding characters (B, R, G and Y) indicating blue, red, green and yellow as specified in ARIB TR-B14 and TR-B15.

#### (3) Other

- Audio switching button  
A button used to switch audio ES.
- Caption switching button  
A button used to turn ON/OFF captions and switch the caption language.
- Menu button  
A button used to display the system menu.

### 3.3.1.3.2 Operations on IP Broadcasting Service

#### (1) EPG display

- EPG button

A button used to display the digital program tables of the receiver. For information on EPG, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.9 "EPG".

#### (2) Channel selection

- Numeric buttons (ten keys)

Numeric buttons that are used to enable channel selection by inputting a channel number

- UP/DOWN buttons

Buttons used to select next/previous channels in ascending/descending order.

- One-touch button

A button that allows one-touch selection of the preset service\_id.

In regard to one-touch buttons, it is desirable that receivers provide a function to allow users to reconfigure the buttons after purchase.

- Network switching button

#### (3) Portal display

- *d* button

A button used to display the portal of the service provider when viewing IP broadcasts of the service provider.

See [Appendix S] "Annotation: Implementation Method of Pseudo BML Data Broadcasting".

### 3.3.1.3.3 Operations on VOD Service

#### (1) ECG display

- ECG button

A button used to display ECG applications of the receiver.

For information on ECG, see 3.3.3.2 "ECG".

#### (2) VOD playback control

- Play button

A button used to start playback of the selected VOD content and resume playback from the stopped status.

- Stop button

A button used to stop VOD contents that are being played back.

- Pause button

A button used to pause the stream delivery of VOD contents that are being played back with an assumption to resume later.

This function can be shared with other buttons such as the Play button.

- Fast-forward button/Fast-rewind button

Buttons used to instruct fast-forwarding/fast-rewarding of VOD contents that are being played back.

- Skip-forward button/Skip-backward button

Buttons used to jump forward/backward from the VOD service content that is being played back to a predetermined playback position and continue playback from that point.

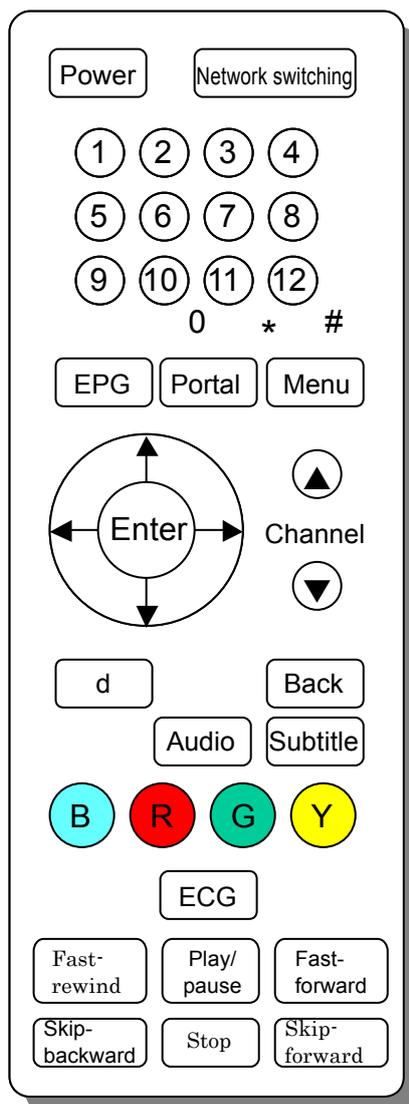


Figure 12 Remote Controller Example

### 3.3.1.4 Configuration for Service Activation

#### 3.3.1.4.1 Initial Configuration Overview

A receiver that acquired an IP address obtains the CDN configuration information via HTTP based on a uniquely determined URI. Additionally, the receiver obtains the PF configuration information based on the pf\_url written in the CDN configuration information, and determines

whether IP broadcasting services are provided on the PF based on the presence of `ip_broadcast_service` elements in the PF configuration information. When IP broadcasting services are provided, information such as multicast addresses for receiving SI information is available for reference in the PF configuration information. To actually receive it, a receiver transmits a group participation request(JOIN) for the SI information multicast stream multicast group and obtains NIT for the PF and other SI information. In this condition, features such as channel selection, EPG display, portal connection and ECG metadata acquisition become possible. For more information, see 4.2 "Communication Protocol Stack" and Chapter 5 "Service Entry and Related Specifications".

### 3.3.1.4.2 Basic Configurations

In order to receive IP broadcasting/VOD services, etc., various types of information should be obtained by a receiver.

Figure 13 illustrates a process flow from the factory shipment and the link-layer connection phase immediately after the power is turned on to initial acquisition of various types of information. However, this flow is not for defining the processing order but for presenting components in various processes. Each process is described in the following section.

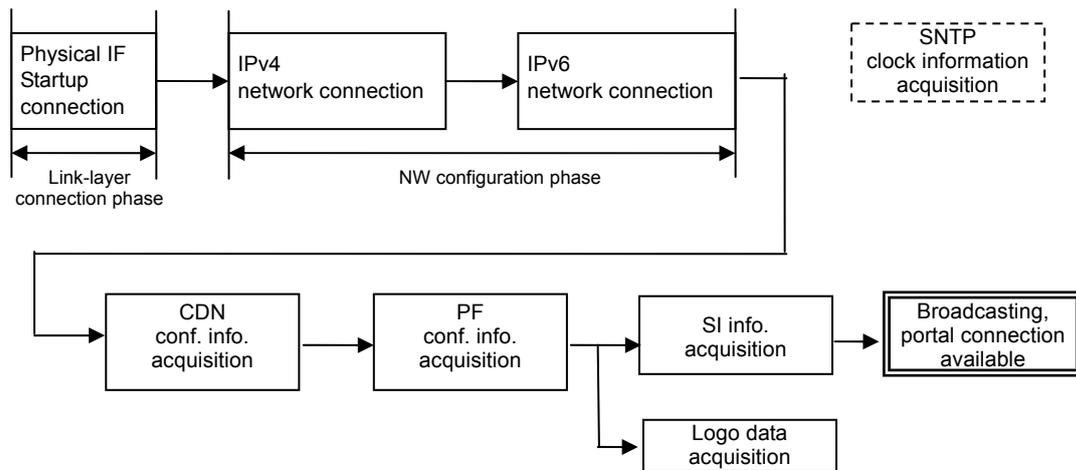


Figure 13 Basic Configurations

- (1) Link-layer connection phase See 5.2.1 (1) "Link-layer connection phase".  
After the power is turned on, the receiver detects a linkup when it is connected to a physical line. It is desirable to provide a feature to notify this linkup status (such as LED).
- (2) Network configuration phase See 5.2.1 (2) "NW connection phase".  
When the IP address is automatically set (recommended default setting) after a linkup with a physical line is detected, the receiver attempts both IPv4 and IPv6 acquisition methods because the receiver may be connected to either or both networks. The order to process IPv4 and IPv6 is not important. The above processing is not required when the IP address is fixed.
- (3) Getting CDN configuration information See 5.2.2 "Getting CDN Configuration Information"  
After NW connection, the receiver obtains CDN configuration information that enables the receiver to access information for obtaining time information and other information in regard to connection to a PF configuration information server that is operated by a PF operator providing services in the CDN, etc. The receiver is connected to a server by referencing the preset connection information to obtain CDN configuration information. It is assumed that the receiver is connected to one CDN, where it is logically fixed with one CDN configuration information server. After the initial acquisition, renewal process should be performed in the order of once a day.  
  
The CDN configuration information mainly contains the following information.
  - (i) A server address to connect via SNTP to implement clock operation, and various parameters that are used for summertime operation, etc.
  - (ii) Various information for individual PFs:
    - Identification information to distinguish among PFs
    - Connection information to obtain a PF configuration information file
    - Serial information to distinguish PF configuration information renewals, etc.
- (4) Getting PF configuration information See 5.2.3 "Getting PF Configuration Information".  
The receiver refers to the connection information to obtain the PF configuration information written in the CDN configuration information and obtains information such as portal server connection information and multicast address for SI reception. This information is in a server that is built for each platform operator (operator to manage and provide transmission facilities) who provides services in the CDN. In the PF configuration information, ip\_broadcast\_service is required to receive broadcasts, and it may not be included for some service providers. After the initial acquisition, the PF's serial information is confirmed when CDN configuration information is referenced, and PF configuration information can be obtained and renewed when there is a change. The PF configuration information mainly contains the following information.
  - (i) PF identification information to distinguish among PFs
  - (ii) Connection destination information to obtain logo data
  - (iii) Various elements that are required to receive SI-exclusive TS
    - Multicast address for SI transmission
    - Transmission port information
    - SI transmission server address, etc.
  - (iv) Various elements for each service provider
    - Identification to distinguish service providers

- Connection information to connect to portals
  - Connection information to connect to a meta server that is used by the ECG, etc.
- (5) Getting SI information See IPTVFJ STD-0004 "IP Broadcasting Specifications".  
When `ip_broadcast_service` is included in the PF configuration information, the receiver acknowledges that broadcasting services are provided in the PF and receives SI information by referencing information such as the multicast address required for receiving SI-exclusive TS in the PF configuration information. This data is transmitted using multicast communication. Therefore a receiver should transmit JOIN request to the edge router to receive data stream, and transmit LEAVE request to stop it after receiving the necessary data

For PSI and SI, signals that comply with "ARIB STD-B10" are superimposed on transport streams and transmitted by each PF operator using multicast.

- (6) Getting Logo data See 5.4 "Logo Data".  
Receivers can use logo data to use the EPG display and selection screens of multiple operators, etc. Logo data can be obtained for each PF operator, service provider and channel.

PF operators operate logo servers and create logo data that is used in IP broadcasting services.

The URI of a logo server is indicated in the `logo_url` of a PF configuration information file, and the file that associates logo id and channels or operators (logo id management file) and other logo files are allocated in a logo server. Logo data types and data format must comply with ARIB TR-B14. It is desirable to perform renewal processing when PF configuration information is referenced after initial acquisition. Also, since the information element of the logo id management file name described in the logo server connection information contains serial information, the information can be renewed if there is a change.

- (7) Getting clock time information See 5.3 "Clock Adjustment".  
TOT is not operated in IP broadcasting/VOD services, so receivers can obtain clock time information using SNTP. Also, receivers can obtain clock time information using methods other than using SNTP.

When receivers obtain clock time information, receivers can adjust the clock by referring to server connection information and offset values, etc. in the CDN configuration information.

TOT is not operated in IP broadcasting/VOD services, so application of summertime using TOT is not available. When receivers operate clock time information using SNTP, summertime is applied using the following information. Application of summertime is operated using `local_time_offset_polarity`, `local_time_offset` and `time_of_change` in the CDN configuration information file, like Local Time Offset Descriptor that is described in ARIB TR-B14.

Also, receivers should be equipped with reliable functions to obtain and store time information that are defined in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications".

#### 3.3.1.4.3 Management of Basic Registration Information

During basic registration with a service provider, a receiver saves the information to identify the contracted service provider (`ip_service_provider_id`) in NVRAM using the basic registration completion process document in a portal. Receivers use this information to give priority to the providers with whom basic registration has been completed when, for example, displaying the EPG. Authentication key information and the CAS/DRM server URI are also saved and managed in NVRAM. Upon expiry, the relevant basic registration information is nullified. Also see [Appendix L] L.1 "Basic Registration".

#### 3.3.1.5 Portal Selection

The receiver must provide a function to display and select links to all service provider portals who provide services in the network environment to which the receiver is connected.

Also, when basic registration is completed with a service provider (or multiple providers), it is desirable that the service providers with whom basic registration has been completed are given priority when service providers are displayed/selected.

#### 3.3.1.6 Displaying Registration Verification Document

When users who applied for off-line contracts via telephone, mail, or shops, etc. perform online basic registration using their receivers, the service providers must verify that the receivers belong to the users and that these users are the same users who made formal subscriptions off-line. These verifications can be implemented by preparing a registration verification document containing a method to let the users enter known information and a method to obtain the `DRM_ID` of receivers and by making the receiver browsers obtain and process this document. It is desirable that receivers provide a function to start the registration verification document of a desired service provider according to user operation, in a BML browser for IPTV. When receivers provide this function, the method to specify service providers can be shared with the function to select portals described in 3.3.1.5, but actual methods are implementation-dependent. However, consideration must be given to cases in which service providers notify users of their service provider ID as well as the information that is required for basic registration or service registration for IP retransmission of digital terrestrial television broadcasting /service registration for IP retransmission of BS digital satellite broadcasting, off-line in advance. Therefore, consideration must be given to the interfaces that are used to enter the service provider ID and methods to specify service providers using the service provider ID. For example, screens to enable users to enter the service provider ID or buttons for starting a BML browser for IPTV can be equipped. For the location where a registration verification document for a specified service provider is obtained, `subscribe.bml` should be added to the service provider portal URI in the PF configuration information. With common receivers having the service registration function for IP retransmission of digital terrestrial television broadcasting using a BML browser for IPTV, `subscribe.bml` should be added to the Portal URI of the service provider who provides IP retransmission services of digital terrestrial television broadcasting listed in the PF configuration information for IP retransmission of digital terrestrial television broadcasting when it is necessary to access to the portal. With common receivers having the service registration function for IP retransmission of BS digital satellite broadcasting, `subscribe.bml` should be added to the Portal URI of the service provider who provides IP retransmission services of BS digital satellite

broadcasting listed in the PF configuration information for IP retransmission of BS digital satellite broadcasting when it is necessary to access to the portal..

See 6.5.3.2 and [Appendix L] "Guidelines on BML Document for Basic Registration, Service Subscription, Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting and Service Registration for IP Retransmission of BS Digital Satellite ".

### 3.3.1.7 Parental Control (Age Restriction)

#### 3.3.1.7.1 Overview

This function is used to compare the parental rate that is described in PSI/SI and ECG metadata with the parental level (minimum age for viewing) that is set on a receiver by a user. When the parental rate exceeds the parental level (minimum age for viewing), users are asked to enter a password (code number) for the parental control target program/contents, which can be viewed only when the entered password matches the password that is preset in the receiver by the user. For more information on the operations, see 3.3.1.7.6 "Displaying Information of Age-Limited Programs/Contents".

This function is used for programs provided by conditional access services and contents provided by conditional playback services.

Receivers should be equipped with a function to set the parental level to ON/OFF, and when the parental level is OFF, receivers should not display the parental level/password entry screen until the parental level is set to ON.

When a password and/or parental level are not set, receivers should not present any services including restricted programs and should display a screen to ask users to set a password and/or parental level. It is desirable to allow users to set the abovementioned "parental function ON/OFF" function in the password and parental level setting screens.

#### 3.3.1.7.2 Initial Setting

In the factory setting of receivers, it is desirable that the parental function is set to ON and the parental level is set to 19 or an equivalent value. However, actual parental level setting and password setting are implementation-dependent.

When the parental level is set to 19, users are not asked to enter a password to view programs and contents that are under R-19. If a password is not set in the factory setting, users should set a password when they change the parental level setting.

#### 3.3.1.7.3 Parental Level (Minimum Age for Viewing)

The parental rate of a program should be (rating + 3). The rating takes a value between 0x01 and 0x11. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 7 "PSI/SI".

The parental rate for contents takes a value between R-4 and R-20. For more information, see [Appendix D] "Specifications on Operation of Classification Scheme "

An exceptional process is applied when a value between 0x12 and 0xFF is specified for rating (age restriction rate), where all become restricted regardless of the parental level setting, except when the parental level (minimum age for viewing) of the receiver is set to "no restriction (unconditional)" or when the setting is made not to use the above-mentioned parental control.

Adult-themed video services with 0x11 rating and R-20 adult themed contents should not be displayed even when the restriction is temporarily removed. However, the above-mentioned restriction does not apply to digital TV services that have 0x11 rating.

This restriction does not apply to programs that do not have a rating (age restriction rate).

Values that are set in receivers should fall between 4 and 20, and should be specifiable in years.

#### 3.3.1.7.4 Password (Code Number)

##### (1) Password Digit Number

- The password should be a decimal 4-digit number.

##### (2) Deletion of password

- Deletion of password is optional depending on the receiver.

#### 3.3.1.7.5 Disabled Restriction Status

After a password and the parental level is set and when the restriction is removed temporarily (after password authentication), it is desirable that restriction is removed at least until the power is turned off (including when the power is turned off using a remote controller).

#### 3.3.1.7.6 Displaying Information of Age-Limited Programs/Contents

For more information on information display using EPG and ECG, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.9 "EPG" and 3.3.3.2.4 "Displaying Information of Content and Content Package" in this document.

For information on the parental control during channel selection, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.7 "Service Channel Selection".

For more information on information display in portals, see [Appendix M] "Guidelines for Parental Control Function in Portal"

#### 3.3.1.8 Displaying CAS/DRM Client Identifier(DRM\_ID)

It is assumed that CAS/DRM client identifiers (DRM\_ID) are registered with subscriber management servers of the service providers as a means to identify devices and users of these devices. CAS/DRM client identifiers are used as needed when the receiver browser, etc. processes authentication, and users do not usually need to know the values. However, users must report the values by phone or by other means when, for example, a service is cancelled due to device failure. Therefore, receiver manufacturers must give consideration to the way in which DRM\_ID can be displayed to users by some means.

DRM\_ID should be displayed as a hexadecimal (0 to F) 16-digit string divided into groups of 4 characters connected with "-" (hyphens) as shown below:

Display format: XXXX-XXXX-XXXX-XXXX

Where "X" is a hexadecimal number or character between 0 to F. (Letters should be in upper case.)

The identifier is called the "DRM number".

In Marlin IPTV-ES, values of Subject in client certificates defined in "Marlin IPTV End-point Service Specification 5.1.1.4" and "Marlin Trust Management Document – for IPTV-ES 1.4" should be used as CAS/DRM client identifiers (DRM\_ID). When a device has a CAS client identifier (DRM\_ID) for IP retransmission of digital terrestrial television broadcasting/BS digital satellite broadcasting in addition to a CAS/DRM client identifier (DRM\_ID), and both of them are listed, it is desirable to list them in the order of CAS/DRM client identifier (DRM\_ID) and CAS client identifier (DRM\_ID).

### 3.3.2 IP Broadcasting Service

See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 3 "Receiver Model".

### 3.3.3 VOD Service

See IPTVFJ STD-0002 "VOD Specifications", Chapter 3 "Receiver Models". The following section defines the operational specifications that are specific to CDN scope services.

#### 3.3.3.1 Playback of VOD Contents

Contents are played back when they are selected from a resident function such as ECG and when they are selected from a portal. For more information, see IPTVFJ STD-0002 "VOD Specifications". The following section defines the operational specifications that are specific to CDN scope services.

##### 3.3.3.1.1 Startup Sequence of Contents Playback

Receivers should start streaming according to the following procedures:

- (1) Receivers access a video content server on a communication network using the sequence that is described in 7.3.2.1 "Specifications for Content Playback Control Metafile Transmission/Reception" according to the ProgramURL description of OnDemandProgram in the instance description metadata (ProgramLocationTable) that corresponds to CRID, based on the information listed in content\_uri of launchIPTVContent() function that is described in 6.4.4.5.2 "Content Startup Function" when streaming is started from a portal, or based on the content reference identifier (CRID) of the content that is selected from ECG when streaming is started from ECG.
- (2) When streaming is started from ECG, authentication is performed between receivers and a video content server so that the receivers can access the server on the communication network and obtain content playback control metafiles of the contents. For more information on authentication, see 5.5.8 (1) ID Authentication.
- (3) Receivers obtain content playback control metafiles (ERI, LLI, NCI) of the contents to be streamed from a video content server on a communication network, analyze the ERI and obtain the URI of the contents.
  - For more information on ERI, LLI and NCI, see IPTVFJ STD-0002 "VOD Specifications", Chapter 5 "Content Playback Control Metafile".
- (4) Receivers analyze NCI and obtain information in regard to content streaming control.
- (5) Receivers analyze LLI and obtain a license from a CAS/DRM server by specifying a license ID to identify the license that is required to play back the contents. When there are multiple licenses that can play back the contents, the license that was selected from ECG in advance is used.
- (6) Receivers input the license into a CAS/DRM client and obtain the Rights Management and Protection Information (RMPI) and a content key.
- (7) Based on the content URL obtained by analyzing ERI, receivers access a video content server and receive and play back streaming data via RTP using RTSP streaming control according to the specifications described in IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol".

- (8) When playback is resumed using a resident function, receivers search the playback start point in the stream resources based on the information related to resume that was stored on receivers when the content playback was previously stopped. To start from a portal, receivers obtain a playback start position that is specified in a BML document. For information on playback start position specifications in a BML document, see 6.4.4.5.2 "Content Startup Function" and [Appendix T] T.4 "Implementation Method of Resume".

#### 3.3.3.1.2 Content Playback Control

Receivers should implement the following processes in regard to playback control for stream resources.

- When stream resources are played back, receivers should be able to operate according to 7.3 "Operation of Streaming" in this document after the content starting process described in the previous section.
- Receivers should operate according to 3.3.3.1.2.1 "Trick Playback" and 7.3.2 "Detailed Operational Specifications on VOD Streaming Services" in regard to trick playback during playback of stream resources.
- Based on the communication quality, receivers should be able to perform appropriate processes using 7.9 "Assuring Quality of " as reference.
- For clock synchronization, receivers should perform processes in accordance with 7.9.1.2 "Clock Synchronization".
- Receivers that implement FEC should perform processes in accordance with IPTVFJ STD-0002 "VOD Specifications", 4.1.3 "FEC".

##### 3.3.3.1.2.1 Trick Playback

In order to implement a trick playback function using a user interface function such as a remote controller, receivers must perform the following processes.

- Two types of fast-forward playback/fast-rewind playback methods are assumed: a method to use stream resources that are dedicated to fast-forwarding and fast-rewinding and a method to use stream resources composed only of the TS packets related to I-frames that are extracted from 1x-speed stream resources. The former method is called the "normal TS method", and the latter method is called the "I-frame TS method". For more information on these methods, see IPTVFJ STD-0002 "VOD Specifications", 6.5 "Transmission Operation of Variable Speed Playback Streams". Also, for information on playback control procedures, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 and 7.3 "Operation of Streaming" in this document.
  - Receivers distinguish between the normal TS method and the I-frame TS method based on the speed value listed in the NCI of the contents.
  - The speed value listed in the NCI should be used to specify the fast-forwarding/fast-rewinding speed.
  - For the normal TS method, receivers should perform playback processes that correspond to the time stamp value of TTS, PCR, PTS and DTS as with 1x-speed playback. Packets other than video packets (audio packets and caption packets) should be discarded without being played back.

- For the I-frame TS method, receivers should ignore the time stamp value of TTS, PCR, PTS and DTS, and perform playback processes. In the I-frame TS method, it is assumed that correct clock synchronization information and presentation synchronization information are lost. Therefore, free-run sequential playback, which does not use the clock synchronization feature of receivers, is acceptable. Also, packets other than video packets (audio packets and caption packets) should be discarded without being played back.
- When receivers reach the end position of contents during fast-forwarding or the start position of contents during fast-rewinding, the receivers should distinguish the status based on an instruction notified from a video content server (ANNOUNCE method) and perform appropriate processes such as stopping or resuming playback. For more information, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and 7.3 "Operation of Streaming" in this document.
- In regard to jump playback, it is desirable to implement a jump playback function that enables jumping to a playback point (or an interval) in the contents. Implementation methods vary depending on receivers, including methods to specify jumping intervals and positions to jump to. For information on the procedures, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and 7.3 "Operation of Streaming" in this document.
- It is desired that receivers implement a chapter playback function. Implementation methods vary depending on receivers.
  - Receivers analyze ERI of the contents to be played back and obtain chapter start points and chapter titles that are described.
  - Using a user interface function such as a remote controller, receivers jump to a chapter start point. The procedures for jumping are the same as the procedures for jump playback.
  - Chapter information display methods to display chapter information are implementation-dependent. When chapter jump is performed using remote controller buttons, it is desirable that the corresponding chapter title is displayed immediately after chapter jump.

#### 3.3.3.1.2.2 Pause/Stop

In order to pause or stop playback of contents using a user interface function such as a remote controller, receivers should implement the following processes.

- Receivers should avoid disconnection by sending a method or heartbeat in an interval that is smaller than the timeout value in the Session header of the SETUP response. On the other hand, receivers should perform stop processing to continue the PAUSE status for more than a defined period of time to reduce the server load. For more information, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and 7.3 "Operation of Streaming" in this document.
- In order to perform stop processing, receivers should use the NPT value listed in the Range header of the RTSP PAUSE response as a playback stop position of the contents, associate it with the content, and record/store the information. For more information on RTSP, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and 7.3

"Operation of Streaming" in this document. Also, for the processes after stopping, follow the procedures described in 3.3.3.1.2.4 "Playback Termination".

### 3.3.3.1.2.3 Resume Playback

When receivers support resume operation using a resident function, receivers should implement the following processes. The resume function provided by a resident function is different from the resume function provided by a portal service in that it is provided differently depending on receivers based on the following processing. For more information on the resume function that is provided by a portal service, see [Appendix T] T.4 "Implementation Method of Resume".

- As described in 3.3.3.1.2.2, when content playback is interrupted by a resident function such as stop, receivers should associate and store the playback stop position of the interrupted content and the identification information of the target streaming content. For the playback stop position, the NPT value described in the Range header of the RTSP PAUSE response should be used. For more information on RTSP, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and 7.3 "Operation of Streaming" in this document.
- For processes in regard to starting contents, follow the procedures described in 3.3.3.1.1 "Startup Sequence of Contents Playback".

### 3.3.3.1.2.4 Playback Termination

The following two cases are assumed as transition destinations when content playback ends.

- When playback of contents that are started from a resident function such as ECG ends, it is desirable that the display of the receiver returns to a resident GUI such as ECG, by which the contents were started.
- When playback of contents that are started from a portal ends, the receiver should operate according to the description in [Appendix T] "Annotation: VOD" and 7.3 "Operation of Streaming".

Completion of content playback is detected using an instruction that indicates completion of content playback from a video content server (ANNOUNCE method). For more information, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and 7.3 "Operation of Streaming". When the notice header indicates reception of 5XXX Event\_Code for playback termination, receivers should display appropriate messages describing the reason for termination.

There are two independent processes in playback termination: (1) termination processing using a user interface function through remote controller operations such as stop, and (2) termination processing for communication servers such as transmission of RTSP TEARDOWN and disconnection of sessions due to timeout. For more information on transmission of RTSP TEARDOWN and disconnection of sessions due to timeout, see 7.3 "Operation of Streaming".

For more information on the termination process regarding licenses, see IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications".

#### 3.3.3.1.2.5 On Screen Display during Playback

AV players are capable of displaying the following information during stream resource playback. Information display methods are implementation-dependent.

- Banners related to contents that are being played back. Content titles and content outlines can be displayed according to the information described in ERI of the contents.
- A user interface function to switch ES for contents that are being played back. Audio ES and caption ES should be switched using the information described in PMT that is multiplexed to the stream resource of the contents. For audio ES switching labeling, "Audio 1, Audio 2" suffices. For caption ES switching labeling, a format in which no caption or one of the languages in the caption ES is selectable, can be used. The default caption setting is no caption.
- A progress bar indicating the streaming playback position. The current playback position on the length of the content that is described in SDP can roughly be determined by combining the value of the Range header indicated in the Response message of the RTSP PAUSE method, clock value in a receiver, or PTS value of the stream, etc. For example, when the mode changes from trick play to normal playback, the PAUSE method is always used for transmission/reception. By this, the playback start time position is located, and time elapsed that is measured by the receiver's clock is added during the following normal playback. During high-speed playback, the product of the measured playback time and the speed value can be added. For more information on SDP and RTSP, see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and Chapter 7 "Operation of VOD" in this document.
- GUI that is used to specify a time code for jump playback. For example, receivers can provide a GUI, which provides a sub menu enabling entry or selection of a playback time position for the content being played back using a user interface function such as a remote controller.

For the guidelines for display during stream resource playback using an AV player, see [Appendix J] "Guidelines on Presentation of IP Broadcasting Program, VOD content and Portal Service".

#### 3.3.3.2 ECG

This section defines the Electronic Contents Guide (ECG) function that is implemented by receivers using ECG metadata provided by service providers. The ECG function is an optional function, and whether it is implemented or not depends on the receivers.

The ECG uses the metadata that is provided by content delivery service providers in advance and provides users with the means to search contents, display information, playback, purchase contents, and work with portals using a receiver resident function. Especially, the ECG enables searching across service providers as it is implemented as a resident function.

### 3.3.3.2.1 Functions Provided by ECG

ECG provides the following functions.

- A function to specify the entire ECG metadata or a query condition for each service provider and obtain metadata
- A function to obtain ECG metadata from multiple service providers
- A function to display lists and details of obtained ECG metadata to users
- A function to move from displayed ECG metadata to contents and procedures to purchase packages
- A function to display contents and packages that are purchased by users
- A function to play back purchased contents

### 3.3.3.2.2 ECG Metadata and Management

#### (1) ECG metadata

For definition of ECG metadata, see Chapter 7 "Operation of VOD".

#### (2) ECG metadata management using receivers

It is assumed that obtained metadata is temporarily stored in cache for ECG.

Implementation of cache depends on individual receivers. It is assumed that cache capacity ranges from the minimum of a content query result screen to the maximum of all ECG metadata from all service providers. Also, the assumed storage methods range from saving temporarily in RAM as storage media to saving on HDD.

ECG compliant receivers build and manage a metadata database based on obtained ECG metadata to reduce stress on users to use functions such as search. However, the methods to manage ECG metadata in receivers are implementation-dependent.

Note the following points in regard to ECG metadata cache management.

- (i) Metadata should be obtained from an ECG metadata server of a service provider and managed so that it is available for use as lists, etc.
  - (ii) Metadata for individual content and content package metadata comprising a content group should be associated correctly.
  - (iii) Effort should be made so that the difference between ECG metadata in a service provider server and cache becomes less than one day.
  - (iv) Receivers should always keep the metadata database up-to-date based on the latest ECG metadata that is obtained.
  - (v) When an expiration date is specified, expired ECG metadata should not be presented to users. Expiration dates may be shortened, so metadata should be renewed in an appropriate manner.
- (3) Management of viewing availability information for individual content packages  
Receivers should save PurchaseID, usage start date, and usage end date of content packages, or the license ID and the expiration date of license usage and the date on which the select option is reset for select packages, in NVRAM, at least until the usage end date or the date on which the select option is reset.
- (4) Other information managed by receivers

It is desirable that receivers can manage viewing status of contents that are available for viewing, such as information on whether they are viewed or not, and content playback stop positions for the resume function, etc.

### 3.3.3.2.3 Getting ECG Metadata

Note the following points in regard to getting metadata by ECG. Cache capacity of ECG varies depending on the receivers, so be careful not to lose data, for example, by exceeding the cache capacity, when obtaining ECG metadata.

- (1) Receivers connect to an ECG metadata server, as described in <meta\_url> in the PF configuration information of a service provider with whom basic registration has been completed and obtain metadata according to the procedures stipulated in Chapter 7 "Operation of VOD".
- (2) When obtaining ECG metadata, receivers should obtain metadata partially, for example, by specifying size, based on the methods stipulated in Chapter 7 "Operation of VOD" with cache capacity in consideration.
- (3) When obtained ECG metadata has the same ProgramInformation/@programID as the cached metadata, and @fragmentVersion of the obtained ECG metadata is new, the cached metadata should be replaced by the obtained metadata.
- (4) Scheduling to obtain ECG metadata is implementation-dependent, but effort should be made so that the difference between the cached metadata and the server is less than one day.
- (5) Implementation in which receivers of a manufacturer obtain ECG metadata concurrently should be avoided. When the error code 503 (Service Unavailable) is returned from a server, receivers should connect to the server after an appropriate interval according to the procedures stipulated in 5.5.9 "Operation of Status Code".
- (6) When there are multiple service providers with whom basic registration has been completed, receivers should obtain metadata evenly from the multiple service providers, associate the obtained metadata with respective service providers and manage the metadata in their metadata database.

### 3.3.3.2.4 Displaying Information of Content and Content Package

ECG should at least provide a function to display content and content package lists and detail screens. Note the following points in regard to each display function.

- (1) ECG should be able to display content and content package lists using obtained metadata. There are two assumed types of lists to be displayed: content lists and content package lists. Also, group lists can be displayed using group information elements such as series.
- (2) Other list display methods are implementation-dependent, but as the number of contents may become large, consideration should be given to paging, scrolling, and hierarchical displays, etc.
- (3) It is assumed that content package name, content package type, price, new arrival, recommended content package, and status such as viewing period are displayed when content packages are displayed in a list. It is assumed that content name, new arrival, recommended contents, and status such as viewing availability and viewing period are displayed when contents are displayed in a list. Also, it is assumed that group name, new

arrival, recommended group, and status such as viewing period are displayed when groups such as series are displayed.

- (4) The display order in lists is implementation-dependent, but consideration should be given to avoid unfair display opportunity among service providers, for example, by ordering items using search keys.
- (5) A purchase button can be displayed for the contents and content packages in the content list screen and content package list screen.
- (6) Users should be able to move to a detail screen that displays information such as details of contents and content packages and purchase conditions by selecting individual contents and content packages displayed in lists.
- (7) Detailed information of obtained contents and content packages should be viewable. A purchase button should be displayed for each content and content package in the detail information screen so that users can proceed to purchase procedures.
- (8) When multiple data is defined with the same tag in ECG metadata, the data should be displayed in the order that follow the described order.
- (9) In regard to license information related to contents and content packages such as viewing period, license reference information should be obtained and displayed.
- (10) It is desirable that contents and content packages that have already been purchased are differentiated in the contents list screen and content package list screen as well as the detail screen.
- (11) If there is a provider logo, it is desirable to display the logo.
- (12) In regard to the items that should be displayed in list screens and detail screens, conform to [Appendix I] "Guidelines on ECG Screen".

#### 3.3.3.2.5 Query Using ECG Metadata

The ECG function should provide users with a metadata query function in cooperation with an ECG metadata server. The following points should be noted in regard to searching.

- (1) Receivers should accept metadata query conditions from users, send the query condition to ECG metadata servers and obtain ECG metadata. When ECG metadata is obtained, receivers can cache the metadata according to the cache capacity of individual receivers. To perform metadata query, follow the procedures that are defined in Chapter 7 "Operation of VOD".
- (2) In regard to ECG metadata display for query results, conform to the display method described above.
- (3) Obtained ECG metadata should be compared to cached metadata, and cached metadata should always be up-to-date.
- (4) When a user presents the same query condition as cached ECG metadata, and it has been more than one day since the ECG metadata was cached, the query should include the ECG metadata server of the service provider.
- (5) Search by genre can be performed according to the operational specifications of the classification scheme that is defined in Chapter 7 "Operation of VOD".
- (6) Consideration should be given to avoid unfair metadata queries among service providers.

#### 3.3.3.2.6 Purchasing Content Packages

Using the ECG function, users should be able to move from list and detail screens to the content package purchase screen to purchase content packages.

- (1) By selecting a button to start the purchase procedure in the content list, content package list, and detail screens, users should be able to start a BML browser for IPTV using the URI indicated in PurchaseInformation/Purchase/PricingServerURL of the purchase information element corresponding to the contents and content packages, move to a portal server of a service provider and proceed with the purchase procedure.
- (2) When multiple content packages contain the selected content, users should be able to select a content package.
- (3) When a content package is purchased in a portal server, viewing availability information should be saved in the receiver at least until the viewing period ends. The storage period after expiration of the viewing period is implementation-dependent.
- (4) When users return to the ECG function after purchasing content packages, it is recommended that the transition to the purchased content package detail screen is carried out using the ECG button or startResidentApp() in the BML document after the purchase.
- (5) When purchased contents and content packages are displayed, they should be displayed in a way that users can find out that they are purchased.
- (6) In regard to contents included in a select contract, the CRID of the contents should be added to the above URI as an argument, and users should be able to move to a portal server and proceed with the selection procedure.

#### 3.3.3.2.7 List of Purchased Contents and Content Packages

Using the ECG function, users should be able to display contents and content packages that are available for viewing and play back them by selecting a content.

- (1) Users should be able to display a list of contents and content packages that are available for viewing using viewing availability information that is saved on receivers. A dedicated screen can be prepared, or it can be included in the list screen. When the purchased content and content package list is included in the list screen or detail screen, the available for viewing status should be displayed.
- (2) When users display the list of contents and content packages that are available for viewing, it is desirable that a play button, viewing status (previous viewing position), viewing period of the contents and links to portal servers are displayed.
- (3) When multiple contents become available for viewing by purchasing one content package such as pack and unlimited content packages, only content package information should be displayed. All contents do not need to be displayed.
- (4) Since it is assumed that content package purchase and cancellation of content package purchase take place off-line, it is desirable that receivers provide a button to start a function to synchronize viewing availability information with a service provider server, or other means to execute an equivalent function such as a menu item.
  - The following methods can be used for synchronization.
    - (a) Receivers access a portal server of a service provider and specify the user using a method such as user authentication with DRM\_ID as shown in the example in 5.5.8 (1) "ID Authentication" by executing the obtained BML document. Then receivers perform renewal processing for the BML document that is customized for a specified user using setContentPackageInfo() (when the information on content packages for which purchase application has been made is added individually) or updatePackageLicenseInfo() (when the information is renewed collectively).

- (b) Using ECG, users connect to the purchased content package information URI of the PF configuration information using HTTPS and obtain a purchased content package information file according to the procedures stipulated in 7.8.2 "Operation of Purchased Content Package Information". When the error code 503 (Service Unavailable) is returned from the server, receivers should connect to the server after an appropriate interval according to the procedures stipulated in 5.5.9 "Operation of Status Code ". In regard to acquisition timing, it is assumed that receivers can perform automatic renewals using the above protocol at any time such as when the power is turned on. Allowing receivers to access a server concurrently should be avoided.

### 3.3.3.2.8 Playback of Contents using ECG

For information on content playback, see 3.3.3.1 "Playback of VOD Contents". For contents that require parental control, the parental control as defined in 3.3.3.2.10 "Parental Control" should be performed.

### 3.3.3.2.9 Linkage with Portal

- (1) It is desirable that links to the corresponding service provider portals are displayed in content lists and content package lists.
- (2) A BML browser for IPTV is started using <portal\_url> in the PF configuration information when a user moves to a portal of a service provider.

### 3.3.3.2.10 Parental Control

In VOD services, delivery of contents with viewing-age restrictions is assumed. For such contents, it is desirable that parental control is applied not only to content playback but also to ECG display using metadata. The basic operation of parental control is defined in 3.3.1.7 "Parental Control (Age Restriction)". In regard to ECG display restrictions, it is desirable to perform parental controls according to Table 3-5.

Table 3-5 ECG Display Restriction Using Parental Control

Signal (R)	Receiver setting (*1) (age)		ECG display (List, link)	Content playback , preview
20 (Adult-the med)	No viewing restriction		○	○
	Viewing restricted	20	○	○
		4 to 19	×	×
12 to 19	No viewing restriction		○	○
	Viewing restricted	age<R	○ (*3)	△ (*2)
		R≤age	○	○
4 to 11	No viewing restriction		○	○
	Viewing	4 to 20	○	○

	restricted			
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Legend - ○: Displayed, △: Password authentication required for display, ×: Not displayed

- (\*1) The above table lists the control specifications for parental control. GUIs to set the parental control function of receivers are implementation-dependent.
- (\*2) With the "age  $\leq$  19" setting, only  $R \leq 19$  contents can be displayed, searched, and played back even when restriction is removed temporarily by password authentication: R20 contents cannot be displayed or played back.
- (\*3) Thumbnail images of age  $< R$  contents can be displayed only when restriction is removed temporarily by password authentication.

Parental control is not applied to display of program genres for metadata search.

### 3.3.4 Other

#### 3.3.4.1 Requirements for BML Browser for IPTV

In order to implement a BML browser for IPTV, receivers need to satisfy the functions and specifications described in Chapter 5 "Service Entry and Related Specifications" such as implementation of additional functions for IP broadcasting/VOD services, implementation (option) of additional functions for IP retransmission services of digital terrestrial television broadcasting and IP transmission services of BS digital satellite broadcasting, and implementation of additional functions for CAS/DRM related features, in addition to the features listed in this document.

Also, a resident application should start and terminate the BML browser for IPTV under the following conditions.

- Starting a BML browser for IPTV
  - When access to a portal is instructed by a portal selection method described in 3.3.1.5 "Portal Selection"
  - When displaying pseudo BML data broadcasts described in [Appendix S] "Annotation: Implementation Method of Pseudo BML Data Broadcasting" using the *d* button of a remote controller during IP broadcasting reception
  - When displaying a portal page specified at start-up to return to upon termination of VOD that is started from the portal as described in 3.3.3.1.2.4 "Playback Termination"
  - When displaying a registration verification document for a portal of the corresponding service provider as described in 3.3.1.6 "Displaying Registration Verification Document"
  - When displaying a purchase processing BML document in PurchaseInformation/Purchase/PricingServerURL through the purchase operation by a user in the package purchase screen of ECG
- Terminating a BML browser for IPTV
  - When IP broadcasting channel selection is performed or when the network is switched

- When selecting an IP broadcast specified by executing `epgTune()` function in a portal document
- When an AV player is started by executing `launchIPTVContent()` function in a portal document
- When a resident application such as the initial setting, EPC, ECG and the portal selection screen is started by user operation
- When restarting ECG by executing `startResidentApp()` function in the portal document for purchase processing that is started from ECG with `pricingServerURL`

#### 3.3.4.2 Requirements for ECG Metadata Function

ECG metadata management functions are implementation-dependent, but receivers should provide the following functions and specifications as described in Chapter 7 "Operation of VOD" in addition to the functions described in this chapter as well as those described in this section.

- Receivers should obtain ECG metadata, request a server for a search, and receive and process the returned results appropriately using the method defined in Chapter 7 "Operation of VOD".
- Receivers should store the fragments of the latest ECG metadata. For example, if a receiver already has the `fragmentId` of the received public metadata and its `fragmentVersion` is newer than that of the stored metadata fragment, the stored metadata is overwritten and renewed.
- Receivers should add/renew/display ECG metadata according to Chapter 7 "Operation of VOD".

#### 3.3.4.3 Access Control

Receivers should satisfy the following access control (CAS/DRM) functions and specifications as described in IPTVFJ STD-0004 "IP Broadcasting Specifications" and IPTVFJ STD-0002 "VOD Specifications" in addition to the functions described in this chapter as well as those described in this section.

- Requirements for receivers in general
  - Receivers should satisfy the functional requirements listed under the required specifications in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 3 "Receiver Model" and IPTVFJ STD-0002 "VOD Specifications", Chapter 3 "Receiver Model".
- Functional requirements for CAS/DRM client
  - Receivers should hold a client certificate and root certificate related to the SAC specifications defined in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in DRM Specifications". Also, receivers should provide the security functions that are required to implement mutual authentication and key exchange as defined in the above specifications.

- Receivers should provide a function to send a request to obtain a license including license ID to a CAS/DRM server, obtain and store the license if necessary, which is defined in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in DRM Specifications".
- Receivers should provide a function to input the ECM packets defined in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 " Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications", perform encryption/decryption using a work key when the corresponding unexpired MC license exists, and output a scramble key.
- Receivers should provide a function to renew and store CRL using the method defined in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in DRM Specifications", and 7.10.1 "Getting CRL" in this document.
- Receivers should provide a function to verify the CAS/DRM server URI signatures based on the information specified by the basic registration information setting functions in LLI and BML using the method specified in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 " Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in DRM Specifications".
- Receivers should provide a function to obtain and manage reliable time information defined in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 " Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in DRM Specifications".
- Functional requirements for descrambler/decrypter
  - Receivers should provide a function to use a scramble key to decrypt TS that is encrypted by the method defined in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] ""Application Specifications of Marlin IPTV-ES system in DRM Specifications".

#### 3.3.4.4 Content Protection

For the functional requirements for receivers in regard to content protection, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS

Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications".

### 3.3.4.5 Recommended Behavior of Receiver and Message to Display on Errors

When a specific condition arises on a receiver such as an error, it is desirable to perform processes such as displaying a message on the screen to encourage users to identify the cause as a primary action. Assumed conditions, recommended behavior and messages of receivers are listed in [Appendix G] "Guidelines on Recommended Behavior of Receivers and Message Examples".

For "receiver statuses" shown in [Appendix G] "Guidelines on Recommended Behavior of Receivers and Message Examples" Table Appendix- 6, detection of the status and display of a message are required for items listed under Large Classification and Middle Classification. These processes are optional for the items listed under Small Classification. Also, for the items that are defined as optional (items for which "\*" is added to the right of the "code" section in Table Appendix- 6), it is desirable to implement functions to detect the statuses listed under Larger Classification and Middle Classification and display a message if the corresponding function is implemented. Items listed under Small Classification are implementation-dependent. The system of "codes" that are added to the receiver status is shown in Table 3-6. The format to display messages listed in Table Appendix- 6 is implementation-dependent. But it is recommended that receivers display a message with a corresponding "code". Messages are implementation-dependent. The message examples in the table can be used as reference, and if necessary, a supporting service provider name can be displayed as well.

Table 3-6 Code System Relevant to Receiver Status

Code System	Receiver Status Classification
IP1000 -	NW connection, Getting initial information
IP2000 -	IP broadcasting
IP3000 -	VOD
IP4000 -	(reserved)
IP5000 -	(reserved)
IP6000 -	Portal, meta, other
IP7000 -	(reserved)
IP8000 -	(reserved)
IP9000 -	(Assigned to receiver-specific errors)

## 3.4 Requirements for Hardware and Software

This section describes the assumed receiver hardware and software requirements.

### 3.4.1 Front Ends

#### 3.4.1.1 IP Front Ends

The IP front end is a logical block used to take in data such as video and audio transmitted as IP packets into a receiver, which is comprised of the "communication I/F" and "communication process" as shown in Figure 9.

- At least one IP front end should be set up.
- For the physical interface specifications for communication I/F, see ARIB STD-B21 Chapter 9, 9.2.1.1 "Physical interface specifications".
- For information on the protocol required for the communication process, see Chapter 4 "Network Connection and Communication Protocol".

#### 3.4.1.2 Satellite/Terrestrial Front End

A model equipped with both the satellite front end and terrestrial front end that are defined in ARIB STD-B21, Chapter 4 "Ratings and specifications of the units of the digital satellite broadcasting receiver" and Chapter 5 "Ratings and specifications of the receiving units for the digital terrestrial television broadcasting" is also assumed but not defined in this document.

### 3.4.2 FEC

See IPTVFJ STD-0004 "IP Broadcasting Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol". In order to realize long-term (one week or so is assumed) stable playback, it is recommended to equip receivers with Pro-MPEG 1D FEC at least.

### 3.4.3 TTS/TS Conversion

For information on the clock synchronization on receivers for TS (TTS) for time stamp, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 4.3.2 "Clock Synchronization" for IP broadcasting and 7.9.1.2 "Clock Synchronization" for VOD.

Also, it should be noted that the time stamp value does not fulfill its original function in VOD fast-forwarding/fast-rewinding.

### 3.4.4 TS Decoder

See ARIB STD-B21 Chapter 5, 5.2.7 "Transport processing".

### 3.4.5 Video Decoding and Output

See IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.2 "Video/Audio Decoding Process and Output" and IPTVFJ STD-0002 "VOD Specifications", 3.2.2 "Video/Audio Decoding Process and Output".

### 3.4.6 Audio Decoding and Output

See the encoding specifications in IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.2 "Video/Audio Decoding Process and Output" and IPTVFJ STD-0002 "VOD Specifications", 3.2.2 "Video/Audio Decoding Process and Output".

### 3.4.7 Memory

#### 3.4.7.1 RAM

- For receivers to receive IP transmission streams stably, a buffer to absorb network jitter is required. The buffer size varies depending on the receivers.
- When equipped with the FEC function, streams should be stored temporarily in order to restore packets using FEC. The FEC processing unit varies depending on the FEC method. Therefore, a buffer capacity corresponding to the FEC method should be ensured depending on receivers. For Pro-MPEG FEC CoP3, a minimum of 160kbyte or so is required based on the FEC processing unit.
- The RAM capacity required to display portal contents is implementation-dependent. Consideration should be given to the content size defined in 6.2.3.1 "RAM".
- The RAM capacity required for receivers' resident programs such as EPG and ECG is implementation-dependent. For RAM capacity estimation, refer to IPTVFJ STD-0004 "IP Broadcasting Specifications", [Appendix I] "Explanation: Estimation of Amount of Information for Commonly Operated SI" for the SI data that is required for EPG, and refer to Chapter 7 "Operation of VOD" for the metadata size that is required for ECG.

#### 3.4.7.2 NVRAM

The following specifications should be observed in regard to NVRAM where information is saved. Memory is implementation-dependent, and nonvolatile memory other than NVRAM can also be used. Information stored in NVRAM is implementation-dependent, and information other than the following can be saved in NVRAM.

- Parental control information  
In order to implement parental controls, the NVRAM capacity to store the information on the parental function's ON/OFF status, parental level (minimum viewing age), and parental password (security code) should be ensured. For information on parental control, see 3.3.1.7 "Parental Control (Age Restriction)".
- User residence information  
The NVRAM capacity to store the prefecture code and postcode should be ensured. For information on residence area, see 3.3.1.2.3 "Residence Location Configuration".
- Network setting information

The NVRAM capacity to store network setting information entered by users should be ensured. For information on network setting information, see 3.3.1.2.1 "Network Interface Configuration".

- Basic registration information

For service providers with whom users have completed basic registration, information to identify service providers (ip\_service\_provider\_id), authentication key information, basic registration expiration date, and CAS/DRM server URI should be saved in NVRAM. The NVRAM capacity should be ensured considering the size of basic registration and number of service providers with whom the user can complete basic registration. For information on service provider identification, see 5.1.2 "PF Configuration Information File", for information on the size of the authentication key information, see 6.4.4.5.3 "Basic Registration-related Function", and for the length of the CAS/DRM server URI, see 6.4.5.3 "Maximum Length of URI".

- MC license

MC licenses described in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications" should be saved in NVRAM. The NVRAM capacity should be ensured considering the size of MC licenses, the number of CAS/DRM operators that can be received, and that fact that the maximum number of work keys that can be operated for each CAS/DRM operator (maximum number of MC licenses) is 16 (See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES system in CAS Specifications ").

- Purchased content package information

Purchased content package information described in 7.8.1 "Purchased Content Package Information File" should be saved in NVRAM. A purchased content package information file is provided for each service provider. The NVRAM capacity should be ensured considering the number of service providers with whom users can complete basic registration.

- CDN configuration information

When CDN configuration information is saved in NVRAM, see 5.1.1 "CDN Configuration Information File".

- PF configuration information

When PF configuration information is saved in NVRAM, see 5.1.2 "PF Configuration Information File". Consideration should be given to the number of platform operators included in a CDN operator and the number of platform operators for which reception is made available.

- Logo data

When logo data is saved in NVRAM, see 5.4 "Logo Data ". Consideration should be given to the number of platform operators included in a CDN operator and the number of platform operators for which reception is made available.

### 3.4.8 Character Encodings

This section describes the character encodings that should be provided on receivers for portal services, ST/EPG and metadata/ECG.

The character encoding methods used on receivers and their usage is as follows:

- EUC-JP -- BML documents
- 8-bit character code -- SI, caption
- UTF-8 -- Metadata

#### 3.4.8.1 Portal Service

See 6.2 "Requirements for Receiver Functions Related to BML Browser for IPTV". The display tone varies depending on receivers.

#### 3.4.8.2 SI/EPG

The character font and size used for EPG are implementation-dependent. For information on character sets, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 7.2.1 "Character Set".

#### 3.4.8.3 Metadata/ECG

The character font and size used for ECG are implementation-dependent. For information on the character set and encoding method for ECG metadata, see Chapter 7 "Operation of VOD". Also, receivers should be able to handle the UCS character set.

### 3.4.9 Receiver Built-in Sound

See 6.3.3.4 "Built-in Sound".

### 3.4.10 Communication Function

In order to use communication networks, receivers should implement the following functions. For more information, see Chapter 4 "Network Connection and Communication Protocol".

- (1) Receivers should provide the capacity to perform streaming processes at approx. 20 Mbps.
- (2) Receivers should be equipped with dual stack capability to use IPv4 and/or IPv6 as the network layer protocol.
- (3) Receivers should be able to connect to routers that are equipped with the following functions.
  - Service network connection function (PPPoE, etc.)
  - NAPT function [IPv4 only]
  - DHCP server function
- (4) Receivers should provide a function to make the following network settings automatically for IPv4 and IPv6 connection. It is desirable that the automatic setting is enabled when the receivers are shipped.
  - DNS server IP address (primary, secondary)

- IP address
  - Subnet mask
  - Default gateway
- (5) Receivers should also provide a function to make the following network settings manually for IPv4 and IPv6 connection.
- DNS server IP address (primary, secondary)
  - IP address
  - Subnet mask
  - Default gateway
- (6) Receivers should provide functions for communication errors such as a function to process timeout and a function to display a screen to prompt users to take action to recover from a communication stand-by status.
- (7) When unicast streaming with UDP is used in IPv4 connection, receivers should be able to open router ports and enable streams to pass through those routers providing the NAPT function. It is recommended that ports are opened using UPnP. For information on how to implement UPnP see, [Appendix B] "Specifications on NAT Traversal".

#### 3.4.11 High-Speed Digital Interfaces

For IP broadcasting, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 3.2.3 "High-Speed Digital Interface". For VOD, see IPTVFJ STD-0002 "Specifications", 3.2.3 "High-Speed Digital Interface".

#### 3.4.12 Copy Control

See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in DRM Specifications".

#### 3.4.13 Video Recording Function

Inclusion of a video recording function on receivers is optional. If receivers are equipped with this function, the specifications described in IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 " Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications" should be followed.

#### 3.4.14 Other

##### 3.4.14.1 Reset Button

It is desirable to place a button to cancel non-operable statuses (reset button) on a receiver that is used when the receiver does not respond to user operations.

#### 3.4.14.2 Analog RGB Interface

- Inclusion of a VGA interface is optional. If a VGA interface is equipped, a connector that is compliant with "Enhanced Display Data Channel Standard (Version 1), "4. Physical Connections" issued by VESA should be equipped, and signals should be output in a format that is compliant with "Video Signal Standard (Version 1, Rev. 1)", "2. VESA Video Signal Definition" issued by VESA.
- Inclusion of a DVI interface with analog output is optional. If such a DVI interface is equipped, it is recommended to equip an interface with a connector that is compliant with "Digital Visual Interface DVI (Revision 1.0)", "5. Physical Interconnect Specifications" issued by DDWG. Also, signals should be output in a format that is compliant with "Digital Visual Interface DVI (Revision 1.0)", "2. Architectural Requirements", "2.5 Analog".
- For information on RGB analog output operation, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in DRM Specifications".

#### 3.4.14.3 Digital Visual Interface

- Inclusion of a DVI interface is optional. If a DVI interface is equipped, it is recommended to equip an interface with a connector that is compliant with "Digital Visual Interface DVI (Revision 1.0)", "5. Physical Interconnect Specifications" issued by DDWG. Also, signals should be output in a format that is compliant with "Digital Visual Interface DVI (Revision 1.0)", "2. Architectural Requirements".
- See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in DRM Specifications" for access control methods, and see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in DRM Specifications" for content protection.

#### 3.4.14.4 High-Definition Multimedia Interface

- Inclusion of an HDMI is optional.  
If an HDMI is equipped, it should comply with the "High-Definition Multimedia Interface Specifications" issued by HDMI Licensing, LLC.
- See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications" for access control methods, and see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in DRM Specifications" for content protection.

## Chapter 4 Network Connection and Communication Protocol

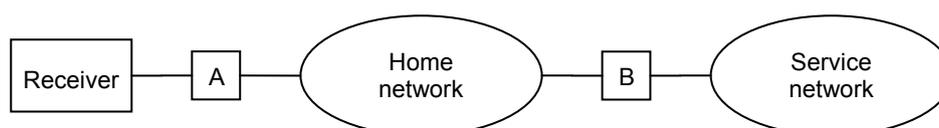
This chapter describes the communication specifications for IP broadcasting/VOD services that are provided as CDN scope services. For information on IP retransmission services of digital terrestrial television broadcasting, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 6, Chapter 4 "System Configuration for IP Retransmission Service of Digital Terrestrial Television Broadcasting" and Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network". For information on IP retransmission services of BS digital satellite broadcasting, see IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting" Volume 6, Chapter 4 "System Configuration for IP retransmission Service of BS Digital Satellite Broadcasting" and Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network".

### 4.1 Network Connection

#### 4.1.1 Model Structure of Network for CDN Scope Services

In CDN scope service networks, IPv4 defined in RFC791 and IPv6 defined in RFC2460 are used as the network layer protocols.

Figure 14 is a connection model of a CDN scope service network. A connection network is comprised of a "home network" on the receiver side and a "service network" on the server side, which is divided by the UNI point (point B) defined by a telecommunication company. A receiver connects to the home network through the physical interface (point A) it is equipped with. The communication network used for IP broadcasting/VOD services is hereinafter called the "communication network", and the CDN scope service receiver is called the "receiver" unless stated otherwise. In this document, behavior of the receiver in point A is defined as receiver behavior. As reference, configuration of the home network will be described as well.



A: Receiver connection point

B: UNI (User Network Interface) defined by telecommunication company

Figure 14 Communication Network Connection Model

#### 4.1.2 Assumed Service Network

A service network is connected to a server that provides CDN scope services and delivers contents, metadata, BML and information such as licenses. Figure 15 shows an example of a service network.

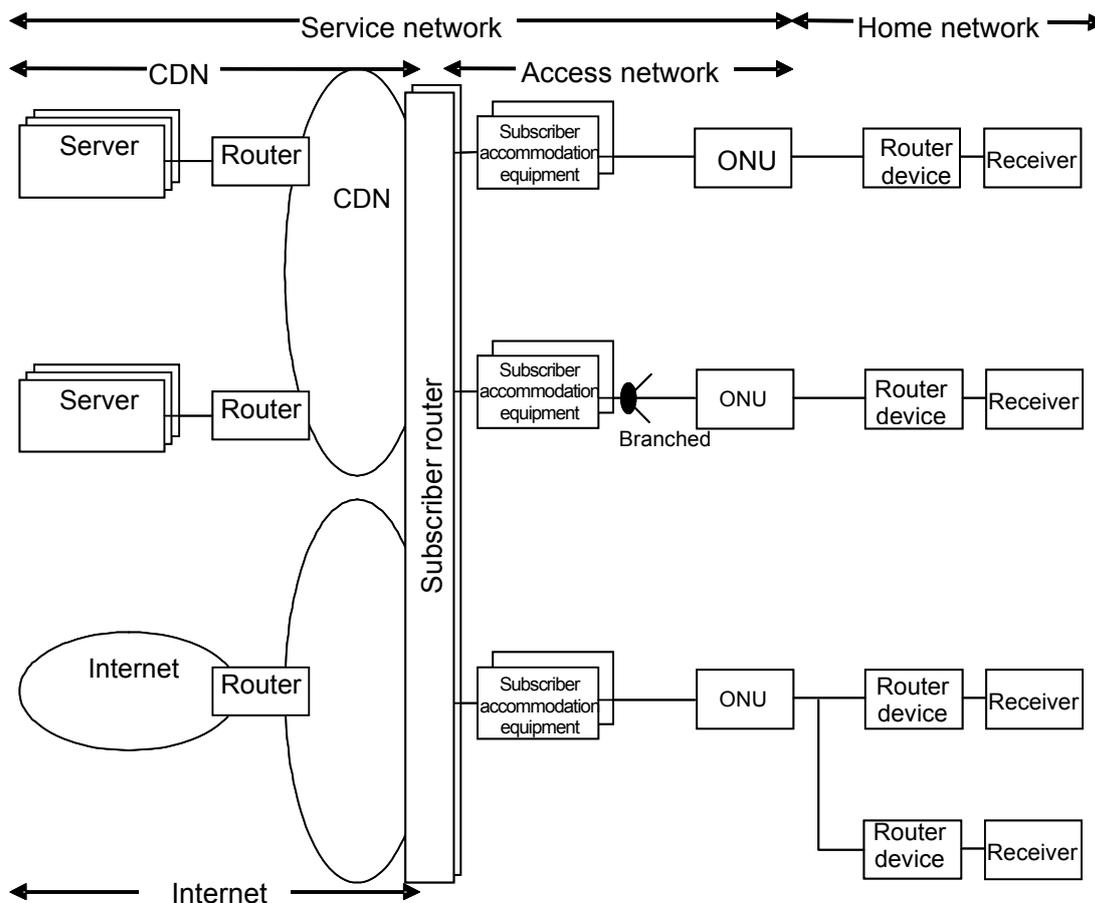


Figure 15 Service Network

Service networks used for IPTV services are classified into general-purpose "Internet" and the "content delivery network (CDN)" specializing in content delivery depending on the intended purpose of the communication networks.

(1) Internet

The Internet is a best-effort type network for which intended usage purposes are not defined. Servers related to CDN scope services do not exist on the Internet but on a content delivery network described below. Receivers do not require the settings and operations defined in this chapter to communicate with servers that are not related to CDN scope IP broadcasting/VOD services. (The Internet is not covered in this document.)

(2) Content delivery network (CDN)

A CDN specializes in content delivery. A CDN is a best-effort type network in which the IP network/access line is managed by one company and service quality is ensured to a certain extent. For example, CDN facilities are operated based on use conditions of users, communication channels are controlled, or communication packets are prioritized and controlled based on payload types. Servers used for CDN scope services exist on CDN. As a general rule, specific conditions and environmental settings apply to use a CDN such as connection to a server and connection settings on receivers.

A content delivery service is hereinafter called "CDN" unless stated otherwise.

(3) Access network

An access network typically provides access from the accommodation equipment of a telecommunication company to the home of a user. It is assumed that the band required for video delivery is provided between the equipment and the user's home. In a typical configuration, subscriber accommodation equipment and ONU are connected by optical fibers. In the specifications discussed in this document, access network configuration does not affect operation of the receivers.

#### 4.1.3 Assumed Home Network

A home network is a network built at home. It is assumed that devices that are not used for IPTV services such as PCs are connected to a home network. Basically, a home network is built by the user, but appliances can be partially provided by telecommunications companies or IPTV service providers.

The following connections are assumed as recommended connection types used between a home network and a receiver.

- (1) IPv4 connection
- (2) IPv6 connection
- (3) IPv4 + IPv6 simultaneous connection

##### 4.1.3.1 IPv4 Connection

Typically, when a service network is provided using IPv4, one global address is provided for a user, and multiple receivers are connected to the user's home network using private addresses.

Therefore, when receivers are connected to a home network based on an IPv4 connection, a "router device" that is generally called a "broadband router" or "home gateway" should be installed in the home network.

Router devices to which receivers are connected should be equipped with the following functions.

- Service network connection function (PPPoE, etc.)
- NAT function
- DHCP server function
- UPnP function

In addition, router devices should be equipped with the following function to view IP broadcasting services (multicast streaming).

- IGMPv2 Proxy function

Also, router devices should be equipped with a NAT traversal function (see [Appendix B] "Specifications on NAT Traversal" to view VOD services (unicast streaming)).

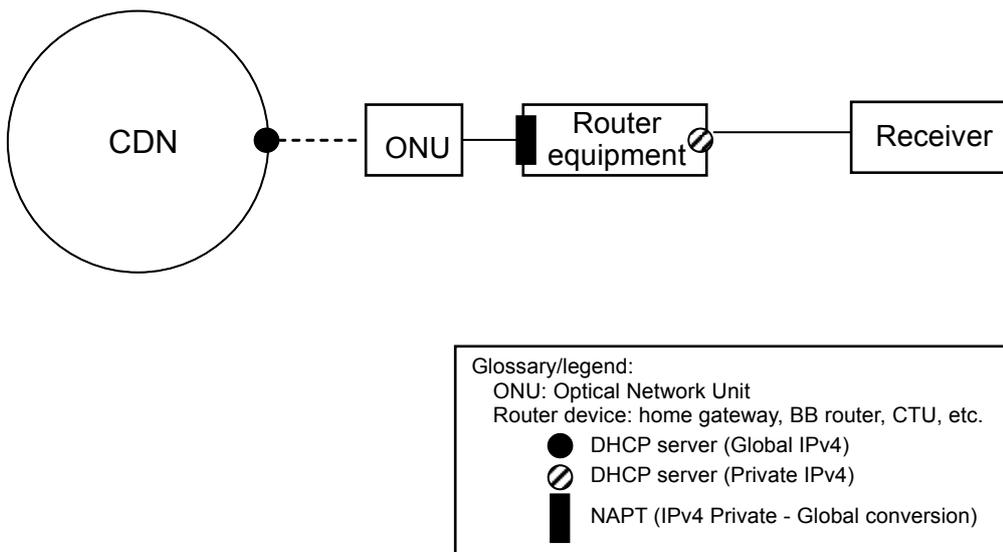


Figure 16 Home Network Configuration (IPv4 Connection)

#### 4.1.3.2 IPv6 Connection

Typically, when a service network is provided using IPv6, multiple receivers are connected to a home network that assign global addresses to all connected receivers.

Therefore, when receivers are installed in a home network based on IPv6 connection, receivers also use global addresses. For this reason, specifications specializing in home networks connected only using IPv6 are not defined in this document.

However, "router devices" called "broadband routers", "home gateways", etc. can be installed in a home network using IPv6 connection in which receivers are installed by users, etc. In this case, it is assumed that IPv6 router devices connecting receivers are commonly equipped with the following functions.

- Service network connection function (DHCPv6-PD, etc.)
- Router advertisement function (RA)
- DHCPv6 server function or DHCPv6 relay function

In addition, it is assumed that IPv6 router devices are commonly equipped with the following function to view IP broadcasting services (multicast streaming).

- MLDv2 Proxy function

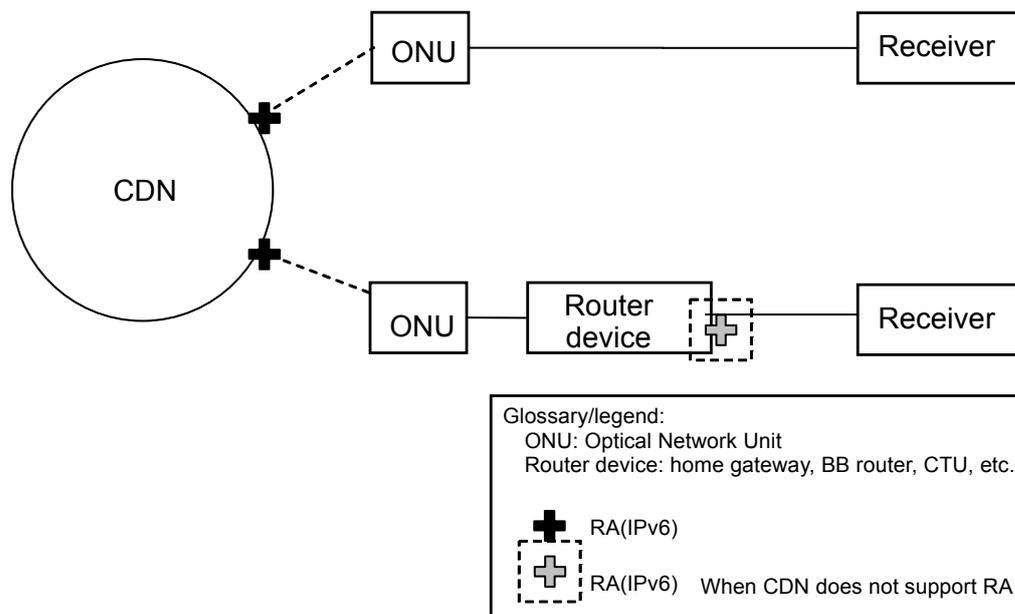


Figure 17 Home Network Configuration (IPv6 Connection)

#### 4.1.3.3 IPv4 and IPv6 Simultaneous Connections

When a service network that uses IPv4 and IPv6 simultaneous connections is provided for a user, it is assumed that a router device is installed for the IPv4 connection in a home network to which receivers are connected. The connection type differs depending on whether an IPv6 bridging function is provided by the router device or not.

When an IPv6 bridging function is provided by a home gateway device, both IPv4 and IPv6 communications become available by connecting a receiver to the LAN side port of the router device in the configuration (a) shown in Figure 18.

When an IPv6 bridging function is not provided by a router device, both IPv4 and IPv6 communications become available by establishing a connection as shown in Configuration (c) in Figure 18, in which IPv4 communication passes through the router device while IPv6 communication skips the router device.

In some cases, IPv6 router devices may be required for IPv6 communication as shown in Configuration (b) in Figure 18 depending on the telecommunications company. In these cases, it is assumed that router devices are commonly equipped with the functions listed in 4.1.3.2 "IPv6 Connection".

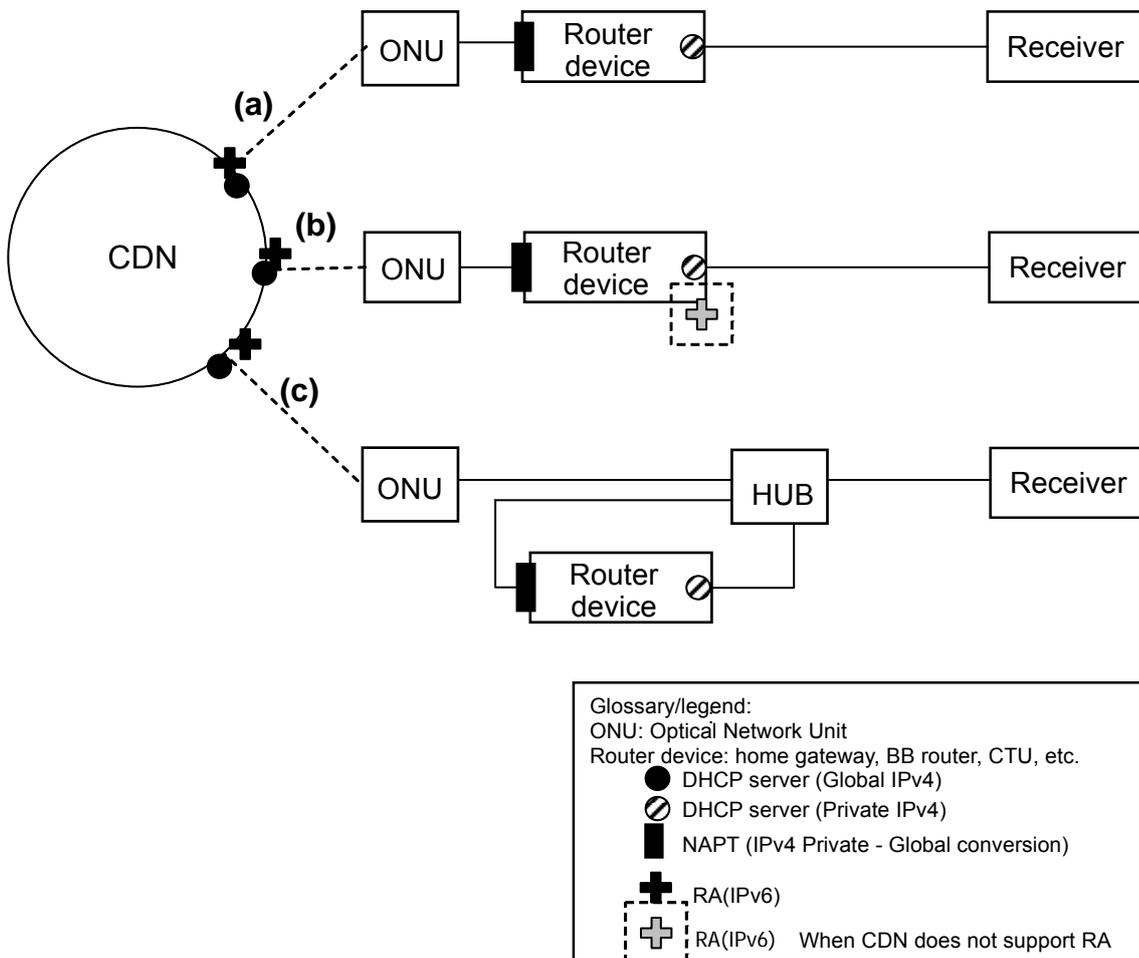


Figure 18 Home Network Configuration (IPv4/IPv6 simultaneous connection)

In the above-mentioned home network, IPv4 router devices may provide a NAT function, so a NAT traversal function (see [Appendix B] "Specifications on NAT Traversal") is required in order to view VOD services (unicast streaming).

#### 4.1.4 Connecting to Network

When a receiver connects to a network, an IPv4 or IPv6 address should be assigned to the receiver. When addresses are assigned automatically from a network, the following protocols are used. When a receiver physically connects to a network, it is unknown whether it has connected to an IPv4 network or IPv6 network. Accordingly, the receiver should attempt to obtain an IPv4/IPv6 address following the procedure described in 4.1.4.2 "Connecting to IPv4 Network" and 4.1.4.3 "Connecting to IPv6 Networks". When an address is set manually by a user, the value that is set manually is used.

##### 4.1.4.1 Communication Network Connection Protocol

Table 4-1 shows the protocols that are used when receivers connect to a network.

Table 4-1 Protocols Used for Connection to a Network

Layer		Protocol used	
		IPv4	IPv6
5 or higher	Application	RFC2131 (DHCP) RFC1034, 1035, 1123, 2181 (DNS) *1	RFC3646, 3736 (DHCPv6) RFC1034, 1035, 1123, 2181, 2671 (DNS) RFC3596 (DNS Extensions to Support IP Version 6)
4	Transport	RFC768 (UDP)	RFC768 (UDP)
3	Network	RFC791 (IP) RFC792 (ICMP)	RFC4291 (IP Version 6 Address Architecture) RFC2460 (IPv6) RFC2461 (Neighbor Discovery for IPv6—NDP—) RFC2462 (IPv6 Stateless Address Autoconfiguration) RFC4443 (ICMPv6)

\*1: UpnP function (See [Appendix B] "Specifications on NAT Traversal".)

#### 4.1.4.2 Connecting to IPv4 Network

##### 4.1.4.2.1 Network Parameter Acquisition Phase

Receivers get the following network parameters from a router device using the DHCP client function to start communication.

- (1) IPv4 private address
- (2) Network address
- (3) Subnet mask
- (4) DNS address
- (5) Default gateway address

Table 4-2 lists the DHCP message types that receivers use, which are comprised of the message types defined in RFC2131 excluding DHCPINFORM. When receivers receive an unexpected message, the message is ignored and discarded.

Table 4-2 DHCP Message Type

Message Type	Value	Description
DHCPDISCOVER	1	A message for a client to search for a server

DHCPOFFER	2	A message sent when a server responds to DHCPDISCOVER
DHCPREQUEST	3	A message used when an IP address or setting parameter is requested or renewed
DHCPDECLINE	4	A message used when duplication of the address that is notified by a DHCPOFFER message is detected
DHCPACK	5	A message used when a server responds to DHCPREQUEST and sends information
DHCPNAK	6	A message used when a server rejects DHCPREQUEST
DHCPRELEASE	7	A message used when a client requests release of an IP address or setting parameter

Table 4-3 lists the DHCP option codes. When receivers receive an option code that is not defined in Table 4-3, the undefined option code is ignored and processing continues.

Table 4-3 DHCP Option Code

Message Type	Value	Description
Pad	0	Padding data. Used to fill in the option data to a certain size (314 octets).
Subnet Mask	1	Subnet mask
Router	3	Default gateway address
Domain Server	6	DNS server address
Address Request	50	IP address requested by a client
Address Time	51	IP address lease period
DHCP Msg Type	53	DHCP message type
DHCP Server Id	54	DHCP server address
Parameter List	55	Parameter request list from a client
Vender Class Identifier	60	Vendor class identifier

#### 4.1.4.2.2 UPnP Service Search (Setup) Phase

IPv4 receivers should search for the UPnP service (search whether HGW is performing UPnP operation) and prepare in advance to perform NAT traversal (see [Appendix B] "Specifications on NAT Traversal") when they receive VOD.

#### 4.1.4.3 Connecting to IPv6 Networks

Receivers should attempt to get an IPv6 global address as defined in RFC4291 according to the procedure in RFC2462 using NDP as defined in RFC2461.

Table 4-4 lists NDP message types that are used by receivers.

Table 4-4 NDP Message Type

Message Type	Description
Router Solicitation	A message sent to a router from a receiver to request an IPv6 prefix that a router assigns
Router Advertisement	A message sent from a router regularly or in response to a Router Solicitation message from a receiver. Notifies an the IPv6 prefix.
Neighbor Solicitation	A message sent from a receiver to check whether the link local address is not used by other receivers
Neighbor Advertisement	A message sent from a receiver when duplication is detected in response to a Neighbor Solicitation message.

- (1) Receivers generate a link local address automatically and transmit a message (Neighbor Solicitation) to confirm that the generated link address is not duplicated.
- (2) Receivers transmit the stipulated message (Router Solicitation) and obtain a 64-bit IPv6 prefix that is assigned to each line by receiving a message (Router Advertisement) from a communication network.
- (3) Receivers generate IPv6 addresses automatically based on the IPv6 prefix and transmit a message (Neighbor Solicitation) to confirm that the generated global address is not duplicated.

After receivers generate an IPv6 global address automatically and when the IPv6 DNS address is not set manually, receivers receive the DHCPv6 Reply from a communications network and obtain an IPv6 address from a DNS server by specifying option code 23 of the DNS server and transmitting a DHCPv6 Information-Request.

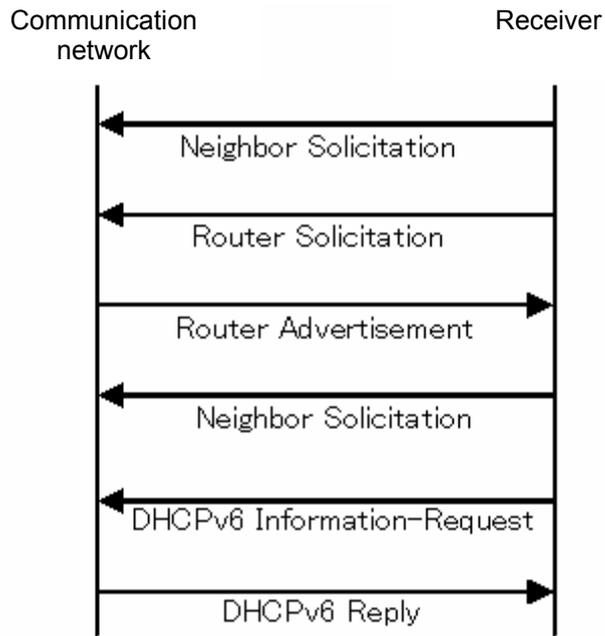


Figure 19 NDP Sequence and DHCPv6 Sequence

#### 4.1.5 Service Network Connection Function

This section defines general specifications applied when receivers access CDN scope service servers on a service network.

##### 4.1.5.1 Unicast Connection

When receivers access a server that is installed by a service provider using the unicast protocol, receivers use the URI format defined in RFC3986.

The URI format is as follows:

```
<scheme>://<authority><path>?<query>
```

Components of the above URI format are as follows:

<scheme>: Protocol name

<authority>: Authority of the service provider who provides the service

<path>: Relative path to the target information to be accessed from the base URI

<query>: Information that is interpreted by a server when querying

For information on the actual URI values when receivers are connected to a server, see 2.3.1 "Functions of Server Entities", 5.2.2 "Getting CDN Configuration Information" and 5.2.3 "Getting PF Configuration Information".

#### 4.1.5.2 Multicast Connection

When receivers access information that is delivered from a server using the multicast protocol, receivers access the server without using the URI but using a multicast address. For the concept of addresses applied when receivers access a server using multicast, see 2.3.1 "Functions of Server Entities".

#### 4.1.5.3 DNS Operation

Business operators can use FQDN names instead of IP addresses when specifying the URI used to access their servers. When an FQDN name is written in the URI instead of an IP address to connect to a CDN scope service server, receivers query the DNS server using a DNS sequence, convert the FQDN name into an IP address and attempt to connect to the server. The following section describes how to obtain and set a DNS server address and how to resolve a name using DNS in CDN scope services.

Receivers resolve FQDN names and IP addresses using DNS by communicating with a DNS server using the following procedures according to the address assignment methods of receivers.

##### (1) IPv4 Connection

When a receiver connects to a network using an IPv4 address only, the receiver queries the DNS server on the IPv4 side for IPv4 address name resolution. The DNS server returns the queried IPv4 address. The receiver connects to the IPv4 address obtained through resolution using the IPv4 protocol. For queries, DNS as defined in RFC1034 and RFC1035 is used.

When the DNS server address is set manually, the set DNS server address is used. When the DNS server address is not set manually, it should be contained in the DHCP sequence described in 4.1.4.2 "Connecting to IPv4 Network".

##### (2) IPv6 Connection

When a receiver connects to a network using an IPv6 address only, the receiver queries the DNS server on the IPv6 side for IPv6 address name resolution. The DNS server returns the queried IPv6 address. The receiver connects to the IPv6 address obtained through resolution using the IPv6 protocol. For queries, DNS as defined in RFC1034, RFC1035 and RFC3596 is used.

When the DNS server address is set manually on the receiver, the set DNS server address is used. When the DNS server address is not set manually, the receiver should attempt to get DNS server address using DHCPv6 that is defined in RFC3646 and RFC3736, obtain a DNS server address and set the obtained address.

##### (3) IPv4 and IPv6 Connection

When a receiver is connected to a network using both IPv4 and IPv6 addresses, consideration should be given to the situation where an IPv6 DNS server that cannot access the Internet but can perform name resolution on the CDN and an IPv4 DNS server that can perform name resolution on the Internet are operated in parallel by some CDN operators and the ISP. When a receiver supports simultaneous connection with the IPv4 Internet in this type of DNS configuration, the following operations should be supported.

When an IPv6 DNS server address is obtained, a receiver first queries the IPv6 DNS server for name resolution and connects to the IPv6 address obtained through resolution using the IPv6 protocol. When the DNS server address is set manually on the receiver, the set DNS server address is used. When the DNS server address is not set manually, the receiver should attempt to get DNS server address using DHCPv6 that is defined in RFC3646 and RFC3736, obtain a DNS server address and set the obtained address. When the receiver fails to obtain an IPv6 address from the IPv6 DNS server or when the IPv6 DNS server fails to resolve the address, the receiver queries the IPv4 DNS server for IPv4 address name resolution and connects to the obtained IPv4 address using the IPv4 protocol. In the case where a DNS server can be identified, such as when it is detectable that a CDN scope service is provided only using one of IPv6 and IPv4, or when it is allowed to be specified by a user, the receiver, as an implementation-dependent function, can query such DNS server.

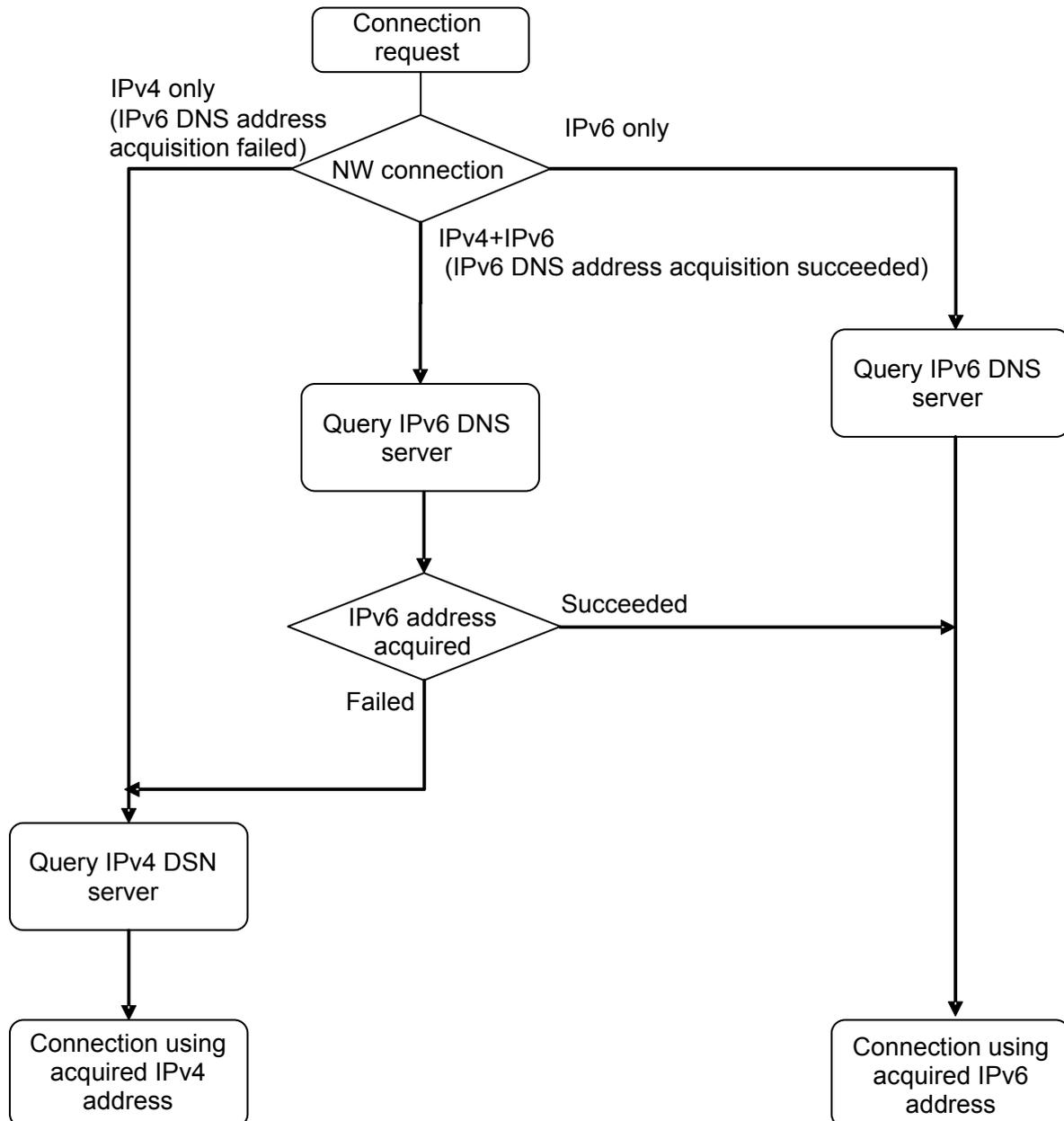


Figure 20 DNS Name Resolution Procedure

#### 4.1.5.4 Selecting between IPv4 and IPv6

When the address of a server to be connected is written in the IPv4 address format, a receiver attempts to establish communication via an IPv4 network. When an IPv4 address is not assigned, a receiver regards that connection to the server is not possible.

When the address of the server to be connected is written in the IPv6 address format, the receiver attempts to establish communication via an IPv6 network. When an IPv6 address is not assigned, the receiver regards that connection to the server is not possible.

## 4.2 Communication Protocol Stack

### 4.2.1 IPv4

Figure 21 is a schematic diagram of the IPv4 protocol stack. Table 4-5 lists the specifications used as the IPv4 network communication interface specifications.

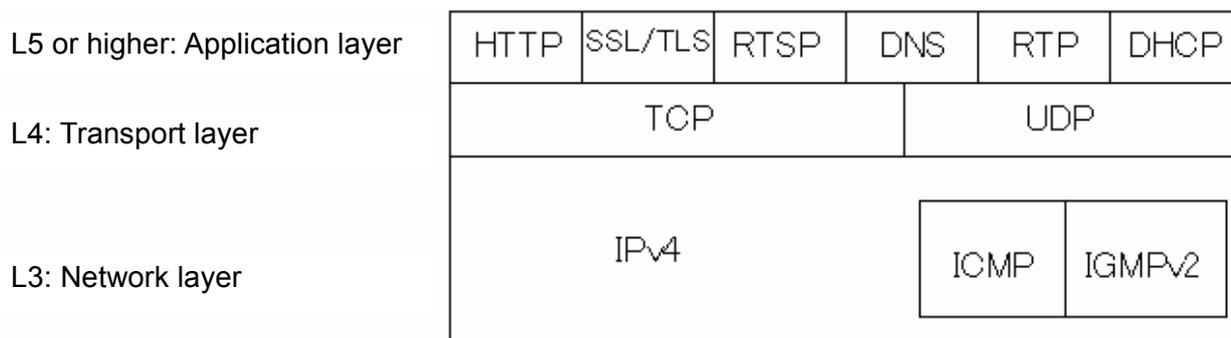


Figure 21 IPv4 Protocol Stack

Table 4-5 IPv4 Specifications

Layer		RFC	Title
5 or higher	Application	2616	Hyper Text Transport Protocol-HTTP1.1
		3550	RTP: A Transport protocol for Real-Time Applications
		2250	RTP Payload Format for MPEG1/MPEG2 Video
		2326	Real Time Streaming Protocol (RTSP)
		1034	Domain Names - concepts and facility (DNS)
		1035	Domain Names - implementation and specifications (DNS)
		1123	Requirements for Internet Hosts - Application and Support
		2181	Clarifications to the DNS Specifications
		2246	TLS Protocol(SSL/TLS)
		2131	Dynamic Host Configuration Protocol (DHCPv4)
4330	Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI		
4	Transport	793	Transmission Control Protocol (TCP)
		768	User Datagram Protocol (UDP)
		1323	TCP Extensions for High Performance (TCP Window Scale etc.) <b>[B specification]</b>
		2018	TCP Selective Acknowledgment Options (SACK) <b>[B specification]</b>

3	Network	791	Internet Protocol (IPv4)
		792	INTERNET CONTROL MESSAGE (ICMP)
		2236	Internet Group Management Protocol, Version 2 PROTOCOL (IGMPv2)
		3228	IANA Considerations for IPv4 Internet Group Management Protocol (IGMP)

#### 4.2.2 IPv6

Figure 22 is a schematic diagram of the IPv6 protocol stack. Table 4-6 lists the specifications used as the IPv6 network communication interface specifications.

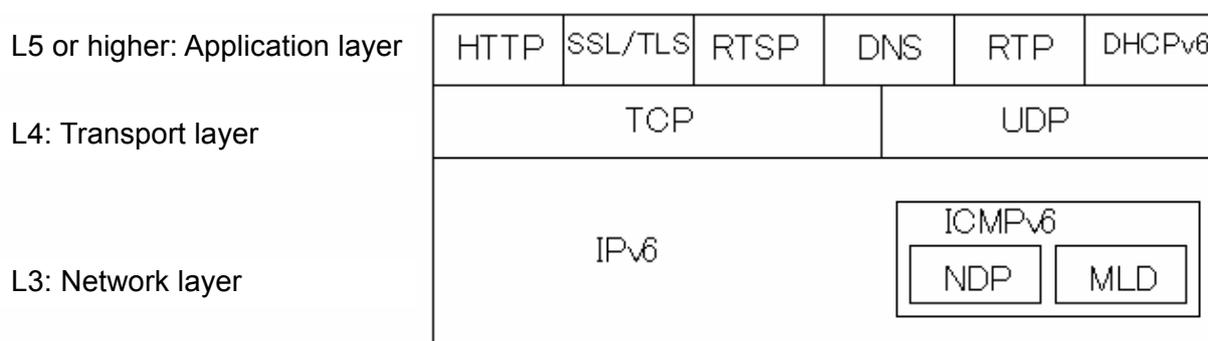


Figure 22 IPv6 Protocol Stack

Table 4-6 IPv6 Specifications

Layer		RFC	Title
5 or higher	Application	2616	Hyper Text Transport Protocol-HTTP1.1
		3550	RTP: A Transport protocol for Real-Time Applications
		2250	RTP Payload Format for MPEG1/MPEG2 Video
		2326	Real Time Streaming Protocol (RTSP)
		1034	Domain Names - concepts and facility (DNS)
		1035	Domain Names – implementation and specifications (DNS)
		3596	DNS Extensions to Support IP Version 6
		2181	Clarifications to the DNS Specifications
		1123	Requirements for Internet Hosts - Application and Support
		2671	Extension Mechanisms for DNS (EDNSO)
		2246	TLS Protocol (SSL/TLS)
		3315	Dynamic Host Configuration Protocol for IPv6

		3646	(DHCPv6) DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
		3736	Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
		4330	Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
4	Transport	793	Transmission Control Protocol (TCP)
		768	User Datagram Protocol (UDP)
		1323	TCP Extensions for High Performance (TCP Window Scale etc.) <b>B</b> specification
		2018	TCP Selective Acknowledgment Options (SACK) <b>B</b> specification
3	Network	4291	IP Version 6 Addressing Architecture
		2460	Internet Protocol Version 6 (IPv6) Specifications
		2461	Neighbor Discovery for IPv6 (NDP)
		2462	IPv6 Stateless Address Autoconfiguration
		4443	Internet Control Message Protocol (ICMPv6) for the Internet protocol Version 6 (IPv6) Specifications
		3810	Multicast Listener Discovery Version 2 (MLDv2) for IPv6

#### 4.2.2.1 IPv6 Address

The IPv6 address length is 128 bits. An IPv6 address is written in hexadecimal, divided into 16-bit groups:

**FEDC:BA98:7654:3210:FEDC:BA98:7654:3210**

There are specifications on IPv6 address abbreviated notation in RFC4291. These specifications are not used in communication with servers excluding DNS and NW equipment.

#### 4.2.2.2 IPv6 Packet

Figure 23 shows the IPv6 header format.



#### 4.3.1 Operation of Server Certifications

##### Root Certificate Management Guideline

In order to establish encrypted communication using TLS/SSL between a receiver and a portal server, etc. as described in 2.3.1.5, the root certificate is required to certify a service provider who operates the portal server, etc. The root certificate is implemented when receivers are manufactured/shipped by receiver manufacturers. Using the root certificates that are generally implemented in encrypted communication for televisions and mobile phones is desirable. It is recommended that multiple root certificates are implemented so that portal servers, etc. operated by CDN scope service providers can be certified comprehensively. Receivers can also use the root certificate that is implemented for purposes other than CDN scope service provision.

It is desirable that the period covered by the root certificate is sufficiently longer than the average period receivers are used. Operations to renew root certificates are not required. However, this does not deny renewals provided by receiver manufacturers, etc. such as renewals using media such as CD/DVD and online renewals by secure methods.

## Chapter 5 Service Entry and Related Specifications

This chapter describes the process in which a user concludes a contract with a service provider, and IP broadcasting/VOD services of the service provider become available for viewing. For IP retransmission services of digital terrestrial television broadcasting, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Networks" and Chapter 6 "Details of Applications that Use Communication Protocols (Operation)". For IP retransmission services of BS digital satellite broadcasting, see IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting" Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Networks" and Chapter 6 "Details of Applications that Use Communication Protocols (Operation)" in addition to this chapter. When IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting are operated in addition to IP broadcasting/VOD services, a CDN configuration information server is installed as a common server to cover IP broadcasting/VOD services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting, and a unique operation configuration including unified file format is applied. The following section describes its functional overview.

### 5.1 Configuration Information

#### 5.1.1 CDN Configuration Information File

CDN operator defines a CDN configuration information file which aims to notify receivers of information on platforms that exist on the CDN. CDN configuration information files are written using XML (version 1.0) and must be provided by CDN configuration information server. The media type of a CDN configuration information file is "text/xml;charset=UTF-8", and the file name is cdn.comp. The maximum size of a CDN configuration information file is 64 KByte.

Table 5-1 shows the structure of a CDN configuration information file when IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting are operated as well as IP broadcasting/VOD services. When only IP broadcasting/VOD services are operated, receivers should ignore information under <ttb\_ip\_broadcaster\_list> and <bs\_ip\_broadcaster\_list>. Also, receivers should ignore elements that are not listed here and ensure adequate operation continues.

Table 5-1 Structure of CDN Configuration Information File

Item	Description	Number of times
<cdn_main>	Overall CDN configuration information	1
<header>		1
<cdn_serial>	Serial information	1
<cdn_name>	CDN identification information	1

<switch_control_flag>	Channel switching control flag	0..1
<sntp>	SNTP	1
<sntp_server>	SNTP server name	1
<time_polarity>	Direction of time difference	1
<time_delay>	Time difference information	1
<local_time_offset>	Summertime	0..1
<local_time_offset_polarity>	Direction of time difference	1
<local_time_offset>	Current offset time	1
<time_of_change>	Date and time of change	1
<next_time_offset>	Offset time after change	1
<platform_list>	Platform operator	1
<platform>		1..n
<network_id>	Network_id	0..1
<platform_name>	PF identification information	1
<pf_url>	PF configuration information server address	1
<pf_serial>	PF renewal information (serial)	1
<ttd_ip_broadcaster_list>	PF operator for IP retransmission of digital terrestrial television broadcasting	0..1
<ttd_ip_broadcaster>		1..n
<ttd_ip_broadcaster_name>	PF identification information for IP retransmission of digital terrestrial television broadcasting	1
<ttd_ip_broadcaster_url>	PF configuration information server address for IP retransmission of digital terrestrial television broadcasting	1
<ttd_ip_broadcaster_serial>	PF renewal information (serial) for IP retransmission of digital terrestrial television broadcasting	1
<bs_ip_broadcaster_list>	PF operator for IP retransmission of BS digital satellite broadcasting	0..1
<bs_ip_broadcaster>		1..n
<bs_ip_broadcaster_name>	PF identification information for IP retransmission of BS digital satellite broadcasting	1
<bs_ip_broadcaster_url>	PF configuration information server address for IP retransmission of BS digital satellite broadcasting	1
<bs_ip_broadcaster_serial>	PF renewal information (serial) for IP retransmission of BS digital satellite broadcasting	1

Each element is described below:

1) cdn\_serial element

This element is used to identify changes in the CDN configuration information file. A 10-digit integer is used. When the element value is different from the previously acquired value, receivers regard that the CDN configuration information file has been changed.

cdn_serial	YYYYMMDDXX
------------	------------

10-digit integer. Y/M/D/X=0~9  
 YYYYMMDD does not need to be a date.  
 Changes must be made when the CDN configuration information file and related platform PF configuration information files are changed. It is desirable that previously used values are not used.

2) cdn\_name element

This element is used to identify the CDN. Receivers can identify which CDN the currently connected network is connected to based on the acquired cdn\_name.

cdn\_name  
 Up to 16 alphanumeric characters

3) switch\_control\_flag element

This element is used to control channel switching on receivers on the CDN. When this element is omitted, receivers regard the value of this element as 1. However, channel switching control of receivers is not restricted by the value of this element.

switch\_control\_flag      1/0  
 1: Receivers can perform channel switching control with an assumption that 300 ms is sufficient time since transmission of Leave until the stream is stopped.  
 0: Receivers can perform channel switching control with an assumption that 2s is sufficient time since transmission of Leave until the stream is stopped.  
  
 \*However, 0 is specified also when the time since transmission of Leave until the stream stop exceeds 2 seconds. Service providers should give consideration on how to handle such cases.

4) snntp\_server element

This element is used to specify an SNTP server provided on the CDN. Receivers get time information (UTC) using the SNTP protocol from the SNTP server that is obtained from the snntp\_server element.

sntp\_server  
 Alphanumeric characters, dots (.) and hyphens (-)  
 The FQND name of an SNTP server is described.  
 Example: snntp.foo.ne.jp  
 This element is specified using up to 64 characters.

5) time\_polarity element

This element is used to specify the clock time of a service that is provided on the CDN. Receivers get the clock time information by correcting the UTC time through communication with the SNTP server obtained in the snntp\_server element and using the time\_polarity element and time\_delay described later.

time\_polarity      1/0  
 1: Set the UTC time forward by the time\_delay value.

<p>0: Set the UTC time backward by the time_delay value. Japan Standard Time is 9 hours ahead of UTC, so the value of this element is 1.</p>
--

## 6) time\_delay element

This element is used to specify the clock time of a service that is provided on the CDN. Receivers get the clock time by correcting the UTC time obtained from the sntp\_server element using the time obtained from the above-mentioned time\_polarity element and time\_delay.

<p>time_delay          hhmm This element indicates time difference between UTC (Universal Time, Coordinated) obtained from an SNTP server and the time of the location where services are provided. hh: hour (00~23) mm: minute (00~59) Japan Standard Time is 9 hours ahead of UTC, so the value of this element is 0900.</p>
--

## 7) local\_time\_offset element

This element is used when summer time is applied to services provided on the CDN. When local\_time\_offset is specified, receivers correct the clock time using local\_time\_offset\_polarity, local\_time\_offset, time\_of\_change, and next\_time\_offset that are described below.

<p>local_time_offset Do not use this element if summer time is not applied. This element can be entered from January 1 of the year the summer time system is applied. This element should be entered 32 days before actual summer time applies or earlier.</p>
--

## 8) local\_time\_offset\_polarity element

This element specifies the direction of time correction when summer time is applied.

<p>local_time_offset_polarity          0/1 0: Set the current time forward by the next_time_offset value. 1: Set the current time backward by the next_time_offset value.</p>
---

## 9) local\_time\_offset element

This element specifies the current offset time for JST\_time between -12 hours and +12 hours.

<p>local_time_offset          Binary 16-digit number Each portion of hhmm is encoded into a 4-bit binary-coded decimal number (BCD). (hh: hour (00~12), mm: minute (00~59)) Example: When hhmm is 0200, the element value is 0000001000000000.</p>
--

## 10) time\_of\_change element

This element includes the time to be changed.

time_of_change	Binary 40-digit number
The value of this element is described using the modified Julian date (MJD) and Japan Standard Time (UTC + 9 hours) in hours, minutes and seconds. The low 16 bits of the MJD and hhmmss are encoded using six 4-bit binary-coded decimal numbers (BCD).	
Example: For 12:00, October 1, 2007, the MJD portion is 54374. 54374 is binary coded and combined with the hours, minutes and seconds (120000) written as a BCD number. The element value is "1101010001100110000100100000000000000000".	

## 11) next\_time\_offset element

This element specifies the time used after summer time is applied.

next_time_offset	Binary 16-digit number
Encode each portion of hhmm into a 4-bit binary-coded decimal number (BCD).	
(hh: hour (00~12), mm: minute (00~59))	
Example: When hhmm is 0100, the element value is 0000000100000000.	

## 12) network\_id element

This element is set for platform operators including service providers who operate IP broadcasting services that specify network IDs. The element is expressed as a 4-digit hexadecimal value. ("0x" is not required, 0000 - FFFF)

network_id	16-bit ****
------------	-------------

## 13) platform\_name element

This element describes the platform identification information. This element is assigned to platforms operated by platform operators so that each platform is identified as unique in the CDN. When platforms have different platform\_name values, receivers treat them as separate platforms.

platform_name	A string containing up to 10 characters with a maximum of 30 bytes.
---------------	---

## 14) pf\_url element

This element is used to notify the URI required to obtain a PF configuration information file for platforms that provide services on the CDN. Receivers attempt to get platform configuration information using the URI obtained from the pf\_url element.

pf_url	<scheme>://<server_name>[:<port>]/<path>/
<scheme>: Protocol to be used. http or https can be used.	
<server_name>: Name of a server (FQDN) that provides the platform configuration information file. Example: kousei.platform.ne.jp	
<port>: Port number. Specification of a value in [ ] can be omitted. When	

omitted, the value is set to 80 (http) or 443 (https).  
 <path>: Name of a path to the file (the file is not specified)  
 Described using up to 128 bytes.

## 15) pf\_serial element

This element is used to identify changes in PF configuration information. A 10-digit integer is used. When the element value is different from the previously acquired value, receivers regard that the PF configuration information file has been changed.

pf\_serial    YYYYMMDDXX  
 A 10-digit integer. Y/M/D/X = 0 to 9  
 YYYYMMDD does not need to be a date.  
 This element must be changed when the PF configuration information file  
 has been changed. It is desirable that previously used values are not used.

## 16) ttb\_ip\_broadcaster\_name element

This element describes identification information for a IP retransmission platform for digital terrestrial television broadcasting. This element is assigned to platforms operated by platform operators for IP retransmission of digital terrestrial television broadcasting so that each platform is identified as unique in the CDN. When platforms have different ttb\_ip\_broadcaster\_name values, receivers treat them as separate platforms.

ttb\_ip\_broadcaster\_name  
 A string containing up to 10 characters with a maximum of 30 bytes.

## 17) ttb\_ip\_broadcaster\_url element

This element is used to notify the URI that is required to get a PF configuration information file of a platform operator for IP retransmission of digital terrestrial television broadcasting that provides IP retransmission services of digital terrestrial television broadcasting on the CDN. Receivers attempt to get the configuration information of platform operator for IP retransmission of digital terrestrial television broadcasting using the URI obtained from the ttb\_ip\_broadcaster\_url element.

ttb\_ip\_broadcaster\_url    <scheme>://<server\_name>[:<port>]/<path>/  
 <scheme>: Protocol to be used. http or https can be used.  
 <server\_name>: Name of a server (FQDN) that provides the PF  
 configuration information file for IP retransmission of digital terrestrial  
 television broadcasting. Example: kousei.platform.ne.jp  
 <port>: Port number. Specification of a value in [ ] can be omitted. When  
 omitted, the value is set to 80 (http) or 443 (https).  
 <path>: Name of a path to the file (the file is not specified)  
 Described using up to 128 bytes.

## 18) ttb\_ip\_broadcaster\_serial element

This element is used to identify changes in PF configuration information for IP retransmission of digital terrestrial television broadcasting. A 10-digit integer is used. When the element value is different from the previously acquired value, receivers regard that the PF configuration information file for IP retransmission of digital terrestrial television broadcasting has been changed.

`ttb_ip_broadcaster_serial`    YYYYMMDDXX  
 A 10-digit integer. Y/M/D/X = 0 to 9  
 YYYYMMDD does not need to be a date.  
 This element must be changed when the PF configuration information file for IP retransmission of digital terrestrial television broadcasting has been changed.  
 It is desirable that previously used values are not used.

19) `bs_ip_broadcaster_name` element

This element describes identification information for a IP retransmission platform for BS digital satellite broadcasting. This element is assigned to platforms operated by platform operators for BS digital satellite broadcastings that each platform is identified as unique in the CDN. When platforms have different `bs_ip_broadcaster_name` values, receivers treat them as separate platforms.

`bs_ip_broadcaster_name`  
 A string containing up to 10 characters with a maximum of 30 bytes.

20) `bs_ip_broadcaster_url` element

This element is used to notify the URI that is required to get a PF configuration information file of a platform operator for IP retransmission of BS digital satellite broadcasting that provides IP retransmission services of BS digital satellite broadcasting on the CDN. Receivers attempt to get the configuration information of the platform operator for IP retransmission of BS digital satellite broadcasting using the URI obtained from the `bs_ip_broadcaster_url` element.

`bs_ip_broadcaster_url`    <scheme>://<server\_name>[:<port>]/<path>/  
 <scheme>: Protocol to be used. http or https can be used.  
 <server\_name>: Name of a server (FQDN) that provides the PF configuration information file for IP retransmission of BS digital satellite broadcasting. Example: kousei.platform.ne.jp  
 <port>: Port number. Specification of a value in [ ] can be omitted. When omitted, the value is set to 80 (http) or 443 (https).  
 <path>: Name of a path to the file (the file is not specified)  
 Described using up to 128 bytes.

21) `bs_ip_broadcaster_serial` element

This element is used to identify changes in PF configuration information for IP retransmission of BS digital satellite broadcasting. A 10-digit integer is used. When the element value is different from the previously acquired value, receivers regard that PF configuration information file for IP retransmission of BS digital satellite broadcasting has been changed.

`bs_ip_broadcaster_serial`    YYYYMMDDXX  
 A 10-digit integer. Y/M/D/X = 0 to 9  
 YYYYMMDD does not need to be a date.  
 This element must be changed when the PF configuration information file for IP retransmission of BS digital satellite broadcasting has been changed.  
 It is desirable that previously used values are not used.

### 5.1.2 PF Configuration Information File

This section defines the PF configuration information file which aims to notify receivers of information on entities that are operated on a platform. A PF configuration information file is provided from PF configuration information server of a platform without fail and is written in XML. XML version 1.0 is used. The media type of the PF configuration information file is “text/xml;charset=UTF-8”, and the file name is pf.comp. The maximum size of the PF configuration information file is 64 KByte.

Table 5-2 shows the structure of the PF configuration information file. Receivers should ignore elements that are not listed here if included.

Table 5-2 Structure of PF Configuration Information File

Item	Description	Number of times
<platform_main>	Overall PF configuration information	
<header>		
<pf_serial>	Serial information	1
<platform_name>	PF identification information	1
<logo_url>	Logo server information	1
<drm_provider_id>		1
<ip_broadcast_service>		0..1
<network_id>	Network identifier	1
<si_stream>	SI stream	1
<ip_protocol>	Protocol to be used	1
<channel_signaling>	Protocol Ver	1
<stream_port_number>	Destination port	1
<multicast_address>	Multicast address	1
<source_address>	Multicast source address	0..1
<service_provider_list>		1
<service_provider>		1..n
<ip_service_provider_id>	Service provider ID	1
<service_provider_name>	Service provider name	1
<ip_broadcaster_id>		0..1
<authority>		1
<portal_url>	Portal URI	1
<meta_url>	Meta URI	0..1
<purchase_package_info_url>	Purchased content package information URI	0..1

		<license_update_info_url>	License renewal notification information URI	0..1
		<cr1_url>	CRL delivery URI	0..1
		<extended>	Service provider extended section	0..1
		<item>		1..n
		<name>		1
		<value>		1..n
		<extended>	PF operator extended section	0..1
		<item>		1..n
		<name>		1
		<value>		1..n

## 1) pf\_serial element

This element is used to identify changes in platform configuration information. A 10-digit integer is used. When the element value is different from the previously acquired value, receivers regard that the PF configuration information file has been changed.

```
pf_serial   YYYYMMDDXX
  A 10-digit integer. Y/M/D/X = 0 to 9
  YYYYMMDD does not need to be a date.
  The value of this element must be changed whenever the PF configuration
  information file has been changed.
  When the value mentioned above is changed, the value of <pf_serial> in
  CDN configuration information file must be set to the same value.
  It is desirable not to use the value used before.
```

## 2) platform\_name element

This element describes platform identification information.

```
platform_name
  A string containing up to 10 characters with a maximum of 30 bytes.
```

## 3) ip\_broadcast\_service element

This element is used when IP broadcasting services are provided on the platform. When the ip\_broadcast\_service element is specified, receivers assume that IP broadcasting services are provided on the platform.

## 4) network\_id element

This element is set for platform operators including service providers who operate IP broadcasting services with specified network ID. The element is expressed as a 4-digit hexadecimal value. ("0x" is not required, 0000 - FFFF)

```
network_id
  16-bit ****
```

## 5) logo\_url element

This element is used to specify the server that provides logo information supplied in the platform and stores logo data, and to specify the name of the file (logo ID management file) associating logo IDs and operator IDs. Receivers get the logo ID management file and logo data from the logo server specified in the logo\_url element.

<pre>logo_url    &lt;scheme&gt;://&lt;server_name&gt;[:&lt;port&gt;]/&lt;path&gt;/&lt;file_name&gt;</pre> <p>&lt;scheme&gt;: Protocol to be used. http or https can be used.          &lt;server_name&gt;: Name of a server that provides logo information.          &lt;port&gt;: Port number. Specification of a value in [ ] can be omitted. When omitted, the value is set to 80 (http) or 443 (https).          &lt;path&gt;: Name of a path to the file          &lt;file_name&gt;: logoYYYYMMDDXX.comp          The specified file is a logo ID management file. See Chapter 6, 6-8.          "YYYYMMDDXX" is treated as serial information of the file.          Described using up to 128 characters.          Logo data is saved under the specified path.</p>
--

## 6) drm\_provider\_id element

An operator ID for DRM. This element is expressed as a 4-digit hexadecimal value. ("0x" is not required, 0000 - FFFF)

<pre>drm_provider_id</pre> <p>16-bit ****</p> <p>For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in DRM Specifications".</p>
---

## 7) ip\_protocol element

This element specifies the SI information transmission protocol (IPv4/IPv6).

<pre>ip_protocol    0/1</pre> <p>0: Transmitted using the IPv4 protocol.          1: Transmitted using the IPv6 protocol.</p>
---

## 8) channel\_signaling element

This element specifies the SI information transmission protocol (IGMP/MLD) and version.

<pre>channel_signaling    XX</pre> <p>A 4-bit unsigned integer (0-15).          XX=0: IGMPv2 control protocol          * If this value is set while the ip_protocol element is set to a value other than "0" (IPv4), the PF configuration information specified by this element becomes invalid.</p>
--

XX=1: MLDv2 control protocol

- \* If this value is set while the ip\_protocol element is set to a value other than "1" (IPv6), the PF configuration information specified by this element becomes invalid.

9) stream\_port\_number element

This element specifies the destination port for SI information multicast streams. Platform operators transmit SI streams to the port specified in the stream\_port\_number element of a receiver. Receivers handle the multicast streams specified in stream\_port\_number and the multicast\_address and source\_address elements discussed later as SI information.

stream\_port\_number    XXXXX

XXXXX: A 16-bit unsigned integer. (0 to 65535)

10) multicast\_address element

This element specifies the multicast address for SI information multicast streams. Platform operators transmit SI streams using the address specified in the multicast\_address element of a receiver. Receivers handle the multicast streams specified in the stream\_port\_number, multicast\_address, and source\_address elements discussed later as SI information.

multicast\_address

A 32-bit IPv4 address (when ip\_protocol=0, channel\_signaling=0) is specified.

Example: 224.136.120.11

A 128-bit IPv6 address (when ip\_protocol=1, channel\_signaling=1) is specified.

Example: FF3E:BA98:7654:3210:FEDC:BA98:7654:3210

11) source\_address element

This element is set to limit the source address of SI information multicast streams. A source address is required for MLDv2 (ip\_protocol=1, channel\_signaling=1) and not required for IGMPv2 (ip\_protocol=0, channel\_signaling=0). Platform operators can transmit SI streams using an address specified in the source\_address element of a receiver. Receivers handle the multicast streams specified in the stream\_port\_number, multicast\_address, and source\_address elements discussed later as SI information.

source\_address

A 128-bit IPv6 address (when ip\_protocol=1, channel\_signaling=1) is specified.

Example: 2000:BA98:7654:3210:FEDC:BA98:7654:3210

12) ip\_service\_provider\_id element

This element is unique and assigned to all service providers operating CDN scope services. By saving this ID during basic registration, receivers can filter information, and only receive and display information from contracted service providers with EPG and ECG.

ip\_service\_provider\_id

The element is expressed as a hexadecimal 2-digit value. ("0x" is not

required, 00 - FF)  
Example: A0

## 13) service\_provider\_name element

This element specifies the service provider name assigned to a service provider. Values of this element are unique in a CDN network.

service\_provider\_name  
A string containing up to 10 characters with a maximum of 30 bytes.

## 14) ip\_broadcaster\_id element

It is assumed that this element is assigned to service providers operating IP broadcasting services. Values of this element are unique in a network. This element is listed in BIT. Values of this element are mapped individually to a service provider ID.

ip\_broadcaster\_id  
The element is expressed as a hexadecimal 2-digit value. ("0x" is not required, 00 - FF)  
Example: 12

## 15) authority element

This element contains a service provider name included in ProgramCRID and purchaseId used in ECD metadata. This element is used to uniquely identify operators who provided contents per use.

authority  
Values of this element are written using up to 56 alphanumeric characters, “-”, “.” and “\_”. For more information, see Chapter 7 "Operation of VOD".

## 16) portal\_url element

This element is used to specify the portal page for a service. Receivers access and display a portal page obtained from the portal\_url element according to the user's operation.

portal\_url <scheme>://<server\_name>[:<port>]/<path>/  
<scheme>: Protocol to be used. http or https can be used.  
<server\_name>: Name of a server (FQDN) that provides the portal page.  
Example: portal.platform.ne.jp  
<port>: Port number. Specification of a value in [ ] can be omitted. When omitted, the value is set to 80 (http) or 443 (https).  
<path>: Name of a path to the file (the file is not specified)  
Described using up to 128 characters.

## 17) meta\_url element

This element is used to obtain service information. Receivers can access a meta server obtained in the meta\_url element and attempt to get meta information.

meta\_url <scheme>://<server\_name>[:<port>]/<path>  
<scheme>: Protocol to be used. http or https can be used.  
<server\_name>: Name of a server (FQDN) that provides meta information.  
Example: meta.platform.ne.jp

`<port>`: Port number. Specification of a value in [ ] can be omitted. When omitted, the value is set to 80 (http) or 443 (https).  
`<path>`: Name of a path to the meta file  
 Described using up to 128 characters.

18) `purchase_package_info_url` element

This element presents a URI to access a purchased content package information file.

`purchase_package_info_url`    `https://<server_name>[:<port>]/<path>`  
`<server_name>`: Name of a server that provides the purchased content package information file.  
 Example: `ppi.platform.ne.jp`  
`<port>`: Port number. Specification of a value in [ ] can be omitted. When omitted, the value is set to 443.  
`<path>`: Name of a path to the purchased content package information file  
 Described using up to 128 characters.

19) `license_update_info_url` element

This element presents a URI to access a license renewal notification information server.

`license_update_info_url`    `https://<server_name>[:<port>]/<path>`  
`<server_name>`: Name of a server that provides the license renewal notification information.  
 Example: `update.platform.ne.jp`  
`<port>`: Port number. Specification of a value in [ ] can be omitted. When omitted, the value is set to 443.  
`<path>`: Name of a path to the license renewal notification information file  
 Described using up to 128 characters.

20) `crl_url` element

This element presents a CRL delivery URI for DRM.

`crl_url`    `http://<server_name>[:<port>]/<path>/iptvescrl.crl` (fixed file name)  
`<server_name>`: Name of a server that provides the CRL file.  
 Example: `crl.platform.ne.jp`  
`<port>`: Port number. Specification of a value in [ ] can be omitted. When omitted, the value is set to 80.  
`<path>`: Name of a path to the CRL file  
 Described using up to 128 bytes.

With PF configuration information, platform operators are allowed to define items independently for their own services using `<extended>` tags without exceeding the maximum file size. Platform operators should add platform operator-specific alphanumeric characters to the item name in `<name>` tag to avoid duplication of items among platform operators (for example, `x-abc123-itemname` where the alphanumeric characters are specific to a platform operator). Reactions of receivers to platform operator-specific items are implementation-dependent. Receivers should ignore items that cannot be interpreted in an appropriate manner.

### 5.1.3 Handling of Tabs, Line Feeds, Carriage Returns and Spaces

For XML file data types defined in 5.1.1 "CDN Configuration Information File", 5.1.2 "PF Configuration Information File" and 7.8.1 "Purchased Content Package Information File", #x9 (tab), #xA (line break) and #xD (return) must not be used among the blank characters including #x9 (tab), #xA (line break), #xD (return) and #x20 (space). The processing method used when #x9 (tab), #xA (line break) or #xD (return) is used varies depending on receivers. #x20 (space) can be used in ERI <content\_title> element, <content\_abstract> element, <chapter\_title> element and <audio\_title> element, and when #x20 (space) is included, it is succeeded from the XML processing system to the upper layer application.

## 5.2 Service Entry

### 5.2.1 Service Entry Overview

Figure 24 shows initial connection flow of receivers to connect to a network and enable service use.

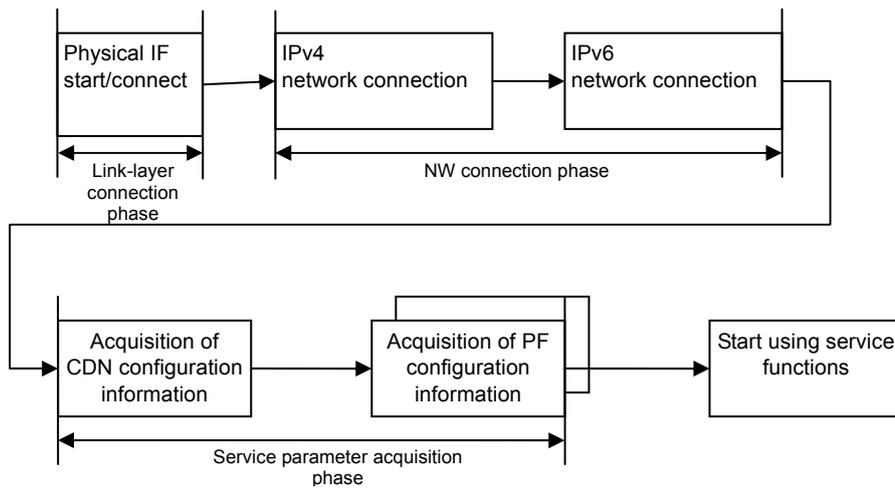


Figure 24 Initial Connection Flow

- (1) Link-layer connection phase  
Receivers physically connect to a home network and establish layer 2 connection. Receivers that are already connected to a network and are in the stopped state also establish layer 2 connection when started.
- (2) NW connection phase  
Receivers that have established layer 2 connection attempt to obtain an IP address from a home network or service network.
- (3) Service parameter acquisition phase  
Receivers that have obtained a network parameter such as an IP address get platform-related information from a CDN configuration information server and PF configuration information server.

#### (4) Start using service functions

Receivers that have obtained CDN and PF-related information get service information of IP broadcasting services from an SI server, which enables them to receive IP broadcasts. Also, this allows receivers to access the BML portal (entrance) pages of service providers using BML, where users can start basic registration and purchase contents. Receivers can also obtain metadata from an ECG metadata server to display contents, etc. using ECG.

### 5.2.2 Getting CDN Configuration Information

Receivers send a GET method request specifying the path to the CDN configuration information file to a CDN configuration information server using the HTTP protocol.

Path to be obtained is defined uniquely by the system.

<http://cdn.iptvf.jp/cdn.comp>

The CDN configuration information server sends the configuration information file based on the request.

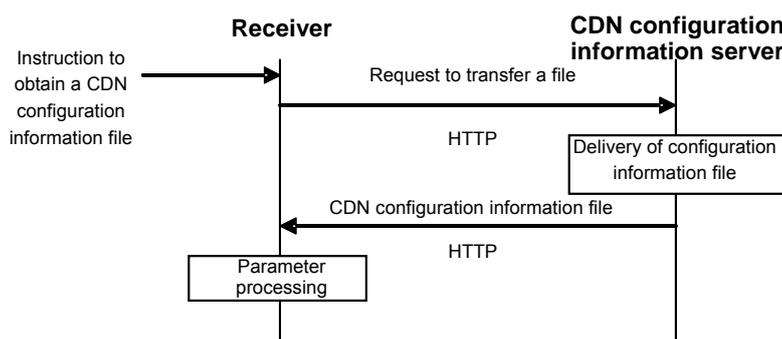


Figure 25 CDN Configuration Information Acquisition Flow

#### 5.2.2.1 Triggers for Getting CDN Configuration Information

It is desirable that receivers under the following conditions access a CDN configuration information server and obtain CDN configuration information promptly.

- When configuration information is lost
- When the receiver is turned on and it has been more than 24 hours since the last acquisition
- Receivers that are assumed to be always kept turned on should provide a function to periodically check whether configuration information is renewed or not.

10 seconds is regarded as sufficient time to obtain CDN configuration information. Reaction of receivers when no response is returned after 10 seconds is implementation-dependent. It is desirable that receivers retry acquisition several times at regular intervals. When receivers fail to obtain information during initial registration or after users retry manual acquisition/renewal, it is desirable to display a notification screen, etc.

### 5.2.3 Getting PF Configuration Information

Receivers send a GET method request specifying the path to the PF configuration information file to the PF configuration information server using the HTTP protocol or HTTPS protocol.

The path obtained from <pf\_url> in a CDN configuration information file is used. The PF configuration information server sends the PF configuration information file according to the request.

When multiple platforms are specified, receivers perform acquisition processing the same number of times as the number of platforms.

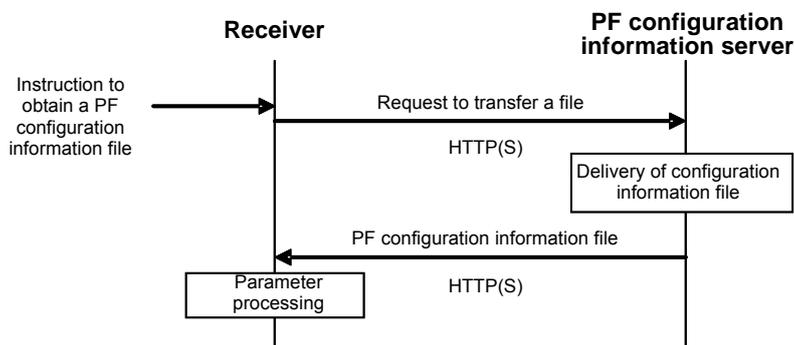


Figure 26 PF Configuration Information Acquisition Flow

#### 5.2.3.1 Triggers for Getting PF Configuration Information

Receivers obtain a PF configuration information file as per the following timing.

- When the value of <pf\_serial> in the CDN configuration information file is different from the last acquisition, receivers regard that the information is renewed and obtain/renew the information.

Serial values may disagree in some cases such as when a CDN configuration information server and a PF configuration information server are managed by different administrators and configuration information is not renewed at the same time. CDN/PF operators should renew PF configuration information and then CDN configuration information. When receivers store PF configuration information and the <pf\_serial> value in the stored PF configuration information and the <pf\_serial> value in CDN configuration information disagree, PF configuration information must be obtained/renewed. When the <pf\_serial> value in the CDN configuration information and the <pf\_serial> value of the obtained PF configuration information disagree, the PF configuration including the <pf\_serial> value is given priority.

10 seconds is regarded as sufficient time to obtain PF configuration information. Reaction of receivers when no response is returned after 10 seconds is implementation-dependent. It is desirable that receivers retry acquisition several times at regular intervals. When receivers fail to obtain information during initial registration or after users retry manual acquisition/renewal, it is desirable to display a notification screen, etc.

## 5.2.4 Entry to Each CDN Scope Services

In order to use a CDN scope service, receivers should obtain and store a CDN configuration information file and a PF configuration information file in advance.

By obtaining and storing configuration information, receivers can enter a CDN scope service.

### 5.2.4.1 Displaying Portal

Receivers can display a portal list and portals of service providers by using <service\_name><portal\_url> in the PF configuration information file.

### 5.2.4.2 Displaying ECG

Receivers can display the ECG by accessing an ECG metadata server indicated by <meta\_url> in the PF configuration information file and obtaining ECG metadata for each service provider.

### 5.2.4.3 Using IP Broadcasting Service

EPG can be displayed and IP broadcasting services can be selected/received by obtaining <network\_id> in CDN configuration information, <si\_stream> <ip\_broadcaster\_id> in the PF configuration information file, and the PSI/SI information of SI streams that are accessed using such information.

## 5.2.5 Service Entry Sequences

Figure 27 to Figure 30 show the initial operations. Receivers can partially omit the sequences depending on information acquisition statuses, etc.

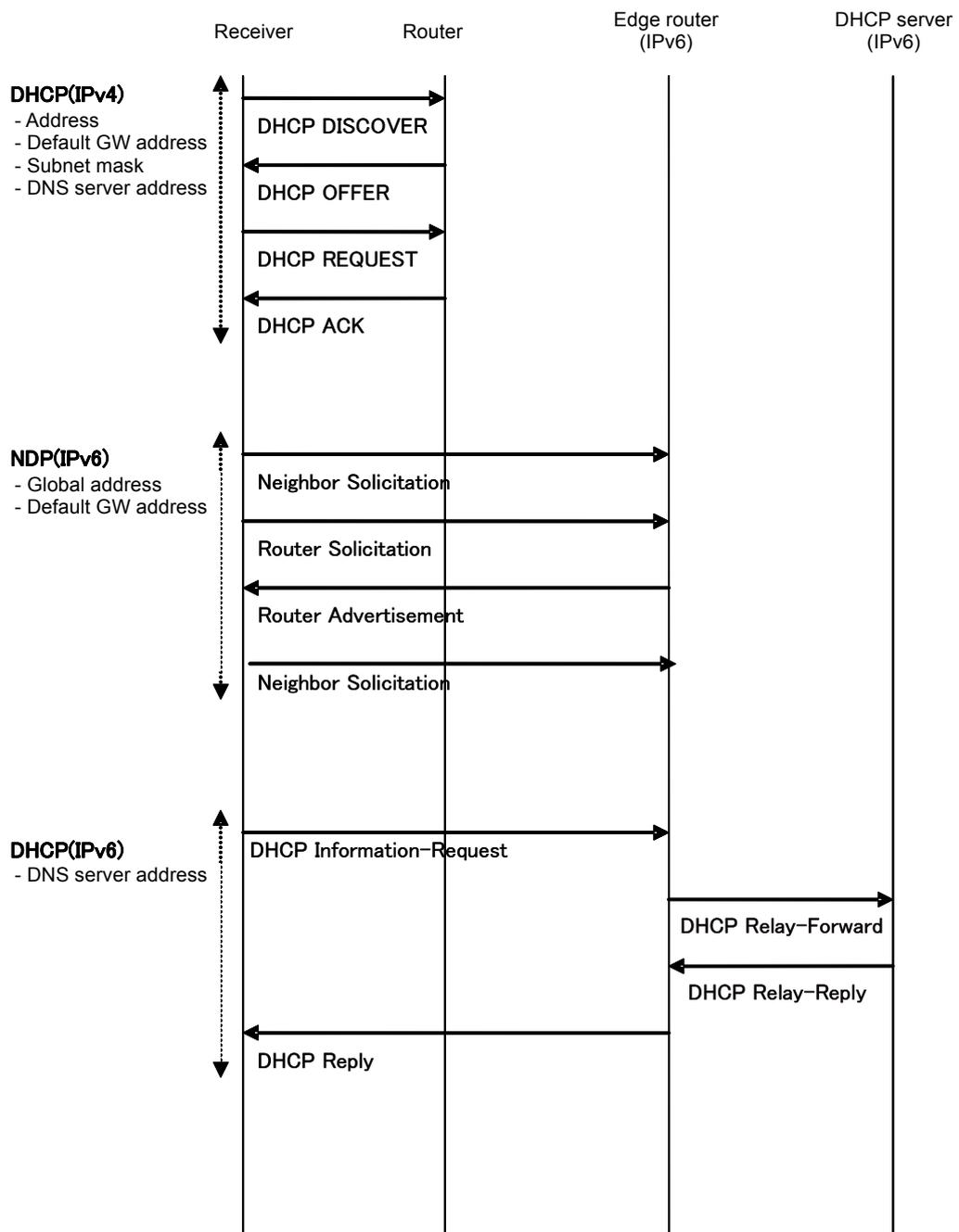


Figure 27 Initial Connection Sequence (1)

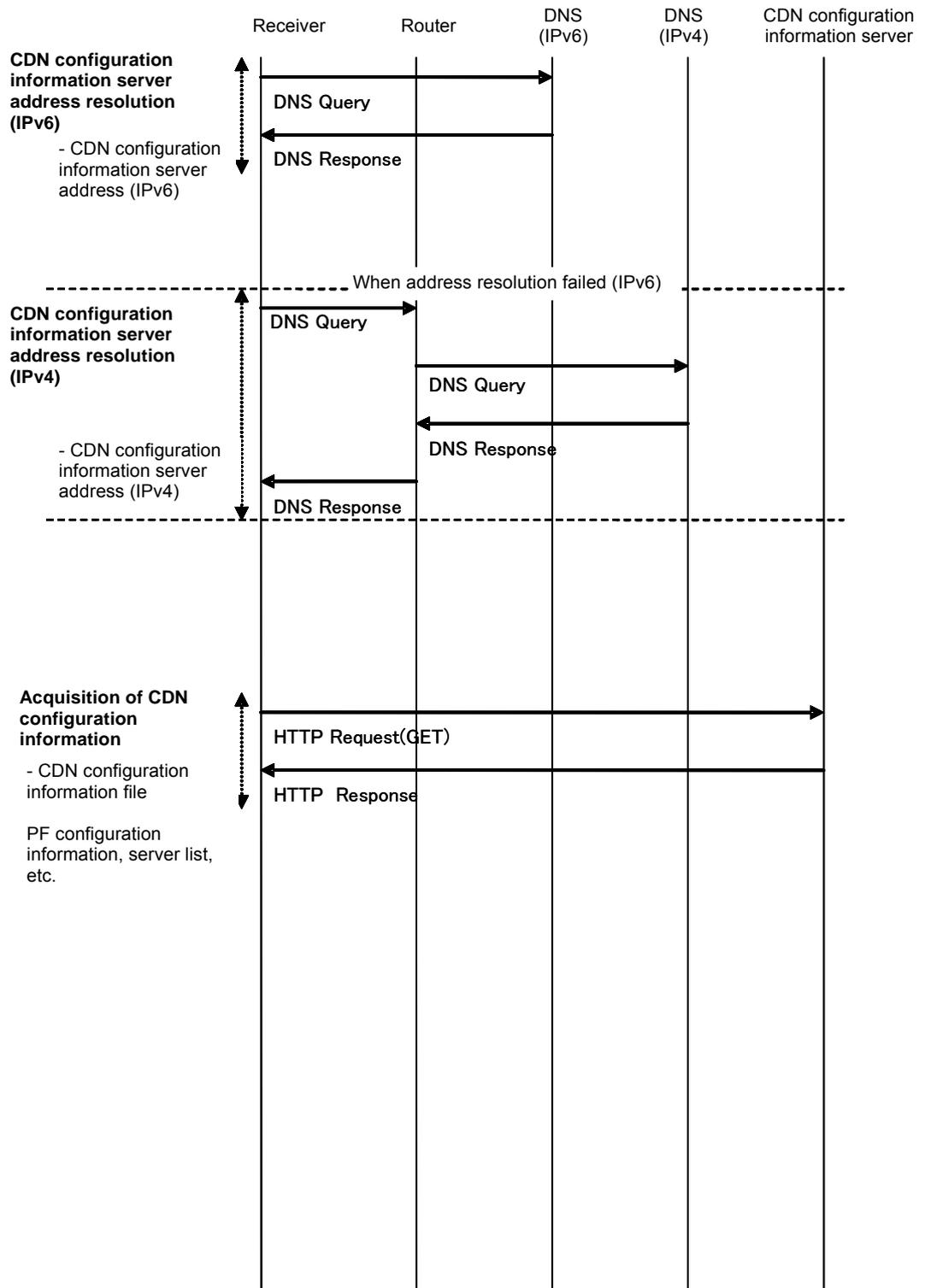


Figure 28 Initial Connection Sequence (2)

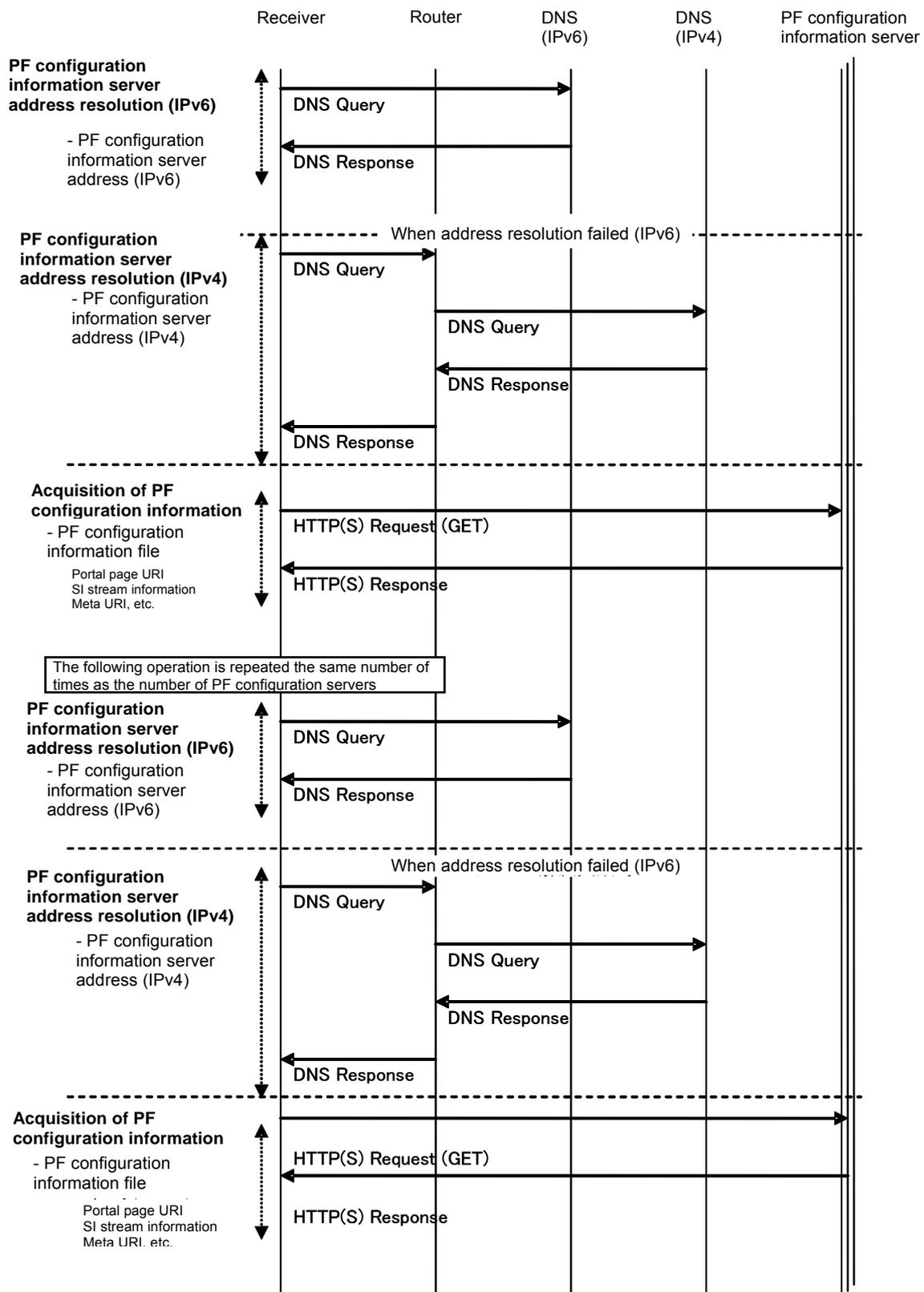


Figure 29 Initial Connection Sequence (3)

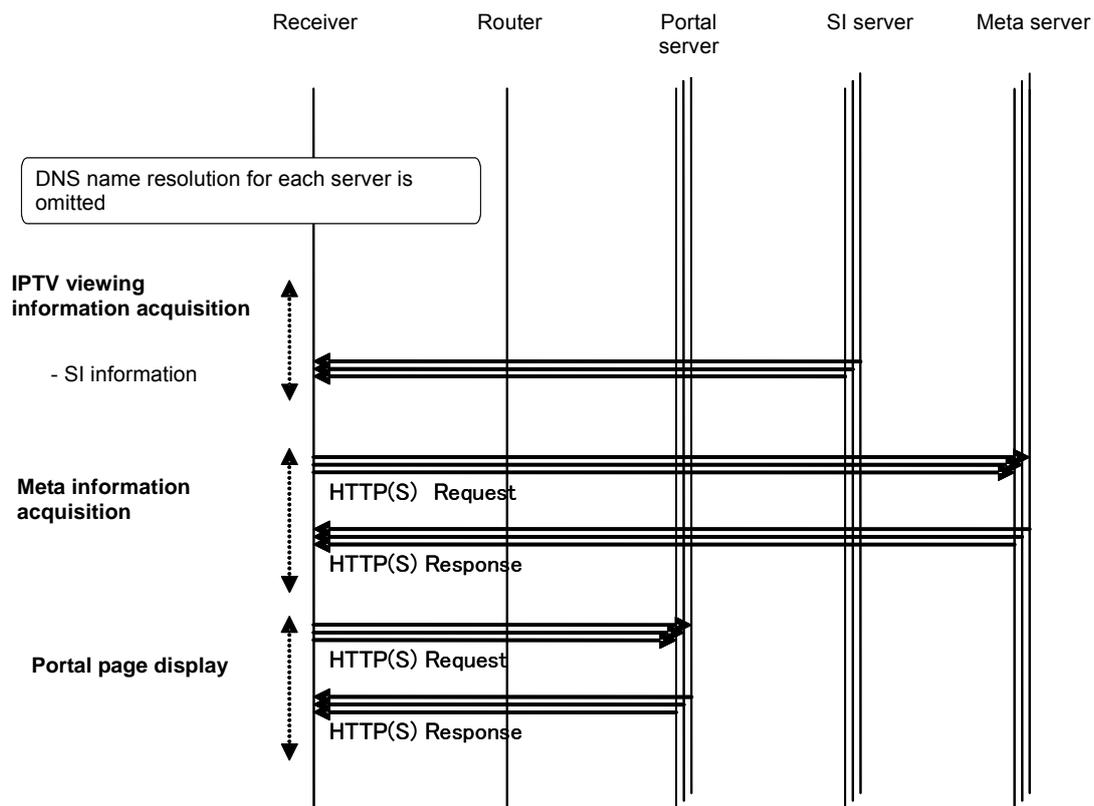


Figure 30 Initial Connection Sequence (4)

## 5.3 Clock Adjustment

### 5.3.1 Getting Clock Information

TOT is not operated in IP broadcasting services. When a receiver cannot get clock information by other means, it can obtain clock information using SNTP protocol.

#### Acquisition of Time information

Receivers attempt to obtain time information from a server specified by `<sntp_server>` in the CDN configuration information file.

For SNTP, SNTP Version 4 as specified in RFC4330 is used.

Receivers obtain JST time by applying the `<time_polarity>` and `<time_delay>` values to the time obtained using SNTP (UTC).

Once obtained, time is managed using the clocks in the receivers.

To recorrect clock by clock information, receivers correct clock again using SNTP when they get CDN configuration information, etc.

## 5.3.2 Clock Operation

### 5.3.2.1 Absolute Delay Time

And SNTP servers should send clock information by SNTP an error range of  $\pm 500$ ms based on JST(Japan Standard Time) when the typical receivers receive it.

### 5.3.2.2 Event Issue Time (Such as Starting and Ending Time)

Transmitters issue all events (IP broadcasting operation) according to the station clock. Events should not be issued ahead of time in consideration of absolute delay time.

### 5.3.2.3 Summertime Operation

Since TOT is not operated in IP broadcasting services, summertime cannot be applied using TOT when receivers receive IP broadcasting service streams. When receivers operate time information using SNTP, summertime is operated using the following information. Summertime is operated using `local_time_offset_polarity`, `local_time_offset` and `time_of_change` in the CDN configuration information file as with the Local Time Offset Descriptor described in ARIB TR-B14.

### 5.3.2.4 Clock Operation for CAS/DRM

For information on the clock used for CAS/DRM, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications", IPTVFJ STD-0002 "VOD Specifications", Chapter 7 "DRM Specifications" and [Appendix B] "Application Specifications of Marlin IPTV-ES System in DRM Specifications".

## 5.4 Logo Data Operation

### 5.4.1 Provision of Logo Data by Logo Server

Each platform operator should operate a logo server and send logo data that is used for IP broadcasting services.

The URI of a logo server is given as the `<logo_url>` value in the PF configuration information file.

6 types of logo data defined in TR-B14 are stored in the logo data.

### 5.4.2 Getting Logo Data

This is a feature to obtain the logo data of a service provider, etc. used in EPG, etc.

Receivers can connect to a server specified in PF configuration information and obtain logo data.

### 5.4.3 Logo Data Definition

#### 5.4.3.1 Logo ID

A logo ID is assigned to individual logo data and is unique in a network.

#### 5.4.3.2 Logo Data Type

Logo data can be delivered to 3 types of operator (broadcaster).

However, this does not mean that logo data is delivered to all operators.

- Channel logo  
Channel display logo data for each broadcaster specifying a logo ID for each service\_id as a channel display logo. Multiple service\_id can share one logo ID.
- Service provider logo  
Specifies a logo ID for each service provider ID as a logo for each service provider. Multiple service provider IDs can share one logo ID.
- Platform operator logo  
Specifies a logo ID for network\_id as the logo of a platform operator.

#### 5.4.3.3 Logo Type

There are 6 logo types that are defined in ARIB-TR B14 Volume 1 "Digital Terrestrial Television Broadcasting: Provisions for Download Operation".

#### 5.4.3.4 Specifications for Logo Image

The colors and data compression method (using PNG) that are defined in ARIB-TR B14 Volume 1 "Digital Terrestrial Television Broadcasting: Provisions for Download Operation" should be used.

### 5.4.4 Specifications for Logo ID Management File

The element <logo\_url> in PF configuration information should be referred to as information used to connect to a server to obtain a logo ID management file. The maximum size of a logo ID management file is 64 KByte.

- Various kinds of information are obtained using the logo URI and logo management file name obtained from a PF configuration information server.
- The following section defines the association between the logo ID and channel (service\_id), the service provider (ip\_service\_provider\_id) and the platform operator (network\_id). Receivers should ignore elements that are not defined here and ensure adequate operation continues.

Table 5-3 Logo ID Management File

Item	Description	Number	Note
------	-------------	--------	------

			of Time	
<logo_data>				
<master>				
	<logo_m_serial>	Serial information	1	YYYYMMDDXX
<logo_info_list>				
	<logo_info>		1..n	
	<logo_id>	Logo identifier	1	
	< logo_serial >	logo_id serial information	1	YYYYMMDDXX
	<logo_level>	Logo data type	1	
	< service_id >	service ID	0..m*	
	<ip_service_provider_id >	Service provider ID	0..p*	
	<network_id >	networkID	1*	

\* The number of listing varies depending on the logo\_level element (logo data type). For more information, see Table 5-4.

(1) logo\_m\_serial element

This element is used to identify changes in a logo ID management file. A 10-digit integer is used. When the element value is different from the previously acquired value, receivers regard that the logo ID management file has been changed.

logo\_m\_serial    YYYYMMDDXX  
 A 10-digit integer. Y/M/D/X = 0 to 9  
 YYYYMMDD does not need to be a date.  
 This element must be changed when the logo ID management file has been changed. It is desirable that previously used values are not used.

(2) logo\_id element

This element is used to identify logo data to be provided. The element is expressed as a 4-digit hexadecimal value (uppercase A to F).

("0x" is not required, 0000 - FFFF)

logo\_id  
 16-bit \*\*\*\*

(3) logo\_serial element

This element is used to identify changes in a logo file. A 10-digit integer is used. When the element value is different from the previously acquired value, receivers regard that the logo file has been changed.

logo\_serial    YYYYMMDDXX  
 A 10-digit integer. Y/M/D/X = 0 to 9

YYYYMMDD does not need to be a date.  
This element must be changed when the logo file has been changed. It is desirable that previously used values are not used.

(4) logo\_level element

This element is used to identify logo file types.

logo\_level  
A 2-digit binary number  
00 Platform operator logo  
01 Service provider logo  
10 Channel logo

(5) service\_id element

An ID to identify channels provided on the platform. The element is expressed as a 4-digit hexadecimal value. ("0x" is not required, 0000 - FFFF)

service\_id  
16-bit \*\*\*\*

(6) ip\_service\_provider\_id element

An ID to identify service providers provided on the platform. The element is expressed as a 2-digit hexadecimal value. ("0x" is not required, 00 - FF)

ip\_service\_provider\_id  
8-bit \*\*

(7) network\_id element

An ID to identify IP broadcasting services (platform operators) provided on the platform. The element is expressed as a 4-digit hexadecimal value. ("0x" is not required, 0000 - FFFF)

network\_id  
16-bit \*\*\*\*

Table 5-4 Relation between Logo Data Type and Number of Listing for ID-Related Element

	service_id	ip_service_provider_id	network_id
Channel logo	○ (1..m)	—	○ (1)
Service provider logo	—	○ (1..P)	○ (1)
Platform operator logo	—	—	○ (1)

Numbers in parentheses indicate the number of elements that need to be listed.

### 5.4.5 Getting Logo Data

The element `<logo_url>` in PF configuration information should be referred to as information used to connect to a server to obtain logo data. The logo ID management file and logo data are located in the same directory. Receivers obtain the data when they perform renewal operation.

#### 5.4.5.1 Location of Logo ID Management File

The location of the logo ID management file is specified by the `logo_url` in the PF configuration information file. Receivers obtain the data when they perform renewal operation.

#### 5.4.5.2 Location of Logo Data

Logo data is placed in the directory (same directory as the logo ID management file) specified by the `logo_url` in PF configuration information. File names for such data are defined as follows.

Logo data file name: `<logo_file>`

`<logo_id>_<logo_type>.png`

`<logo_id>`: Logo ID - A hexadecimal string

`<logo_type>`: A value indicating 6 logo types (00 to 05)

- Data location Specified server/specified path/logo ID management file

`/logo data (<logo_id>_<logo_type>.png)`

/  
/

#### 5.4.5.3 Triggers for Renewing Server

It is assumed that the logo ID management file is accessed at the same time as the configuration information. Therefore, logo data should be renewed in sync with the PF configuration information. Also, when the logo ID management file is newly obtained or has been changed since the previous acquisition, logo data can be renewed accordingly (only changed data or entire data can be renewed).

#### 5.4.5.4 Communication Protocol

Receivers connect to a server using HTTP or HTTPS and obtain data.

## 5.5 HTTP

For file transmission/reception between servers and receivers, HTTP1.1 is used to send file acquisition requests from receivers and deliver files from servers. HTTP1.1 in this document should conform to RFC2616 Hypertext Transfer Protocol-HTTP/1.1 unless stated otherwise.

### 5.5.1 HTTP1.1 Operation Guideline

This section presents HTTP operation guidelines. For the specifications on BML and ECG metadata, the specifications in Chapter 6 "Specifications of BML for IPTV" and "Chapter 7 "Operation of VOD" are given priority.

### 5.5.2 HTTP/1.1 Operation Overview

- Communication port

When the URI has "http:", receivers and Web servers establish HTTP/1.1 communication on the port specified by the URI. When the URI has "https:", receivers and Web servers establish encrypted communication using HTTP/1.1 on the port specified by the URI after establishing a connection using TLS1.0 and SSL3.0. When the URI does not specify a port number, port number 80 (for "http:") or port number 443 (for "https:") should be used as the default port number. However, the port to be connected may be different depending on the connection status such as firewall settings. The default connection port can be configured on receivers out of consideration for the connection status.

- Date/Time Format

Fixed length subset defined in RFC1123 is used for the date/time format. All HTTP date/time stamps should be in GTM with exceptions.

- It is desirable that Web servers send the date/time to receivers only using the date/time format in the fixed length subset defined in RFC1123.
- Receivers should be able to interpret the fixed length subset defined in RFC1123 used for the date/time format. It is desirable that receivers can interpret dates in the RFC1036 or ANSI C format, but these formats can be ignored.

Example:

Sun, 06 Nov 1994 08:49:37 GMT ; RFC822, updated by RFC1123

Sunday, 06-Nov-94 08:49:37 GMT ; RFC850, obsoleted by RFC1036

Sun Nov 6 08:49:37 1994 ; ANSI C's asctime() format

- Character set

"UTF-8" is used as the character set. For BML and meta operation, see Chapter 5 "Service Entry and Related Specifications" and Chapter 7 "Operation of VOD" respectively.

- Content coding

"identity" is used for content coding. "deflate" and "gzip" are optional. The behavior of receivers when they receive "deflate", "gzip" or other values that they do not support is implementation-dependent.

- Transfer coding

Receivers should support the chunked transfer encoding defined in RFC2616 to receive responses from Web servers. "chunked" is used when the transfer coding is specified. The behavior of receivers when they receive other values is implementation-dependent.

- Quality value

The quality value is implementation-dependent.

- Language tag

"ja" is used for the language tag. The behavior of receivers when they receive other language tags is implementation-dependent.

### 5.5.3 Use of Request Method

- Use of GET

GET is used by both receivers and Web servers.

- Use of HEAD

Support for HEAD is optional on receivers. Web servers should return responses to HEAD requests in compliance with RFC2616.

- Use of OPTIONS

Support for OPTIONS is optional on both receivers and Web servers.

- Other methods

The use of POST, CONNECT, PUT, DELETE and TRACE is implementation-dependent.

### 5.5.4 Operation of Headers for Requests

The following section describes the HTTP headers that require special operational specifications when Web servers send requests using HTTP/1.1 communication. However, these specifications only present minimal guidelines for use of headers and do not restrict implementation of headers that are not defined here.

Table 5-5 lists the headers that are used. The meaning of symbols used under "Use of header" is as follows:

"○" Used in this specification.

"—" Neither defined as used or optional in this specification

Table 5-5 Use of Header for Request

	Header name	Use of header		Note
		Receiver	Server	
General header	Cache-Control	○	○	Only no-cache is used
	Connection	○	○	Only close is used
	Date	—	—	
	Pragma	○	○	Only no-cache is used. Optional on receivers.
	Trailer	—	—	
	Transfer-Encoding	—	—	
	Upgrade	—	—	
	Via	—	—	
	Warning	—	—	

Request header	Accept	○	○	
	Accept-Charset	○	○	
	Accept-Encoding	○	○	Only "identity", "deflate" and "gzip" are used
	Accept-Language	○	○	Only "ja" is used
	Authorization	—	—	
	Expect	—	—	
	From	—	—	
	Host	○	○	
	If-Modified-Since	—	○	
	If-Match	—	○	
	If-None-Match	—	○	
	If-Range	—	—	
	If-Unmodified-Since	—	○	
	Max-Forwards	—	—	
	Proxy-Authorization	—	—	
	Range	—	—	
	Referer	—	—	
	TE	—	—	
	User-Agent	○	○	
Entity header	Allow	—	—	
	Content-Encoding	—	—	
	Content-Language	—	—	
	Content-Length	—	—	
	Content-Location	—	—	
	Content-MD5	—	—	
	Content-Range	—	—	
	Content-Type	—	—	
	Expires	—	—	
	Last-Modified	—	—	

- General header

- Use of Cache-Control

This header is used on both receivers and Web servers. Receivers should specify "no-cache" in a request message. Receivers should not include any field name in a request message with the no-cache designator. Considering proxies supporting HTTP/1.1 on the transmission channel, it is desirable that the Pragma general header is placed specifying "no-cache".

- Use of Connection

This header is used on both receivers and Web servers. "close" is used for the connection option. For more information, see 5.5.6 "Operation of Persistent Connections" The behavior of receivers when they receive a value other than "close" is implementation-dependent.

- Use of Pragma

This header is used on receivers as an option. Considering that there are HTTP/1.0 proxies on the transmission channel, only "no-cache" can be specified when the Pragma header is used.

- Request header
  - Use of Accept
 

This header is used on both receivers and Web servers. Receivers can specify the following media types with this header.

text/xml, application/X-arib-contentPlayControl,
  - Use of Accept-Charset
 

This header is used on both receivers and Web servers. When this field is added, receivers should set the value to "UTF-8".
  - Use of Accept-Encoding
 

This header is used on both receivers and Web servers. Receivers can specify "identity", "deflate" and "gzip".
  - Use of Accept-Language
 

This header is used on both receivers and Web servers. Receivers should specify "ja".
  - Use of User-Agent
 

The User-Agent header must be used so that servers can identify the type of receivers from which file acquisition requests are sent when HTTP is used.

When receivers connect to servers, Use-Agent is used in the following way.

#### Specifications on Use of User-Agent

User-Agent: \*[Other Description] IptvServiceProduct IptvServiceComment \*[Other Description]

IptvServiceProduct ::= IptvServiceAppName "/" IptvServiceSpecVersion

IptvServiceAppName ::= "IptvSvcClient"

IptvServiceSpecVersion ::= <Compliant CDN scope service approach specification version>

IptvServiceComment ::= "(" MakerId ";" ModelId ";" MajorVer ";" MinorVer  
\*[";" Optional Other Description] ")"

MakerId ::= <A string indicating the manufacturer ID>

ModelId ::= <A string indicating the model name>

MajorVer ::= <A string indicating the major version number>

MinorVer ::= <A string indicating the minor version number>

Other Description ::= <A string that does not begin with "IptvSvcClient/">

Optional Other Description is used for future extensions.

Comply with RFC2616 for strings to be used.

Example:

IptvSvcClient/1.0 (008045;D40;001;000)

Mozilla/4.0 (compatible;ABCD;EFG;HIJ) IptvSvcBrowser/1.0 (008045;D40;001;000)

#### ● IptvSvcSpecVersion

IptvSvcSpecVersion indicates the version of the CDN scope service approach specifications that receivers comply with. The specifications in this document are

version 1.3. Reference versions that can be listed will be added according to changes made to the specifications.

- **MakerId**

MakerId indicates the manufacturer identification.

MakerId is a 6-digit string indicating the IEEE-defined 24-bit company ID (OUI) using a hexadecimal number.

Example:

008045

- **ModelId**

ModelId is a code that indicates the receiver model. ModelId is a unique code set by the manufacturer.

ModelId is a string containing up to 10 digits. The use of ModelId is manufacturer-dependent.

Example:

D40

- **MajorVer, MinorVer**

MajorVer and MinorVer indicate the receiver version. When a single model has multiple versions that behave differently, different version identification should be given to each version.

MajorVer and MinorVer are strings containing up to 8 digits. The use of MajorVer and MinorVer is manufacturer-dependent.

### 5.5.5 Operation of Headers for Responses

The following section describes the HTTP headers that require special operational specifications when Web servers send responses using HTTP/1.1 communication. However, these specifications only present minimal guidelines for use of headers and do not restrict implementation of headers that are not defined here. Receivers should be able to ignore headers that are not supported without problem.

Table 5-6 lists the headers that are used. The meaning of symbols used under "Use of header" is as follows:

- "○"            Used in this specification
- "—"            Neither defined as used or optional in this specification

Table 5-6 Use of Header for Response

	Header name	Use of header		Note
		Receiver	Server	

General header	Cache-Control	○	○	"no-cache" and "no-store" are used "max-age" is optional
	Connection	○	○	Only "close" is used
	Date	○	○	
	Pragma	○	○	"no-cache" is used as an option
	Trailer	—	—	
	Transfer-Encoding	○	○	"chunked" is used
	Upgrade	—	—	
	Via	—	—	
	Warning	—	—	
Response header	Accept-Range s	—	—	
	Age	—	—	
	ETag	—	○	
	Location	○	○	
	Proxy-Authenticate	—	—	
	Retry-After	—	—	
	Server	—	○	
	Vary	—	—	
	WWW-Authenticate	—	—	
Entity header	Allow	○	○	
	Content-Encoding	○	○	"identity" is used
	Content-Language	○	○	"ja" is used
	Content-Length	○	○	
	Content-Location	○	○—	Used in the content playback control meta file
	Content-MD5	—	—	
	Content-Range	—	—	
	Content-Type	○	○	
	Expires	—	○	Use of "Cache-Control:max-age" is recommended to indicate the expiration date
	Last-Modified	—	○	
Other header	Extension header	—	○	

- General header

- Use of Cache-Control

This header is used on both receivers and Web servers. Web servers can specify "no-cache" in the Cache-Control header of response messages. Receivers that receive "no-cache" can cache the messages but cannot display the cache without checking the availability of the cached contents.

As an option, "max-age=XX" is used. When receivers with a cache function receive "max-age=XX" (where XX is the number of seconds), receivers can display the cached

contents without checking the availability before expiration. The value of `max-age` is given priority over the `Expires` header (implementation-dependent).

When `no-store` is received, receivers should not cache the specified file during the HTTP session. The behavior of receivers when they receive other than `no-cache`, `no-store` and `max-age` is implementation-dependent.

- **Use of Connection**  
This header is used on both receivers and Web servers. `close` is used for the connection option. For more information, see 5.5.6 "Operation of Persistent Connections". The behavior of receivers when they receive a value other than `close` is implementation-dependent.
- **Use of Pragma**  
This header is used on both receivers and Web servers as an option. Only `no-cache` can be specified for the Pragma header.
- **Use of Transfer-Encoding**  
This header is used on both receivers and Web servers. When Web servers respond using chunked transfer encoding, this header must be added to the response header specifying `chunked`.

Note that `Transfer-Encoding` cannot be used with `Content-Length` in the entity header simultaneously. For more information, see RFC2616. The behavior of receivers when they receive other values is implementation-dependent.

- **Response header**
  - **Use of Etag**  
This header is used on Web servers. Reaction when receivers receive this header is implementation-dependent. Receivers can use this header as hints for `If-Match` and `If-None-Match`.
  - **Use of Server**  
This header is used on Web servers. Reaction when receivers receive this header is implementation-dependent.
- **Entity header**
  - **Use of Allow**  
This header is used as an option on both receivers and Web servers. Comply with the specifications described in 5.5.3 "Use of Request Method" for request method operation.
  - **Use of Content-Encoding**  
This header is used on both receivers and Web servers. If the response body is encoded, the method should be selected from the ones notified by receivers using `Accept-Encoding` when a request was sent. If the response body is not encoded, this header is not sent. When the response body is encoded with the method notified using `Accept-Encoding`, receivers should be able to perform decoding properly. The behavior of receivers when they receive a value other than the ones notified using `Accept-Encoding` is implementation-dependent.
  - **Use of Content-Language**

This header is used on both receivers and Web servers. The value "ja" can be specified for this heading. The behavior of receivers when they receive other values is implementation-dependent.

- Use of Content-Length

This header is used on both receivers and Web servers. Comply with RFC2616 when chunked transfer encoding is used. The behavior of receivers when they receive a response message that does not include this header is implementation-dependent.

- Use of Content-Type

This header is used on both receivers and Web servers.

The media types that can be specified in response messages are as follows:

Content-Type should be 0 for BML contents.

For Content-Type for ECG metadata, comply with the specifications in Chapter 7 "Operation of VOD".

For content playback control metafile getting, modular form data, which is the same as the transmission for broadcasting system based on home servers, should be included in the entity body, and "application/x-arib-contentPlayControl" should be specified for Content-Type.

For getting of the CDN configuration information file, PF configuration information file, logo ID management file, purchased content package information file, "text/xml" should be specified for Content-Type.

- Use of Last-Modified

This header is used on Web servers. The receiver operation is implementation-dependent. Receivers can use this header as hints for If-Modified-Since and If-Unmodified-Since.

- Use of extension header

This header is used on Web servers. Web servers can define an extension header as required and send it to receivers as an HTTP header. The behavior of receivers when they receive an extension header is implementation-dependent, but receivers should ignore extension headers properly.

### 5.5.6 Operation of Persistent Connections

In HTTP/1.1 connection, the Connection header instruction should be followed when the connection session is disconnected. When "close" is not specified in the Connection header or the Connection header is not used, HTTP connection must be maintained persistently. Through persistent connection (keep-alive) of HTTP, the TCP connection process required every time an HTTP connection is established can be reduced, and communication response can be improved.

### 5.5.7 HTTP Security

As described in 4.3 "Security Function", data sent through the HTTP protocol should be encrypted and protected using SSL/TLS as needed. SSL/TLS is specified in RFC2246, the TLS Protocol Version1.0.

### 5.5.8 Authentication on Resident Applications

#### (1) ID Authentication

When authentication defined in this section is used, data must be protected by SSL/TLS specified in 4.3 "Security Function". Certificates of supporting servers should be verified by the root certificate defined in 4.3.1 "Operation of Server Certifications".

Receivers should use the following authentication sequence for servers that require DRM\_ID transmission.

- (i) A receiver establishes connection to the server (URI).
- (ii) The receiver sends a GET file acquisition request by adding DRM\_ID to the URI. In order to add DRM\_ID, "drmId=" format should be used for the URI query. DRM\_ID should be a 16-digit hexadecimal value that does not start or end with "0x" or "h", in which lower case alphabetic characters are used.

Example: `drmId=0000ffff11112222`

When `drmId` is added to the URI and a query is not set for the URI (when URI does not include "?"), a query should be set using "?". When a query is already set for the URI (when URI includes "?"), the query should be specified using "&". Examples 1 and 2 below show queries (underlined parts) specified by receivers.

Example 1: `"GET /abc/file1?drmId=XX HTTP/1.1"`

Example 2: `"GET /abc/file1?abc=XX&def=XX&drmId=XX HTTP/1.1"`

- (iii) When the server performs authentication based on `drmId`, the server sends the file according to the GET request if authentication succeeds.

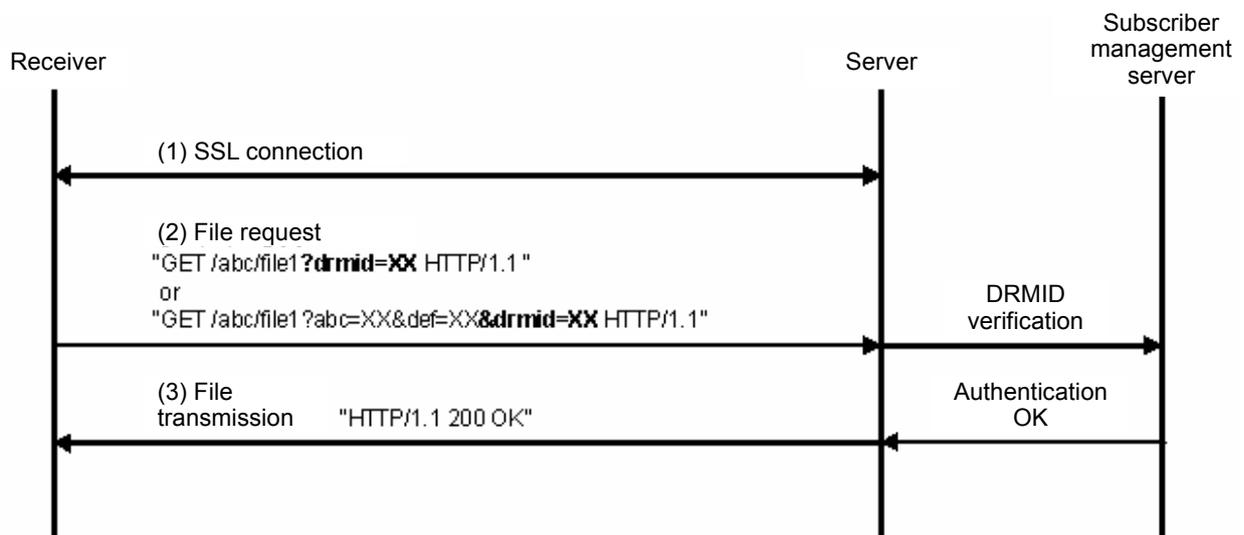


Figure 5-4 ID Authentication Flow

#### (2) Simple authentication

When authentication defined in this section is used, data must be protected by SSL/TLS specified in 4.3 "Security Function". Certificates of supporting servers should be verified by the root certificate that is defined in 4.3.1 "Operation of Server Certifications"

Receivers should use the following authentication sequence for servers that require DRM\_ID and key transmission.

- (i) A receiver establishes an SSL connection to the server.
- (ii) The receiver adds the DRM\_ID and key (a value specified as a key using the basic registration information record function defined in 6.4.4.5.3 "Basic Registration-related Function") to the URI and sends a GET file request. In order to add DRM\_ID, the "drmId=" format should be used for the URI query, and "key=" format should be used to specify a key. DRM\_ID should be a 16-digit hexadecimal value that does not start or end with "0x" or "h", in which lower case alphabetic characters are used.

Example: `drmId=0000ffff11112222`

When `drmId` and `key` are added to the URI and a query is not set for the URI (when URI does not include "?"), a query (`drmId=XX&key=XX`) should be set using "?". When a query is already set for the URI (when URI includes "?"), the query (`drmId=XX&key=XX`) should be specified using "&". Examples 1 and 2 below show queries (underlined parts) specified by receivers.

Example 1: "GET /abc/file1?drmId=XX&key=XX HTTP/1.1"

Example 2: "GET /abc/file1?abc=XX&def=XX&drmId=XX&key=XX HTTP/1.1"

- (iii) When the server performs authentication based on `drmId` and `key`, the server sends the file according to the GET request if authentication succeeds.

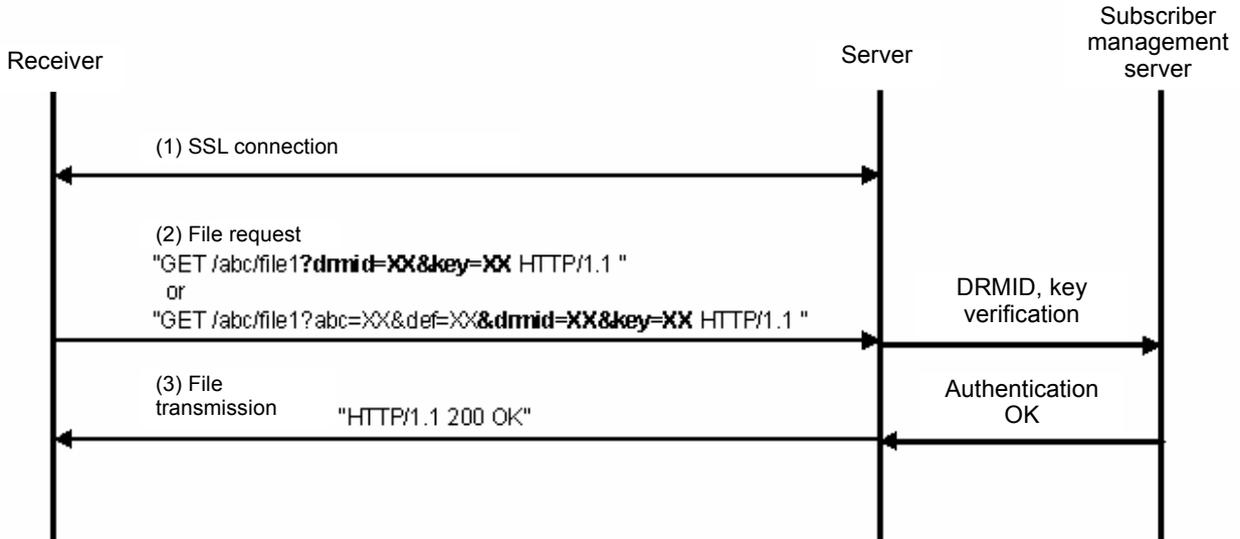


Figure 5-5 Simple Authentication Flow

### 5.5.9 Operation of Status Code 503

If the status code 503 Service Unavailable is received from a server when a file acquisition request is made, receivers regard that the processing load of the server is high and attempt to obtain the file after a certain period of time. The time interval between acquisition attempts is implementation-dependent.

### 5.5.10 Specifications on Send of CAS/DRM Client Identifier (DRM\_ID) Except for Getting Licenses

Excluding the time when they are getting licenses, receivers send CAS/DRM client identifiers (DRM\_ID) to networks only under the following conditions.

- When receivers send DRM\_ID to the URI listed in the PF configuration information defined in 5.1.2 "PF Configuration Information File"
- When receivers send DRM\_ID based on execution of a BML document in the IPTVmanaged status defined in 6.4.6.3 "Transition of States based on BML Documents in IPTV Service"
- When receivers send DRM\_ID to the URI listed in instance metadata defined in Chapter 7 "Operation of VOD"

Also, receivers must send DRM\_ID via encrypted channels using SSL/TLS.

## Chapter 6 Specifications of BML for IPTV

This chapter defines multimedia encoding in portal services that are used as means to provide delivery services for IP broadcasting/VOD services, etc. on a CDN.

BML, which is used for broadcasting services such as digital terrestrial television broadcasting and BS digital satellite broadcasting, is employed as the base of the multimedia encoding method. BML is employed mainly because there is an assumption that there will be products serving as both a digital broadcasting receiver and an IPTV service receiver, where the efficiency to develop receivers can be increased and cost can be reduced by adopting unified specifications. This chapter defines CDN scope portal service operations in detail by referring to the ordinances and announcements of the Ministry of Internal Affairs and Communications (including the ordinances and announcements of the former Ministry of Posts and Telecommunications), and the standards issued by the Association of Radio Industries and Businesses (hereinafter referred to as ARIB) as well as the broadcasting extension functions defined in the operational specifications on broadcasting systems based on servers (ARIB TR-B27), of which many technical elements are followed in this document. BML specifications discussed in this document are called the specifications of BML for IPTV.

### 6.1 Use of BML for IPTV

There are some ways to use the BML for IPTV in CDN scope services.

#### 6.1.1 Portal Service

BML documents that comply with the specifications in this document can be allocated on portal servers (Web servers) provided by each service provider. The main purpose of this is to provide a navigation method to enable use of contents. It is assumed that the portal services provide the following functions utilizing multimedia encoding.

- Basic registration

Portal services provide users with opportunities to complete basic registration for IP broadcasting/VOD services with service providers who operate portals to enable use of basic services. It is assumed that personal information and receiver information are sent to a subscriber management server, etc. via a portal server. Also, IDs of registered service providers must be saved on receivers.

- Service subscription (purchase of content package)

Portal services enable users to sign up for monthly services and purchase content packages consisting of one or more contents for IP broadcasting/VOD services. After receiver authentication and personal authentication using information such as user ID and password if needed, portal services send information indicating the subscribed services to a server.

- Service registration for IP retransmission of digital terrestrial television broadcasting

Portal services enable users to register with and use IP retransmission services of digital terrestrial television broadcasting of service providers who operate portals. It is assumed that personal information and receiver information are sent to a subscriber management

server, etc. via a portal server. Also, the IDs of registered service providers should be saved on receivers. Then receivers obtain a license so that the users can view the services.

- Service registration for IP retransmission of BS digital satellite broadcasting

Portal services enable users to register with and use IP retransmission services of BS digital satellite broadcasting of service providers who operate portals. It is assumed that personal information and receiver information are sent to a subscriber management server, etc. via a portal server. Also, the IDs of registered service providers should be saved on receivers. Then receivers obtain a license so that users view services.

- Service promotion

For service promotion, advanced multimedia rendering such as promotional video played in the L-shaped display area is required.

- Content navigation

Portal services list contents and content packages. A conditional search function is also required. Also, functions to provide users with information such as availability, status, use conditions, detailed description of contents and content previews are assumed. Information display using metadata is assumed as well.

- Starting/finishing contents

Portal services start contents selected as a result of content navigation. It is also assumed that portal services provide a function to return to execution of the specified BML document after the contents are finished.

- IP broadcasting service channel selection

Portal services provide a function to select broadcasting services that are specified in an IP broadcasting service list.

- Other

Portal services provide general Web service functions such as shopping and provision of information that is not directly related to content delivery.

### 6.1.2 Pseudo BML Data Broadcasting Services on IP Broadcasting Service

This is a type of service that starts the BML document obtained from a portal server of the service provider providing the channel that is currently viewed when a user presses the *d* button of a remote controller when viewing an IP broadcast. It is defined as a type of portal service. However, users assume that this service works with an IP broadcasting service, so the following service functions should be provided other than portal service functions.

- Linkage with IP broadcasting programs

This is a function to synchronize with video. Here, using data events and event messages of the data carousel used for broadcasting is not provided, but loose program linkage based on time information is available. This function enables display of the IP broadcasting programs and multimedia contents in conjunction with scenes.

- Service guidance when IP broadcasts are not available for viewing

When an IP broadcasting service is not available for viewing and *d* button is pressed, a service guidance screen can be presented to check the contract status and license

acquisition status of receivers so that the users can be guided to a basic registration screen or service subscription screen depending on the situation. If a license is not acquired after users complete their application for service subscription, users can also be instructed to obtain a license to view the service.

## 6.2 Requirements for Receiver Functions Related to BML Browser for IPTV

### 6.2.1 Presentation Function

The presentation function of receivers should be compliant with the specifications of the presentation function of receivers described in ARIB STD-B24 Volume 1, Part 1 "Reference Model for Data Broadcasting".

#### 6.2.1.1 Resolution and Restrictions of Each Plane of Display Screen

Table 6-1 shows the specifications related to resolution of planes comprising the display screen.

Table 6-1 Resolution of Screen Planes

Item	Description of specifications	
Video plane	Pixel size	1920×1080×16, YCbCr (4:2:2), 16:9
Still picture plane	Pixel size	1920×1080×16, YCbCr (4:2:2), 16:9
Text and graphic plane	Pixel size	960×540×8, 16:9 (Note) The display size is 1920×1080 (each pixel is rendered twice both horizontally and vertically)
	CLUT	CLUT number: 1 Common fixed colors: 17 colors (See ARIB TR-B14 Volume 3, Section 2, Appendix-1 "Receiver Unit Common Fixed Colors", index value 0-16) Broadcaster setup colors: 207 colors (index value 17-223) Receiver unit dependent colors: 32 colors (index value 224-255) However, regarding the index value of 0-127, on each BML document presentation, the value indicated in ARIB TR-B14 Volume 3, Section 2, Appendix-1 "Receiver Unit Common Fixed Colors" should be set as the initial value by the receiver unit.
	Presentation	Present 8-bit index value of CLUT after conversion to a value of 4 bits and YCbCr (4:2:2). (*1)
Caption plane	Pixel size	960×540×8, 16:9 (Note) The display size is 1920×1080 (each pixel is rendered twice both horizontally and vertically)
	CLUT	CLUT number: 1 Common fixed colors: 128 colors (See ARIB TR-B14 Volume 3, Section 2, Appendix-1 "Receiver Unit Common Fixed Colors")
	Presentation	Present 8-bit index value of CLUT after conversion it to a value of 4 bits and YCbCr (4:2:2). (*1)
Video and still picture switching plane	Pixel size	960×540×1, 16:9 (Note) The display size is 1920×1080 (each pixel is rendered twice both horizontally and vertically)

(\*1) When setting a color map with an 8-bit alpha value to the CLUT, the most significant 4 bits of the alpha value in the color map should be mapped to the 4 bits of the alpha value in the CLUT.

For a combined display of the text and graphic plane and the caption plane, nonlinearity in alpha

blending is allowed. However, the objective is to allow a degree of flexibility in the design of blending circuits, and it is required to realize the presentation effect according to the 16 levels of alpha values.

Table 6-2 shows the restrictions for planes related to presentable mono-media codes, the presentation position of mono-media contents and size, etc.

Table 6-2 Presentation Restrictions in Screen Planes

Item	Description of specifications	
Video plane	Presentable mono-media code	H.264 (Note) Number of videos presented at once is 1 regardless of the encoding method.
		MPEG-2 (Note) Number of videos presented at once is 1 regardless of the encoding method.
	Presentation position	From even number picture elements to odd number picture elements of planes for both x and y coordinates. (*1)
	Size	Even number picture element for both x and y coordinates.
	Overlapping	Videos do not overlap each other.
	Clipping	Only possible in the direction of x coordinates. (See ARIB TR-B14, Volume 3, Section 2, Appendix -3 "Clip Function in Video Plane".)
Still picture plane	Presentable mono-media code	JPEG
	Presentation position	From even number picture elements to odd number picture elements of planes for both x and y coordinates.
	Size	Even number picture element for both x and y coordinates
	Overlapping	No restrictions (*2)
Text and graphic plane	Presentable mono-media code	EUC-JP
		PNG
		MNG
	Presentation position	From any picture element to any picture element for both x and y coordinates
	Size	Any picture element count for both x and y coordinates
Overlapping	No restrictions(*2)	
Caption plane	Presentable mono-media code	8-unit character codes
	Presentation position	From any picture element to any picture element for both x and y coordinates
	Size	Any picture element count for both x and y coordinates
Video and still picture switching plane	Switching position	From any picture Video and still element for both x and y coordinates.
	Size	Any picture element count for both x and y coordinates

Presentation switching effect	The process of presentation switching effect is implementation-dependent.
-------------------------------	---

(\*1) The definition of picture element is based on ARIB STD-B24.

(\*2) Production of applications with no (or little) need to re-render still pictures, texts and graphics due to changes and moving of overlapping sequence is recommended. However, receivers should not fail to display contents due to re-rendering. For restrictions on overlapping of still pictures due to combined use with video, see 6.2.1.2 "Available Combinations and Restrictions of Planes to "

## 6.2.1.2 Available Combinations and Restrictions of Planes to Display

As indicated in the reference model, the presentation screen is comprised of a combination of various planes. Table 6-3 shows the specifications on the combination of planes.

Table 6-3 Combinations and Restrictions of Planes to Display

Item	Description of specifications
Resolution	For presentation of combinations of video, still picture, text and graphic, and caption planes, only those with the same resolution and the same aspect ratio shown in Table 6-1 can be presented in combination. The text and graphic/caption plane in 960×540 is, however, recognized as 1920×1080. (*1)(*2)
	In the video and still picture switching plane, video to be switched/still picture plane resolution in 1/2×1/2 resolution is recognized as the same resolution as the switching target plane. (*3)
Area specification in video and still picture switching plane	The area specification for both video and still pictures is rectangular. (*4)
Maximum area set up number of video, still picture	When the rectangular area displays video, the maximum area setup number is 1. When all the rectangular areas display still pictures, the maximum area setup number is 4. (*4)

- (\*1) For presentation of contents with only video as the display target, receivers that can provide a presentation function without combining the above planes can be assumed. Even in such cases, considerations should be given to the points described in ARIB TR-B14 Volume 3, Section 2, Appendix-10 “Precautions at the Time of Switching Pixel Size”.
- (\*2) Text and graphic plane overlaps the video and still picture respectively by rendering each pixel twice horizontally and rendering each line twice vertically.
- (\*3) Both video and still pictures are in YCbCr (4:2:2) at full resolution, and the effective unit for switching is 2 picture elements. This is to execute switching of video/still pictures using a video/still picture switching plane of 1/2×1/2 resolution of video, still picture planes.
- (\*4) There are two visual patterns for display combinations of the video plane and still picture plane. The first pattern is where the video is placed over a still picture as shown in Figure 31. In this case, the rectangular area is a video area and the number of areas that can be set is 1. The second pattern is where still pictures are placed over a full screen view video as shown in Figure 32. In this case, the rectangular area is a still picture area and the number of areas that can be set is 4 or less. Also, as an example where multiple still picture areas are set as shown in Figure 34, a case where the area is set with still pictures 1 and 2 overlapping each other is conceivable. In this case, however, the area is not rectangular, so it contravenes these specifications and is therefore cannot be implemented. On the other hand, still pictures 3 and 4 in Figure 33 do not form a rectangle, but in this case, they are regarded as two rectangular areas sharing a border and are recognized as being in compliance with these specifications.

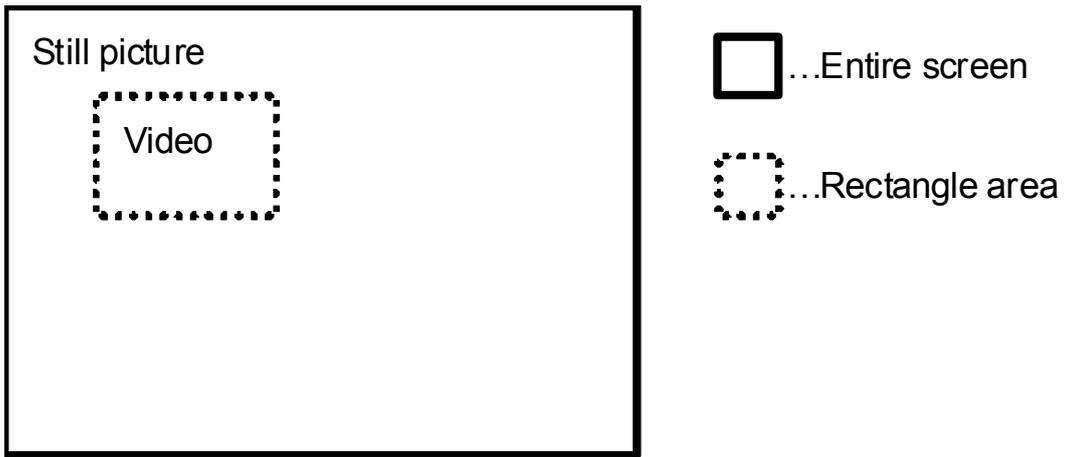


Figure 31 Display Example 1: Possible Combination of Video and Still Pictures

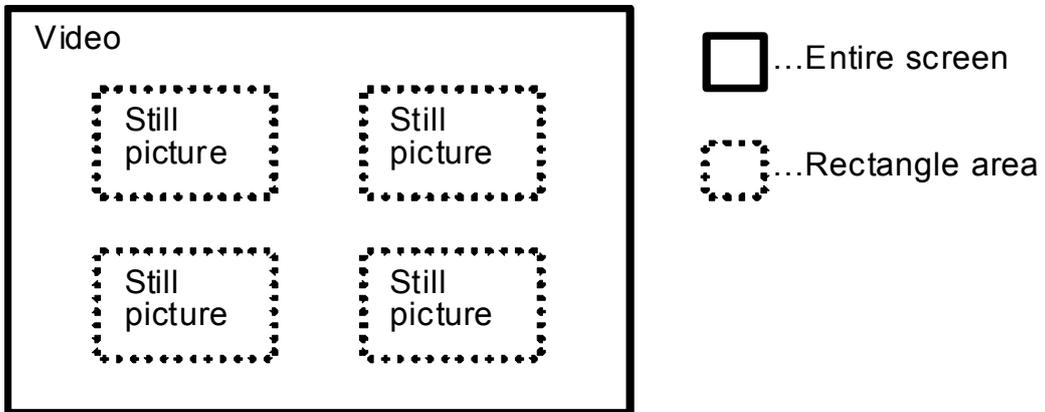


Figure 32 Display Example 2: Possible Combination of Video and Still Pictures

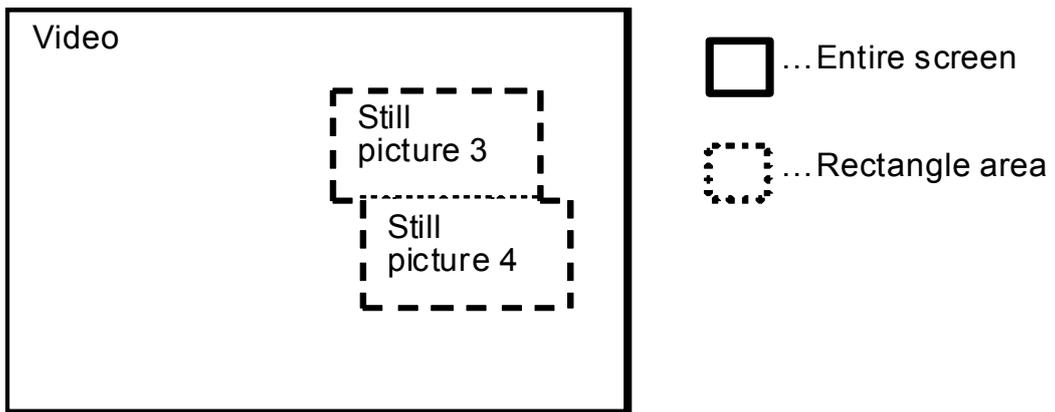


Figure 33 Display Example 3: Possible Combination of Video and Still Pictures

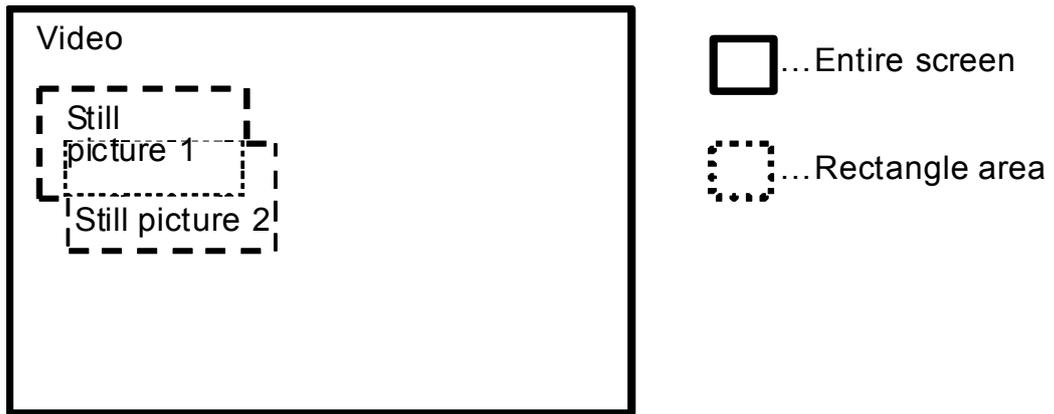


Figure 34 Display Example: Impossible Combination of Video and Still Pictures

## 6.2.1.3 Relationship between Mono-media Encoding and Planes to Display

Table 6-4 shows an overview of the restriction conditions for mono-media coding presented in planes described in the previous section. It is assumed that broadcasters do not send mono-media data encoded in a way that is not discussed in this document and mono-media data encoded through non-standard operations. Details of the specifications regarding each encoding method are defined in 6.3 "Operation of Mono-media Encoding".

Table 6-4 Overview of Restriction Conditions for Mono-media Encoding Presented in Each Screen Plane

Encoding method		Description of specifications	
Video encoding	H.264	Transmission method	Screen image PES for IP broadcasting or streaming TS for VOD Stream type identifier = 0 x 1B
		Image size	1920×1080 (16:9), 1440×1080 (16:9), 1280×720 (16:9), 720×480 (16:9), 720×480 (4:3)
		Scaling	256/128, 192/128, 160/128, 128/128, 112/128, 96/128, 80/128, 64/128, 48/128, 32/128 (*1)
	MPEG-2	Transmission method	Screen image PES for IP broadcasting or streaming TS for VOD Stream type identifier = 0x02
		Image size	720×480 (16:9), 720×480 (4:3)
		Scaling	256/128, 192/128, 160/128, 128/128, 112/128, 96/128, 80/128, 64/128, (*1)
Still picture encoding	JPEG	Transmission method	Acquisition of JPEG files via HTTP
		Image size	Any desired size from a horizontal/vertical 16-picture element image to a full size image
		Scaling	128/128 (*2)
		Other	Presentation in 4:2:0 resolution is assumed. However, receivers should not fail to display 4:2:2 input.
Text and graphic encoding	PNG	Transmission method	Acquisition of PNG files via HTTP
		Image size	Any desired size from a horizontal/vertical 2-picture element image to a full size image
		Scaling	128/128
	MNG	Transmission method	Acquisition of MNG files via HTTP
		Image size	Any desired size from a horizontal/vertical 2-picture element image to a full size image
		Scaling	128/128
	8-unit character code including EUC-JP	Transmission method	Use in caption: Caption PES for IP broadcasting or streaming TS for VOD (stream type identifier = 0x06) Use in portal: Acquisition of BML document files via HTTP (EUC-JP only)

(\*1) Scaling factors are defined as follows. (ARIB TR-B14 Volume 3, Section 2, Appendix-4 "Regarding the Scaling of Videos")

- Video data presentation with scaling ratio of 128/128 (100%) when presenting HD video data in video planes is defined as follows:
  - 1) Quantize video data in picture element of respective encoding resolutions. For MPEG-2, encoding resolutions indicate the resolutions defined using `vertical_size_value` and `horizontal_size_value` in Sequence Header. For H.264, encoding resolutions indicate the resolutions defined by the number of horizontal picture elements and number of vertical picture elements described in IPTVFJ STD-0004 "IP Broadcasting Specifications", [Appendix A] "Operation Specifications on H.264/MPEG-4 AVC".
  - 2) Quantized video data is presented using the following number of horizontal/vertical picture elements on the video plane:
    - The number of vertical picture elements is the same as that of video data.
    - The number of horizontal picture elements is the aspect ratio of the number of vertical picture elements×video data. In this case, the aspect ratio is based on picture elements of the encoding resolution. With MPEG-2, note that the aspect ratio does not necessarily match the aspect ratio indicated by `aspect_ratio_information` in the Sequence Header. Using this, the video data is mapped to full screen in the video plane with a resolution of 1920×1080 (16:9).
    - For 1280×720 (16:9) video data, the scaling ratio = 128/128 is applied by mapping (vertical picture element count 1080, horizontal picture element count 1920) the data in the video plane with a resolution of 1920×1080 (16:9).
- Video data presentation with a scaling ratio of n/128 when presenting HD video data in video planes is defined as follows:
  - 1) Quantize video data in picture element based on each encoding resolution.
  - 2) In accordance with the logic described above, the data is mapped to the full screen of the video plane with a resolution of 1920×1080 (16:9) with a scaling ratio of 128/128.
  - 3) Quantized video data is presented using the following number of horizontal/vertical picture elements on the video plane:
    - The vertical picture element count is the same as the vertical picture element count for video data specified in height property for object elements in the BML document.
    - The number of horizontal picture elements is the aspect ratio of the number of vertical picture elements×video data. If the horizontal/vertical picture element count is an odd number, the data is rounded by truncating picture elements. Truncating is done from picture elements with a larger picture element number (lower right) for both horizontal and vertical elements. (For information on picture element number, see ARIB STD-B24) However, presentation where horizontal picture elements do not match the value specified in the width property of the object element is implementation-dependent.
- The scaling ratio used for displaying SD video data on a video plane is defined as follows:  
The scaling ratio should be defined with the flexibility to change resolution from 960×540 and also with consideration to ensure the image quality of the video.

Definition to securing flexibility to change video resolutions:

First of all, define the scaling ratio =128/128 as follows:

- 1) Quantize video data in picture elements based on each encoding resolution.
- 2) Map the quantized video data on the video plane according to the number of vertical/horizontal picture elements listed below:
  - The number of vertical picture elements is converted to the number of vertical picture element on the video plane.
  - The number of horizontal picture elements is converted to the number of picture element that maintains the roundness ratio against the vertical picture elements described above.
  - When the scaling ratio = n/128, use the above scaling ratio = 128/128 as the standard. The number of vertical picture elements should be the same as the number of vertical picture elements of the video data specified by the height property for object elements in the BML document.
  - The number of horizontal picture elements is the aspect ratio of the number of vertical picture elements×video data. If the horizontal/vertical picture element count is an odd number, the data is rounded by truncating picture elements. Truncating is done from picture elements with the

larger picture element number (lower right) for both horizontal and vertical elements. (For information on picture element numbers, see ARIB STD-B24) However, presentation where horizontal picture elements do not match the value specified in the width property of the object element is implementation-dependent.

Definition with consideration to ensure the picture quality of video:

First of all, define the scaling ratio =128/128 as follows:

- 1) Quantize the video data in the picture elements based on each encoding resolution.
- 2) Map the quantized video data on the video plane according to the number of vertical/horizontal picture elements listed below:
  - The number of vertical direction picture elements is the same as that of the video data.
  - The number of horizontal picture elements is converted to the number of picture elements that maintains the roundness ratio against the vertical picture elements described above.
  - When the scaling ratio =  $n/128$ , use the above scaling ratio =  $128/128$  as the standard. The number of vertical picture elements should be the same as the number of vertical picture elements of the video data specified by the height property for object elements in the BML document.
  - The number of horizontal picture elements is the aspect ratio of the number of vertical picture elements $\times$ video data. If the horizontal/vertical picture element count is an odd number, the data is rounded by truncating picture elements. Truncating is done from picture elements with the larger picture element number (lower right) for both horizontal and vertical elements. (For information on picture element numbers, see ARIB STD-B24) However, presentation where horizontal picture elements do not match the value specified in the width property of the object element is implementation-dependent.

- The image size and scaling combinations shown in the following table should be applied regardless of the video encoding method and aspect ratio.

Resolution Scaling	1920×1080	1440×1080	1280×720	720×480
256/128	—	—	—	○
192/128	—	—	—	○
160/128	—	—	—	○
128/128	○	○	○	○
112/128	○	○	○	○
96/128	○	○	○	○
80/128	○	○	○	○
64/128	○	○	○	○
48/128	○	○	○	—
32/128	○	○	○	—

- (\*2) 256/128 scaling is used only when transmitting an image with a resolution of 960× 540 and presenting it by rendering each pixel twice both horizontally and vertically as a 1920× 1080 size image.

## 6.2.1.4 Audio Playback Function

Table 6-5 shows the specifications related to audio playback. It is assumed that broadcasters do not send or manage mono-media data encoded in any way that is not discussed in this document and mono-media data encoded through non-standard operations. Details of the specifications regarding each encoding method are defined in 6.3 "Operation of Mono-media Encoding".

Table 6-5 Audio Playback Function

Encoding method	Description of specifications	
AAC-LC	Transmission method	Audio PES: Stream type identifier = 0x0F Audio file: HTTP
	Sampling frequency	48 kHz (*1)
	Maximum file size for continuous playback	512 KB
	Other	(*1)
MPEG1 layer 2	Transmission method	Audio PES: Stream type identifier = 0x03
	Sampling frequency	48 kHz, 32 kHz (*1)
	Other	(*1)
AIFF-C	Transmission method	Audio file: HTTP
	Sampling frequency	12 kHz 1/4 of main audio stream
	Maximum file size for continuous playback	96 KB
	Other	(*1)
Caption warning sound	Transmission method	Built-in sound (*2)
	Sampling frequency	12 kHz
	Maximum file size for continuous playback	48 KB

(\*1) For restrictions such as availability of simultaneous decoding with other encoded audio data, see 6.3.3.5.2 "Simultaneous Playback of Sounds of Different Encodings".

(\*2) Total ROM size for built-in sound is 480 KB.

## 6.2.1.5 Fonts

Regarding fonts, restrictions that do not affect practicality have been added out of consideration for the size of ROM featured in receivers. Table 6-6 lists font specifications.

Table 6-6 Font

Item	Description of specifications
Number of font styles	Number of styles: 3 (round gothic, bold round gothic, square gothic) (Note) Shared for 960×540 and 720×480 Proportional font: none
Character type	Kanji (1st, 2nd level), Hiragana, Katakana, alphanumeric characters, symbols, etc. (*1)

	External characters (Reference from BML documents is not used)	
Character size (pixel)	Round gothic	16, 20, 24, 30, 36
	Bold round gothic	30
	Square gothic	20, 24
Grayscale font	4 shades	

(\*1) For more information on character type, see ARIB TR-B14 Volume 3, Section 2, 3.4.1.2 "Character Sets Used in Data Broadcasting".

## 6.2.2 Remote Controller

Comply with the specifications defined in ARIB TR-B14 Volume 3, Section 2, 1.3 "Remote control" (except bookmark keys).

## 6.2.3 Memory to Be Equipped in Receivers

### 6.2.3.1 RAM

There are no special specifications with regard to RAM capacity on receivers. Sufficient RAM should be equipped to enable playback of contents based on the maximum content size shown in Table 6-7.

Table 6-7 Content Size Restriction

Item	Maximum value	Supplementary information
Size of a page	5 MB	Total amount of all resources composing a portal page related to one BML document including data such as a BML document, still pictures and audio files.
Size of a screen	2 MB	Total amount of resources displayed on a screen simultaneously. This includes the audio file resources that are played back directly with the screen display.
Size of a resource	1 MB	Size of compressed still pictures (JPEG, PGN, etc.). When the maximum size is defined for each format (audio file, etc.), the defined restriction is given priority over this specification.

### 6.2.3.2 NVRAM

With regard to BML browsers for IPTV, it is assumed that NVRAM is used with the functions defined in 6.4.4.5.3 "Basic Registration-related Function", 6.4.4.5.4 "Service

Registration-related Functions in IP Retransmission Service of Digital Terrestrial Television Broadcasting" and 6.4.4.5.5 "Service Registration-related Functions in IP Retransmission Service". There is no special specification for NVRAM capacity. Out of consideration for the lifetime of NVRAM, service providers should avoid excessive write operation.

#### 6.2.4 Text Input Method

Comply with the specifications defined in ARIB TR-B14 Volume 3, Section 2, 1.6 "Character Entry Function".

### 6.3 Operation of Mono-media Encoding

#### 6.3.1 Video Encoding

BML documents reference the contents of IP broadcasting services and VOD services. Therefore, mono-media video encoding is only used for video ES within the TS comprising the contents. For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 5 "Video Content" and IPTVFJ STD-0002 "VOD Specifications", Chapter 6 "Video Content".

#### 6.3.2 Still Images and Bitmap Figure Encoding

Comply with the specifications defined in ARIB TR-B14 Volume 3, Section 2, 3.2 "Still Images and Bitmap Figure Encoding".

#### 6.3.3 Audio Encoding

##### 6.3.3.1 Audio Stream

BML documents reference the contents of IP broadcasting services and VOD services. Therefore, mono-media audio encoding for audio streams is only used for audio ES within the TS comprising the contents. See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 5 "Video Content" and IPTVFJ STD-0002 "VOD Specifications", Chapter 6 "Video Content".

##### 6.3.3.2 MPEG2 AAC-LC Audio Files

###### 6.3.3.2.1 Restrictions on MPEG2 AAC-LC Audio Files

Only 48 kHz can be used for the sampling frequency. The file size should be 512 KB or less.

The audio being played back can be stopped when the Stop control is received.

An MPEG2 AAC-LC audio file cannot be simultaneously played back with IP broadcasting/VOD service video streams.

###### 6.3.3.2.2 MPEG2 AAC-LC Audio File Data Format

MPEG2 AAC-LC audio files adopt the MPEG-2 AAC Elementary Stream format.

As shown in Figure 35, an audio frame comprised of an ADTS header and corresponding audio data is regarded as a unit, and one or multiple audio frame units comprise an audio file. (Because one audio frame becomes a unit of 1024 samples in PCM, it is about 21.3 milliseconds at 48 kHz sampling.)

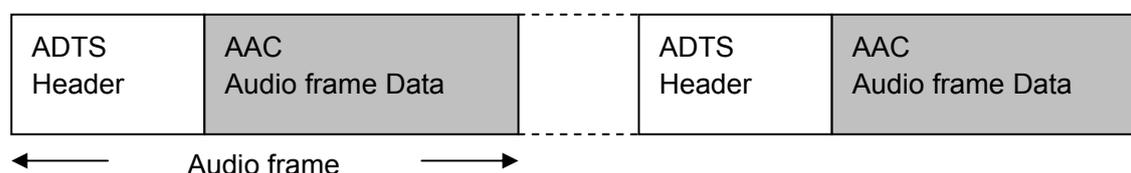


Figure 35 MPEG2AAC-LC Audio File Data Format

### 6.3.3.3 AIFF-C Audio Files

#### 6.3.3.3.1 Encoding Parameters

Table 6-8 AIFF-C Encoding Parameters

Sampling frequency	Bit length
12 kHz	16 bits

#### 6.3.3.3.2 Maximum Data Size

The maximum size is 96KB or less.

#### 6.3.3.3.3 Other Specifications

Receivers do not need to support Private\_chunk (chunks other than Format\_Version\_Chunk, Extended\_Common\_Chunk, Sound\_Data\_Chunk).

Number of channel is 1.

Repeated playback does not need to be supported. (Seamless playback is not possible.)

#### 6.3.3.4 Built-in Sound

Comply with the specifications defined in ARIB TR-B14 Volume 3, Section 2, 3.3.5 "Built-in Sound"

#### 6.3.3.5 Audio Mixing on Receivers

##### 6.3.3.5.1 Mixing Balance

When mixing audio distributed in different codes, the volume should be mixed in a 1:1 ratio.

### 6.3.3.5.2 Simultaneous Playback of Sounds of Different Encodings

Simultaneous playback of multiple audio is only possible for the combinations with the ○ symbol in Table 6-9. ( ) indicates the audio with a higher playback priority when simultaneous playback is not possible. Conditions for prioritized playback are described below:

MPEG-2 AAC-LC and MPEG-1 layer 2 that are included in IP broadcasting streams and VOD streams cannot be played back simultaneously. These items should be treated equally as stream audio.

If duplicated playback of an AIFF-C file and built-in sound is specified, the audio that is specified later takes priority as a basic rule.

If playback of an MPEG-2 AAC-LC file and of an AIFF-C file/built-in sound are instructed simultaneously, playback of the MPEG-2 AAC-LC file should be given priority.

Table 6-9 Simultaneous Playback of Sounds of Different Encodings

	MPEG-2 AAC-LC and MPEG-1 layer 2 stream	MPEG-2 AAC-LC file	AIFF-C file	Built-in sound
MPEG-2 AAC-LC and MPEG-1 layer 2 stream	×	× (Stream is prioritized)	○ (1)(2)(3)	○ (1)(2)(3)
MPEG-2 AAC-LC file		× (Whichever is written later is prioritized)	× (AAC is prioritized)	× (AAC is prioritized)
AIFF-C file			× (Whichever is written later is prioritized)	× (Whichever is written later is prioritized)
Built-in sound				× (Whichever is written later is prioritized)

- (1) While performing composite output of MPEG-2 AAC-LC or MPEG-1 layer 2 stream and an AIFF-C file/built-in sound, if the stream audio disappears, then playback of the AIFF-C file/built-in sound is not guaranteed.
- (2) When an AIFF-C file/built-in sound is being played back independently (without composite), it cannot be combined with the stream audio in the middle of playback.
- (3) When the sampling frequency of MPEG-1 layer 2 is 32 kHz, simultaneous playback is not possible. Playback of MPEG-2 AAC-LC or MPEG-1 layer 2 transmitted by the audio stream is prioritized.

### 6.3.4 Character Encoding

Comply with the specifications defined in ARIB TR-B14 Volume 3, Section 2, 3.4 "Character Encoding". However, 8-bit codes that are referenced externally from BML documents are not supported.

## 6.4 Operation of BML for IPTV

### 6.4.1 Specifications Related to Multimedia Coding in IPTV Service

Multimedia coding in IPTV services is defined as coding used to operate portal contents. Basically, the BML that complies with ARIB TR-B14 Volume 3, Section 2 (profile A), Chapter 5 "Operation of Multimedia Encoding" (that is to say, the BML complies with "ARIB STD-B24", which ARIB TR-B14 refers to) is applicable. However, operational conditions are modified according to the differences between assumed receiver configuration and requirements. In other words, for the specifications that are defined in TR-B14 Chapter 5 "Operation of Multimedia Encoding" but not in this document, comply with TR-B14 Chapter 5 "Operation of Multimedia Encoding". The modified parts and relevant IPTV service operations are defined in the following sections.

#### 6.4.1.1 Operation of the BML Version

Comply with `major_version` and `minor_version` that are assigned by ARIB. The value is set to "100.0".

The behavior when a different BML version is received is implementation-dependent.

#### 6.4.1.2 Operational Guidelines of BML Elements

Comply with ARIB TR-B14 Volume 3, Section 2, 5.7.2 "Operational Guidelines of BML Elements".

#### 6.4.1.3 Attributes

Comply with ARIB TR-B14 Volume 3, Section 2, 5.7.3 "Attributes". However, the following conditions apply.

- For operation of the `object_id` attribute in the `beitem` element, the ID of the object element in which the `type` attribute is `application/X-arib-contentPlayControl` can also be used as the attribute value.
- For operation of the `streamposition` attribute value of the object element of in which the `type` attribute is `application/X-arib-contentPlayControl` and operation of `streamstatus` attribute value of object element in which the `type` attribute is `application/X-arib-mpeg2-tts`, the `application/X-arib-contentPlayControl` is defined additionally in 6.4.3.1.1 "Operation of Attributes" and 6.4.3.2.1 "Operation of Attributes".
- The `invisible` attribute of the `body` element is not used operationally.
- The `remain` attribute of the object element in which the `type` attribute is `application/X-arib-mpeg2-tts` is used operationally. In this case, all URLs including `service_ref` should be specified as data attributes.

- For beitem, only the type attributes "TimerFired", "CCStatusChanged", "MediaStopped" and "DataButtonPressed" are used operationally.

#### 6.4.1.4 Operation Relating to beitem Elements

Comply with ARIB STD-B24 Volume 2, Appendix 2, 4.3.4 "Operation of beitem Element". However, the following conditions apply.

- Only the type attributes "TimerFired", "CCStatusChanged", "MediaStopped" and "DataButtonPressed" are used operationally.
- For time\_mode, only "absolute" is used operationally.
- The object element in which the type attribute is application/X-arib-mpeg2-tts is not used for MediaStopped events.

#### 6.4.1.5 Operation of BML Elements Extension Module (Interruption Event)

Comply with ARIB TR-B14 Volume 3, Section 2, 5.7.5 "Operation of the BML Elements Extension Module (Interruption Event)". However, the specifications relating to the attributes that are not operated in 6.4.1.3 "Attributes" and 6.4.1.3 "Attributes" are excluded.

#### 6.4.1.6 Operation of CSS

Comply with ARIB STD-B24 Volume, Appendix 2 4.4 "CSS-Based Style Sheet". However, 720×480 specification in the resolution property is not supported.

#### 6.4.1.7 Operation of used-key-list

The used-key-list property is operated as follows:

Operation item	
<key-group> value *1	"special-1" is the VOD playback control key group (*3)
Key code *2	Defined additionally for the vendor-dependent (key code: 150) in order of precedence
Access key characters *2	Not defined *2
Behavior management	When describing playback control processes in a BML document, it is desirable to mask "special-1", <key-group> of the VOD playback control key, to avoid user confusion. When masked, the VOD playback control key is obtained by a browser, while key codes become implementation-dependent. It is not recommended to create contents using these keys.

\*1: See ARIB STD B-24 Volume 2, 5.4.13.4 "Properties for Exclusive Control with Remote Control Keys", Table 5-12 "Values Applicable to <key-group>".

\*2: See ARIB STD B-24 Volume 2, Appendix 2 "Operational Guidelines for Implementing Basic Services", Table 5-9 "Relationship among Remote Control Keys, Key Codes and Access Keys".

\*3: Indicates keys such as play, stop, fast-forwarding, fast-rewinding and chapter jump. Implementation of physical keys is implementation-dependent. Software keys on OSD are also included in this key group.

#### 6.4.1.8 Operation Area of Media Types and Mono-media

Comply with the following specifications as also described in ARIB TR-B14 Volume 3, Section 2, 5.6 "Operation Area of Media Type and Mono-media".

- CSS data (media type "text/css") may appear in BML documents in some cases and may be sent as independent resources in other cases. CSS data sent as mono-media should be CSS on its own with a concluded description.
- ECMAScript data (media type "text/X-arib-ecmascript; charset='euc-jp'") may appear in BML documents in some cases and may be sent as independent resources in other cases. ECMAScript data sent as mono-media should be ECMAScript data on its own with concluded expression.

Table 6-10 shows the media types that are operated and mono-media coding operations that can be specified for object elements.

Table 6-10 Media Type/Mono-media Operation

Scheme	Media type	Operation (object element)	Remark
http:, https:	multipart/mixed	—	
	text/css	—	
	text/X-arib-bml; charset="euc-jp"	—	Note 1
	text/X-arib-ecmascript; charset="euc-jp"	—	Note 1
	image/jpeg	○	
	image/X-arib-png	○	
	image/X-arib-mng	○	
	audio/X-arib-mpeg2-aac	○	
	audio/X-arib-aiff	○	
	application/X-arib-bmlclut	—	
	application/X-arib-btable	—	
	application/X-arib-resourceList	—	
	application/X-arib-contentPlayControl	○	
arib:	application/X-arib-mpeg2-tts	○	
romsound:	audio/X-arib-romsound	—	

Note 1: charset cannot be omitted.

For the specifications relating to media type application/X-arib-contentPlayControl, see 7.3.2.1 "Specifications for Content Playback Control Metafile Transmission/Reception".

### 6.4.1.9 Operation Area of Character Codes

Comply with ARIB TR-B14 Volume 3, Section 2, 5.5 "Operation of Character Codes". However, ARIB TR-B14 Volume 3, Section 2, 5.5.1 "Transmission of DRCS Pattern Data" does not apply because external characters are not operated.

### 6.4.2 Restrictions in Document Description

Comply with ARIB TR-B14 Volume 3, Section 2, 5.10 "Restrictions in the BML Document Description".

### 6.4.3 Presentation Control of BML Document

Comply with ARIB TR-B14 Volume 3, Section 2, 5.11 "Presentation Control of BML Document". However, the following restrictions are added.

More than one object element in which the type attribute is application/X-arib-mpeg2-tts and application/X-arib-contentPlayControl cannot be described in a BML document. Therefore, object elements in which the type attribute is application/X-arib-mpeg2-tts and application/X-arib-contentPlayControl cannot coexist in a BML document. In other words, the object element to present VOD service video/audio and the object element to present IP broadcasting service video/audio are not allowed in the same BML document.

For stream presentation operation of the object elements in which the type attribute is application/X-arib-mpeg2-tts and application/X-arib-contentPlayControl, comply with 6.4.3.1 "Stream Presentation Control in IP Broadcasting" and 6.4.3.2 "Stream Presentation Control in VOD Service". For stream presentation operation of the object elements with other type attributes, comply with ARIB STD-B24 Volume 2, Appendix 2 4.8.5.2 "Operation of Attributes Regarding Presentation of Stream Data".

#### 6.4.3.1 Stream Presentation Control in IP Broadcasting Service

##### 6.4.3.1.1 Operation of Attributes

Table 6-11 shows the operational guidelines on the type attribute, streamposition attribute, streamstatus attribute and streamlooping attribute when IP broadcasting video and audio are presented as the object elements.

Table 6-11 Operation of Attributes Regarding Presentation of Stream Data

type attribute	streamposition	streamstatus	streamlooping
application/X-arib-mpeg2-tts Note 1	Not used in operation	play stop Note 2, Note 3	Fixed to 1

Note 1: IP broadcasting services should be specified by data attribute using the namespace defined in 6.4.5.2 "Namespace of IP Broadcasting".

Note 2: Dynamic change of the type attribute and dynamic change of schema through modification of the data attribute are prohibited.

Note 3: In ARIB STD-B24 Volume 2, Appendix 2, 4.8.5.2 "Operation of Attributes Regarding Presentation of Stream Data", it is defined that the initial value of streamstatus for the object element referencing media of the type attribute which can take "stop" is "stop". However, "play" should be used when the above-mentioned type attribute is specified.

#### 6.4.3.1.2 Guidelines on Presentation Behavior

This section describes guidelines on the semantics of attributes of the object element and the presentation behavior when application/X-arib-mpeg2-tts is specified for the type attribute.

- When the streamstatus attribute is not specified, receivers assume that "play" is specified and behave accordingly.
- "pause" is not used as the streamstatus attribute in this operation.
- Table 6-12 lists behaviors based on the values of the visibility property.

Table 6-12 Presentation of Video Corresponding to visibility Property Value

Value of streamstatus attribute	visibility="visible"	visibility="hidden"
play	Normal playback	Not displayed Receivers proceed with playback process (renewal of frames to be displayed) without presentation. When "visible" is set as the value of the visibility property, playback resumes from the frame where the value is set. Audio playback continues while no display is specified.
stop	Not displayed	Not displayed
pause	Not used in this operation	Not used in this operation

- Table 6-13 shows the presentation status when the streamstatus attribute is changed using DOM API.

Table 6-13 Access to streamstatus Attribute

Former streamstatus value	Set to "play"	Set to "stop"
play	—	<ul style="list-style-type: none"> <li>● Playback is stopped and the frame is not displayed. Issue a IGMP/MLD Leave message and exit the</li> </ul>

		multicast group
stop	<ul style="list-style-type: none"> <li>● Issue an IGMP/MLD Join message and start playback of contents from the current time.</li> </ul>	—

The data attribute can be modified only when the value of the streamstatus attribute is "stop".

- It depends on receiver models whether renewal of the presentation frame is suspended or playback is continued by the execution of lockScreen() in the period when screen renewal is prohibited.

#### 6.4.3.1.3 Change in Streamstatus Attribute Value Based on Change in AV Player Status

The value of the streamstatus attribute changes automatically as shown in Table 6-14 depending on the playback condition without the renewal of the streamstatus attribute using DOM API. The following condition is assumed when the value is changed automatically.

- When receivers detect an error and determine that playback should be stopped.

Table 6-14 Status and streamstatus Attribute Value after Change

Status after change (Note 1)	Value of streamstatus
Stop	stop

Note 1: The status after change is defined as follows:

- Stop: Not in play status

#### 6.4.3.1.4 Guidelines for Behavior of Video Playback Process on Screen Transition

When transition to another BML document is performed using the values such as launchDocument(), regarding the original object element in which the type attribute is application/X-arib-mpeg2-tts, it is desirable that the stream indicated in the original object element leaves the multicast group except when it exists in the destination BML document with the remain attribute specified. Continuous reception of non-display streams using the destination BML document should be avoided out of consideration for network band consumption and load reduction for the hosts that deliver the streams.

### 6.4.3.2 Stream Presentation Control in VOD Service

#### 6.4.3.2.1 Operation of Attributes

Table 6-15 shows an operational guideline on the type attribute, streamposition attribute, streamstatus attribute, and streamlooping attribute when VOD service video and audio are presented as object elements.

Table 6-15 Operation of Attributes Related to Stream Presentation

type attribute	streamposition	streamstatus	streamlooping
application/X-arib-contentPlayControl Note 1	Read only. Note 4: The values to be read vary depending on streamstatus. When streamstatus is "stop" or "pause", the value is based on the NPT value that the AV player last received from the video content server using RTSP. When streamstatus is "play", reading is not used in this operation, and if reading is performed, the returned value is implementation-dependent. The initial value is specified as an attribute value. For the streamposition value, a value with a integer (up to 5 digits) + one decimal place in npt-sec format of NPT (Normal Play Time) that complies with RFC2326 ([12.29]) is multiplied by 10, so that the a 6-digit integer is returned. This attribute is a numeric value parameter, so "npt=" is not used.	play stop pause Note 2, Note 3, Note 5, Note 6	Fixed to 1

Note 1: The content playback control metafile should be specified in the data attribute.

Note 2: Dynamic change of the type attribute and dynamic change of schema through modification of the data attribute are not possible.

Note 3: When the playback ends, streamstatus is automatically set to "stop".

Note 4: As an exception, the initial value of the streamposition attribute of the object element in a BML document can be specified.

Note 5: When the AV player status changes, the value should be changed automatically as defined in 6.4.3.1.3 "Change in Streamstatus Attribute Value Based on Change in AV Player Status". However, the timing when the value is changed is implementation-dependent. In other words, the following implementation is allowed: the value of streamstatus is not changed when the AV player status changes, but the AV player status is reflected when the value of streamstatus is read using DOM.

Note 6: In ARIB STD-B24 Volume 2, Appendix 2, 4.8.5.2 "Operation of Attributes Regarding Presentation of Stream Data", it is defined that the initial value of streamstatus for

the object element referencing media of the type attribute which can take "stop" is "stop". However, the initial value of the type attribute should be "play" in this operation.

### 6.4.3.2.2 Guidelines on Presentation Behavior

This section describes guidelines on the interpretation of attributes of the object element and the presentation behavior when application/X-arib-contentPlayControl is specified in the type attribute.

- When "play" is specified as the streamstatus attribute, playback is started from the position specified in the streamstatus attribute.
- When the streamstatus attribute is not specified, receivers assume that "play" is specified and behave accordingly.
- When the streamposition attribute is not specified, receivers assume that "0" is specified and behave accordingly.
- Table 6-16 lists behaviors based on the values of the visibility property.

Table 6-16 Presentation of Video According to visibility Property Value

Value of streamstatus attribute	visibility="visible"	visibility="hidden"
play	Normal playback	Not displayed Receivers proceed with playback process (renewal of frames to be displayed) without presentation. When "visible" is set for the value of the visibility property, playback resumes from the frame where the value is set. Audio playback continues while no display is specified.
stop	Not displayed	Not displayed
pause	The frame specified in the streamposition attribute is displayed.	Not displayed

- Table 6-17 lists actions when the streamposition attribute is accessed using DOM API.

Table 6-17 Access to streamposition Attribute

Value of streamstatus attribute	Read streamposition attribute	Write streamposition attribute

play	Not used in this operation	Not used in this operation
stop	The NPT value that the AV player last received from a video content server using RTSP is returned. Note 1	Not used in this operation
pause	The NPT value that the AV player last received from a video content server using RTSP is returned. Note 1	Not used in this operation

Note 1: The value is implementation-dependent when the NPT value is not received.

- Table 6-18 shows presentation statuses when the streamstatus attribute is changed using DOM API.

Table 6-18 Access to streamstatus Attribute (1)

Former streamstatus value	Set to "play"	Set to "stop"	Set to "pause"
play	—	<ul style="list-style-type: none"> <li>● Playback is stopped, and the status becomes "not displayed". The display position is the same position as the position set by "stop".</li> <li>● The NPT value that the AV player last received from a video content server using RTSP is set.</li> <li>● A MediaStopped event occurs.</li> </ul>	<ul style="list-style-type: none"> <li>● Playback is stopped, and one frame is displayed.</li> <li>● The NPT value that the AV player last received from a video content server using RTSP is set.</li> </ul>
stop	<ul style="list-style-type: none"> <li>● The content playback control metafile is read (license is acquired), and contents are started again.</li> <li>● streamposition is set to the initial value described in the document (set to "0" if not described), and playback is started from the set value.</li> </ul>	—	<ul style="list-style-type: none"> <li>● Not specified</li> </ul>

pause	<ul style="list-style-type: none"> <li>● Playback is started from the frame that is set in the streamposition attribute value when paused.</li> <li>● The control file is not reprocessed.</li> </ul>	<ul style="list-style-type: none"> <li>● Display status becomes "not displayed", and the display position is not changed.</li> <li>● The streamposition attribute is not changed.</li> <li>● A MediaStopped event occurs.</li> </ul>	—
-------	---	--	---

The data attribute can be modified only when the streamstatus attribute is stop. When this change is made, "0" is set for the streamposition attribute. Even when the data attribute has the same URI, it is regarded as a change.

- It depends on receivers whether renewal of the presentation frame is suspended or playback is continued by the execution of lockScreen() during the period when screen renewal is prohibited.

#### 6.4.3.2.3 Change in streamstatus Attribute Based on Change in AV Player Status

The value of the streamstatus attribute specified in the object element changes automatically as shown in Table 6-19 depending on the target AV player status without the write operation of the streamstatus attribute using DOM API. The following conditions are assumed when the value is changed automatically.

- When a video referenced from the object element is controlled by a remote controller whose controls are not obtained by the browser using used-key-list.
- When contents are played back to the end.
- When receivers detect an error and determine that playback should be stopped.

The streamstatus values corresponding to changed statuses of AV players are defined in this section, but the effect of remote controllers on video statuses is implementation-dependent. (Generally, it is assumed that a play button will start playback, and a stop button will stop playback, etc.)

Also, a MediaStopped event should occur when the status of an AV player changes to stop.

When the playback status of an AV player changes to so-called trick play by fast-forwarding or fast-rewinding, etc. that is not controlled by the browser, the value of streamstatus attribute of the object element is "play".

(Note) When the VOD control remote controller keys are not obtained by the browser with the used-key-list property, playback of the stopped VOD contents presented according to the specification of the object element can be started using the remote controller keys. In this case, the following problems may occur:

- When "0" is specified for either the width property value or height property value of the object element with the of aim of preventing presentation while the presentation is stopped, only audio is played back without any display.

- When the visibility property value is set to "hidden" for the same reason, only audio is played back without any display.
- When stopped, the data attribute can be modified. This means that there is the possibility that the control module to be played is not described (for example, null string), and resuming playback may result in an error.

Therefore, it is recommended to mask remote controller keys for stopped VOD contents that are controlled by object elements.

Table 6-19 AV Player Status and streamstatus Attribute Values after Change

AV player status after change (Note 1)	Value of streamstatus
Play	play
Stop	stop
Pause	pause

Note 1: AV player states are defined as follows:

- Play: When "Playing" in the RTSP client state transitions described in IPTVFJ STD-0002 "VOD Specifications", 4.1.1.2 "State Transitions"
  - Pause: When "Ready" in the RTSP client state transitions described in IPTVFJ STD-0002 "VOD Specifications", 4.1.1.2 "State Transitions"
  - Stop: When the AV player is not started.
- \* The value of the streamstatus attribute when the RTSP client is "Init" or before and after the RTSP connection is established (when obtaining the content playback control metafile and DRM license, etc.) is implementation-dependent.

#### 6.4.3.2.4 Guidelines for Behavior of Video Playback on Screen Transition

When transition to another BML document is performed using the values such as `launchDocument()`, regarding the original object element in which the value of type attribute is `application/X-arib-contentPlayControl`, it is desirable that receivers perform the TEARDOWN process of RTSP during transition as a termination process for stream presentation indicated in the destination object element. Continuous reception of non-display streams using the destination BML document should be avoided out of consideration for network band consumption and load reduction for the hosts that deliver the streams.

### 6.4.4 Operation Guidelines Relating to Procedure Description

#### 6.4.4.1 Operation Area of DOM

Comply with ARIB STD-B24 Volume 2, Appendix 2 4.5.1 "Operational Guidelines of DOM". However, the following specifications should be given priority.

#### 6.4.4.1.1 Methods that Are Not Operated

The `setMainAudioStream()` and `getMainAudioStream()` methods of the `BMLObjectElement` interface are not operated.

The `invisible` attribute of the `BMLBodyElement` interface is not operated.

#### 6.4.4.2 Operation Area of Embedded Objects

Comply with ARIB STD-B24 Volume 2, Appendix 2 4.5.2 "Operation Range of Built-in Objects".

#### 6.4.4.3 Operation Area of Extended Objects for Broadcasting

Extended objects for broadcasting are not operated.

#### 6.4.4.4 Operation Range of Navigator Pseudo-objects

Navigator pseudo-objects are not operated.

#### 6.4.4.5 Expansion Function Set by IPTV

The following section describes the expansion functions and operational guidelines that are defined independently in this document.

##### 6.4.4.5.1 License-related Functions

- `getIPTVLicense()`: Obtains a license

Grammar:

```
Number getIPTVLicense(input String drm_system
                      ,input String id
                      ,input Array license_id )
```

Argument:

<code>drm_system</code>	String to indicate the CAS/DRM method.
<code>id</code>	Service provider ID ( <code>ip_service_provider_id</code> )
<code>license_id</code>	License ID array
<code>Array[0](String)</code>	First license ID
<code>...(repeated)</code>	

Return value:

- 1: Normal completion
  - 1: The CAS/DRM method is incorrect
  - 2: The CAS/DRM server URL is unknown
  - 3: License acquisition is rejected
  - 4: Client authentication failure on the server
  - 5: Server authentication failure
  - 6: Communication error with the DRM server
- NaN: Other failure

Explanation:

The license specified in `license_id` is obtained from the CAS/DRM server of the service provider specified in the `id` only when the `drm_system` value is correct as defined in the operation. If license acquisition fails for any of multiple `license_id`, an error result is returned as the return value. For information on how to obtain multiple licenses, see IPTVFJ STD-0004 "IP Broadcasting Specifications", [Appendix B] "Application Specifications of Marlin IPTV-ES System in CAS Specifications" the `license_id` is a 16-digit hexadecimal string. Prefixes such as "0x" are not added at the beginning of the `license_id`. Alphabetic characters in hexadecimal values should be in upper case.

- `getIPTVLicenseInfo()`: Obtains information relating to the specified license

Grammar:

```
Array getIPTVLicenseInfo( input String license_id
                          ,input Number search_type )
```

Argument:

<code>license_id</code>	License ID
<code>search_type</code>	Search type
1:	MC licenses are searched for

Return value:

Arrays that store information:	Success
<code>Array[0](Number)</code> :	Execution result
1:	Normal completion
-1:	The specified license does not exist
NaN:	Other failure
<code>Array[1](Date)</code> :	Viewing start time
<code>Array[2](Date)</code> :	Viewing end time
<code>Array[3](String)</code> :	Tier bit array
<code>Array[4](Boolean)</code> :	Renewal – false: no, true: yes
<code>Array[5](Date)</code> :	Renewal start date and time
null:	Failure

Explanation:

Information relating to the license specified in `search_type` and `license_id` such as license use conditions, etc. are obtained as arrays. `Array[5]` renewal date and time returns NaN when the value of `Array[4]` renewal is false. The `license_id` is a 16-digit hexadecimal string. Prefixes such as "0x" are not added at the beginning of `license_id`. The tier bit array is a 16-digit hexadecimal string. Alphabetic characters in hexadecimal values should be in upper case.

- `getDRMID()`: Obtains the CAS/DRM client identifier corresponding to the specified DRM system

## Grammar:

```
String getDRMID ( input String drm_system )
```

## Argument:

drm\_system      The CAS/DRM method name

## Return value:

```
DRMID:      Success
null:      Failure
```

## Explanation:

The CAS/DRM client identifier that is stored and managed permanently in the CAS/DRM client corresponding to the CAS/DRM system specified in `drm_system` is returned.

## 6.4.4.5.2 Content Startup Function

launchIPTVContent(): Starts IPTV contents.

## Grammar:

```
Number launchIPTVContent( input String content_uri
                           ,input String ret_uri
                           ,input Number start_npt
                           [,input String license_id] )
```

## Argument:

content\_uri:      URI of the content playback control metafile corresponding to the IPTV contents to be played back

ret\_uri:          URI of the BML document to be restarted when the IPTV content playback is completed

start\_npt:        Playback start time position in the IPTV contents (Number of seconds from the beginning of the contents)

license\_id:       License ID of the license used for playback

## Return value:

```
1:                  Success
NaN:                Failure
```

## Explanation:

The content playback control metafile specified in `content_uri` is obtained as well as the license, and the VOD contents are received and played back from the time position specified in `start_npt`. Browsers may be stopped because this function only processes startup and AV players are responsible for controlling the contents. When an errors that can be verified before transition such as incorrect parameter specification, failure is returned and operation continues.

When the transition operation is performed, the script that follows this function is not executed. When playback is complete, the AV player instructs the browsers to obtain the BML document specified in `ret_uri`. Browsers resume operation based on the instructions from the AV players. When an error occurs with the AV players, the status is returned using a query string. (See 6.4.4.7 "Operation of Browser Pseudo-Objects Behavior".) For more information on the operation, see

[Appendix T] "Annotation: VOD ". Prefixes such as "0x" are not added at the beginning of `license_id`. Alphabetic characters in hexadecimal values should be in upper case.

#### 6.4.4.5.3 Basic Registration-related Functions

- `setIPTVServiceRegistrationInfo()`: Sets the basic registration information for IP broadcasting/VOD services

Grammar:

```
Number setIPTVServiceRegistrationInfo(
    input String id
    ,input String key
    ,input Date expire_date
    [,input String license_uri
    ,input String signature
    ,input String certificate_uri])
```

Argument:

<code>Id</code>	Service provider ID ( <code>ip_service_provider_id</code> )
<code>key</code>	Key information for authentication (8-byte)
<code>expire_date</code>	Basic registration expiration date/time
<code>license_uri</code>	URI of the CAS/DRM server for IP broadcasting/VOD of the licenser
<code>signature</code>	Signature of <code>license_uri</code>
<code>certificate_uri</code>	URI of the public key certificate (chain) used for signature verification

Return value:

1:	Success
-1	Failed to verify the signature of the CAS/DRM server URL
NaN:	Other failure

Explanation:

It is assumed that this function is used in the BML document obtained from an IPTV service portal when basic registration with a service provider is completed.

For `id`, the `ip_service_provider_id` described in the PF configuration information defined in 5.1.2 "PF Configuration Information File" is specified. Failure is returned when an `id` value that is not described in the PF configuration information is specified. Also, failure is returned when the `portal_url` element value in the PF configuration information corresponding to `ip_service_provider_id` specified in `id` does not match the domain name excluding the label (host name) on the left end of a server name (FQDN) for the URI from which the BML document being executed is acquired. For `key`, the key information consisting of a 8-byte alphanumeric string which is used for authentication is set. For `license_uri`, signature verification is performed based on `signature` and the public key certificate (chain) obtained from `certificate_uri`, and failure is returned when

signature verification fails.

Receivers record the `id`, `key`, `expire_date` and `license_uri` specified with arguments in the non-volatile memory area only when the above destination domain match verification and `license_uri` signature verification are successful. If `license_uri` is not specified in an argument, receivers record the `id`, `key` and `expire_date` in the non-volatile memory area when the domain match verification succeeds. When the time in the receivers reaches the `expire_date`, the corresponding `id`, `key` and `license_uri` become invalid. The invalid `id`, `key` and `license_uri` data may be deleted.

When the same value as or prior to the execution date/time for this function is specified in `expire_date`, registration becomes invalid immediately. In other words, the same kind of process is performed as when the `expire_date` is reached.

The `key`, `expire_date` and `license_uri` are always overwritten with the values of the last execution when the function is executed multiple times for the same `id`.

- `checkIPTVServiceRegistrationInfo()`: Verifies the basic registration information for IP broadcasting/VOD services

Grammar:

```
Array checkIPTVServiceRegistrationInfo( input String id )
```

Argument:

```
Id          Service provider ID (ip_service_provider_id)
```

Return value:

```
Arrays that store data:  Success
  Array[0](String):      key
  Array[1](Date):        expire_date
  Array[2](String)       license_uri
null:                    Failure
```

Explanation:

Based on the argument `id` indicating the service provide ID from the basic registration information set in the non-volatile memory area in receivers using `setIPTVServiceRegistrationInfo()`, the basic registration information of the specified service provider is obtained. Failure is returned when an ID that is not described in the PF configuration information is specified. Also, failure is returned when the `portal_url` element value in the PF configuration information corresponding to `ip_service_provider_id` specified in `id` and the domain name excluding the label (host name) on the left end of a server name (FQDN) for the URI from which the BML document being executed is acquired do not match.

When `license_uri` is not set, NaN is returned for `Array[2]`.

However, failure is returned when the basic registration information corresponding to the specified `id` is not recorded in the receiver or when `expire_date` of the recorded basic registration information is a past date.

#### 6.4.4.5.4 Service Registration-related Functions in IP Retransmission Service of Digital Terrestrial Television Broadcasting

- `setTBServiceRegistrationInfo()`: Sets service registration information for IP retransmission of digital terrestrial television broadcasting

Grammar:

```
Number setTBServiceRegistrationInfo(
    input String id
    ,input String key
    ,input Date expire_date
    ,input String area
    ,input Boolean duplication_flag
    ,input String license_uri
    ,input String signature
    ,input String certificate_uri)
```

Argument:

<code>id</code>	Service provider ID ( <code>ip_service_provider_id</code> )
<code>key</code>	Key information for authentication (8-byte)
<code>expire_date</code>	Date/time when service registration becomes invalid
<code>area</code>	User area information
<code>duplication_flag</code>	Prefecture duplication flag
<code>license_uri</code>	URI of the CAS server for IP retransmission of digital terrestrial television broadcasting from which the license is obtained
<code>signature</code>	Signature of <code>license_uri</code>
<code>certificate_uri</code>	URI of the public key certificate (chain) used for signature verification

Return value:

1:	Success
-1	Failed to verify the signature of the CAS/DRM server URL
NaN:	Other failure

Explanation:

It is assumed that this function is used in the BML document obtained from an IPTV service portal when service registration for IP retransmission of digital terrestrial television broadcasting of a specific service provider is completed.

For `id`, the `ip_service_provider_id` described in the PF configuration information for IP retransmission of digital terrestrial television broadcasting defined in IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting", Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network" is specified. Failure is returned when an `id` value that is not described in the PF configuration information for IP retransmission of digital terrestrial

television broadcasting is specified. Failure is returned when the `portal_url` element value in the PF configuration information defined in the corresponding `ip_service_provider_id` specified in `id` (or the `portal_url` element value in the PF configuration information for IP retransmission of digital terrestrial television broadcasting defined in IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" when the corresponding `portal_url` does not exist in the PF configuration information) does not match the domain name excluding the label (host name) on the left end of a server name (FQDN) for the URI from which the BML document being executed is acquired.

For `key`, the key information consisting of a 8-byte alphanumeric string which is used for authentication is set (a fixed 2-digit decimal number).

When the value of the `area` is not defined, null is specified.

Either "true" or "false" is specified for the `duplication_flag` value. The "true" is specified when the second TS of the 2TS transmission by the same `area` provider identification is used in the `area`.

For `license_uri` indicating the URI of the CAS server in a IP retransmission of digital terrestrial television broadcasting, signature verification is performed based on `signature` and the public key certificate (chain) obtained from `certificate_uri`, and failure is returned when signature verification fails.

Receivers record the `id`, `key`, `expire_date`, `area`, `duplication_flag` and `license_uri` specified with arguments in the non-volatile memory area only when the above destination domain match verification and the `license_uri` signature verification are successful. When the time in the receivers reaches the `expire_date`, the corresponding `id`, `key`, `area`, `duplication_flag` and `license_uri` become invalid. The invalid `id`, `key` and `license_uri` data may be deleted.

When the same value as or prior to the execution date/time for this function is specified in `expire_date`, registration becomes invalid immediately. In other words, the same kind of process is performed as when `expire_date` is reached.

The `key`, `expire_date`, `area`, `duplication_flag` and `license_uri` are always overwritten with the values of the last execution when the function is executed multiple times for the same `id`.

- `checkTBServiceRegistrationInfo()`: Verifies service registration information for IP retransmission of digital terrestrial television broadcasting

Grammar:

```
Array checkTBServiceRegistrationInfo( input String id )
```

Argument:

```
Id          Service provider ID (ip_service_provider_id)
```

Return value:

```

Arrays that store data:  Success
  Array[0](String):    key
  Array[1](Date):     expire_date
  Array[2](String):   area
  Array[3](Boolean)  duplication_flag
  Array[4](String)   license_uri
null:                  Failure

```

**Explanation:**

Based on the argument `id` indicating the service provide ID from the service registration information set in the non-volatile memory area in receivers using `setTBServiceRegistrationInfo()`, the service registration information of the specified service provider is obtained. Failure is returned when an ID that is not described in the PF configuration information for IP retransmission of digital terrestrial television broadcasting is specified. Failure is returned when the `portal_url` element value in the PF configuration information defined in 5.1.2 "PF Configuration Information File" corresponding to the `ip_service_provider_id` specified in `id` (or the `portal_url` element value in the PF configuration information for IP retransmission of digital terrestrial television broadcasting defined in IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting" Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network" when the corresponding `portal_url` does not exist in the PF configuration information) does not match the domain name excluding the label (host name) on the left end of a server name (FQDN) for the URI from which the BML document being executed is acquired. However, failure is returned when the registration information corresponding to the specified `id` is not recorded in the receiver or when `expire_date` corresponding to the `id` is a past date.

#### 6.4.4.5.5 Service Registration-related Functions in IP Retransmission Service of BS Digital Satellite Broadcasting

- `X_ipTVF_setBSServiceRegistrationInfo()`: Sets service registration information for IP retransmission of BS digital satellite broadcasting

**Grammar:**

```

Number X_ipTVF_setBSServiceRegistrationInfo(
    input String id
    ,input String key
    ,input Date expire_date
    [,input String license_uri
    ,input String signature
    ,input String certificate_uri])

```

**Argument:**

<code>id</code>	Service provider ID ( <code>ip_service_provider_id</code> )
<code>key</code>	Key information for authentication (8-byte)
<code>expire_date</code>	Date/time when BS broadcasting IP retransmission service registration becomes invalid
<code>license_uri</code>	URI of the CAS server for IP retransmission of BS digital satellite broadcasting from which the license is obtained
<code>signature</code>	Signature of <code>license_uri</code>
<code>certificate_uri</code>	URI of the public key certificate (chain) used for signature verification

**Return value:**

1:	Success
-1	Failed to verify the signature of the CAS/DRM server URL
NaN:	Other failure

**Explanation:**

It is assumed that this function is used in the BML document obtained from an IPTV service portal when service registration for IP retransmission of BS digital satellite broadcasting of a specific service provider is completed.

For `id`, the `ip_service_provider_id` described in the BS broadcasting IP retransmission PF configuration information defined in "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting" Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network" is specified.

Failure is returned when an `id` value that is not described in the PF configuration information for IP retransmission of BS digital satellite broadcasting is specified. Also, failure is returned when the `portal_url` element value in the PF configuration information for IP retransmission of BS digital satellite broadcasting corresponding to the `ip_service_provider_id` specified in the `id` does not match the domain name excluding the label (host name) on the left end of a server name (FQDN) for the URI from which the BML document being executed is acquired.

For `key`, the key information consisting of a 8-byte alphanumeric string which is used for authentication is set. For the `license_uri` indicating the URI of the CAS server for IP retransmission of BS digital satellite broadcasting, signature verification is performed based on `signature` and the public key certificate (chain) obtained from the `certificate_uri`, and failure is returned when signature verification fails.

Receivers record the `id`, `key`, `expire_date` and `license_uri` specified with arguments in the non-volatile memory area only when the above destination domain match verification and the `license_uri` signature verification are successful. If `license_uri` is not specified in an argument, receivers record the `id`, `key` and `expire_date` in the non-volatile memory area when the domain match verification

succeeds. When the time in the receivers reaches the `expire_date`, the corresponding `id`, `key` and `license_uri` become invalid. The invalid `id`, `key` and `license_uri` data may be deleted.

When the same value as or prior to the execution date/time for this function is specified in `expire_date`, registration becomes invalid immediately. In other words, the same kind of process is performed as when `expire_date` is reached.

The `key`, `expire_date` and `license_uri` are always overwritten with the values of the last execution when the function is executed multiple times for the same `id`.

- `X_iptvf_checkBSServiceRegistrationInfo()`: Verifies service registration information for IP retransmission of BS digital satellite broadcasting

Grammar:

```
Array X_iptvf_checkBSServiceRegistrationInfo( input
String id )
```

Argument:

```
id          Service provider ID (ip_service_provider_id)
```

Return value:

```
Arrays that store data:  Success
  Array[0](String):      key
  Array[1](Date):        expire_date
  Array[2](String):      license_uri
null:                    Failure
```

Explanation:

Based on the argument `id` indicating the service provider ID from the service registration information set in the non-volatile memory area in receivers using `X_iptvf_setBSServiceRegistrationInfo()`, the basic registration information of the specified service provider is obtained. Failure is returned when an ID that is not described in the PF configuration information for IP retransmission of BS digital satellite broadcasting is specified. Also, failure is returned when the `portal_url` element value in the PF configuration information for IP retransmission of BS digital satellite broadcasting corresponding to the `ip_service_provider_id` specified in `id` does not match the domain name excluding the label (host name) on the left end of a server name (FQDN) for the URI from which the BML document being executed is acquired.

When `license_uri` is not set, NaN is returned for `Array[2]`.

However, failure is returned when the service registration information corresponding to the specified `id` is not recorded in the receiver or when the `expire_date` of the recorded service registration information is a past date.

#### 6.4.4.5.6 Function to Notify Package/License-related Information

- `setContentPackageInfo()`: Sets information for purchased content packages

Grammar:

```
Number setContentPackageInfo ( input String id
                               ,input Date valid_start_date
                               [,input Date valid_end_date] )
```

Argument:

<code>id</code>	Group identification for the purchased content package
<code>valid_start_date</code>	Content package use start date/time
<code>valid_end_date</code>	Content package use end date/time

Return value:

1:	Success
NaN:	Failure

Explanation:

Information on purchase through service subscription and purchased content packages is set in the receivers. For `id`, an identifier for a content package which consists of one or multiple contents is specified. In other words, the `PurchaseID` described in the metadata `PurchaseInformationTable` is listed. The `valid_start_date` indicates the date/time when each content in the content package becomes available for use. The `valid_end_date` indicates the date/time when each content in the content package expires. Receivers save the information notified by this function in the non-volatile memory area.

- `setSelectedLicenseInfo()`: Sets license information for select packages

Grammar:

```
Number setSelectedLicenseInfo( input String id
                               ,input Array selected_license_info )
```

Argument:

<code>id</code>	Group identification for the target purchased select package
<code>selected_license_info</code>	Information related to the selected license
<code>Array[0][0](String)</code>	LicenseID of the first license
<code>Array[0][1](Date)</code>	Expiration date of the first license
<code>Array[0][2](Date)</code>	Select time limit of the first license
<code>Array[1][0](String)</code>	LicenseID of the second license
<code>Array[1][1](Date)</code>	Expiration date of the second license
<code>Array[1][2](Date)</code>	Select time limit of the second license
<code>...(repeated)</code>	

Return value:

1:	Success
NaN:	Failure

Explanation:

License information of the contents specified in the argument `id` is set in the receivers for select packages for which contracts have been concluded. For `id`, the identifier of a select package whose package type is selected and for which a purchase has been concluded is specified. In

other words, the PurchaseID described in the metadata PurchaseInformationTable is listed. For `selected_license_info`, license information for all contents that are already selected by users in the current selection period are listed using arrays. For license information, license ID and the expiration date of the license, the selected time limit are returned. Receivers link the information notified with this function with the `id` and the license information arrays and set it in the non-volatile memory area. Failure is returned when the selected license information does not exist. The LicenseID is a 16-digit hexadecimal string. Prefixes such as "0x" are not added to the beginning of LicenseID. Alphabetic characters in hexadecimal values should be in upper case.

- `updatePackageLicenseInfo ()`: Renews information related to all packages/licenses

Grammar:

```
Number updatePackageLicenseInfo( input String id )
```

Argument:

```
id                Target service provider ID (ip_service_provider_id)
```

Return value:

```
1:                Success
```

```
NaN:             Failure
```

Explanation:

Renewal of information related to all valid packages and licenses that users concluded contracts with or purchased from a specific service provider is reserved for receivers. The service provider ID (`ip_service_provider_id`) is specified for `id`. When a reservation is executed, receivers obtain information from a purchased content package information server of the specified service provider and synchronize with the server. Timing to execute reservations is implementation-dependent during the period until content package information/license information is presented to users next time, but reservation must be executed in synchronization with the operation of this function. In other words, this function returns a return value when the renewal reservation is received and does not perform renewal operation.

#### 6.4.4.5.7 Transition-related Functions

- `launchUnmanagedDocument()`: Launches in the IPTV unmanaged state

Grammar:

```
Number launchUnmanagedDocument ( input String dst_uri
                                ,input String ret_uri )
```

Argument:

```
dst_uri           Destination URI
```

```
ret_uri           Return URI
```

Return value:

1: Success  
NaN: Failure

Explanation:

Receivers move to URI specified in `dst_uri` in the IPTV unmanaged state.  
Receivers store the URI specified in `ret_uri` and move to the stored URI when `quitDocument()` is called in the destination document.  
When the transition operation is performed, the script that follows this function is not executed.  
The storage area is consumed when `quitDocument()` is called or reset when the browser status is managed or when the browser is closed.  
This function cannot be used in the IPTV unmanaged state.

- `getDocManagementStat ()`: Obtains the management status of documents

Grammar:

```
Number getDocManagementStat ( )
```

Argument:

None

Return value:

0: unmanaged state  
1: managed state

Explanation:

The management status of the documents defined in 6.4.6.3 "Transition of States based on BML Documents in IPTV Service" is obtained. When the document for which this function is executed is in the IPTV managed state, 1 is returned. When it is in the unmanaged state, 0 is returned.

#### 6.4.4.5.8 Display Control Function

- `marqueeText ()`: Displays the p element string as marquee

Grammar:

```
Number marqueeText( input String id
                    ,input Number loop )
```

Argument:

`id` id of the p element for which marquee is applied  
`loop` Number of repeated times

Return value:

1: Success  
NaN: Failure

Explanation:

Marquee process is performed for the p element with the specified `id`. Marquee process is a process in which the first character of a string appears from the right, the string scrolls from right to left, and the last character of the string disappears to the left (1 loop). The scrolling speed

is implementation-dependent, but 80 to 115 pixels per second is desirable. Target p elements should satisfy the following conditions. When p elements that do not satisfy these conditions are specified for id, the response is implementation-dependent including failure.

- Only PCDATA can be handled.
- The line feed character (`\n`) (backslash/0x5C) should not be included.
- A nontransparent color is specified for the background color.
- Other nontransparent presentation elements should not overlap or come in front of the element's presentation area.

The maximum length of PCDATA discussed above is 1,024 bytes. If this length is exceeded, characters are truncated and deleted from the text node. In other words, when the target p element contents are read using DOM API after this function is executed, the string after truncation is returned.

Even if an area capable of presenting 2 lines or more is secured, the PCDATA text in the target p element is always displayed in a single line. Presentation when the position and contents of the target p element are operated using DOM API is implementation-dependent. If the contents are rewritten, it is desirable to rewrite the contents after changing the visibility of the target p element to "hidden".

For startup of this function in the BML document and MNG presentation, only one of them can be performed at a time. The behavior of this function when it is called multiple times and when it is called while MNG is presented is implementation-dependent.

The maximum value that can be specified for loop is 16. 0 is specified to set the value to infinite. When 0 is specified, receivers may stop the loop after a set number of times according to receiver-specific specifications.

#### 6.4.4.5.9 Parental Control-related Functions

`checkParentalCtrlPassword()`: Verifies the password for parental control

Grammar:

```
Number checkParentalCtrlPassword ( )
```

Argument:

None

Return value:

1: Password is verified successfully, or parental control is unlocked.  
 0: The entered password is incorrect.  
 NaN: Password has not been set.

Explanation:

The parental control password entry dialog is displayed to request the user to enter a password.

The password entry dialog returns "1" when the entered password matches the password saved in the receiver and "0" when it does not match the saved password to the browser as a return value of this function.

However, when a password is not set for the receiver, NaN is returned without the password entry dialog display.

Also, when the parental control is unlocked by the resident application of the receiver, 1 is returned without the password entry dialog display.

#### 6.4.4.6 Operation of Browser Pseudo-Objects

In IP broadcasting/VOD service operation, availability and behavior of the functions are different in the IPTV's managed and unmanaged states. For basic concepts of the IPTV managed and unmanaged state, see 6.4.6.3 "Transition of States based on BML Documents in IPTV Service".

Behavior of respective functions when each function is called in these states are listed under "IPTV managed" and "IPTV unmanaged" in the following table. The meaning of the marks in the fields are as follows.

- "○" Normal operation.
- "○ (\*)" Normal operation when these functions can be processed in receivers. In the case of using these functions in contents, the presence of the process function of the corresponding function should be verified using the `getBrowserSupport()` function before using the function.
- "×" Operation fails.
- "—" Not used operationally. Therefore, the behavior of receivers when these functions are used in contents is not guaranteed.

Any other functions that are not listed in the following tables are not used in operations.

#### [1] EPG-related functions

Table 6-20 shows the operation of EPG-related functions.

Table 6-20 Operation of EPG-related Functions

	IPTV managed	IPTV unmanaged
<code>epgGetEventStarttime()</code>	—	—
<code>epgGetEventDuration()</code>	—	—
<code>epgTune()</code>	○	×
<code>epgTuneToComponent()</code>	—	—
<code>epgTuneToDocument()</code>	—	—
<code>epgReserve()</code>	—	—
<code>epgIsReserved()</code>	—	—
<code>epgCancelReservation()</code>	—	—
<code>epgRecIsReserved()</code>	—	—
<code>epgRecReserve()</code>	—	—
<code>epgRecCancelReservation()</code>	—	—

## [2] Non-volatile memory functions

Table 6-21 shows the operation of non-volatile memory functions.

Table 6-21 Operation of Non-volatile Memory Functions

	IPTV managed	IPTV unmanaged
readPersistentArray()	○	×
writePersistentArray()	—	—

For operation of namespaces of the NVRAM area that can be used in the IPTV managed state, see 6.4.6.4 "Use of NVRAM in Portal". Operation of receivers fails when other namespaces are specified.

## [3] Interaction channel functions – TCP/IP

Table 6-22 shows the operation of interaction channel functions. TCP/IP is required for receivers that support CDN scope services. Since implementation of a modem is not assumed, functions related to modems are not used operationally.

Table 6-22 Operation of Interaction Channel Functions – TCP/IP

	IPTV managed	IPTV unmanaged
setISPParams()	—	—
getISPParams()	—	—
ConnectPPP()	—	—
connectPPPWithISPParams ()	—	—
disconnectPPP()	—	—
getConnectionType()	—	—
isIPConnected()	—	—
sendTextMail()	—	—
sendMIMEMail()	—	—
transmitTextDataOverIP()	○	○
setCacheResourceOverIP()	○	○

## [4] Operational control functions

Table 6-23 shows the operation of the functions for operational control features.

Table 6-23 Operation of Operational Control Functions for Communication Contents

	IPTV managed	IPTV unmanaged
reloadActiveDocument()	○	○
getNPT ()	—	—

getProgramRelativeTime()	—	—
isBeingBroadcast()	—	—
lockModuleOnMemory ()	—	—
unlockModuleOnMemory()	—	—
setCachePriority()	—	—
getIRDID()	—	—
getBrowserVersion()	○	○
getProgramID()	—	—
getActiveDocument()	○	○
lockScreen()	○	○
unlockScreen()	○	○
getBrowserSupport()	○	○
launchDocument()	○	○
launchDocumentRestricted()	—	—
quitDocument()	○	○
launchExApp()	—	—
getFreeContentsMemory()	—	—
isSupportedMedia()	—	—
detectComponent()	—	—
lockModuleOnMemoryEx()	—	—
unlockModuleOnMemoryEx()	—	—
unlockAllModulesOnMemory()	—	—
getLockedModuleInfo()	—	—
getBrowserStatus()	—	—
getResidentAppVersion()	○	○
isRootCertificateExisting()	—	—
getRootCertificateInfo()	—	—
startResidentApp()	○ (*)	—

[5] Receiver audio control

Table 6-24 shows the operation of the function for the receiver audio control.

Table 6-24 Operation of Receiver Audio Control

	IPTV managed	IPTV unmanaged
playRomSound()	○	○

[6] Timer functions

Table 6-25 shows the operation of the functions for timer features.

Table 6-25 Operation of Timer Functions

	IPTV managed	IPTV unmanaged

sleep ()	○	○
setTimeout()	—	—
setInterval()	○	○
clearTimer()	○	○
pauseTimer()	○	○
resumeTimer()	○	○
setCurrentDateMode()	—	—

## [7] Other functions

Table 6-26 shows the operation of other functions.

Table 6-26 Operation of Other Functions

	IPTV managed	IPTV unmanaged
random()	○	○
subDate()	○	○
addDate()	○	○
formatNumber()	○	○

## [8] Print-related functions

Table 6-27 shows the operation of the functions for print-related features. These features are optional, so the availability of the functions must be verified using `getBrowserSupport()` before use.

Table 6-27 Operation of Print-related Functions

	IPTV managed	IPTV unmanaged
getPrinterStatus()	○ (*)	○ (*)
printFile()	○ (*)	×
printTemplate()	○ (*)	×
printURI()	○ (*)	○ (*)
printStaticScreen()	○ (*)	○ (*)
saveImageToMemoryCard()	○ (*)	×
saveHttpServerImageToMemoryCard()	○ (*)	○ (*)
saveStaticScreenToMemoryCard()	○ (*)	○ (*)

## [9] Functions related to broadcasting based on home servers – playback control function

Table 6-28 shows the operation of the functions related to the playback control features from among the functions defined in ARIB TR-B27.

Table 6-28 Operation of Playback Control Functions

	IPTV managed	IPTV unmanaged
launchContent()	—	—
playSegment()	—	—
launchDynamicDocument ()	○	○

[10] Functions related to broadcasting based on home servers – metadata referencing function

Table 6-29 shows the operation of the functions related to the metadata control features from among the functions defined in ARIB TR-B27. These features are optional, so availability of the functions must be verified using `getBrowserSupport()` before use.

Table 6-29 Operation of Metadata Referencing Functions

	IPTV managed	IPTV unmanaged
getMetadataElement()	○ (*)	×
getSynopsis()	○ (*)	×
searchMetadata()	○ (*)	×
searchMetadataOnServer()	○ (*)	×
getEntryResourceInformation()	—	—
getLicenseLinkInformation()	—	—

[11] Functions related to broadcasting based on home servers - other functions

Table 6-30 shows the operation of the functions for other features from among the functions defined in ARIB TR-B27.

Table 6-30 Operation of Other Functions

	IPTV managed	IPTV unmanaged
getFreeStorableSpace()	—	—
setTune()	—	—
getTransitSource()	—	—
getDirStructure()	—	—

[12] IPTV service-related functions – license related functions

Table 6-31 shows the operation of the functions of license-related features in IPTV services.

Table 6-31 Operation of License-related Functions

	IPTV managed	IPTV unmanaged
getIPTVLICENSE()	○	×
getIPTVLICENSEINFO()	○	×

getDRMID()	○	×
------------	---	---

[13] IPTV service-related functions – playback control function

Table 6-32 shows the operation of the functions of playback control feature in IPTV services.

Table 6-32 Operation of Playback Control Function

	IPTV managed	IPTV unmanaged
launchIPTVContent()	○	×

[14] IPTV service-related functions – operational control functions

Table 6-33 shows the operation of the functions of operational control features in IPTV services.

Table 6-33 Operation of Other Operational Control Functions in IPTV Services

	IPTV managed	IPTV unmanaged
launchUnmanagedDocument()	○	×
getDocManagementStat()	○	○
marqueeText()	○ (*)	○ (*)

[15] IPTV service-related functions – basic registration functions

Table 6-34 shows the operation of the functions of basic registration related features in IPTV services.

Table 6-34 Operation of Basic Registration Functions in IPTV Services

	IPTV managed	IPTV unmanaged
setIPTVServiceRegistrationInfo()	○	×
checkIPTVServiceRegistrationInfo()	○	×

[16] IPTV service-related functions – functions related to service registration for IP retransmission of digital terrestrial television broadcasting

Table 6-35 shows the operation of the functions for the features related to service registration for IP retransmission of digital terrestrial television broadcasting

Table 6-35 Operation of Service Registration Functions for IP Retransmission of Digital Terrestrial Television Broadcasting

	IPTV managed	IPTV unmanaged
setTBServiceRegistrationInfo()	○ (*)	×
checkTBServiceRegistrationInfo()	○ (*)	×

[17] IPTV service-related functions – functions related to service registration for IP retransmission of BS digital satellite broadcasting

Table 6-36 shows the operation of the functions for the features related to service registration for IP retransmission of BS digital satellite broadcasting.

Table 6-36 Operation of Service Registration Functions for IP Retransmission of BS Digital Satellite broadcasting

	IPTV managed	IPTV unmanaged
X_ipTVf_setBSServiceRegistrationInfo()	○ (*)	×
X_ipTVf_checkBSServiceRegistrationInfo()	○ (*)	×

[18] IPTV service-related functions – functions related to content package/license information notification

Table 6-37 shows the operation of the functions for the features related to content package/license information notification in IPTV services.

Table 6-37 Operation of Package/License Information Notification Functions in IPTV Services

	IPTV managed	IPTV unmanaged
setContentPackageInfo ()	○	×
setSelectedLicenseInfo()	○	×
updatePackageLicenseInfo()	○	×

[19] IPTV service related functions - parental control function

Table 6-38 shows the operation of the function for the parental control feature in IPTV services.

Table 6-38 Operation of Parental Control Function in IPTV Services

	IPTV managed	IPTV unmanaged
checkParentalCtrlPassword()	○	○

#### 6.4.4.7 Operation of Browser Pseudo-Objects Behavior

The following section describes the operation of browser pseudo-objects. For objects that are defined as operational in 6.4.4.6 "Operation of Browser Pseudo-Objects", comply with the operational specifications for browser pseudo-objects defined in ARIB TR-B14 Volume 3, Section 2, 5.12.6 "Browser Pseudo-objects" unless otherwise stated.

- Operation of Ureg/Greg

Ureg/Greg is not used operationally.

- Operation of epgTune()

When this function is called in the IPTV unmanaged state, the operation of this function fails.

For operation of epgTune(), comply with ARIB STD-B24 Volume 2, Appendix 1, 8.5.1 "Operation of Operational Control Functions".

For the specifications regarding namespaces, see 6.4.5 "Namespace Used in BML Document for IPTV".

- Operation of readPersistentArray()

When this function is called in the IPTV unmanaged state, the operation of this function fails.

For operation of namespaces that can be specified in readPersistentArray(), see 6.4.6.4 "Use of NVRAM in Portal".

- Operation of transmitTextDataOverIP ()

When data obtained using getDRMID() is sent to a server on the communication network using this function to perform production operation, the https scheme should be used to specify the transmission destination URI.

- Operation of getIPTVLicense()

When this function is called in the IPTV unmanaged state, the operation of this function fails. This function is only used when the MC license is obtained for IP broadcasting services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting.

For the value of `drm_system`, 'marlin\_iptv\_es' is specified in IP broadcasting services, 'marlin\_iptv\_es\_tb' is specified in IP retransmission services of digital terrestrial television broadcasting, and 'marlin\_iptv\_es\_bs' is specified in IP retransmission services of BS digital satellite broadcasting. Therefore, operation of receivers fails when a value other than those listed above is specified.

The maximum number of arrays specifying `license_id` is 16.

For more information on the values specified for `license_id` and license acquisition process, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)".

In order to execute this function, the `setIPTVServiceRegistrationInfo ()` function, `setTBSserviceRegistrationInfo()` function, or `X_iptvf_setBSServiceRegistrationInfo()`

specifying the `license_uri` must be executed, and the `license_uri` corresponding to the `id` must be stored on the receivers in advance.

Receivers read and use the corresponding `license_uri` written in NVRAM using the above function from `ip_service_provider_id` specified in `id`.

- Operation of `getIPTVLicenseInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails. This function is only used when the MC license information is obtained for IP broadcasting services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting.

For more information on the tier bit arrays, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 6 "Specifications for Conditional Access System(CAS)". When the value of `Array[0]` is other than 1, the values of `Array[1]` and on will be undefined.

- Operation of `getDRMID()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

When the Marlin IPTV-ES system is applied, `DRM_ID` may differ among IP broadcasting/VOD/download services, IP retransmission services of digital terrestrial television broadcasting and IP retransmission services of BS digital satellite broadcasting. Therefore, "marlin\_iptv\_es" is specified in `drm_system` for IP broadcasting/VOD/download services, "marlin\_iptv\_es\_tb" is specified for IP retransmission services of digital terrestrial television broadcasting, and "marlin\_iptv\_es\_bs" is specified for IP retransmission services of BS digital satellite broadcasting.

The return value is a string converted from an 8-byte numeric value. The value is a hexadecimal string starting with a supplementary "0", and other values such as "0x" are not added to the beginning. Alphabetic characters in the hexadecimal value should be in upper case. An example is shown below.

<Example>

"0000FFFF11112222"

- Operation of `setContentPackageInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

This function should be executed properly on receivers that support ECG.

When this function is called on receivers that do not support ECG, success can be returned without any action.

When `valid_end_date` is not specified, it indicates that the valid period is of unlimited duration.

When it is set using the same `id` as the purchased content package information that is already set on receivers, receivers renew the corresponding purchased content package information. Handling of the purchased content package information exceeding `valid_end_date` is implementation-dependent.

- Operation of `setSelectedLicenseInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

This function should be executed properly on receivers that support ECG.

When this function is called on receivers that do not support ECG, success can be returned without any action.

When it is set using the same `id` as the select package that is already set on receivers, the receivers renew the license information associated with the packages with the same `id`.

When this happens, the license information that is linked to the select package with the same `id` is replaced by the license information that is newly specified.

- Operation of `updatePackageLicenseInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

This function should be executed properly on receivers that support ECG.

When this function is called on receivers that do not support ECG, success can be returned without any action.

Actual package information/license information renewal processes using this function should be performed when the BML browser for IPTV is not operating because `setContentPackageInfo()` and `setSelectedLicenseInfo()` can be executed simultaneously during the process resulting in mismatched information.

- Operation of `launchIPTVContent()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

Playback of the specified contents starts.

The URI scheme of the content playback control metafile specified in `content_uri` should be `https`.

The URI of the BML document that AV players instruct browsers to obtain after contents playback is completed is not identical to `ret_uri` specified as the argument of this function but is an URI that includes query strings added by AV players indicating the contents' end status and playback stop position information when playback is completed normally (see 7.3.2.3 "Setting Additional Parameters to URI for Reopening Browser after Termination of ". Points to be noted for contents production using query strings are described in [Appendix T] "Annotation: VOD ").

When multiple licenses are set for contents (when multiple licenses are described in LLI defined in IPTVFJ STD-0002 "VOD Specifications"), `license_id` is specified, and one of the licenses is selected. When only one license is set for contents, `license_id` is omitted, and the license is obtained only using the information described in LLI. When multiple licenses are set and `license_id` is omitted, operation is not guaranteed. For more information on the contents startup process in regard to this function, see IPTVFJ STD-0002 "VOD Specifications".

- Operation of `setIPTVServiceRegistrationInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

The key information is specified for each user (or receiver) per service provider.

Receivers store `id`, `key`, `expire_date` and `license_uri` specified with arguments in the non-volatile memory area.

When the time in the receivers reaches the `expire_date`, the corresponding `id`, `key` and `license_uri` become invalid. The invalid `id`, `key` and `license_uri` data may be deleted. When the same value as, or prior to, the execution date and time for this function is specified in `expire_date`, registration becomes invalid immediately. In other words, the same kind of process is performed as when `expire_date` is reached.

The `key`, `expire_date` and `license_uri` are always overwritten with the values of the last execution when the function is executed multiple times for the same `id`.

Service providers who operate IP broadcasting services must set arguments of `license_uri`, `signature` and `certificate_uri` for this function.

Signature is described as a nonbreaking Base64-encoded signature value of the element. The elements subject to signature include space, tab and line feed.

The maximum number of certificate files in a certificate chain allocated in `certificate_uri` is 5, and the maximum size is 5,120 bytes. However the root certificate stored on receivers is not included.

A certificate chain is described in the certificate file allocated in `certificate_uri` in the PKIPath format. Certificates are described as nonbreaking base64-encoded public key certificates that are required for verification of the signature listed in the signature element. HTTP GET is used for file acquisition, and the MIME Type of the file is text/plain.

For more information on the signature generation process and signature verification process of `license_uri` based on the generation process, see IPTVFJ STD-0004 "IP Broadcasting Specifications", 6.3.10 "Signature Verification for CAS Server URI". The name of the server from which the BML document that executes this function is obtained should be specified using FQDN.

- Operation of `checkIPTVServiceRegistrationInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

TLS/SSL must be used when key information for authentication that is read using this function is sent.

The name of the server from which the BML document that executes this function is obtained should be specified using FQDN.

- Operation of `setTBServiceRegistrationInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

Receivers store `id`, `key`, `expire_date`, `area`, `duplication_flag` and `license_uri` specified with arguments in the non-volatile memory area.

When the time in receivers reaches `expire_date`, stored and corresponding `id`, `key`, `area`, `duplication_flag` and `license_uri` become invalid. The invalid `id`, `key`, `area`, `duplication_flag` and `license_uri` data may be deleted.

The `key`, `area`, `duplication_flag` and `license_uri` are always overwritten with the values of the last execution when this function is executed multiple times for the same `id`.

The signature is described as a nonbreaking Base64-encoded signature value of the element. The elements subject to signature include space, tab and line feed.

The maximum number of certificate files in a certificate chain allocated in `certificate_uri` is 5, and the maximum size is 5,120 bytes. However, the root certificate stored on receivers is not included.

A certificate chain is described in the certificate file allocated in `certificate_uri` in the PKIPath format. Certificates are described as nonbreaking base64-encoded public key certificates that are required for verification of the signature listed in the signature element. HTTP GET is used for file acquisition, and MIME Type of the file is text/plain.

For more information on signature generation process and signature verification process of `license_uri` based on the generation process, see IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting", Volume 5 "Provisions for Conditional Access System (CAS), Operations and Specifications on Receiver Units".

The name of the server from which the BML document that executes this function is obtained should be specified using FQDN.

- Operation of `checkTBServiceRegistrationInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

TLS/SSL must be used when key information for authentication that is read using this function is sent.

The name of the server from which the BML document that executes this function is obtained should be specified using FQDN.

- Operation of `X_iptvf_setBSServiceRegistrationInfo()`

When this function is called in the IPTV unmanaged state, the operation of this function fails.

The key information is specified for each user (or receiver) per service provider.

Receivers store the `id`, `key`, `expire_date` and `license_uri` specified with arguments in the non-volatile memory area.

When the time in the receivers reaches the `expire_date`, the corresponding `id`, `key` and `license_uri` become invalid. The invalid `id`, `key` and `license_uri` data may be deleted. When the same value as or prior to the execution date and time for this function is specified in `expire_date`, registration becomes invalid immediately. In other words, the same kind of process is performed as when `expire_date` is reached.

The `key`, `expire_date` and `license_uri` are always overwritten with the values of the last execution when the function is executed multiple times for the same `id`.

The `signature` is described as a nonbreaking Base64-encoded signature value of the element. The element subject to signature include space, tab and line feed.

The maximum number of certificate files in a certificate chain allocated in `certificate_uri` is 5, and the maximum size is 5,120 bytes. However the root certificate stored on receivers is not included.

A certificate chain is described in the certificate file allocated in `certificate_uri` in the PKIPath format. Certificates are described as nonbreaking base64-encoded public key certificates that are required for verification of the signature listed in the signature element. HTTP GET is used for file acquisition, and MIME Type of the file is `text/plain`.

For more information on the signature generation process and signature verification process of `license_uri` based on the generation process, see IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting", Volume 5 "Provisions for Conditional Access System (CAS), Operations and Specifications on Receiver Units"..

The name of the server from which the BML document that executes this function is obtained should be specified using FQDN.

- Operation of `X_iptvf_checkBSServiceRegistrationInfo()`

When this function is called in the IPTVunmanaged state, the operation of this function fails.

TLS/SSL must be used when key information for authentication that is read using this function is sent.

The name of the server from which the BML document that executes this function is obtained should be specified using FQDN.

- Operation of `launchDynamicDocument()`

It is desirable to obtain the consent of users before execution of this function as it is accompanied with transmission of information to the communication site.

`http://` or `https://` should be specified for `src_path`. Operation fails if other schemes are specified.

The same restrictions apply to strings specified for `post_body` as the argument "text" of `transmitTextDataOverIP()`, and the data sent to a server using the POST method takes the same format as `transmitTextDataOverIP()`.

When data obtained using `getDRMID()` is sent to a server on a communication network using this function to perform production operations, the `https` scheme should be used to specify the transmission destination URI.

- Operation of `quitDocument()`

When this function is called in the IPTVunmanaged state, transition to the URI stored with `launchUnmanagedDocument()` takes place. The transition destination when this function is called in the IPTVmanaged state is implementation-dependent.

- Operation of `startResidentApp ()`

When this function is called in the IPTVunmanaged state, the operation of this function fails.

The following table shows the combinations of values that can be specified for the arguments `appName`, `showAV` and `Ex_info`.

<code>appName</code>	<code>showAV</code>	<code>Ex_info</code>
ECG	0 only	Hints indicating the desirable ECG presentation status. “Start”: The startup screen is presented. “Resume”: The last presentation status is resumed.

- After execution of this function, the browser is terminated and control is passed to the receiver application without execution of the script that follows this function.

- Operation of `setCacheResourceOverIP()`

The `setCacheResourceOverIP` function sets hints for resources on the Internet that are cacheable and stored in arrays of arguments. Cache and release operations for the set resources are implementation-dependent. This function is operated in the IPTVmanaged state and the IPTV unmanaged state.

It is desirable that resources that have not reached the max-age in the Cache-Control header cached on receivers using this function are given priority for storage over the resources cached using other control information. Also, content providers can use this function to read resources that are planned to be used in the future. For more information, see [Appendix W] "Annotation: Cache Control".

- Operation of `reloadActiveDocument()`

This function is used operationally in the IPTV managed and unmanaged states. When this function is called, receivers reacquire the BML document and mono-media that are currently being displayed from a Web server. However, if the internal cache of receivers has not reached max-age in the Cache-Control header when this function is called and the target resource is verified as the latest by checking with a server, receivers can display the cached resource.

If receivers are reproducing communication contents of which resource names cannot be identified such as when "/" is specified at the end of URI or when "?query" is specified, receivers should reacquire the communication contents that are currently presented by resending the URI specifying the corresponding BML document.

For example, the action of receivers when the `reloadActiveDocument` function is called by the contents launched by `launchDocument("http://localhost/hoge/","cut")` should be the same as when the above `launchDocument` function is called.

- Operation of `checkParentalCtrlPassword()`

If this function is executed when the parental control restrictions are released temporarily by a resident application of receivers such as EPG, ECG and direct channel selection, "1" may be returned without displaying the password entry dialog. Also, when this function is executed and password authentication succeeds, receivers can improve the convenience of users by removing the parent control restrictions of resident applications. For information

on the duration of the restriction release state reached by execution of this function, see 3.3.1.7.5 "Disabled Restriction Status".

#### 6.4.5 Namespace Used in BML Document for IPTV

##### 6.4.5.1 Content Reference Method on Web Server and Namespace

When contents on a Web server are referenced from a BML document using streaming, the URL representing the content playback control metafile of the referenced contents is specified in the data attribute of the object element. When the streamstatus attribute of the object element described above becomes play, AV players obtain the content playback control metafile, perform processes such as the license process according to information described in the content playback control metafile, and start playback of the contents in the area specified in the object element. For more information on AV player operation when the content playback control metafile is received, see IPTVFJ STD-0002 "VOD Specifications".

Example:

```
<object id="id1"
      data="http://foo.var.com/content1.cpc"
      type="application/X-arib-contentPlayControl">
</object>
```

##### 6.4.5.2 Namespace of IP Broadcasting Service

For namespaces used to reference IP broadcasting services, the scheme that starts with arib:// should be used based on the specifications defined in ARIB STD-B24 Volume 2, 9.2.5 "Service Identification". However, ARIB STD-B24 Volume 2, 9.2.5.1 "Identification of Currently Selected Broadcasting Service on Receiver" is not operated.

##### 6.4.5.3 Maximum Length of URI

The maximum length of the URI is 1,024 bytes. However, the maximum length of the argument license\_uri of setIPTVServiceRegistrationInfo() and setTBSserviceRegistrationInfo() is 240 bytes.

##### 6.4.5.4 Operation of URI

Multibyte characters such as Japanese are not used in the URI.

When a directory is specified, "/" must be added at the end.

When IPv6 is used at the network layer, IP addresses are not specified directly. When IPv4 is used, IP addresses can be specified directly.

#### 6.4.6 Behavior of Browser

Comply with ARIB TR-B14 Volume 3, Section 2, 5.12 "Performance of BML Browsers". However, Ureg/Greg is not used in operation and thus not applicable. The following specifications are added in this operation.

- Return to portal after content playback

When transition is performed using `launchIPTVContent()`, browsers may stop. Therefore, consideration must be given to the possibility whereby screen transition that producers have intended may not be achieved by storing the URI only and returns to the portal from the destination after content playback without storing cookie information of the session. When returning to the browser after playback of the destination contents is completed, cookie information should be restored.

- Relationship between ECG/EPG and browser

If ECG/EPG is started while a page is viewed using a browser, the browser is terminated. However, since only storing the URI information when redisplaying the page results in a loss of cookie information, it is assumed that the intended presentation screens cannot be reconfigured. Therefore, when ECG/EPG is started and terminated, and represented using a browser, it is desirable to restore cookie information.

#### 6.4.6.1 Operation Guideline of Script Language

Refer to the following documents. In BML documents where multiple script elements are described, the following restrictions are applied for the state that all scripts are read (scripts described in the resources indicated by the `src` attribute of the script elements and scripts described in the script elements that do not have the `src` attribute).

- ARIB STD-B24 Volume 2, Appendix 3, 5.4.1 "Operation of Script Working Environment"
- ARIB STD-B24 Volume 2, Appendix 3, 5.4.2 "Data Type", 5.4.3 "Effects on Basic Objects Caused by Data Type Restrictions" and 5.4.4 "Operation Rule of Implementation-dependent Portion"

Regarding the items listed in Table 6-39 for operation of script working environment, it is desirable that receivers support the maximum value of the work memory regardless of the above-mentioned specifications.

Whether the work memory listed in Table 6-39 is supported in the script working environment or not can be verified using the `getBrowserSupport()` function. When contents requiring the work memory listed in Table 6-39 are produced exceeding the values defined in ARIB STD-B24 Volume 2, Appendix 2 "Operational Guidelines for Implementing Basic Services", whether receivers support the value or not should be confirmed using the `getBrowserSupport()` function, and measures such as not presenting the BML document including the script should be taken if it is not supported.

Table 6-39 Restrictions Related to Script Work Memory

Item	Maximum value	Supplement
Total size of overall character string length	196,608 bytes	Total characters of the string (evaluation result of string expression, character constant, character variable value) and symbol name

### 6.4.6.2 Guidelines on Functions Straying from Operational Specifications for Each Media Type

In order to enable contents to use a proprietary function other than the functions that are defined as standard functions in an operational standard regulation specific to a media type, the `getBrowserSupport()` function must be used to verify whether or not the proprietary function is accepted to ensure that the proprietary function is invoked only when the function is accepted.

- Arguments of `getBrowserSupport()`

Table 6-40 shows the functions that enable verification using `functionname` and `additionalinfo` when "IPTV" is specified with `sProvider`. Only the items that are added for IP broadcasting/VOD services are defined in this document.

Table 6-40 Strings Available for Arguments of `getBrowserSupport()`

functionname	additionalinfo	Behavior of <code>getBrowserSupport()</code>
ResidentApp	"ECG"	When a receiver is equipped with the ECG application, "1" is returned.
ResidentApp	"ECGBMLEnable"	When the ECG application can be started from BML, "1" is returned.
AvailableMemory	"ECMAExtension"	When a receiver supports the ECMA script work memory listed in Table 6-39, "1" is returned.

- Specification of extended function group

Strings that should be specified for `additionalinfo` are indicated when "APIGroup" is specified for the `functionname` argument of `getBrowserSupport()`. Table 6-41 shows only the extended functions that are newly defined for IP broadcasting/VOD services.

Table 6-41 Extended Functions for Broadcasting, Classes and Extended Function Group Specification

API	Extended function group specification (additionalinfo argument)
getIPTVLicense()	License.Basic
getIPTVLicenseInfo()	
getDRMID()	
launchIPTVContent()	Ctrl.IPTV
setIPTVServiceRegistrationInfo()	Ctrl.Registration
checkIPTVServiceRegistrationInfo()	
setContentPackageInfo()	License.Package
setSelectedLicenseInfo()	
updatePackageLicenseInfo()	
setTBServiceRegistrationInfo()	Ctrl.TB
checkTBServiceRegistrationInfo()	
X_iptvf_setBSServiceRegistrationInfo()	Ctrl.BS
X_iptvf_checkBSServiceRegistrationInfo()	
launchUnmanagedDocument()	Ctrl.StateManagement
getDocManagementStat()	
marqueeText()	Ctrl.TextScroll
checkParentalCtrlPassword()	Ctrl.Parental

### 6.4.6.3 Transition of States based on BML Documents in IPTV Service

In IPTV services, there are "IPTVmanaged state" and "IPTV unmanaged state" that IP broadcasting/VOD service contents can take in addition to the receiver states described in ARIB TR-B14 Volume 3, Section 2, Chapter 5 "Operation of Multimedia Encoding". These are called "Transition of States based on BML Documents".

Figure 36 shows transition and receiver state transitions.

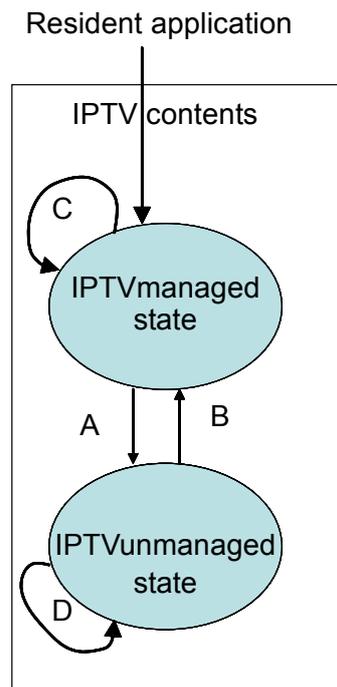


Figure 36 Transition between Documents and Receiver State Transitions

- Transition A: Transition is triggered by `launchUnmangedDocument()`. The document management status becomes IPTV unmanaged. In the IPTVunmanaged state, `application/X-arib-contentPlayControl` and `application/X-arib-mpeg2-tts` cannot be specified as the type attribute of object elements.
- Transition B: Transition is triggered by `quitDocument()`. The document management status becomes IPTVmanaged. Transition cannot be triggered by `launchDocument()` or by specifying the href attribute of *a* elements.
- Transition C: Transition can be triggered by `launchDocument()/launchDynamicDocument()` or by specifying the href attribute of *a* elements.
- Transition D: Transition can be triggered by `launchDocument()/launchDynamicDocument()` or by specifying the href attribute of *a* elements.

If an error occurs during document transition in the IPTV unmanaged state, transition is made to the document to return to that is specified when transition from the IPTVmanaged state to IPTV unmanaged state is made. The behavior when the document is not specified is implementation-dependent. Also, transition errors in the IPTV managed state are implementation-dependent.

The state of browsers becomes IPTV managed in the following cases.

- Transition is made when the BML document is obtained based on the `portal_url` element described in the PF configuration information
- Transition is made when the BML document is obtained based on the URL of the hyperlink descriptor by pressing the *d* button
- Transition is made when the BML document is obtained based on the URL described in `PricingServerURL` from the ECG
- Transition is made when the BML document is obtained based on the `ret_uri` specified with the `launchIPTVContent()` function
- Transition is made when the BML document is obtained from the data broadcasting/linked state using the transition function of BML for broadcasting defined in the integration with broadcasting scope service approach specifications (TBD) (See [Appendix X] "Annotation: Broadcasting BML and Transition (TBD)")

#### 6.4.6.3.1 Behavior Guidelines on Receiver Operation Failure

Receivers perform failure operations when functions that cannot be used in the states that are defined in 6.4.4.6 "Operation of Browser Pseudo-Objects" are used.

Receivers perform the following processes when "operation fails" and "failure" are listed for browsers.

- (1) Browsers terminate presentation of the currently displayed document.
- (2) The behavior in the IPTVmanaged state is implementation-dependent.
- (3) In the IPTV unmanaged state, transition to the document to return to that is specified for transition from the IPTV managed state to the IPTV unmanaged state is made.

#### 6.4.6.4 Use of NVRAM in Portal

In a portal page, parental control information and user residential area information that is written in the NVRAM using the initial setting function of receivers can be read and used. For the initial setting function, see 3.3.1.2 "Initial Setting".

Only user residential area information can be specified as URI other than parental control information. For specifications on user residence area information, see ARIB TR B-14 Volume 3, Section 2, 5.2.7 "Use of the Viewer Residential Area Information from the Multimedia Service". When `readPersistentArray()` is executed with other information specified in URI, null (failure) is returned without reading the NVRAM.

##### 6.4.6.4.1 Access to Parental Control Information

When "parental control information" that is assumed to be stored in the NVRAM by resident applications of receivers is read from a portal of an IP broadcasting/VOD service, `readPersistentArray()` is executed using the following URI.

`nvrाम://receiverinfo/<parentalinfotype>`

Table 6-42 shows a string that can be specified for < parentalinfotype >.

Table 6-42 Parental Control Information Types

<parentalinfotype >	Type	Possibility to Read/Write	Field type
parentallevel	Age	Only reading is possible as a numerical value	U:7b
	Restriction state	Only reading is possible as a Boolean value	B:1b

A value between 4 and 20 is returned when age is set for return values. Age is undefined when a value other than 4 to 20 is returned.

For the restriction state, true (restricted) or false (released) is returned.

## 6.5 Operation of Network Access to Portal Service

### 6.5.1 Operation Guidelines for Transmission of Portal BML Contents

#### 6.5.1.1 Overview of Network Access to Portal Service

Portal BML contents are sent using HTTP or HTTPS. For the HTTP version, only HTTP/1.1 is operated. Operation of HTTP/1.0 by Web servers is not permitted as a basic rule. The behavior of receivers when HTTP/1.0 is received is implementation-dependent.

HTTP/1.1 should comply with the RFC2616 specifications. In HTTPS, encrypted communication using HTTP is performed after connection is established using TLS and SSL. The versions of TLS and SSL should be TLS 1.0 and SSL 3.0. For more information on the operation of TLS and SSL, see ARIB TR-B14 Volume 6 "Digital Terrestrial Television Broadcasting: Provisions for Interactive Data Broadcasting Services" and RFC2818.

This document provides the minimum guidelines for operation and does not define the implementation range of receivers.

#### 6.5.1.2 Operation Guidelines for HTTP/1.1

##### 6.5.1.2.1 Overview of HTTP/1.1 Operation

- Communication port

When the URI has "http:", receivers and Web servers establish HTTP/1.1 communication on the port specified by the URI. When the URI has "https:", receivers and Web servers establish encrypted communication using HTTP/1.1 on the port specified by the URI after establishing connection using TLS1.0 and SSL3.0. When the URI does not specify a port number, port number 80 (for "http:") or port number 443 (for "https:") should be used as a default port number. However, the port to be connected may be different depending on the connection status such as firewall settings. The default connection port can be configured on receivers with consideration for the connection status.

- Date/time format

Fixed length subset defined in RFC1123 is used for the date/time format. All HTTP date/time stamps should be operated in GMT with exceptions.

- It is desirable that Web servers send date/time to receivers only using the date/time format in the fixed length subset defined in RFC1123.
- Receivers should be able to interpret the fixed length subset defined in RFC1123 used for the date/time format. It is desirable that receivers can interpret dates in the RFC1036 or ANSI C format, but these formats can be ignored.

Example:

Sun, 06 Nov 1994 08:49:37 GMT ; RFC1123

Sunday, 06-Nov-94 08:49:37 GMT ; RFC1036

Sun Nov 6 08:49:37 1994 ; ANSI C

- Character set

As a character set, only "EUC-JP" is operated for all request messages/response messages/entities. The behavior of receivers when they receive another character set is implementation-dependent.

- Content coding

The "identity" is used for content coding. Both "deflate" and "gzip" are operated as options. The behavior of receivers when they receive "deflate", "gzip" or other values that they do not support is implementation-dependent.

- Transfer coding

Receivers should support the chunked transfer encoding defined in RFC2616 to receive responses from Web servers. "chunked" should be operated when transfer coding is specified. The behavior of receivers when they receive other values is implementation-dependent.

- Quality value

The quality value is implementation-dependent.

- Language tag

"ja" is operated for the language tag. The behavior of receivers when they receive other language tags is implementation-dependent.

#### 6.5.1.2.2 Operation of Request Methods

- Operation of GET

It is operated on both receivers and Web servers.

- Operation of POST

It is operated on both receivers and Web servers.

- Operation of HEAD

It is operated as an option on receivers. Web servers should return responses to HEAD requests in compliance with RFC2616.

- Operation of OPTIONS

It is operated as an option on both receivers and Web servers.

- Other methods

Operation of CONNECT, PUT, DELETE and TRACE is implementation-dependent.

### 6.5.1.2.3 Operation of Header for Request

The following section describes the HTTP headers that require special operational specifications when Web servers send requests using HTTP/1.1 communication. However, these specifications only present minimal guidelines for use of headers and do not restrict implementation of headers that are not defined here.

Table 6-43 shows the operation status of each header. The meaning of the marks under "Operation of header" are as follows.

- “○”            Used operationally in these specifications
- “—”            Not used operationally in these specifications

Table 6-43 Operation Range of Header for Request

	Header name	Operation of header		Note
		Receiver	Server	
General headers	Cache-Control	○	○	Only "no-cache" is used operationally.
	Connection	○	○	Only "close" is used operationally.
	Date	—	—	
	Pragma	○	○	Only "no-cache" is used operationally as an option
	Trailer	—	—	
	Transfer-Encoding	—	—	
	Upgrade	—	—	
	Via	—	—	
	Warning	—	—	
Request headers	Accept	○	○	
	Accept-Charset	○	○	Only "EUC-JP" is used operationally.
	Accept-Encoding	○	○	Only "identity", "deflate", and "gzip" are used operationally.
	Accept-Language	○	○	Only "ja" is used operationally.
	Authorization	○	○	
	Expect	—	—	
	From	—	—	
	Host	○	○	
	If-Modified-Since	—	○	
	If-Match	—	○	
	If-None-Match	—	○	
	If-Range	—	—	
	If-Unmodified-Since	—	○	
	Max-Forwards	—	—	
	Proxy-Authorization	—	—	
	Range	—	—	
	Referer	○	○	
TE	—	—		

	User-Agent	○	○	
Entity headers	Allow	—	—	
	Content-Encoding	—	—	
	Content-Language	○	○	Only "ja" is used operationally.
	Content-Length	○	○	
	Content-Location	—	—	
	Content-MD5	—	—	
	Content-Range	—	—	
	Content-Type	○	○	
	Expires	—	—	
	Last-Modified	—	—	
Other header	Cookie	○	○	See 6.5.2

- Operation of general headers

- Operation of Cache-Control

This header is used operationally on both receivers and Web servers. Receivers should specify "no-cache" in request messages. Receivers should not include any field name in a request message with the no-cache designator. Out of consideration for proxy servers supporting HTTP/1.1 on the transmission channel, it is desirable that the general header Pragma is placed specifying "no-cache".

- Operation of Connection

This header is used operationally on both receivers and Web servers. "close" is used for the connection option. For more information, see 6.5.1.3 "Operation of Persistent Connection". The behavior of receivers when they receive a value other than "close" is implementation-dependent.

- Operation of Pragma

This header is used operationally on receivers as an option. Considering the fact that there are HTTP/1.0 proxies on the transmission channel, receivers can specify "no-cache" only when the Pragma header is used.

- Operation of request headers

- Operation of Accept

This header is used operationally on both receivers and Web servers. Receivers can specify the following media types with this header.

text/plain, text/X-arib-bml, text/X-arib-jis8text,

text/css, text/X-arib-ecmascript, image/jpeg, image/X-arib-png, image/X-arib-mng,

audio/X-arib-mpeg2-aac, audio/X-arib-aiff,

application/X-arib-bmlclut, application/X-arib-btable

- Operation of Accept-Charset

This header is used operationally on both receivers and Web servers. When this field is added, receivers should set the value to "EUC-JP".

- Operation of Accept-Encoding

This header is used operationally on both receivers and Web servers. Receivers can specify "identity", "deflate" and "gzip" for the value.

- Operation of Accept-Language

This header is used operationally on both receivers and Web servers. Receivers should specify "ja".

- Operation of Authorization

This header is used operationally on both receivers and Web servers, and only basic authentication is available as the authentication type. This header is used to send the user ID and password when WWW-Authenticate is specified in the response header.

The presentation method and specifications of the user interface for entering information such as user ID and password are implementation-dependent.

- Operation of Host

This header is used operationally on both receivers and Web servers. Host information is sent when a request is sent to a Web server.

- Operation of If-Modified-Since

This header is used operationally on Web servers. Receivers can use the value of Last-Modified as hints for If-Modified-Since.

- Operation of If-Unmodified-Since

This header is used operationally on Web servers. Receivers can use the value of Last-Modified as hints for If-Unmodified-Since.

- Operation of If-Match

This header is used operationally on Web servers. Receivers can use the value of ETag as hints for If-Match.

- Operation of If-None-Match

This header is used operationally on Web servers. Receivers can use the value of ETag as hints for If-None-Match.

- Operation of Referer

This header is used operationally on both receivers and Web servers. Referer information is sent when a request is sent to a Web server. Referer information is not sent when initial connection to a Web server is made by a resident application. Also, if the scheme transition from "https:" to "http:" occurs during connection to a Web server, URI of "https:" is not sent as Referer information.

- Operation of User-Agent

This header is used operationally on both receivers and Web servers. User-Agent information is sent when a request is sent to a Web server. Comply with the specifications described in 6.5.1.4 "Operation of User-Agent" for the format of this header.

- Operation of entity headers

- Operation of Content-Language

This header is used operationally and Web servers as an option. Only "ja" is available as the value. This header is used when data is sent to a Web server using the POST method.

- Operation of Content-Length  
This header is used operationally on both receivers and Web servers. This header is used when data is transmitted to a Web server using the POST method.
- Operation of Content-Type  
This header is used operationally on both receivers and Web servers. This header is used when data is sent to a Web server using the POST method. The media type that can be specified in request messages is as follows:

application/x-www-form-urlencoded

- Operation of other header
  - Operation of Cookie  
This header is used operationally on both receivers and Web servers. For more information, see 6.5.2 "Operation of Cookie".

#### 6.5.1.2.4 Operation of Header for Response

The following section describes the HTTP headers that require special operational specifications when Web servers send responses using HTTP/1.1 communication. However, these specifications only present minimal guidelines for use of headers and do not restrict implementation of headers that are not defined here. Receivers should be able to ignore headers that are not supported without errors.

Headers are used operationally as shown in Table 6-44. The meaning of the marks under "Operation of header" are as follows.

- "○" Used operationally in these specifications
- "—" Not defined as used operationally nor an option in these specifications

Table 6-44 Operation Range of Header for Response

	Header name	Operation of header		Note
		Receiver	Server	
General headers	Cache-Control	○	○	"no-cache" and "no-store" are used operationally. "max-age" is used as an option.
	Connection	○	○	Only "close" is used operationally.
	Date	○	○	
	Pragma	○	○	"no-cache" is used operationally.
	Trailer	—	—	
	Transfer-Encoding	○	○	"chunked" is used operationally
	Upgrade	—	—	
	Via	—	—	
Response headers	Warning	—	—	
	Accept-Range s	—	—	
	Age	—	—	
	ETag	—	○	
	Location	○	○	
	Proxy-Authenticate	—	—	
	Retry-After	—	—	
	Server	—	○	
	Vary	—	—	
Entity headers	WWW-Authenticate	○	○	
	Allow	○	○	Used operationally as an option.
	Content-Encoding	○	○	
	Content-Language	○	○	"ja" is used operationally.
	Content-Length	○	○	
	Content-Location	—	—	
Content-MD5	—	—		

	Content-Range	—	—	
	Content-Type	○	○	
	Expires	—	○	Used operationally as an option. Use of "Cache-Control:max-age" is recommended to present the expiration date.
	Last-Modified	—	○	
Other headers	Set-Cookie	○	○	See 6.5.2.
	Set-Cookie2	—	—	See 6.5.2.
	Extension header	—	○	

- Operation of general headers

- Operation of Cache-Control

This header is used operationally on both receivers and Web servers. Web servers can specify "no-cache" for the Cache-Control header of response messages. Receivers that received "no-cache" can cache the messages but cannot display the cache without checking the availability of the cached contents.

"max-age" is used operationally as an option. When receivers with a cache function receive "max-age=XX" (where XX is the number of seconds), receivers can display the cached contents without checking the availability before expiration. The value of max-age is given priority over the Expires header (implementation-dependent). Also, the value of max-age is used as reference information for the cache retention period when setCacheResourceOverIP() is used.

If "no-store" is received, receivers should not cache the file specified during the HTTP session. The behavior of receivers when they receive a value other than "no-cache", "no-store" and "max-age" is implementation-dependent.

- Operation of Connection

This header is used operationally on both receivers and Web servers. "close" is used for the connection option. For more information, see 6.5.1.3 "Operation of Persistent Connection". The behavior of receivers when they receive a value other than "close" is implementation-dependent.

- Operation of Pragma

This header is used operationally as an option on both receivers and Web servers. Only "no-cache" can be specified as the Pragma header.

- Operation of Transfer-Encoding

This header is used operationally on both receivers and Web servers. When Web servers respond using chunked transfer encoding, this header must be added to the response header specifying "chunked".

Note that Transfer-Encoding cannot be used simultaneously with Content-Length in the entity header. For more information, see RFC2616. The behavior of receivers when they receive other values is implementation-dependent.

- Operation of response headers

- Operation of Location

This header is used operationally on both receivers and Web servers. This header is used in responses with the status code 3xx by a Web server to redirect receivers to another URI.

- Operation of Etag

This header is used operationally on Web servers. The behavior of receivers when they receive this header is implementation-dependent. Receivers can use this header as hints for If-Match and If-None-Match.

- Operation of Server

This header is used operationally on Web servers. The behavior of receivers when they receive this header is implementation-dependent.

- Operation of WWW-Authenticate

This header is used operationally on both receivers and Web servers, and only basic authentication is available as the authentication type. This header is used in response headers with the status code 410 Unauthorized when HTTP access authentication is required.

The presentation method and specifications of the user interface for entering information such as user ID and password are implementation-dependent.

- Operation of entity headers

- Operation of Allow

This header is used as an option on both receivers and Web servers. Comply with the specifications described in 6.5.1.2.2 "Operation of Request Methods" for operation of request methods.

- Operation of Content-Encoding

This header is used operationally on both receivers and Web servers. If the response body is encoded, the method should be selected from the ones notified by receivers using Accept-Encoding when a request was sent. If the response body is not encoded, this header is not sent. When the response body is encoded with the method notified using Accept-Encoding, receivers should be able to perform decode processing properly. The behavior of receivers when they receive a value other than the ones notified using Accept-Encoding is implementation-dependent.

- Operation of Content-Language

This header is used operationally on both receivers and Web servers. "ja" can be specified. The behavior of receivers when they receive other values is implementation-dependent.

- Operation of Content-Length

This header is used operationally on both receivers and Web servers. Comply with RFC2616 when chunked transfer encoding is used. The behavior of receivers when they receive a response message that does not include this header and Transfer-Encoding is implementation-dependent.

- Operation of Content-Type

This header is used operationally on both receivers and Web servers.

The media types that can be specified in response messages are as follows.

The behavior of receivers when they receive other media types is implementation-dependent.

text/plain, text/X-arib-bml, text/X-arib-jis8text,  
text/css, text/X-arib-ecmascript,  
image/jpeg, image/X-arib-png, image/X-arib-mng,  
audio/X-arib-mpeg2-aac, audio/X-arib-aiff,  
application/X-arib-bmlclut, application/X-arib-btable,

- Operation of Expires  
This header is used operationally on Web servers as an option. Use of Cache-Control:max-age is recommended to present the expiration date.
- Operation of Last-Modified  
This header is used operationally on Web servers. The behavior of receivers is implementation-dependent. Receivers can use this header as hints of If-Modified-Since for If-Unmodified-Since.
- Operation of extension headers  
Extension headers are used operationally on Web servers. Web servers can define an extension header as required and send it to receivers as an HTTP header. The behavior of receivers when they receive an extension header is implementation-dependent, but receivers should ignore extension headers properly.
- Operation of entity headers
  - Operation of Set-cookie  
This header is used operationally on both receivers and Web servers. For more information, see 6.5.2 "Operation of Cookie".
  - Operation of Set-cookie2  
The use of this function is implementation-dependent on both receivers and Web servers. For more information, see 6.5.2 "Operation of Cookie".

### 6.5.1.3 Operation of Persistent Connection

In HTTP/1.1 connection, the Connection header instruction should be followed when the connection session is disconnected. When "close" is not specified in the Connection header or the Connection header is not used, HTTP connection must be maintained persistently. Through persistent connection (keep-alive) of HTTP, processing for TCP connection required every time HTTP connection is established can be reduced, and communication response can be improved.

### 6.5.1.4 Operation of User-Agent

Comply with the specifications defined in 5.5.4 "Operation of Headers for Request".

## 6.5.2 Operation of Cookie

### 6.5.2.1 Cookie Version

Cookie is based on RFC2965. Considering compatibility with existing Web servers, the following operational specifications are defined.

#### 6.5.2.1.1 Operation of Response Header

Receivers must be able to interpret the Set-Cookie response header. The interpretation of the Set-Cookie2 response header is implementation-dependent.

Table 6-45 lists the parameters that must be interpreted on receivers.

Table 6-45 Parameters Requiring Interpretation on Receiver

Attribute	Setting of response header on servers	Contents
NAME=VALUE	Required	<ul style="list-style-type: none"> <li>● Cookie information body</li> <li>● The interpretation of double quotation ("), space, tab and line feed (LF, CR) is implementation-dependent.</li> </ul>
domain=DOMAIN	Option	Name of domain where cookie is valid
path=PATH	Option	Path where Cookie is valid
secure	Option	If the secure attribute is added to Cookie, it is sent only when the communication with the host is protected (connection with an HTTPS server, etc.)
expires = DATE	Option	Expiration date Follow one of the following formats to describe DATE: Wdy,dd Mth yyyy hh:mm:ss GMT Wdy,dd-Mth-yyyy hh:mm:ss GMT

- "," must be interpreted as a delimiter for attributes. The interpretation of "," is implementation-dependent.

- The interpretation of attributes other than those listed above is implementation-dependent.
- Only one Cookie is listed per response header. In other words, the response header must be described using multiple lines to set multiple Cookies. Also, the behavior when two or more NAME=VALUE attributes are specified for one response header is implementation-dependent.
- Receivers operate as follows based on the value specified for the expires attribute and the elapsed time.
  - (1) Date when Set-cookie is received is present or expired.  
The corresponding Cookie is discarded.
  - (2) Date when Set-cookie is received is before the expiration date.
    - (a) Expired when requested  
Receivers discard the corresponding Cookie and do not send the Cookie to Web servers.
    - (b) Before the expiration date when requested  
Receivers keep the Cookie until the corresponding date and send the Cookie to Web servers.  
  
However, receivers do not need to guarantee retention caching of Cookie until the corresponding date.
  - (3) expires attribute not specified  
The Cookie-discarding operation is implementation-dependent.

#### 6.5.2.1.2 Operation of Request Header

A pair of name and value is added to the HTTP request header and sent to the request host.

(Example) Cookie: NAME1=VALUE1;\_NAME2=VALUE2;\_NAME3=VALUE3;...

Receivers do not specify \$Version, \$Path and \$Domain for the request header.

#### 6.5.2.1.3 Operation of Cache Control

The interpretation of the response header for cache control (Cache-Control or Cache-Control2) is implementation-dependent.

#### 6.5.2.2 Setting for Cookie

It is desirable that receivers provide a function enabling users to select whether they use Cookie or not.

#### 6.5.2.3 Restriction for Cookie Implementation

- The maximum size of the string in the Set-Cookie header syntax excluding "Set-Cookie:" is 4096 bytes.
- The total Cookie capacity that a receiver can retain should be 80 Kbytes.
- The total Cookie number that a receiver can retain should be 300 or more.

- The Cookie number that a receiver can retain for each domain should be 20.
- The Cookie capacity that a receiver can retain for each domain should be 10 Kbytes.

When receivers reach the total Cookie capacity limit or the total Cookie number, it is desirable that the Cookie discard order is in priority from (1) to (3).

- (1) Expired Cookies
- (2) Domains that are not connected using HTTP and not using IP broadcasting/VOD services (or domains for which basic registration has not been completed)
- (3) Cookies that are infrequently used

#### 6.5.2.4 Operation of Session Information Retention

The following section describes the guidelines for session retention.

Figure 37 shows the transition flow for viewing VOD and IP broadcasting contents (L-shaped display) using the BML browser for IPTV. First, the session retention guidelines for transition after the BML browser for IPTV is started by the portal startup function in Figure 37 are described. The domain started first from the portal is referred to as the portal domain. Explanations of transition from (1) to (9) in Figure 37 are as follows:

- (1) Transition within the portal domain and link from the BML contents of the portal domain to another domain
- (2), (3) Transition from the portal domain to another domain and return to the portal domain
- (4), (5) AV player startup with `launchIPTVContent()` from the portal domain and return to the portal domain
- (6), (7) ECG startup with the ECG startup function (ECG button) from the portal domain and return to the portal domain
- (8), (9) EPG startup with the EPG startup function (EPG button) from the portal domain and return to the portal domain
- (10) Program selection with `epgTune()` from the portal domain
- (11) Return to the portal associated with programs (portal domain) from IP broadcasting by pressing the *d* button

It is desirable that receivers retain Cookie as session information in the above cases (1) to (9). However, when session information cannot be retained during transition in (6), (7) and (8), (9) or when receivers cannot return to the same URL, receivers should advise users that they cannot return to the site displayed immediately before the transition to ECG/EPG.

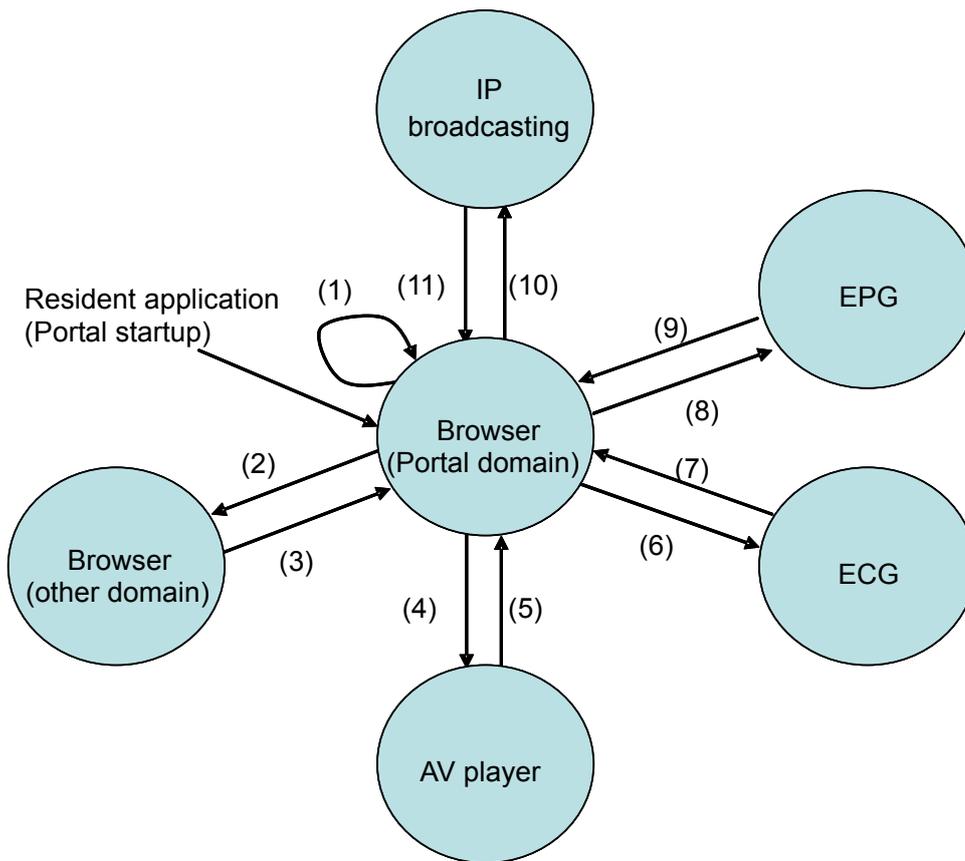


Figure 37 Transition from Portal Domain When Viewing VOD and IP Broadcasting

### 6.5.3 Operation of URI for Portal Access

#### 6.5.3.1 Operation of Portal Access Following Portal Selection

When a browser is started through selection of a service provider portal, receivers access the portal URI of the selected service provider to which the file name `startup.bml` is added. If the service provider provides an IP broadcasting/VOD service, receivers should access a portal server that is on the platform providing the IP broadcasting/VOD service. When only an IP retransmission service of digital terrestrial television broadcasting (IP retransmission service of BS digital satellite broadcasting) is provided, compliant receivers should access a portal server on the platform providing the IP retransmission service of digital terrestrial television broadcasting (IP retransmission service of BS digital satellite broadcasting). However, when the service provider only provides an IP retransmission service of digital terrestrial television broadcasting and IP retransmission service of BS digital satellite broadcasting, compliant receivers should access a portal server on the platform providing the IP retransmission service of BS digital satellite broadcasting.

From the viewpoint of receiver operation, receivers that handle IP broadcasting/VOD services should obtain the portal URI of the selected service provider from the `portal_url` element of the PF configuration information and access the URI to which the file name `startup.bml` is added. Common receivers with the service registration function for IP retransmission of digital terrestrial television broadcasting using a browser should obtain the portal URI of the selected service provider from the `portal_url` element of the PF configuration information (if there is no

portal\_url corresponding to the PF configuration information, the portal\_url element of the PF configuration information for IP retransmission of digital terrestrial television broadcasting defined in IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting", Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network") and access the URI to which the file name startup.bml is added. In a similar way, common receivers with the service registration function for IP retransmission of digital terrestrial television broadcasting and common receivers with the service registration function for IP retransmission of BS digital satellite broadcasting using a browser should obtain the portal URI of the selected service provider from the portal\_url element of the PF configuration information (if there is no portal\_url corresponding to the PF configuration information, the portal\_url element of the PF configuration information for IP retransmission of BS digital satellite broadcasting defined in IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting", Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network") and access the URI to which the file name startup.bml is added.

<portal\_url>startup.bml

#### 6.5.3.2 Operation of Portal Access Following Selection of Registration Verification Document

When a browser is started through selection of a registration verification document of a service provider, receivers access the portal URI of the selected service provider to which the file name subscribe.bml is added. If the service provider provides an IP broadcasting/VOD service, receivers should access a portal server that is on the platform providing the IP broadcasting/VOD service. When only a IP retransmission service of digital terrestrial television broadcasting(IP retransmission service of BS digital satellite broadcasting) is provided, compliant receivers should access a portal server on the platform providing the IP retransmission service of digital terrestrial television broadcasting(IP retransmission service of BS digital satellite broadcasting). However, when the service provider only provides IP retransmission service of digital terrestrial television broadcasting and BS broadcasting IP retransmission service, compliant receivers should access a portal server on the platform providing the BS broadcasting IP retransmission service.

From a viewpoint of receiver operation, receivers that receive IP broadcasting/VOD services should obtain the portal URI of the selected service provider from the portal\_url element of the PF configuration information and access the URI to which the file name subscribe.bml is added. Common receivers with the service registration function for IP retransmission of digital terrestrial television broadcasting using a browser should obtain the portal URI of the selected service provider from the portal\_url element of the PF configuration information (if there is no portal\_url corresponding to the PF configuration information, the portal\_url element of the PF configuration information for IP retransmission of digital terrestrial television broadcasting defined in IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting", Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network") and access the URI to which the file name subscribe.bml is added. In a similar way, common receivers with the service registration function for IP retransmission of digital terrestrial television broadcasting and common receivers with the service registration function for IP retransmission of BS digital satellite

broadcasting using a browser should obtain the portal URI of the selected service provider from the portal\_url element of the PF configuration information (if there is no portal\_url corresponding to the PF configuration information, the portal\_url element of the PF configuration information for IP retransmission of BS digital satellite broadcasting defined in IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting", Volume 6, Chapter 5 "Application Signal Sequence and Message Processing Using Communication Network") and access the URI to which the file name subscribe.bml is added.

<portal\_url>subscribe.bml

The BML document for registration verification should be allocated where transition is possible from startup.bml for users who have not completed basic registration/ service registration for IP retransmission of digital terrestrial television broadcasting/ service registration for IP retransmission of BS digital satellite broadcasting.

For information on the BML document displayed during basic registration, service registration for IP retransmission of digital terrestrial television broadcasting, or service registration for IP retransmission of BS digital satellite broadcasting, see [Appendix L] "Guidelines on BML Document for Basic Registration, Service Subscription, Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting and Service Registration for IP Retransmission of BS Digital Satellite".

### 6.5.3.3 Operation of Portal Access Following Pushing *d* Button While Viewing IP Broadcasting Service

If a browser is started by the use of the *d* button when an IP broadcasting service is selected, receivers identify the IP broadcaster to which the service selected when the *d* button is pressed belongs using BIT and access the URI stated in the hyperlink descriptor of the corresponding IP broadcaster to which the network ID, transport stream ID and service ID are added as query strings as shown below.

<URI stated in the hyperlink descriptor>?service\_ref=

<original\_network\_id>. <transport\_stream\_id>. <service\_id>

The value of the service selected when the *d* button was pressed should be specified for <original\_network\_id>. <transport\_stream\_id>. <service\_id>. A hexadecimal string is used to describe <original\_network\_id>, <transport\_stream\_id> and <service\_id>. However, characters (string) indicating a hexadecimal string such as "0x" at the beginning or "h" at the end of the string are not added. The required number of "0" are added at the beginning of the string so that it becomes a fixed-length string based on the digit number corresponding to the bit number of each ID. For example, when the value of \_original\_network\_id is "0x0234", "0234" is specified for <original\_network\_id>.

For information on the BML document that is displayed when the *d* button is pressed, see [Appendix S] "Annotation: Implementation Method of Pseudo BML Data Broadcasting" and [Appendix N] "Guidelines on Decision Process in Portal Documents for *d* Button".

#### 6.5.3.4 Operation of Portal Access After Termination of VOD Playback

For operation of portal access when a browser is started through termination of VOD playback started from a portal using `launchIPTVContent()`, see 7.3.2.3 "Setting Additional Parameters to URI for Reopening Browser after Termination of ".

#### 6.5.3.5 Operation of Portal Access for Purchasing with ECG

When a browser is started by a user through a purchase operation with ECG, receivers access the purchase process document using the URI stated in `PricingServerURL` (`PurchaseInformation/Purchase/PricingServerURL`) of the purchase information element of the metadata indicating the corresponding package. (The process when `PricingServerURL` is not specified is TBD.)

For information on the purchase process document, also see [Appendix O] "Guidelines on Purchase Process Using ECG".

## Chapter 7 Operation of VOD Service

In regard to IPTVFJ STD-0002 "VOD Specifications" defining the IPTV standards, operational specifications that are specific to CDN scope services are defined in the following sections. HTTP streaming is not used operationally.

### 7.1 Operation of RTSP

#### 7.1.1 Handling of Headers

Header operations listed in Table 7-1 are added to the IPTVFJ STD-0002 "VOD Specifications" Table 4-2 "Operation of RTSP Headers". The meaning of required/option and handling of headers that are not defined in the table should be as defined in IPTVFJ STD-0002 "VOD Specifications", 4.1.1.4 "Handling of Headers".

The VersionSupport header is not defined in RFC and is defined as a header required to notify the version of these specifications.

Table 7-1 Operation of RTSP Headers

Header	Type	Required/option	Method
Require	R	Option	all
Unsupported	r	Required *1	all
VersionSupport	r	Required	OPTIONS, SETUP

Header: Header name

Type: R The header is used in request messages

r The header is used in response messages

Rr The header is used in both request messages and response messages

Method: The name of the method that uses the header. "all" means that the header is used with all methods.

\*1: Required only if the Require header is specified when requesting and the server does not support the extension header (See 7.1.2.1 "Require Header and Unsupported Header").

#### 7.1.2 General Specifications for Headers

##### 7.1.2.1 Require Header and Unsupported Header

The Require header is used to confirm headers that are created by extending this specification. The Require header can be added to any method. A receiver requests a server to investigate using the Require header. When the extension header is not implemented for the corresponding method on the server, the server sends an error (551 Option not supported) and the header name that is not implemented to the receiver as parameters of the Unsupported header.

When an unknown header that is not clearly specified in Require is received in a request, a server should ignore the header and continue the process (an error (551 Option not supported) should not be returned).

The following table shows an example of a response when the extension header added to the receiver request is not implemented on the server as "x-playAtOnce".

Table 7-2 When Require Is Specified

Client → Server	Server → Client
PLAY rtsp://srv.com/foo/test.mpeg RTSP/1.0 CSeq: 302 Session: 47112344 Require: x-playAtOnce x-playAtOnce:	RTSP/1.0 551 Option not supported CSeq: 302 Session: 47112344 Unsupported: x-playAtOnce

Table 7-3 When Require Is not Specified

Client → Server	Server → Client
PLAY rtsp://srv.com/foo/test.mpeg RTSP/1.0 CSeq: 302 Session: 47112344 x-playAtOnce:	RTSP/1.0 200 OK CSeq: 302 Session: 47112344

### 7.1.3 RTSP Message in Detail

#### 7.1.3.1 OPTIONS

The VersionSupport header is not described in RFC and notifies the version number of this specification. The following format is used.

VersionSupport: Protocol\_Name/Version

Protocol\_Name = "IPTV" | extension  
Version = major-version "." minor-version  
major-version = 1(DIGIT)  
minor-version = 1(DIGIT)

Versions that are compliant with this specification are protocol-name = IPTV, MajorVersion = 1 and MinorVersion = 3. An example of VersionSupport is shown below.

Example:

VersionSupport: IPTV/1.3

■ Request message

OPTIONS \* RTSP/1.0  
 CSeq: CSeq\_Number

■ Response message

RTSP/1.0 Status\_Code Reason\_Phrase  
 CSeq: CSeq\_Number  
 Public: (List of the set of methods supported by the server)  
 VersionSupport: Protocol\_Name/Version

7.1.3.2 ANNOUNCE

Table 7-4 Event\_Code and Event\_Phrase in Notice Header

Event_Code	Event_Phrase	Operation		Explanation
		Receiver	Server	
2101	End-of-Stream Reached	○	○	Termination of contents playback
2104	Start-of-Stream Reached	○	○	Playback returned to the beginning of contents.
5401	Downstream Failure	○	○	Stream transmission is not possible.
5404	Internal Server Error	○	○	Server error
5501	End-of-Window_term	○	△	Termination of contents publication period
5502	End-of-Contract_term	○	△	Termination of contents contract period

\* The meaning of marks in the Operation fields are as follows:

"○": Used operationally in this specification    "△": Optional in this specification.

## 7.2 Operation of RTP

### 7.2.1 Operation Guideline for Senders

#### Guideline T1.1 (Operation of RTP)

- The number of TS packets with time stamp stored in the RTP packet should be variable between 1 and 7.

### 7.2.2 Operation Guideline for Receivers

#### Guideline R1.1 (Operation of RTP)

- If no error is detected in the transmission system and the marker bit of the RTP header is off, mute operation for video/audio is not performed even when discontinuity occurs with the continuity index (sequence number of the RTP header).

## 7.3 Operation of Streaming

### 7.3.1 Streaming System Model

Figure 38 shows a streaming system model.

In VOD streaming services, a video content server provides contents using unicast. A video content server is composed of an HTTP server that provides the content playback control metafile before streaming, the RTSP function for streaming control and the RTP transmission function for sending streaming signals using unicast. As with IP broadcasting services, the FEC/interleaving function may be used as measures against packet loss on a CDN.

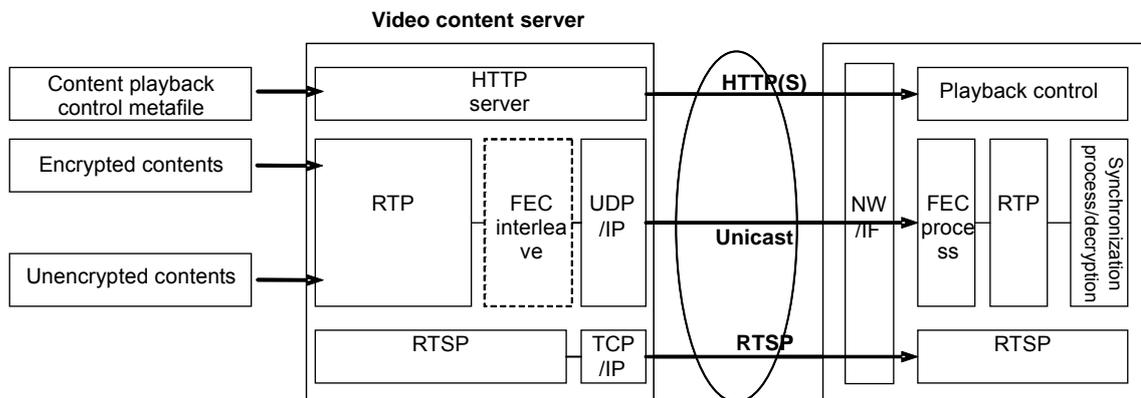


Figure 38 Streaming System Model

### 7.3.2 Detailed Operational Specifications on VOD Streaming Services

#### 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception

- (1) Extension of content playback control metafile  
The extension of the content playback control metafile is "cpc".
- (2) File size for content playback control metafile  
The maximum size is 64 Kbytes.
- (3) Protocol for getting content playback control metafile  
Receivers request acquisition using the HTTP or HTTPS Get method. When LLI is included, HTTPS must be used.
- (4) Transmission/reception of content playback control metafile  
A video content server returns an HTTP response including the module format data defined in IPTVFJ STD-0002 "VOD Specifications", Chapter 5 "Content Playback Control Metafile" and specifying "application/X-arib-contentPlayControl" for Content-Type. Figure 39 shows an example of an HTTP response message when the content playback control metafile is sent and Figure 40 shows an example of the content playback control metafile acquisition sequence.

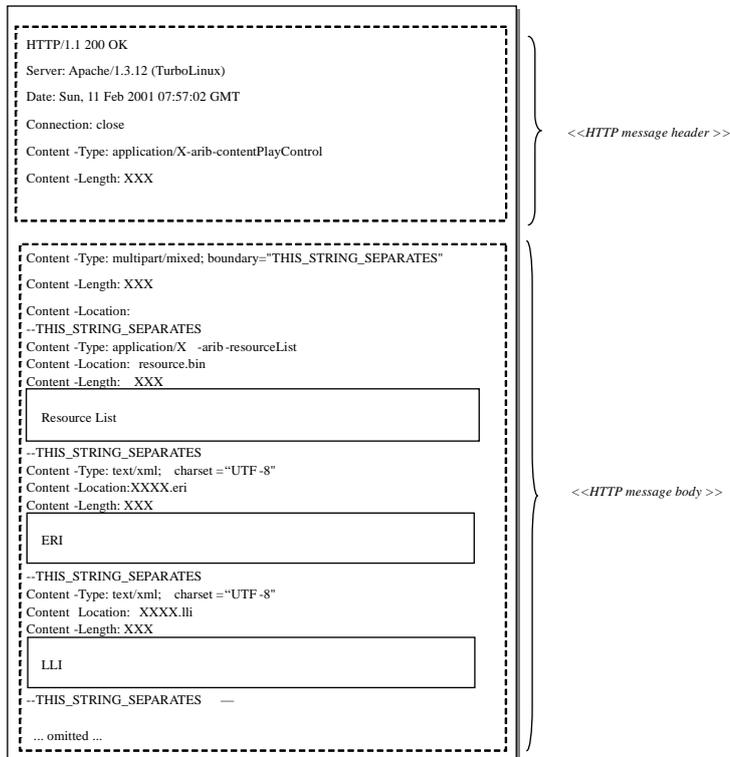


Figure 39 Example of HTTP Response Message When Content Playback Control Metafile Is Obtained

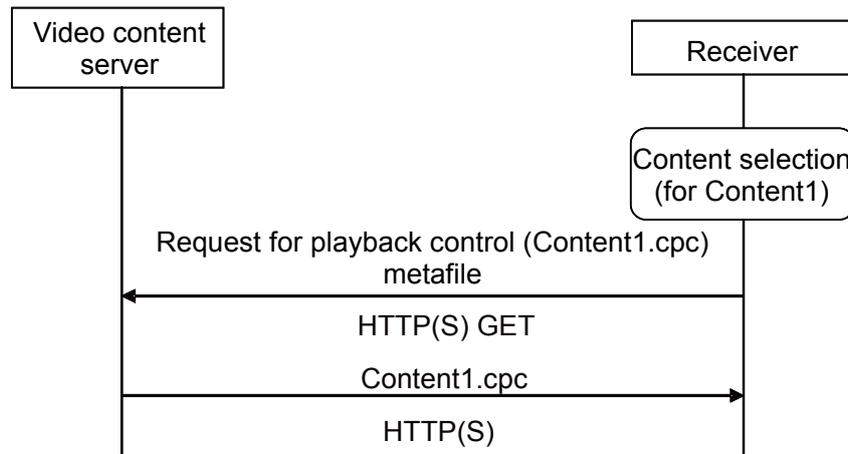


Figure 40 Example of Content Playback Control Metafile Acquisition Sequence

### 7.3.2.2 Detailed Operational Specifications on RTSP Control

The following operational specifications are added to the detailed operational specifications on RTSP control in IPTVFJ STD-0002 "VOD Specifications" for the Range header specification (Start\_Time) with PLAY request when VOD streaming is started from a portal service.

- If the start\_npt argument of the launchIPTVContent() function or the streamposition attribute of the object element are specified for Start\_Time of the npt value in the Range header when a PLAY request is sent for the first time after SETUP, receivers should be set accordingly.
- In case that the PLAY start position is not specified by a portal service or when the Range header is to be set after sending first PLAY Request, the value of Start\_Time in the Range header is implementation-dependent.. However, the value should not exceed end\_time of the content provision range (content length) specified by a description starting with "a=range" of SDP.

### 7.3.2.3 Setting Additional Parameters to URI for Reopening Browser after Termination of Playback

When playback is started using the launchIPTVContent() function of the BML document provided from a portal server, receivers obtain and display the BML document specified by the returned URI specified by the second argument of the launchIPTVContent() function in the browser when playback is terminated. (See 6.4.4.5.2 "Content Startup Function".)

In this case, a query parameter is added to the returned URI as shown below.

#### (1) Adding a query parameter for the VOD end status

A message indicating how VOD streaming playback is terminated is added as a parameter.

The parameter format is as follows.

```

Status=<status_code>
<status_code> Normal termination: 0
  
```

Error: 3XXX (A code in 3000s listed in [Appendix G] "Guidelines on Recommended Behavior of Receivers and Message Examples" based on the reason for VOD playback termination is set as a 4-digit decimal number. "IP" is not added to the beginning of the string. Whether codes are taken from the common codes of the middle classification or the number of small classification items is implementation-dependent. )

The status parameter in the format described above should be added to the returned URI query (<query> portion of 4.1.5.1) after "?". However, when a query parameter already exists in the return URI as the argument of launchIPTVContent(), the Status parameter in the above format should be added as an additional parameter following "&".

(2) Adding of a query parameter for the VOD playback stop position

The NPT value obtained from the PAUSE response before TEARDOWN when VOD streaming playback is terminated is added as a parameter.

The parameter format is as follows.

StopPos=<stop\_time>

According to the specifications defined in IPTVFJ STD-0002 "VOD Specifications", 4.1.1.9 (7) "Specification on Restriction of TEARDOWN from the Playing State", the NPT value obtained from the RTSP PAUSE response header (Range header) that is issued immediately before RTSP TEARDOWN is set for <stop\_time> as a value comprised of a maximum 5-digit integer and 1-digit decimal number in the npt-sec format of NPT (Normal Play Time) that is compliant with RFC2326 ([12.29]).

This parameter is added after the "&" that follows the Status parameter described in the previous section. When VOD playback is not terminated normally (Status=0), this parameter is not added.

Example:

Abnormal termination (when the specified returned URI does not include an existing query)

http://<server\_name>[:<port>]/<path>/return.cgi?Status=xxxx

Abnormal termination (when the specified returned URI includes an existing query)

http://<server\_name>[:<port>]/<path>/return.cgi?unknown\_query=zzz&Status=xxxx

Normal termination (when the specified returned URI does not include an existing query)

http://<server\_name>[:<port>]/<path>/return.cgi?Status=xxxx&StopPos=1024.8

#### 7.3.2.4 RTSP Control and NAT Traversal

When video contents are transmitted using IPv4, NAT traversal should be performed for routers. The procedures for NAT traversal using RTSP control to start content playback are as follows.

First, if information related to video contents is required, receivers obtain the information related to video contents in the SDP format from a video content server using DESCRIBE. Next, receivers perform the NAT traversal process (see [Appendix B] "Specifications on NAT Traversal". Then, receivers perform the playback process including acquisition of the transport parameter using SETUP.

When content playback is stopped, receivers send TEARDOWN to the video content server and then perform the termination process for NAT traversal (see [Appendix B] "Specifications on NAT Traversal").

## 7.4 Operation of Content Playback Control Metafile

The following sections describe the difference between the operational specifications on the content playback control metafile that are specific to CDN scope services and the specifications defined in IPTVFJ STD-0002 "VOD Specifications", 5.3 "Configuration of Content Playback Control Metafile".

### 7.4.1 ERI

For resourceTypeValue, TypeValue=0x1 and SubtypeValue=0x014 are used in the resource list.

For the resolution attribute of the es\_info element, a type number from the following table is specified as the resolution type that combines resolution, scanning and aspect ratio information. However, the type numbers "5" and "6" are not used operationally.

Type number	Resolution, scanning, aspect ratio
"1"	1080i 16:9
"2"	720p 16:9
"3"	480i 16:9
"4"	480i 4:3
"5"	240p 16:9
"6"	240p 4:3

### 7.4.2 LLI

For resourceTypeValue, TypeValue=0x1 and SubtypeValue=0x014 are put in the resource list.

The main requirements for LLI in this specification are as follows.

- Provide information required to obtain a license for reproducing target contents
- Lead securely to an appropriate server from which a license is obtained

For information on each element, see IPTVFJ STD-0002 "VOD Specifications", 5.3.2 "LLI". The license\_description element is not used operationally. Also, the signature value of the target element and the public key certificate required for verification of the signature listed in the signature element should be described as a nonbreaking Base64-encoded value for the signature element and the certificate element, respectively.

### 7.4.3 NCI

For resourceTypeValue, TypeValue=0x1 and SubtypeValue=0x014 are put in the resource list.

The main requirement for NCI is as follows.

- Provide information on the variable speed playback method that can be provided and scale values

Table 7-5 shows the NCI file configuration used for CDN scope services. For information on each element, see IPTVFJ STD-0002 "VOD Specifications", 5.3.3 "NCI". HTTP streaming is not used operationally. Receivers should ignore the elements that are included but are not listed here, and operate properly.

Table 7-5 NCI Document Structure

Item	Explanation	No. of times
<nci>	Overall NCI document	1
<header>		1
<date>	Creation date	1
<time>	Creation time	1
<content_scale>	Notification of the speed value supported by the target content	0..1
<scale_value>	Scale value	1..10
@type	Scale value attribute	1

## 7.5 Operation of Source Encoding

### 7.5.1 Input Signal Specifications

[GOP structure]

The GOP length should be 500 ms as a basic rule. The maximum length should be 1 s.

However, for GOP of H264, follow the specifications defined in IPTVFJ STD-0002 "VOD Specifications", [Appendix A] "Application Specifications of H.264/MPEG-4 AVC".

### 7.5.2 Detailed Operation of MPEG-2 Video

[Encoded parameter restriction]

Encoding for VOD streaming is performed using CBR.

[Range of video encoding rate]

The following range of video encoding is used operationally. However, the bit rate for actual transmission should be determined with consideration given to the image quality.

MP@ML :1.5 to 10Mbps

### 7.5.3 Detailed Operation of H264/MPEG-4 AVC Video

[Encoding parameter restriction]

Encoding for VOD streaming is performed using CBR.

[Range of video encoding rate]

The following range of video encoding is used operationally. However, the bit rate for actual transmission should be determined with consideration given to the image quality.

HPorMP@Level 4.0 :3 to 15Mbps  
 HPorMP@Level 3.0/3.1/3.2 :0.5 to 8Mbps

### 7.5.4 Combination of Video/Audio Encoding Method

The following combinations are used operationally.

	Combination 1 (SD service)	Combination 2 (HD/SD service)
Video encoding	MPEG2 Video	H264/MPEG-4 AVC
Audio encoding	MPEG2-AAC MPEG1-L2	MPEG2-AAC

## 7.6 Operation of Multiplexing

### 7.6.1 Detailed Operation of MPEG-2 Systems

#### 7.6.1.1 Handling of PMT and ES

- (1) The version\_number listed in PMT always indicates 0x00, and ES is not increased/decreased within a service.
- (2) The program\_number value listed in PMT is used to maintain consistency with PAT and does not indicate service\_id.

Audio ES and caption ES may not be transmitted during trick playback such as fast-forwarding playback/fast-rewinding playback, but audio ES and caption ES descriptions are kept in the second loop of PMT. Also, abnormal audio ES and caption ES may be transmitted in trick playback. For more information on operation of TS transmission for variable speed playback, see IPTVFJ STD-0002 "VOD Specifications", Chapter 6 "Video Content".

- (3) Table 7-6 shows the range of PID that is available for PMT\_PID and PCR\_PID, ES\_PID listed in PMT.

Table 7-6 PID Allocation

PID	Description
0x0000–0x002F	Reserved for PSI/SI
0x0030–0x1FFE	Available as PMT_PID, PCR_PID, ES_PID
0x1FFF	Reserved as a null packet

#### 7.6.1.2 Default Maximum Bitrate

In VOD streaming, streams are not output to digital recording devices. Delivery should be performed with consideration given to the default maximum bit rate for each component.

Table 7-7 lists the default maximum bit rate for each component, and Table 7-8 shows the default maximum bit rate for each service.

Table 7-7 Default Maximum Bitrate for Each Component (TS Rate)

Video	1080I	6 to 16 Mbps
	720P	6 to 16 Mbps
	480P	Not used operationally
	480I	1.5 to 8 Mbps
Audio	Standard stereo	Up to 384 kbps
	High-quality sound stereo	Up to 256 kbps
	5.1 channel stereo	Up to 384 kbps
Caption		256 kbps

Table 7-8 Default Maximum Bitrate for TV type (TS Rate)

TV type	1080I	18Mbps
	720P	18Mbps
	480P	Not used operationally
	480I	11Mbps

### 7.6.1.3 Maximum Rate of TS

The maximum value of the TS rate is 18 Mbps. This value should not be exceeded.

## 7.6.2 Multiplexing of Services

### 7.6.2.1 Maximum Number of Services

The maximum number of services for one TS is 1.

Also, in VOD streaming, service IDs are not assigned for each provider.

## 7.6.3 TS Operation Guidelines

The following section describes the guidelines for TS operation on the receiver side.

### 7.6.3.1 Guidelines for Receivers

#### Guideline R1.2 (Operation of TS)

- Unnecessary processes should not be performed when the decoding process is not changed even when the section version number is changed.

#### Guideline R1.3 (Operation of TS)

- Faults should be adjusted without performing the mute process, etc. where possible using other means such as pitch control of the playback clock and skip/repeat process when the PTS difference of the audio PES packet fluctuates between 0 and double before/after switching.

#### Guideline R1.4 (Operation of TS)

- Incomplete sections such as those interrupted in the middle or those starting

from the middle should be discarded, and the next complete sections received should be used.

## 7.6.4 Details of PSI

### 7.6.4.1 Retransmission Cycle of PSI

Table 7-9 shows the retransmission cycle of SI tables. For 500-ms transmissions exceeding the retransmission cycle, consideration should be given so that the retransmission process is performed.

Also, the maximum transmission interval is double the retransmission cycle for sections. However, when the I-frame method is used for variable speed playback, the retransmission cycle specifications are not applicable.

Table 7-9 PSI Retransmission Cycle

Periodic group	Retransmission Cycle (seconds)
PAT	0.1
PMT	0.1

## 7.7 Operational Guidelines for VOD Service Provider

In order to realize stable playback of VOD contents on receivers, it is assumed that receivers receive packets by satisfying the following formula when the packets are transmitted from a video content server (VOD streaming) via a network. The values of T, x and y are determined by receiver manufacturers and service providers independently and are not included in the receiver/server design requirements. However, it is desirable that service providers operate services based on these values.

$$T - x \cdot T - y < t < T + x \cdot T + y$$

T: Streaming time [hour]

T Indicates the time difference between TTS time stamp values at two given points of the received stream. It is assumed that this value is 4 hours or less for most VOD contents.

t: The time a receiver actually received the packet included in T time

t indicates the time that the packet corresponding to the time range of T is actually transmitted.

x: Factor indicating the accuracy of the server transmission system clock [ms/hour] (Note 1)

In order to realize stable and prompt stream reception and playback on receivers, it is desirable to set this value to 108, the same value used for IP broadcasting service transmission. However, it is acceptable to have approximately 180 when operation of the transmission server is difficult in the foreseeable future.

y: Jitter for packet reception [ms]

This is the total value of jitter that occurs on the video content server and network. In order to realize stable and prompt reception and playback of streams on receivers, it is desirable to set this value to 100 or less. However, it is acceptable to have approximately 300 when operation of the transmission server is difficult in the foreseeable future.

(Note 1) This factor does not include clock errors, such as PCR accuracy, that VOD contents themselves have.

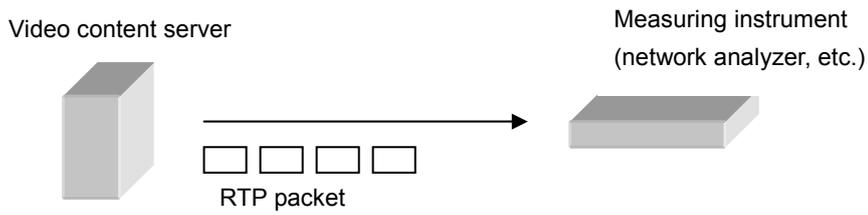
The burstiness of packets that receivers receive should be

"up to 3125 KB/second (25 Mbps\*) (however 157 KB  $\pm$  100% per 50 ms)".

As a basic rule, the burst per 50 ms should not be continuous on one end.

\* The value based on the data amount of Ethernet packet when PromPEG 2D FEC is implemented at a TS rate of 18 Mbps.

Next, a method to verify whether the above guidelines are satisfied is described below with an example. Figure 41 shows the measurement method. The video content sever (VOD streaming) and a measuring instrument such as a network analyzer are connected directly, and the transmitted streams are directly received by the network analyzer. The compliance with the guidelines can be verified based on the TTS time stamp information included in the received packet and the information on the actual packet reception time.



Packet reception time	TTS time stamp value
T(0)	TTS(a1) – TTS(an) (Note 2)
:	:
T(1)	TTS(b1) – TTS(bn)
:	:

When the time difference between TTS(bn) and TTS(a1) is T(ab)[hour], measurement is possible by verifying

$$T(ab) - x \cdot T(ab) - y < T(1) - T(0) < T(ab) + x \cdot T(ab) + y$$

Figure 41 Example of Video Content Server (VOD streaming) Delivery Quality Measurement Method

## 7.8 Operation of ECG

### 7.8.1 Purchased Content Package Information File

This section defines purchased content package information files which are used to notify receivers of content viewing availability when receivers obtain information on subscribing/purchased packages to present contract information for the contents in ECG. A purchased content package information file is provided for each service provider and written in XML format. XML version 1.0 is used. The extension is ppi. The maximum size of a purchased content package information file is 64 KByte.

Table 7-10 shows the structure of a purchased content package information file. Receivers should ignore the elements that are included but are not listed here, and operate properly.

Table 7-10 Structure of Purchased Content Package Information File

Item	Description	Number of times
<purchase_package_main>	Purchased content package information	1
<package>		1..n
<purchase_id>	purchaseId of purchased content package	1
<valid_start_date>	Use start date	1
<valid_end_date>	Use end date	1
<license>		0..n
<license_id>	License ID	1
<license_expire_date>	License expiration date	1
<select_expire_date>	License reset date	1

1) purchase\_id element

- This element stores the purchaseId of the purchased content package.

purchase\_id  
24 Byte or less. See Chapter 7 "Operation of VOD".

2) valid\_start\_date element and valid\_end\_date element

- These elements store the use start date and end date of the target content package, respectively.

valid\_start\_date      YYYYMMDDhhmmss  
 YYYYMMDDhhmmss: Describes the use start date of the target package  
 Each part takes an integer as shown below to indicate a consistent time.  
 YYYY: 0001 to 9999  
 MM: 01 to 12  
 DD: 01 to 31  
 hh: 00 to 23

mm: 00 to 59  
ss: 00 to 59  
valid\_end\_date      YYYYMMDDhhmmss  
YYYYMMDDhhmmss: Describes the use end date of the target content package  
Each part takes an integer as shown below to indicate a consistent time.  
YYYY: 0001 to 9999  
MM: 01 to 12  
DD: 01 to 31  
hh: 00 to 23  
mm: 00 to 59  
ss: 00 to 59

3) license element

- This element is used for purchased content packages using the target GroupID to identify a select package.

license 0..n  
No element: The content package using the target GroupID is not a select package.  
With element: The content package using the target GroupID is a select package.

4) license\_id element

- This element stores the LicenseID of individual licenses in a select package.

license\_id  
license\_id: License ID is specified as a 16-digit hexadecimal value. ("0x" is not required) .

5) license\_expire\_date element

- This element stores the license expiration date defined in <license\_id> described above.

license\_expire\_date      YYYYMMDDhhmmss  
YYYYMMDDhhmmss: Describes the expiration date of the target license  
Each part takes an integer as shown below to indicate a consistent time.  
YYYY: 0001 to 9999  
MM: 01 to 12  
DD: 01 to 31  
hh: 00 to 23  
mm: 00 to 59  
ss: 00 to 59

6) select\_expire\_date element

- This element stores the select expiration date for the license described above.

```
select_expire_date    MMMMMMM
    MMMMMMM: A decimal integer value, the expiration date is described as the
    number of minutes.
```

## 7.8.2 Operation of Purchased Content Package Information

### 7.8.2.1 Provision of Content Package Information by Purchased Content Package Information Server

Service providers who manage metadata servers should operate a purchased content package information server and send purchased content package information files used in ECG.

The URI for a purchased content package information file is provided as the `<purchase_package_info_url>` value in the PF configuration information file.

### 7.8.2.2 Reception of Purchased Content Package Information File

Receivers can connect to a purchased content package information server specified in the PF configuration information and obtain the purchased content package information file defined in 7.8.1 "Purchased Content Package Information File". Receivers should send a HTTPS GET request to obtain the file.

Purchased content package information servers use the HTTP authentication method defined in 5.5.8 (2) "Simple authentication" to identify the user to whom a purchased content package information file should be sent.

15 seconds should be regarded as sufficient time to obtain purchased content package information. Behavior of receivers when no response is returned after 15 seconds is implementation-dependent. It is desirable that receivers retry acquisition several times at regular intervals.

## 7.9 Assuring Quality of Service

### 7.9.1 Quality of Streaming Service

In streaming transmission, video/audio can be disturbed due to clock drift caused by packet loss on the network and asynchronous communication. Therefore, in order to realize stable long-term playback, it is desirable that service providers and receivers implement the following measures to improve streaming quality.

Realization of long-term stable playback assumes that a receiver can receive TS streams stably with no packet loss for about a week in a stationary state without congestion.

#### 7.9.1.1 FEC

In order to transmit streams that realize long-term stable playback, it is recommended that transmission servers be equipped with Pro-MPEG 1D FEC or higher as needed out of consideration for the quality of the communication network to be used. It is also recommended that receivers be equipped at least with Pro-MPEG 1D FEC.

#### 7.9.1.2 Clock Synchronization

Unlike RF transmission using radio waves, asynchronous communication is used for IP transmission, which makes the explicit transmission of clock information difficult. However, in order to realize long-term stable playback, the mechanism for clock synchronization between the sender side and receiver side is important.

Since IP transmission systems are best-effort systems, a robust mechanism that assumes various disturbances such as packet loss, jitter and burst is required.

In this specification, the TS (TTS) with a 4-byte, 27-MHz base time stamp added at the beginning of each TS packet (188-byte) defined in ARIB STD-B24 is implemented with the objective of improving performance/accuracy, and promoting compliance with other standards, etc.

Figure 42 shows clock synchronization between the sender side and receiver side using TTS.

27MHz of the added time stamp should be synchronized with the PCR held by the TS. The receiver side should be equipped with the TTS decoding function, store the received TTS packets in the FIFO memory for buffering, and perform the gating process for output by comparing the local counter value, which is subordinate to and synchronized with the 27-MHz information on the sender side and provided by the time stamp and the time stamp value of the TTS packet in the FIFO memory.

Since multiple sessions occur simultaneously in VOD, it is not realistic to perform the TTS process in real time for each session. It is assumed that TTS time stamps are added in advance.

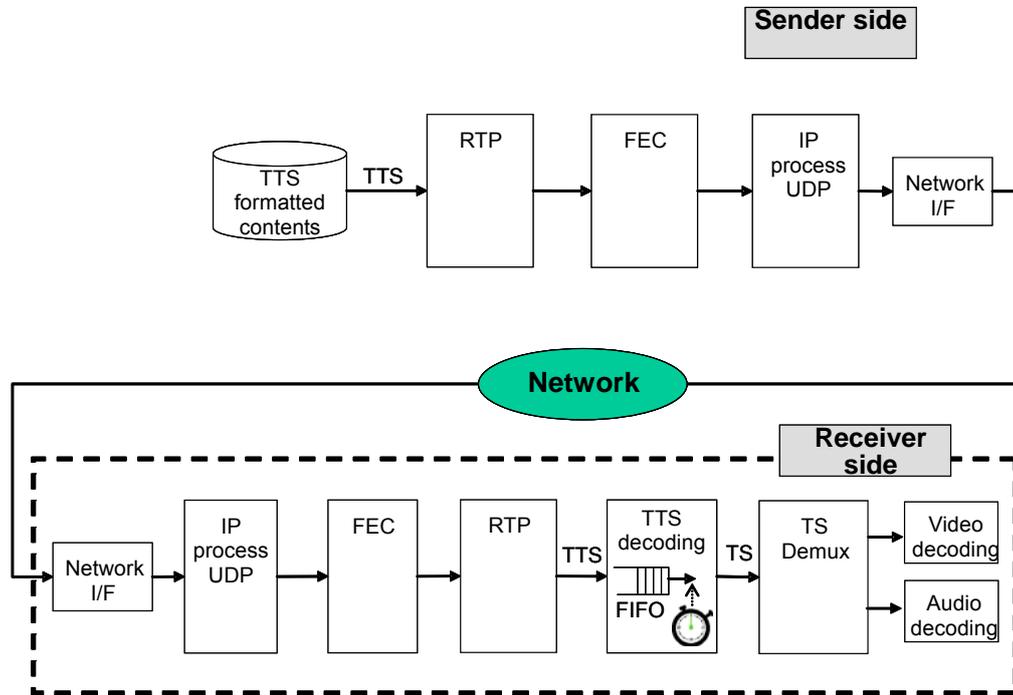


Figure 42 System Configuration Related to Clock Synchronization

## 7.10 Operation of DRM

### 7.10.1 Getting CRL

The CRL should be obtained by accessing the CRL delivery URI defined in the Marlin Trust Management Document – for IPTV-ES 1.3, 1.4 CRL Distribution Points. When the CRL delivery URI (`crl_url`) is specified in the PF configuration information, the CRL can be obtained from this URI.

### 7.10.2 Verification of Valid DRM

When the `drm_system` element value of the LLI in the content playback control metafile is invalid (or a value other than 'marlin\_ip\_tv\_es' when the Marlin IPTV-ES system is applied) in the specifications defined in IPTVFJ STD-0002 "VOD Specifications", 7.3.6 "Verification of Valid DRM System", license acquisition and playback operation following the acquisition should not be performed.

### 7.10.3 Getting Reliable Clock Time

When the Get Trusted Time Protocol, as defined in the Marlin IPTV-ES/J Specific Compliance Rules for VOD Services 6.2, and Marlin IPTV-ES/J Specific Compliance Rules for IP Multicast Services 6.2, is used as the method to obtain a rationally accurate clock time in the specifications defined in IPTVFJ STD-0002 "VOD Specifications", 7.3.8 "Getting Reliable Clock Time", it is recommended that clock time information be obtained with a license using Packed Message. Clock time information can also be obtained on demand. In this case, it is desirable for receivers to obtain the information after at least 24 hours have passed since the last acquisition out of consideration for the server load. Also, it is desirable to comply with the guidelines on access to information servers described in [Appendix K] "Guidelines on Triggers to Access Information Servers".

## 7.11 ECG Metadata

### 7.11.1 Outline of Metadata Operation

#### 7.11.1.1 Definition and Positioning of Metadata

In VOD, the description language type metadata defined in ARIB STD-B38 3.1 "Description Language Type Metadata" is used for metadata. Hereinafter, "metadata" refers to the description language type metadata.

Metadata in these specifications is prerequisite data that is referred freely from receiver applications for presentation, etc. Metadata is not assumed to be protected and sent as a part of the contents, or to be encrypted like contents and sent..

In this operational specifications, operation of metadata by service providers is not required. Also, whether receivers provide a function to obtain and present metadata (ECG described later) is implementation-dependent.

#### 7.11.1.2 Metadata Description Language

Metadata description language should be based on ARIB STD-B38 3.1 "Description Language Type Metadata".

#### 7.11.1.3 Targeted Applications on Receiver

Receiver applications by which metadata is intended to be used in these specifications are described below. For the definition and details of applications, see IPTVFJ STD-0002 "VOD Specifications", Chapter 3 "Receiver Model".

(1) ECG

ECG(Electronic Contents Guide) is intended to be the typical receiver application that uses metadata.

(2) Other

Applications using information that requires VOD content chaptering(chapter titles, relative position, etc.) is intended to use content playback control metafile at this time, not to use metadata.

#### 7.11.1.4 Relationship between Content Packages/Contents Model and Metadata Model

This section describes the relationship between content packages and contents models that are described using metadata and metadata elements in VOD services. For more information on content packages/contents in the CDN scope, see Chapter 2 "Overview".

(1) Content

A content is a logical unit that is intended for information presentation, and playback/management/copyright protection using a receiver application. In VOD services, it is assumed that every content consists of single video typically.

Contents are identified by the content reference identifier defined in 7.11.3.1 "Operation of Content Reference Identifier (CRID)".

Information on content is described using content description metadata called the program information element (ProgramInformation).

(2) Instance

An instance is physical entity of a content.

Information about instance is described in OnDemandProgram fragment in ECG metadata. .

(3) License

A license is a grants to use contents. Multiple licenses may apply to a single content(for example, different use conditions can be applied for a single content such as duration of use being three days and two nights, a week, etc.). Licenses are identified using license ID.

In VOD services, it is assumed that a license is issued to receivers per viewing on the DRM server. However, a license here does not refer to this but means "grants to use" for individual contents that are obtained by users through purchase (service subscription).

Information about a license is described in LicenseInformation fragment in ECG metadata.

(4) Content Package

A content package is a unit representing a group of multiple contents and is used as a purchase (service subscription) unit, etc. One content package can include multiple contents through a license. Also, multiple licenses for a single content can belong to different content packages. Content packages are identified using purchase identifiers (purchaseId).

In VOD services, the following four package types are operated.

(i) Single item

A content package comprised of a single content.

(ii) Pack

A content package comprised of multiple contents. The combination of contents (components) is fixed when a package is defined.

(iii) Select

A content package comprised of multiple contents. The combination of contents (components) is not fixed. For example, contents can be changed monthly. The number of viewable contents in the content package is limited (for example, any five contents are viewable in a given month).

(iv) Unlimited

A content package comprised of multiple contents. The combination of contents (components) is not fixed. For example, contents can be changed monthly. The number of viewable contents in the package is not limited.

Information on a content package is described using the PurchaseInformation fragment and ProgramInformation fragment for single item packages, and using the PurchaseInformation fragment and the GroupInformation fragment for other packages. Information particular to the content package type is described in the PurchaseInformation fragment, and information that does not depend on the content

package type is described in the ProgramInformation fragment or the GroupInformation fragment..

(5) Group

A group is a unit representing a group of multiple contents and used to indicate content series and packages.

Groups are identified by the group reference identifier defined in 7.11.3.1 "Operation of Content Reference Identifier (CRID)"

Information on a group is described using content description metadata of GroupInformation fragment.

#### 7.11.1.5 Operation of Identification Information

In VOD services, contents are identified uniquely using content reference identifiers defined in 7.11.3.1 "Operation of Content Reference Identifier (CRID)". Operation specifications on location resolution to obtain the physical location of contents from the identifiers are defined in 7.11.3.2 "Operation of Location Resolution".

#### 7.11.1.6 Metadata System Reference Model

Figure 43 shows the metadata system reference model.

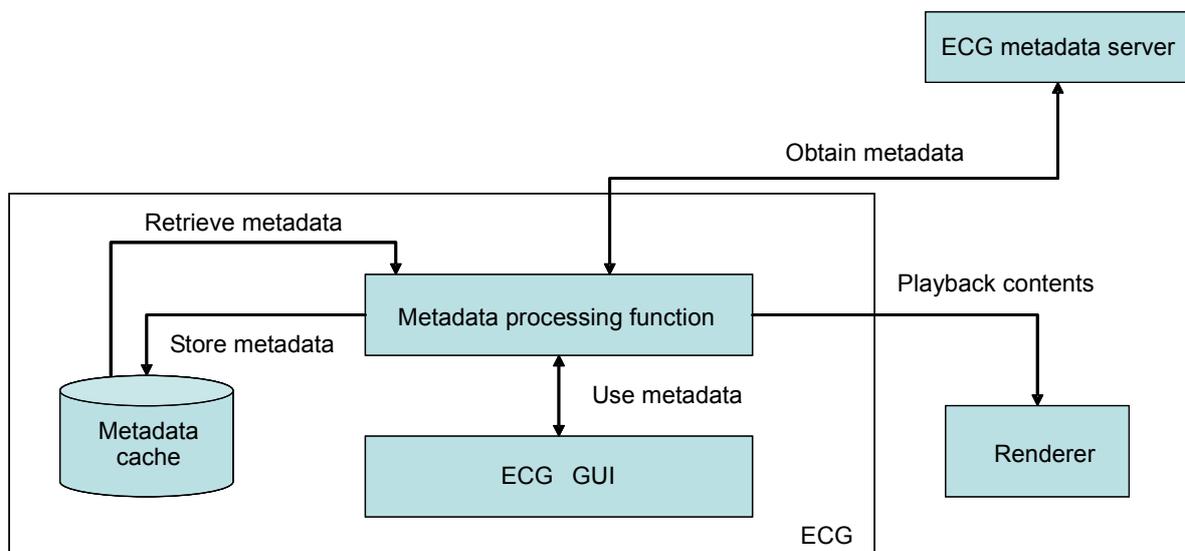


Figure 43 Metadata System Reference Model

This reference model is created based on the system reference model shown in "ARIB STD-B38" in accordance with the operational specifications discussed in this document. Requirements not explicitly defined in this specification are considered to be according to "ARIB STD-B38".

Table 7-11 shows the components of the reference model.

Table 7-11 Components of Metadata System Reference Model

Component	Function
Metadata processing function	A function on receiver that receives metadata and manages locations
Metadata cache	Receiver internal storage for caching metadata
ECG GUI	A receiver function to provide a user interface using metadata such as contents search and display (A browser can also provide this function using metadata.)
Renderer	A receiver function to play back contents

■ **Getting metadata:**

Getting metadata is defined in 7.11.5 "Operation of Metadata Delivery Method".

■ **Metadata cache:**

The cache function for metadata is implementation-dependent. These operational specifications assume the receivers both with and without metadata cache functions. For more information, see 7.11.6 "Metadata Cache Control".

■ **Retrieving metadata:**

Retrieving cached metadata is implementation-dependent. These operational specifications assume the receivers both with and without metadata cache functions. For more information, see 7.11.6 "Metadata Cache Control".

■ **Use of metadata:**

For information on the use of metadata in ECG, see IPTVFJ STD-0002 "VOD Specifications", Chapter 3 "Receiver Model" and [Appendix Z] "Annotation: Correspondence between ECG Screen Items and ECG Metadata Elements". (Use of metadata from the BML is defined in Chapter 5 "Service Entry and Related Specifications".)

■ **Content playback:**

The metadata processing function of ECG instructs the renderer to play back contents, and contents are played back. The operations and other topics related to content startup are described in "VOD Specifications", Chapter 2 "Overview".



characters (in the order of CARRIAGE RETURN + LINE FEED) and counted as 2 characters, 2 bytes.

### 7.11.2.2 Operation of Metadata Namespace

The namespace of the metadata description scheme should be "http://www.iptvforum.jp/metadata/tva/2008/07". This is a namespace that is defined by extending the schema based on the schema of the namespace defined in ARIB STD-B38 3.2.1 "Metadata Namespace" to introduce the elements/attributes that are newly added in these specifications. The extended schema is shown in [Appendix E] "Specifications on XML Extension Schema".

### 7.11.2.3 Operation of Metadata Document

The elements/attributes shown in Table 7-13 are used operationally among the metadata document elements/attributes defined in ARIB STD-B38 3.2.7.1 "Information Table". This metadata document includes LicenseInformationTable that is not discussed in "ARIB STD-B38". This is an element that is introduced in 7.11.2.2 "Operation of Metadata Namespace" to store license reference information. The metadata document defined in this document stores the table elements ClassificationSchemeTable, ProgramInformationTable, GroupInformationTable, ProgramLocationTable, ProgramReviewTable, PurchaseInformationTable and LicenseInformationTable.

The elements that are included in the schema but not listed in the tables in this chapter are regarded as non-operated items in which the occurrence column of the element is 0 within the scope of this document.

Also, the occurrence column of the elements(operation) indicates the occurrence column of the elements under the condition in which the parent of the element/attribute occurs.

Table 7-13 Operation of Metadata in Fragment-Separate Format

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
TVAMain				
@xml:lang	0..1	1	always "ja"	
@publisher	0..1	1	Up to 127 bytes	Note 1
CopyrightNotice	0..1	0..1	Up to 300 byte CJK characters, or 900 bytes. SP allowed. CR and LF not allowed.	Note 2 See "7.11.2.1.2"
ClassificationSchemeTable	0..1	0..1		Note 3
@xml:lang	0..1	0..1		
ClassificationScheme	1	1		See Table 7-14
ProgramDescription	0..1	0..1		
ProgramInformationTable	0..1	0..1		

		ProgramInformation	0..∞	1		See Table 7-15
		GroupInformationTable	0..1	0..1		
		GroupInformation	0.. ∞	1		See Table 7-35
		ProgramLocationTable	0..1	0..1		
		OnDemandProgram	0.. ∞	1		See Table 7-56
		ProgramReviewTable	0.. ∞	0..1		
		Review	0.. ∞	1		See Table 7-53
		PurchaseInformationTable	0.. ∞	0..1		注 4)
		PurchaseInformation	0.. ∞	1		See Table 7-54
		LicenseInformationTable	-	0..1		Note 4
		LicenseInformation	-	1		See Table 7-58

Note: In metadata in fragment-separate format, only one of the following combinations exists: "combination of ClassificationSchemeTable+ClassificationScheme", "combination of ProgramInformationTable+ProgramInformation", "combination of GroupInformationTable+GroupInformation", "combination of ProgramLocationTable+BroadcastEvent", "combination of ProgramLocationTable+OnDemandProgram", "combination of ProgramReviewTable+Review", "combination of PurchaseInformationTable+PurchaseInformation", "combination of LicenseInformationTable+LicenseInformation".

Note 1: Value of publisher element must be authority defined in section 7.11.3.1.2 "Operation of Authority (<authority>)".

Note 2: This is copyright notice of the metadata itself. Not used by receivers.

Note 3: ClassificationScheme is definition of classification scheme. This is not returned as the result of query for metadata.

Note 4: When the transmission unit is the CRID unit (fragments associated with the same CRID are stored in a single TVAMain), up to 10 items are described.

Figure 44 is reference diagram among fragments in metadata.

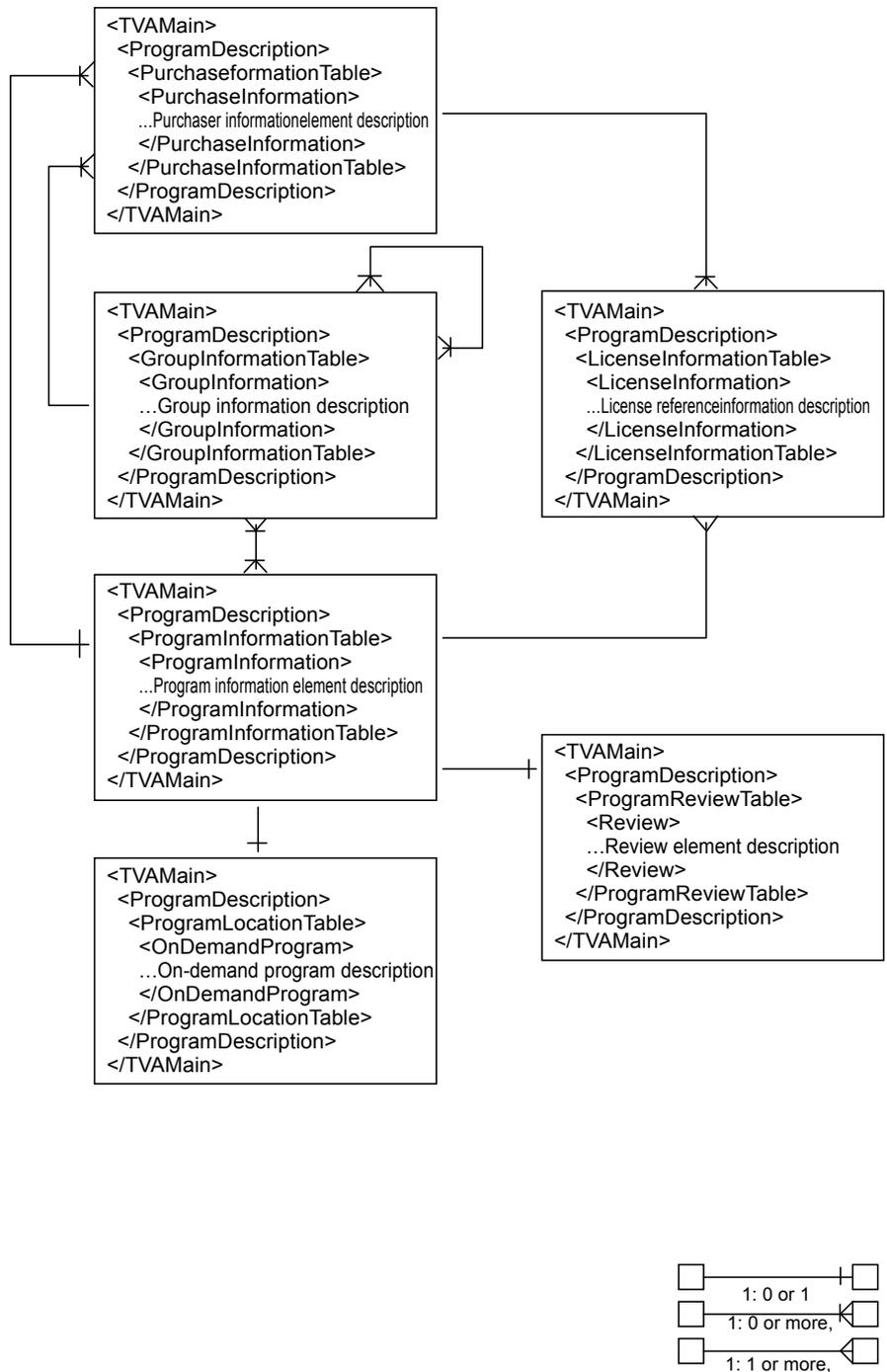


Figure 44 Reference Diagram among Fragments in Metadata

#### 7.11.2.4 Operation of Content Description Metadata

This section defines the operation of the ClassificationScheme, ProgramInformation, GroupInformation, Review and PurchaseInformation fragments among the content description metadata defined in ARIB STD-B38 3.2.3 "Content Description Metadata".

##### 7.11.2.4.1 Operation of Classification Scheme Fragments

The elements/attributes listed in Table 7-14 are used operationally among the fragments defined in ARIB STD-B38 3.2.3.1 "Classification Scheme".

Table 7-14 Operation of Classification Scheme

Element/attribute name		Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Classification Scheme					
	@fragmentId	0..1	1	10-digit hexadecimal integer (10 characters)	Note 1 See "7.11.4.4.1".
	@fragmentVersion	0..1	1	14-digit decimal number (14 characters)	Note 1 See "7.11.4.4.3".
	@fragmentExpirationDate	0..1	0..1	Specify in YYYY-MM-DDT hh:mm:ss+09:00 format (25 bytes)	See "7.11.6.4.2".
	@uri	1	1		
	Term	1..∞	1..1024		
	@termId	1	1	Up to 16 bytes. SP, CR and LF not allowed.	See "7.11.2.1.2".
	Name	0..∞	0..3	Up to 32 CJK characters, or 96 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2".
	@xml:lang	0..1	0..1	One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese),	

					"ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	
		Definition	0..∞	0..3	Up to 128 CJK characters, and up to 384 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2".
		@xml:lang	0..1	0..1	One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	

Note 1: There are no two ClassificationSchemes that have the same uri and different fragmentId. Even when fragmentVersion is renewed under the same fragmentId, the uri is not changed.

## 7.11.2.4.2 Operation of Program Information Fragments

The elements/attributes listed in Table 7-15 are used operationally among the fragments defined in ARIB STD-B38 3.2.3.6 "Program Information".

Table 7-15 Operation of ProgramInformation

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
<b>ProgramInformation</b>				
@programId	1	1	Up to 255 bytes	Note 1 See "7.11.3.1".
@fragmentId	0..1	1	10-digit hexadecimal integer (10 characters)	Note 1 See "7.11.4.4.1".
@fragmentVersion	0..1	1	14-digit decimal number (14 characters)	Note 1 See "7.11.4.4.3".
@fragmentExpirationDate	0..1	0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	See "7.11.6.4.2".
BasicDescription	1	1		See Table 7-16
OtherIdentifier	0..∞	0..1		See Table 7-33
AVAttributes	0..1	0..1		See Table 7-34
MemberOf	0..∞	0..20		
@crid	1	1	Up to 255 bytes	See 7.11.3.1".
@index	0..1	0..1	5-digit decimal number (5 characters) (0 to 65535)	
@xsi:type	1	1	"MemberOfType" (Add the namespace prefix if needed)	
Period	-	0..3		Added in these specifications
@type	-	1	One of the following, "display" (display period), "availability" (delivery period) and "new_arrival" (new arrival)	

				period). Up to 12 bytes.	
	Start	-	1	Specify in YYYY-MM-DDTh h:mm:ss+09:00 format (25 bytes)	
	End	-	0..1	Specify in YYYY-MM-DDTh h:mm:ss+09:00 format (25 bytes)	

Note 1: There are no two ProgramInformation that have the same programId and different fragmentId. Even when fragmentVersion is renewed under the same fragmentId, programId is not changed.

Table 7-16 Operation of ProgramInformation/BasicDescription

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
BasicDescription				
Title	0..∞	2..6		See Table 7-17
MediaTitle	0..∞	0..1		
TitleImage	0..1	0..1		See Table 7-18
TitleVideo	0..1	0..1		See Table 7-19
Synopsis	0..∞	0..3		See Table 7-20
PromotionalInformation	0..∞	0..1		See Table 7-21
Keyword	0..∞	0..20		See Table 7-22
Genre	0..∞	0..20		See Table 7-23
ParentalGuidance	0..1	1		See Table 7-24
Language	0..∞	0..4		See Table 7-25
CaptionLanguage	0..∞	0..2		See Table 7-26
SignLanguage	0..∞	0..1		See Table 7-27
CreditsList	0..1	0..1		See Table 7-28
RelatedMaterial	0..∞	0..20		See Table 7-29
ProductionDate	0..1	0..1		See Table 7-30
ReleaseInformation	0..∞	0..1		See Table 7-31
Duration	0..1	0..1	Specify in PThhHmmMssS format	
PurchaseList	0..1	0..1		See Table 7-32

Table 7-17 Operation of ProgramInformation/BasicDescription/Title

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Title			Up to 128 CJK characters, or 384 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2".
@type	0..1	1	One of the following, "main", "alternative", "popular", "seriesTitle" and "episodeTitle". Up to 12 bytes.	

Note: Only 1 title element with @type=main is required, and only 1 title element with @type=alternative is required. Up to 3 title elements with @type="popular" can be used. @type="main" describes the title string for presentation. @type="alternative" describes the reading for the title string and is used as a search key and a sort key when sorting. Also, @type="popular" is an attribute that is specified when there are 2 or more readings and is used as a search key but not as a sort key. For more information on readings, see [Appendix E] "Specifications on XML Extension Schema".  
The processing of Title when @type="seriesTitle" and @type="episodeTitle" is implementation-dependent.

Table 7-18 Operation of ProgramInformation/BasicDescription/MediaTitle/TitleImage

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
TitleImage				
MediaUri	1	1	Up to 255 bytes	
CopyrightNotice	-	0..1	Up to 150 bytes. Up to 50 CJK characters. SP allowed. CR and LF not allowed.	Added in these specifications Note 1 See "7.11.2.1.2"

Note: TitleImage specifies a still picture used for thumbnail display, etc. This still picture is not encrypted.

Reduction of image size is allowed for thumbnail image displays, but enlargement and change of the aspect ratio are not allowed. When using thumbnail images, the maximum image size should be about 480×270, and it is recommended that PNG or JPG be used as the image format.

Note 1: For more information on the CDN scope operation, see "CDN Scope Service Approach Specifications".

Table 7-19 Operation of ProgramInformation/BasicDescription/MediaTitle/TitleVideo

Element/attribute name	Occurrence	Occurrence	Length/Range	Note
------------------------	------------	------------	--------------	------

	(B38)	(IPTV)		
TitleVideo				
MediaUri	1	1	Up to 255 bytes	
CopyrightNotice	-	0..1	Up to 150 bytes. Up to 50 CJK characters. SP allowed. CR and LF not allowed.	Added in these specifications Note 1 See "7.11.2.1.2"

Note: TitleVideo specifies contents used for preview display, etc. MediaUri describes the locator of the VOD contents.

Note 1: For more information on the CDN scope operation, see "CDN Scope Service Approach Specifications".

Table 7-20 Operation of ProgramInformation/BasicDescription/Synopsis

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Synopsis			Up to 408 CJK characters, or 1224 bytes. SP, CR and LF allowed.	Note 1 See "7.11.2.1.2"
@length	0..1	1	One of the following, "short", "long" and "medium". Up to 6 bytes.	

Note: Up to 25 characters, up to 75 bytes when @length is "short". Up to 100 characters, up to 300 bytes when @length is "medium". Up to 408 characters, up to 1,224 bytes when @length is "long".

Table 7-21 Operation of ProgramInformation/BasicDescription/PromotionalInformation

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
PromotionalInformation			Up to 200 CJK characters, or 600 bytes. SP, CR and LF allowed.	See "7.11.2.1.2"
@href	-	0..1	IPTVSERVICEPromotionalTypeCS	Added in these specifications See [Appendix D] D.6.

Table 7-22 Operation of ProgramInformation/BasicDescription/Keyword

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Keyword			Up to 40 CJK characters, or 120 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
@type	0..1	0..1	One of the following, "main" (main), "secondary" (secondary) and "other" (supplemental). Only 1 "main".	Note 1

Note 1: In ECG, keywords specified as "main" or "secondary" can be used for presentation, but keywords specified as "other" should not be used for presentation. When it is not specified, it is regarded as "main". When there is 1 keyword, the type can be omitted, but when there are multiple keywords, type description is required.

Table 7-23 Operation of ProgramInformation/BasicDescription/Genre

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Genre				
@href	1	1	One of the items in ARIBGenreCS or IPTVSERVICEGenreCS (when @type=main, secondary) and provider-specific GenreCS (when @type=other).	See [Appendix D] D.1
@type	0..1	0..1	One of the following, "main" (main), "secondary" (secondary) and other". Only 1 "main".	Note 1

Note 1: When only one genre is presented/used for list presentation, etc. in ECG, those with "main" specified are given priority. When there is 1 Genre element, @type can be omitted, but when there are multiple Genre elements, @type description is required. When ARIBGenreCS is specified, the first should take "main" and the second and onwards should take "secondary". The processing of Genre elements of which @type="other" is implementation-dependent.

Table 7-24 Operation of ProgramInformation/BasicDescription/ParentalGuidance

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
ParentalGuidance				
Select from (1) and (2)	1	1		
(1) ParentalRating	1	1		
@href	1	1	One of the items in ARIBParentalRatingCS	See [Appendix D] D.2

Table 7-25 Operation of ProgramInformation/BasicDescription/Language

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Language			One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	

Table 7-26 Operation of ProgramInformation/BasicDescription/CaptionLanguage

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
CaptionLanguage			One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	
@closed	0..1	1		
@description	-	0..1	Up to 33 bytes. SP allowed. CR and LF not allowed.	Added in these specifications. See "7.11.2.1.2"

Table 7-27 Operation of ProgramInformation/BasicDescription/SignLanguage

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
SignLanguage			One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	Sign language is described.
@primary	0..1	0..1		
@translation	0..1	0..1		

Table 7-28 Operation of ProgramInformation/BasicDescription/CreditsList

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
CreditsList				
CreditsItem	0..∞	1-20		
@role	1	1	One of the items in IPTVSERVICERoleCS or the items in service provider-specific classificationscheme.	See [Appendix D] D.7
PersonName	0..∞	1..5		
@type	0..1	0..1	One of the following, "main", "variant" and "former". Up to 7 bytes. Only 1 "main". Note 1	
GivenName	1..∞	1	Up to 100 CJK characters, or 300 bytes. SP allowed. CR and LF not allowed.	A full name is described. See "7.11.2.1.2"
@abbrev	0..1	0..1	Up to 16 CJK characters, or 48 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
Character	0..∞	0..1		
GivenName	1..∞	1	Up to 100 CJK characters, or 300 bytes. SP allowed. CR and LF not allowed.	A full name is described. See "7.11.2.1.2"
@abbrev	0..1	0..1	Up to 16 CJK characters, or 48 bytes.	



Table 7-29 Operation of ProgramInformation/BasicDescription/RelatedMaterial

Element/attribute name		Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
RelatedMaterial					
	HowRelated	0..1	1		
	@href	1	0..1 Note 1	One of the items in IPTVSERVICEHowRelatedCS and the provider-specific RelatedCS. Note 6	See [Appendix D] D.3
	Name	0..1	0..1 Note 1	Up to 32 CJK characters, or 96 bytes. Note 2 SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
	Format	0..1	0..1		
	@href	1	1	One of the items in IPTVSERVICEFileFormatCS and the provider-specific CS. Note 6	See [Appendix D] D.10
	MediaLocator	1	1		
	MediaUri	0..1	1	Up to 255 bytes.	Note 3
	PromotionalText	0..∞	0..1	Up to 3,000 bytes. SP, CR and LF allowed.	Note 4 See "7.11.2.1.2"
	PromotionalMedia	0..∞	0..1		Note 5
	TitleImage	0..1	1		See Table 7-18

Note 1: The Name element shall be specified when @href is not specified. However, the behavior of receivers is implementation-dependent.

Note 2: The process related to the specified Name is implementation-dependent (independently defined by service providers).

Note 3: The URI to be referenced is specified. Content or the URL of BML file is specified. The relationship with the reference destination is specified by the dictionary item of IPTVSERVICEHowRelatedCS of HowRelated/@href. The same dictionary item (relationship) can be specified for multiple reference destinations.

Note 4: Promo words, etc. are described for the entity specified in MediaLocator/Uri.

Note 5: A thumbnail still picture file is specified for the entity specified in MediaLocator/Uri.

Note 6: The process performed by receivers when the provider-specific CS is specified is implementation-dependent.

Table 7-30 Operation of ProgramInformation/BasicDescription/ProductionDate

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
ProductionDate				
TimePoint	1	1	Describe in YYYY-MM-DD, YYYY format. Up to 10 bytes.	
YearRange		0..1	Describe in YYYY-YY, YYYY-YYYY format. Up to 9 bytes	Added in these specifications. Note 1

Note 1: When YearRange is specified, YearRange should be used to display the production year instead of TimePoint.

Table 7-31 Operation of ProgramInformation/BasicDescription/ReleaseInformation

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
ReleaseInformation				
ReleaseDate	0..1	0..1		
Select from (1) and (2)				
(1) DayAndYear	1	1	Specify in YYYY-MM-DD format	
(2) Year	1	1	Specify in YYYY format	
ReleaseLocation	0..1	0..1	Specify using the 2-character country code defined in "ISO3166-2"	

Table 7-32 Operation of ProgramInformation/BasicDescription/PurchaseList

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
<b>PurchaseList</b>				
PurchaseIdRef	0..∞	0..10	Describe the purchase identifier. Up to 24 bytes. High-order 2 bytes represent an identifier that uniquely identifies service providers (equivalent to ip_service_provider_id defined in the CDN scope service approach specifications) and is expressed as a 2-digit hexadecimal value. The 22 bytes that follow the identifier represent a string that is unique within the service provider. For information on syntax, see 7.11.3.1.3.	

Table 7-33 Operation of ProgramInformation/OtherIdentifier

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
OtherIdentifier			Up to 9 bytes. SP, CR and LF now allowed.	See "7.11.2.1.2"
@type	0..1	1	"VideoID"	

Note: When @type is "VideoID", it indicates VideoID to be described by ProgramInformation. It takes a decimal integer value of 9 digits or less that is unique within the provider.

Table 7-34 Operation of ProgramInformation/AVAttributes

Element/attribute name		Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
AVAttributes					
	BitRate	0..1	0..1	Specify the fixed bit rate in bit/second for CBR operation. A decimal value, up to 20 digits, no prefix "0".	
AudioAttributes		0..∞	0..2		
	Coding	0..1	0..1		
	@href	1	1	One of the items in IPTVSERVICEAudioCodingFormatCS	See [Appendix D] D.8 Note 1
	NumOfChannels	0..1	0..1	A decimal value up to 2 digits(2 characters) with no prefix "0"	
	MixType	0..1	0..1		
	@href	1	1	One of the items in ARIBAudioComponentCS	See [Appendix D] D.12 Note 2
	AudioLanguage	0..1	0..2	One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	Maximum occurrence is increased to 2 to support multiple languages in one ES(ex. bilingual on dual mono). Note 3
	@type	0..1	0..1	One of the following, "original", "dubbed" and "background" (up to 10 bytes).	Regarded as "original" when not specified.

	@channel		0..1	One of the following, "main", "sub", "alternate" and "other" (up to 9 bytes).	The primary audio (main) and the secondary audio (sub) are distinguished for dual mono and dual stereo. When it is not specified, it is regarded as "main".
	@description		0..1	Up to 33 bytes (string). SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
	StreamDescription	-	0..1	Up to 15 characters. SP allowed. CR and LF not allowed.	Added in these specifications. See "7.11.2.1.2"
	@type	-	0..1	One of the following, "main", "sub", "alternate" and "other"	For making a distinction among ES streams. When it is not specified, it is regarded as "main".
	@id	-	1	4-digit hexadecimal value without prefix.	
	BitRate	0..1	-	Specify in bit/second. A decimal number up to 20 characters without the prefix "0".	
	SamplingRate		-	4-digit decimal value in kHz. (One of "32" and "48").	
	VideoAttributes	0..1	0..1		
	Coding	0..1	0..1		
	@href	1	1	One of the items in IPTVSERVICEVisualCodingFormatCS	See [Appendix D] D.9 Note 4
	Scan	0..1	0..1	"interlaced" or "progressive"	Note 5
	HorizontalSize	0..1	0..1	Pixels in decimal without the prefix "0".	Note 5
	VerticalSize	0..1	0..1	Pixels in decimal without the prefix "0".	Note 5

	AspectRatio	0..2	0..1	"4:3" or "16:9"	Note 5
	Color	0..1	0..1		
	@type	1	1	"color" or "blackAndWhite"	

Note 1: Specify "http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEAudioCodingFormatCS:1"(MPEG-1 Layer II) for MPEG1 layer 2 and  
"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEAudioCodingFormatCS:2"(MPEG-2 AAC) for MPEG2AAC.

Note 2: Select the parameters defined in IPTVFJ STD-0002 "VOD Specifications", 6.1.2 "Audio" among the classification scheme "http://www.arib.or.jp/cs/2006/03/ARIBAudioComponetCS" items.

Note 3: AudioLanguage describes the language information of each audio traffic in AudioAttributes describing technical attributes such as the audio encoding method.

Note 4: "http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEVisualCodingFormatCS:1"(MPEG-2) for MPEG2 and  
"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEVisualCodingFormatCS:2"(AVC) for H.264.

Note 5: Select from the parameters defined in IPTVFJ STD-0002 "VOD Specifications", 6.1.1 "Video".

## 7.11.2.4.3 Operation of Group Information Fragments

The elements/attributes listed in Table 7-35 are used operationally among the fragments defined in ARIB STD-B38 3.2.3.7 "Group Information".

Table 7-35 Operation of GroupInformation

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
<b>GroupInformation</b>				
@groupId	1	1	Up to 255 bytes	Note 1, see "7.11.3.1"
@ordered	0..1	0..1		
@numOfItems	0..1	0..1	5-digit decimal number (0 to 65535)	
@fragmentId	0..1	1	10-digit hexadecimal integer (10 characters)	Note 1, see "7.11.4.4.1"
@fragmentVersion	0..1	1	14-digit decimal number (14 characters)	Note 1, see "7.11.4.4.3"
@fragmentExpirationDate	0..1	0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	See "7.11.6.4.2"
<b>GroupType</b>				
@xsi:type	1	1	"ProgramGroupTypeType" (Add the namespace prefix if needed.)	
@value	1	1	One of the following, "series", "show", "otherCollection" and "package". Up to 20 bytes.	Note 2
BasicDescription	1	1		See Table 7-36
<b>MemberOf</b>				
@crid	1	1	Up to 255 bytes	
@index	0..1	0..1	5-digit decimal number (5 characters) (0 to 65535)	
@xsi:type	1	1	"MemberOfType" (Add the namespace prefix if needed)	
<b>OtherIdentifier</b>				
		0..1		See Table 7-33
<b>Period</b>				
@type		1	One of the following, "display" (display period), "availability"	Note 3

				(delivery period) and "new_arrival" (new arrival period). Up to 12 bytes.	
	Start		1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format. (25 bytes)	
	End		0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format. (25 bytes)	

Note 1: There are no two GroupInformation that have the same groupId and different fragmentId. Even when fragmentVersion is renewed under the same fragmentId, the groupId is not changed.

Note 2: Receivers interpret "series", "show" and "otherCollection" as groups that are different from packages.

Note 3: The use of Period is implementation-dependent.

Table 7-36 Operation of GroupInformation/BasicDescription

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
<b>BasicDescription</b>				
Title	0..∞	2..7		See Table 7-37
MediaTitle	0..∞	0..1		
TitleImage	0..1	0..1		See Table 7-38
TitleVideo	0..1	0..1		See Table 7-39
Synopsis	0..∞	0..3		See Table 7-40
PromotionalInformation	0..∞	0..1		See Table 7-41
Keyword	0..∞	0..20		See Table 7-42
Genre	0..∞	0..20		See Table 7-43
ParentalGuidance	0..1	1		See Table 7-44
Language	0..∞	0..4		See Table 7-45
CaptionLanguage	0..∞	0..2		See Table 7-46
SignLanguage	0..∞	0..1		See Table 7-47
CreditsList	0..1	0..1		See Table 7-48
RelatedMaterial	0..∞	0..65535		See Table 7-49
ProductionDate	0..1	0..1		See Table 7-50
ReleaseInformation	0..∞	0..1		See Table 7-51
PurchaseList	0..1	0..1		See Table 7-52

Table 7-37 Operation of GroupInformation/BasicDescription/Title

Element/attribute	Occurrence	Occurrence	Length/Range	Note
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name	(B38)	(IPTV)		
Title			Up to 128 CJK characters, or 384 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
@type	0..1	1	One of the following, "main", "alternative", "popular", "seriesTitle" and "episodeTitle". Up to 12 bytes.	Note 1

Note: Only 1 title element with @type=main is required, and only 1 title element with @type=alternative is required. Up to 3 title elements with @type="popular" can be used. The @type="main" is a required element that describes the title string for presentation. The @type="alternative" describes the reading for the title string and is used as a search key and a sort key when sorting. Also, the @type="popular" is an attribute that is specified when there are 2 or more readings and is used as a search key but not as a sort key. For more information on readings, see [Appendix E] "Specifications on XML Extension Schema". The processing of Title when @type="seriesTitle" and @type="episodeTitle" is implementation-dependent.

Table 7-38 Operation of GroupInformation/BasicDescription/MediaTitle/TitleImage

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
TitleImage				
MediaUri	0..1	1	Up to 255 bytes	
CopyrightNotice		0..1	Up to 150 bytes. Up to 50 CJK characters. SP allowed. CR and LF not allowed.	Added in these specifications Note 1  See "7.11.2.1.2"

Note: TitleImage specifies still pictures used for thumbnail displays, etc. This still picture is not encrypted.

Reduction of image size is allowed for thumbnail image displays, but enlargement and change of the aspect ratio are not allowed. When using thumbnail images, the maximum image size should be about 480×270, and it is recommended that PNG or JPG be used as the image format.

Note 1: For more information on the CDN scope operation, see "CDN Scope Service Approach Specifications".

Table 7-39 Operation of GroupInformation/BasicDescription/MediaTitle/TitleVideo

Element/attribute name	Operation	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
TitleVideo					

	MediaUri	○	0..1	1	Up to 255 bytes	
	CopyrightNotice	○		0..1	Up to 150 bytes. Up to 50 CJK characters. SP allowed. CR and LF not allowed.	Added in these specifications. . Note 1 See "7.11.2.1.2"

Note: TitleVideo specifies contents used for preview display, etc. MediaUri describes the locator of the VOD contents.

Note 1: For more information on the CDN scope operation, see "CDN Scope Service Approach Specifications".

Table 7-40 Operation of GroupInformation/BasicDescription/Synopsis

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Synopsis			Up to 408 CJK characters, or 1,224 bytes. SP, CR and LF allowed.	Note 1 See "7.11.2.1.2"
@length	0..1	1	One of the following, "short", "long" and "medium". Up to 6 bytes.	

Note: Up to 25 characters, up to 75 bytes when @length is "short". Up to 100 characters, up to 300 bytes when @length is "medium". Up to 408 characters, up to 1,224 bytes when @length is "long".

Table 7-41 Operation of GroupInformation/BasicDescription/PromotionalInformation

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
PromotionalInformation			Up to 200 CJK characters, or 600 bytes. SP, CR and LF allowed.	See "7.11.2.1.2"
@href		0..1	One of the items in IPTVSERVICEPromotionalTypeCS	See [Appendix D] D.6

Table 7-42 Operation of GroupInformation/BasicDescription/Keyword

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Keyword			Up to 40 CJK characters, or 120 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
@type	0..1	0..1	One of the following, "main" (main), "secondary" (secondary) and "other" (supplemental). Only 1 "main".	Note 1

Note 1: In ECG, keywords specified as "main" or "secondary" can be used for presentation, but keywords specified as "other" should not be used for presentation. When it is not specified, it is regarded as "main". When there is 1 keyword, the type can be omitted, but when there are multiple keywords, type description is required.

Table 7-43 Operation of GroupInformation/BasicDescription/Genre

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
<b>Genre</b>				
@href	1	1	One of the items in ARIBGenreCS or IPTVSERVICEGenreCS (when @type=main,secondary) and provider-specific GenreCS (when @type=other).	See [Appendix D] D.1
@type	0..1	0..1	One of the following, "main" (main), "secondary" (secondary) and other". Only 1 "main".	Note 1

Note 1: When only one genre is presented/used using list presentation, etc. of ECG, those with "main" specified are given priority. When it is not specified, it is regarded as "main". When ARIBGenreCS is specified, the first should take "main" and the second and onwards should take "secondary".

The processing of Genre elements of which @type="other" is implementation-dependent.

Table 7-44 Operation of GroupInformation/BasicDescription/ParentalGuidance

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
<b>ParentalGuidance</b>				
ParentalRating	1	1		
@href	1	1	One of the items in ARIBParentalRatingCS	See [Appendix D] D.2

Table 7-45 Operation of GroupInformation/BasicDescription/Language

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
Language			One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	

Table 7-46 Operation of GroupInformation/BasicDescription/CaptionLanguage

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
CaptionLanguage			One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	
@closed	0..1	1		
@description	-	0..1	Up to 33 bytes. SP allowed. CR and LF not allowed.	Added in these specifications See "7.11.2.1.2"

Table 7-47 Operation of GroupInformation/BasicDescription/SignLanguage

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
SignLanguage			One of the following, "ja" (Japanese), "en" (English), "de" (German), "fr" (French), "it" (Italian), "ru" (Russian), "zh"(Chinese), "ko" (Korean), "es" (Spanish) and "xx" (Other language, multiple languages, language unknown)	Sign language is described.
@primary	0..1	0..1		
@translation	0..1	0..1		

Table 7-48 Operation of GroupInformation/BasicDescription/CreditsList

Element/attribute name	Operation	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
CreditsList					
CreditsItem	○	0..∞	1..20		
@role	○	1	1	One of the items in IPTVSERVICERoleCS and provider-specific RoleCS. Note 1	See [Appendix D] D.7
PersonName	○	0..∞	1..5		
@type	○	0..1	0..1	One of the following, "main", "variant" and "former". Up to 7 bytes. Only 1 "main" should be used. Note 2	
GivenName	○	1..∞	1	Up to 100 CJK characters, or 300 bytes. SP allowed. CR and LF not allowed.	A full name is described. See "7.11.2.1.2"
@abbrev	○	0..1	0..1	Up to 16 CJK characters, up to 48 bytes. SP allowed. CR and LF not	See "7.11.2.1.2"

							allowed.	
			Character	○	0..∞	0..1		
			GivenName	○	1-∞	1	Up to 100 CJK characters, up to 300 bytes. SP allowed. CR and LF not allowed.	A full name is described. See "7.11.2.1.2"
			@abbrev	○	0..1	0..1	Up to 16 CJK characters, up to 48 bytes. SP allowed. CR and LF not allowed.	See "7.11.2.1.2"

Note 1: Behavior of receivers when a service provider specific CS item listed in @role is implementation-dependent.

Note 2: Only one PersonName element with @type="main" is required, which describes the credit string for presentation. Only one PersonName element with @type="variant" is allowed, which describes the ruby of the credit string and is used as a search key and a sort key when sorting. Up to 3 PersonName elements with @type="former" can be used. The @type="former" is an attribute that is specified when there are 2 or more rubies and is used as a search key but not as a sort key. For more information on rubies, see [Appendix E] "Specifications on XML Extension Schema".

Table 7-49 Operation of GroupInformation/BasicDescription/RelatedMaterial

Element/attribute name		Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
RelatedMaterial					
	HowRelated	0..1	1		
	@href	1	0..1 Note 1	One of the items in IPTVSERVICEHowRelatedCS and the provider-specific RelatedCS.	See [Appendix D] D.3
	Name	0..1	0..1 Note 1	Up to 32 CJK characters, or 96 bytes. Note 2 SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
	Format	0..1	0..1		
	@href	1	1	One of the items in IPTVSERVICEFileFormatCS and the provider-specific CS.	See [Appendix D] D.10
	MediaLocator	1	1		
	MediaUri	0..1	1	Up to 255 bytes.	Note 3
	PromotionalText	0..∞	0..1	Up to 3,000 bytes. SP, CR and LF allowed.	Note 4 See "7.11.2.1.2"
	PromotionalMedia	0..∞	0..1		Note 5
	TitleImage	0..1	1		See Table 7-18

Note 1: The Name element shall be specified when @href is not specified. However, the behavior of receivers is implementation-dependent.

Note 2: Implementation-dependent (service provider-specific definition).

Note 3: The URI to be referenced is specified. The relationship with the reference destination is specified by the dictionary item of IPTVSERVICEHowRelatedCS of HowRelated/@href. Contents or browser script files may be referenced as reference destinations. When reference destinations are contents or browser script files, the same dictionary item (relationship) can be specified for multiple reference destinations.

Note 4: Promo words, etc. for sales promotions are described for the entity specified in MediaLocator/Uri.

Note 5: A thumbnail still picture file is specified for the entity specified in MediaLocator/Uri.

Table 7-50 Operation of GroupInformation/BasicDescription/ProductionDate

Element/attribute name		Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
ProductionDate					
	TimePoint	1	1	Describe in YYYY-MM-DD, YYYY format. Up to 10 bytes.	
	YearRange		0..1	Describe in YYYY-YY, YYYY-YYYY format. Up to 9 bytes.	Added in this provision Note 1

Note 1: When YearRange is specified, YearRange should be used to display the production year instead of TimePoint.

Table 7-51 Operation of GroupInformation/BasicDescription/ReleaseInformation

Element/attribute name		Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
ReleaseInformation					
	ReleaseDate	0..1	0..1		
	Select from (1) and (2)	1	1		
(1)	DayAndYear	1	1	Specify in YYYY-MM-DD format.	
(2)	Year	1	1	Specify in YYYY format.	
	ReleaseLocation	0..1	0..1	Specify using the 2-character country code defined in "ISO3166-2".	

Table 7-52 Operation of GroupInformation/BasicDescription/PurchaseList

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
PurchaseList				
PurchaseIdRef	0..∞	0..10	The purchase identifier is described. Up to 24 bytes. High-order 2 bytes represent an identifier that uniquely identifies service providers (equivalent to ip_service_provider_id defined in this document) and is expressed as a 2-digit hexadecimal value. The 22 bytes that follow the identifier represent a string that is unique within the service provider. For information on syntax, see 7.11.3.1.3.	

## 7.11.2.4.4 Operation of Review Fragments

The elements/attributes listed in Table 7-53 are used operationally among the elements defined in ARIB STD-B38 3.2.3.5 "Media Review Description Scheme".

Table 7-53 Operation of Review(TBD)

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
<b>Review</b>				
@programId	1	1	Up to 255 bytes	Note 1, see "7.11.3.1"
@fragmentId	0..1	1	10-digit hexadecimal integer (10 characters)	Note 1, see "7.11.4.4.1"
@fragmentVersion	0..1	1	14-digit decimal number (14 characters)	Note 1, "7.11.4.4.3"
@fragmentExpirationDate	0..1	0..1	14-digit decimal number (14 characters) Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	See "7.11.6.4.2"
<b>Rating</b>				
RatingValue	1	1	An integer value between 1 and 10	For operation in CDN scope, see Chapter 6.
RatingScheme	1	1		
@style	1	1	Fixed to "higherBetter"	
FreeTextReview	0..∞	0..1	Up to 255 CJK characters, or 765 bytes. SP, CR and LF allowed.	See "7.11.2.1.2"

Note 1: Even when fragmentVersion is renewed under the same fragmentId, programId is not changed.

## 7.11.2.4.5 Operation of Purchase Information Fragments

Purchase information fragments are used to describe the reference information for the price and sales pattern of charged packages and corresponding licenses. Detailed information on the use conditions after purchasing contents included in the packages is described in the license reference information defined in 7.11.2.6 "Operation of License Reference Information".

- (1) When the PurchaseInformation fragment that the value of its PurchaseType is "single" (single item), the PurchaseInformation fragment is associated with a ProgramInformation fragment. The reference from the PurchaseInformation fragment to the ProgramInformation fragment is described in the CRIDRef element of the PurchaseInformation fragment. The reference from the ProgramInformation fragment to the PurchaseInformation fragment is described in the PurchaseIdRef element of the

ProgramInformation fragment (1 to 10 items). The reference from the LicenseInformation to the ProgramInformation fragment is described in the ProgramCRID element of the LicenseInformation. 1 ProgramInformation fragment can be referenced by 1 to 10 LicenseInformation fragments. The reference from the LicenseInformation to the PurchaseInformation fragment is described in the PurchaseIdRef element of the LicenseInformation. 1 PurchaseInformation fragment can be referenced by 1 LicenseInformation fragment. Also, there is a reference relationship between ProgramInformation fragments and GroupInformation fragments describing a series, and a reference relationship among GroupInformation fragments describing a series, which is independent of the reference relationship among PurchaseInformation fragments, LicenseInformation fragments and ProgramInformation fragments. The reference from the ProgramInformation fragment to the GroupInformation fragment describing a series is described in the crid attribute of the MemberOf element (0 to 20 items) of the ProgramInformation fragment. 1 GroupInformation fragment describing the series can be referenced from 0 to 500 ProgramInformation fragments. Also, the reference from the GroupInformation fragment describing low-order series to the GroupInformation fragment describing high-order series is described in the crid attribute of the MemberOf element of the GroupInformation fragment describing low-order series (0 to 20 items). 1 GroupInformation fragment describing high-order series can be referenced by 0 to 100 GroupInformation fragments describing low-order series. .

- (2) When the PurchaseInformation fragment that the value of its PurchaseType is "pack" (pack), the PurchaseInformation fragment is associated with the ProgramInformation fragment through the GroupInformation fragment describing the content package. The reference from the PurchaseInformation fragment to the GroupInformation fragment describing the content package is described in the ProgramInformation fragment CRIDRef. The reference from the GroupInformation fragment describing the content package to the PurchaseInformation fragment is described in the PurchaseIdRef element of the GroupInformation fragment describing the content package (1 to 10 items). The reference from the LicenseInformation fragment to the PurchaseInformation fragment is described in the PurchaseIdRef element of the LicenseInformation fragment. 1 PurchaseInformation fragment can be referenced by 1 to 500 LicenseInformation fragments. The reference from the LicenseInformation fragment to the ProgramInformation fragment is described in the ProgramCRID element of the LicenseInformation fragment. 1 ProgramInformation fragment can be referenced by 1 to 10 LicenseInformation fragments. The reference from the ProgramInformation fragment to the GroupInformation fragment describing the content package is described in the crid attribute of the MemberOf (1 to 20 items) element of the ProgramInformation fragment. 1 GroupInformation fragment describing the content package can be referenced from 1 to 500 ProgramInformation fragments. Furthermore, the reference from the GroupInformation fragment describing the content package to the ProgramInformation fragment is described in the RelatedMaterial element of the GroupInformation fragment describing the content package (0 to 500 items). 1 ProgramInformation fragment can be referenced by 1 to 20 GroupInformation fragment describing the content package. When the GroupInformation fragment describing the content package is associated with the GroupInformation fragment describing the series, the elements are cross-referenced using the RelatedMaterial element. The reference from the GroupInformation fragment describing the content package to the GroupInformation fragment describing the series is described in the RelatedMaterial element of the

GroupInformation fragment describing the content package (0 to 20 items). The reference from the GroupInformation fragment describing the series to the GroupInformation fragment describing the content package is described in the RelatedMaterial element of the GroupInformation fragment describing the series (0 to 20 items).

- (3) When the PurchaseInformation fragment that the value of its PurchaseType is "subscription" (unlimited) or "select" (select), the PurchaseInformation fragment is associated with the ProgramInformation fragment through the GroupInformation fragment describing the content package. The reference relationship between the PurchaseInformation fragment and the group information element describing the content package is the same as (2). The reference from the LicenseInformation fragment to the PurchaseInformation fragment is described in the PurchaseIdRef element of the LicenseInformation fragment. 1 PurchaseInformation fragment can be referenced by 0 to 65535 LicenseInformation fragments. The reference from the LicenseInformation fragment to the ProgramInformation fragment is described in the ProgramCRID element of the LicenseInformation. 1 ProgramInformation fragment can be referenced by 1 to 10 LicenseInformation fragments. The reference from the ProgramInformation fragment to the GroupInformation fragment describing the content package is described in the crid attribute of the MemberOf element (1 to 20 items) of the ProgramInformation fragment. 1 GroupInformation fragment describing the content package can be referenced from 0 to 65,535 ProgramInformation fragments. Furthermore, the reference from the GroupInformation fragment describing the content package to the ProgramInformation fragment is described in the RelatedMaterial element of the GroupInformation fragment describing the content package (0 to 65,535 items). 1 ProgramInformation fragment can be referenced by 1 to 20 GroupInformation fragments describing the content package. When the GroupInformation fragment describing the content package is associated with the GroupInformation fragment describing the series, the reference relationship is the same as (2).

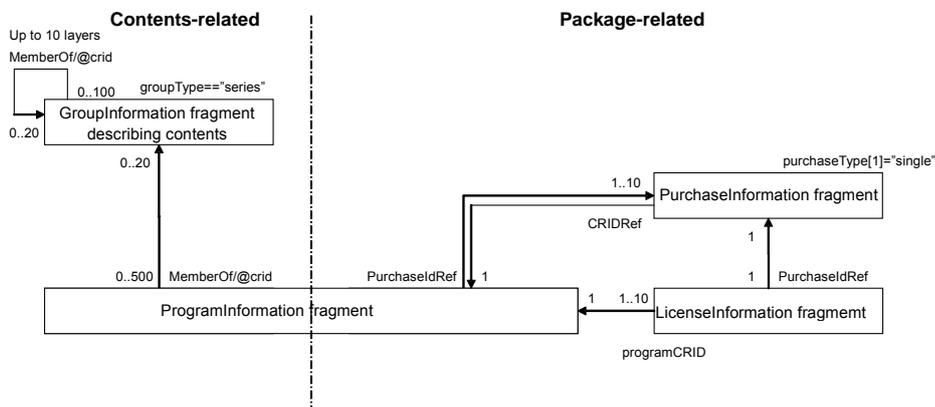


Figure 45 Relationship among PurchaseInformation Fragment, ProgramInformation Fragment and LicenseInformation Fragment (Single Item)

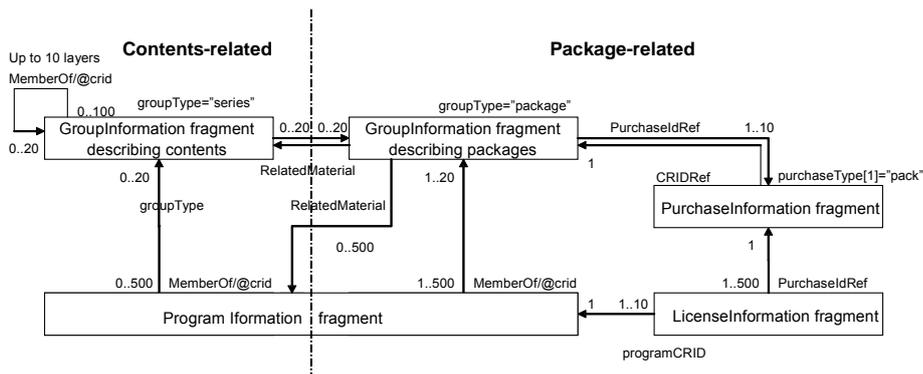


Figure 46 Relationship among PurchaseInformation Fragment, ProgramInformation Fragment and LicenseInformation Fragment (Pack)

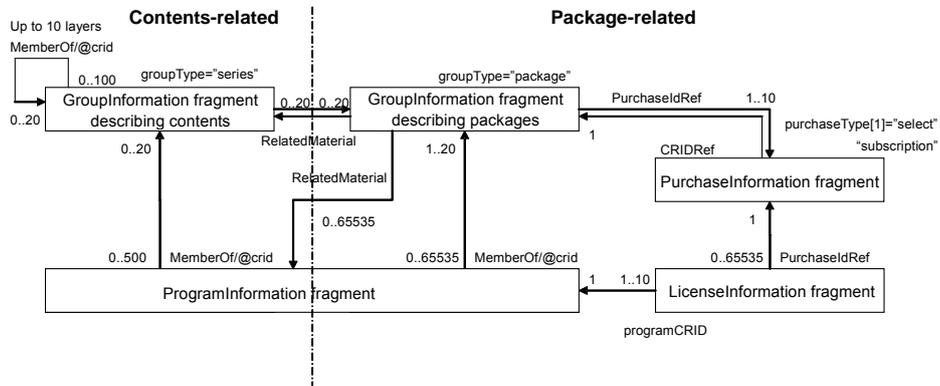


Figure 47 Relationship among PurchaseInformation Fragment, ProgramInformation Fragment and LicenseInformation Fragment (Unlimited/Select)

The elements/attributes listed in Table 7-54 are used operationally among the elements defined in ARIB STD-B38 3.2.7.1 "Information Table".

Table 7-54 Operation of PurchaseInformation

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
PurchaseInformation				
@start	0..1	0..1	Specify in YYYY-MM-DDThh:m m:ss+09:00 format (25 bytes)	Start date when purchase of charged content packages becomes possible
@end	0..1	0..1	Specify in YYYY-MM-DDThh:m m:ss+09:00 format (25 bytes)	End date when purchase of charged content packages becomes impossible
@purchaseId	1	1	Up to 24 bytes. High-order 2 bytes represent an identifier that uniquely identifies service providers (equivalent to ip_service_provider_id defined in this document) and is expressed as a 2-digit hexadecimal value. The 22 bytes that follow the identifier represent a string that is unique within the service provider. For information on syntax, see 7.11.3.1.3.	Note 1 purchase identifier
@fragmentId	0..1	1	10-digit hexadecimal integer (10 characters)	Note 1, see "7.11.4.4.1"
@fragmentVersion	0..1	1	14-digit decimal number (14 characters)	Note 1, see "7.11.4.4.3"
@fragmentExpirationDate	0..1	0..1	Specify in	See "7.11.6.4.2"

				YYYY-MM-DDThh:m m:ss+09:00 format (25 bytes)	
	Price	1..∞	1	10-digit decimal integer (10 characters) with no prefix "0"	Purchase price for the charged content package in yen
	@currency	1	1	Specify "JPY" (3 characters)	Currency unit for charged content package purchase price
	Purchase	0..∞	Note 2		
	PurchaseType	0..1	1		
	@href	1	1	One of the items in IPTVSERVICEPurch aseTypeCS	See [Appendix D] D.4
	Name	0..1	0..1	64 CJK characters Note 3. SP allowed. CR and LF not allowed.	See "7.11.2.1.2"
	QuantityUnit	0..1	1		
	@href	1	1	One of the items in IPTVSERVICEUnitT ypeCS (128 bytes).	See [Appendix D] D.5
	QuantityRange	0..1	1		
	@max	0..1	1	No prefix "0", maximum 5 digit decimal number, 5 bytes.	
	Description	0..∞	0..1	Up to 200 CJK characters, or 600 bytes. SP, CR and LF allowed.	See "7.11.2.1.2"
	PricingServerURL	0..∞	0..1 Note 2	Up to 255 bytes	The URL of the purchase site destination browser script file
	CRIDRef		1		
	@crid		1	Up to 255 bytes	ProgramInform ation/programId of ProgramInform ation or

					GroupInformation/groupId of GroupInformation referencing PurchaseInformation/@purchaseId is described. See 7.11.3.1
--	--	--	--	--	---

Note 1: Even when fragmentVersion is renewed under the same fragmentId, purchaseId is not changed.

Note 2: Behavior for PurchaseInformation without PricingServerURL is undefined.

Note 3: The occurrence of Purchase element in PurchaseInformation PurchaseType of which is "select" is 3, and 1 for "single", "pack" and "subscription". Table 7-55 shows detailed information on the contents of the Purchase element for each GroupType.

Note 4: Handling of strings specified for this element is implementation-dependent.

Table 7-55 Correspondence between PurchaseType and Purchase Elements

Purchase Type	Purchase element				
	Occurrence	Element order	Value of attribute PurchaseType/@href	Value of attribute QuantityUnit/@href	Value of attribute QuantityRange/@max
"single"	1	1st	"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPurchaseTypeCS/1" (Single item)	Select one from "minute, hour, day, week, month, year" from IPTVSERVICEUnitTypeCS as the unit of "available period"	Value of "available period"
"pack"	1	1st	"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPurchaseTypeCS/2" (Pack)	Select one from "minute, hour, day, week, month, year" from IPTVSERVICEUnitTypeCS as the unit of "available period"	Value of "available period"
"subscription"	1	1st	"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPurchaseTypeCS/4" (Unlimited)	Select one from "minute, hour, day, week, month, year" from IPTVSERVICEUnitTypeCS/ as the unit of "billing cycle"	Value of "billing cycle"
"select"	3	1st	"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPurchaseTypeCS/1" (Single item)	Select one from "minute, hour, day, week, month, year" from IPTVSERVICEUnitTypeCS as the unit of "available period"	Value of "available period"

			VSERVICEPurchase TypeCS/3" (Select)	week, month, year" from IPTVSERVICEUnit TypeCS as the unit of "billing cycle"	
		2nd	"http://www.iptvforu m.jp/cs/2008/07/IPT VSERVICEPurchase TypeCS/3.1" (Number of contents available)	Select IPTVSERVICEUnit TypeCS/counts" (Number of contents available) representing "Number of contents available"	Value of "Number of contents available"
		3rd	"http://www.iptvforu m.jp/cs/2008/07/IPT VSERVICEPurchase TypeCS/3.2" (Reset cycle for number of contents available)	Select one from "minute, hour, day, week, month, year" from IPTVSERVICEUnit TypeCS as the unit of "Reset cycle for number of contents available"	Value of "Reset cycle for number of contents available"

### 7.11.2.5 Operation of Instance Description Metadata

This section defines OnDemandProgram fragment from the instance description metadata defined in ARIB STD-B38 3.2.4 "Instance Description Metadata".

#### 7.11.2.5.1 Operation of On-Demand Programs

The elements/attributes listed in Table 7-56 are used operationally among the on-demand programs (OnDemandProgram) defined in ARIB STD-B38 3.2.4.2 "Program Location".

Table 7-56 Operation of OnDemandProgram

Element/attribute name	Occurrence (B38)	Occurrence (IPTV)	Length/Range	Note
OnDemandProgram				
@fragmentId	0..1	1	10-digit hexadecimal integer (10 characters)	Note 1, see "7.11.4.4.1"
@fragmentVersion	0..1	1	14-digit decimal number (14 characters)	Note 1, "7.11.4.4.3"
@fragmentExpirationDate	0..1	0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	See "7.11.6.4.2"
Program	1	1		
@crid	1	1	Up to 255 bytes	Note 1, see "7.11.3.1"
ProgramURL	0..1	0..1	Up to 255 bytes	See, "7.11.3.2"
InstanceMetadataId	0..1	1	Up to 255 bytes	Note 1, see "7.11.3.3.1"
PublishedDuration	0..1	0..1	Specify in PThhHmMssS format (11 bytes)	
StartOfAvailability	1	1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	
EndOfAvailability	0..1	0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	

Note 1: There are no two OnDemandProgram that belong to the same Program/@crid+InstanceMetadataId group yet have a different fragmentId. Even when fragmentVersion is renewed under the same fragmentId, Program/@crid+InstanceMetadataId is not changed.

### 7.11.2.5.2 Reference Relationship between ProgramInformation Fragment and Instance Description Metadata

Figure 48 shows the reference relationship between ProgramInformation fragments and OnDemandProgram fragments. 1 ProgramInformation can be associated with 0 or 1 OnDemandProgram. 1 OnDemandProgram must be associated with 1 ProgramInformation . The reference from an OnDemandProgram to a ProgramInformation is described in the Program/@crid attribute of the OnDemandProgram.

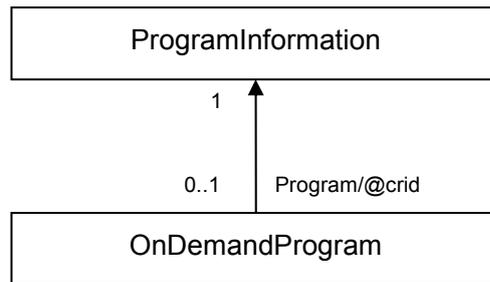


Figure 48 Relationship between ProgramInformation and OnDemandProgram

### 7.11.2.6 Operation of License Reference Information

#### 7.11.2.6.1 License Reference Information

Metadata structure to store license related information is called the license reference information. The license reference information is introduced to summarize license types and conditions for use after purchasing contents (RMPI) and to inquire about the reference relationship between licenses and contents. The details of conditions for use of contents included in content packages are described in the license reference information. Users inquire about the package contents using the purchase information element and the conditions for use of contents included in the package using the license reference information when they select contents using ECG.

The license reference information itself is not protected (encrypted, etc.) using DRM and can be handled with the same security level as other metadata. Also, the license reference information contains universal information in regard to the license and does not contain the conditions or states for use that vary depending on the CAS/DRM client. For example, when viewing is started using a license in which the viewing period specified in the conditions is 8 days and 7 nights, the actual viewing expiration date is set 8 days and 7 nights after the date the user purchased or selected the package. Therefore, the license reference information is used on receivers to reference conditions for use of contents before license acquisition. After licenses are acquired, the conditions and state for license use is obtained using the license retention status information stored on receivers.

#### 7.11.2.6.2 Information Element of License Reference Information

Table 7-57 shows the main information elements included in the license reference information.

Table 7-57 Main Information Elements of License Reference Information

Information item	Required/ Optional	Description
License ID	Required	Identifier of the target license of the license reference information (LicenseID)
Content identifier	Required	Identifier of the target contents of the license (CRID)
Purchase identifier	Required	Identifier of the package including the license (PurchaseIdRef)
RMPI description	Required	Summarized description of the conditions for license use (RMPIDescription) <ul style="list-style-type: none"> <li>• Number of viewing</li> <li>• Viewing (start/end) expiration date</li> <li>• Viewing period from the start of viewing</li> <li>• Whether or not external output copy restriction is applied during playback</li> </ul>

## 7.11.2.6.3 Operation of License Reference Information

The elements/attributes listed in Table 7-58 are used to operate metadata documents that store the license reference information.

Table 7-58 Operation of LicenseInformation

Element/attribute name	Occurrence (IPTV)	Length/Range	Note
LicenseInformation			
@fragmentId	1	10-digit hexadecimal integer (10 characters)	Note 1 See "7.11.4.4.1"
@fragmentVersion	1	14-digit decimal number (14 characters)	Note 1 See "7.11.4.4.3"
@fragmentExpirationDate	0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	See "7.11.6.4.2"
LicenseID	1	16-digit hexadecimal integer (16 characters)	Note 1, Note 2
LicenseType	1	"VoD"	
ProgramCRID	1		
@crid	1	Up to 255 bytes	See "7.11.3.1"
PurchaseIdRef	1	Up to 24 bytes. High-order 2 bytes represent an identifier that uniquely identifies service providers (equivalent to ip_service_provider_id defined in this document) and is expressed as a 2-digit hexadecimal value. The 22 bytes that follow the identifier represent a string that is unique within the service provider. For information on syntax, see 7.11.3.1.3.	The purchase identifier is specified.
RMPIDescription	1		
TextualDescription	0..1	Up to 127 bytes. SP, CR and LF allowed.	Description of the RMPI summary using strings for presentation on receivers. Note 3, Note 4

					See "7.11.2.1.2"
		ValidityIntervalStart	0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	Note 4 Viewing period start date
		ValidityIntervalEnd	0..1	Specify in YYYY-MM-DDThh:mm:ss+09:00 format (25 bytes)	Note 4 Viewing period end date
		OutputRestriction	0..10		
		Port	1		
		@href	1	One of the items in IPTVSERVICEOutputPortCS	See [Appendix D] D.13
		Mode	1		
		@href	1	One of the items in IPTVSERVICECopyControlMethodCS	See [Appendix D] D.14

Note 1: There are no two LicenseInformation that have the same LicenseID and different fragmentId. Even when fragmentVersion is renewed under the same fragmentId, LicenseID is not changed.

Note 2: LicenseID is described as a 16-digit hexadecimal integer. "0x", etc., indicating a hexadecimal code, is not added to the beginning. When the value has less than 16 digits, add "0" to the beginning to make a 16-digit value.

Note 3: The viewing period is specified. Example: "3 days 2 nights".

Note 4: The TextualDescription element or ValidityIntervalEnd element must be listed. When the ValidityIntervalEnd element is listed, the ValidityIntervalStart element can also be listed.

### 7.11.3 Operation of Contents and Metadata Identification Information

#### 7.11.3.1 Operation of Content Reference Identifier (CRID)

Content reference identifiers are used operationally to identify contents and content packages of VOD services.

##### 7.11.3.1.1 Description Format of Content Reference Identifier and Group Reference Identifier

Contents and groups are identified using content reference identifiers (CRID) sharing a domain in compliance with ARIB STD-B38 4.1.1 "Content Reference Identifier" as follows:

```
crid://<authority>/<data >
```

The total number of characters that can be used to describe a content reference identifier is 255 bytes including "crid://<authority>". In order to clarify that a CRID identifies the group, CRID is sometimes referred to as the group reference identifier. However, identification of the entity referenced by a CRID as a content or a group is not possible based only on CRID information.

##### 7.11.3.1.2 Operation of Authority (<authority>)

<authority> is used to uniquely identify service providers who provided the contents.

<authority> is described in compliance with ARIB STD-B38, Chapter 4.1.2 "Authority" as follows:

```
<authority>= <DNS name>
```

A DNS (Domain Name System) name defined in "IETF-RFC1034" and "IETF-RFC1035" is described in <DNS name>, and the DNS name should be unique among service providers.

The following characters can be used for <DNS name>.

```
<DNS name>      =      startChar *echar
echar            =      startChar | "-" | "."
startChar       =      lowalpha | upalpha | digit | "_"
lowalpha        =      "a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" |
                        "j" | "k" | "l" | "m" | "n" | "o" | "p" | "q" | "r" |
                        "s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"
upalpha         =      "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" |
                        "J" | "K" | "L" | "M" | "N" | "O" | "P" | "Q" | "R" |
                        "S" | "T" | "U" | "V" | "W" | "X" | "Y" | "Z"
digit           =      "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"
```

Up to 56 characters can be used for <DNS name>.

### 7.11.3.1.3 Operation of Data (<data>)

The <data > part represents a unique string in <authority>.

The following characters can be used for <data>.

```

<data>      =      startChar *echar
echar       =      startChar | "-" | "." | "/"
startChar   =      lowalpha | upalpha | digit | "_"
lowalpha    =      "a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" |
                  "j" | "k" | "l" | "m" | "n" | "o" | "p" | "q" | "r" |
                  "s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"
upalpha     =      "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" |
                  "J" | "K" | "L" | "M" | "N" | "O" | "P" | "Q" | "R" |
                  "S" | "T" | "U" | "V" | "W" | "X" | "Y" | "Z"
digit       =      "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"

```

### 7.11.3.2 Operation of Location Resolution

Location resolution is used operationally to find the location (locator) of the content entity from receivers using content reference identifiers. For operation of location resolution, comply with the method using ProgramURL defined in ARIB STD-B38, Chapter 4.1.4 "Location Resolution".

#### 7.11.3.2.1 Locator Description Format

The following locator format is used in compliance with ARIB STD-B38 4.1.3.1 "Format":  
<transport mechanism>:<transport system specific>

The URL for the content playback control metafile of the contents should be used as the VOD content locator. For information on content playback control metafiles, see IPTVFJ STD-0002 "VOD Specifications", Chapter 5 "Content Playback Control Metafile".

Example:

<http://foo.bar.co.jp/vod/movie/titleA/episode1/0000/episode1.cpc>

#### 7.11.3.2.2 Locator Description Position

The VOD content locator is listed in the ProgramURL element of the instance metadata (/TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/ProgramURL).

### 7.11.3.3 Operation of Other Identifier

#### 7.11.3.3.1 Operation of Instance Metadata ID

Instance metadata IDs are used to differentiate multiple on-demand programs that support the same content reference identifier (CRID). An instance metadata ID represents a string that is unique in the CRID scope.

The syntax of an instance metadata ID should be as follows in compliance with ARIB STD-B38 3.2.4.2 "Program Location":

imi:<data>

The following characters can be used for <data>.

```

<data>      =      startChar *echar
echar       =      startChar | "-" | "." | "#"
startChar   =      lowalpha | upalpha | digit | "_"
lowalpha    =      "a" | "b" | "c" | "d" | "e" | "f" | "g" | "h" | "i" |
"j" | "k" | "l" | "m" | "n" | "o" | "p" | "q" | "r" |
"s" | "t" | "u" | "v" | "w" | "x" | "y" | "z"
upalpha     =      "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" |
"J" | "K" | "L" | "M" | "N" | "O" | "P" | "Q" | "R" |
"S" | "T" | "U" | "V" | "W" | "X" | "Y" | "Z"
digit       =      "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"

```

## 7.11.4 Operation of Metadata Transmission Encoding

### 7.11.4.1 Metadata Encoding Method

The metadata transmission encoding is UTF-8, one of the encodings defined in ARIB STD-B38 3.3.2 "Text Format Encoding".

### 7.11.4.2 Metadata Description Unit

Metadata that is encoded in text format is described in a metadata document (TVAMain).

With metadata, only 1 fragment is listed in 1 metadata document. Also, fragmentId and fragmentVersion are used to identify and manage renewal of fragments.

(Explanation)

Metadata documents and fragments are explained below.

The smallest unit in metadata delivery is called a metadata fragment.

Metadata fragments are stored in an independent XML document that uses the TVAMain element as the root element.

Figure 49 shows an example of an metadata document and fragment.

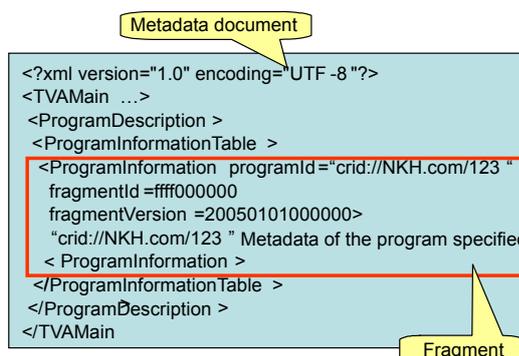


Figure 49 Example of Metadata Document and Fragment

### 7.11.4.3 Metadata File Format

Metadata received by receivers basically means a file (resource) containing a metadata document (XML declaration in the first line and XML description starting with <TVAMain ...> in the second line and ending with </TVAMain>). This file (resource) is called a metadata resource.

The metadata resource can also include all fragments that have the same CRID in a single TVAMain when specified by a query request.

The XML declaration should be as follows:

<?xml version="1.0" encoding="UTF-8"?>

#### 7.11.4.4 Operation of Fragment Identification

##### 7.11.4.4.1 Operation of fragmentId

The range of fragmentId is "0" to "2 to the 40th power" minus 1, and fragmentId is unique in <authority> allocated for metadata transmission channels. In a metadata document, fragmentId is described as a 16-digit hexadecimal integer. "0x", etc., indicating a hexadecimal code, is not added to the beginning. When the value has less than 10 digits, add "0" to the beginning to make a 10-digit value..

For the same description target, different fragmentId should not be added to <authority> to list multiple fragments. The same description target here means one of the following:

- ProgramInformation fragment with the same programId
- GroupInformation fragment with the same groupId
- ProgramLocation fragment with the same Program(crid) or ProgramURL
- LicenseInformation fragment with the same LicenseId
- PurchaseInformation fragment with the same PurchaseId
- Review fragment with the same programId

Also, for different description targets, fragments to which the same fragmentId is given in <authority> should not be listed.

#### <Reference information>

Any method can be used to allocate fragmentId in <authority>, but attention needs to be paid to the fact that an allocated fragmentId cannot be duplicated or reused as stipulated in the specifications. For reference, examples of operational specifications on creation of metadata to allocate unique fragmentId in <authority> are shown below:

- 8 bit: An identification number 0 to 255 allocated to each organization/department that create metadata in <authority>
- 16 bit: Fragment creation year, month and date converted to an MJD value (for the conversion method, see ARIB STD-B10 Part 2, Annex C "Conversion of Hours and Dates")
- 4 bit: An identification number 0 to 15 allocated in advance according to the information format (ProgramInformation, GroupInformation, etc.)
- 12 bit: A serial number 0 to 4,095 allocated to fragments in ascending order in the format of information created on the year, month and date

##### 7.11.4.4.2 Reuse of fragmentId

A fragmentId can be reused two months after the last fragmentExpirationDate of all fragments that have been issued for a given fragmentId in the past. For information on how to handle the metadata expiration date on receivers, see 7.11.6.4 "Displaying Metadata".

#### 7.11.4.4.3 Operation of fragmentVersion

The fragmentVersion describes the date on which the fragment was renewed. In a metadata document, fragmentVersion is described as a 14-digit decimal number (YYYYMMDDhhmmss format).

## 7.11.5 Operation of Metadata Delivery Method

### 7.11.5.1 Overview of Metadata Delivery Method

This section defines the operation of metadata delivery using network communication.

Receivers can send an acquisition request to obtain lists of metadata, its CRID, etc., by adding a query condition specifying metadata to the request. This delivery method assumes two-way communication using TCP/IP. Figure 50 shows an overview of the delivery.

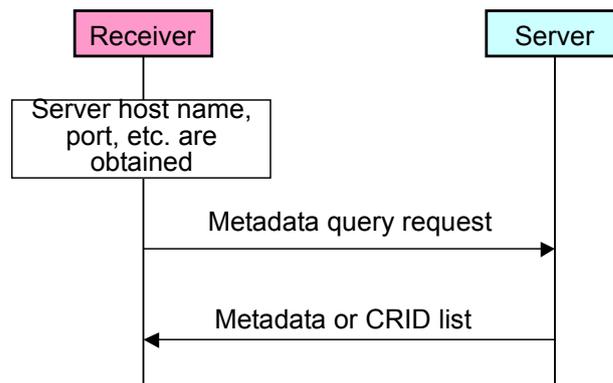


Figure 50 Overview of Metadata Delivery

### 7.11.5.2 Required Protocol

HTTP 1.1 [RFC-2616] or HTTP/TLS (HTTPS) [RFC-2818] is used for sending acquisition requests (query requests) and receiving corresponding query results. Details of the operation are defined in the following sections.

The timeout value to receive metadata is implementation-dependent, but should not exceed 15 seconds.

### 7.11.5.3 Query Request

This section describes how query requests are sent using HTTP.

#### 7.11.5.3.1 Overview of Query Request

A query request is comprised of pairs of a parameter name and parameter value and sent using the HTTP POST and GET methods. For more information on the format, see [HTML4.01] 17.13 Form submission. The following section described the query request format when POST is used. In the format description, <...> indicates a parameter, and [...] indicates that it can be omitted.

POST /get\_Data

Host: <server>

Content-Type: application/x-www-form-urlencoded

<parameters>

---

◆ <server>	Server URL
◆ <parameters>	<parameter>[&<parameters>]
◆ <parameter>	<paraname>=<paravalue>
◆ <paraname>	Parameter name
◆ <paravalue>	Parameter value

With a POST request, the body part of the query request is sent only using the x-www-form-urlencoded format, and the parameter name and parameter value should be properly encoded into a URL as with a GET request. For the URL encoding specifications, see [RFC-1738] and [RFC-2396]. Comply with 7.11.2.1 "Operation of Metadata Character Encoding" for character encoding when encoding URLs.

#### 7.11.5.3.2 Details of Query Request

##### 7.11.5.3.2.1 Common Format

This section describes the common forms that do not depend on the query pattern. The formats are as follows. The order of appearance for the items that can be omitted is fixed.

[Format]	<predicate-bag>[&<range>][&<fragment>][&<format>][&<type>]	
◆ <predicate-bag>	Specifies query conditions.	(Described in detail in (a) below)
◆ <range>	Specifies the return range.	(Described in detail in (b) below)
◆ <fragment>	Specifies the return fragment.	(Described in detail in (c) below)
◆ <format>	Specifies the encoding method for returned data.	(Described in detail in (d) below)
◆ <type>	Specifies the format of the returned data.	(Described in detail in (e) below)

## (a) &lt;predicate-bag&gt;

[Format]	predicate=<binary-predicates>[&<sort>]
◆ <binary-predicates>	<p>&lt;binary-predicates&gt; set. Listed multiple &lt;binary-predicate&gt; are interpreted as a logical product(conjunction).</p> <p>[Format] <code>[!&lt;binary-predicate&gt;[,&lt;binary-predicates&gt;]</code></p> <p>! is a NOT operator and selects the complementary set of fragments selected in &lt;binary-predicate&gt; following immediately after it.</p>
◆ <binary-predicate>	Detailed conditions for each query pattern are specified. Defined in 7.11.5.3.2.2.
◆ <sort>	<p>Sort is specified.</p> <p>[Format] <code>sort = crid   fragmentid   title   none</code></p> <p>crid: Sorted in ascending order using CRID.  fragmentid: Sorted in ascending order using fragmentId.  title: Sorted in order of title(*).  none: Not sorted.</p> <p>When this parameter is not specified, it is regarded as "sort=note".</p>
<p>* Sorting in order of title is performed using BasicDescription/Title[@type="alternative"]/text() of ProgramInformation or GroupInformation.</p> <p>For contents of the overall predicate evaluation result, see 7.11.5.3.3.</p>	

## (b) &lt;range&gt;

[Format]	range=<from>[,<count>]   unlimit
◆ <from>	Specifies the starting position of returned query results (1 and on).
◆ <count>	Specifies the number of query results returned from the starting position.
◆ unlimit	Specifies that all query results from the beginning are returned.
<p>When this parameter is not specified, it is regarded as "range=unlimit".</p> <p>* There are cases in which results in a different range from the one specified in the range are returned due to server processing. The specified range should still be included in such cases. The actual range returned is notified by the HTTP header X-metaserver-range: in the response.</p>	

## (c) &lt;fragment&gt;

[Format] fragment=<singlefragmentspecs> | ALL | PGSET

singlefragmentspecs=<singlefragmentspec>[,<singlefragmentspecs>]

singlefragmentspec=PIT | GIT | PLT | LIT | PRT | PuIT

- 
- ◆ PIT            Specifies ProgramInformationTable.
  - ◆ GIT            Specifies GroupInformationTable.
  - ◆ PLT            Specifies ProgramLocationTable.
  - ◆ LIT            Specifies LicenseInformationTable.
  - ◆ PRT            Specifies ProgramReviewTable.
  - ◆ PuIT           Specifies PurchaseInformationTable.
  - ◆ ALL            All fragments with the same CRID
  - ◆ PGSET         Returns the same fragments as ALL stored in a single TVAMain.

When this parameter is not specified, it is regarded as "fragment=ALL".

The order can be irregular when multiple fragments are specified, but the same fragment should not be duplicate. Also, fragments appear in an irregular order in the CRID return result when the CRID order is sorted (including ALL).

## (d) &lt;format&gt;

[Format] format=textual | binary

- 
- ◆ textual        Specifies the xml format (text).
  - ◆ binary         Specifies the binary format (BiM) (option).

When this parameter is not specified, it is regarded as "format=textual".

## (e) &lt;type&gt;

[Format] type= body | countonly | cridlist

- 
- ◆ body            Specifies the xml body of the metadata corresponding to the query condition.
  - ◆ countonly      Specifies that only the number of items is returned.
  - ◆ cridlist        Specifies the CRID list of the metadata corresponding to the query result.

When this parameter is not specified, it is regarded as "type=body".

## 7.11.5.3.2.2 Format of Each Query Pattern

The format of <binary-predicate> in 7.11.5.3.2.1 (a) varies depending on the query pattern, or which element/attribute in the metadata is used as a key for the query.

This document defines the <binary-predicate> format for the following query patterns and fieldId. The fieldId is a search position label in metadata. For the correspondence between fieldId and the information element/attribute of the metadata to be queried, see Table 7-60.

Title search (fieldId: Title)

Keyword search (fieldId: Keyword)

Cast member search (fieldId: Role, GivenName)

Broadcast date and time search (fieldId: PublishedStart, PublishedEnd)

CRID search (fieldId: Crid)

FragmentId/FragmentVersion search (fieldId: FragmentId, FragmentVersion)

Genre search (fieldId: Genre)

Parent group (MemberOf) search (fieldId: MemberOf)

Group type search (fieldId: GroupType)

License ID search (fieldId: LicenseId)

PromotionalStatus search (fieldId: PromotionalStatus)

Parental rating search (fieldId: ParentalRating)

FragmentExpirationDate search (fieldId: FragmentExpirationDate)

Identifier search (fieldId: OtherIdentifier)

Period search (fieldId: Period)

Period exclusion search (fieldId: Period)

Table 7-59 shows <binary-predicate> of each query pattern.

Table 7-59 <binary-predicate> Format

Query pattern	<binary-predicate> format	fieldId	Note
Title search	title(<value>, ...)	Title	OR search using multiple values is possible.
Keyword search	keyword(<value>, ...)	Keyword	OR search using multiple values is possible.
Cast member search	credit((<value_1[, value_2>]), ...) *) value_1: GivenName, value_2: role	Role	OR search using multiple values is possible. AND applies to <value_1>, <value_2>.
		GivenName	
Broadcast date and time search	timerange([<start-time>], [<end-time>])	PublishedStart	
		PublishedEnd	

CRID search	crid(<value>, ...)	CRID	OR search using multiple values is possible.
FragmentId search	fragmentid(<value>, ...)	FragmentId	OR search using multiple values is possible.
FragmentVersion search	fragmentversion([<minimum-version>], [<maximum-version>])	FragmentVersion	
Genre search	genre(<value>, ...)	Genre	OR search using multiple values is possible.
Parent group search	memberof(<value>, ...)	MemberOf	OR search using multiple values is possible.
Group type search	grouptype(<value>, ...)	GroupType	OR search using multiple values is possible.
License ID search	licenseid(<value>, ...)	LicenseId	OR search using multiple values is possible.
PromotionalStatus search	promotionalstatus(<value>, ...)	PromotionalStatus	OR search using multiple values is possible.
Parental rating search	parentalrating(<value>,...)	ParentalRating	OR search using multiple values is possible.
FragmentExpirationDate search	expirationdate(<not-before>)	FragmentExpirationDate	
Identifier search	identifier(<id>,[<id-type>])	OtherIdentifier	
Period search	period(<type>,[<start>],[<end>])	PeriodType	
		PeriodStart	
		PeriodEnd	
Period exclusion search	periodex(<type>,[<start>],[<end>])	PeriodType	
		PeriodStart	
		PeriodEnd	

Search is performed using the following general format for fieldId not listed in Table 7-59. Multiple <value> can be listed, and the found results for each condition are joined with OR. This format cannot be used for fieldId listed in Table 7-59, and the formats in Table 7-59 should be used.

```
field(<fieldId>,<value>[, ...])
```

When the following characters are included in <value>, "\"(backslash/0x5C) should be used for escaping.

```
'(', ')', ',', '*', '&', '\\'(backslash/0x5C)
```

<value> can also specify query conditions in the following format.

```
[*]<string>[*] (<string> is a search string)
```

Prefix asterisk only → Backward match  
Postfix asterisk only → Forward match  
Asterisk on both end → Containing match

No asterisk →Exact match

The following section provides supplementary explanations for query formulas that are not for simple string queries among the formulas listed in Table 7-59.

(1) credit

Names (GivenName) and roles (Role) can be specified. Names and roles can be specified as pairs using AND. Multiple pairs are specified using OR.

Examples are shown below.

- credit((name))  
Data with GivenName "name" is selected.
- credit((name, http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERoleCS:3.1),(name, http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERoleCS:1))  
Data with GivenName "name" and Role "director" or "performer" is selected

(2) timerange

When there is an overlap between the time period presented using the specified start time and end time and the delivery period described in the metadata, this metadata fragment is selected. The following method is used to determine overlaps between the periods.

(Content delivery start time < <end-time>) and (Content delivery end time > <start-time>)

<start-time> and <end-time> describe time in the "YYYYMMDDHH" format or "YYYY-MM-DDTHH[+zz:zz]" format. Minutes and seconds are processed as 0. Time zone can be added to the latter format. When time zone is not specified, both formats are processed assuming the default time zone of the server. The default time zone information is sent as the header information of the returned result.

<start-time> or <end-time> can be omitted. When one of them is not specified, the omitted boundary is matched without conditions. For example, when timerange(2006010100,) is set for the condition, a metadata fragment of a content that ends after 2006/01/01 0:00:00' is selected.

Examples of query conditions when the content's available period is set to StartOfAvailability =2005/12/24 0:00:00 and EndOfAvailability =2006/1/1 0:00:00 are as follows.

- Example of timerange with which the content's metadata fragment is selected

Query condition	Explanation
timerange(2005122423,2005122504)	The query range overlaps the beginning of the available period.
timerange(2005122500,2005122501)	The query range is included in the available period.
timerange(2005123123,2006010104)	The query range overlaps the end of the available period.
timerange(2005122000,2006020100)	The query range includes the available period.

- Example of timerange with which the content's metadata fragment is not selected

Query condition	Explanation
timerange(2005122320,2005122323)	The query range does not overlap the available period.
timerange(2005122323,2005122400)	The end point of the query range and the beginning point of the available period are the same.
timerange(2006010100,2006010110)	The beginning of the query range and the end point of the available period are the same.

(3) fragmentversion

The metadata fragment with *FragmentVersion* included between the specified < minimum-version > and < maximum-version > is selected. The following method is used to determine inclusions.

$(\text{FragmentVersion} \geq \text{<minimum-version>})$  and  $(\text{FragmentVersion} \leq \text{<maximum-version>})$

< minimum-version > and < maximum-version > describe time in "YYYYMMDDhhmmss" format.

<minimum-version> or <maximum-version> can be omitted. When one of them is not specified, the omitted boundary is matched without conditions. For example, when fragmentversion(20060101000000,) is listed as a condition, the metadata fragment with FragmentVersion that matches '20060101000000' or larger is selected.

(4) expirationdate

The metadata fragment with FragmentExpirationDate that matches the time specified in <not-before> or later is selected.

The time in "YYYY-MM-DDThh:mm:ss[+zz:zz]" format is listed in <not-before>. The time zone process is performed in the same way as (2) timerange.

(5) period

The period condition evaluation for the Period field with @type specified in <type> is performed in the same way as with timerange.

(6) periodex

The period condition evaluation for the Period field with @type specified in <type> is performed in the same way as with !timerange (negation of timerange).

### 7.11.5.3.3 Overview of Query Process

This section describes how query requests in accordance with the above-mentioned syntaxes are processed. The process method described in this document does not define the actual server process method but is presented only to define returned result sets clearly.

#### Creation of <binary-predicate> evaluation result

The <binary-predicate> evaluates formulas for all paths included in the fieldId which its predicate corresponds to and generates a list of pairs of fragment ID and CRID by fragment type for all fragments for which the result was true.

#### a) Extraction of result set for every binary-predicate

The following processes are performed for every binary-predicate to generate a fragment ID list of result candidates.

##### (1) When there is 1 return fragment

All fragment id of the fragments meeting the following conditions are extracted: fragments that have the same CRID as those listed in the ID lists of the fragments in which the fragment type is different from the returned fragment, and the fragments in which the type is the same as the returned fragment. A list is created by adding the fragment id and the fragment id of the ID list of the fragments in which the fragment type corresponds to the returned fragment.

##### (2) Other than above

A list of fragment id of fragments that have all CRID included in all result lists and in which the type corresponds to the returned fragment is created.

#### b) Creation of final result

Finally, fragment IDs in all binary-predicate result candidate lists are collected to create a fragment id set (final result).

### 7.11.5.3.4 Additional Notice on Query Request Description

#### 7.11.5.3.4.1 "Rounding" of Specified Value

When a server query is performed, some query condition values may be corrected (rounded) to match the boundaries of data managed on servers, etc. This correction is made to include the specified range of the query condition. As a consequence, query results may include data outside the range intended by receivers. In this case, receivers should select suitable data. The following section describes the selection method for query conditions that can be rounded.

##### (1) Range specification

When range is specified, more data including the range from "from" to "from + count" may be returned. Query responses of metadata servers always indicate the return data range using X-metasever-range: in the HTTP header, so the range to be selected can be identified using this value.

## 7.11.5.3.4.2 Definition and Operation of fieldId

Table 7-60 shows the fieldId definitions, corresponding query target XPath and the type of format used for <binary-predicate> description.

- “Condition format” indicates the format used to describe conditions for the corresponding fielded. The prefix “tva:” is omitted.

Table 7-60 Relationship between fieldId and Search Target and Operation

fieldId	Corresponding XPath	Condition format A: Format in Table 6-1 B: fieldId()
Crid	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/@programId	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/@groupId	
	/TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/Program/@crid	
	/TVAMain/ProgramDescription/IPTVService:LicenseInformationTable/IPTVService:LicenseInformation/IPTVService:ProgramCRID/@crid	
	/TVAMain/ProgramDescription/IPTVService:LicenseInformationTable/IPTVService:LicenseInformation/IPTVService:GroupCRID/@crid	
	/TVAMain/ProgramDescription/ProgramReviewTable/Review/@programId	
	/TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/CRIDRef/@crid	
MemberOf	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/MemberOf/@crid	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/MemberOf/@crid	
GroupType	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/GroupType/@value	A
FragmentId	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/@fragmentId	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/@fragmentId	
	/TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/@fragmentId	
	/TVAMain/ProgramDescription/ProgramReviewTable/Review/@fragmentId	
	/TVAMain/ProgramDescription/IPTVService:LicenseInformationTable/IPTVService:LicenseInformation/@fragmentId	
	/TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/@fragmentId	
FragmentVersion	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/@fragmentVersion	A

	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/@fragmentVersion /TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/@fragmentVersion /TVAMain/ProgramDescription/ProgramReviewTable/Review/@fragmentVersion /TVAMain/ProgramDescription/IPTVService:LicenseInformationTable/IPTVService:LicenseInformation/@fragmentVersion /TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/@fragmentVersion	
FragmentExpire	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/@fragmentExpirationDate /TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/@fragmentExpirationDate /TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/@fragmentExpirationDate /TVAMain/ProgramDescription/ProgramReviewTable/Review/@fragmentExpirationDate /TVAMain/ProgramDescription/IPTVService:LicenseInformationTable/IPTVService:LicenseInformation/@fragmentExpirationDate /TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/@fragmentExpirationDate	A
OtherIdentifier	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/OtherIdentifier/text() /TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/OtherIdentifier/text()	A
OtherIdType	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/OtherIdentifier/@type /TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/OtherIdentifier/@type	A
Title	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/Title/text() (*1) /TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/Title/text() (*1)	A
Duration	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/Duration/text()	B
Synopsis	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/Synopsis/text() /TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/Synopsis/text()	B
Keyword	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/Keyword/text() /TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/Keyword/text()	A A
Genre	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/Genre/@href /TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/Genre/text()	A
Role	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/CreditsList/CreditsItem/@role	A

	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/CreditsList/CreditsItem/@role	
GivenName	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/CreditsList/CreditsItem/PersonName/GivenName/text()	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/CreditsList/CreditsItem/PersonName/GivenName/text()	
Character	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/CreditsList/CreditsItem/Character/GivenName/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/CreditsList/CreditsItem/Character/GivenName/text()	
Language	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/Language/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/Language/text()	
CaptionLanguage	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/CaptionLanguage/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/CaptionLanguage/text()	
SignLanguage	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/SignLanguage/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/SignLanguage/text()	
PromotionInfo	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/PromotionalInformation/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/PromotionalInformation/text()	
PromotionStatus	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/PromotionalInformation/@href	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/PromotionalInformation/@href	
ProductDate	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/ProductionDate/TimePoint/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/ProductionDate/TimePoint/text()	
ReleaseDate	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/ReleaseInformation/ReleaseDate/DayAndYear/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/ReleaseInformation/ReleaseDate/DayAndYear/text()	
ReleaseYear	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/ReleaseInformation/ReleaseDate/Year/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/ReleaseInformation/ReleaseDate/Year/text()	

ReleaseLocation	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/ReleaseInformation/ReleaseLocation/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/ReleaseInformation/ReleaseLocation/text()	
PeriodType	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/Period/@type	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/Period/@type	
PeriodStart	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/Period/Start/text()	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/Period/Start/text()	
PeriodEnd	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/Period/End/text()	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/Period/End/text()	
ProgramURL	/TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/ProgramURL/text()	B
PublishedStart	/TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/StartOfAvailability/text()	A
PublishedEnd	/TVAMain/ProgramDescription/ProgramLocationTable/OnDemandProgram/EndOfAvailability/text()	A
Price	/TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/Price/text()	B
PurchaseStart	/TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/@start	B
PurchaseEnd	/TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/@end	B
LicenseID	/TVAMain/ProgramDescription/IPTVService:LicenseInformationTable/IPTVService:LicenseInformation/IPTVService:LicenseID/text()	A
LicenseType	/TVAMain/ProgramDescription/IPTVService:LicenseInformationTable/IPTVService:LicenseInformation/IPTVService:LicenseType/text()	B
ParentalRating	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/ParentalGuidance/ParentalRating/@href	A
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/ParentalGuidance/ParentalRating/@href	
PurchaseId	/TVAMain/ProgramDescription/ProgramInformationTable/ProgramInformation/BasicDescription/PurchaseList/PurchaseIdRef/text()	B
	/TVAMain/ProgramDescription/GroupInformationTable/GroupInformation/BasicDescription/PurchaseList/PurchaseIdRef/text()	
	/TVAMain/ProgramDescription/LicenseInformationTable/LicenseInformation/PurchaseIdRef/text()	
	/TVAMain/ProgramDescription/PurchaseInformationTable/PurchaseInformation/@purchaseId	

\*1: This condition is implicitly restricted to "Title[(@type="main") or (@type="alternative") or (@type="popular")]".

#### 7.11.5.4 Reception of Query Result

This section describes how query requests are received using HTTP.

##### 7.11.5.4.1 Normal Response

Query results are stored in the body part of HTTP and returned. Information may be added to query results in the HTTP header area using private headers.

##### 7.11.5.4.1.1 Syntax

The query results for query condition specification other than type=countonly are stored in the multipart/mixed (RFC2046) format.

When type=countonly is specified in a query request, the body part of the query result response becomes empty.

The definition of the multipart syntax of RFC2046 is as follows.

```

boundary := 0*69<bchars> bcharsnospace

bchars := bcharsnospace / " "

bcharsnospace := DIGIT / ALPHA / "'" / "(" / ")" /
    "+" / "_" / "," / "-" / "." /
    "/" / ":" / "=" / "?"
dash-boundary := "--" boundary
    ; boundary taken from the value of
    ; boundary parameter of the Content-Type field.
multipart-body := [preamble CRLF]
    dash-boundary transport-padding CRLF
    body-part *encapsulation
    close-delimiter transport-padding
    [CRLF epilogue]
transport-padding := *LWSP-char
    ; Composers MUST NOT generate non-zero length transport padding,
    ; but receivers MUST be able to handle padding
    ; added by message transports.
encapsulation := delimiter transport-padding
    CRLF body-part

delimiter := CRLF dash-boundary
close-delimiter := delimiter "--"
preamble := discard-text
epilogue := discard-text
discard-text :=>(*text CRLF) *text
    ; May be ignored or discarded.

body-part := MIME-part-headers [CRLF *OCTET]
    ; Lines in a body-part must not start with the specified
    ; dash-boundary and the delimiter must not appear anywhere
    ; in the body part. Note that the semantics of a body-part differ from
    ; the semantics of a message, as described in the text.

OCTET := <any 0-255 octet value>

```

#### 7.11.5.4.1.2 Additional Information Described in Entity Header

The following information is added to the entity header based on the query specification and query result.

(1) count

Indicates the total number of metadata that match the query condition (<totalcount>). This header field is added only when type=countonly is specified in the query request.

`X-metaserver-count: <totalcount>`

(2) range

Indicates the total number of metadata that match the return range of metadata returned as the query result (<from>, <to>) and the query condition. This header field must be added when a parameter other than type=countonly is specified in the query request.

`X-metaserver-range: <from>-<to>/<totalcount>`

(3) latest version

Indicates the maximum value (maximum-version) of fragmentVersion of the metadata returned as the query result in YYYYMMDDhhmmss format. This header field must be added when a parameter other than type=countonly is specified in the query request.

`X-metaserver-latestversion: <maximum-version>`

(4) timezone

Presents the time zone in which the time specification without time zone included in the query result is processed in +zzzz format.

This must be returned when time specification without time zone is included in the query request.

`X-metaserver-default-timezone: +0900`

(5) warning

Indicates warning information for query request processes. Receivers do not need to perform processing according to this information.

`X-metaserver-warning: <warnings>`

(6) error

When a result cannot be returned properly in the query request process, error information is returned using the following header. Receivers do not need to perform processing according to this value. For more information, see 7.11.5.4.2 (1).

`X-metaserver-error: <error code>`

#### 7.11.5.4.1.3 Additional Information Described in Part Header

When type=body, the following information is added to the header of parts in the response.

(1) Fragment information

In cases other than fragment=PGSET, fragmentId and fragmentVersion of the fragments stored in parts are added to the part header in the following format.

Content-Description: <fragmentId>,<fragmentVersion>

(2) CRID

When fragment=PGSE, the CRID of the metadata stored in a part is added to the part header in the following format.

Content-Description: <CRID>

#### 7.11.5.4.1.4 Data types in Each Part of Query Result

When a query result returned in the multipart format, only types of data can be included in each part. The Content-Length field is operated for all part headers. The Content-Location field is not operated.

(1) Fragment/metadata

A metadata fragment corresponding to a query result is stored in the text XML format. The Content-Type header field of the part in which the fragment is included is as follows.

```
Content-Type: application/X-arib-meta+xml; charset="UTF-8"
```

(2) Binary format fragment/metadata (option)

If format=binary is operated for query requests, a fragment or metadata of each part is returned in the binary format (BiM) when this is specified. In this case, the Content-Type header field of the part should be as follows.

```
Content-Type: application/X-arib-meta+bim
```

#### 7.11.5.4.1.5 Structure of Body Part

As a query result, multiple XML documents corresponding to the query conditions and a list of query results are returned. The structure of data included in the body is determined by the type specified in the query request. The structures of parts for each type are as follows.

(1) type=countonly

The result is described in the X-metaserver-count header field, and the body does not exist.

(2) type=body

The result is returned in the multipart format.

When there are 1 or more query results, all parts except for the first part are fragments.

When there are 0 query results, the first part is empty and no following parts exist.

(3) type=cridlist

The result is returned in the text format.

There is one CRID in a line. CR-LF is used for line feeds.

### 7.11.5.4.1.6 Example of Query Result

The following is an example of a response to 7.11.5.4.1.4 (2) type=body.

```
(Example)
-----
Content-Type: multipart/mixed; boundary=gc0p4Jq0M2Yt08j34c0p
Content-Length: 80192
X-metaserver-range: 1-10/1000
X-metaserver-latestversion: 20060101000000
X-metaserver-warning: Some parameters are ignored
X-metaserver-default-timezone: +0900

--gc0p4Jq0M2Yt08j34c0p
Content-Type: application/X-arib-meta+xml;charset="UTF-8"
Content-Description: 0cd321101e,20080101000000
Content-Length: 6452

<?xml version="1.0" encoding="UTF-8"?>
<TVAMain>
....
</TVAMain>
--gc0p4Jq0M2Yt08j34c0p
...
--gc0p4Jq0M2Yt08j34c0p
Content-Type: application/X-arib-meta+xml;charset="UTF-8"
Content-Description: 20d33313fb,20080101000000
Content-Length: 3446

<?xml version="1.0" encoding="UTF-8"?>
<TVAMain>
...
</TVAMain>
--gc0p4Jq0M2Yt08j34c0p--
-----
```

First fragment

Last fragment

#### 7.11.5.4.2 Error Response

When an error occurs after a query request reaches the server successfully, an error response is returned.

The following 3 types of errors are returned.

(1) Server process error

When the query process cannot be performed due to, for example, a wrong query request format, while the server program is operating, an error code is returned in X-metaserver-error: header with HTTP status 200. Error codes vary depending on the provider.

(2) Error code 500 Internal Error

This error may be returned when a server program is not operational.

(3) Error code 503 Service Unavailable

This error is returned when requests cannot be processed temporarily. Time during which a retry may be performed is specified in the Retry-After header. The behavior when Retry-After is not specified varies depending on receiver models.

The following is an example of an error response when a server process error occurs.

(Example)

```
-----  
HTTP/1.1 200 OK  
Content-Type: Text/Plain; charset='UTF-8'  
X-metaserver-error: ERR00004
```

```
.....  
-----
```

## 7.11.6 Metadata Cache Control

### 7.11.6.1 Metadata Cache Control Method

#### 7.11.6.1.1 Guidelines on Metadata Cache

Obtained metadata can be saved in the cache of a receiver and reused for efficient display using ECG. Provision of a cache function, cache capacity and usage of cache are implementation-dependent.

#### 7.11.6.1.2 Targeted Receivers

Various receivers are targeted such as receivers without a cache function, receivers with a cache having a small capacity, and receivers with a cache having a large capacity that can store all metadata.

### 7.11.6.2 Getting Metadata

Receivers can get metadata by sending an acquisition request including query conditions to a metadata server. For more information, see 7.11.5 "Operation of Metadata Delivery Method"

### 7.11.6.3 Adding/Updating Metadata

#### 7.11.6.3.1 Metadata Adding/Renewing Process

By using fragment identification of metadata belonging to the same authority, receivers can identify logical adding/renewing by metadata fragment. Identification of fragments is performed using fragmentVersion defined in 7.11.4.4.3 "Operation of fragmentVersion".

To obtain added/renewed data for metadata, a query request is made by omitting <maximum-version> from the value returned when <minimum-version> of fragmentversion is obtained the last time with X-metaserver-latestversion.

When fragmentId of the obtained metadata is new, the receiver can regard it as an addition of metadata and perform the process to add it to the cache.

When fragmentId of the obtained metadata already exists in the cache of a receiver and when fragmentVersion is newer than the cache, the receiver can perform the metadata renewal process.

#### 7.11.6.3.2 Triggers for Adding/Renewing Metadata

When cache is reused 24 hours after getting or adding/renewing of metadata, it is recommended to perform a metadata adding/renewing process. It is recommended to prevent query requests from concentrating at the same time when obtaining additional/renewal data. Also, the renewal process is performed on the assumption that receivers do not handle metadata that has expired a month or more ago.

#### 7.11.6.3.3 Adding/Renewing Process on Receivers

It is recommended that receivers that cache a large amount of metadata perform the metadata addition/renewal process to reduce the data amount and server load.

For an example of addition/renewal processes, see [Appendix AA] AA.2 "Example of Metadata Query and Acquisition on Receivers with Large-Capacity Cache".

#### 7.11.6.4 Displaying Metadata

##### 7.11.6.4.1 Conditions for Displaying Metadata

The expiration date determines whether metadata is displayed or not. Expired metadata should not be displayed in ECG.

Deletion of unnecessary expired metadata is implementation-dependent.

##### 7.11.6.4.2 Expiration of Metadata

The last date (Japan Standard Time) of the available period is used to describe the metadata expiration date in the dateTime format (YYYY-MM-DDThh:mm:ss+09:00 format) in the FragmentExpirationDate attribute. In Japan, the time zone is fixed to +09:00. When the FragmentExpirationDate attribute is not specified, the handling of the expiration date is implementation-dependent.

##### 7.11.6.4.3 Notice on Operation of Metadata Expiration

Note that expired metadata can be provided over a long period of time in obtained data. As shown in Figure 51, when the expiration date of metadata that is once presented by a server is shortened, a receiver can cache the metadata that is presented first and perform addition/renewal process after the shortened expiration date. If the receiver cannot obtain the metadata with the shortened expiration date, the receiver has to present the cached metadata until the expiration date before the change. Therefore, it is assumed that a server presents expired metadata until the expiration date presented first and that receivers perform the renewal process properly.

If expired metadata is not required, for example, like with receivers without a cache, acquisition using exclusion in metadata query sentences is possible. For an actual query example, see [Appendix AA] AA.1 "Example of Metadata Query and Acquisition on Receiver without Large-Capacity Cache".

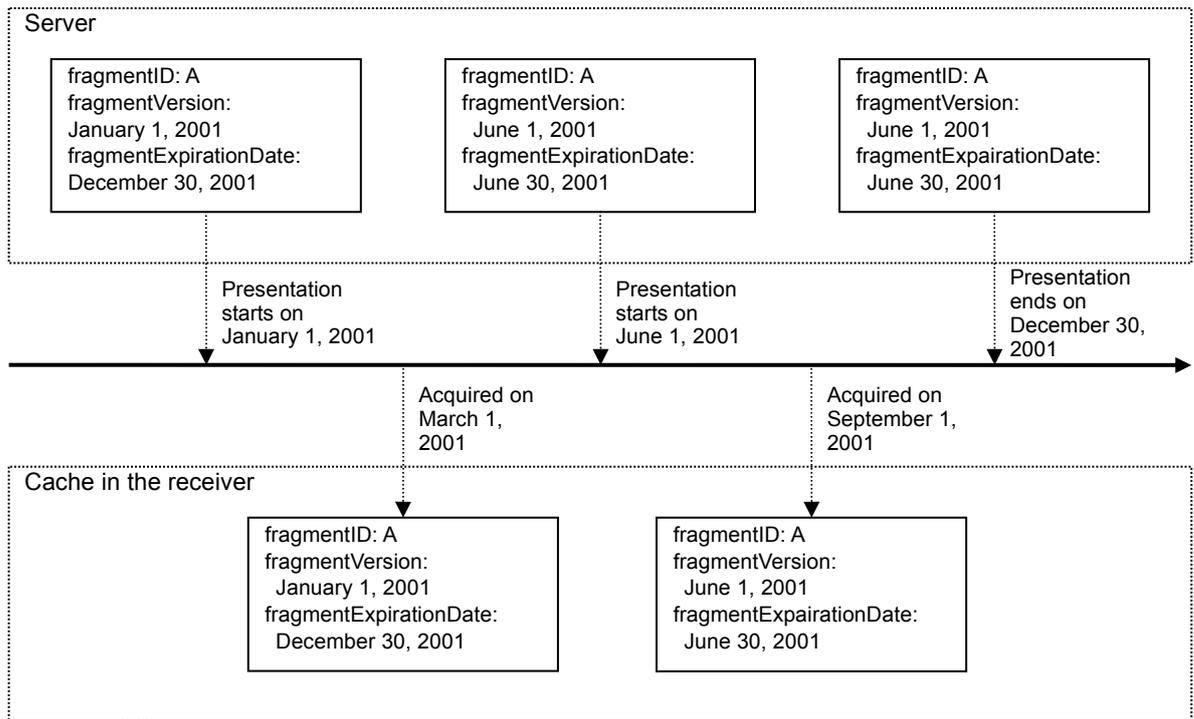


Figure 51 Example of Shortened Metadata Expiration Date Operation

## 7.12 Operation Model for ECG Metadata Information Element

When metadata is used with ECG, it is assumed that a receiver queries across the metadata provided by multiple service providers and displays the content list screen. In order to avoid having significantly unbalanced display results among the service providers, it is desirable to follow the operation model shown in [Appendix P] “Guidelines on Operation Model for ECG Metadata Information Element to Be Standardized among Service Providers” for each information element that should be unified among service providers.

## Chapter 8 Operational Specifications for Download Service(TBD)

Download service is not supported in this version..

## Chapter 9 Operational Specifications for IP Broadcasting Service

Besides IPTVFJ STD-0004 "IP Broadcasting Specifications", No operational specifications for IP broadcasting service specific to CDN scope are defined.

## Chapter 10 Operational Specifications for IP Retransmission Service of Digital Terrestrial Television Broadcasting

Besides IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting", no operational specifications for IP retransmission service of digital terrestrial television broadcasting specific to CDN scope are defined.

## Chapter 11 Operational Specifications for IP Retransmission Service of BS Digital Satellite Broadcasting

Besides IPTVFJ STD-0009 "Operational Specifications on IP Retransmission of BS Digital Satellite Broadcasting", no operational specifications for IP retransmission service of BS digital satellite broadcasting specific to CDN scope are defined.

## [Appendix A] Specifications on Copy Generation Management System-Analog(CGMS-A)

To output analog video signals from the receiver, CGMS-A-based copy control should be used.

Regarding 480i (525i) streams and related copyright information, conformance to CPR-1204 of JEITA (EIAJ) and IEC 61880, respectively, should be ensured. Regarding 480p (525p) streams and related copyright information, conformance to CPR-1204-1 of JEITA (EIAJ) and IEC 61880, respectively, should be ensured. Regarding 720p (750p) and 1080i (1125i) streams and related copyright information, conformance to CPR-1204-2 of JEITA (EIAJ) and IEC 61880, respectively, should be ensured.

### A.1 Definition of CGMS-A

Table Appendix- 1 shows the definition of CGMS-A and recording controls applicable to recording media.

Table Appendix- 1 Definition of CGMS-A and Recording Controls Applicable to Recording Media

CGMS-A	Definition	Recording method
0 , 0	Copy freely	Recording is done with the CGMS mode set to 0 , 0.
0 , 1	Not defined	
1 , 0	Copy one generation	Recording is done with the CGMS mode set to 1 , 1.
1 , 1	Copy prohibited	No recording.

### A.2 Transmission Method When Using CGMS-A

Copy generation control information should be sent using the 1H of the vertical blanking interval of luminance signals. Reference signals, reduced to 70% of the white peak level, and 20-bit digital signals with an amplitude of 70% or 0%, should be assigned to the 1H of the active video area, and using the 20 bits, the copy generation control information and video-related information are coded for transmission.

#### A.2.1 Analogue Output Using the Composite System (480i)

Analog transmission using the composite system (480i) should conform to the specifications for the identification signal waveform in the following standard.

- EIAJ CPR-1204 "Video ID Signal Transmission Method Using a VBI (525 Line System)"

#### A.2.2 Analogue Output Using the Component System (480i)

Multiplex line	The 20H and 283H vertical blanking interval of luminance signals
Multiplex level	Logic 1: 70% ± 10% of the white peak level Logic 0: +10% and -5% of the black level
Clock frequency	$f_{sc}/8 = (455/16) f_H = 447 \text{ kHz}$ However, it should be noted that $f_H$ represents the horizontal scanning frequency.

Figure Appendix- 1 shows the transmission signal waveform. The cumulative time error from the rise of Ref bit to each bit should be less than  $0.44\mu\text{s}$ .

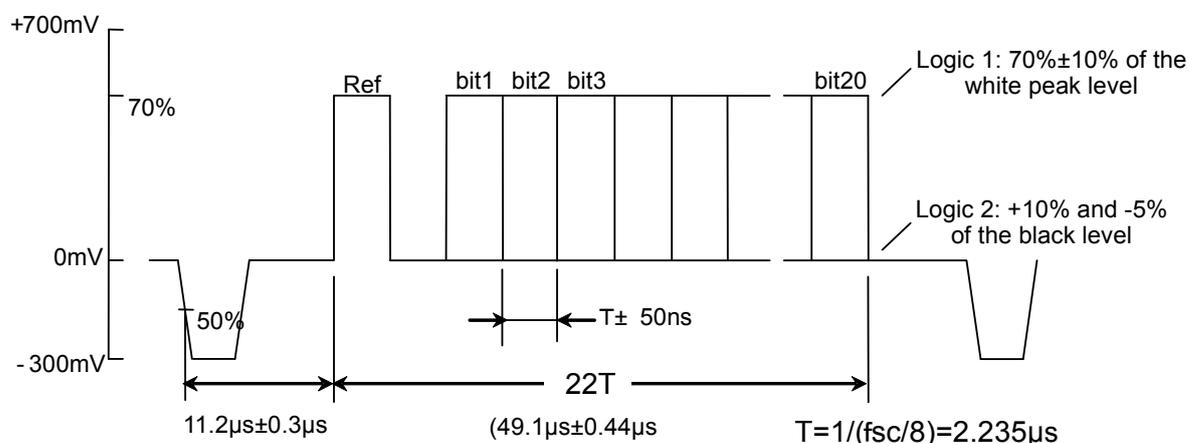


Figure Appendix- 1 Identification Signal Waveform When Using the Component System (480i)

#### A.2.3 Analogue Output Using the Component System (480p)

Analogue transmission using the component system (480p) should conform to the specifications for the identification signal waveform in the following standard.

- EIAJ CPR-1204-1 "Video ID Signal Transmission Method and System Using a VBI (525p System)"

#### A.2.4 Analogue Output Using the Component System (720p)

Analogue transmission using the component system (720p) should conform to the specifications for the identification signal waveform in the following standard.

- EIAJ CPR-1204-2 "Video ID Signal Transmission Method Using a VBI (750p and 1125i System)"

#### A.2.5 Analogue Output Using the Component System (1080i)

Analogue transmission using the component system (1080i) should conform to the specifications for the identification signal waveform in the following standard.

- EIAJ CPR-1204-2 "Video ID Signal Transmission Method Using a VBI (750p and 1125 System)"

### A.3 Assignment of Identification Signals

The identification signal is comprised of 20-bit information, and the 20-bit data is comprised of WORD 0 = 2 bits, WORD 1 = 4 bits, WORD 2 = 8 bits and CRCC = 6 bits.

The detailed structure is shown below. Unspecified bits are considered not to be in use ("0").

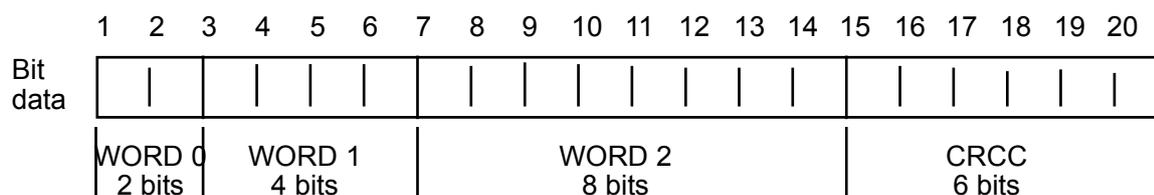


Figure Appendix- 2 Assignment of Identification Signals

- (1) WORD 0 Information concerning the aspect ratio

Table Appendix- 2 WORD 0 Information Concerning Aspect Ratio

WORD 0		Detail
bit1	bit2	
0	0	Signal for a picture with an aspect ratio of 4:3
0	1	Signal for a letter box with an aspect ratio of 4:3
1	0	Signal for a picture with an aspect ratio of 16:9
1	1	Reserved

- (2) WORD 1 Header Indicating Information to Be Transmitted in WORD 2

Table Appendix- 3 Header indicating the information to be transmitted in WORD 2

WORD 1				Information transmitted in WORD2
Bit3	bit4	Bit5	bit6	
0	0	0	0	CGMS-A information
1	1	1	1	No information
Other than above				Not defined

- (3) WORD 2 (bits 7, 8, 9, 10) information

When bits 3 to 6 in WORD 1 are set to 0000, CGMS-A information and analog output copy control information should be respectively assigned to bits 7 and 8 and bits 9 and 10 in WORD 2.

Table Appendix- 4 WORD 2 (bits 7, 8) Information

b7	b8	CGMS-A
0	0	0, 0
0	1	0, 1
1	0	1, 0
1	1	1, 1

## [Appendix B] Specifications on NAT Traversal

When unicast streaming delivery is performed using IPv4/IPv6 protocol in an environment where a router device, etc. using NAT is installed between the service network and home network, the UDP streaming data may not pass through the device. Therefore, NAT traversal should be implemented.

### B.1 Reason Why UDP Unicast Stream Fails to Reach Over NAT

The NAT function of a router device, etc. enables mutual conversion of addresses during transmission by creating a conversion table of IP addresses and ports when a receiver with a local IP address in a home network sends a connection request to a node with a global IP address.

However, the port information for UDP streaming data transmitted from a server using unicast streaming is determined in the preceding RTSP playback sequence (see IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol"). Therefore, if no measures are taken, the port information cannot pass through the router device, etc. because the information is not notified to the router device, etc. in advance (the conversion table is not created), and receivers may not be able to receive video data.

### B.2 Solution

UPnP is used to solve this problem. To use UPnP, a router device, etc. that supports UPnP is required.

Consideration should be given to network security in regard to the traversal process (UPnP, etc.) for installation of the router device, etc.

#### Resolution using UPnP (NAT traversal with IPv4)

(1) UPnP protocol specifications

Comply with Internet Gateway Device (IGD) Standardized Device Control Protocol V 1.0. Refer to WANIPConnection.

(2) Working with the RTSP process

The UPnP traversal control process should be performed in collaboration with the RTSP communication.

This process should be performed before the SETUP process with RTSP. Also, consideration should be given to duplication of setting data, etc. as other devices in the home network perform similar processes for the router device, etc.

### B.3 Sequence

#### B.3.1 Phase Structure

NAT traversal using UPnP functions in 4 phases through linkage between UPnP and RTSP. The 4 phases and operation flow are shown below.

- Setup phase
- Video startup phase
- Video playback continuation phase
- Video stop phase

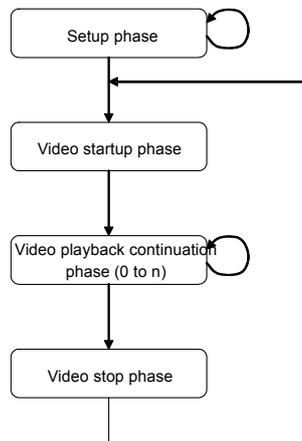


Figure Appendix- 3 NAT Traversal Using UPnP

#### B.3.2 Setup Phase

In the setup phase, receivers obtain the router device information in the following steps and prepare for the next phase. The setup phase is implemented regularly in the period before the UPnP information expires. For the following sequences, use of VOD based on the Pro-MPEG specifications is assumed.

- (1) The router device announces UPnP, and the receiver obtains a response of the router device (recommended).  
(2) to (4) can be performed even if the information in (1) is not received by the receiver.)
- (2) The receiver queries "WANConnectionDevice" and obtains the response from the router device.  
(The receiver can skip (2) if the information in (1) is received and valid.)
- (3) The receiver requests the device information of the router device and obtains a response.
- (4) The receiver requests the service information of the router device and obtains a response (option).

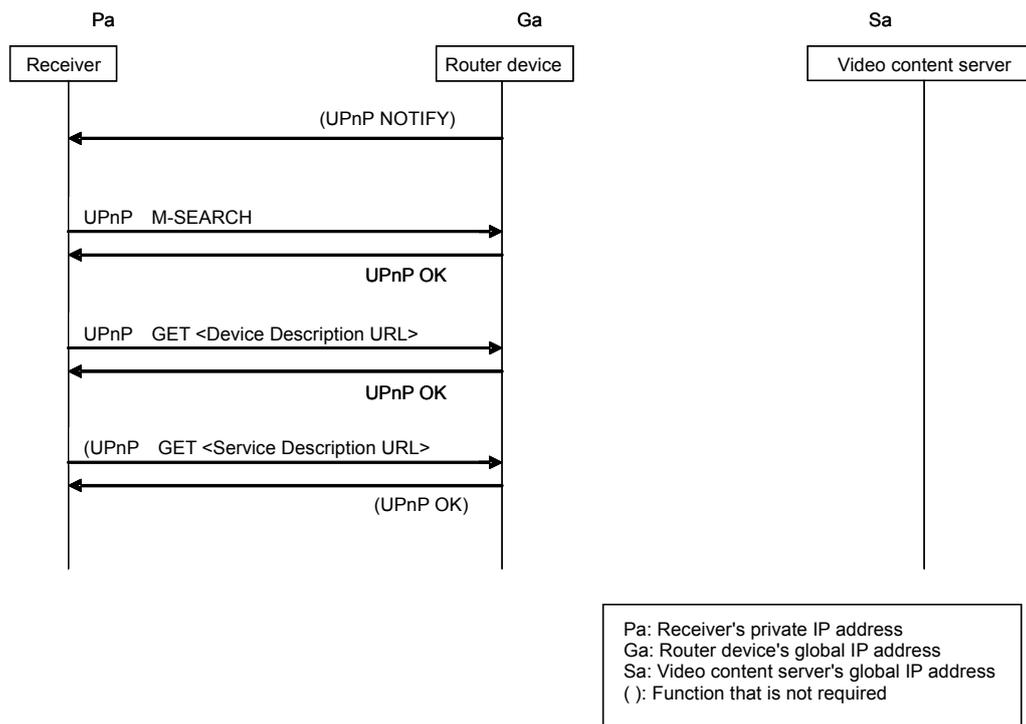


Figure Appendix- 4 Setup Phase Sequence

### B.3.3 Video Startup Phase

In the video startup phase, video startup operation is performed. The basic sequence in the video startup phase is shown below.

#### B.3.3.1 Deciding Whether to Do NAT Traversal

The NAT traversal process should be performed when IPv4 is used. The following cases can be used to confirm in advance that IPv4 is used.

- An only IPv4 address is obtained when a query is sent to the DNS server to obtain an IP address from the URI of the RTSP server during RTSP communication.
- An only IPv4 address is obtained when a query is sent to the DNS server to obtain an IP address from the URI of the RTSP server during RTSP communication.

#### B.3.3.2 NAT Traversal Process

When the NAT traversal process is performed after use of IPv4 is confirmed, a series of processes listed below should be performed. (The state in which use of IPv4 is recognized should also be maintained in B.3.4 "Video Playback Continuation Phase", B.3.5 "Video Stop Phase".)

- (1) The receiver obtains content information using RTSP DESCRIBE.
- (2) The receiver determines the local port to receive RTP packets required for the streams and the WAN port of the router to receive the packets and creates port mappings in the router device using the port mapping request (AddPortMapping) with the set values.
- (3) The receiver performs RTSP SETUP. The port for TS (Gp0) is set to client\_port parameter of the transport header from the WAN side port numbers of the router device in the

mapping created with UPnP AddPortMapping.

The receiver performs a play request using RTSP PLAY.

- (4) The video content server starts distribution of the video content data. The data that is transmitted from the video content server to the port number on the WAN side of the router device is received by the receiver after address conversion and port conversion are performed on the router device based on the created mapping.

#### Supplementary information

- When the specified port is already used by the router, etc. for the port mapping request in (2), and when an error is returned, a port mapping request should be sent for a different port.
- It is desirable to set an expiration date when a port mapping request is made in (2).

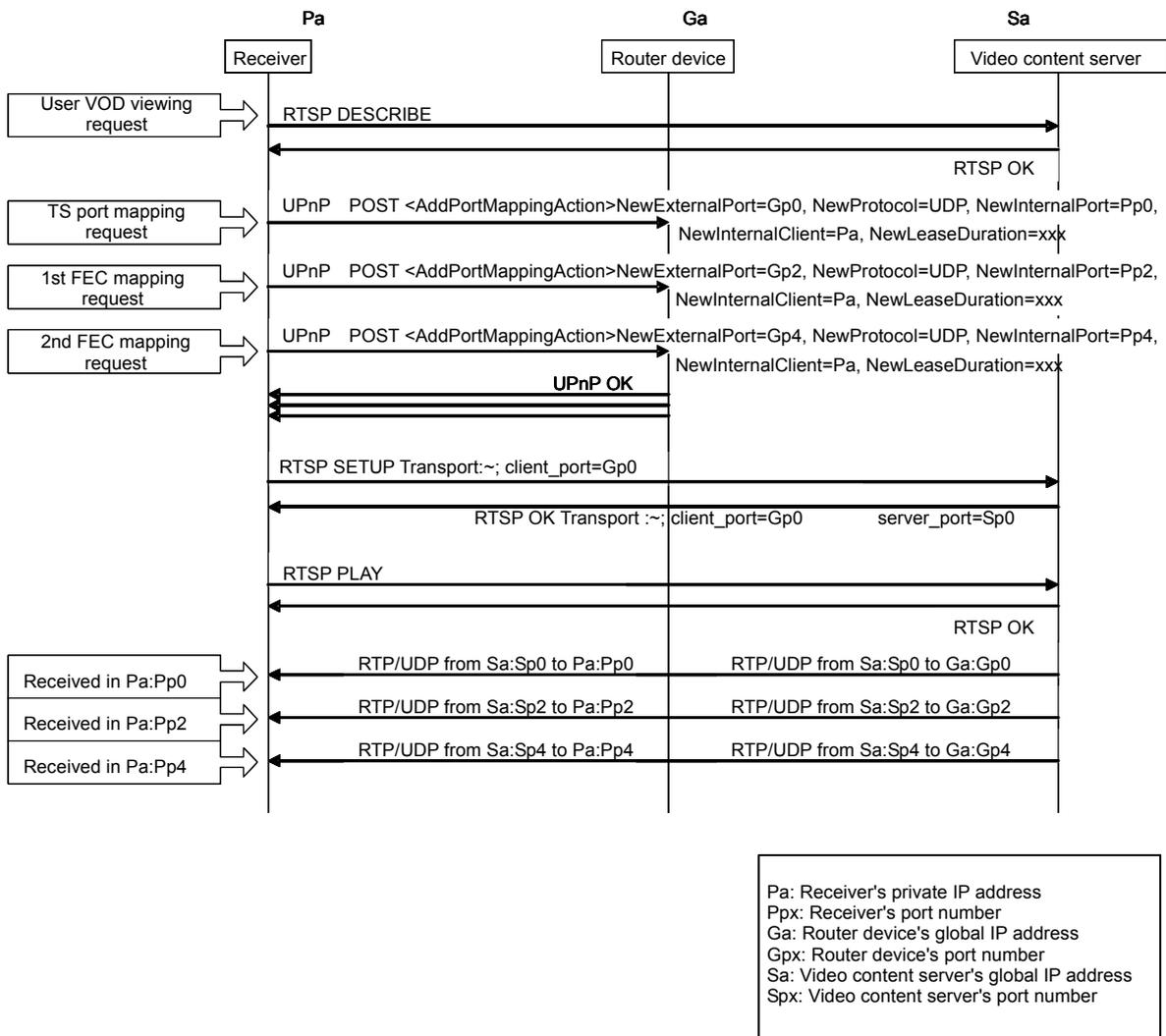


Figure Appendix- 5 Video Startup Phase Sequence

### B.3.4 Video Playback Continuation Phase

In the video playback continuation phase, the UPnP port mapping is renewed during playback. The port mapping renewal should be performed so as not to exceed the time specified in <NewLeaseDuration>. The basic sequence of the viewing renewal phase is shown below.

(When receiving video content data)

- (1) The port mapping of the router device is renewed using the port mapping request (AddPortMapping) that has set the value in the viewing start phase.

(Reception of video content data continued)

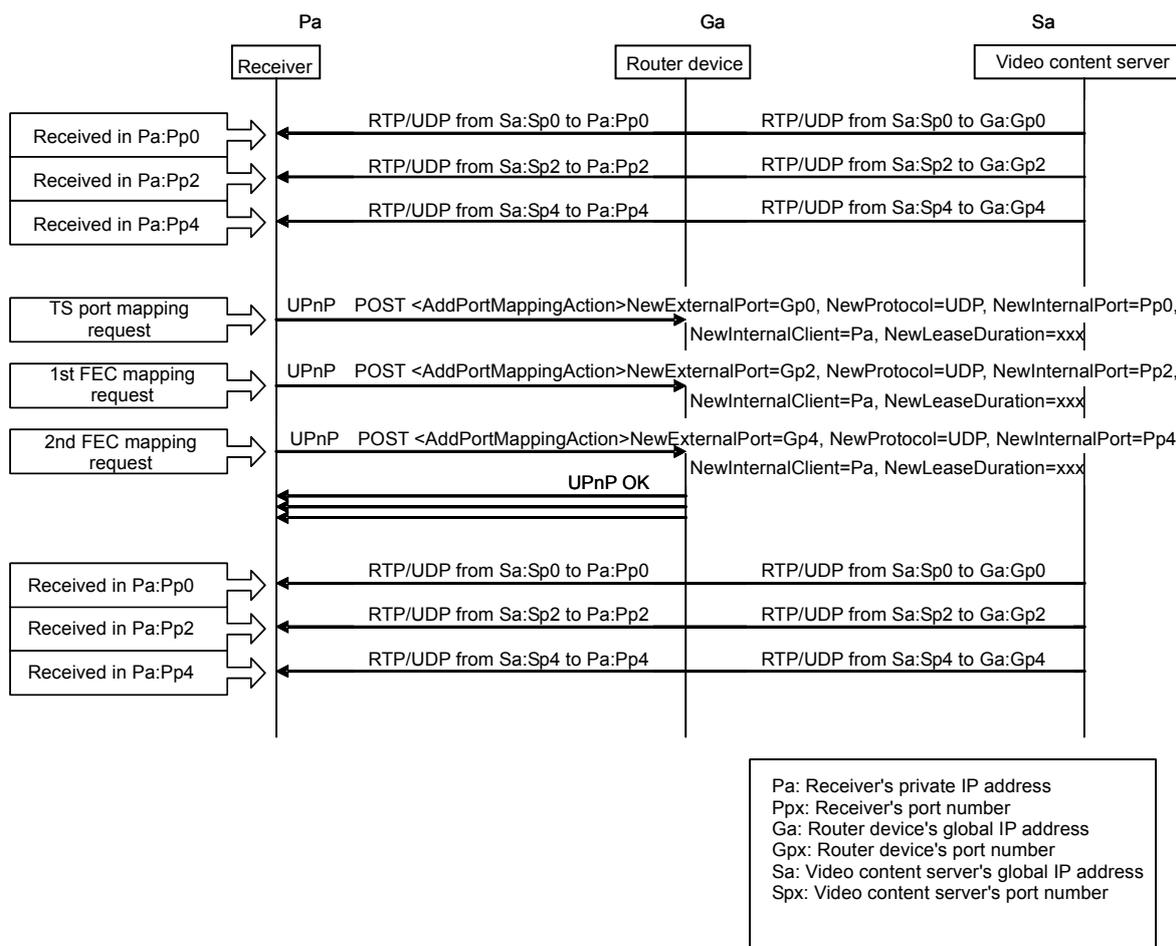


Figure Appendix- 6 Video Playback Continuation Phase Sequence

### B.3.5 Video Stop Phase

In the video stop phase, video stop operation is performed. The basic sequence when content viewing is stopped by a user is shown below. The same UPnP operation should be performed after content data reception is stopped when viewing is stopped for a different reason.

(When receiving video content data)

- (1) The receiver performs RTSP PAUSE request.
- (2) The receiver performs RTSP TEARDOWN.
- (3) The receiver deletes the port mapping created in the viewing start phase or viewing renewal phase by using UPnP DeletePortMapping.

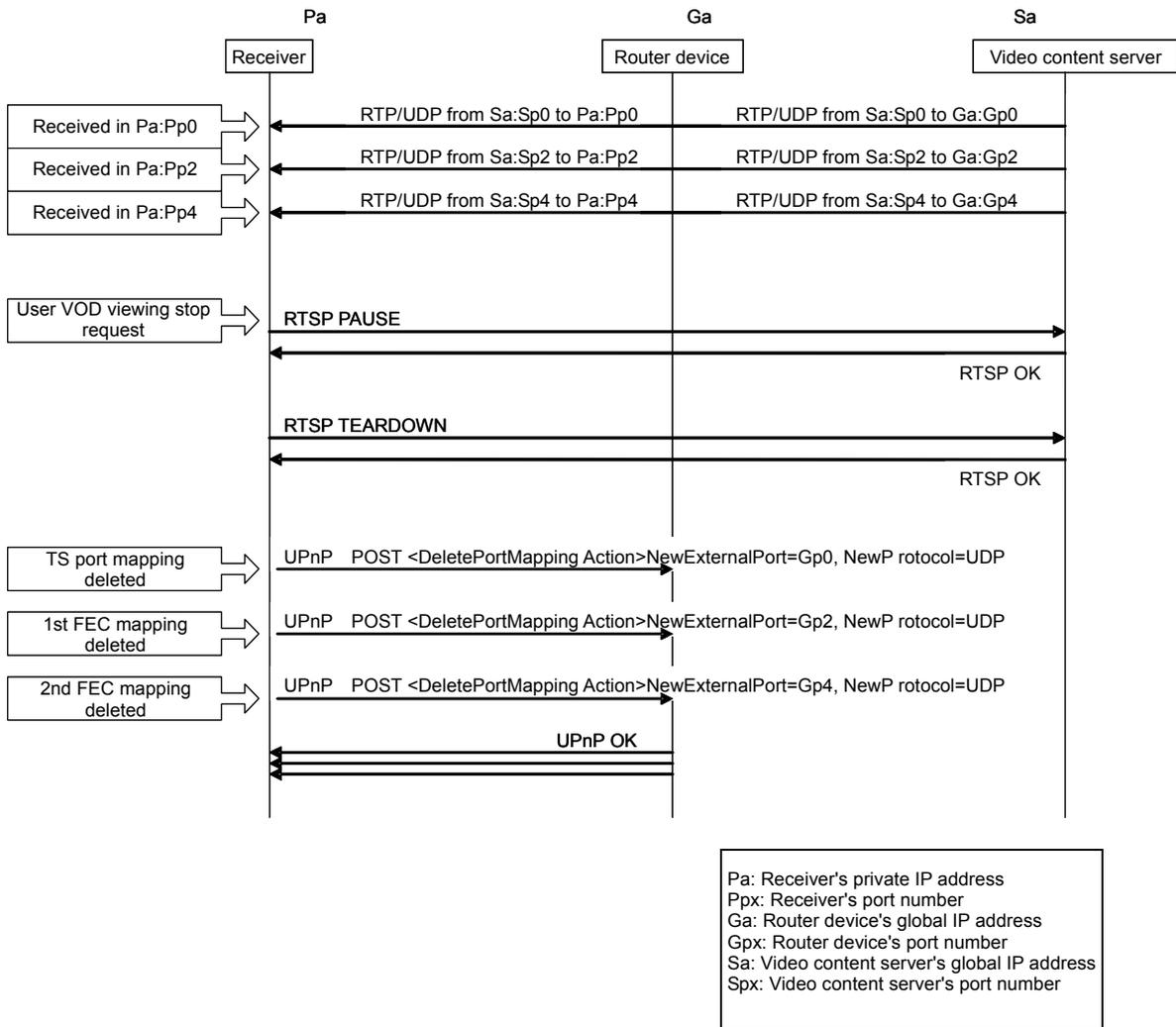


Figure Appendix- 7 Video Stop Phase Sequence

## B.3.6 Error Codes and Corresponding Actions

Table Appendix- 5 Error Codes and Corresponding Actions

error code	error Description	Corresponding Action	Description
402	Invalid Args	Retry up to 2 times Display an error after that	Could be any of the following: not enough in args, too many in args, no in arg by
501	Action Failed		May be returned in current state of service prevents invoking that action.
715	WildCardNotPermittedInSrcIP		The source IP address cannot be wild-carded
716	WildCardNotPermittedInExtPort		The external port cannot be wild-carded
718	ConflictInMappingEntry	Repeat retry	The port mapping entry specified conflicts with a mapping assigned previously to another client
724	SamePortValuesRequired	Retry up to 2 times Display an error after that	Internal and External port values must be the same

## [Appendix C] Specifications on DTD

```

<!-- ===== Broadcast Markup Language (BML) for IPTV x.0 DTD [OPERATABLE]
===== -->
<!ENTITY %      ContentType "CDATA">
<!ENTITY %      Charset "CDATA">
<!ENTITY %      Character "CDATA">
<!ENTITY %      LanguageCode "NMTOKEN">
<!ENTITY %      Number "CDATA">
<!ENTITY %      URI "CDATA">
<!ENTITY %      Script "CDATA">
<!ENTITY %      StyleSheet "CDATA">
<!ENTITY %      Text "CDATA">
<!ENTITY % Events.attrib
"onclick %Script; #IMPLIED
onkeydown %Script; #IMPLIED
onkeyup %Script; #IMPLIED">

<!ATTLIST a
      onfocus %Script; #IMPLIED
      onblur %Script; #IMPLIED
>
<!ATTLIST input
      onfocus %Script; #IMPLIED
      onblur %Script; #IMPLIED
      onchange %Script; #IMPLIED
>
<!ATTLIST body
      onload %Script; #IMPLIED
      onunload %Script; #IMPLIED
>
<!ATTLIST div
      onfocus %Script; #IMPLIED
      onblur %Script; #IMPLIED
      accesskey %Character; #IMPLIED
>
<!ATTLIST p
      onfocus %Script; #IMPLIED
      onblur %Script; #IMPLIED
      accesskey %Character; #IMPLIED
>
<!ATTLIST object
      onfocus %Script; #IMPLIED
      onblur %Script; #IMPLIED
      accesskey %Character; #IMPLIED
>
<!ATTLIST span
      onfocus %Script; #IMPLIED
      onblur %Script; #IMPLIED
      accesskey %Character; #IMPLIED
>

<!ENTITY % Core.attrib
"id ID #IMPLIED
class CDATA #IMPLIED
style %StyleSheet; #IMPLIED"
>
<!ENTITY % Common.attrib
"%Core.attrib;
%Events.attrib;"
>
<!ENTITY % Inlstruct.class "br | span">
<!ENTITY % Inline.class "%Inlstruct.class;
| a">

```

```

<!ENTITY % Inline-noa.class "%Inlstruct.class;">
<!ENTITY % Blkstruct.class "p | div">
<!ENTITY % Block.class "%Blkstruct.class;">
<!ENTITY % Boxed.mix "%Block.class;
| object
| input">
<!ENTITY % Br.content "EMPTY">
<!ELEMENT br %Br.content;>
<!ATTLIST br
    %Core.attrib;
    %Style.attrib;
>
<!ENTITY % Span.content "( #PCDATA | %Inline.class; )*">
<!ELEMENT span %Span.content;>
<!ATTLIST span
    %Common.attrib;
>
<!ENTITY % Div.content "( %Boxed.mix; )*">
<!ELEMENT div %Div.content;>
<!ATTLIST div
    %Common.attrib;
>
<!ENTITY % P.content "( #PCDATA | %Inline.class; )*">
<!ELEMENT p %P.content;>
<!ATTLIST p
    %Common.attrib;
>
<!ENTITY % Script.content "( #PCDATA )">
<!ELEMENT script %Script.content;>
<!ATTLIST script
    src %URI; #IMPLIED
>
<!ENTITY % Style.content "( #PCDATA )">
<!ELEMENT style %Style.content;>
<!ENTITY % A.content "( #PCDATA | %Inline-noa.class; )*">
<!ELEMENT a %A.content;>
<!ATTLIST a
    %Common.attrib;
    href %URI; #IMPLIED
    accesskey %Character; #IMPLIED
>
<!ENTITY % Object.content "EMPTY">
<!ELEMENT object %Object.content;>
<!ATTLIST object
    %Common.attrib;
    data %URI; #IMPLIED
    type %ContentType; #IMPLIED
    remain (remain) #IMPLIED
    streamposition %Number; "0"
    streamstatus (stop | play | pause) #IMPLIED
>
<!ENTITY % InputType.class "( text | password )">
<!ENTITY % Input.content "EMPTY">
<!ELEMENT input %Input.content;>
<!ATTLIST input
    %Common.attrib;
    type %InputType.class; "text"
    value CDATA #IMPLIED
    disabled (disabled) #IMPLIED
    readonly (readonly) #IMPLIED
    maxlength %Number; "40"
    accesskey %Character; #IMPLIED
    inputmode (direct | indirect | none) "none"
    charactertype (all | number | alphabet | hankaku | zenkaku | katakana | hiragana) "all"
>
<!ENTITY % Title.content "( #PCDATA )">
<!ELEMENT title %Title.content;>

```

```

<!ENTITY % Meta.content "EMPTY">
<!ELEMENT meta %Meta.content;>
<!ATTLIST meta
  name NMTOKEN #IMPLIED
  content CDATA #REQUIRED
>
<!ENTITY % Head.content "( title, meta?, style?, link?, script*, bevent? )">
<!ELEMENT head %Head.content;>
<!ENTITY % Body.content "( div | p )+ ">
<!ELEMENT body %Body.content;>
<!ATTLIST BODY
  %Core.attrib;
  %Style.attrib;
  invisible (invisible) #IMPLIED
>
<!ENTITY % Bml.content "( head, body )">
<!ELEMENT bml %Bml.content;>
<!ENTITY % bevent.content "( beitem )+ ">
<!ELEMENT bevent %bevent.content;>
<!ATTLIST bevent
  id ID #IMPLIED
>
<!ENTITY %BMLEventType "(TimerFired | CCStatusChanged |
MediaStopped | DataButtonPressed)">
<!ENTITY % BMLTimeMode "(absolute)">
<!ENTITY % beitem.content "EMPTY">
<!ELEMENT beitem %beitem.content;>
<!ATTLIST beitem
  id ID #REQUIRED
  type %BMLEventType; #REQUIRED
  onoccur %Script; #REQUIRED
  es_ref %URI; #IMPLIED
  language_tag %Number; #IMPLIED
  time_mode %BMLTimeMode; #IMPLIED
  time_value CDATA #IMPLIED
  object_id CDATA #IMPLIED
  subscribe (subscribe) #IMPLIED
>
<!ENTITY % link.content "EMPTY">
<!ELEMENT link %link.content;>
<!ATTLIST link
  href %URI; #IMPLIED
>
<!-- End of BML for IPTV DTD -->

```

The DTD declaration part should be described as follows:

```

<?xml version="1.0" encoding="EUC-JP" ?>
<!DOCTYPE bml PUBLIC
  "-//IPTVF CDN:2008//DTD BML Document for IPTV//JA"
  "http://www.iptvforum.jp/CDN/DTD/bml_100_0_iptv.dtd">
<?bml bml-version="100.0" ?>

```

## [Appendix D] Specifications on Operation of Classification Scheme for ECG Metadata

## D.1 Common Specifications

The following table presents a list of classification schemes referred to in these specifications. The classification scheme marked "This document" in the "referenced standards" column is defined in these specifications or modified from classification schemes of "ARIB STD-B38". It is ensured that the classification schemes in the same category have upward compatibility. In other words, when a new dictionary item is added to the original classification scheme and the version of the classification scheme is changed, the category at the end of the URI that is newly provided is not changed while the year/month part is changed. For example, when the version of the classification scheme "http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERoleCS" is changed, the new URI will inherit "IPTVSERVICERoleCS" at the end and become "http://www.iptvforum.jp/cs/2009/05/IPTVSERVICERoleCS".

Classification scheme URI	Defined in	Referred in	Items to use
http://www.arib.or.jp/cs/2006/03/ARIBGenreCS	ARIB STD-B38	Table 7-23, Table 7-43 :Genre/@href	3.Genre 4.1 GENERAL AUDIENCE 4.2 AGE GROUPS
http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEGenreCS	This document	Table 7-23, Table 7-43 :Genre/@href	All items. See [Appendix D] D.11 for the dictionary definition.
http://www.arib.or.jp/cs/2006/03/ARIBParentalRatingCS	ARIB STD-B38	Table 7-24, Table 7-44 :ParentalGuidance/ParentalRating/@href	The items referred to in [Appendix D] D.2
http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERelatedCS	This document	Table 7-29, Table 7-49 :RelatedMaterial/HowRelated/@href	The items referred to in See [Appendix D] D.3.
http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPurchaseTypeCS	This document	Table 7-52 :PurchaseList/PurchaseItem/Purchase/PurchaseType/@href	All items. For the dictionary definition, see [Appendix D] D.4.
http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERelatedCS	This document	Table 7-52 :PurchaseList/PurchaseItem/Purchase/QuantityUnit/@href	All items. For the dictionary definition, see [Appendix D] D.5.
http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERelatedCS	This document	Table 7-21, Table 7-41 :PromotionalInformation/@href	All items. For the dictionary definition, see [Appendix D] D.6.
http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERelatedCS	This document	Table 7-28, Table 7-48 :CreditsList/CreditsItem/@role	All items. For the dictionary definition, see [Appendix D] D.6.

<a href="http://www.arib.or.jp/cs/2006/03/ARIBAudioComponentCS">http://www.arib.or.jp/cs/2006/03/ARIBAudioComponentCS</a>	ARIB STD-B38	Table 7-34 :AVAttributes/ AudioAttributes/MixType/@href	The items referred to in IPTVFJ STD-0002 "VOD Specifications" 6.1.2.2. See [Appendix D] D.12.
<a href="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEAudioCodingFormatCS">http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEAudioCodingFormatCS</a>	This document	Table 7-34 :AVAttributes/ AudioAttributes/Coding/@href	All items. For the dictionary definition, see [Appendix D] D.8.
<a href="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEVisualCodingFormatCS">http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEVisualCodingFormatCS</a>	This document	Table 7-34 :AVAttributes/ VideoAttributes/Coding/@href	All items. For the dictionary definition, see [Appendix D] D.9.
<a href="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEFileFormatCS">http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEFileFormatCS</a>	This document	Table 7-29, Table 7-49 :FileFormat/@href	All items. For the dictionary definition, see [Appendix D] D.10.
<a href="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEOutputPortCS">http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEOutputPortCS</a>	This document	Table 7-58 :OutputRestriction/Port/@href	All items. For the dictionary definition, see [Appendix D] D.13.
<a href="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICECopyControlMethodCS">http://www.iptvforum.jp/cs/2008/07/IPTVSERVICECopyControlMethodCS</a>	This document	Table 7-58 :OutputRestriction/Module/@href	All items. For the dictionary definition, see [Appendix D] D.14.

## D.2 Operation of ARIBParentalRatingCS

Only PG-12 is used for PG ratings, and R-4 to R-20 are used for R ratings from parenting ratings defined in ARIB STD-B38 Appendix 2 "Parental Guidance Dictionary", Appendix 2-1 "Parenting Rating Names". All others are rated G (when age restrictions are not applied). The following table lists the recommended minimum viewing ages for ratings and points to be noted when implementing them on receivers. For more information on parental control in the CDN scope, see Chapter 3 "Receiver Specifications" and Chapter 7 "Operation of VOD".

Name	Recommended minimum viewing age	Notes on implementation
R-4	4	Display in ECG and viewing are not restricted regardless of the result of comparison between the parenting rating specification (parental rate) and the parental level (minimum viewing age).
R-5	5	
R-6	6	
R-7	7	
R-8	8	
R-9	9	
R-10	10	
R-11	11	
PG-12,R-12	12	
R-13	13	
R-14	14	
R-15	15	
R-16	16	
R-17	17	
R-18	18	
R-19	19	Display in ECG and playback of the corresponding contents should not be allowed. Only when the parental control is removed by password entry, etc., display in ECG and playback of the contents are allowed.
R-20	20	
G	No age limit	Display in ECG and playback are not restricted regardless of the result of comparison between the parenting rating specification (parental rate) and the parental level (minimum viewing age).

```
<ClassificationScheme fragmentId="0000000002" fragmentVersion="20071203000000"
uri="http://www.arib.or.jp/cs/2006/03/ARIBParentalRatingCS">
  <Term termID="PG-4">
    <Name xml:lang="en">PG-4</Name>
    <Definition xml:lang="ja">4歳未満の視聴者に対して不適切な内容を含む番組
    <!-- It is desirable for those under 4 to be accompanied by parent or adult
guardian. -->
    </Definition>
```

```
</Term>
<Term termID="PG-5">
  <Name xml:lang="en">PG-5</Name>
  <Definition xml:lang="ja">5歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 5 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-6">
  <Name xml:lang="en">PG-6</Name>
  <Definition xml:lang="ja">6歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 6 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-7">
  <Name xml:lang="en">PG-7</Name>
  <Definition xml:lang="ja">7歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 7 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-8">
  <Name xml:lang="en">PG-8</Name>
  <Definition xml:lang="ja">8歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 8 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-9">
  <Name xml:lang="en">PG-9</Name>
  <Definition xml:lang="ja">9歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 9 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-10">
  <Name xml:lang="en">PG-10</Name>
  <Definition xml:lang="ja">10歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 10 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-11">
  <Name xml:lang="en">PG-11</Name>
  <Definition xml:lang="ja">11歳未満の視聴者に対して不適切な内容を含む番組
```

```
<!-- It is desirable for those under 11 to be accompanied by parent or adult
guardian. -->
</Definition>
</Term>
<Term termID="PG-12">
  <Name xml:lang="en">PG-12</Name>
  <Definition xml:lang="ja">12歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 12 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-13">
  <Name xml:lang="en">PG-13</Name>
  <Definition xml:lang="ja">13歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 13 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-14">
  <Name xml:lang="en">PG-14</Name>
  <Definition xml:lang="ja">14歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 14 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-15">
  <Name xml:lang="en">PG-15</Name>
  <Definition xml:lang="ja">15歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 15 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-16">
  <Name xml:lang="en">PG-16</Name>
  <Definition xml:lang="ja">16歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 16 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-17">
  <Name xml:lang="en">PG-17</Name>
  <Definition xml:lang="ja">17歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 17 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-18">
```

```
<Name xml:lang="en">PG-18</Name>
<Definition xml:lang="ja">18歳未満の視聴者に対して不適切な内容を含む番組
<!-- It is desirable for those under 18 to be accompanied by parent or adult
guardian. -->
</Definition>
</Term>
<Term termID="PG-19">
  <Name xml:lang="en">PG-19</Name>
  <Definition xml:lang="ja">19歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 19 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="PG-20">
  <Name xml:lang="en">PG-20</Name>
  <Definition xml:lang="ja">20歳未満の視聴者に対して不適切な内容を含む番組
  <!-- It is desirable for those under 20 to be accompanied by parent or adult
guardian. -->
  </Definition>
</Term>
<Term termID="R-4">
  <Name xml:lang="en">R-4</Name>
  <Definition xml:lang="ja">4歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 4 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-5">
  <Name xml:lang="en">R-5</Name>
  <Definition xml:lang="ja">5歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 5 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-6">
  <Name xml:lang="en">R-6</Name>
  <Definition xml:lang="ja">6歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 6 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-7">
  <Name xml:lang="en">R-7</Name>
  <Definition xml:lang="ja">7歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 7 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-8">
  <Name xml:lang="en">R-8</Name>
  <Definition xml:lang="ja">8歳未満の視聴者に対して視聴を制限すべき番組
```

```
<!-- Nobody under 8 is admitted because of inappropriate content. -->
</Definition>
</Term>
<Term termID="R-9">
  <Name xml:lang="en">R-9</Name>
  <Definition xml:lang="ja">9歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 9 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-10">
  <Name xml:lang="en">R-10</Name>
  <Definition xml:lang="ja">10歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 10 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-11">
  <Name xml:lang="en">R-11</Name>
  <Definition xml:lang="ja">11歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 11 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-12">
  <Name xml:lang="en">R-12</Name>
  <Definition xml:lang="ja">12歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 12 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-13">
  <Name xml:lang="en">R-13</Name>
  <Definition xml:lang="ja">13歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 13 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-14">
  <Name xml:lang="en">R-14</Name>
  <Definition xml:lang="ja">14歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 14 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-15">
  <Name xml:lang="en">R-15</Name>
  <Definition xml:lang="ja">15歳未満の視聴者に対して視聴を制限すべき番組
  <!-- Nobody under 15 is admitted because of inappropriate content. -->
  </Definition>
</Term>
<Term termID="R-16">
  <Name xml:lang="en">R-16</Name>
```

```

    <Definition xml:lang="ja">16歳未満の視聴者に対して視聴を制限すべき番組
    <!-- Nobody under 16 is admitted because of inappropriate content. -->
    </Definition>
  </Term>
  <Term termID="R-17">
    <Name xml:lang="en">R-17</Name>
    <Definition xml:lang="ja">17歳未満の視聴者に対して視聴を制限すべき番組
    <!-- Nobody under 17 is admitted because of inappropriate content. -->
    </Definition>
  </Term>
  <Term termID="R-18">
    <Name xml:lang="en">R-18</Name>
    <Definition xml:lang="ja">18歳未満の視聴者に対して視聴を制限すべき番組
    <!-- Nobody under 18 is admitted because of inappropriate content. -->
    </Definition>
  </Term>
  <Term termID="R-19">
    <Name xml:lang="en">R-19</Name>
    <Definition xml:lang="ja">19歳未満の視聴者に対して視聴を制限すべき番組
    <!-- Nobody under 19 is admitted because of inappropriate content. -->
    </Definition>
  </Term>
  <Term termID="R-20">
    <Name xml:lang="en">R-20</Name>
    <Definition xml:lang="ja">20歳未満の視聴者に対して視聴を制限すべき番組
    <!-- Nobody under 20 is admitted because of inappropriate content. -->
    </Definition>
  </Term>
  <Term termID="N">
    <Name xml:lang="en">N</Name>
    <Definition xml:lang="ja">年齢制限指定を明確にすることが困難であるため視聴については注意が必要である番組
    <!-- Attention should be paid because age restriction is not indicated
clearly. -->
    </Definition>
  </Term>
  <Term termID="G">
    <Name xml:lang="en">G</Name>
    <Definition xml:lang="ja">年齢制限がない番組
    <!-- General audiences (all ages admitted) -->
    </Definition>
  </Term>
</ClassificationScheme>
</ClassificationSchemeTable>

```

## D.3 Operation of IPTVSERVICEHowRelatedCS

The definition of the IPTVSERVICEHowRelatedCS referred in these specifications is as follows.

```

<ClassificationScheme fragmentId="0000000006" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEHowRelatedCS">
  <Term termID="1">
    <Name xml:lang="ja">予告編</Name>
    <Definition xml:lang="ja">
      関係：現在の A/V コンテンツは CRID に関連付けた番組の予告編。例：予告される映画を録画
      する。
      <!-- Relation: The current A/V content is a trailer for the programme identifying
      the CRID Example: Record the film being trailed -->
    </Definition>
  </Term>
  <Term termID="2">
    <Name xml:lang="ja">グループ予告編</Name>
    <Definition xml:lang="ja">
      関係：現在の A/V コンテンツは CRID に関連付けた番組グループの予告編。例：予告される間
      もなく始まるシリーズ番組を録画する。
      <!-- Relation: The current A/V content is a trailer for the group of programmes
      identified by the CRID Example: Record a forthcoming series being trailed -->
    </Definition>
  </Term>
  <Term termID="3">
    <Name xml:lang="ja">兄弟</Name>
    <Definition xml:lang="ja">
      関係：CRID に関連付けた番組は、現在の A/V コンテンツと兄弟関係である。例：前のエピソード
      を見ると同時に、シリーズの次のエピソードを録画する。
      <!-- Relation: The programme identified by the CRID is a sibling of the current
      A/V content Example: Record the next episode in a series whilst watching an earlier
      episode -->
    </Definition>
  </Term>
  <Term termID="4">
    <Name xml:lang="ja">代替</Name>
    <Definition xml:lang="ja">
      関係：CRID の識別子が、現在の A/V ストリームの編集的に同じコンテンツである別の
      バージョンの番組を参照する。例：ある番組、または番組の一部を見ると同時に、ユーザは、
      その番組の高精細バージョンが別の所から取得できることを発見する。
      <!-- Relation: The CRID identifies an alternative version of a programme with
      the same editorial content of the current A/V stream Example: Whilst watching
      a programme the user discovers that a high definition version is available elsewhere
      -->
    </Definition>

```

```

</Term>
<Term termID="5">
  <Name xml:lang="ja">親</Name>
  <Definition xml:lang="ja">
    関係：ある番組のグループは、現在の A/V コンテンツである番組を含んだ CRID によって関連
    付けられる。例：エピソードに一つを見ると同時に、シリーズ全てを録画する。
    <!-- Relation: A group of programmes identified by the CRID contain the programme
    which is the current A/V content Example: Record an entire series, whilst watching
    one of the episodes -->
  </Definition>
</Term>
<Term termID="6">
  <Name xml:lang="ja">推薦</Name>
  <Definition xml:lang="ja">
    関係：放送事業者は、現在の A/V コンテンツと CRID によって関連付けられる番組間に関連性
    があると考え。例：ユーザが見ているという理由で放送事業者が推薦する番組を録画する。
    <!-- Relation: The broadcaster considers there to be a relationship between
    the current A/V content and the programme identified by the CRID Example: Record
    a programme which the broadcaster recommends -->
  </Definition>
</Term>
<Term termID="7">
  <Name xml:lang="ja">グループ推薦</Name>
  <Definition xml:lang="ja">
    関係：放送事業者は、現在の A/V コンテンツと CRID によって関連付けられる番組グループ間
    に関連性があると考え。例：ユーザが見ているという理由で放送事業者が推薦する番組
    シリーズを録画する。
    <!-- Relation: The broadcaster considers there to be a relationship between
    the current A/V content and the group of programmes Example: Record a seris which
    the broadcaster recommends -->
  </Definition>
</Term>
<Term termID="8">
  <Name xml:lang="ja">商業広告</Name>
  <Definition xml:lang="ja">
    関係：現在の A/V コンテンツで取り扱われた商品またはサービスが、別の所に広告されている。
    CRID は、その広告の A/V コンテンツを関連付ける。例：ユーザは、欲しい商品が写っている
    映像を見ている。ユーザがその製品に興味があることを示すと、更に詳細な情報を提供する
    広告が録画される。
    <!-- Relation: A product or service featured in the current A/V content is being
    advertised elsewhere. The CRID identifies the A/V content of that advert Example:
    The user is watching a film containing a desirable product. If the user indicates
    interest int that product an advert is captured providing further information.
    -->
  </Definition>
</Term>
<Term termID="9">

```

```
<Name xml:lang="ja">直接商品購入</Name>
```

```
<Definition xml:lang="ja">
```

関係：商品またはサービスが視聴している番組に直接リンクされ、そのリンクされたリソースから直接購入可能である。例：ユーザは、欲しい商品またはサービスが写っている映像を見ている。（例えば、料理法シリーズのレシピ本）。ユーザがその商品に興味があることを示すと、購入の要求ができるウェブページ（または対話型のアプリケーション）に誘導される。

```
<!-- Relation: A product or service is directly linked to the programme being watched and can be purchased directly from this linked resource Example: The user is watching a film containing a desirable product or service. (The recipe book from from a cookery series for instance) If the user indicates interest in that product they are taken to a web page (or interactive application) which is able to fulfil their purchasing requirement -->
```

```
</Definition>
```

```
</Term>
```

```
<Term termID="10">
```

```
<Name xml:lang="ja">追加情報</Name>
```

```
<Definition xml:lang="ja">
```

関係：番組は、"音声/映像/文字/画像/対話型アプリケーション/ウェブコンテンツ"などの形式の追加情報を持っている。例：ユーザは、コンテンツ提供者がその番組用に追加情報を用意している、番組をみている。ユーザが興味を示すと、その追加のコンテンツに誘導され、視聴後に元のコンテンツへと戻られる。

```
<!-- Relation: A programme has additional information in the form of text./graphics/interactive app/web content Example: The user watching a programme for which the content provider has made available additional information. If the user indicates interest they are taken directly to that additional content -->
```

```
</Definition>
```

```
</Term>
```

```
<Term termID="11">
```

```
<Name xml:lang="ja">番組批評情報</Name>
```

```
<Definition xml:lang="ja">
```

関係：番組は、ユーザが番組の視聴を続けるかどうか決定する際に対象となるかもしれない批評や評論を持っている。例：ユーザは、追加の情報を見る事ができ、番組の視聴を続けるかどうかを決めるためにその情報を使うことができる。

```
<!-- Relation: A programme has a review or critique that may be of interest to the user in deciding whether to continue to watch Example: The user can look at the additional information and use it to decide whether to continue watching the programme -->
```

```
</Definition>
```

```
</Term>
```

```
<Term termID="12">
```

```
<Name xml:lang="ja">要約</Name>
```

```
<Definition xml:lang="ja">
```

関係：シリーズ中のある番組は、文字また AV の要約を持つ。例：ユーザは、前回のエピソードを見逃したり、シリーズのあらすじを忘れてしまった場合、要約を読んだり・見たりできる。

```
<!-- Relation: A programme in a series has a text or av recap Example: The user can chose to read/watch a recap if they have missed a previous episode of forgotten the thread of the series -->
```

```

</Definition>
</Term>
<Term termID="13">
  <Name xml:lang="ja">メイキング</Name>
  <Definition xml:lang="ja">
    関係：放送事業者は、番組や情報の"メイキング"を提供。例：ユーザは興味があれば、その
    番組がどう制作されたかの背景を見ることができる。
    <!-- Relation: The broadcaster has produced a "making of" programme or
    information Example: The user, if iterested can view the background to how the
    programme was made -->
  </Definition>
</Term>
<Term termID="14">
  <Name xml:lang="ja">サポート</Name>
  <Definition xml:lang="ja">
    関係：ユーザが質問したいかもしれない問題を含んだ番組。例：その番組の主題として、
    ユーザは、助言を得ることができるようにする電話相談、郵便、電子メールアドレス、または
    ウェブページなどの形式で、サポートがあるかどうかを知ることができる。
    <!-- Relation: A programme that contains issues the user may wish to enquire
    about Example: The user can find out if there is support in the form of a telephone
    help line, postal or email address or web page that provides them with the ability
    to seek advice on the subject matter of the programme. -->
  </Definition>
</Term>
<Term termID="15">
  <Name xml:lang="ja">派生</Name>
  <Definition xml:lang="ja">
    関係：現在の A/V コンテンツは CRID に関連付けた番組から派生したもの。例：ユーザは現在
    見ている番組から派生した商品等(たとえばシナリオを元にした小説や、一部登場人物に
    関する外伝を元にした番組等)を知ることができる。
    <!-- Relation: A programme has derived works in the forms of A/V content, books
    or others. Example: The user can find out if there are derived works, such as
    script novels or other programmes of side story about some characters in this programme
    -->
  </Definition>
</Term>
<Term termID="16">
  <Name xml:lang="ja">セグメンテーション</Name>
  <Definition xml:lang="ja">関係：セグメンテーショングループへのポインタ
  <!-- Relation: A programme has relation with segment groups Example: The user
  can watch the segment groups has relation with this A/V content -->
  </Definition>
</Term>
<Term termID="17">
  <Name xml:lang="ja">参照</Name>
  <Definition xml:lang="ja">関係：現在のコンテンツから参照するコンテンツ。例：TYPE
  2 コンテンツから参照して利用する TYPE1 コンテンツを知ることができる。

```

```

    <!-- Relation: This content has relation with other contents Example: The
user can find out type 1 content in relation with this type 2 content -->
    </Definition>
</Term>
<Term termID="18">
    <Name xml:lang="ja">ライセンス情報</Name>
    <Definition xml:lang="ja">関係：ライセンス情報へのポインタ。例：コンテンツのライセン
ス情報（利用可能期間等）を知ることができる。
    <!-- Relation: This content has license information Example: Use can confirm
the license conditions such as available period -->
    </Definition>
</Term>
<Term termID="19">
    <Name xml:lang="ja">本編</Name>
    <Definition xml:lang="ja">関係：コンテンツの本編を指す。
    <!-- Relation: The CRID identifies the main content of the current A/V stream
Example: Whilst watching a programme the user discovers that a the main content
is available elsewhere -->
    </Definition>
</Term>
<Term termID="20">
    <Name xml:lang="ja">高画質版</Name>
    <Definition xml:lang="ja">関係：コンテンツの高精細版を指す。
    <!-- Relation: The CRID identifies an high-def version of a programme with the
same editorial content of the current A/V stream Example: Whilst watching a programme
the user descovers that a high definition version is available elsewhere -->
    </Definition>
</Term>
<Term termID="21.1">
    <Name xml:lang="ja">パック下の GI</Name>
    <Definition xml:lang="ja">関係：パッケージを記述するグループ情報要素からシリーズを記
述するグループ情報要素へのリンク
    <!-- Relation: The CRID identifies the GroupInformation belongs to this package
Example: The user can navigate down into subgroups of this pakcage on ECG -->
    </Definition>
</Term>
<Term termID="21.2">
    <Name xml:lang="ja">パック下の PI</Name>
    <Definition xml:lang="ja">関係：パッケージを記述するグループ情報要素から PI へのリン
ク
    <!-- Relation: The CRID identifies the ProgramInformation belongs to this package
Example: The user can see the list of contents of this pakcage on ECG -->
    </Definition>
</Term>
<Term termID="21">
    <Name xml:lang="ja">パッケージ参照</Name>
    <Definition xml:lang="ja">関係：パッケージを記述するグループ情報要素への参照。

```

```

<!-- Relation: The CRID identifies another GroupInformation that describes a
package Example: The user can navigate from the series description to package
to purchase on ECG -->
  </Definition>
</Term>
</ClassificationScheme>

```

The following section describes the details of the operation of each item listed above. In the table, "○" in "Use" fields indicates operated, and "-" indicates not operated. "Target" indicates the ProgramInformation fragment of the corresponding content or the target pointed by the GroupInformation fragment RelatedMaterial/MediaLocator/MediaUri of the corresponding package. "Text displayed by receiver" indicates a string describing the relationship between the content and target, which is recommended to be used to present information concerning the target on receivers. "Application" indicates how the target is processed on a receiver (assumed behavior of a receiver). (1) is selected when the target is a content, and (2) is selected when the target specifies the URL of the BML file. In (1), the receiver displays the metadata information of the content or plays back the content. In (2), the receiver downloads the corresponding BML file and processes it with the browser. Based on the information in the "Relationship definition" below, the definitions of the above-mentioned items (Information in <Definition> element) are redefined and reused.

TermID	Use	Text displayed by receiver	Target form	Applic ation	Relationship definition	Example of use
1	—					
2	—					
3	—					
4	—					
5	—					
6	○	Recommended contents	A/V contents, CRID	(1)	Recommended works related to the content	The target is a content recommended by the provider.
7	○	Related contents	A/V contents, CRID	(1)	Works related to the content	The content is a short version and the target content is the full version.
8	○	Related advertisement information	BML contents, URL	(1),(2)	Advertisement information related to the content	The target is a related advertisement or sponsor site.
9	○	Related product purchase	BML contents, URL	(1),(2)	Product purchase information related to the content	The target is related product purchase information or a product purchase

						site.
10	○	Related information	BML contents, URL	(1),(2)	Information related to the content	The target is information related to the content.
11	—					
12	—					
13	○	Making of this content	A/V contents, CRID	(1)	"Making" video of the corresponding contents	
14	—					
15	—					
16	—					
17	—					
18	○	License information	License reference information, LicenseID	(Reference)	(No change)	
19	○	Main content	A/V contents, CRID	(1)	(No change)	The target is the main part of the content.
20	○	HD version	A/V contents, CRID	(1)	(No change)	The target content is the HD version (or high bit rate)
21.1	○	Groups belongs to this pack	Group information element describing the series	(1)	Link from the group information element describing the content package to the group information element describing the series	Implement layered transition from the group information element describing the content package.
21.2	○	Contents belongs to this pack	Program information element	(1)	Link from the group information element describing the content package to the program information element	Implement layered transition from the group information element describing the content package.
21	○	Reference to this pack	Group information element describing	(1)	Link from the group information element describing the	

			the package		series to the group information element describing the content package	
--	--	--	-------------	--	--	--

## D.4 Operation of IPTVSERVICEPurchaseTypeCS

The definition of the IPTVSERVICEPurchaseTypeCS referred in these specifications is as follows. All items listed below are operated.

```

<ClassificationScheme fragmentId="0000000008" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPurchaseTypeCS">
  <Term termID="1">
    <Name xml:lang="en">single</Name>
    <Name xml:lang="ja">単品販売</Name>
    <Definition xml:lang="ja">QuantityUnit, QuantityRange には利用可能期間を記載
    <!-- QuantityUnit and QuantityRange describes the available period. -->
    </Definition>
  </Term>
  <Term termID="2">
    <Name xml:lang="en">pack</Name>
    <Name xml:lang="ja">パック販売</Name>
    <Definition xml:lang="ja">QuantityUnit, QuantityRange には利用可能期間を記載
    <!-- QuantityUnit and QuantityRange describes the available period. -->
    </Definition>
  </Term>
  <Term termID="3">
    <Name xml:lang="en">select</Name>
    <Name xml:lang="ja">セレクト販売</Name>
    <Definition xml:lang="ja">QuantityUnit, QuantityRange には決済周期を記載。定期購読契約であるため、解約するまで契約は継続。
    <!-- QuantityUnit and QuantityRange describes payment interval. This is a
    sbuscription contract, so payment continues until cancellation. -->
    </Definition>
  </Term>
  <Term termID="3.1">
    <Name xml:lang="en">select_countlimit</Name>
    <Name xml:lang="ja">選択可能数</Name>
    <Definition xml:lang="ja">QuantityUnit, QuantityRange には選択可能数
    (IPTVSERVICEUnitTypeCS/counts)を記載。
    <!-- QuantityUnit is ``IPTVSERVICEUnitTypeCS/counts'' and QuantityRange
    describes the number of contents available for a payment cycle. -->
    </Definition>
  </Term>
  <Term termID="3.2">
    <Name xml:lang="en">select_reset</Name>
    <Name xml:lang="ja">選択可能リセット周期</Name>
    <Definition xml:lang="ja">QuantityUnit, QuantityRange には選択可能リセット周
    期を記載。
    <!-- QuantityUnit and QuantityRange describes the cycle for clearing usage
    count. -->
  </Term>

```

```
</Definition>
</Term>
<Term termID="4">
  <Name xml:lang="en">subscription</Name>
  <Name xml:lang="ja">見放題販売</Name>
  <Definition xml:lang="ja">QuantityUnit, QuantityRange には決済周期を記載。定期購読契約であるため、解約するまで契約は継続。
  <!-- QuantityUnit and QuantityRange describes the payment interval. Thw payment continues until cancellation. -->
  </Definition>
</Term>
</ClassificationScheme>
```

## D.5 Operation of IPTVSERVICEUnitTypeCS

The definition of the IPTVSERVICEUnitTypeCS referred in these specifications is as follows.  
All items listed below are operated.

```
<ClassificationScheme fragmentId="000000000A" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEUnitTypeCS">
  <Term termID="minute">
    <Name xml:lang="ja">分</Name>
    <Definition xml:lang="ja">単位時間：1分
    <!-- Unit of 1 minute -->
    </Definition>
  </Term>
  <Term termID="hour">
    <Name xml:lang="ja">時間</Name>
    <Definition xml:lang="ja">単位時間：1時間
    <!-- Unit of 1 hour -->
    </Definition>
  </Term>
  <Term termID="day">
    <Name xml:lang="en">day</Name>
    <Name xml:lang="ja">日</Name>
    <Definition xml:lang="ja">単位時間：1日（24時間）
    <!-- Unit of 1 day or 24 hours -->
    </Definition>
  </Term>
  <Term termID="week">
    <Name xml:lang="ja">週</Name>
    <Definition xml:lang="ja">単位時間：1週（168時間）
    <!-- Unit of 1 week or 168 hours -->
    </Definition>
  </Term>
  <Term termID="month">
    <Name xml:lang="ja">ヶ月</Name>
    <Definition xml:lang="ja">単位時間：1ヶ月
    <!-- Unit of 1 month -->
    </Definition>
  </Term>
  <Term termID="year">
    <Name xml:lang="ja">年</Name>
    <Definition xml:lang="ja">単位時間：1年
    <!-- Unit of 1 year -->
    </Definition>
  </Term>
  <Term termID="counts">
    <Name xml:lang="ja">回</Name>
```

```
<Definition xml:lang="ja">単位：回数 ※セレクトの場合に用いる選択可能なコンテンツ数を指定
  <!-- Number of contents or play count -->
</Definition>
</Term>
</ClassificationScheme>
```

## D.6 Operation of IPTVSERVICEPromotionalTypeCS

The definition of the IPTVSERVICEPromotionalTypeCS referred in these specifications is as follows. All items listed below are operated.

```
<ClassificationScheme fragmentId="0000000007" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPromotionalTypeCS">
  <Term termID="1">
    <Name xml:lang="en">Recommended</Name>
  </Term>
  <Term termID="2">
    <Name xml:lang="en">NewArrival</Name>
  </Term>
</ClassificationScheme>
```

## D.7 Operation of IPTVSERVICERoleCS

The definition of the IPTVSERVICERoleCS referred in these specifications is as follows. All items listed below are operated.

```

<ClassificationScheme fragmentId="0000000009" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICERoleCS">
  <Term termID="1">
    <Name xml:lang="ja">出演者</Name>
    <!-- Cast member -->
  </Term>
  <Term termID="1.1">
    <Name xml:lang="ja">出演</Name>
    <!-- Cast member -->
  </Term>
  <Term termID="1.2">
    <Name xml:lang="ja">司会</Name>
    <!-- Chair person-->
  </Term>
  <Term termID="1.3">
    <Name xml:lang="ja">キャスター</Name>
    <!-- Newscaster -->
  </Term>
  <Term termID="1.4">
    <Name xml:lang="ja">リポーター</Name>
    <!-- Reporter -->
  </Term>
  <Term termID="1.5">
    <Name xml:lang="ja">解説者</Name>
    <!-- Commentator -->
  </Term>
  <Term termID="1.6">
    <Name xml:lang="ja">コメンテーター</Name>
    <!-- Commentator -->
  </Term>
  <Term termID="1.7">
    <Name xml:lang="ja">アナウンサー</Name>
    <!-- News reader -->
  </Term>
  <Term termID="1.8">
    <Name xml:lang="ja">実況</Name>
    <!-- Running commentary -->
  </Term>
  <Term termID="1.9">
    <Name xml:lang="ja">ナレーター</Name>
    <!-- Narrator -->
  </Term>

```

```
</Term>
<Term termID="1.10">
  <Name xml:lang="ja">声の出演</Name>
  <!-- Voice cast member -->
</Term>
<Term termID="1.11">
  <Name xml:lang="ja">通訳</Name>
  <!-- Interpreter -->
</Term>
<Term termID="1.12">
  <Name xml:lang="ja">ゲスト</Name>
  <!-- Guest -->
</Term>
<Term termID="1.13">
  <Name xml:lang="ja">ナビゲーター</Name>
  <!-- Navigator -->
</Term>
<Term termID="1.14">
  <Name xml:lang="ja">講師</Name>
  <!-- Lecturer -->
</Term>
<Term termID="1.15">
  <Name xml:lang="ja">アシスタント</Name>
  <!-- Assistant -->
</Term>
<Term termID="1.16">
  <Name xml:lang="ja">語り(語り手)</Name>
  <!-- Narrator -->
</Term>
<Term termID="1.17">
  <Name xml:lang="ja">選手</Name>
  <!-- Athlete -->
</Term>
<Term termID="1.18">
  <Name xml:lang="ja">キャスト</Name>
  <!-- Cast Member -->
</Term>
<Term termID="1.19">
  <Name xml:lang="ja">登場怪獣</Name>
  <!-- Monster -->
</Term>
<Term termID="1.20">
  <Name xml:lang="ja">ナレーション</Name>
  <!-- Narrator -->
</Term>
<Term termID="1.21">
  <Name xml:lang="ja">案内人</Name>
```

```
<!-- Navigator -->
</Term>
<Term termID="1.22">
  <Name xml:lang="ja">プロモデラー</Name>
  <!-- Modeller -->
</Term>
<Term termID="1.23">
  <Name xml:lang="ja">声優</Name>
  <!-- Voice actor -->
</Term>
<Term termID="1.24">
  <Name xml:lang="ja">妖怪の声</Name>
  <!-- Monster voice actor -->
</Term>
<Term termID="1.25">
  <Name xml:lang="ja">声出演</Name>
  <!-- Voice cast member-->
</Term>
<Term termID="1.26">
  <Name xml:lang="ja">MC</Name>
  <!-- MC -->
</Term>
<Term termID="1.27">
  <Name xml:lang="ja">インタビュアー</Name>
  <!-- Interviewer -->
</Term>
<Term termID="1.28">
  <Name xml:lang="ja">インストラクター</Name>
  <!-- Instructor -->
</Term>
<Term termID="1.29">
  <Name xml:lang="ja">モデル</Name>
  <!-- Model -->
</Term>
<Term termID="1.30">
  <Name xml:lang="ja">朗読</Name>
  <!-- Reading -->
</Term>
<Term termID="1.99">
  <Name xml:lang="ja">主演</Name>
  <!-- Starring -->
</Term>
<Term termID="2">
  <Name xml:lang="ja">原作・脚本</Name>
  <!-- Original work and scenario -->
</Term>
<Term termID="2.1">
```

```

<Name xml:lang="ja">原作</Name>
<!--Original work -->
<Definition xml:lang="ja">説明：原作名または原作者</Definition>
<!-- Name of the original work or its author -->
</Term>
<Term termID="2.2">
  <Name xml:lang="ja">脚本</Name>
  <!-- scenario -->
  <Definition xml:lang="ja">説明：脚本名または脚本を担当した組織名または氏名
  </Definition>
  <!-- Schenario or the name of its production organization or the author -->
</Term>
<Term termID="2.3">
  <Name xml:lang="ja">連載誌</Name>
  <!--Magazine of serialize -->
</Term>
<Term termID="2.4">
  <Name xml:lang="ja">シナリオ</Name>
  <!-- Scenario -->
</Term>
<Term termID="2.5">
  <Name xml:lang="ja">翻訳</Name>
  <!-- Translate -->
</Term>
<Term termID="2.6">
  <Name xml:lang="ja">原案</Name>
  <!--Original idea -->
</Term>
<Term termID="2.7">
  <Name xml:lang="ja">詩</Name>
  <!-- Poem -->
</Term>
<Term termID="2.8">
  <Name xml:lang="ja">作画</Name>
  <!-- Animator -->
</Term>
<Term termID="2.9">
  <Name xml:lang="ja">原画</Name>
  <!-- Key animator -->
</Term>
<Term termID="3">
  <Name xml:lang="ja">監督・演出</Name>
  <!-- Supervising director -->
</Term>
<Term termID="3.1">
  <Name xml:lang="ja">監督</Name>
  <!-- Supervisor -->

```

```

<Definition xml:lang="ja">説明：監督を担当した組織名または氏名</Definition>
<!-- Name of the supervisor or the name of the supervising organization -->
</Term>
<Term termID="3.2">
  <Name xml:lang="ja">演出</Name>
  <!-- Director -->
  <Definition xml:lang="ja">説明：演出を担当した組織名または氏名</Definition>
  <!-- Name of the director or the name of the directing organization -->
</Term>
<Term termID="3.3">
  <Name xml:lang="ja">監修</Name>
  <!-- Supervisor -->
  <Definition xml:lang="ja">説明：監修を担当した組織名または氏名</Definition>
  <!-- Name of the supervisor or the name of the supervising organization -->
</Term>
<Term termID="3.4">
  <Name xml:lang="ja">プロデューサー</Name>
  <!-- Producer -->
</Term>
<Term termID="3.5">
  <Name xml:lang="ja">構成作家</Name>
  <!-- Writer -->
</Term>
<Term termID="3.6">
  <Name xml:lang="ja">CG</Name>
  <!-- CG -->
  <Definition xml:lang="ja">説明：CGを制作した組織名または氏名</Definition>
  <!-- Name of the creator or creating organization of computer -->
</Term>
<Term termID="3.7">
  <Name xml:lang="ja">取材者</Name>
  <!-- Collector -->
</Term>
<Term termID="3.8">
  <Name xml:lang="ja">美術</Name>
  <!-- Art -->
</Term>
<Term termID="3.9">
  <Name xml:lang="ja">照明</Name>
  <!-- Light -->
</Term>
<Term termID="3.10">
  <Name xml:lang="ja">録音</Name>
  <!--Sound recording -->
</Term>
<Term termID="3.11">
  <Name xml:lang="ja">整音</Name>

```

```
<!-- Sound adjustment -->
</Term>
<Term termID="3.12">
  <Name xml:lang="ja">編集</Name>
  <!-- Editor -->
</Term>
<Term termID="3.13">
  <Name xml:lang="ja">助監督</Name>
  <!-- Assistant supervisor -->
</Term>
<Term termID="3.14">
  <Name xml:lang="ja">製作管理統括</Name>
  <!-- Chief production manager -->
</Term>
<Term termID="3.15">
  <Name xml:lang="ja">宣伝統括</Name>
  <!--Chief advertiser -->
</Term>
<Term termID="3.16">
  <Name xml:lang="ja">特殊監督</Name>
  <!-- Supecial effects -->
</Term>
<Term termID="3.17">
  <Name xml:lang="ja">総監督</Name>
  <!-- Chief supervisor -->
</Term>
<Term termID="3.18">
  <Name xml:lang="ja">スタッフ</Name>
  <!-- Staff -->
</Term>
<Term termID="3.19">
  <Name xml:lang="ja">特殊技術</Name>
  <!-- Special effects -->
</Term>
<Term termID="3.20">
  <Name xml:lang="ja">演出・脚色</Name>
  <!--Direction-dramatize -->
</Term>
<Term termID="3.21">
  <Name xml:lang="ja">場面設定</Name>
  <!-- Situation -->
</Term>
<Term termID="3.22">
  <Name xml:lang="ja">製作・総括・演出</Name>
  <!-- Director -->
</Term>
<Term termID="4">
```

```

<Name xml:lang="ja">音楽</Name>
<!-- Musics -->
</Term>
<Term termID="4.1">
  <Name xml:lang="ja">曲目</Name>
  <!-- Musics -->
  <Definition xml:lang="ja">説明：曲目</Definition>
  <!-- Music title -->
</Term>
<Term termID="4.2">
  <Name xml:lang="ja">音楽</Name>
  <!-- Music provider -->
  <Definition xml:lang="ja">説明：音楽を提供した組織名または氏名</Definition>
  <!-- The name of the organization provides musics or of the music provider -->
</Term>
<Term termID="4.3">
  <Name xml:lang="ja">歌手</Name>
  <!-- Singer -->
</Term>
<Term termID="4.4">
  <Name xml:lang="ja">作詞</Name>
  <!-- Lyrics -->
</Term>
<Term termID="4.5">
  <Name xml:lang="ja">作曲</Name>
  <!-- Composer -->
</Term>
<Term termID="4.6">
  <Name xml:lang="ja">演奏</Name>
  <!-- Player -->
</Term>
<Term termID="4.7">
  <Name xml:lang="ja">指揮</Name>
  <!-- Conductor -->
</Term>
<Term termID="4.8">
  <Name xml:lang="ja">オーケストラ</Name>
  <!-- Orchestra -->
</Term>
<Term termID="4.9">
  <Name xml:lang="ja">主題歌</Name>
  <!-- Theme song -->
  <Definition xml:lang="ja">主題歌の曲名または曲名のリスト</Definition>
  <!-- The name of the theme song or the list of songs -->
</Term>
<Term termID="4.10">
  <Name xml:lang="ja">挿入歌</Name>

```

```

<!-- Soundtrack songs -->
<Definition xml:lang="ja">挿入歌の曲名または曲名リスト</Definition>
<!-- The title of the soundtrack song or the title list of the soundtrack songs
-->
</Term>
<Term termID="4.11">
  <Name xml:lang="ja">テーマ音楽</Name>
  <!-- Theme song -->
  <Definition xml:lang="ja">テーマ音楽の曲名または曲名リスト</Definition>
  <!-- The title of the theme song or the title list of the theme songs -->
</Term>
<Term termID="4.12">
  <Name xml:lang="ja">編曲</Name>
  <!-- Arranger -->
</Term>
<Term termID="4.13">
  <Name xml:lang="ja">歌</Name>
  <!-- Singer -->
</Term>
<Term termID="5">
  <Name xml:lang="ja">制作</Name>
  <!-- Production -->
</Term>
<Term termID="5.1">
  <Name xml:lang="ja">制作著作</Name>
  <!--Produced and copyrighted -->
  <Definition xml:lang="ja">制作の著作権を有する組織名または氏名</Definition>
  <!-- -->
</Term>
<Term termID="5.2">
  <Name xml:lang="ja">制作協力</Name>
  <!-- Produce partner -->
  <Definition xml:lang="ja">制作に協力した組織名または氏名</Definition>
  <!-- The name of the person or organization in corporation -->
</Term>
<Term termID="5.3">
  <Name xml:lang="ja">制作年</Name>
  <!-- Production year -->
</Term>
<Term termID="5.4">
  <Name xml:lang="ja">制作国</Name>
  <!-- Production country -->
</Term>
<Term termID="5.5">
  <Name xml:lang="ja">制作場所</Name>
  <!-- Production location -->
</Term>

```

```
<Term termID="5.6">
  <Name xml:lang="ja">取材日</Name>
  <!-- Report date -->
</Term>
<Term termID="5.7">
  <Name xml:lang="ja">取材地</Name>
  <!-- Location -->
</Term>
<Term termID="5.8">
  <Name xml:lang="ja">ロケ地</Name>
  <!-- Location -->
</Term>
<Term termID="5.9">
  <Name xml:lang="ja">開催地</Name>
  <!-- Location -->
</Term>
<Term termID="5.10">
  <Name xml:lang="ja">会場</Name>
  <!-- Location -->
  <Definition xml:lang="ja">汎用的な施設名など</Definition>
</Term>
<Term termID="5.11">
  <Name xml:lang="ja">劇場</Name>
  <!-- Theater -->
  <Definition xml:lang="ja">使用目的が明確な施設名</Definition>
</Term>
<Term termID="5.12">
  <Name xml:lang="ja">競技場</Name>
  <!-- Sports field -->
  <Definition xml:lang="ja">使用目的が明確な施設名</Definition>
</Term>
<Term termID="5.13">
  <Name xml:lang="ja">製作総指揮</Name>
  <!-- Chief producer -->
</Term>
<Term termID="5.14">
  <Name xml:lang="ja">制作統括</Name>
  <!-- Chief producer -->
</Term>
<Term termID="5.15">
  <Name xml:lang="ja">企画</Name>
  <!-- Planning -->
</Term>
<Term termID="5.16">
  <Name xml:lang="ja">制作</Name>
  <!-- Produce -->
</Term>
```

```
<Term termID="5.17">
  <Name xml:lang="ja">配給</Name>
  <!-- Distribution -->
</Term>
<Term termID="5.18">
  <Name xml:lang="ja">商標</Name>
  <!-- Trademark -->
</Term>
<Term termID="5.19">
  <Name xml:lang="ja">出版権</Name>
  <!-- Publication rights -->
</Term>
<Term termID="5.20">
  <Name xml:lang="ja">著作権</Name>
  <!-- Copyrights -->
</Term>
<Term termID="5.21">
  <Name xml:lang="ja">レーベル</Name>
  <!-- Label -->
</Term>
<Term termID="5.22">
  <Name xml:lang="ja">提供</Name>
  <!-- Sponsor -->
</Term>
<Term termID="5.23">
  <Name xml:lang="ja">製作</Name>
  <!-- Produce -->
</Term>
<Term termID="5.24">
  <Name xml:lang="ja">お店</Name>
  <!-- Shop -->
</Term>
<Term termID="5.25">
  <Name xml:lang="ja">スタジアム</Name>
  <!-- Stadium -->
</Term>
<Term termID="5.26">
  <Name xml:lang="ja">衣装提供</Name>
  <!-- Clothes provider -->
</Term>
<Term termID="5.27">
  <Name xml:lang="ja">衣装協力</Name>
  <!-- Clothes partner -->
</Term>
<Term termID="6.1">
  <Name xml:lang="ja">2ヶ国語</Name>
  <!-- Bilingual -->
```

```
</Term>
<Term termID="6.2">
  <Name xml:lang="ja">音声</Name>
  <!-- Sound -->
</Term>
<Term termID="6.3">
  <Name xml:lang="ja">Part1</Name>
  <!-- Part1 -->
</Term>
<Term termID="6.4">
  <Name xml:lang="ja">Part2</Name>
  <!-- Part2 -->
</Term>
<Term termID="6.5">
  <Name xml:lang="ja">Part3</Name>
  <!-- Part3 -->
</Term>
<Term termID="6.6">
  <Name xml:lang="ja">美食</Name>
  <!-- Epicurism -->
</Term>
<Term termID="6.7">
  <Name xml:lang="ja">人形劇</Name>
  <!-- Puppet plays -->
</Term>
<Term termID="6.8">
  <Name xml:lang="ja">入場者数</Name>
  <!-- Number of participants -->
</Term>
<Term termID="6.9">
  <Name xml:lang="ja">使用する道具</Name>
  <!-- Tools -->
</Term>
</ClassificationScheme>
```

## D.8 Operation of IPTVSERVICEAudioCodingFormatCS

The definition of the IPTVSERVICEAudioCodingFormatCS referred in these specifications is as follows. All items listed below are operated.

```
<ClassificationScheme fragmentId="0000000003" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEAudioCodingFormatCS">
  <Term termID="1">
    <Name xml:lang="en">MPEG-1 Layer II</Name>
  </Term>
  <Term termId="2">
    <Name xml:lang="en">MPEG-2 AAC</Name>
  </Term>
</ClassificationScheme>
```

## D.9 Operation of IPTVSERVICEVisualCodingFormatCS

The definition of the IPTVSERVICEVisualCodingFormat *CS* dictionary referred in these specifications is as follows. All items listed below are operated.

```
<ClassificationScheme fragmentId="000000000B" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEVisualCodingFormatCS">
  <Term termID="1">
    <Name xml:lang="en">MPEG-2</Name>
  </Term>
  <Term termId="2">
    <Name xml:lang="en">AVC</Name>
  </Term>
</ClassificationScheme>
```

## D.10 Operation of IPTVSERVICEFileFormatCS

The definition of the IPTVSERVICEFileFormatCS referred in these specifications is as follows.  
All items listed below are operated.

```
<ClassificationScheme fragmentId="0000000004" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEFileFormatCS">
  <Term termID="jpg">
    <Name xml:lang="en">jpg</Name>
    <Definition xml:lang="ja">参照情報が JPG 画像であることを表す
    <!-- JPEG file format -->
    </Definition>
  </Term>
  <Term termID="png">
    <Name xml:lang="en">png</Name>
    <Definition xml:lang="ja">参照情報が PNG 画像であることを表す
    <!-- Portable network graphic format -->
    </Definition>
  </Term>
  <Term termID="mpg">
    <Name xml:lang="en">mpg</Name>
    <Definition xml:lang="ja">参照情報が MPG ファイルであることを表す
    <!-- MPEG file format -->
    </Definition>
  </Term>
  <Term termID="txt">
    <Name xml:lang="en">txt</Name>
    <Definition xml:lang="ja">参照情報が TXT ファイルであることを表す
    <!-- Text file -->
    </Definition>
  </Term>
  <Term termID="html">
    <Name xml:lang="en">html</Name>
    <Definition xml:lang="ja">参照情報が HTML ファイルであることを表す
    <!-- HTML file -->
    </Definition>
  </Term>
  <Term termID="shtml">
    <Name xml:lang="en">shtml</Name>
    <Definition xml:lang="ja">参照情報が SHTML ファイルであることを表す
    <!-- SHTML file -->
    </Definition>
  </Term>
  <Term termID="cgi">
    <Name xml:lang="en">cgi</Name>
    <Definition xml:lang="ja">参照先が CGI であることを表す
```

```
<!-- CGI -->
</Definition>
</Term>
<Term termID="zip">
  <Name xml:lang="en">zip</Name>
  <Definition xml:lang="ja">参照情報が ZIP ファイルであることを表す
  <!-- Compressed binary file format -->
  </Definition>
</Term>
</ClassificationScheme>
```

## D.11 Operation of IPTVSERVICEGenreCS

The definition of the IPTVSERVICEGenreCS referred in these specifications is as follows. All items listed below are operated.

```
<ClassificationScheme fragmentId="0000000005" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEGenreCS ">
  <Term termID="0">
    <Name xml:lang="ja">ニュース／報道</Name>
    <Definition xml:lang="ja">ニュース／報道</Definition>
    <!-- News/Report -->
  </Term>
  <Term termID="0.0">
    <Name xml:lang="ja">定時・総合</Name>
    <Definition xml:lang="ja">定時・総合</Definition>
    <!-- Regular/General -->
  </Term>
  <Term termID="0.1">
    <Name xml:lang="ja">天気</Name>
    <Definition xml:lang="ja">天気</Definition>
    <!-- Weather -->
  </Term>
  <Term termID="0.10">
    <Name xml:lang="ja">交通</Name>
    <Definition xml:lang="ja">交通</Definition>
    <!-- Traffic -->
  </Term>
  <Term termID="0.15">
    <Name xml:lang="ja">その他</Name>
    <Definition xml:lang="ja">その他</Definition>
    <!-- Other news -->
  </Term>
  <Term termID="0.2">
    <Name xml:lang="ja">特集・ドキュメント</Name>
    <Definition xml:lang="ja">特集・ドキュメント</Definition>
    <!-- Special program/Documentary -->
  </Term>
  <Term termID="0.3">
    <Name xml:lang="ja">政治・国会</Name>
    <Definition xml:lang="ja">政治・国会</Definition>
    <!-- Government/Diet -->
  </Term>
  <Term termID="0.4">
    <Name xml:lang="ja">経済・市況</Name>
    <Definition xml:lang="ja">経済・市況</Definition>
    <!-- Economy/Market -->
  </Term>
</ClassificationScheme>
```

```

</Term>
<Term termID="0.5">
  <Name xml:lang="ja">海外・国際</Name>
  <Definition xml:lang="ja">海外・国際</Definition>
  <!-- Worldwide/International -->
</Term>
<Term termID="0.6">
  <Name xml:lang="ja">解説</Name>
  <Definition xml:lang="ja">解説</Definition>
  <!-- Commentary -->
</Term>
<Term termID="0.7">
  <Name xml:lang="ja">討論・会談</Name>
  <Definition xml:lang="ja">討論・会談</Definition>
  <!-- Discussion/Talk -->
</Term>
<Term termID="0.8">
  <Name xml:lang="ja">報道特番</Name>
  <Definition xml:lang="ja">報道特番</Definition>
  <!-- Special news program -->
</Term>
<Term termID="0.9">
  <Name xml:lang="ja">ローカル・地域</Name>
  <Definition xml:lang="ja">ローカル・地域</Definition>
  <!-- Local/Regional -->
</Term>
<Term termID="1">
  <Name xml:lang="ja">スポーツ</Name>
  <Definition xml:lang="ja">スポーツ</Definition>
  <!-- Sports -->
</Term>
<Term termID="1.0">
  <Name xml:lang="ja">スポーツニュース</Name>
  <Definition xml:lang="ja">スポーツニュース</Definition>
  <!-- Sports news -->
</Term>
<Term termID="1.1">
  <Name xml:lang="ja">野球</Name>
  <Definition xml:lang="ja">野球</Definition>
  <!-- Baseball -->
</Term>
<Term termID="1.10">
  <Name xml:lang="ja">競馬・公営競技</Name>
  <Definition xml:lang="ja">競馬・公営競技</Definition>
  <!-- Horseracing/Government-sponsored sporting events -->
</Term>
<Term termID="1.15">

```

```

<Name xml:lang="ja">その他</Name>
<Definition xml:lang="ja">その他</Definition>
<!-- Other sports -->
</Term>
<Term termID="1.2">
  <Name xml:lang="ja">サッカー</Name>
  <Definition xml:lang="ja">サッカー</Definition>
  <!-- Soccer -->
</Term>
<Term termID="1.3">
  <Name xml:lang="ja">ゴルフ</Name>
  <Definition xml:lang="ja">ゴルフ</Definition>
  <!-- Golf -->
</Term>
<Term termID="1.4">
  <Name xml:lang="ja">その他の球技</Name>
  <Definition xml:lang="ja">その他の球技</Definition>
  <!-- Other ball games -->
</Term>
<Term termID="1.5">
  <Name xml:lang="ja">相撲・格闘技</Name>
  <Definition xml:lang="ja">相撲・格闘技</Definition>
  <!-- Sumo wrestling/Martial arts -->
</Term>
<Term termID="1.6">
  <Name xml:lang="ja">オリンピック・国際大会</Name>
  <Definition xml:lang="ja">オリンピック・国際大会</Definition>
  <!-- Olympic/International sports events -->
</Term>
<Term termID="1.7">
  <Name xml:lang="ja">マラソン・陸上・水泳</Name>
  <Definition xml:lang="ja">マラソン・陸上・水泳</Definition>
  <!-- Marathon/Field and track/Swimming -->
</Term>
<Term termID="1.8">
  <Name xml:lang="ja">モータースポーツ</Name>
  <Definition xml:lang="ja">モータースポーツ</Definition>
  <!-- Motorsports -->
</Term>
<Term termID="1.9">
  <Name xml:lang="ja">マリン・ウィンタースポーツ</Name>
  <Definition xml:lang="ja">マリン・ウィンタースポーツ</Definition>
  <!-- Marine and winter sports -->
</Term>
<Term termID="2">
  <Name xml:lang="ja">情報／ワイドショー</Name>
  <Definition xml:lang="ja">情報／ワイドショー</Definition>

```

```

    <!-- Information/Infotainment -->
</Term>
<Term termID="2.0">
  <Name xml:lang="ja">芸能・ワイドショー</Name>
  <Definition xml:lang="ja">芸能・ワイドショー</Definition>
  <!-- Showbiz/Infotainment -->
</Term>
<Term termID="2.1">
  <Name xml:lang="ja">ファッション</Name>
  <Definition xml:lang="ja">ファッション</Definition>
  <!-- Fashion -->
</Term>
<Term termID="2.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other information -->
</Term>
<Term termID="2.2">
  <Name xml:lang="ja">暮らし・住まい</Name>
  <Definition xml:lang="ja">暮らし・住まい</Definition>
  <!-- Life/Living -->
</Term>
<Term termID="2.3">
  <Name xml:lang="ja">健康・医療</Name>
  <Definition xml:lang="ja">健康・医療</Definition>
  <!-- Health/Medical -->
</Term>
<Term termID="2.4">
  <Name xml:lang="ja">ショッピング・通販</Name>
  <Definition xml:lang="ja">ショッピング・通販</Definition>
  <!-- Shopping/TV shopping -->
</Term>
<Term termID="2.5">
  <Name xml:lang="ja">グルメ・料理</Name>
  <Definition xml:lang="ja">グルメ・料理</Definition>
  <!-- Gourmet/Cooking -->
</Term>
<Term termID="2.6">
  <Name xml:lang="ja">イベント</Name>
  <Definition xml:lang="ja">イベント</Definition>
  <!-- Events -->
</Term>
<Term termID="2.7">
  <Name xml:lang="ja">番組紹介・お知らせ</Name>
  <Definition xml:lang="ja">番組紹介・お知らせ</Definition>
  <!-- Trailers/Announcement -->
</Term>

```

```
<Term termID="3">
  <Name xml:lang="ja">ドラマ</Name>
  <Definition xml:lang="ja">ドラマ</Definition>
  <!-- TV series -->
</Term>
<Term termID="3.0">
  <Name xml:lang="ja">国内ドラマ</Name>
  <Definition xml:lang="ja">国内ドラマ</Definition>
  <!-- Domestic TV series -->
</Term>
<Term termID="3.1">
  <Name xml:lang="ja">海外ドラマ</Name>
  <Definition xml:lang="ja">海外ドラマ</Definition>
  <!-- Foreign TV series -->
</Term>
<Term termID="3.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other TV series -->
</Term>
<Term termID="3.2">
  <Name xml:lang="ja">時代劇</Name>
  <Definition xml:lang="ja">時代劇</Definition>
  <!-- Historical play -->
</Term>
<Term termID="4">
  <Name xml:lang="ja">音楽</Name>
  <Definition xml:lang="ja">音楽</Definition>
  <!-- Music -->
</Term>
<Term termID="4.0">
  <Name xml:lang="ja">国内ロック・ポップス</Name>
  <Definition xml:lang="ja">国内ロック・ポップス</Definition>
  <!-- Domestic Rock/Pops -->
</Term>
<Term termID="4.1">
  <Name xml:lang="ja">海外ロック・ポップス</Name>
  <Definition xml:lang="ja">海外ロック・ポップス</Definition>
  <!-- Foreign Rock/Pops -->
</Term>
<Term termID="4.10">
  <Name xml:lang="ja">民族音楽・ワールドミュージック</Name>
  <Definition xml:lang="ja">民族音楽・ワールドミュージック</Definition>
  <!-- Ethnic/World music -->
</Term>
<Term termID="4.15">
  <Name xml:lang="ja">その他</Name>
```

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    <Definition xml:lang="ja">その他</Definition>
    <!-- Other music -->
</Term>
<Term termID="4.2">
    <Name xml:lang="ja">クラシック・オペラ</Name>
    <Definition xml:lang="ja">クラシック・オペラ</Definition>
    <!-- Classical music/Opera -->
</Term>
<Term termID="4.3">
    <Name xml:lang="ja">ジャズ・フュージョン</Name>
    <Definition xml:lang="ja">ジャズ・フュージョン</Definition>
    <!-- Jazz/Fusion -->
</Term>
<Term termID="4.4">
    <Name xml:lang="ja">歌謡曲・演歌</Name>
    <Definition xml:lang="ja">歌謡曲・演歌</Definition>
    <!-- J-Pops/Enka -->
</Term>
<Term termID="4.5">
    <Name xml:lang="ja">ライブ・コンサート</Name>
    <Definition xml:lang="ja">ライブ・コンサート</Definition>
    <!-- Live/Concert -->
</Term>
<Term termID="4.6">
    <Name xml:lang="ja">ランキング・リクエスト</Name>
    <Definition xml:lang="ja">ランキング・リクエスト</Definition>
    <!-- Ranking/Request -->
</Term>
<Term termID="4.7">
    <Name xml:lang="ja">カラオケ・のど自慢</Name>
    <Definition xml:lang="ja">カラオケ・のど自慢</Definition>
    <!-- Karaoke/Amateur singing contest -->
</Term>
<Term termID="4.8">
    <Name xml:lang="ja">民謡・邦楽</Name>
    <Definition xml:lang="ja">民謡・邦楽</Definition>
    <!-- Folk songs/Domestic songs -->
</Term>
<Term termID="4.9">
    <Name xml:lang="ja">童謡・キッズ</Name>
    <Definition xml:lang="ja">童謡・キッズ</Definition>
    <!-- Children's song -->
</Term>
<Term termID="5">
    <Name xml:lang="ja">バラエティ</Name>
    <Definition xml:lang="ja">バラエティ</Definition>
    <!-- Variety show -->

```

```
</Term>
<Term termID="5.0">
  <Name xml:lang="ja">クイズ</Name>
  <Definition xml:lang="ja">クイズ</Definition>
  <!-- Quiz show -->
</Term>
<Term termID="5.1">
  <Name xml:lang="ja">ゲーム</Name>
  <Definition xml:lang="ja">ゲーム</Definition>
  <!-- Game show -->
</Term>
<Term termID="5.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other variety show -->
</Term>
<Term termID="5.2">
  <Name xml:lang="ja">トークバラエティ</Name>
  <Definition xml:lang="ja">トークバラエティ</Definition>
  <!-- Talk show -->
</Term>
<Term termID="5.3">
  <Name xml:lang="ja">お笑い・コメディ</Name>
  <Definition xml:lang="ja">お笑い・コメディ</Definition>
  <!-- Comedy show -->
</Term>
<Term termID="5.4">
  <Name xml:lang="ja">音楽バラエティ</Name>
  <Definition xml:lang="ja">音楽バラエティ</Definition>
  <!-- Music variety show -->
</Term>
<Term termID="5.5">
  <Name xml:lang="ja">旅バラエティ</Name>
  <Definition xml:lang="ja">旅バラエティ</Definition>
  <!-- Travel variety show -->
</Term>
<Term termID="5.6">
  <Name xml:lang="ja">料理バラエティ</Name>
  <Definition xml:lang="ja">料理バラエティ</Definition>
  <!-- Cooking variety show -->
</Term>
<Term termID="6">
  <Name xml:lang="ja">映画</Name>
  <Definition xml:lang="ja">映画</Definition>
  <!-- Movie -->
</Term>
<Term termID="6.0">
```

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    <Name xml:lang="ja">洋画</Name>
    <Definition xml:lang="ja">洋画</Definition>
    <!-- Foreign movie -->
</Term>
<Term termID="6.1">
    <Name xml:lang="ja">邦画</Name>
    <Definition xml:lang="ja">邦画</Definition>
    <!-- Domestic movie -->
</Term>
<Term termID="6.15">
    <Name xml:lang="ja">その他</Name>
    <Definition xml:lang="ja">その他</Definition>
    <!-- Other movie -->
</Term>
<Term termID="6.2">
    <Name xml:lang="ja">アニメ</Name>
    <Definition xml:lang="ja">アニメ</Definition>
    <!-- Animation -->
</Term>
<Term termID="7">
    <Name xml:lang="ja">アニメ／特撮</Name>
    <Definition xml:lang="ja">アニメ／特撮</Definition>
    <!-- Animation/Special effects -->
</Term>
<Term termID="7.0">
    <Name xml:lang="ja">国内アニメ</Name>
    <Definition xml:lang="ja">国内アニメ</Definition>
    <!-- Domestic animation -->
</Term>
<Term termID="7.1">
    <Name xml:lang="ja">海外アニメ</Name>
    <Definition xml:lang="ja">海外アニメ</Definition>
    <!-- Foreign animation -->
</Term>
<Term termID="7.15">
    <Name xml:lang="ja">その他</Name>
    <Definition xml:lang="ja">その他</Definition>
    <!-- Other animation -->
</Term>
<Term termID="7.2">
    <Name xml:lang="ja">特撮</Name>
    <Definition xml:lang="ja">特撮</Definition>
    <!-- Special effects -->
</Term>
<Term termID="8">
    <Name xml:lang="ja">ドキュメンタリー／教養</Name>
    <Definition xml:lang="ja">ドキュメンタリー／教養</Definition>

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    <!-- Documentary/Educational -->
  </Term>
  <Term termID="8.0">
    <Name xml:lang="ja">社会・時事</Name>
    <Definition xml:lang="ja">社会・時事</Definition>
    <!-- Society/Current events -->
  </Term>
  <Term termID="8.1">
    <Name xml:lang="ja">歴史・紀行</Name>
    <Definition xml:lang="ja">歴史・紀行</Definition>
    <!-- History/Travel documentary -->
  </Term>
  <Term termID="8.15">
    <Name xml:lang="ja">その他</Name>
    <Definition xml:lang="ja">その他</Definition>
    <!-- Other documentary -->
  </Term>
  <Term termID="8.2">
    <Name xml:lang="ja">自然・動物・環境</Name>
    <Definition xml:lang="ja">自然・動物・環境</Definition>
    <!-- Nature/Animals/Environment -->
  </Term>
  <Term termID="8.3">
    <Name xml:lang="ja">宇宙・科学・医学</Name>
    <Definition xml:lang="ja">宇宙・科学・医学</Definition>
    <!-- Space/Science/Medical documentary -->
  </Term>
  <Term termID="8.4">
    <Name xml:lang="ja">カルチャー・伝統文学</Name>
    <Definition xml:lang="ja">カルチャー・伝統文学</Definition>
    <!-- Culture/Traditional literature -->
  </Term>
  <Term termID="8.5">
    <Name xml:lang="ja">文学・文芸</Name>
    <Definition xml:lang="ja">文学・文芸</Definition>
    <!-- Literature -->
  </Term>
  <Term termID="8.6">
    <Name xml:lang="ja">スポーツ</Name>
    <Definition xml:lang="ja">スポーツ</Definition>
    <!-- Sports documentary -->
  </Term>
  <Term termID="8.7">
    <Name xml:lang="ja">ドキュメンタリー全般</Name>
    <Definition xml:lang="ja">ドキュメンタリー全般</Definition>
    <!-- General documentary -->
  </Term>

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<Term termID="8.8">
  <Name xml:lang="ja">インタビュー・討論</Name>
  <Definition xml:lang="ja">インタビュー・討論</Definition>
  <!-- Interview/Discussion -->
</Term>
<Term termID="9">
  <Name xml:lang="ja">劇場／公演</Name>
  <Definition xml:lang="ja">劇場／公演</Definition>
  <!-- Theater/Public performance -->
</Term>
<Term termID="9.0">
  <Name xml:lang="ja">現代劇・新劇</Name>
  <Definition xml:lang="ja">現代劇・新劇</Definition>
  <!-- Historical play -->
</Term>
<Term termID="9.1">
  <Name xml:lang="ja">ミュージカル</Name>
  <Definition xml:lang="ja">ミュージカル</Definition>
  <!-- Musical play -->
</Term>
<Term termID="9.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other theatricals -->
</Term>
<Term termID="9.2">
  <Name xml:lang="ja">ダンス・バレエ</Name>
  <Definition xml:lang="ja">ダンス・バレエ</Definition>
  <!-- Dance/Ballet -->
</Term>
<Term termID="9.3">
  <Name xml:lang="ja">落語・演芸</Name>
  <Definition xml:lang="ja">落語・演芸</Definition>
  <!-- Rakugo/Verbal entertainment -->
</Term>
<Term termID="9.4">
  <Name xml:lang="ja">歌舞伎・古典</Name>
  <Definition xml:lang="ja">歌舞伎・古典</Definition>
  <!-- Kabuki/Traditional theatrical entertainment -->
</Term>
<Term termID="10">
  <Name xml:lang="ja">趣味／教育</Name>
  <Definition xml:lang="ja">趣味／教育</Definition>
  <!-- Hobby/Educational -->
</Term>
<Term termID="10.0">
  <Name xml:lang="ja">旅・釣り・アウトドア</Name>

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    <Definition xml:lang="ja">旅・釣り・アウトドア</Definition>
    <!-- Travel/Fishing/Outdoor -->
  </Term>
  <Term termID="10.1">
    <Name xml:lang="ja">園芸・ペット・手芸</Name>
    <Definition xml:lang="ja">園芸・ペット・手芸</Definition>
    <!-- Gardening/Pet/Knitting -->
  </Term>
  <Term termID="10.10">
    <Name xml:lang="ja">大学生・受験</Name>
    <Definition xml:lang="ja">大学生・受験</Definition>
    <!-- University student/Entrance exam -->
  </Term>
  <Term termID="10.11">
    <Name xml:lang="ja">生涯教育・資格</Name>
    <Definition xml:lang="ja">生涯教育・資格</Definition>
    <!-- Lifetime education/License/Qualification -->
  </Term>
  <Term termID="10.12">
    <Name xml:lang="ja">教育問題</Name>
    <Definition xml:lang="ja">教育問題</Definition>
    <!-- Educational problem -->
  </Term>
  <Term termID="10.15">
    <Name xml:lang="ja">その他</Name>
    <Definition xml:lang="ja">その他</Definition>
    <!-- Other educational programs -->
  </Term>
  <Term termID="10.2">
    <Name xml:lang="ja">音楽・美術・工芸</Name>
    <Definition xml:lang="ja">音楽・美術・工芸</Definition>
    <!-- Music/Art/Handcraft -->
  </Term>
  <Term termID="10.3">
    <Name xml:lang="ja">囲碁・将棋</Name>
    <Definition xml:lang="ja">囲碁・将棋</Definition>
    <!-- Igo/Shogi -->
  </Term>
  <Term termID="10.4">
    <Name xml:lang="ja">麻雀・パチンコ</Name>
    <Definition xml:lang="ja">麻雀・パチンコ</Definition>
    <!-- Mahjong/Pachinko -->
  </Term>
  <Term termID="10.5">
    <Name xml:lang="ja">車・オートバイ</Name>
    <Definition xml:lang="ja">車・オートバイ</Definition>
    <!-- Car/Motorbike -->

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</Term>
<Term termID="10.6">
  <Name xml:lang="ja">コンピュータ・TVゲーム</Name>
  <Definition xml:lang="ja">コンピュータ・TVゲーム</Definition>
  <!-- Computer/Video game -->
</Term>
<Term termID="10.7">
  <Name xml:lang="ja">会話・語学</Name>
  <Definition xml:lang="ja">会話・語学</Definition>
  <!-- Conversation/Languages -->
</Term>
<Term termID="10.8">
  <Name xml:lang="ja">幼児・小学生</Name>
  <Definition xml:lang="ja">幼児・小学生</Definition>
  <!-- Pre-school/Primary school age children -->
</Term>
<Term termID="10.9">
  <Name xml:lang="ja">中学生・高校生</Name>
  <Definition xml:lang="ja">中学生・高校生</Definition>
  <!-- junior high school/High school students -->
</Term>
<Term termID="11">
  <Name xml:lang="ja">福祉</Name>
  <Definition xml:lang="ja">福祉</Definition>
  <!-- Welfare -->
</Term>
<Term termID="11.0">
  <Name xml:lang="ja">高齢者</Name>
  <Definition xml:lang="ja">高齢者</Definition>
  <!-- Aged -->
</Term>
<Term termID="11.1">
  <Name xml:lang="ja">障害者</Name>
  <Definition xml:lang="ja">障害者</Definition>
  <!-- Handicapped -->
</Term>
<Term termID="11.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other topics on welfare -->
</Term>
<Term termID="11.2">
  <Name xml:lang="ja">社会福祉</Name>
  <Definition xml:lang="ja">社会福祉</Definition>
  <!-- Social welfare -->
</Term>
<Term termID="11.3">

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<Name xml:lang="ja">ボランティア</Name>
<Definition xml:lang="ja">ボランティア</Definition>
<!-- Volunteer -->
</Term>
<Term termID="11.4">
  <Name xml:lang="ja">手話</Name>
  <Definition xml:lang="ja">手話</Definition>
  <!-- Hand sign -->
</Term>
<Term termID="11.5">
  <Name xml:lang="ja">文字（字幕）</Name>
  <Definition xml:lang="ja">文字（字幕）</Definition>
  <!-- Caption -->
</Term>
<Term termID="11.6">
  <Name xml:lang="ja">音声解説</Name>
  <Definition xml:lang="ja">音声解説</Definition>
  <!-- Audio commentary -->
</Term>
<Term termID="14.1.0">
  <Name xml:lang="ja">スポーツ</Name>
  <Definition xml:lang="ja">スポーツ</Definition>
  <!-- Sports -->
</Term>
<Term termID="14.1.0.0">
  <Name xml:lang="ja">テニス</Name>
  <Definition xml:lang="ja">テニス</Definition>
  <!-- Tennis -->
</Term>
<Term termID="14.1.0.1">
  <Name xml:lang="ja">バスケットボール</Name>
  <Definition xml:lang="ja">バスケットボール</Definition>
  <!-- Basket ball -->
</Term>
<Term termID="14.1.0.2">
  <Name xml:lang="ja">“ラグビー”</Name>
  <Definition xml:lang="ja">“ラグビー”</Definition>
  <!-- Rugby -->
</Term>
<Term termID="14.1.0.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other sports -->
</Term>
<Term termID="14.1.0.2">
  <Name xml:lang="ja">ラクビー</Name>
  <Definition xml:lang="ja">ラクビー</Definition>

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    <!-- Rugby -->
  </Term>
  <Term termID="14.1.0.3">
    <Name xml:lang="ja">アメリカンフットボール</Name>
    <Definition xml:lang="ja">アメリカンフットボール</Definition>
    <!-- American football -->
  </Term>
  <Term termID="14.1.0.4">
    <Name xml:lang="ja">ボクシング</Name>
    <Definition xml:lang="ja">ボクシング</Definition>
    <!-- Boxing -->
  </Term>
  <Term termID="14.1.0.5">
    <Name xml:lang="ja">プロレス</Name>
    <Definition xml:lang="ja">プロレス</Definition>
    <!-- Pro wrestling -->
  </Term>
  <Term termID="14.1.1">
    <Name xml:lang="ja">洋画</Name>
    <Definition xml:lang="ja">洋画</Definition>
    <!-- Foreign movies -->
  </Term>
  <Term termID="14.1.1.0">
    <Name xml:lang="ja">アクション</Name>
    <Definition xml:lang="ja">アクション</Definition>
    <!-- Action -->
  </Term>
  <Term termID="14.1.1.1">
    <Name xml:lang="ja">SF／ファンタジー</Name>
    <Definition xml:lang="ja">SF／ファンタジー</Definition>
    <!-- SF/Fantasy -->
  </Term>
  <Term termID="14.1.1.10">
    <Name xml:lang="ja">アドベンチャー／冒険</Name>
    <Definition xml:lang="ja">アドベンチャー／冒険</Definition>
    <!-- Adventure -->
  </Term>
  <Term termID="14.1.1.11">
    <Name xml:lang="ja">ミュージカル／音楽映画</Name>
    <Definition xml:lang="ja">ミュージカル／音楽映画</Definition>
    <!-- Musical -->
  </Term>
  <Term termID="14.1.1.12">
    <Name xml:lang="ja">ホームドラマ</Name>
    <Definition xml:lang="ja">ホームドラマ</Definition>
    <!-- Drama of family life -->
  </Term>

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```
<Term termID="14.1.1.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other foreign movies -->
</Term>
<Term termID="14.1.1.2">
  <Name xml:lang="ja">コメディ</Name>
  <Definition xml:lang="ja">コメディ</Definition>
  <!-- Comedy -->
</Term>
<Term termID="14.1.1.3">
  <Name xml:lang="ja">サスペンス／ミステリー</Name>
  <Definition xml:lang="ja">サスペンス／ミステリー</Definition>
  <!-- Suspense/Mystery -->
</Term>
<Term termID="14.1.1.4">
  <Name xml:lang="ja">恋愛／ロマンス</Name>
  <Definition xml:lang="ja">恋愛／ロマンス</Definition>
  <!-- Romance -->
</Term>
<Term termID="14.1.1.5">
  <Name xml:lang="ja">ホラー／スリラー</Name>
  <Definition xml:lang="ja">ホラー／スリラー</Definition>
  <!-- Horror/Thriller -->
</Term>
<Term termID="14.1.1.6">
  <Name xml:lang="ja">ウエスタン</Name>
  <Definition xml:lang="ja">ウエスタン</Definition>
  <!-- Western -->
</Term>
<Term termID="14.1.1.7">
  <Name xml:lang="ja">ドラマ／社会派ドラマ</Name>
  <Definition xml:lang="ja">ドラマ／社会派ドラマ</Definition>
  <!-- Drama/Social drama -->
</Term>
<Term termID="14.1.1.8">
  <Name xml:lang="ja">アニメーション</Name>
  <Definition xml:lang="ja">アニメーション</Definition>
  <!-- Animation -->
</Term>
<Term termID="14.1.1.9">
  <Name xml:lang="ja">ドキュメンタリー</Name>
  <Definition xml:lang="ja">ドキュメンタリー</Definition>
  <!-- Documentary -->
</Term>
<Term termID="14.1.2">
  <Name xml:lang="ja">邦画</Name>
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    <Definition xml:lang="ja">邦画</Definition>
    <!-- Domestic movies -->
</Term>
<Term termID="14.1.2.0">
    <Name xml:lang="ja">アクション</Name>
    <Definition xml:lang="ja">アクション</Definition>
    <!-- Action -->
</Term>
<Term termID="14.1.2.1">
    <Name xml:lang="ja">SF／ファンタジー</Name>
    <Definition xml:lang="ja">SF／ファンタジー</Definition>
    <!-- SF/Fantasy -->
</Term>
<Term termID="14.1.2.10">
    <Name xml:lang="ja">アドベンチャー／冒険</Name>
    <Definition xml:lang="ja">アドベンチャー／冒険</Definition>
    <!-- Adventure -->
</Term>
<Term termID="14.1.2.11">
    <Name xml:lang="ja">ミュージカル／音楽映画</Name>
    <Definition xml:lang="ja">ミュージカル／音楽映画</Definition>
    <!-- Musical -->
</Term>
<Term termID="14.1.2.12">
    <Name xml:lang="ja">ホームドラマ</Name>
    <Definition xml:lang="ja">ホームドラマ</Definition>
    <!-- Drama of family life -->
</Term>
<Term termID="14.1.2.15">
    <Name xml:lang="ja">その他</Name>
    <Definition xml:lang="ja">その他</Definition>
    <!-- Other domestic movies -->
</Term>
<Term termID="14.1.2.2">
    <Name xml:lang="ja">お笑い／コメディ</Name>
    <Definition xml:lang="ja">お笑い／コメディ</Definition>
    <!-- Comedy -->
</Term>
<Term termID="14.1.2.3">
    <Name xml:lang="ja">サスペンス／ミステリー</Name>
    <Definition xml:lang="ja">サスペンス／ミステリー</Definition>
    <!-- Suspense/Mystery -->
</Term>
<Term termID="14.1.2.4">
    <Name xml:lang="ja">恋愛／ロマンス</Name>
    <Definition xml:lang="ja">恋愛／ロマンス</Definition>
    <!-- Romance -->

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</Term>
<Term termID="14.1.2.5">
  <Name xml:lang="ja">ホラー／スリラー</Name>
  <Definition xml:lang="ja">ホラー／スリラー</Definition>
  <!-- Horror/Thriller -->
</Term>
<Term termID="14.1.2.6">
  <Name xml:lang="ja">青春／学園／アイドル</Name>
  <Definition xml:lang="ja">青春／学園／アイドル</Definition>
  <!-- Teen/idol -->
</Term>
<Term termID="14.1.2.7">
  <Name xml:lang="ja">任侠／時代劇</Name>
  <Definition xml:lang="ja">任侠／時代劇</Definition>
  <!-- Mafia/Historical play -->
</Term>
<Term termID="14.1.2.8">
  <Name xml:lang="ja">アニメーション</Name>
  <Definition xml:lang="ja">アニメーション</Definition>
  <!-- Animation -->
</Term>
<Term termID="14.1.2.9">
  <Name xml:lang="ja">ドキュメンタリー</Name>
  <Definition xml:lang="ja">ドキュメンタリー</Definition>
  <!-- Documentary -->
</Term>
<Term termID="14.6.11">
  <Name xml:lang="ja">海外放送</Name>
  <Definition xml:lang="ja">海外放送</Definition>
  <!-- Foreign program -->
</Term>
<Term termID="14.6.11.0">
  <Name xml:lang="ja">アジア</Name>
  <Definition xml:lang="ja">アジア</Definition>
  <!-- Asia -->
</Term>
<Term termID="14.6.11.1">
  <Name xml:lang="ja">オセアニア</Name>
  <Definition xml:lang="ja">オセアニア</Definition>
  <!-- Oceania -->
</Term>
<Term termID="14.6.11.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other -->
</Term>
<Term termID="14.6.11.2">

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```

    <Name xml:lang="ja">ヨーロッパ</Name>
    <Definition xml:lang="ja">ヨーロッパ</Definition>
    <!-- Europe -->
</Term>
<Term termID="14.6.11.3">
    <Name xml:lang="ja">北米</Name>
    <Definition xml:lang="ja">北米</Definition>
    <!-- North America -->
</Term>
<Term termID="14.6.11.4">
    <Name xml:lang="ja">中南米</Name>
    <Definition xml:lang="ja">中南米</Definition>
    <!-- Latin america -->
</Term>
<Term termID="14.6.11.5">
    <Name xml:lang="ja">アフリカ</Name>
    <Definition xml:lang="ja">アフリカ</Definition>
    <!-- Africa -->
</Term>
<Term termID="14.6.12">
    <Name xml:lang="ja">成人向け</Name>
    <Definition xml:lang="ja">成人向け</Definition>
    <!-- Adult -->
</Term>
<Term termID="14.6.12.0">
    <Name xml:lang="ja">洋画</Name>
    <Definition xml:lang="ja">洋画</Definition>
    <!-- Foreign movies -->
</Term>
<Term termID="14.6.12.1">
    <Name xml:lang="ja">邦画</Name>
    <Definition xml:lang="ja">邦画</Definition>
    <!-- Domestic movies -->
</Term>
<Term termID="14.6.12.2">
    <Name xml:lang="ja">ビデオ（国内）</Name>
    <Definition xml:lang="ja">ビデオ（国内）</Definition>
    <!-- Domestic video -->
</Term>
<Term termID="14.6.12.3">
    <Name xml:lang="ja">ビデオ（海外）</Name>
    <Definition xml:lang="ja">ビデオ（海外）</Definition>
    <!-- Foreign video -->
</Term>
<Term termID="14.6.12.4">
    <Name xml:lang="ja">アニメ</Name>
    <Definition xml:lang="ja">アニメ</Definition>

```

```

    <!-- Animation -->
</Term>
<Term termID="14.6.12.5">
  <Name xml:lang="ja">ショー／ステージ</Name>
  <Definition xml:lang="ja">ショー／ステージ</Definition>
  <!-- Show/Stage -->
</Term>
<Term termID="14.6.12.6">
  <Name xml:lang="ja">成人向けバラエティ</Name>
  <Definition xml:lang="ja">成人向けバラエティ</Definition>
  <!-- Adult variety -->
</Term>
<Term termID="14.6.12.15">
  <Name xml:lang="ja">その他（成人向け）</Name>
  <Definition xml:lang="ja">その他（成人向け）</Definition>
  <!-- Other adult -->
</Term>
<Term termID="14.6.13">
  <Name xml:lang="ja">デジタルラジオ</Name>
  <Definition xml:lang="ja">デジタルラジオ</Definition>
  <!-- Digital radio -->
</Term>
<Term termID="14.6.13.0">
  <Name xml:lang="ja">日本のポップス</Name>
  <Definition xml:lang="ja">日本のポップス</Definition>
  <!-- Domestic pops -->
</Term>
<Term termID="14.6.13.1">
  <Name xml:lang="ja">演歌</Name>
  <Definition xml:lang="ja">演歌</Definition>
  <!-- Enka -->
</Term>
<Term termID="14.6.13.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Others -->
</Term>
<Term termID="14.6.13.2">
  <Name xml:lang="ja">洋楽</Name>
  <Definition xml:lang="ja">洋楽</Definition>
  <!-- Foreign music -->
</Term>
<Term termID="14.6.13.3">
  <Name xml:lang="ja">クラシック</Name>
  <Definition xml:lang="ja">クラシック</Definition>
  <!-- Classical music -->
</Term>

```

```
<Term termID="14.6.13.4">
  <Name xml:lang="ja">ジャズ</Name>
  <Definition xml:lang="ja">ジャズ</Definition>
  <!-- Jazz -->
</Term>
<Term termID="14.6.13.5">
  <Name xml:lang="ja">ニューリリース</Name>
  <Definition xml:lang="ja">ニューリリース</Definition>
  <!-- New release -->
</Term>
<Term termID="14.6.13.6">
  <Name xml:lang="ja">BGM</Name>
  <Definition xml:lang="ja">BGM</Definition>
  <!-- BGM -->
</Term>
<Term termID="14.6.13.7">
  <Name xml:lang="ja">インフォメーション</Name>
  <Definition xml:lang="ja">インフォメーション</Definition>
  <!-- Information -->
</Term>
<Term termID="14.6.13.8">
  <Name xml:lang="ja">スペシャル</Name>
  <Definition xml:lang="ja">スペシャル</Definition>
  <!-- Special -->
</Term>
<Term termID="14.6.14">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other -->
</Term>
<Term termID="14.6.14.0">
  <Name xml:lang="ja">イベント</Name>
  <Definition xml:lang="ja">イベント</Definition>
  <!-- Event -->
</Term>
<Term termID="14.6.14.1">
  <Name xml:lang="ja">ショッピング</Name>
  <Definition xml:lang="ja">ショッピング</Definition>
  <!-- Shopping -->
</Term>
<Term termID="14.6.14.15">
  <Name xml:lang="ja">その他</Name>
  <Definition xml:lang="ja">その他</Definition>
  <!-- Other -->
</Term>
</ClassificationScheme>
```

## D.12 Operation of ARIBAudioComponentCS

The definition of the ARIBAudioComponentCS referred in these specification is as follows. All items listed below are operated.

```

<ClassificationScheme fragmentId="0000000001" fragmentVersion="20071203000000"
uri="http://www.arib.or.jp/cs/2006/03/ARIBAudioComponentCS">
  <Term termID="1">
    <Name xml:lang="ja">モノラル</Name>
    <Definition xml:lang="ja">1/0 モード (シングルモノ) </Definition>
    <!-- Monoral -->
  </Term>
  <Term termID="2">
    <Name xml:lang="ja">デュアルモノラル</Name>
    <Definition xml:lang="ja">1/0+1/0 モード (デュアルモノ) </Definition>
    <!-- Dual monoral -->
  </Term>
  <Term termID="3">
    <Name xml:lang="ja">ステレオ</Name>
    <Definition xml:lang="ja">2/0 モード (ステレオ) </Definition>
    <!-- Stereo -->
  </Term>
  <Term termID="4">
    <Name xml:lang="ja">2/1 モード</Name>
    <!-- 2/1 mode -->
  </Term>
  <Term termID="5">
    <Name xml:lang="ja">3/0 モード</Name>
    <!-- 3/0 mode -->
  </Term>
  <Term termID="6">
    <Name xml:lang="ja">2/2 モード</Name>
    <!-- 2/2 mode -->
  </Term>
  <Term termID="7">
    <Name xml:lang="ja">3/1 モード</Name>
    <!-- 3/1 mode -->
  </Term>
  <Term termID="8">
    <Name xml:lang="ja">3/2 モード</Name>
    <!-- 3/2 mode -->
  </Term>
  <Term termID="9">
    <Name xml:lang="ja">3/2+LFE モード</Name>
    <Definition xml:lang="ja">5.1ch サラウンド</Definition>
    <!-- 3/2 + LFE mode -->

```

```
</Term>  
</ClassificationScheme>
```

## D.13 Operation of IPTVSERVICEOutputPortCS

The definition of the IPTVSERVICEOutputPortCS referred in these specifications is as follows.  
All items listed below are operated.

```
<ClassificationScheme fragmentId="000000000D" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEOutputPortCS">
<!--
  Defines the output port of the receiver
  Described in LI/RMPIDescription の OutputRestriction/Port/@href
/-->
  <Term termID="composite">
    <Name xml:lang="ja">コンポジット出力</Name>
    <Name xml:lang="en">Composite Port</Name>
  </Term>
  <Term termID="component">
    <Name xml:lang="ja">コンポーネント出力</Name>
    <Name xml:lang="en">Component Port</Name>
  </Term>
  <Term termID="d_terminal">
    <Name xml:lang="ja">D 端子</Name>
    <Name xml:lang="en">D terminal</Name>
  </Term>
  <Term termID="s_terminal">
    <Name xml:lang="ja">S 端子</Name>
    <Name xml:lang="en">S terminal</Name>
  </Term>

  <Term termID="digital_serial">
    <Name xml:lang="ja">デジタル出力（シリアルインタフェース）</Name>
    <Name xml:lang="en">Digital Serial Interface</Name>
  </Term>
  <Term termID="digital_ip">
    <Name xml:lang="ja">デジタル出力（IP インタフェース）</Name>
    <Name xml:lang="en">Digital IP Interface</Name>
  </Term>
  <Term termID="dvi-d">
    <Name xml:lang="ja">DVI-D</Name>
    <Name xml:lang="en">Digital Visual Interface Digital</Name>
  </Term>
  <Term termID="dvi-i">
    <Name xml:lang="ja">DVI-I</Name>
    <Name xml:lang="en">Digital Visual Interface Integrated</Name>
  </Term>
  <Term termID="dv">
    <Name xml:lang="ja">DV</Name>
```

```
<Name xml:lang="en">Digital Video</Name>
</Term>
<Term termID="hdmi">
  <Name xml:lang="ja">HDMI</Name>
  <Name xml:lang="en">High-Definition Multimedia Interface</Name>
</Term>

<Term termID="s_pdif">
  <Name xml:lang="ja">光デジタル音声端子</Name>
  <Name xml:lang="en">Sony Philips Digital Interface</Name>
</Term>
</ClassificationScheme>
```

## D.14 Operation of IPTVSERVICECopyControlMethodCS

The definition of the IPTVSERVICECopyControlMethodCS referred in these specification is as follows. All items listed below are operated.

```

<ClassificationScheme fragmentId="000000000E" fragmentVersion="20071203000000"
uri="http://www.iptvforum.jp/cs/2008/07/IPTVSERVICECopyControlMethodCS">
<!--
  Defines the copy control method
  Described in LI/RMPIDescription の OutputRestriction/Mode/@href
// -->
  <Term termID="macrovision">
    <Name xml:lang="ja">マクロビジョン</Name>
    <Name xml:lang="en">macrovision</Name>
    <Definition xml:lang="ja">コピー禁止（アナログ映像出力）
    <!-- Copy inhibited (Analog video output) -->
    </Definition>
  </Term>

  <Term termID="CGMS-A">
    <Definition xml:lang="ja">アナログ映像出力フォーマット毎のコピー制御
    <!-- Copy Generation Management System - Analog -->
    </Definition>
  </Term>
  <Term termID="CGMS-A:CopyNever">
    <Definition xml:lang="ja">コピー禁止
    <!-- Copy Never -->
    </Definition>
  </Term>
  <Term termID="CGMS-A:CopyOnce">
    <Definition xml:lang="ja">1回だけコピー可
    <!-- Copy Once -->
    </Definition>
  </Term>
  <Term termID="CGMS-A:CopyFree">
    <Definition xml:lang="ja">制約条件なしにコピー可
    <!-- Copy Free -->
    </Definition>
  </Term>

  <Term termID="DTCP">
    <Definition xml:lang="ja">デジタル映像出力（シリアルインタフェース）のコピー制御
    <!-- Digital Transmission Content Protection -->
    </Definition>
  </Term>
  <Term termID="DTCP:CopyNever">

```

```

<Definition xml:lang="ja">コピー禁止
<!-- Copy Never -->
</Definition>
</Term>
<Term termID="DTCP:CopyOnce">
  <Definition xml:lang="ja">1回だけコピー可
  <!-- Copy Once -->
  </Definition>
</Term>
<Term termID="DTCP:CopyNoMore">
  <Definition xml:lang="ja">1回コピー後にコピー禁止
  <!-- Copy No More -->
  </Definition>
</Term>
<Term termID="DTCP:CopyFree">
  <Definition xml:lang="ja">制約条件なしにコピー可
  <!-- Copy Free -->
  </Definition>
</Term>

<Term termID="DTCP-IP">
  <Definition xml:lang="ja">デジタル映像出力（IP インタフェース）のコピー制御
  <!-- DTCP-IP -->
  </Definition>
</Term>
<Term termID="DTCP-IP:CopyNever">
  <Definition xml:lang="ja">コピー禁止
  <!-- Copy Never -->
  </Definition>
</Term>
<Term termID="DTCP-IP:CopyOnce">
  <Definition xml:lang="ja">1回だけコピー可
  <!-- Copy Once -->
  </Definition>
</Term>
<Term termID="DTCP-IP:CopyNoMore">1回コピー後にコピー禁止
  <Definition xml:lang="ja">
  <!--Copy No More -->
  </Definition>
</Term>
<Term termID="DTCP-IP:CopyFree">
  <Definition xml:lang="ja">制約条件なしにコピー可
  <!-- Copy Free -->
  </Definition>
</Term>

<Term termID="SCMS">

```

```
<Definition xml:lang="ja">デジタル音声出力のコピー制御
<!-- Serial Copy Management System -->
</Definition>
</Term>
<Term termID="SCMS:CopyNever">
  <Definition xml:lang="ja">コピー禁止
  <!-- Copy Never -->
  </Definition>
</Term>
<Term termID="SCMS:CopyOnce">
  <Definition xml:lang="ja">1回だけコピー可
  <!-- Copy Once -->
  </Definition>
</Term>
<Term termID="SCMS:CopyNoMore">
  <Definition xml:lang="ja">1回コピー後にコピー禁止
  <!-- Copy No More -->
  </Definition>
</Term>
<Term termID="SCMS:CopyFree">
  <Definition xml:lang="ja">制約条件なしにコピー可
  <!-- Copy Free -->
  </Definition>
</Term>
</ClassificationScheme>
```

## [Appendix E] Specifications on XML Extension Schema for ECG Metadata

The extensions schema for ECG metadata is as follows:

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001" xmlns:tva="http://www.iptvforum.jp/metadata/tva/2008/07"
xmlns="http://www.w3.org/2001/XMLSchema" targetNamespace="http://www.iptvforum.jp/metadata/tva/2008/07"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <annotation>
    <documentation xml:lang="en"> ===== Base Schema for IPTV Service ===== </documentation>
  </annotation>
  <simpleType name="TVAIDType">
    <restriction base="string">
      <whiteSpace value="collapse"/>
    </restriction>
  </simpleType>
  <simpleType name="TVAIDRefType">
    <restriction base="string">
      <whiteSpace value="collapse"/>
    </restriction>
  </simpleType>
  <simpleType name="TVAIDRefsType">
    <list itemType="tva:TVAIDRefType"/>
  </simpleType>
  <simpleType name="CRIDType">
    <restriction base="anyURI">
      <pattern value="(c|C)(r|R)(i|I)(d|D)://.*/*"/>
    </restriction>
  </simpleType>
  <complexType name="CRIDRefType">
    <attribute name="crid" type="tva:CRIDType" use="required"/>
  </complexType>
  <complexType name="FlagType">
    <attribute name="value" type="boolean" use="required"/>
  </complexType>
  <simpleType name="YearRangeType">
    <restriction base="string">
      <pattern value="Y-?Yd+(Y-Yd+)?"/>
    </restriction>
  </simpleType>
  <complexType name="TVATimeType">
    <sequence>
      <element name="TimePoint" type="mpeg7:timePointType"/>
      <element name="Duration" type="mpeg7:durationType" minOccurs="0"/>
      <element name="YearRange" type="tva:YearRangeType" minOccurs="0"/>
    </sequence>
  </complexType>
  <simpleType name="currencyCodeType">
    <restriction base="string">
      <pattern value="[a-zA-Z]{3}"/>
    </restriction>
  </simpleType>
  <complexType name="TermNameType">
    <simpleContent>
      <extension base="mpeg7:TextualType">
        <attribute name="preferred" type="boolean" use="optional"/>
      </extension>
    </simpleContent>
  </complexType>
  <complexType name="ControlledTermType">
    <sequence>
      <element name="Name" type="tva:TermNameType" minOccurs="0"/>
    </sequence>
  </complexType>

```

```

    <element name="Definition" type="mpeg7:TextualType" minOccurs="0"/>
  </sequence>
  <attribute name="href" type="mpeg7:termReferenceType" use="required"/>
</complexType>
<complexType name="TVAIDRefElementType">
  <attribute name="ref" type="tva:TVAIDRefType" use="required"/>
</complexType>
<complexType name="TVAAgentType">
  <sequence>
    <choice minOccurs="0" maxOccurs="unbounded">
      <element name="PersonName" type="mpeg7:PersonNameType"/>
      <element name="PersonNameIDRef" type="tva:TVAIDRefElementType"/>
      <element name="OrganizationName" type="mpeg7:TextualType"/>
      <element name="OrganizationNameIDRef" type="tva:TVAIDRefElementType"/>
    </choice>
  </sequence>
</complexType>
<attributeGroup name="fragmentIdentification">
  <attribute name="fragmentId" type="tva:TVAIDType" use="optional"/>
  <attribute name="fragmentVersion" type="unsignedLong" use="optional"/>
  <attribute name="fragmentExpirationDate" type="dateTime" use="optional"/>
</attributeGroup>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.3.4 DESCRIPTION </documentation>
</annotation>
<complexType name="KeywordType">
  <simpleContent>
    <extension base="mpeg7:TextualType">
      <attribute name="type" use="optional" default="main">
        <simpleType>
          <restriction base="NMTOKEN">
            <enumeration value="main"/>
            <enumeration value="secondary"/>
            <enumeration value="other"/>
          </restriction>
        </simpleType>
      </attribute>
    </extension>
  </simpleContent>
</complexType>
<complexType name="GenreType">
  <complexContent>
    <extension base="tva:ControlledTermType">
      <attribute name="type" use="optional" default="main">
        <simpleType>
          <restriction base="string">
            <enumeration value="main"/>
            <enumeration value="secondary"/>
            <enumeration value="other"/>
          </restriction>
        </simpleType>
      </attribute>
    </extension>
  </complexContent>
</complexType>
<simpleType name="SynopsisLengthType">
  <restriction base="string">
    <enumeration value="short"/>
    <enumeration value="medium"/>
    <enumeration value="long"/>
  </restriction>
</simpleType>
<complexType name="SynopsisType">
  <simpleContent>
    <extension base="mpeg7:TextualType">
      <attribute name="length" type="tva:SynopsisLengthType" use="optional"/>
    </extension>
  </simpleContent>
</complexType>

```

```

</simpleContent>
</complexType>
<complexType name="ImageLocatorType">
  <complexContent>
    <extension base="mpeg7:ImageLocatorType">
      <sequence>
        <element name="CopyrightNotice" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<complexType name="TemporalSegmentLocatorType">
  <complexContent>
    <extension base="mpeg7:TemporalSegmentLocatorType">
      <sequence>
        <element name="CopyrightNotice" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- Replacement of mpeg7:TitleMediaType -->
<complexType name="TitleMediaType">
  <sequence>
    <element name="TitleImage" type="tva:ImageLocatorType" minOccurs="0"/>
    <element name="TitleVideo" type="tva:TemporalSegmentLocatorType" minOccurs="0"/>
    <element name="TitleAudio" type="tva:TemporalSegmentLocatorType" minOccurs="0"/>
  </sequence>
</complexType>
<simpleType name="segmentTypeType">
  <restriction base="string">
    <enumeration value="segment"/>
    <enumeration value="segmentgroup"/>
  </restriction>
</simpleType>
<complexType name="SegmentReferenceType">
  <attribute name="segmentType" type="tva:segmentTypeType" default="segment"/>
  <attribute name="ref" type="tva:TVAIDRefType" use="required"/>
</complexType>
<complexType name="RelatedMaterialType">
  <sequence>
    <element name="HowRelated" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="Format" type="tva:ControlledTermType" minOccurs="0"/>
    <choice>
      <element name="MediaLocator" type="mpeg7:MediaLocatorType"/>
      <element name="SegmentReference" type="tva:SegmentReferenceType"/>
    </choice>
    <element name="PromotionalText" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="PromotionalMedia" type="tva:TitleMediaType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="SourceMediaLocator" type="mpeg7:MediaLocatorType" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="CreditsItemType">
  <complexContent>
    <extension base="tva:TVAAGentType">
      <sequence>
        <element name="Character" type="mpeg7:PersonNameType" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="role" type="mpeg7:termReferenceType" use="required"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="CreditsListType">
  <sequence>
    <element name="CreditsItem" type="tva:CreditsItemType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="AwardType">

```

```

<sequence>
  <element name="Category" type="mpeg7:TextualType"/>
  <choice minOccurs="0">
    <element name="Nominee" type="tva:CreditsItemType"/>
    <element name="Recipient" type="tva:CreditsItemType"/>
  </choice>
</sequence>
</complexType>
<complexType name="AwardsListItemType">
  <sequence>
    <element name="Title" type="mpeg7:TextualType"/>
    <element name="Year" type="gYear"/>
    <element name="Award" type="tva:AwardType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="AwardsListType">
  <sequence>
    <element name="AwardsListItem" type="tva:AwardsListItemType" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="ShortTitleType">
  <simpleContent>
    <extension base="mpeg7:TitleType">
      <attribute name="length" type="unsignedShort" use="required"/>
    </extension>
  </simpleContent>
</complexType>
<complexType name="CaptionLanguageType">
  <simpleContent>
    <extension base="language">
      <attribute name="closed" type="boolean" use="optional" default="true"/>
      <attribute name="supplemental" type="boolean" use="optional" default="false"/>
      <attribute name="description" type="string" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<complexType name="SignLanguageType">
  <simpleContent>
    <extension base="language">
      <attribute name="primary" type="boolean" use="optional"/>
      <attribute name="translation" type="boolean" use="optional"/>
      <attribute name="type" type="string" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<complexType name="CreationCoordinatesType">
  <sequence>
    <element name="CreationDate" type="tva:TVATimeType" minOccurs="0"/>
    <element name="CreationLocation" type="mpeg7:regionCode" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="DepictedCoordinatesType">
  <sequence>
    <element name="DepictedDate" type="tva:TVATimeType" minOccurs="0"/>
    <element name="DepictedLocation" type="mpeg7:PlaceType" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="ReleaseDateType">
  <choice>
    <element name="DayAndYear" type="date"/>
    <element name="Year" type="gYear"/>
  </choice>
</complexType>
<complexType name="ReleaseInformationType">
  <sequence>
    <element name="ReleaseDate" type="tva:ReleaseDateType" minOccurs="0"/>
    <element name="ReleaseLocation" type="mpeg7:regionCode" minOccurs="0"/>
  </sequence>

```

```

</sequence>
</complexType>
<complexType name="PurchaseItemType">
  <sequence>
    <element name="Price" maxOccurs="unbounded">
      <complexType>
        <simpleContent>
          <extension base="string">
            <attribute name="currency" type="tva:currencyCodeType" use="required"/>
          </extension>
        </simpleContent>
      </complexType>
    </element>
    <element name="Purchase" minOccurs="0" maxOccurs="unbounded">
      <complexType>
        <sequence>
          <element name="PurchaseType" type="tva:ControlledTermType" minOccurs="0"/>
          <element name="QuantityUnit" type="tva:ControlledTermType" minOccurs="0"/>
          <element name="QuantityRange" minOccurs="0">
            <complexType>
              <attribute name="min" type="unsignedInt" use="optional"/>
              <attribute name="max" type="unsignedInt" use="optional"/>
            </complexType>
          </element>
        </sequence>
      </complexType>
    </element>
    <element name="Description" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="PricingServerURL" type="anyURI" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="start" type="dateTime" use="optional"/>
  <attribute name="end" type="dateTime" use="optional"/>
</complexType>
<complexType name="PurchaseListType">
  <sequence>
    <choice minOccurs="0" maxOccurs="unbounded">
      <element name="PurchaseItem" type="tva:PurchaseItemType"/>
      <element name="PurchaseIdRef" type="tva:TVAIDRefType"/>
    </choice>
  </sequence>
</complexType>
<complexType name="PromotionalInformationType">
  <simpleContent>
    <extension base="mpeg7:TextualType">
      <attribute name="href" use="optional">
        <simpleType>
          <list itemType="mpeg7:termReferenceType"/>
        </simpleType>
      </attribute>
    </extension>
  </simpleContent>
</complexType>
<complexType name="BasicContentDescriptionType">
  <sequence>
    <element name="Title" type="mpeg7:TitleType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="MediaTitle" type="tva:TitleMediaType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ShortTitle" type="tva:ShortTitleType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="Synopsis" type="tva:SynopsisType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="PromotionalInformation" type="tva:PromotionalInformationType" minOccurs="0"
maxOccurs="unbounded"/>
    <element name="Keyword" type="tva:KeywordType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="Genre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ParentalGuidance" type="mpeg7:ParentalGuidanceType" minOccurs="0"
maxOccurs="unbounded"/>
    <element name="Language" type="mpeg7:ExtendedLanguageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="CaptionLanguage" type="tva:CaptionLanguageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="SignLanguage" type="tva:SignLanguageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>

```

```

    <element name="CreditsList" type="tva:CreditsListType" minOccurs="0"/>
    <element name="AwardsList" type="tva:AwardsListType" minOccurs="0"/>
    <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ProductionDate" type="tva:TVATimeType" minOccurs="0"/>
    <element name="ProductionLocation" type="mpeg7:regionCode" minOccurs="0" maxOccurs="unbounded"/>
    <element name="CreationCoordinates" type="tva:CreationCoordinatesType" minOccurs="0"
maxOccurs="unbounded"/>
    <element name="DepictedCoordinates" type="tva:DepictedCoordinatesType" minOccurs="0"
maxOccurs="unbounded"/>
    <element name="ReleaseInformation" type="tva:ReleaseInformationType" minOccurs="0"
maxOccurs="unbounded"/>
    <element name="Duration" type="duration" minOccurs="0"/>
    <element name="PurchaseList" type="tva:PurchaseListType" minOccurs="0"/>
  </sequence>
</complexType>
<annotation>
  <documentation xml:lang="en" >==== Section 6.3.5 AUDIO AND VIDEO INFORMATION </documentation>
</annotation>
<complexType name="BitRateType">
  <simpleContent>
    <extension base="nonNegativeInteger">
      <attribute name="variable" type="boolean" use="optional" default="false"/>
      <attribute name="minimum" type="unsignedLong" use="optional"/>
      <attribute name="average" type="unsignedLong" use="optional"/>
      <attribute name="maximum" type="unsignedLong" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<simpleType name="AudioChannelType">
  <restriction base="NMTOKEN">
    <enumeration value="main"/>
    <enumeration value="sub"/>
    <enumeration value="alternate"/>
    <enumeration value="other"/>
  </restriction>
</simpleType>
<complexType name="AudioLanguageType">
  <simpleContent>
    <extension base="mpeg7:ExtendedLanguageType">
      <attribute name="purpose" type="mpeg7:termReferenceType" use="optional"/>
      <attribute name="channel" type="tva:AudioChannelType" use="optional"/>
      <attribute name="description" type="string" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<simpleType name="StreamTypeType">
  <restriction base="NMTOKEN">
    <enumeration value="main"/>
    <enumeration value="sub"/>
    <enumeration value="alternate"/>
    <enumeration value="other"/>
  </restriction>
</simpleType>
<complexType name="StreamDescriptionType">
  <simpleContent>
    <extension base="mpeg7:TextualType">
      <attribute name="type" type="tva:StreamTypeType" use="optional"/>
      <attribute name="id" type="string" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<complexType name="AudioAttributesType">
  <sequence>
    <element name="Coding" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="NumOfChannels" type="unsignedShort" minOccurs="0"/>
    <element name="MixType" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="AudioLanguage" type="tva:AudioLanguageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>

```

```

    <element name="StreamDescription" type="tva:StreamDescriptionType" minOccurs="0"/>
    <element name="BitRate" type="tva:BitRateType" minOccurs="0"/>
    <element name="SamplingRate" type="nonNegativeInteger" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="VideoAttributesType">
  <sequence>
    <element name="Coding" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="Scan" type="tva:ScanType" minOccurs="0"/>
    <element name="HorizontalSize" type="unsignedShort" minOccurs="0"/>
    <element name="VerticalSize" type="unsignedShort" minOccurs="0"/>
    <element name="AspectRatio" type="tva:AspectRatioType" minOccurs="0" maxOccurs="2"/>
    <element name="Color" type="tva:ColorType" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="AVAttributesType">
  <sequence>
    <element name="FileFormat" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="FileSize" type="unsignedLong" minOccurs="0"/>
    <element name="System" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="BitRate" type="tva:BitRateType" minOccurs="0"/>
    <element name="AudioAttributes" type="tva:AudioAttributesType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="VideoAttributes" type="tva:VideoAttributesType" minOccurs="0"/>
  </sequence>
</complexType>
<simpleType name="ScanType">
  <restriction base="string">
    <enumeration value="interlaced"/>
    <enumeration value="progressive"/>
  </restriction>
</simpleType>
<simpleType name="ColorTypeType">
  <restriction base="string">
    <enumeration value="color"/>
    <enumeration value="blackAndWhite"/>
    <enumeration value="blackAndWhiteAndColor"/>
    <enumeration value="colorized"/>
  </restriction>
</simpleType>
<complexType name="ColorType">
  <attribute name="type" type="tva:ColorTypeType" use="required"/>
</complexType>
<simpleType name="RatioType">
  <restriction base="string">
    <pattern value="¥d+;¥d+"/>
  </restriction>
</simpleType>
<complexType name="AspectRatioType">
  <simpleContent>
    <extension base="tva:RatioType">
      <attribute name="type" use="optional" default="original">
        <simpleType>
          <restriction base="string">
            <enumeration value="original"/>
            <enumeration value="publication"/>
          </restriction>
        </simpleType>
      </attribute>
    </extension>
  </simpleContent>
</complexType>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.3.6 PROGRAMME INFORMATION </documentation>
</annotation>
<complexType name="AggregationOfType">
  <sequence>
    <element name="AggregatedProgram" type="tva:CRIDRefType" minOccurs="2" maxOccurs="unbounded"/>

```

```

</sequence>
<attribute name="type" use="required">
  <simpleType>
    <restriction base="string">
      <enumeration value="omnibus"/>
      <enumeration value="magazine"/>
    </restriction>
  </simpleType>
</attribute>
</complexType>
<simpleType name="PeriodTypeType">
  <restriction base="NMTOKEN">
    <enumeration value="display"/>
    <enumeration value="purchase"/>
    <enumeration value="premium"/>
    <enumeration value="new_arrival"/>
    <enumeration value="availability"/>
    <enumeration value="program"/>
  </restriction>
</simpleType>
<complexType name="PeriodType">
  <sequence>
    <element name="Start" type="dateTime"/>
    <choice maxOccurs="2">
      <element name="End" type="dateTime" minOccurs="0"/>
      <element name="Duration" type="duration" minOccurs="0"/>
    </choice>
  </sequence>
  <attribute name="type" type="tva:PeriodTypeType" use="optional"/>
</complexType>
<complexType name="ProgramInformationType">
  <sequence>
    <element name="BasicDescription" type="tva:BasicContentDescriptionType"/>
    <element name="OtherIdentifier" type="mpeg7:UniqueIDType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="AVAttributes" type="tva:AVAttributesType" minOccurs="0"/>
    <element name="MemberOf" type="tva:BaseMemberOfType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="DerivedFrom" type="tva:DerivedFromType" minOccurs="0"/>
    <element name="EpisodeOf" type="tva:EpisodeOfType" minOccurs="0"/>
    <element name="PartOfAggregatedProgram" type="tva:CRIDType" minOccurs="0"/>
    <element name="AggregationOf" type="tva:AggregationOfType" minOccurs="0"/>
    <element name="Period" type="tva:PeriodType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="programId" type="tva:CRIDType" use="required"/>
  <attributeGroup ref="tva:fragmentIdentification"/>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="EpisodeOfType">
  <complexContent>
    <extension base="tva:BaseMemberOfType"/>
  </complexContent>
</complexType>
<complexType name="BaseMemberOfType" abstract="true">
  <complexContent>
    <extension base="tva:CRIDRefType">
      <attribute name="index" type="unsignedInt" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="MemberOfType">
  <complexContent>
    <extension base="tva:BaseMemberOfType"/>
  </complexContent>
</complexType>
<complexType name="BaseDerivationReasonType" abstract="true"/>
<complexType name="DerivationReasonType">
  <complexContent>

```

```

<extension base="tva:BaseDerivationReasonType">
  <attribute name="value" use="required">
    <simpleType>
      <restriction base="string">
        <enumeration value="violence"/>
        <enumeration value="language"/>
        <enumeration value="sex"/>
        <enumeration value="duration"/>
        <enumeration value="other"/>
      </restriction>
    </simpleType>
  </attribute>
</extension>
</complexContent>
</complexType>
<complexType name="DerivedFromType">
  <complexContent>
    <extension base="tva:BaseMemberOfType">
      <sequence>
        <element name="DerivationReason" type="tva:BaseDerivationReasonType" minOccurs="0"
maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.3.7 GROUP INFORMATION </documentation>
</annotation>
<complexType name="BaseProgramGroupTypeType" abstract="true"/>
<complexType name="ProgramGroupTypeType">
  <complexContent>
    <extension base="tva:BaseProgramGroupTypeType">
      <attribute name="value" use="required">
        <simpleType>
          <restriction base="string">
            <enumeration value="series"/>
            <enumeration value="show"/>
            <enumeration value="programConcept"/>
            <enumeration value="programCompilation"/>
            <enumeration value="otherCollection"/>
            <enumeration value="otherChoice"/>
            <enumeration value="single"/>
            <enumeration value="pack"/>
            <enumeration value="select"/>
            <enumeration value="subscription"/>
            <enumeration value="package"/>
          </restriction>
        </simpleType>
      </attribute>
    </extension>
  </complexContent>
</complexType>
<complexType name="GroupInformationType">
  <sequence>
    <element name="GroupType" type="tva:BaseProgramGroupTypeType"/>
    <element name="BasicDescription" type="tva:BasicContentDescriptionType"/>
    <element name="MemberOf" type="tva:BaseMemberOfType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="OtherIdentifier" type="mpeg7:UniqueIDType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="Period" type="tva:PeriodType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="groupId" type="tva:CRIDType" use="required"/>
  <attribute name="ordered" type="boolean" use="optional" default="false"/>
  <attribute name="numOfItems" type="unsignedInt" use="optional"/>
  <attributeGroup ref="tva:fragmentIdentification"/>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>

```

```

<annotation>
  <documentation xml:lang="en"> ===== Section 6.3.8 MEDIA REVIEW DS </documentation>
</annotation>
<complexType name="ReviewerType">
  <complexContent>
    <extension base="tva:TVAAgentType">
      <sequence>
        <element name="Publication" type="mpeg7:TextualType" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<complexType name="MediaReviewType">
  <sequence>
    <element name="Rating" type="mpeg7:RatingType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="FreeTextReview" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="Reviewer" type="tva:ReviewerType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ReviewReference" type="anyURI" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="ReviewType">
  <complexContent>
    <extension base="tva:MediaReviewType">
      <attribute name="programId" type="tva:CRIDType" use="required"/>
      <attributeGroup ref="tva:fragmentIdentification"/>
      <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
      <attribute ref="xml:lang" use="optional" default="en"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="ProgramReviewTableType">
  <sequence>
    <element name="Review" type="tva:ReviewType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.4.2 PROGRAM LOCATION </documentation>
</annotation>
<simpleType name="InstanceMetadataIdType">
  <restriction base="anyURI">
    <pattern value="(i | I)(m | M)(i | I):(([/+])?([/+] +))"/>
  </restriction>
</simpleType>
<complexType name="ProgramLocationType" abstract="true">
  <sequence>
    <element name="Program" type="tva:CRIDRefType"/>
    <element name="ProgramURL" type="anyURI" minOccurs="0"/>
    <element name="InstanceMetadataId" type="tva:InstanceMetadataIdType" minOccurs="0"/>
    <element name="InstanceDescription" type="tva:InstanceDescriptionType" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="OutputRestrictionType">
  <sequence>
    <element name="Port" type="tva:ControlledTermType"/>
    <element name="Mode" type="tva:ControlledTermType"/>
  </sequence>
</complexType>
<complexType name="ExportRestrictionType">
  <sequence>
    <element name="ExportMedia" type="tva:ControlledTermType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ExportCountsLimit" type="integer"/>
  </sequence>
</complexType>
<complexType name="ScheduleType">
  <sequence>

```

```

    <element name="ScheduleEvent" type="tva:ScheduleEventType" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="serviceIDRef" type="tva:TVAIDRefType" use="required"/>
  <attribute name="start" type="dateTime" use="optional"/>
  <attribute name="end" type="dateTime" use="optional"/>
  <attributeGroup ref="tva:fragmentIdentification"/>
  <attribute name="metadataOriginIDRef" use="optional" default="en"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="ScheduleEventType">
  <complexContent>
    <extension base="tva:ProgramLocationType">
      <sequence>
        <element name="PublishedStartTime" type="dateTime" minOccurs="0"/>
        <element name="PublishedEndTime" type="dateTime" minOccurs="0"/>
        <element name="PublishedDuration" type="duration" minOccurs="0"/>
        <element name="Live" type="tva:FlagType" minOccurs="0"/>
        <element name="Repeat" type="tva:FlagType" minOccurs="0"/>
        <element name="FirstShowing" type="tva:FlagType" minOccurs="0"/>
        <element name="LastShowing" type="tva:FlagType" minOccurs="0"/>
        <element name="Free" type="tva:FlagType" minOccurs="0"/>
      </sequence>
      <attributeGroup ref="tva:fragmentIdentification"/>
      <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
      <attribute ref="xml:lang" use="optional" default="en"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="BroadcastEventType">
  <complexContent>
    <extension base="tva:ScheduleEventType">
      <attribute name="serviceIDRef" type="tva:TVAIDRefType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="OnDemandProgramType">
  <complexContent>
    <extension base="tva:ProgramLocationType">
      <sequence>
        <element name="PublishedDuration" type="duration" minOccurs="0"/>
        <element name="StartOfAvailability" type="dateTime" minOccurs="0"/>
        <element name="EndOfAvailability" type="dateTime" minOccurs="0"/>
        <element name="FirstAvailability" type="tva:FlagType" minOccurs="0"/>
        <element name="LastAvailability" type="tva:FlagType" minOccurs="0"/>
        <element name="ImmediateViewing" type="tva:FlagType" minOccurs="0"/>
      </sequence>
      <attributeGroup ref="tva:fragmentIdentification"/>
      <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
      <attribute ref="xml:lang" use="optional" default="en"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="OnDemandServiceType">
  <sequence>
    <element name="OnDemandProgram" type="tva:OnDemandProgramType" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="serviceIDRef" type="tva:TVAIDRefType" use="required"/>
  <attributeGroup ref="tva:fragmentIdentification"/>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="InstanceDescriptionType">
  <sequence>
    <element name="Title" type="mpeg7:TitleType" minOccurs="0"/>
    <element name="Synopsis" type="tva:SynopsisType" minOccurs="0"/>
    <element name="Genre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="PurchaseList" type="tva:PurchaseListType" minOccurs="0"/>
  </sequence>

```

```

    <element name="AVAttributes" type="tva:AVAttributesType" minOccurs="0"/>
    <element name="MemberOf" type="tva:BaseMemberOfType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="OutputRestriction" type="tva:OutputRestrictionType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.4.3 SERVICE INFORMATION </documentation>
</annotation>
<simpleType name="ServiceInformationNameLengthType">
  <restriction base="string">
    <enumeration value="short"/>
    <enumeration value="medium"/>
    <enumeration value="long"/>
  </restriction>
</simpleType>
<complexType name="ServiceInformationNameType">
  <simpleContent>
    <extension base="mpeg7:TextualType">
      <attribute name="length" type="tva:ServiceInformationNameLengthType" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<complexType name="ValidPeriodType">
  <sequence>
    <element name="ValidFrom" type="dateTime" minOccurs="0"/>
    <element name="ValidTo" type="dateTime" minOccurs="0"/>
  </sequence>
</complexType>
<complexType name="ServiceRefType">
  <sequence>
    <element name="ValidPeriod" type="tva:ValidPeriodType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="serviceIDRef" type="tva:TVAIDRefType" use="required"/>
</complexType>
<complexType name="ServiceInformationType">
  <sequence>
    <element name="Name" type="tva:ServiceInformationNameType" maxOccurs="unbounded"/>
    <element name="Owner" type="string" minOccurs="0"/>
    <element name="ServiceURL" type="anyURI" minOccurs="0"/>
    <element name="Logo" type="mpeg7:MediaLocatorType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ServiceDescription" type="tva:SynopsisType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ServiceGenre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ServiceLanguage" type="language" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ParentService" type="tva:ServiceRefType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="serviceId" type="tva:TVAIDType" use="required"/>
  <attributeGroup ref="tva:fragmentIdentification"/>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.5 CONSUMER METADATA (mostly imported from
MPEG-7; see MPEG7_tva.xsd) </documentation>
</annotation>
<complexType name="UserActionType">
  <complexContent>
    <extension base="mpeg7:UserActionType">
      <sequence>
        <element name="ProgramLocation" type="anyURI" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.6 SEGMENTATION METADATA </documentation>
</annotation>
<complexType name="BasicSegmentDescriptionType">

```

```

<sequence>
  <element name="Title" type="mpeg7:TitleType" minOccurs="0" maxOccurs="unbounded"/>
  <element name="Synopsis" type="tva:SynopsisType" minOccurs="0" maxOccurs="unbounded"/>
  <element name="Genre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
  <element name="Keyword" type="tva:KeywordType" minOccurs="0" maxOccurs="unbounded"/>
  <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
  <element name="CreditsList" type="tva:CreditsListType" minOccurs="0"/>
</sequence>
</complexType>
<complexType name="TVAMediaRelIncrTimePointType">
  <simpleContent>
    <restriction base="mpeg7:MediaRelIncrTimePointType">
      <attribute name="mediaTimeUnit" type="mpeg7:mediaDurationType" use="optional" default="PT1N1000F"/>
    </restriction>
  </simpleContent>
</complexType>
<complexType name="TVAMediaTimeType">
  <sequence>
    <choice>
      <element name="MediaRelTimePoint" type="mpeg7:MediaRelTimePointType"/>
      <element name="MediaRelIncrTimePoint" type="tva:TVAMediaRelIncrTimePointType"/>
    </choice>
    <choice minOccurs="0">
      <element name="MediaDuration" type="mpeg7:mediaDurationType"/>
      <element name="MediaIncrDuration" type="mpeg7:MediaIncrDurationType"/>
    </choice>
  </sequence>
</complexType>
<complexType name="TimeBaseReferenceType">
  <sequence>
    <choice>
      <element name="MediaTimePoint" type="mpeg7:mediaTimePointType"/>
      <element name="MediaRelIncrTimePoint" type="mpeg7:MediaRelIncrTimePointType"/>
    </choice>
  </sequence>
  <attribute name="timebaseId" type="string"/>
</complexType>
<complexType name="SegmentInformationType">
  <sequence>
    <element name="ProgramRef" type="tva:CRIDRefType" minOccurs="0"/>
    <element name="TimeBaseReference" type="tva:TimeBaseReferenceType" minOccurs="0"/>
    <element name="Description" type="tva:BasicSegmentDescriptionType" minOccurs="0"/>
    <element name="SegmentLocator" type="tva:TVAMediaTimeType"/>
    <element name="KeyFrameLocator" type="tva:TVAMediaTimeType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="segmentId" type="tva:TVAIDType" use="required"/>
  <attributeGroup ref="tva:fragmentIdentification"/>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="GroupIntervalType">
  <attribute name="ref" type="tva:TVAIDRefType" use="optional"/>
</complexType>
<complexType name="SegmentsType">
  <attribute name="refList" type="tva:TVAIDRefsType" use="required"/>
</complexType>
<complexType name="GroupsType">
  <attribute name="refList" type="tva:TVAIDRefsType" use="required"/>
</complexType>
<complexType name="SegmentGroupInformationType">
  <sequence>
    <element name="ProgramRef" type="tva:CRIDRefType"/>
    <element name="TimeBaseReference" type="tva:TimeBaseReferenceType" minOccurs="0"/>
    <element name="GroupType" type="tva:BaseSegmentGroupTypeType" maxOccurs="unbounded"/>
    <element name="Description" type="tva:BasicSegmentDescriptionType" minOccurs="0"/>
    <element name="GroupInterval" type="tva:GroupIntervalType" minOccurs="0"/>
    <choice minOccurs="0">

```

```

    <element name="Segments" type="tva:SegmentsType"/>
    <element name="Groups" type="tva:GroupsType"/>
</choice>
    <element name="KeyFrameLocator" type="tva:TVAMediaTimeType" minOccurs="0" maxOccurs="unbounded"/>
</sequence>
<attribute name="groupId" type="tva:TVAIDType" use="required"/>
<attribute name="ordered" type="boolean" use="optional" default="true"/>
<attribute name="numberOfSegments" type="unsignedShort" use="optional"/>
<attribute name="numberOfKeyFrames" type="unsignedShort" use="optional"/>
<attribute name="duration" type="mpeg7:mediaDurationType" use="optional"/>
<attribute name="topLevel" type="boolean" use="optional"/>
<attributeGroup ref="tva:fragmentIdentification"/>
<attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
<attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="BaseSegmentGroupTypeType" abstract="true"/>
<complexType name="SegmentGroupTypeType">
    <complexContent>
        <extension base="tva:BaseSegmentGroupTypeType">
            <attribute name="value" use="required">
                <simpleType>
                    <restriction base="string">
                        <enumeration value="highlights"/>
                        <enumeration value="highlights/objects"/>
                        <enumeration value="highlights/events"/>
                        <enumeration value="bookmarks"/>
                        <enumeration value="bookmarks/objects"/>
                        <enumeration value="bookmarks/events"/>
                        <enumeration value="themeGroup"/>
                        <enumeration value="preview"/>
                        <enumeration value="preview/title"/>
                        <enumeration value="preview/slideshow"/>
                        <enumeration value="tableOfContents"/>
                        <enumeration value="synopsis"/>
                        <enumeration value="shots"/>
                        <enumeration value="insertionPoints"/>
                        <enumeration value="alternativeGroups"/>
                        <enumeration value="other"/>
                    </restriction>
                </simpleType>
            </attribute>
        </extension>
    </complexContent>
</complexType>
<complexType name="SegmentListType">
    <sequence>
        <element name="SegmentInformation" type="tva:SegmentInformationType" minOccurs="0"
maxOccurs="unbounded"/>
    </sequence>
</complexType>
<complexType name="SegmentGroupListType">
    <sequence>
        <element name="SegmentGroupInformation" type="tva:SegmentGroupInformationType" minOccurs="0"
maxOccurs="unbounded"/>
    </sequence>
</complexType>
<complexType name="SegmentInformationTableType">
    <sequence>
        <element name="SegmentList" type="tva:SegmentListType" minOccurs="0"/>
        <element name="SegmentGroupList" type="tva:SegmentGroupListType"/>
    </sequence>
    <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
    <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<annotation>
    <documentation xml:lang="en"> ===== Section 6.7.1 INFORMATION TABLES </documentation>
</annotation>

```

```

<complexType name="ProgramInformationTableType">
  <sequence>
    <element name="ProgramInformation" type="tva:ProgramInformationType" minOccurs="0"
maxOccurs="unbounded"/>
  </sequence>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="GroupInformationTableType">
  <sequence>
    <element name="GroupInformation" type="tva:GroupInformationType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="ProgramLocationTableType">
  <sequence>
    <element name="Schedule" type="tva:ScheduleType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="BroadcastEvent" type="tva:BroadcastEventType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="OnDemandProgram" type="tva:OnDemandProgramType" minOccurs="0"
maxOccurs="unbounded"/>
    <element name="OnDemandService" type="tva:OnDemandServiceType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="ServiceInformationTableType">
  <sequence>
    <element name="ServiceInformation" type="tva:ServiceInformationType" minOccurs="0"
maxOccurs="unbounded"/>
  </sequence>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="TVAPersonNameType">
  <complexContent>
    <extension base="mpeg7:PersonNameType">
      <attribute name="personNameId" type="tva:TVAIDType" use="required"/>
      <attributeGroup ref="tva:fragmentIdentification"/>
      <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="OrganizationNameType">
  <simpleContent>
    <extension base="mpeg7:TextualType">
      <attribute name="organizationNameId" type="tva:TVAIDType" use="required"/>
      <attributeGroup ref="tva:fragmentIdentification"/>
      <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<complexType name="CreditsInformationTableType">
  <sequence>
    <choice minOccurs="0" maxOccurs="unbounded">
      <element name="PersonName" type="tva:TVAPersonNameType"/>
      <element name="OrganizationName" type="tva:OrganizationNameType"/>
      <element name="CreditsItem" type="tva:CreditsItemType" minOccurs="0" maxOccurs="unbounded"/>
    </choice>
  </sequence>
  <attribute name="meatdataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="PurchaseInformationType">
  <complexContent>
    <extension base="tva:PurchaseItemType">
      <sequence>

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        <element name="CRIDRef" type="tva:CRIDRefType" minOccurs="0"/>
    </sequence>
    <attribute name="purchaseId" type="tva:TVAIDType" use="required"/>
    <attributeGroup ref="tva:fragmentIdentification"/>
    <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
</extension>
</complexContent>
</complexType>
<complexType name="PurchaseInformationTableType">
    <sequence>
        <element name="PurchaseInformation" type="tva:PurchaseInformationType" minOccurs="0"
maxOccurs="unbounded"/>
    </sequence>
    <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
    <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="LicenseInformationType">
    <sequence>
        <element name="LicenseID" type="tva:TVAIDType"/>
        <element name="LicenseType">
            <simpleType>
                <restriction base="string">
                    <enumeration value="VoD"/>
                    <enumeration value="Download"/>
                    <enumeration value="Export"/>
                </restriction>
            </simpleType>
        </element>
        <element name="LicenseTypeExtension" minOccurs="0">
            <simpleType>
                <restriction base="string">
                    <enumeration value="Updatable"/>
                    <enumeration value="PeriodExtendable"/>
                </restriction>
            </simpleType>
        </element>
        <element name="ProgramCRID" type="tva:CRIDRefType"/>
    </choice>
    <choice>
        <element name="PurchaseIDRef" type="tva:TVAIDRefType" minOccurs="0"/>
        <element name="GroupCRID" type="tva:CRIDRefType" minOccurs="0"/>
    </choice>
    <element name="RMPIDescription">
        <complexType>
            <sequence>
                <element name="TextualDescription" type="string" minOccurs="0" maxOccurs="unbounded"/>
            </sequence>
            <sequence>
                <element name="PlayCountsLimit" type="integer" minOccurs="0"/>
                <element name="ValidityIntervalStart" type="dateTime" minOccurs="0"/>
                <element name="ValidityIntervalEnd" type="dateTime" minOccurs="0"/>
                <element name="ValidityIntervalAfterFirstUse" type="duration" minOccurs="0"/>
                <element name="ValidityInterval" type="duration" minOccurs="0"/>
                <element name="TrickPlayEnabled" type="boolean" minOccurs="0"/>
                <element name="OutputRestriction" type="tva:OutputRestrictionType" minOccurs="0"
maxOccurs="unbounded"/>
                <element name="ExportRestriction" type="tva:ExportRestrictionType" minOccurs="0"
maxOccurs="unbounded"/>
                <element name="ChargeOption" minOccurs="0">
                    <complexType>
                        <sequence>
                            <sequence>
                                <element name="ChargeMessage" type="string" minOccurs="0"/>
                            </sequence>
                        </sequence>
                        <attribute name="Timing" use="required">
                            <simpleType>
                                <restriction base="string">
                                    <enumeration value="BeforeDownloading"/>
                                    <enumeration value="BeforeUse"/>
                                </restriction>
                            </simpleType>
                        </attribute>
                    </complexType>
                </element>
            </sequence>
        </complexType>
    </element>

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        </simpleType>
      </attribute>
    </complexType>
  </element>
</sequence>
</sequence>
</complexType>
</element>
</sequence>
<attributeGroup ref="tva:fragmentIdentification"/>
<attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
<attribute ref="xml:lang" use="optional"/>
</complexType>
<complexType name="LicenseInformationTableType">
  <sequence>
    <element name="LicenseInformation" type="tva:LicenseInformationType" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
  <attribute ref="xml:lang" use="optional"/>
</complexType>
<element name="TVAContentLinks">
  <complexType>
    <sequence>
      <element name="RelatedMaterial" type="tva:RelatedMaterialType" maxOccurs="unbounded"/>
    </sequence>
  </complexType>
</element>
<annotation>
  <documentation xml:lang="en"> ===== Section 6.7.2 TV-ANYTIME PROGRAM INFORMATION DOCUMENT
</documentation>
</annotation>
<element name="TVAMain" type="tva:TVAMainType"/>
<complexType name="TVAMainType">
  <sequence>
    <element name="CopyrightNotice" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="MetadataOriginationInformationTable" type="tva:MetadataOriginationInformationTableType"
minOccurs="0"/>
    <element name="ClassificationSchemeTable" type="tva:ClassificationSchemeTableType" minOccurs="0"/>
    <element name="ProgramDescription" type="tva:ProgramDescriptionType" minOccurs="0"/>
    <element name="UserDescription" type="tva:UserDescriptionType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute ref="xml:lang" use="required"/>
  <attribute name="publisher" type="string" use="optional"/>
  <attribute name="publicationTime" type="dateTime" use="optional"/>
  <attribute name="rightsOwner" type="string" use="optional"/>
  <attribute name="originID" type="tva:TVAIDType" use="optional"/>
  <attribute name="version" type="unsignedInt" use="optional"/>
</complexType>
<complexType name="MetadataOriginationInformationType">
  <sequence>
    <element name="Publisher" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="RightsOwner" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="CopyrightNotice" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="originID" type="tva:TVAIDType" use="required"/>
  <attribute name="fragmentId" type="tva:TVAIDType" use="optional"/>
  <attribute name="fragmentVersion" type="unsignedLong" use="optional"/>
  <attribute ref="xml:lang" use="optional"/>
</complexType>
<complexType name="MetadataOriginationInformationTableType">
  <sequence>
    <element name="MetadataOriginationInformation" type="tva:MetadataOriginationInformationType"
minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute ref="xml:lang" use="optional" default="en"/>
</complexType>
<complexType name="UserDescriptionType">

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    <sequence>
      <element name="UserPreferences" type="mpeg7:UserPreferencesType" minOccurs="0"/>
      <element name="UsageHistory" type="mpeg7:UsageHistoryType" minOccurs="0"/>
    </sequence>
  </complexType>
  <complexType name="CSAliasType">
    <complexContent>
      <extension base="mpeg7:ClassificationSchemeAliasType">
        <attributeGroup ref="tva:fragmentIdentification"/>
        <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
      </extension>
    </complexContent>
  </complexType>
  <complexType name="ClassificationSchemeType">
    <complexContent>
      <extension base="mpeg7:ClassificationSchemeType">
        <attributeGroup ref="tva:fragmentIdentification"/>
        <attribute name="metadataOriginIDRef" type="tva:TVAIDRefType" use="optional"/>
        <attribute ref="xml:lang" use="optional" default="en"/>
      </extension>
    </complexContent>
  </complexType>
  <complexType name="ClassificationSchemeTableType">
    <sequence>
      <element name="CSAlias" type="tva:CSAliasType" minOccurs="0" maxOccurs="unbounded"/>
      <element name="ClassificationScheme" type="tva:ClassificationSchemeType" minOccurs="0"
maxOccurs="unbounded"/>
    </sequence>
    <attribute ref="xml:lang" use="optional" default="en"/>
  </complexType>
  <complexType name="ProgramDescriptionType">
    <sequence>
      <element name="ProgramInformationTable" type="tva:ProgramInformationTableType" minOccurs="0"/>
      <element name="GroupInformationTable" type="tva:GroupInformationTableType" minOccurs="0"/>
      <element name="ProgramLocationTable" type="tva:ProgramLocationTableType" minOccurs="0"/>
      <element name="ServiceInformationTable" type="tva:ServiceInformationTableType" minOccurs="0"/>
      <element name="CreditsInformationTable" type="tva:CreditsInformationTableType" minOccurs="0"/>
      <element name="ProgramReviewTable" type="tva:ProgramReviewTableType" minOccurs="0"/>
      <element name="SegmentInformationTable" type="tva:SegmentInformationTableType" minOccurs="0"/>
      <element name="PurchaseInformationTable" type="tva:PurchaseInformationTableType" minOccurs="0"/>
      <element name="LicenseInformationTable" type="tva:LicenseInformationTableType" minOccurs="0"/>
    </sequence>
  </complexType>
</schema>

```

## [Appendix F] Specifications on Operation of Phonetic Reading of Title Element in ECG

### Metadata

The service providers can specify search keys and sort keys for the title of the content using the Title element in which the @type attribute is "alternative".

Furigana is comprised of a name and episode number and operated in the following way.

A. The name is written using "full-width katakana".

(Example: CAB NY "キャブニューヨーク", 23 "トゥエンティースリー")

B. The episode number is an option. When the episode number is used, it is desirable to enter a half-size space after the name followed by a 2-digit half-size number.

(Example: Mimin Episode 1 - "ミーミン 01", Final episode of Kinosenchi Kuntam NEED - "キノウセンシカントムニード 50". \*"キノウセンシ" can be omitted, and "カントム" can be specified as furigana. )

## [Appendix G] Guidelines on Recommended Behavior of Receivers and Message Examples

Table Appendix- 6 shows recommended behavior of receivers and message examples.

Items with "\*" to the right of the "Code" field indicate the specifications are optional.

Table Appendix- 6 Assumed Receiver Behavior and Message Examples

Code	Large classification	Middle classification (required level)	Small classification (optional level)	Assumed cause	Assumed receiver behavior	Error message example	Operation specification reference
IP 1000	Network Connection	Network connection error	Common		Display a message to prompt the user to take action.	"Unable connect to the network"	
IP 1001			Link-up error	Receiver cable connection defect, receiver network module failure, HGW/ONU failure		"LAN cable is not connected" "Unable connect to the network"	CDN Scope Service Approach Specifications 5.2.1 Service Entry Overview (1) Link-layer connection phase
IP 1002			IP address acquisition error (IPv6)	Manual address setting error, CDN contract/access network defect, router failure (NDP error)		"Unable to obtain IP address" "Unable connect to the network"	CDN Scope Service Approach Specifications 5.2.1 Service Entry Overview (2) NW connection phase
IP 1003			IP address acquisition error (IPv4)	Manual address setting error, HGW failure, DHCP server failure			CDN Scope Service Approach Specifications 5.2.1 Service Entry Overview (2) NW connection phase
IP 1004			DNS address acquisition error	DHCPv6 server failure (DHCPv4 server failure)			CDN Scope Service Approach Specifications 4.1.4.2 Connecting to IPv4 network 4.1.4.3 Connecting to IPv6 network 5.2.1 Service Entry Overview (3) Service parameter acquisition phase
IP 1005			IP address acquisition error (IPv4/IPv6)	Manual address setting error, HGW failure, DHCP server failure, CDN contract/access network defect, router failure (NDP error), DHCPv6 server error	Display a message to prompt the user to take action.	"Unable to obtain IP address" "Unable connect to the network"	CDN Scope Service Approach Specifications 5.2.1 Service Entry Overview (2) NW connection phase

IP 1008			UPnP error	UPnP server failure/temporary congestion on the HGW side	Perform a certain number (regularly) of UPnP setup (device detection. If the device is not detected, the receiver behaves assuming there is no HGW (NAT traversal)).	None	CDN Scope Service Approach Specifications [Appendix H]
IP 1009			Other		Display a message to prompt the user to take action.	"Unable to obtain IP address" "Unable connect to the network"	
IP 1110	Initial information acquisition	CDN configuration information server error		Network connection NG, DNS server failure, CDN server down	For the first access, display a message to prompt the user to take action. For the second access and on, the behavior is implementation dependent.	"Unable to obtain part of the information required to use the service." "Unable to user the service due to an initial information acquisition error."	CDN Scope Service Approach Specifications 5.2.2 Getting CDN Configuration Information
IP 1111			No DNS record for CDN configuration information server				CDN Scope Service Approach Specifications 5.2.2 Getting CDN Configuration Information
IP 1120		CDN configuration information communication error	Common				CDN Scope Service Approach Specifications 5.2.2 Getting CDN Configuration Information
IP 1121			Server error (500 status)	CDN configuration information server failure			CDN Scope Service Approach Specifications 5.2.2 Getting CDN Configuration Information
IP 1122			The configuration information file not found (404 status)	CDN configuration information file allocation failure			CDN Scope Service Approach Specifications 5.2.2 Getting CDN Configuration Information
IP 1129			Other				CDN Scope Service Approach Specifications 5.2.2 Getting CDN Configuration Information
IP 1130			CDN configuration information server busy (503 status)				Excessive server access
IP 1140		CDN configuration information data error		Inputting error, inadequate production system check	For the first access, display a message to prompt the user to take action. For the second access and on, the action is implementation dependent. Basically, no action is required. It is desirable that all obtained data is discarded.	"Unable to obtain part of the information required to use the service." "Unable to user the service due to an initial information acquisition error."	CDN Scope Service Approach Specifications 5.1.1 CDN Configuration Information File 5.2.2 Getting CDN Configuration Information

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IP 1210		PF configuration information server connection error		DNS server failure, PF configuration information server down, network failure, network disconnection, incorrect URL information	If required, perform the PF configuration information acquisition process for PF other than the one where an error occurred. The following action is taken for the configuration information for the PF where an error occurred. For the first access, display a message to prompt the user to take action. For the second access and on, the action is implementation dependent.	"Unable to obtain part of the information required to use the service." "Unable to user the (PF name) service due to an initial information acquisition error."	CDN Scope Service Approach Specifications 5.2.3 Getting PF Configuration Information
IP 1220		PF configuration information server communication error	Common				CDN Scope Service Approach Specifications 5.2.3 Getting PF Configuration Information
IP 1221	Server error (500 status)		Server failure	CDN Scope Service Approach Specifications 5.2.3 Getting PF Configuration Information			
IP 1222	The configuration information file not found (404 status)		PF configuration information file allocation failure	CDN Scope Service Approach Specifications 5.2.3 Getting PF Configuration Information			
IP 1229	Other						
IP 1230		PF configuration information server busy (503 status)		Excessive server access	Retry. The behavior when retry-over occurs is the same as above. (However, it is recommended that retry is not performed for the first access.)	"Unable to obtain part of the information required to use the service due to traffic congestion on the server."	CDN Scope Service Approach Specifications 5.2.3 Getting PF Configuration Information
IP 1240		PF configuration information data error		Inputting error, inadequate production system check	If required, perform the PF configuration information acquisition process for PF other than the one where an error occurred. The following action is taken for the configuration information for the PF where an error occurred. For the first access, display a message to prompt the user to take action. For the second access and on, the action is implementation dependent. It is desirable to discard all configuration information of the PF where an error occurred.	"Unable to obtain part of the information required to use the service."	CDN Scope Service Approach Specifications 5.1.2 PF Configuration Information File 5.2.3 Getting PF Configuration Information
IP 1310	*	Logo data server connection error		DNS server failure, logo server down, network failure, network disconnection, incorrect URL information	No special action is required.	—	CDN Scope Service Approach Specifications 5.4.5 Getting Logo Data
IP 1320	*	Logo data server communication error	Common			—	CDN Scope Service Approach Specifications 5.4.5 Getting Logo Data
IP 1321	*		Server error (500 status)	Server failure			CDN Scope Service Approach Specifications 5.4.5 Getting Logo Data

IP 1322	*			The logo ID management file/logo data file not found (404 status)	Incorrect logo ID management file/logo data file. The logo ID management file/logo data file does not exist.		—	CDN Scope Service Approach Specifications 5.4.5 Getting Logo Data
IP 1329	*			Other			—	CDN Scope Service Approach Specifications 5.4.5 Getting Logo Data
IP 1330	*		Logo data server busy (503 status)			Retry. The behavior when retry-over occurs is implementation dependent after the second retry. Basically, no action is required.	—	CDN Scope Service Approach Specifications 5.4.5 Getting Logo Data
IP 1340	*		Logo ID management data error		Inputting error, inadequate production system check	For an error concerning the entire logo data, the logo data should not be obtained. For an error concerning part of the logo data, obtainable logo data may be acquired/stored.	—	CDN Scope Service Approach Specifications 5.4.4 Specifications for Logo ID Management File 5.4.5 Getting Logo Data
IP 1400			SNTP time acquisition error		DNS server failure, SNTP server down, network failure, network disconnection, incorrect URL information, incorrect data format	Implementation dependent. It is desirable to provide other means to set time in the receiver if required.	—	CDN Scope Service Approach Specifications 2.3.1.13 SNTP Server
IP 1510			SI stream reception disabled		SI server failure, network failure, network disconnection, excessive edge router access, incorrect MC address information, QoS degradation	If required, perform the SI stream acquisition process for PF other than the one where an error occurred. For the SI stream of the PF with an error, the subtable with an error is obtained by the following retransmission. It is desirable to display a message prompt the user to take action when NIT/BIT cannot be replaced soon in the first access. The behavior of the receiver when it takes a long time to obtain entire data due to temporary bandwidth shortage, etc. is implementation dependent.	"Unable to obtain part of the information required to use IP broadcasting services."	CDN Scope Service Approach Specifications 5.1.2 PF Configuration Information File 5.2.3 PF Configuration Information IP Broadcasting Specifications 3.2.9 EPG
IP 1530			SI stream data error		Inputting error, inadequate production system check	Implementation dependent. Basically, the receiver can discard subtables with an error and store/use the valid information from the obtained SI information. Display a message If required.	"Unable to obtain part of the information required to use IP broadcasting services."	IP Broadcasting Specifications 7.8 Commonly Operated SI and Individually Operated SI

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IP 2000	IP broadcasting playback	Stream reception failure	Common (including temporal reception failure and deterioration of communication quality)	RTP server failure, network failure, network disconnection, access network bandwidth shortage, excessive edge router access	Display a message to notify the user. The behavior after this, whether to return to the channel displayed last, display EPG, or display black screen, etc., is implementation dependent.	"Unable to receive signals of this channel."	CDN Scope Service Approach Specifications 3.3.1.2 Initial Setting Chapter 4 Network Connection and Communication Protocol IP Broadcasting Specifications 3.2 Functional Requirements of Receiver
IP 2001			End of broadcasting hour/temporary out of service	The selected channel is temporarily out of service.	Display a message for out of service and no signal state, respectively.	"The channel is out of service temporarily" (out of service), "No signal is currently received for this channel" (no signal)	IP Broadcasting Specifications 5.3.4 Handling of Broadcast Suspension
IP 2002			Channel selection error	The selected channel does not exist.	Display a message.	"This channel does not exist."	IP Broadcasting Specifications 3.2.7 Service Channel Selection
IP 2009			Other				
IP 2100		Stream data error	Common		Whether to display a message and discontinue playback or not depends on the receiver model. Display a message to notify the user when playback is discontinued. After that, the behavior is implementation-dependent whether to return to the channel displayed last, display EPG, or display black screen, etc.	"Content playback is discontinued due to a signal problem."	IP Broadcasting Specifications 4.3 Streaming Quality
IP 2101			RTP/TTS/TS data error	Transmission system failure			IP Broadcasting Specifications 4.1.2 RTP 5.2.3 Time-stamped TS
IP 2102			Scramble setting error (mismatch between the TS header and PTM setting)	Inadequate production system check			IP Broadcasting Specifications 6.3.5 Chargeable/Free Programs and Scrambling in Broadcasting Service
IP 2103			PSI data error	Inputting error, inadequate production system check			IP Broadcasting Specifications 5.2.2.5 Handling of PMT and ES
IP 2104			Video decoding error	Control information/ES mismatch, incorrect parameter in ES, undefined ES			IP Broadcasting Specifications 5.1.1 Video
IP 2105			Audio decoding error	Control information/ES mismatch, incorrect parameter in ES, undefined ES			IP Broadcasting Specifications 5.1.2 Audio
IP 2106			Presentation synchronization not possible	Server, network jitter, incorrect TimeStamp			IP Broadcasting Specifications 5.2.2.2 Synchronization of Video, Audio and Caption
IP 2107			PMT CA system ID mismatch (unsupported CAS)	Incorrect PMT setting			IP Broadcasting Specifications 6.3.9 Verification of Valid CAS System

IP 2108			ECM data error	Transmission system failure, incorrect time information			IP Broadcasting Specifications 6.3.5 Chargeable/Free Program and Scrambling in IP Broadcasting Service 7.18.2 Setting Billing Unit for Program [Appendix B] B.4 ECM Encoding/Transmission Specifications
IP 2109			Other				
IP 2200		No valid MC license	Non-contracted service, other DRM related errors	Non-contracted service, other DRM related errors	Display a message to confirm that the contract information screen is displayed. The behavior of the receiver, whether to return to the channel displayed last, EPG display, black screen, etc., is implementation dependent.	"Unable to play the channel. You don't have the right to play the channel. "	IP Broadcasting Specifications 3.2.7 Service Channel Selection 6.3.5 Chargeable/Free Program and Scrambling in IP Broadcasting Service 6.4.2.Operation of MC License in IP Broadcasting Service [Appendix B]
IP 2300		Viewing restriction setting applies	Parental rate setting	The program setting exceeds the set viewing age.	Display a message to prompt the user to enter PIN.	"Viewing restriction applies to this program."	IP Broadcasting Specifications 3.2.7 Service Channel Selection 7.18.4 Setting Parental Rate CDN Scope Service Approach Specifications 3.3.1.7 Parental Control
IP 3010	VOD playback	Playback control information server connection error		DNS server failure, playback control information server down, network failure, network disconnection, incorrect URL information (incorrect metadata, incorrect portal document)	Obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Unable to connect to the server. Unable to play the contents ."	VOD Specifications Chapter 5 Content Playback Control Metafile CDN Scope Service Approach Specifications 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception
IP 3020		Playback control file server communication error	Common			"Unable to play the contents due to a server error."	VOD Specifications Chapter 5 Content Playback Control Metafile CDN Scope Service Approach Specifications 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception

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IP 3021			Server error (500 status)	Server failure			VOD Specifications Chapter 5 Content Playback Control Metafile CDN Scope Service Approach Specifications 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception RFC2616
IP 3022			Content playback control metafile not found (404 status)	Incorrect metadata, incorrect portal document			VOD Specifications Chapter 5 Content Playback Control Metafile CDN Scope Service Approach Specifications 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception RFC2616
IP 3023			Server busy (503 status)	Excessive server access	Retry. If the maximum retry is exceeded, obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.		VOD Specifications Chapter 5 Content Playback Control Metafile CDN Scope Service Approach Specifications 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception
IP 3024			SSL/TLS server authentication error	Incorrect server, inadequate root certificate	Obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.		
IP 3029			Other				VOD Specifications Chapter 5 Content Playback Control Metafile CDN Scope Service Approach Specifications 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception

IP 3040		Content playback control metafile data error		Inputting error, inadequate production system check	Whether to continue or discontinue the playback process or not is implementation dependent. If playback is discontinued, obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Unable to play the contents due to a data error."	VOD Specifications Chapter 5 Content Playback Control Metafile CDN Scope Service Approach Specifications 7.3.2.1 Specifications for Content Playback Control Metafile Transmission/Reception 7.4 Operation of Content Playback Control Metafile
IP 3060		LLI DRM information error	Common		Obtain the return destination document by setting the error code when starting from the portal. Display a message and move to the same kind of screen displayed after playback is finished when starting from ECG.	"Unable to play the contents."	
IP 3061	LLI DRM system mismatch		LLI inputting error, unsupported DRM	"Unable to play the contents."		VOD Specifications 7.3.6 Verification of Valid DRM System) [Appendix B]	
IP 3062	LLI DRM server URL signature verification error		Incorrect server, inadequate root certificate	"Unable to play the contents."		VOD Specifications 7.3.7 Signature Verification Processing for URI of DRM Server [Appendix B] B.6 Specifications on Signature Verification for DRM Server URI	
IP 3110		DRM server connection error		DNS server failure, DRM server down, network failure, network disconnection, incorrect URL information (incorrect LLI)	Obtain the return destination document by setting the error code when starting from the portal. Display a message and move to the same kind of screen displayed after playback is finished when starting from ECG.	"Unable to play the contents."	VOD Specifications 7.3.1 Response to Error in License Acquisition Processing [Appendix B] B.3 Specifications on License
IP 3120		DRM server communication/VOD license acquisition error	Common		Retry. If the maximum retry is exceeded, obtain the return destination document by setting the error code when starting from the portal. Display a message and move to the same kind of screen displayed after playback is finished when starting from ECG.	"Unable to play the contents."	Transmission
IP 3121	DRM server error (500 status)		Server failure				
IP 3123	DRM server busy		Excessive server access				
IP 3124	DRM server authentication error		Server revoke, incorrect server	Obtain the return destination document by setting the error code when starting from the portal.			
IP 3127	License acquisition rejected		No right, system mismatch	Display a message and move to the same kind of screen displayed after playback is finished when starting from ECG.		"Unable to play the contents. You don't have the right to play. "	
IP 3129		Other			"Unable to play the contents."		

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IP 3171		DRM client authentication error		Client revoke	Obtain the return destination document by setting the error code when starting from the portal. Display a message and move to the same kind of screen displayed after playback is finished when starting from ECG.	"Unable to play the contents. All services may not be available on this receiver."	VOD Specifications 7.3.1 Response to Error in License Acquisition Processing 7.3.4 Receiver Operation When Receiver is Revoked [Appendix B] B.3 Specifications on License Transmission
IP 3210		RTSP server connection error		DNS server failure, RTSP server down, network failure, network disconnection, incorrect URL information (incorrect ERI)	Obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Unable to connect to the server. Unable to play the contents ."	VOD Specifications 4.1.1.9 Detailed Operational Specifications on RTSP Control 4.1.4.1 Basic Communication Sequence under Control of RTSP CDN Scope Service Approach Specifications 7.3.2.2 Detailed Operational Specifications on RTSP Control
IP 3220		RTSP server communication error	Common		Obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Unable to play the contents due to a server error."	VOD Specifications 4.1.1.9 Detailed Operational Specifications on RTSP Control 4.1.4.1 Basic Communication Sequence under Control of RTSP CDN Scope Service Approach Specifications 7.3.2.2 Detailed Operational Specifications on RTSP Control RFC 2326
IP 3221	Server error (500 status)		RTSP server failure				
IP 3222	Stream resources not found (404status)		Wrong content allocation				
IP 3223	RTSP server busy (503 status)		Excessive server access				
IP 3224	No server response		RTSP server down, network failure				
IP 3225	Session disconnected		Set time elapse, RTSP server down, network failure				
IP 3229	Other						
IP 3240		RTSP data error	Common		Whether to discontinue playback or not is implementation dependent. If playback is discontinued, obtain the return destination document after TEARDOWN by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Unable to play the contents due to a data error."	VOD Specifications 4.1.1.9 Detailed Operational Specifications on RTSP Control 4.1.4.1 Basic Communication Sequence under Control of RTSP CDN Scope Service Approach Specifications 7.3.2.2 Detailed Operational Specifications on RTSP Control
IP 3241	SDP error		Inputting error, inadequate production system check				
IP 3249	Other						

IP 3310		Stream reception failure	Common (including temporal reception failure and deterioration of communication quality)	RTP server failure, network failure, network disconnection, access network bandwidth shortage	Obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Unable to receive signals. Unable to play the contents."	-
IP 3320		Stream (RTP) server error	Common	Announce method with Event_Code in 5400s	Obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Unable to play the contents due to a server failure."	VOD Specifications 4.1.1.8.7 ANNOUNCE CDN Scope Service Approach Specifications 7.1.3.2 ANNOUNCE
IP 3326	Stream transmission not possible		Announce method with Event_Code 5401	VOD Specifications 4.1.1.8.7 ANNOUNCE CDN Scope Service Approach Specifications 7.1.3.2 ANNOUNCE			
IP 3322	Server error		Announce method with Event_Code 5402	VOD Specifications 4.1.1.8.7 ANNOUNCE CDN Scope Service Approach Specifications 7.1.3.2 ANNOUNCE			
IP 3340		Stream data error	Common		Whether to discontinue playback or not is implementation dependent. If playback is discontinued, obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal. Display a message when starting from ECG.	"Content playback is discontinued due to a signal problem."	VOD Specifications 4.1.2 RTP 6.1.1 Video 6.1.2 Audio 6.2. Multiplexing 6.2.2.1 Synchronization of Video, Audio and Caption Presentation 6.3 Details of PSI 7.3.3 Encrypted and Non-encrypted Content in VOD Service [Appendix B] CDN Scope Service Approach Specifications 7.9.1.2 Clock Synchronization
IP 3341	RTP/TTS/TS data error		Transmission system failure	VOD Specifications 4.1.2 RTP 6.2. Multiplexing CDN Scope Service Approach Specifications 7.9.1.2 Clock Synchronization			
IP 3342	Encryption setting error		Content playback control metafile mismatch (when a scramble flag is set for unencrypted contents)	VOD Specifications 7.3.3 Encrypted and Non-encrypted Content in VOD Service [Appendix B]			

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IP 3343			PSI data error	Inputting error, inadequate production system check			VOD Specifications 6.3 Details of PSI
IP 3344			Video decoding error	Control information/ES mismatch, incorrect parameter in ES, undefined ES			VOD Specifications 6.1.1 Video
IP 3345			Audio decoding error	Control information/ES mismatch, incorrect parameter in ES, undefined ES			VOD Specifications 6.1.2 Audio
IP 3346			Presentation synchronization not possible	Server, network jitter, incorrect TimeStamp			VOD Specifications 6.2.2.1 Synchronization of Video, Audio and Caption Presentation
IP 3349			Other				
IP 3350		Contract expiration	Common	Announce method with Event_Code in 5500s	Obtain the return destination document by setting the error code to the left in the query parameter status_code of the return URL when starting from the portal.	"The content viewing period has expired. Playback is discontinued."	VOD Specifications 4.1.1.8.7 ANNOUNCE CDN Scope Service Approach Specifications 7.1.3.2 ANNOUNCE
IP 3351	Contract period expiration		Announce method with Event_Code 5502	Display a message when starting from ECG.	VOD Specifications 4.1.1.8.7 ANNOUNCE CDN Scope Service Approach Specifications 7.1.3.2 ANNOUNCE		
IP 3352	Viewing period expiration		Announce method with Event_Code 5501		VOD Specifications 4.1.1.8.7 ANNOUNCE CDN Scope Service Approach Specifications 7.1.3.2 ANNOUNCE		
IP 3460		UPnP setting (NAT traversal setting) error	Common	The specified port in use, HGW side uPnP server failure , temporary congestion	Attempt to reset the router. Display a message when a resetting error occurred more than a given number of time.	"Unable to connect to the router. Unable to play the contents."	CDN Scope Service Approach Specifications [Appendix H]
IP 3461	Port mapping setting error		The specified port in use, HGW side uPnP server failure , temporary congestion	For an internal server error, specify a different port from the one specified previously and try resetting. Display a message when a resetting error occurred more than a given number of time.			
IP 3462	Port mapping renewal error		The specified port in use, HGW side uPnP server failure , temporary congestion	Attempt to reset the router. Display a message when a resetting error occurred more than a given number of time.			
IP 3469	Other errors		The specified port in use, HGW side uPnP server failure , temporary congestion	Attempt to reset the router. Display a message when a resetting error occurred more than a given number of time.			

IP 5010	MC license renewal	CAS server connection error		DNS server failure, DRM server down, network failure, network disconnection, incorrect URL information	Whether to display a message or not is implementation dependent.	"Unable to process service renewal."	IP Broadcasting Specifications 6.3.1 Dealing with Error in License Acquisition Processing 6.3.3 License Renewal Processing [Appendix B] B.3 License Transmission Specifications	
IP 5020		MC license acquisition error	Error					
IP 5021			Server error (500 status)	Server failure				
IP 5023			CAS server authentication error	Server revoke, incorrect server				
IP 5024			MC license acquisition rejected	No right, system mismatch				
IP 5025			MC license storage not possible	Insufficient storage area in the receiver				
IP 5029			Other					
IP 5030		MC license renewal CAS server busy (503 status)		Excessive server access	Retry. Whether to display a message when retry-over occurs is implementation dependent.	"Unable to process service renewal due to congestion on the server."		
IP 5040		MC license renewal CAS client authentication error		Client revoke	Display a message.	"Unable to process service renewal. All services may not be available on this receiver."	IP Broadcasting Specifications 6.3.1 Dealing with Error in License Acquisition Processing 6.3.7 Receiver Operation When Revoked [Appendix B] B.3 License Transmission Specifications	
IP 5110	CRL server access	CRL server connection error		Network connection NG, DNS server failure, network failure, incorrect URL	Whether to display a message or not is implementation dependent.	-	IP Broadcasting Specifications [Appendix B] B.6 CRL Specifications VOD Specifications [Appendix B] B.5 CRL Specifications	
IP 5120		CRL server communication error	Common					-
IP 5121			CRL server error (500 status)	Server failure				-
IP 5122			CRL not found (404 status)	The CRL file does not exist.				-
IP 5123			Other					-
IP 5130			CRL server busy (503 status)		Excessive server access	Retry. Whether to display a message when retry-over occurs is implementation dependent.		-
IP 6010	Portal access	Portal server connection error		DNS server failure, portal server down, network failure, network disconnection, incorrect URL information (incorrect PF configuration information, BIT)	Display a message. The subsequent process is implementation dependent, but it is desirable to return to the original screen.	"Unable to display the specified page in the browser."	CDN Scope Service Approach Specifications 6.5 Operation of Network Access to Portal Service	
IP 6020		Portal server	Common				CDN Scope Service Approach	

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IP 6021		communication error	Server error (500 status)	Server failure			Specifications 6.5 Operation of Network Access to Portal Service RFC 2616
IP 6022			Specified page does not exist (404 status)	The portal document not allocated			
IP 6023			Portal server busy (503 status)	Excessive server access	Retry and display a message after retry-over. The subsequent process is implementation dependent, but it is desirable to return to the original screen.	"Unable to display the specified page in the browser due to congestion on the server. Access again later."	CDN Scope Service Approach Specifications 5.5.9 503 Status Code Operation 6.5 Operation of Network Access to Portal Service
IP 6024			SSL/TLS server authentication error	Incorrect server, inadequate root certificate	Display a message. The subsequent process is implementation dependent, but it is desirable to return to the original screen.	"Unable to display the specified page in the browser."	CDN Scope Service Approach Specifications 6.5 Operation of Network Access to Portal Service RFC 2818
IP 6029			Other				
IP 6040		BML document data error		Inputting error, inadequate production system check	Display a message. The subsequent process is implementation dependent, but it is desirable to return to the original screen.	"Unable to display the specified page due to a data problem."	CDN Scope Service Approach Specifications Chapter 6 Specifications of BML for IPTV
IP 6050		Portal URI not specified		No hyperlink descriptor, inadequate PF configuration information portal URL, inadequate launchDocument(), launchUnmanagedDocument() URL, inadequate launchIPTVContent(), launchUnmanagedDocument() return destination.		"Unable to display the specified page in the browser."	CDN Scope Service Approach Specifications 5.1.2 PF Configuration Information File Chapter 6 Specifications of BML for IPTV IP Broadcasting Specifications 7.28.2.3.3 Hyperlink Descriptor

IP 6110	*	Metadata server access	Metadata server connection error		Network connection NG, DNS server failure, network failure, incorrect URL (incorrect PF configuration information)	If required, continue the process to obtain metadata from the metadata servers of the service provider other than the failed server. Whether to display a message or not is implementation dependent.	"Unable to obtain part of the metadata."	CDN Scope Service Approach Specifications 7.11.5 Operation of Metadata Delivery Method RFC 2616
IP 6120	*	Metadata server communication error	Common					
IP 6121	*		Server error (500 status)	Server failure				
IP 6122	*		Specified metadata does not exist (404 status)	Incorrect query				
IP 6123	*		Metadata server busy (503 status)	Excessive server access	Retry. If required, continue the process to obtain metadata from the metadata servers of the service provider other than the failed server after retry-over. Whether to display a message or not is implementation dependent.			
IP 6124	*	Metadata error	SSL/TLS server authentication error	Incorrect server, inadequate root certificate		If required, continue the process to obtain metadata from the metadata servers of the service provider other than the failed server. Whether to display a message or not is implementation dependent.	"Unable to obtain part of the metadata."	CDN Scope Service Approach Specifications 7.11.5 Operation of Metadata Delivery Method RFC 2818
IP 6129	*		Other					
IP 6140	*	Metadata error		Inputting error, inadequate production system check		The behavior is implementation dependent. Fragments with a error can be discarded, and the rest can be used as valid data.	"Unable to display the metadata due to a metadata problem. "	CDN Scope Service Approach Specifications 7.11.2 Operation of Description Language Type Metadata Format
IP 6210	*	Contract package information server connection error			Network connection NG, DNS server failure, network failure, incorrect URL (incorrect PF configuration information)	If required, continue the process to obtain metadata from the purchased content package information servers of the service provider other than the failed server. Whether to display a message or not is implementation dependent.	"Failed to obtain part of the contract information. Incorrect content availability information may be displayed."	CDN Scope Service Approach Specifications 7.8.2.2 Reception of Purchased Content Package Information File

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IP 6220	*	Contract package information server communication error	Common		If required, continue the process to obtain metadata from the purchased content package information servers of the service provider other than the failed server. Whether to display a message or not is implementation dependent.	"Failed to obtain part of the contract information. Incorrect content availability information may be displayed."	CDN Scope Service Approach Specifications 7.8.2.2 Reception of Purchased Content Package Information File RFC 2616	
IP 6221	*		Server error (500 status)	Server failure				
IP 6222	*		No corresponding package information (404 status)	Incorrect query				
IP 6223	*		Contract package information server busy (503 status)	Excessive server access	Retry. If required, continue the process to obtain metadata from the purchased content package information servers of the service provider other than the failed server after retry-over. Whether to display a message or not is implementation dependent.	"Unable to obtain part of metadata due to congestion on the server. Incorrect content availability information may be displayed."		CDN Scope Service Approach Specifications 5.5.9 503 Status Code Operation 7.8.2.2 Reception of Purchased Content Package Information File RFC 2616
IP 6224	*		SSL/TLS server authentication error	Incorrect server, inadequate root certificate	If required, continue the process to obtain metadata from the purchased content package information servers of the service provider other than the failed server. Whether to display a message or not is implementation dependent.	"Failed to obtain part of the contract information. Incorrect content availability information may be displayed."		CDN Scope Service Approach Specifications 7.8.2.2 Reception of Purchased Content Package Information File RFC 2818
IP 6229	*		Other					
IP 6240	*	Contract package information data error		Inadequate production system check	Discard the erroneous contract package information of the service provider. If required, continue the process to obtain metadata from the purchased content package information servers of the service provider other than the failed server. Whether to display a message or not is implementation dependent.	"Failed to obtain part of the contract information. Incorrect content availability information may be displayed."	CDN Scope Service Approach Specifications 7.8.1 Purchased Content Package Information File 7.8.2.2 Reception of Purchased Content Package Information File	
IP 6250	*	Contract package information storage not possible		Receiver's NVRAM failure, insufficient storage area	If required, continue the process to obtain metadata from the purchased content package information servers of the service provider other than the failed server. Whether to display a message or not is implementation dependent.	"Unable to save the contract information. Incorrect content availability information may be displayed."	CDN Scope Service Approach Specifications 7.8.2.2 Reception of Purchased Content Package Information File	

IP 6310	*	License renewal notification information server	License renewal notification information server connection error		Network connection NG, DNS server failure, network failure, incorrect URL (incorrect PF configuration information)	No special action is required.	-	IP Broadcasting Specifications 6.3.4 Acquisition of License Renewal Notification Information
IP 6320	*		License renewal notification information server	Common			-	IP Broadcasting Specifications 6.3.4 Acquisition of License Renewal Notification Information
IP 6321	*		communication error	Server error (500 status)	Server failure		-	IP Broadcasting Specifications 6.3.4 Acquisition of License Renewal Notification Information RFC 2616
IP 6322	*			No corresponding license renewal notification information (404 status)	Incorrect query		-	IP Broadcasting Specifications 6.3.4 Acquisition of License Renewal Notification Information RFC 2616
IP 6323	*			License renewal notification information server busy (503 status)	Excessive server access		-	IP Broadcasting Specifications 6.3.4 Acquisition of License Renewal Notification Information CDN Scope Service Approach Specifications 5.5.9 Operation of 503 Status Code
IP 6324	*			SSL/TLS server authentication error	Incorrect server, inadequate root certificate		-	IP Broadcasting Specifications 6.3.4 Acquisition of License Renewal Notification Information RFC 2818
IP 6329	*			Other			-	IP Broadcasting Specifications 6.3.4 Acquisition of License Renewal Notification Information
IP 6340	*		License renewal notification information data error		Metadata inputting error, inadequate production system check	No special action is required.	-	IP Broadcasting Specifications 6.2.2 License Renewal Notification Information File

[Appendix H] Guidelines on State Transition on VOD and IP Broadcasting Service

H.1 State Transition Model on VOD Service

The state transition model on VOD service is shown below.

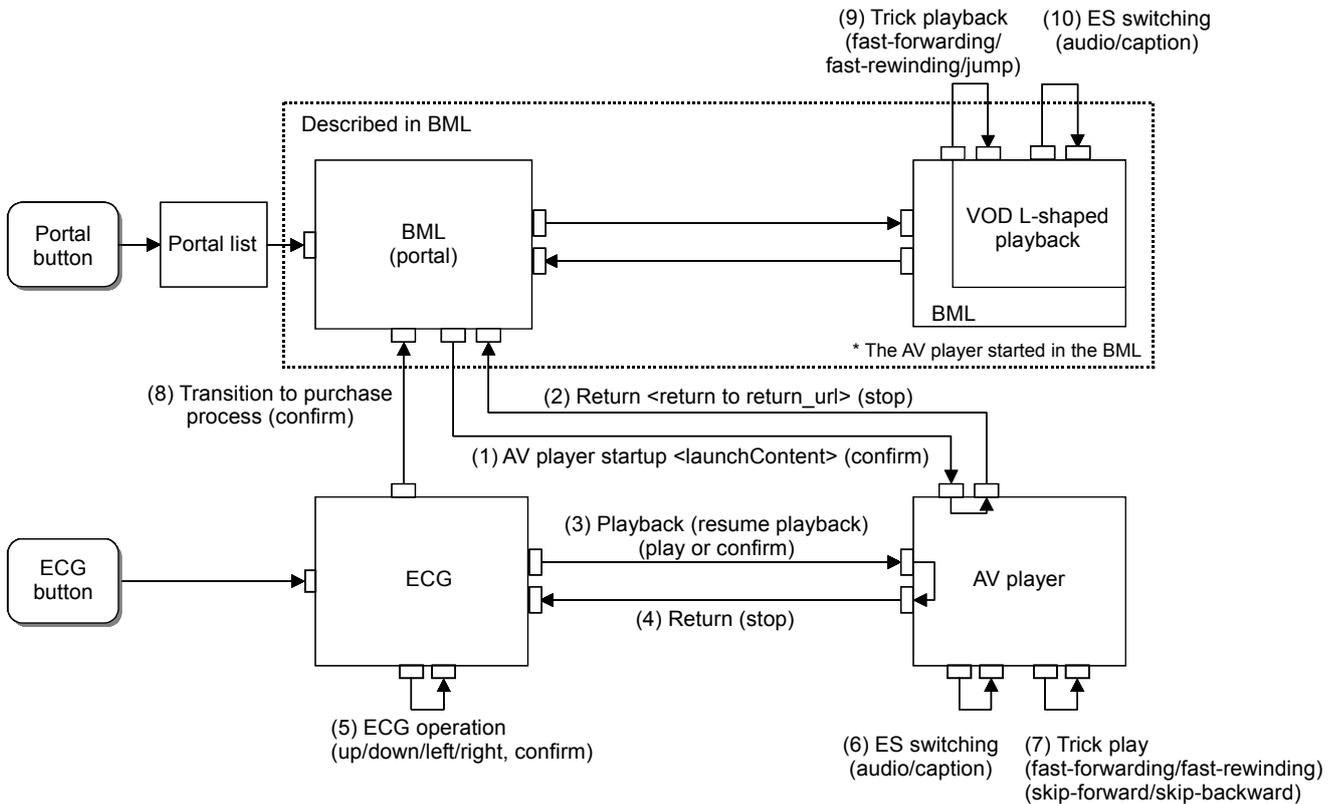


Figure Appendix- 8 VOD Service State Transition Model

## H.2 State Transition Model on IP Broadcasting Service

The state transition model on IP Broadcasting service is shown below.

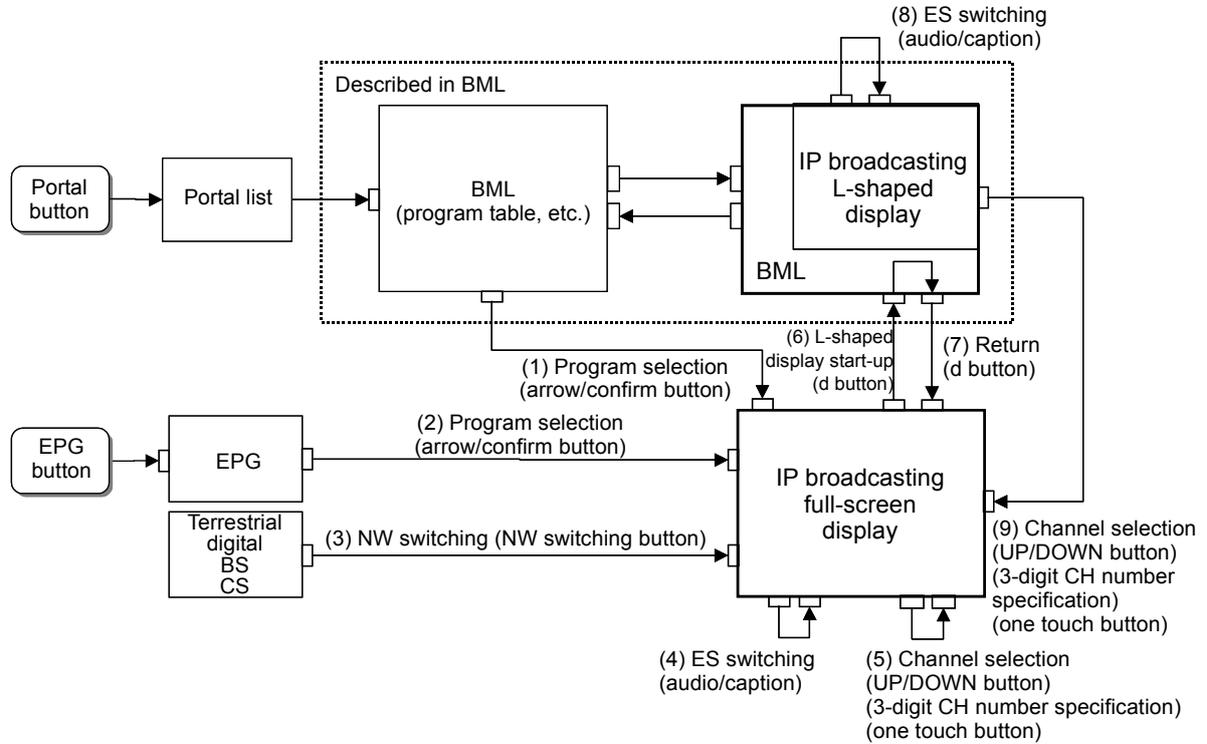


Figure Appendix- 9 IP Broadcasting Service State Transition Model

## [Appendix I] Guidelines on ECG Screen

The ECG function is optional, and screen configuration, etc. are implementation-dependent. This section provides examples of ECG screens and information presented in the screens as guidelines to enable all receivers to provide a similar function. For the relationship between the displayed items and ECG metadata elements, see [Appendix Z] "Annotation: Correspondence between ECG Screen Items and ECG Metadata Elements".

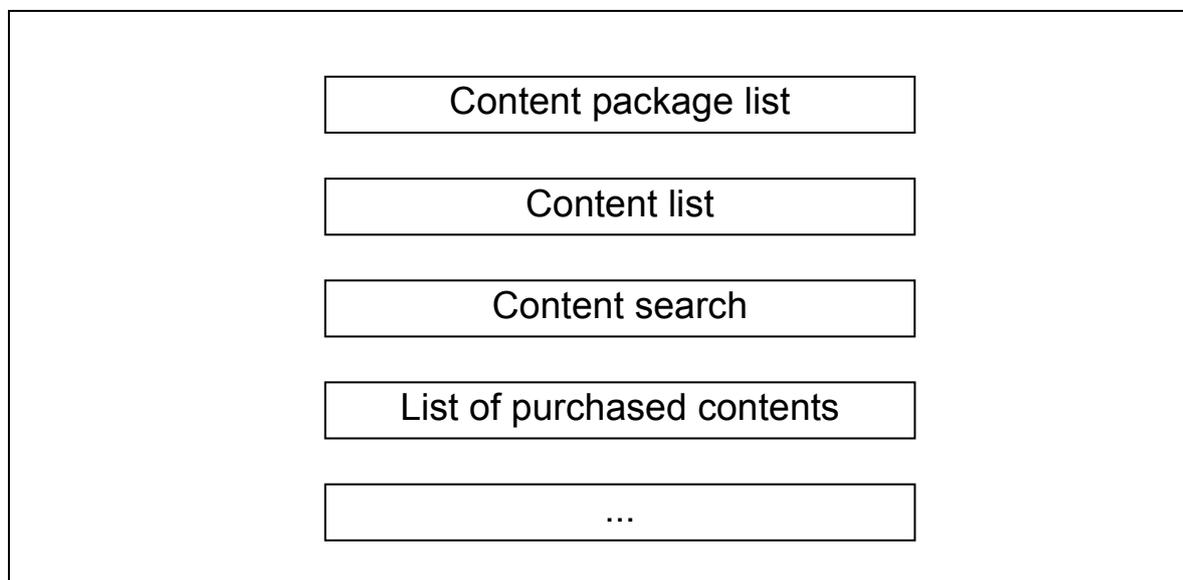
### I.1 Example of ECG Screen

It is assumed that the following screens are required to provide the ECG function.

- (1) ECG menu screen
- (2) Contents and content packages list screen
- (3) Content detail screen
- (4) Content package detail screen
- (5) Purchased content and content package list screen

### I.2 ECG Menu Screen

The ECG menu screen displays a list of ECG functions. The display method and whether to provide a screen or not are implementation-dependent.

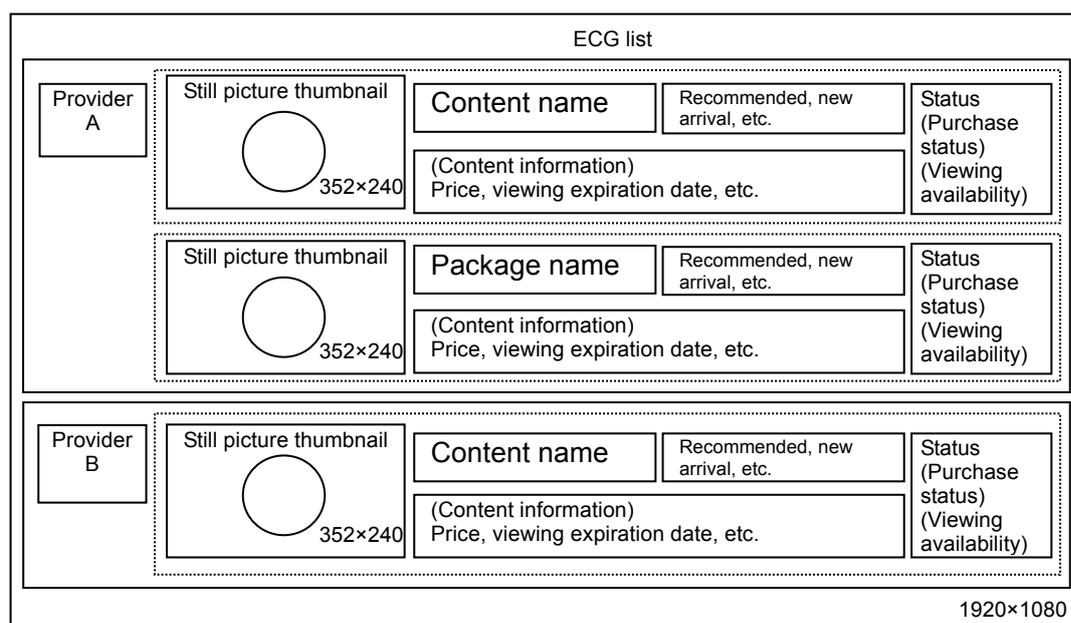


### I.3 Contents and Content packages List Screen

The contents and content packages list screen displays a list of contents and content packages using obtained metadata. This screen can also be used to display content and content package query results.

It is assumed that the content package name, content package type, price, new arrival, recommended content packages, status such as viewing period are displayed when content packages are displayed in the list screen. It is assumed that the content name, new arrival, recommended contents, status such as viewing availability and viewing period are displayed when contents are displayed in the list screen. Also, it is assumed that group name, new arrival, recommended group, status such as viewing period are displayed when groups such as series are displayed.

(Example of content list screen)

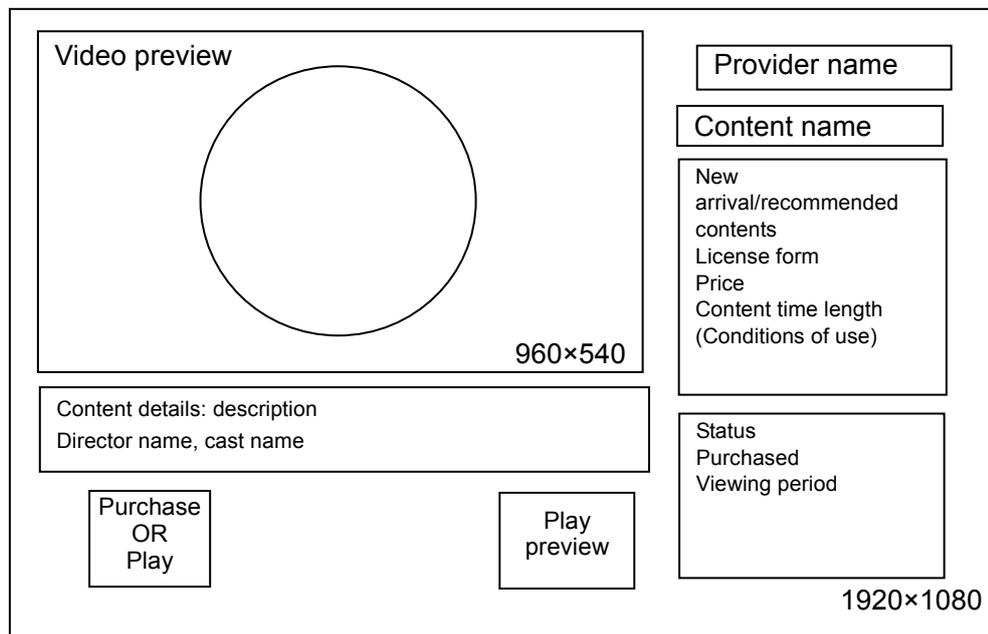


- \* When the aspect ratio of the still picture thumbnail presentation area is 16:9 or 4:3, the aspect ratio of the still picture video source should stay unchanged by adding a side panel or using the letterbox format.
- \* It is desirable to use the still picture thumbnail scaling of 352 × 240. Also, scaling exceeding 720 × 480 of the video source should not be used.
- \* It is desirable that users can select to display single item sales only and package sales only.
- \* The viewing availability and viewing expiration date are calculated based on the presence of the viewing availability information and the license reference information.
- \* It is desirable to display service provider logos if they are set.
- \* Same metadata items should be displayed in the order of description in the metadata.

#### 1.4 Content Detail Screen

The users move from the content list screen to the content detail screen where details of contents are displayed. It is assumed that video preview, content name, new arrival, recommended contents, time length of contents, license form, price, viewing expiration date (re-purchase time limit), detailed program information, and genre, etc. are displayed in this screen.

(Example of content detail screen)



- \* When the aspect ratio of the video preview presentation is 16:9 or 4:3, the aspect ratio of the video source should stay unchanged by adding a side panel or using the letterbox format.
- \* The desirable scaling ratio of the presentation screen is 64/128.
- \* Consideration should be given to the fact that the transmitted preview video is scaled.
- \* It is desirable not to scale video preview to exceed the video source size when the video preview is displayed full-screen.
- \* Even if video preview is specified, it is recommended that video previews not be played back automatically when the content detail display screen is presented.
- \* Video should not be hidden when video previews are played back. It is prohibited to hide any part of the video by the display frame, etc.
- \* It is prohibited to display information (banners, etc.) that is not relevant to the service provider next to the video preview frame.
- \* Reduced video previews can be displayed and played back in the ECG user interface. However, the preceding two requirements should be satisfied for the information displayed in the video area and the surrounding area.
- \* When a preview is played back in full screen, information such as the content title and the playback status of the content can be displayed temporarily as a resident function. In this case, however, receivers should be able to hide the information.
- \* Service providers should take necessary actions concerning trick play for video previews by, for example, prohibiting trick play using RMPI, etc.

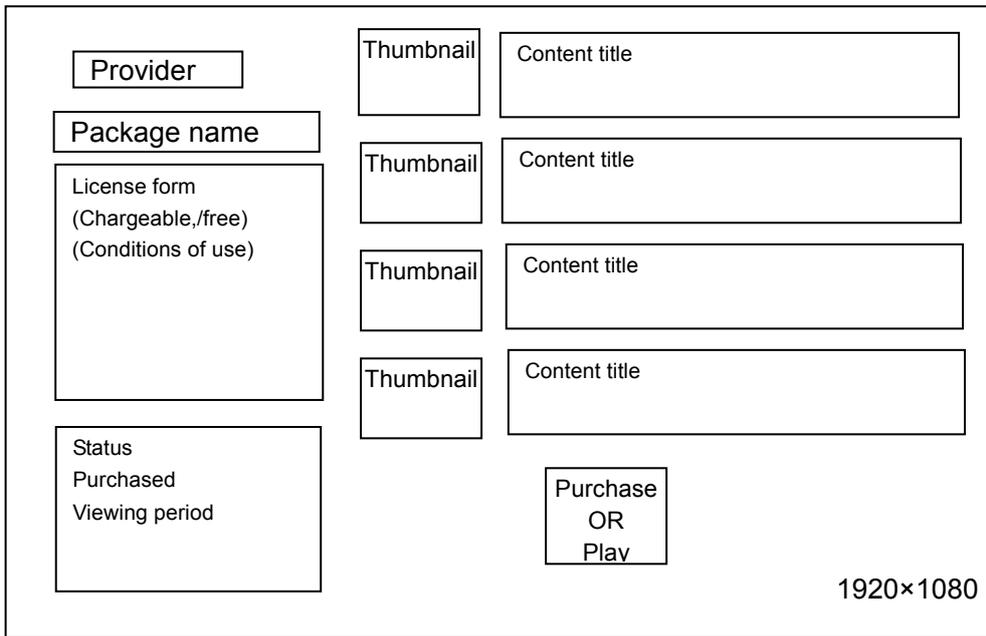
## 1.5 Content Package Detail Screen

The users move from the content package list screen to the content package detail screen where details of content packages are displayed.

It is assumed that content package names, new arrivals, recommended content packages, license forms, prices, viewing expiration dates (re-purchase time limits), detailed program information, and genres, etc. are displayed in this screen.

Thumbnails and content titles are displayed for the list of contents that are included in the content package.

(Example of package detail screen)

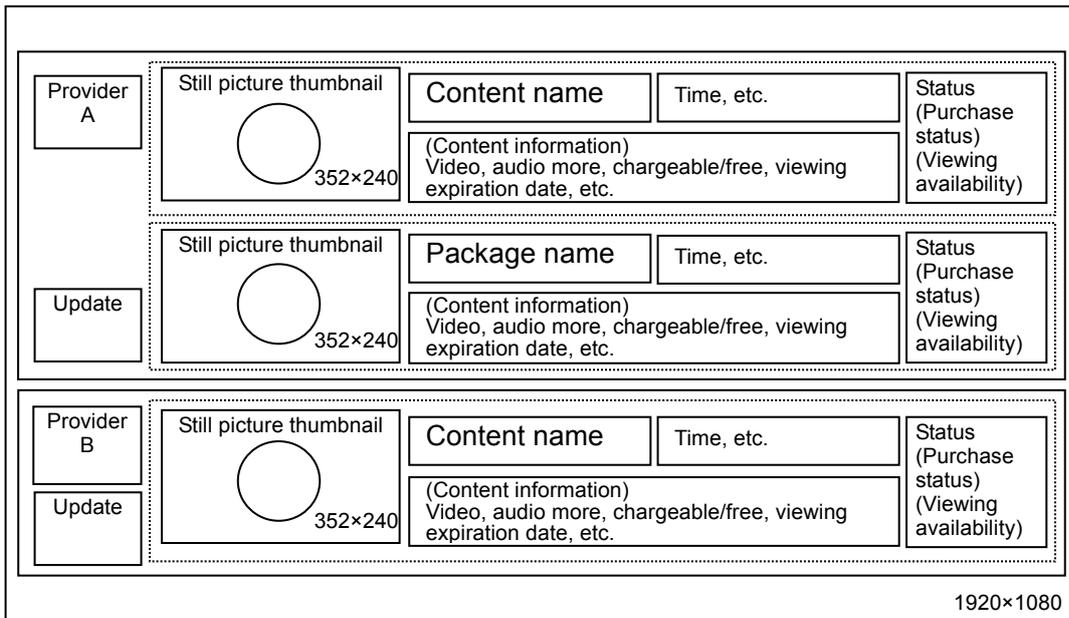


\* If there are many contents, scrolling/paging should be possible.

### 1.6 Purchased Content and Content Package List Screen

The purchased content and content package list screen displays a list of purchased contents and content packages.

(Example of content list screen)



- \* When the aspect ratio of the still picture thumbnail presentation area is 16:9 or 4:3, the aspect ratio of the still picture video source should stay unchanged by adding a side panel or using the letterbox format.
- \* It is desirable to use the still picture thumbnail scaling of 352 × 240. Also, scaling exceeding 720 × 480 of the video source should not be used.
- \* Viewing availability information should be kept when the main power is turned off.
- \* Contents and packages whose expiration date has passed should be deleted from the saved list and should not be presented.
- \* Information on playback availability should be displayed according to the following specifications:
  - When the type of sales is individual content or packs, the period of the viewing availability information should be used.
  - For unlimited and select contracts, only the state in which the contract is concluded should be displayed.
  - The license period of the viewing availability information should be used for contents that are individually selected for a select contract.

A button to renew the purchased content list should be prepared for each service provider.

### 1.7 Guidelines on Items to Be Displayed in ECG Screens

Table Appendix-7 shows the guidelines on the items to be displayed in ECG screens. The table lists the items to be displayed in ECG screens from metadata, PF configuration information file and viewing availability information.

Table Appendix-7 Items to Be Displayed in ECG

Information source	Unit of handling	Information	Item to be displayed in a list	Item to be displayed (in any way)	Filter /query condition	Sort condition
Metadata	Package	Pack/service type	<input type="radio"/>	<input type="radio"/>		
		Price	<input type="radio"/>	<input type="radio"/>		
		Sales period		<input type="radio"/>		
		Link to the purchase screen (button display)	<input type="radio"/>	<input type="radio"/>		
		New arrival	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Recommended	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		R-rated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		Title	<input type="radio"/>	<input type="radio"/>		
		Title furigana				<input type="checkbox"/>
		Description		<input type="radio"/>		
		Genre		<input type="radio"/>	<input type="radio"/>	
		Thumbnail		<input type="radio"/>		
		Catch phrase		<input type="radio"/>		
		Content	New arrival	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Recommended		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	R-rated		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Title		<input type="radio"/>	<input type="radio"/>		
	Title furigana					<input type="checkbox"/>
	Genre			<input type="radio"/>	<input type="radio"/>	
	Thumbnail			<input type="radio"/>		
	Preview			<input type="radio"/>		
	Description			<input type="radio"/>		
	Catch phrase			<input type="radio"/>		
	Director/cast			<input type="radio"/>		
	Content time length			<input type="radio"/>		
	Delivery period		<input type="radio"/>			
Viewing expiration date		<input type="radio"/>				

		Trick play availability		○		
Configuration information file	Package	Provider name		○	○	
		Provider logo	○	○		
	Content	Provider name		○	○	
		Provider logo	○	○		
Stored on receivers	Package	Whether purchase is possible or not	○	○		
	Content	Whether purchase is possible or not	○	○		

○: Items that should be displayed

△: Items that are sent as a general rule. Use of items on receivers is optional.

\* However, keywords with @type="other" should not be displayed.

## [Appendix J] Guidelines on Presentation of IP Broadcasting Program, VOD content and Portal Service

It is desirable that receivers comply with the following specifications when presenting IP broadcasting programs, VOD contents and portals. It is also desirable that receivers comply with the following specifications when receivers have a storage function or a function to control an external recording device.

- Receivers should not be equipped with a function to automatically cut or skip contents such as notifications and advertisements using IP broadcasting signals or descriptors/data included in IP broadcasting signals. Also, receivers should not control the storage function and external devices automatically. This specification does not apply to user operations such as fast-forwarding and pausing.
- When an IP broadcasting program, VOD content or portal is presented, unrelated contents should not be mixed or displayed intentionally. For example, this specification prohibits a function to present contents and notifications that are not relevant to the broadcast program being presented to intentionally encourage users to believe that such contents (notifications, advertisements) are part of the program. Receivers should not be equipped with a function that misleads users into believing that the TV broadcasting screen and the internet browser screen are unified. This specification does not apply to functions whose aim is not to mislead users but present multiple contents in a single screen simultaneously in accordance with user operation, such as a dual-screen and small screen display functions. Also, this specification does not apply to functions to display information related to user operations and receiver status temporarily such as IP broadcast channel numbers and VOD playback status, given that such information can be cleared manually/automatically.
- When an IP broadcasting program, VOD content or portal is presented, unrelated audio should not be played back regardless of its audio status (with/without audio). For example, background music, etc. that is not relevant to the broadcast program or content being presented should not be played back.

Follow the guidelines shown in I.4 "Content Detail Screen" when VOD preview contents are presented in an ECG screen interface frame.

## [Appendix K] Guidelines on Triggers to Access Information Servers

When receivers access servers described in 2.3.1 "Functions of Server Entities" and obtain information (including SI-exclusive TS transmitted by SI servers), concentrated access on the provider servers and networks can cause problems depending of the number of accesses and their timing.

For example, if receivers exceeding the number assumed by the equipment perform an action to obtain information simultaneously at a preset time (0:00 everyday, etc.) or when program reservation (viewing reservations, recording reservations, etc.) actions are performed, then fail to obtain the information and repeat their re-acquisition actions, problems such as slower server response over a long period of time may occur. In order to avoid and improve such situations, providers should enhance their facilities while measures should be taken on the receiver side as well. It is desirable that receivers comply with the guidelines on server access provided in IPTVFJ STD-0004 "IP Broadcasting Specifications", IPTVFJ STD-0002 "VOD Specifications" and this document.

[Appendix L] Guidelines on BML Document for Basic Registration, Service Subscription, Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting and Service Registration for IP Retransmission of BS Digital Satellite Broadcasting

"Basic registration" to become a member of a provider and "service subscription" to purchase/conclude monthly contracts to view certain contents (content packages) are essential portal functions. Also, service providers for IP retransmission of digital terrestrial television broadcasting need a "service registration for IP retransmission of digital terrestrial television broadcasting" function, and service providers for IP retransmission of BS digital satellite broadcasting need a "service registration for IP retransmission of BS digital satellite broadcasting" function. This section presents the guidelines for creation of related BML documents by showing sequences to implement these functions in a portal for each assumed basic use case.

Offline registration in the following use cases indicates the situation where a user goes through the registration procedures without using a receiver (in a shop, by phone, by post, or via a PC, etc.) and then personal information of the user is entered in the subscriber management server as registration information. In the current operation, it is assumed that the online registration process is used more often. In online registration, a process to set receiver information on a server and a process to set the registration information on receivers are required and should still be completed using the portal function.

For more information on acquisition/renewal of licenses that are obtained from the BML document when IP broadcasting services are subscribed/cancelled, see IPTVFJ STD-0004 "IP Broadcasting Specifications".

#### L.1 Basic Registration

Users go through the basic registration procedures of a service provider via online registration and then operate a receiver to access the portal and complete basic registration. It is assumed that a function to complete basic registration in a portal is comprised of a registration verification document and registration completion document. Figure Appendix- 10 shows the assumed communication sequence.

The assumed basic process sequence is as follows:

- (1) The user goes through the basic registration procedures offline in advance, and personal information, etc. required for basic registration is entered in the subscriber management server, etc.
- (2) The user selects the service provider registered offline in the screen provided by the resident function of the receiver shown in 3.3.1.6 "Displaying Registration Verification Document " and performs the completion process to proceed to the following process. First, the portal server URL (portal\_uri) corresponding to ip\_service\_provider\_id of the selected service provider is obtained from the PF configuration information using the receiver's resident function described above. Then the BML browser for IPTV of the receiver is

started, and the registration verification document (BML document) specified in subscribe.bml on the portal server is obtained.

- (3) The receiver's BML browser for IPTV prompts the user to enter identification information (registration number) such as the password entered during offline registration by executing the registration verification document, makes the CAS/DRM function, extracts the CAS/DRM client identifier (DRM\_ID) that is also used for receiver authentication, and sends the information to the portal server.
- (4) The portal server communicates with the subscriber management server and processes registration for the corresponding user and receiver. Upon completion of registration, the registration completion document is returned to the corresponding receiver's browser.
- (5) The receiver's BML browser for IPTV executes the registration completion document and completes the basic registration process by recording required basic registration information on the receiver and notifying the user of the completion of basic registration.

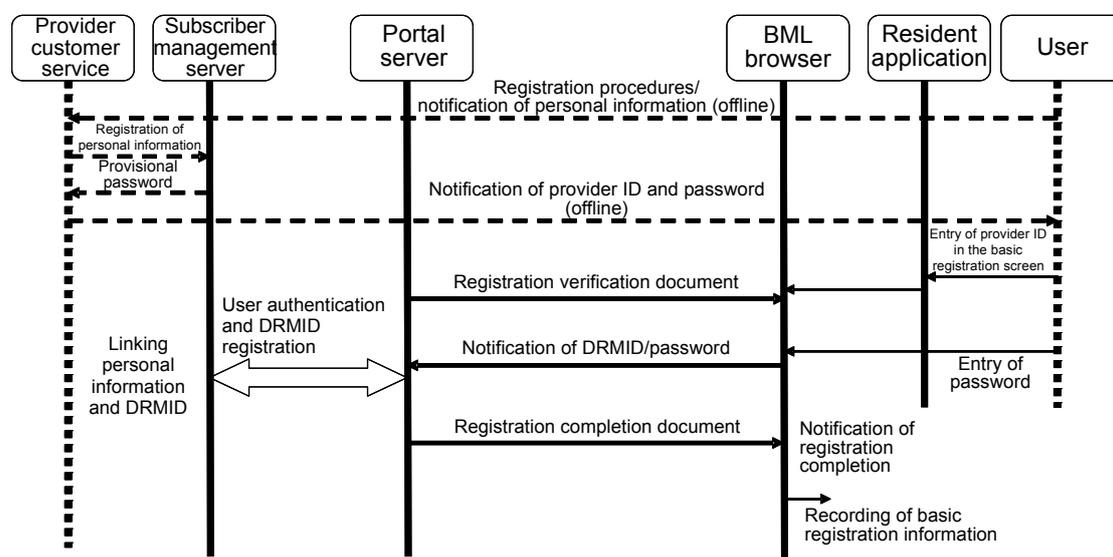


Figure Appendix- 10 Basic Sequence of Basic Registration

The guidelines for creation of each document, points to note and guidelines for related server operation are as follows:

- (1) Registration Verification Document
  - It should be the entry document subscribe.bml itself or a document linked to subscribe.bml. It should also be a document linked from startup.bml of the portal top.
  - It is assumed that a means to enter identification information (registration number) such as a password notified to the user during offline registration is provided and that the entered information is sent to the portal server for user authentication.
  - In order to register receiver identification information, a script must be inserted in the document to send the CAS/DRM client identifier (DRM\_ID) obtained from the getDRMID() function, for which marlin\_iptv\_es is set as the argument drm\_system, to the portal server. This process is required to make the CAS/DRM function.
  - By using the launchDynamicDocument() function for transmission of DRM\_ID and identification information, transition to the registration completion document can be

made after the registration process on the server. Also, https must be used as the reference URL scheme when this function is used.

(2) Registration Completion Document

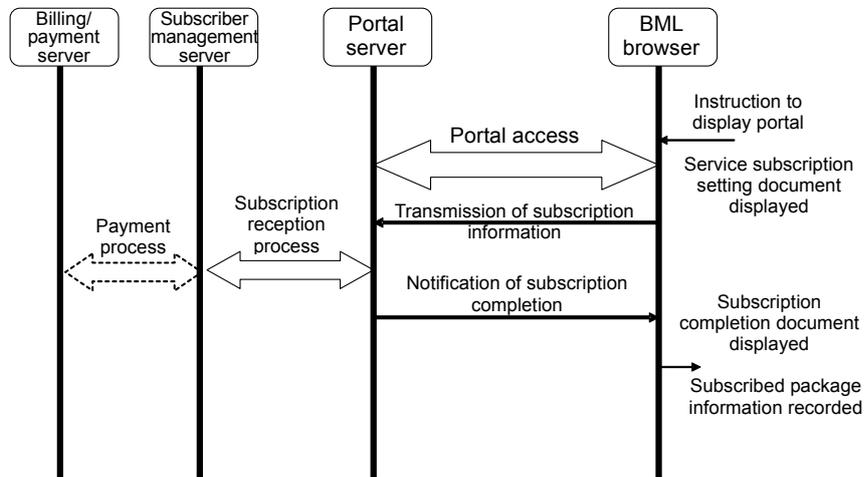
- This is a destination document of `launchDynamicDocument()` in the registration verification document. The document is sent to the receiver after the basic registration process is completed on the server.
- The `setIPTVServiceRegistrationInfo()` function is executed to record the service provider's service provider ID (`ip_service_provider_id`), expiration date (`expire_date`), and authentication key in the receiver's NVRAM as basic registration information. Consideration should be given to prevent the registration information from being deleted during the contract period by, for example, specifying a date in the distant future for `expire_date`. Also, for IP broadcasting service providers, DRM server URL and signature verification information are set as arguments in addition to the above function, the signature verification process is performed, and the above basic registration information and DRM server URL are recorded in NVRAM only when the verification has succeeded.
- When the above processes are completed properly, it is desirable to display a message to notify the user that basic registration is complete. When the basic registration information cannot be recorded on the receiver due to a failure to execute the `setIPTVServiceRegistrationInfo()` function, a process to perform synchronization by sending the information on failure to the portal server is also assumed.

## L.2 Service Subscription

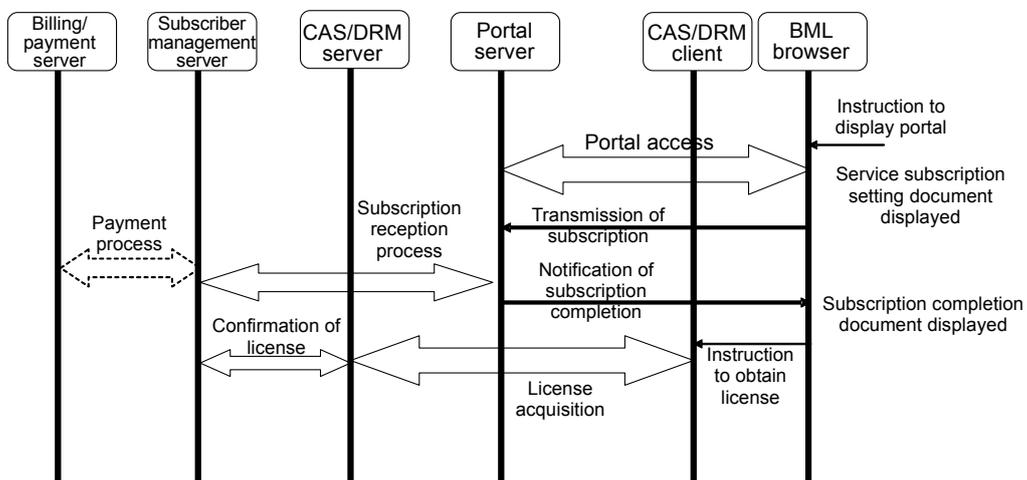
It is assumed that users conclude unlimited, select or monthly contracts for IP broadcasting/VOD services and purchase single items or packs, etc. for VOD services in a portal based on receiver operations. The service subscription function in a portal should be comprised of the subscription setting document and subscription completion document. The functions required for service subscription related to VOD services and service subscription related to IP broadcasting services are slightly different. Figure Appendix-11 shows the transition between documents and assumed communication sequence.

The basic process flow is as follows:

- (1) In the BML browser for IPTV of the receiver, the user selects an item such as the monthly service contract subject to service subscription and a package comprised of single or multiple contents in the portal screen, and sends the subscription information to the portal server using the service subscription setting document.
- (2) The corresponding user's service subscription process is performed on the portal server via communication with the subscriber management server and billing/payment server based on the subscription information items. The servers enable acquisition of corresponding licenses and perform the billing/payment process if necessary via communication between servers and server processing. The subscription completion document is returned to the receiver's browser when the subscription process on the server is completed.
- (3) The receiver's BML browser for IPTV executes the subscription completion document and notifies the user of completion of service subscription when the service subscription process has completed. For IP broadcasting service subscription, the MC license is obtained at this point.



[A] VOD service subscription



[B] IP broadcasting service subscription

Figure Appendix-11 Basic Sequence of Service Subscription

The guidelines for creation of each document, points to note and guidelines for related server operation are as follows:

## (1) Subscription setting document

- The authenticated state should be maintained by user authentication described in [Appendix V] "Annotation: User Authentication in Portal Service" using cookies in the subscription setting document or the document used before the transition to the subscription setting document.
- Completion of basic registration should be verified in the subscription setting document or the document used before the transition to the subscription setting document.
- The means to navigate/select subscribed content packages should be provided, and a description for sending the identification information for the content packages selected by users should be inserted in the document. Also, transition can be made to the subscription completion document after the subscription process on the server by using `launchDynamicDocument()` for package information transmission. Furthermore, `https` must be used as the reference URL schema when this function is used.
- When basic registration and service subscription are processed at the same time, it is assumed that the registration verification document and subscription setting document are provided in the same BML document. In this case, the means to navigate/select service subscription can be added to the registration verification document, or the script for sending information on the selected packages with `DRM_ID` and registration numbers can be created.
- In this document, consideration should be given to controlling channel selection operations by users using remote controllers. For example, remote control operations can be limited using `used-key-list`.

## (2) Subscription completion document

- This is a destination document of `launchDynamicDocument()` in the subscription setting document. The document is sent to the receiver after the subscription process is completed on the server.
- When the type of the VOD service package to be subscribed is unlimited or select, the `setContentPackageInfo()` function must be executed once, and `PurchaseID` and `valid_start_date` must be recorded in the nonvolatile memory of the receiver (`valid_end_date` is not specified). Using this, contents included in the monthly contract can be displayed as available in ECG, etc. after the specified `valid_start_date`.
- When the type of VOD service package being subscribed to is a single item or pack, the `setContentPackageInfo()` function must be executed once, and `PurchaseID`, `valid_start_date` and `valid_end_date` must be recorded in the nonvolatile memory of the receiver (`valid_end_date` must be specified). The `valid_start_date` indicates the date when contents become valid, and `valid_end_date` indicates the date when contents become invalid. Using this, availability of the contents comprising the package can be displayed in ECG.
- For an IP broadcasting service, the `getIPTVLicense()` is executed once under normal conditions to obtain the required MC license. Using this, the corresponding IP broadcasting service becomes available for use.

- When the above processes are completed properly, it is desirable to display a message to notify the user that service subscription is complete. On the other hand, consideration should be given to behaviors when acquisition of the main license for an IP broadcasting service fails. Such behaviors include obtaining the license again and displaying a message to instruct operations by the user according to the status indicated in the return value.
- When basic registration and service subscription are processed at the same time, it is assumed that the registration completion document and subscription completion document are provided in the same BML document. In this case, the document should satisfy the guidelines for both documents.

### L.3 Basic Registration Cancellation

To cancel basic registration, users go through primary procedures offline as with basic registration. Users can also access a page for cancellation in the corresponding service provider's portal and perform cancellation operations without using the setting screen of the resident application as with basic registration. It is assumed that a function to cancel basic registration in a portal is comprised of a cancellation setting document and cancellation completion process document. Figure Appendix-12 shows an example of basic registration cancellation sequence.

The assumed basic process sequence is as follows:

- (1) A user operates a receiver to access a portal of the service provider to be cancelled, performs user authentication, and follows the links to access the cancellation setting document for canceling basic registration.
- (2) After the BML browser for IPTV in the receiver confirms the basic registration status by executing the cancellation setting document, cancellation information is sent to the portal server based on the user's cancellation operation.
- (3) The portal server communicates with the subscriber management server and processes cancellation for the corresponding user and receiver. When the cancellation process is completed, the cancellation completion document is returned to the browser.
- (4) The receiver's BML browser for IPTV executes the cancellation completion process document and completes the basic registration cancellation process by overwriting the expiration date of the basic registration information with the cancellation date and notifying the user of the completion of the basic registration cancellation process.
- (5) The basic registration information on the receiver becomes invalid when the cancellation date passes.

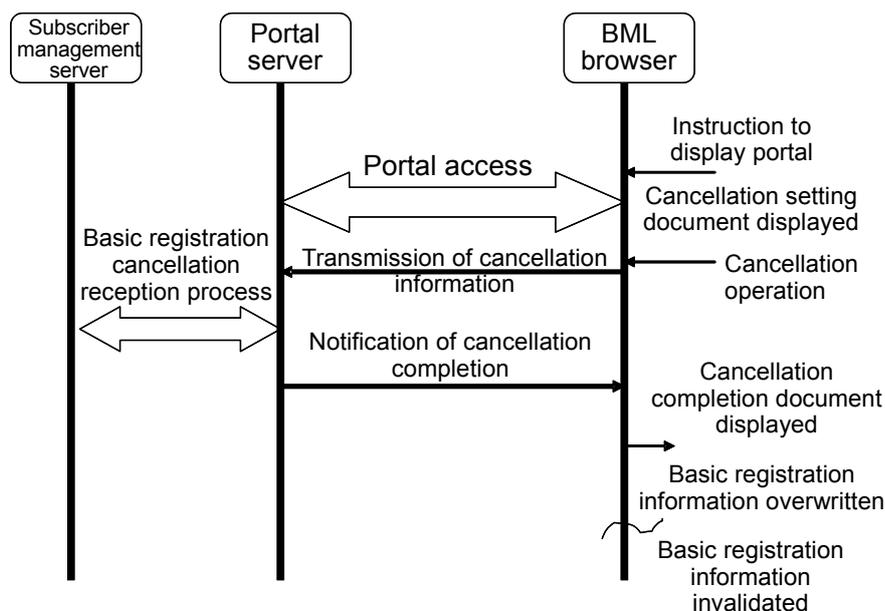


Figure Appendix-12 Basic Sequence of Basic Registration Cancellation

The guidelines for creation of the cancellation setting document and cancellation completion document, points to be note and guidelines for related server operation are as follows:

(1) Cancellation setting document

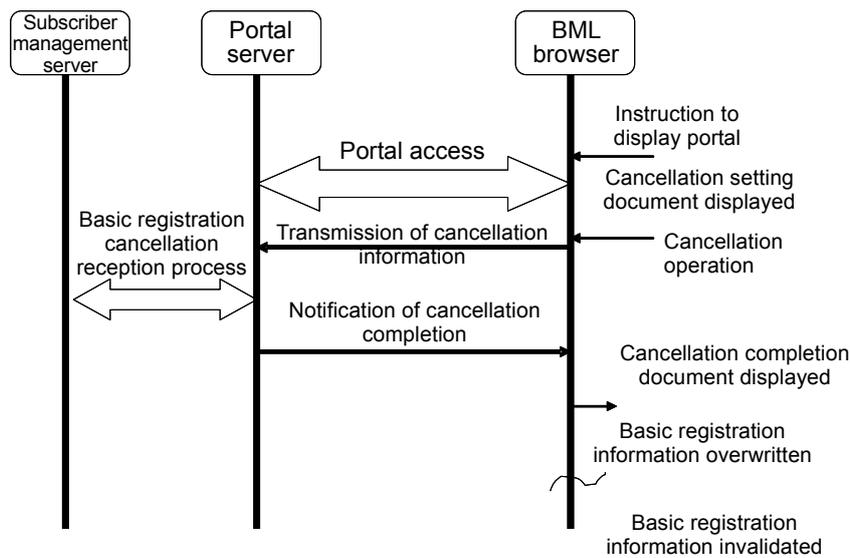
- The authenticated state should be maintained by user authentication described in [Appendix V] "Annotation: User Authentication in Portal Service" using cookies in the cancellation setting document or the document used before the transition to the cancellation setting document.
- The basic registration status should be verified in the cancellation setting document or the document used before the transition to the cancellation setting document.
- The means for the users to perform the cancellation operation should be provided, and a description should be inserted in the document to send a string indicating cancellation based on the user operation. Also, transition to the cancellation completion document can be made after the cancellation process is performed on the server by using `launchDynamicDocument()` for string transmission. Furthermore, `https` must be used as the reference URL schema when this function is used.

(2) Cancellation completion document

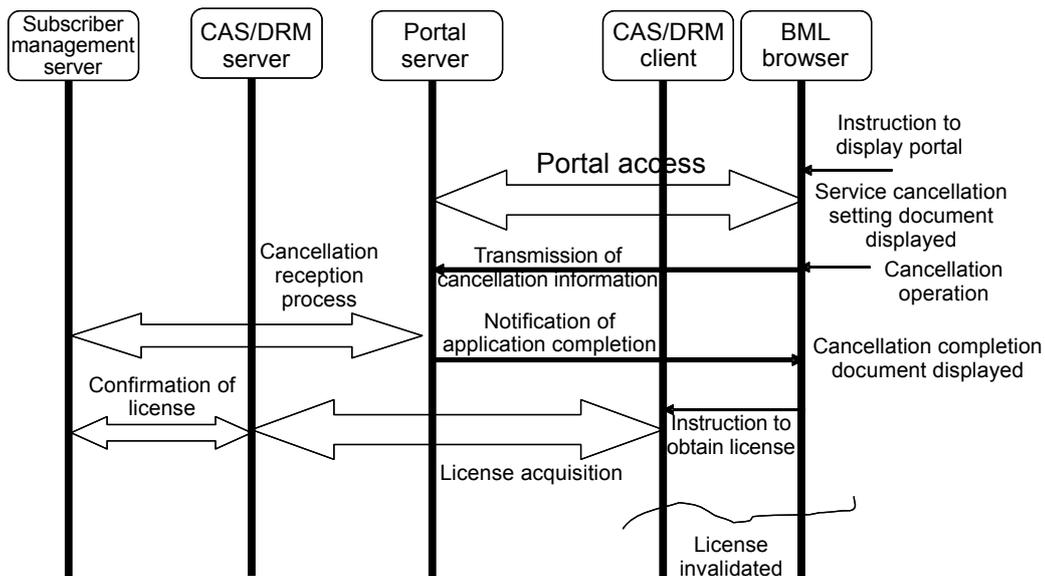
- This is a transition destination document of `launchDynamicDocument()` in the cancellation setting document. The document is sent to the receiver after the cancellation process is completed on the server.
- The `setIPTVServiceRegistration Info()` function in which `expire_date` is set to the date when the basic registration information is deleted is executed once. When contents/IP broadcasting services that are available for use exist, `expire_date` should be specified in consideration of the expiration date to avoid mismatch.
- When the above processes are completed properly, it is desirable to display a message to notify the user that basic registration cancellation has completed.

#### L.4 Service Cancellation

Service cancellation indicates cancellation of monthly service contracts such as unlimited and select. It is assumed that once service subscription is completed, the contract is renewed automatically until the service is cancelled (For IP broadcasting services, contract renewal is based on the automatic license renewal process between the resident application and CAS/DRM server). To cancel a service, users go through primary procedures offline. Users can also access a page for service cancellation in the corresponding service provider's portal and perform cancellation operations as with cancellation of basic registration. It is assumed that a function to cancel a service in a portal is comprised of a cancellation setting document and cancellation completion document. Figure Appendix-13 shows an example of a service cancellation sequence.



[A] VOD service cancellation



[B] IP broadcasting service cancellation

Figure Appendix-13 Basic Sequence of Service Cancellation

The assumed basic process sequence is as follows:

- (1) A user operates a receiver to access a portal of the service provider delivering the service to be cancelled, performs user authentication, and follows the links to access the cancellation setting document for canceling the service.

- (2) After the BML browser for IPTV in the receiver confirms the basic registration status by executing the cancellation setting document, cancellation information is sent to the portal server based on the user's cancellation operation.
- (3) The portal server communicates with the subscriber management server and processes cancellation for the corresponding user and receiver. When the cancellation process is completed, the cancellation completion document is returned to the browser.
- (4) The BML browser for IPTV on the receiver executes the cancellation completion document and performs the process related to service cancellation. The process varies between VOD services and IP broadcasting services. For VOD, the expiration date of the content package information of the content package to be cancelled is reset to the cancellation date. For IP broadcasting, the MC license that expires on the cancellation date is retained by re-acquiring and overwriting the MC license related to the service to be cancelled. After this process, the service cancellation process is completed by notifying the user of service cancellation completion.
- (5) The VOD service package information becomes invalid on the receiver when the cancellation date passes. The IP broadcasting service package information becomes invalid when the MC license expires.

The guidelines for creation of the cancellation setting document and cancellation completion document, points to note and guidelines for related server operation are as follows:

- (1) Cancellation setting document
  - The authenticated state should be maintained by user authentication described in [Appendix V] "Annotation: User Authentication in Portal Service" using cookies in the cancellation setting document or the document used before the transition to the cancellation setting document.
  - The basic registration status should be verified in the cancellation setting document or the document used before the transition to the cancellation setting document.
  - A description should be inserted in the document to send the identification information of the package to be cancelled as a string to a given server through the user's cancellation operation. Also, transition to the cancellation completion process document can be made after the cancellation process is performed on the server by using `launchDynamicDocument()` for string transmission. Furthermore, `https` must be used as the reference URL schema when this function is used.
- (2) Cancellation completion document
  - This is a destination document of `launchDynamicDocument()` in the cancellation setting document. The document is sent to the receiver after the cancellation process is completed on the server.
  - When the target contract is of a VOD service, the `setContentPackageInfo()` function for which `valid_end_date` is specified must be executed once. Using this, the receiver regards the contents comprising the content package with the specified `PurchaseID` as not available and displays information in ECG accordingly once the date indicated in `valid_end_date` passes.

- When the target contract is of an IP broadcasting service, the `getIPTVLicense()` function is executed under normal conditions as with when a contract is concluded. Using this, the license is overwritten with the expiration date that is brought forward to the cancellation date.
- When the above processes are completed properly, it is desirable to display a message to notify the user that service cancellation has completed.
- When basic registration cancellation and service cancellation are processed at the same time, it is assumed that the registration cancellation completion document and service cancellation completion document are provided in the same BML document. In this case, the document should satisfy the guidelines for both documents. However, the value specified for `expire_date` of the `setIPTVServiceRegistrationInfo()` function should come after the expiration date of the MC license obtained using `valid_end_date`, `getIPTVLicense()` of `setContentPackageInfo()`.

#### L.5 Contents Selection on VOD Select Package

In a select package of VOD services, a limited number of contents selected from the parent group (for example, 5 titles per month) become available for viewing over a set period of time (for example, 3 nights and 4 days). Therefore, licenses should be established and issued, and the number of remaining viewable contents should be managed when contents are selected at users' convenience after the service subscription for a select package is completed. It is assumed that users operate a receiver to access a portal of the service provider delivering the corresponding select package and select contents in the content selection screen for the select package. It is assumed that a function to cancel a service in a portal is comprised of a select setting document and select completion process document. Figure Appendix-14 shows an example of content selection for select packages.

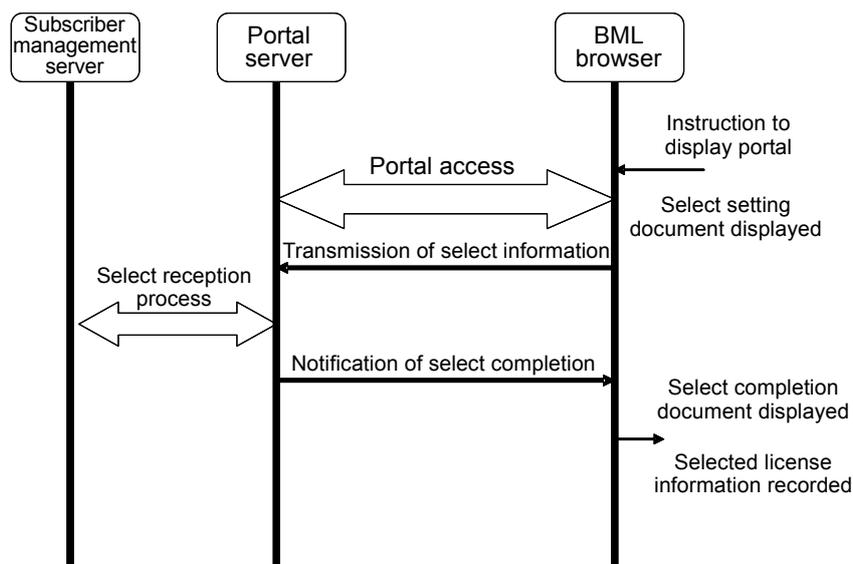


Figure Appendix-14 Content Selection Process for Select Package

The assumed basic process sequence is as follows:

- (1) A user operates a receiver to access a portal of the service provider delivering the select package for which contents are selected, performs user authentication, and verifies the basic registration and service subscription statuses for the corresponding select service, and follows the links to access the select setting document of the select package for which contents are selected.
- (2) The BML browser for IPTV on the receiver displays a list of contents that can be selected for the select package by executing the select setting document. The user selects contents and sends the information on selected contents to the portal server.
- (3) The portal server communicates with the subscriber management server, enables acquisition of the corresponding license for the user, and performs select related processes such as updating the conditions of use for the select package. When the process is completed, the select completion document is returned to the browser on the receiver.
- (4) The BML browser for IPTV on the receiver executes the select completion process document and records (after updating) the content (license) information that is available in the select package at the time. After this process, the select process is completed by notifying the user of completion of the select process.

The guidelines for creation of the select setting document and select completion process document, points to note and guidelines for related server operation are as follows:

- (1) Select setting document
  - The authenticated state should be maintained by user authentication described in [Appendix V] "Annotation: User Authentication in Portal Service" using cookies in the select setting document or the document used before the transition to the select setting document.
  - Completion of basic registration and service subscription for the target select package should be verified in the select setting document or the document used before the transition to the select setting document.
  - When the user entered into a select package contract and the upper limit of contents that are selectable for the month has not been reached, content information such as a content list (superset) of selectable contents should be presented and the user should be prompted to select contents.
  - When the above conditions are not satisfied, content selection becomes not available after the reason is displayed.
  - A description must be inserted in the document to send the information on the contents selected through user operation to a given server as a string. Also, transition can be made to the subscription completion document after the subscription process on the server by using `launchDynamicDocument()` for string transmission. Furthermore, `https` must be used as the reference URL schema when this function is used.
- (2) Select completion document
  - This is a transition destination document of `launchDynamicDocument()` in the select setting document. The document is sent to the receiver after the subscription process is completed on the server.

- The `setSelectedLicenseInfo()` function specifying all license information for the contents that are selected by the user in the select period (for example, the current month) and the contents that were selected in the past select period but have not expired must be executed once.
- When the above processes are completed properly, it is desirable to display a message to notify the user of completion of the select process and the remaining number of selections.

## L.6 Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting

It is assumed that the service registration process using a resident application of receivers described in IPTVFJ STD-0005 "Operational Specifications on IP Retransmission of Digital Terrestrial Television Broadcasting", Volume 6, Chapter 6 "Details of Application that Uses Communication Protocol (Operation)" is realized as a portal function. Service registration for IP retransmission services of digital terrestrial television broadcasting includes both basic registration and service subscription for IP broadcasting/VOD services, by which user and receiver information is registered, service contracts are concluded (billing/payment is processed if necessary), and licenses are obtained so that IP retransmission services of digital terrestrial television broadcasting become available for use. (However, the channel selection control information needs to be obtained after service registration to enable channel selection, reception and playback.) As with the basic registration for IP broadcasting/VOD services, users go through the service registration for an IP retransmission service of digital terrestrial television broadcasting of a service provider using offline registration and then operate a receiver to access the portal and complete service registration. It is assumed that a function to complete service registration in a portal is comprised of a registration verification document and registration completion document. Figure Appendix-15 shows the assumed communication sequence.

The assumed basic process sequence is as follows. (1) and (2) are non-portal processes.

- (1) The user goes through offline service registration procedures for IP retransmission of digital terrestrial television broadcasting in advance, and personal information, etc. required for service registration is entered in the subscriber management server, etc.
- (2) The user selects the service provider registered offline in the screen provided by the resident function of the receiver shown in 3.3.1.6 "Displaying Registration Verification Document" and performs the completion process to proceed to the following process. First, the portal server URL (`portal_uri`) corresponding to `ip_service_provider_id` of the selected service provider is obtained from the PF configuration information using the receiver's resident function described above (when the corresponding `ip_service_provider_id` does not exist in the PF configuration information, it is obtained from the IP retransmission PF configuration information). Then the BML browser for IPTV of the receiver is started, and the registration confirmation document (BML document) specified in `subscribe.bml` on the portal server is obtained.
- (3) The receiver's BML browser for IPTV prompts the user to enter identification information (registration number) such as the password entered during offline registration by executing the registration verification document, makes the CAS/DRM function, extracts the CAS/DRM client identifier (`DRM_ID`) that is also used for receiver authentication, and sends the information to the portal server.

- (4) The portal server communicates with the subscriber management server and process registration for the corresponding user and receiver. Upon completion of registration, the registration completion document is returned to the corresponding receiver's browser.
- (5) The receiver's BML browser for IPTV executes the registration completion document, records required service registration information on the receiver, performs the process to obtain a license, and then completes the service registration process by notifying the user of the completion of service registration.

The guidelines for creation of each document, points to note and guidelines for related server operation are as follows:

- (1) Registration verification document
  - The registration verification document should be the entry document `subscribe.bml` itself or a document linked to `subscribe.bml`. Also, it should be linked from `startup.bml` of the portal top.
  - It is assumed that a means to enter identification information (registration number) such as a password notified to the user during offline registration is provided and that the entered information is sent to the portal server for user authentication.
  - In order to register receiver identification information, a script must be inserted in the document to send the CAS/DRM client identifier (DRM\_ID) obtained from the `getDRMID()` function, for which `marlin_iptv_es_tb` is set as the argument `drm_system`, to the portal server. This process is also required to make CAS function.
  - By using the `launchDynamicDocument()` function for transmission of DRM\_ID and identification information, transition to the registration completion document can be made after the registration process on the server. Furthermore, `https` must be used as the reference URL scheme when this function is used.
- (2) Registration completion document
  - This is a destination document of `launchDynamicDocument()` in the registration verification document. The document is sent to the receiver after the service registration process is completed on the server.
  - The `setTBServiceRegistrationInfo()` function is executed once to record the service provider's service provider ID (`ip_service_provider_id`), expiration date (`expire_date`), authentication key, area code, prefecture duplication flag, and CAS server URL in the receiver's NVRAM as service registration information only when the signature verification process for the CAS server URL that is specified as an argument succeeds. Consideration should be given to prevent the registration information from being deleted during the contract period by specifying a date in the distant future for `expire_date`, etc.
  - The license ID for the service to be registered is specified, and the `getIPTVLICENSE()` function is executed once to obtain the MC license for the IP retransmission service of digital; terrestrial television broadcasting.
  - When the above processes are completed properly, it is desirable to display a message to notify the user that service registration is complete. When the service registration

information could not be recorded on the receiver due to a failure to execute the `setTBSserviceRegistrationInfo()` function or when acquisition of the MC license failed, synchronization should be established by notifying the portal server of the failure. In this case, it is desirable to display the cause and a message to prompt the user to perform the registration operation again.

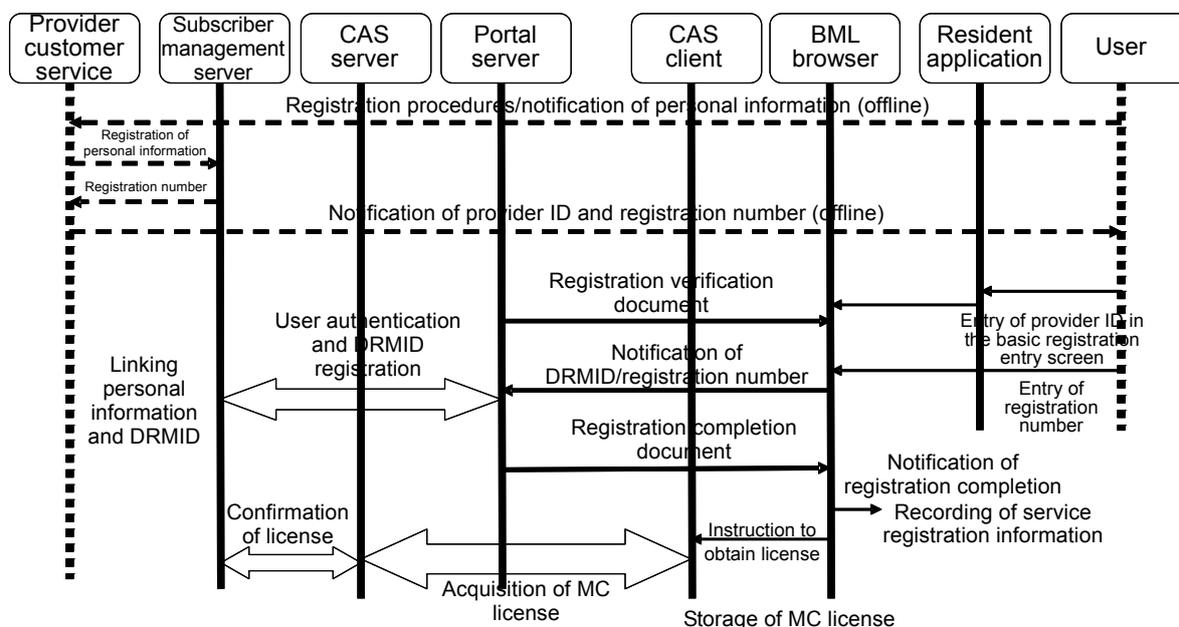


Figure Appendix-15 Basic Sequence of Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting

#### L.7 Cancellation of Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting

To cancel service registration for an IP retransmission service of digital terrestrial television broadcasting, users access a cancellation page in the corresponding service provider's portal and perform the cancellation operation without using the setting screen of the resident application. It is assumed that a function to cancel service registration for an IP retransmission service for digital terrestrial television broadcasting in a portal is comprised of a cancellation setting document and cancellation completion document. Figure Appendix-16 shows an example of a service registration cancellation sequence.

The assumed basic process sequence is as follows.

- (1) A user operates a receiver to access a portal of the service provider for IP retransmission of digital terrestrial television broadcasting to be cancelled, performs user authentication, and follows the links to access the cancellation setting document for canceling the IP retransmission service for digital terrestrial television broadcasting.
- (2) After the BML browser for IPTV in the receiver confirms the service registration status by executing the cancellation setting document, cancellation information is sent to the portal server based on the user's cancellation operation.

- (3) The portal server communicates with the subscriber management server and processes cancellation for the corresponding user and receiver. When the cancellation process is completed, the cancellation completion document is returned to the browser.
- (4) The receiver's BML browser for IPTV executes the cancellation completion document and completes the service registration cancellation process by overwriting the expiration date of the service registration information with the cancellation date and notifying the user of the completion of service registration cancellation.
- (5) The service registration information on the receiver becomes invalid when the cancellation date passes.

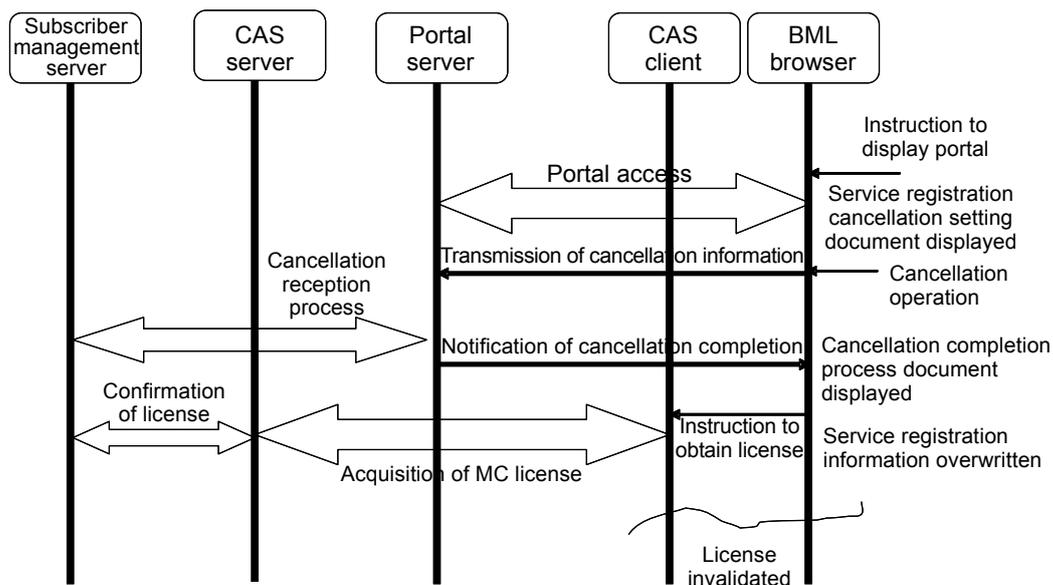


Figure Appendix-16 Basic Sequence of Service Registration Cancellation for IP Retransmission of Digital Terrestrial Television Broadcasting

The guidelines for creation of the cancellation setting document and cancellation completion process document, points to note and guidelines for related server operation are as follows:

- (1) Cancellation setting document
  - The authenticated state should be maintained by user authentication described in [Appendix V] "Annotation: User Authentication in Portal Service" using cookies in the cancellation setting document or the document used before the transition to the cancellation setting document.
  - The service registration status should be verified in the cancellation setting document or the document used before the transition to the cancellation setting document.
  - The means for the users to perform the cancellation operation should be provided, and a description should be inserted in the document to send a string indicating cancellation based on the user operation. Also, transition to the cancellation completion process document can be made after the cancellation process is performed on the server by using `launchDynamicDocument()` for string transmission. Furthermore, `https` must be used as the reference URL schema when this function is used.

## (2) Cancellation completion document

- This is a destination document of `launchDynamicDocument()` in the cancellation setting document. The document is sent to the receiver after the cancellation process is completed on the server.
- The `setTBServiceRegistrationInfo()` function in which `expire_date` is set to the date when the service registration information is deleted is executed once. Consideration should be given to the expiration date of the service license for IP retransmission of digital terrestrial television broadcasting to avoid mismatch when setting `expire_date`.
- The license ID for the service for which registration is cancelled is specified, and the `getIPTVLicense()` function is executed once to obtain the MC license for the IP retransmission service of the digital terrestrial television broadcasting. Using this, the cancellation date is set as the expiration date of the license, to which license renewal is not applied.
- When the above processes are completed properly, it is desirable to display a message to notify the user that service registration cancellation is complete.

## L.8 Service Registration for IP Retransmission of BS Digital Satellite Broadcasting

Service registration for BS broadcasting IP retransmission services includes both basic registration and service subscription for IP broadcasting/VOD services, by which user and receiver information is registered, service contracts are concluded (billing/payment is processed if necessary), and licenses are obtained so that BS broadcasting IP retransmission services become available for use. (However, the channel selection control information needs to be obtained after service registration to enable channel selection, reception and playback.) As with the basic registration for IP broadcasting/VOD services, users go through the service registration for a BS broadcasting IP retransmission service of a service provider using offline registration and then operate a receiver to access the portal and complete service registration. It is assumed that a function to complete service registration in a portal is comprised of a registration verification document and registration completion document. Figure Appendix-17 shows the assumed communication sequence.

The assumed basic process sequence is as follows. (1) and (2) are non-portal processes.

- (1) The user goes through offline service registration procedures for IP retransmission of BS digital satellite broadcasting in advance, and personal information, etc. required for service registration is entered in the subscriber management server, etc.
- (2) The user selects the service provider registered offline in the screen provided by the resident function of the receiver shown in 3.3.1.6 "Displaying Registration Verification Document " and performs the completion process to proceed to the following process. First, the portal server URL (`portal_uri`) corresponding to `ip_service_provider_id` of the selected service provider is obtained from the PF configuration information using the receiver's resident function described above. Then the BML browser for IPTV of the receiver is started, and the registration verifications document (BML document) specified in `subscribe.bml` on the portal server is obtained.
- (3) The receiver's BML browser for IPTV prompts the user to enter identification information (registration number) such as the password entered during offline registration by executing the registration verification document, makes the CAS/DRM function, extracts

the CAS/DRM client identifier (DRM\_ID) that is also used for receiver authentication, and sends the information to the portal server.

- (4) The portal server communicates with the subscriber management server and process registration for the corresponding user and receiver. Upon completion of registration, the registration completion document is returned to the corresponding receiver's browser.
- (5) The receiver's BML browser for IPTV executes the registration completion document and completes the service registration process by recording required service registration information on the receiver and notifying the user of the completion of service registration.

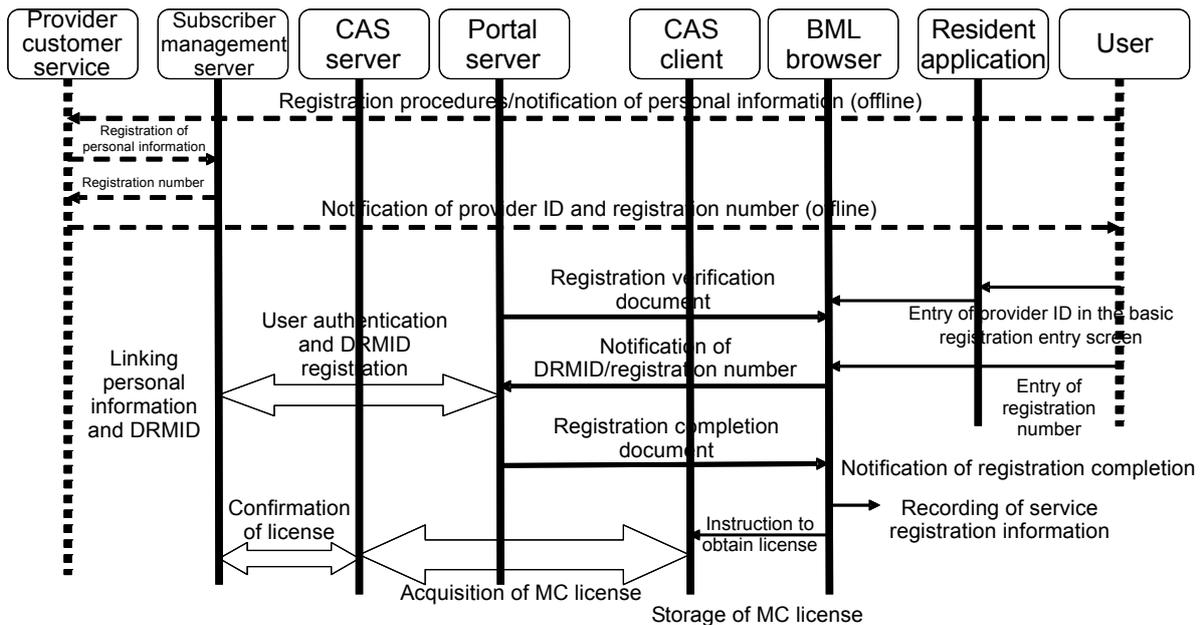


Figure Appendix-17 Basic Sequence of Service Registration for IP Retransmission of BS Digital Satellite Broadcasting

The guidelines for creation of each document, points to note and guidelines for related server operation are as follows:

- (1) Registration verification document
  - The registration verification document should be the entry document subscribe.bml itself or a document linked to subscribe.bml. Also, it should be linked from startup.bml of the portal top.
  - It is assumed that a means to enter identification information (registration number) such as a password notified to the user during offline registration is provided and that the entered information is sent to the portal server for user authentication.
  - In order to register receiver identification information, a script must be inserted in the document to send the CAS/DRM client identifier (DRM\_ID) obtained from the getDRMID() function, for which marlin\_iptv\_es\_bs is set as the argument drm\_system, to the portal server. This process is also required to make the CAS function.
  - By using the launchDynamicDocument() function for transmission of DRM\_ID and identification information, transition to the registration completion document can be

made after the registration process on the server. Also, https must be used as the reference URL scheme when this function is used.

(2) Registration completion document

- This is a destination document of `launchDynamicDocument()` in the registration verification document. The document is sent to the receiver after the service registration process is completed on the server.
- The `X_ipTVf_setBSServiceRegistrationInfo()` function is executed to record the service provider's service provider ID (`ip_service_provider_id`), expiration date (`expire_date`), authentication key, and CAS server URL in the receiver's NVRAM as service registration information only when the signature verification process for the CAS server URL that is specified as an argument succeeds. Consideration should be given to prevent the registration information from being deleted during the contract period by specifying a date in the distant future for `expire_date`, etc.
- The license ID for the service to be registered is specified, and the `getIPTVLicense()` function is executed once to obtain the MC license for IP retransmission service of BS digital satellite broadcasting.
- When the above processes are completed properly, it is desirable to display a message to notify the user that service registration is complete. When the service registration information could not be recorded on the receiver due to a failure to execute the `_X_ipTVf_setBSServiceRegistrationInfo()` function or when acquisition of the MC license failed, synchronization should be established by notifying the portal server of the failure. In this case, it is desirable to display the cause and a message to prompt the user to perform the registration operation again.

## L.9 Cancellation of Service Registration for IP Retransmission of BS Digital Satellite Broadcasting

To cancel service registration for an IP retransmission service of BS digital satellite broadcasting, users access a cancellation page in the corresponding service provider's portal and perform the cancellation operation without using the setting screen of the resident application. It is assumed that a function to cancel registration for an IP retransmission service of BS digital satellite broadcasting in a portal is comprised of a cancellation setting document and cancellation completion document. Figure Appendix-18 shows an example of a service registration cancellation sequence.

The assumed basic process sequence is as follows.

- (1) A user operates a receiver to access a portal of the service provider to be cancelled, performs user authentication, and follows the links to access the cancellation setting document for canceling service registration for IP retransmission of BS digital satellite broadcasting.
- (2) After the BML browser for IPTV in the receiver confirms the service registration status by executing the cancellation setting document, cancellation information is sent to the portal server based on the user's cancellation operation.

- (3) The portal server communicates with the subscriber management server and processes cancellation for the corresponding user and receiver. When the cancellation process is completed, the cancellation completion process document is returned to the browser.
- (4) The receiver's BML browser for IPTV executes the cancellation completion document and completes the service registration cancellation process by overwriting the expiration date of the service registration information with the cancellation date and notifying the user of the completion of the service registration cancellation process.
- (5) The service registration information on the receiver becomes invalid when the cancellation date passes.

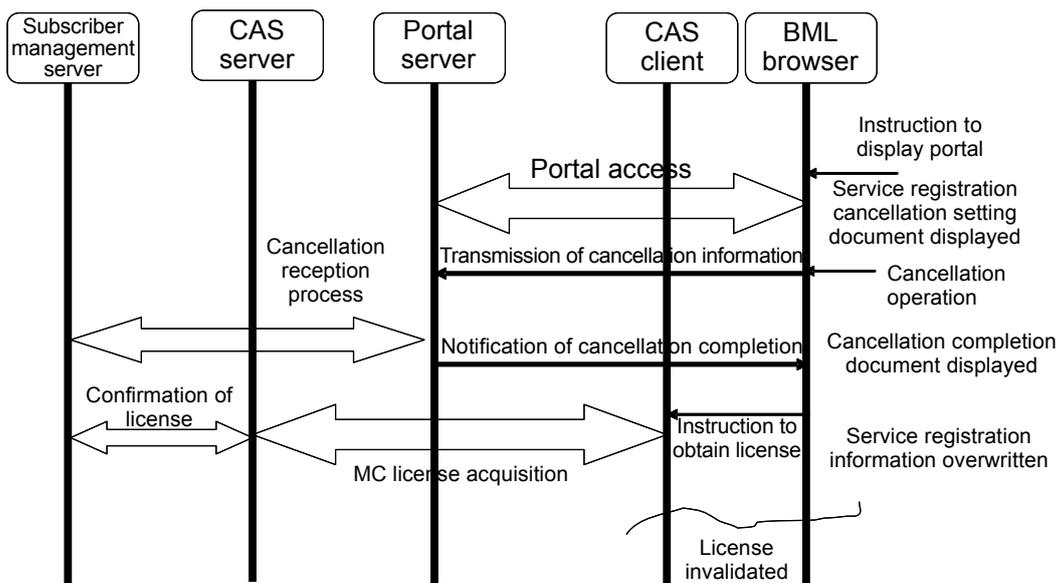


Figure Appendix-18 Basic Sequence of Service Registration Cancellation for IP Retransmission Service of BS digital satellite broadcasting

The guidelines for creation of the cancellation setting document and cancellation completion document, points to note and guidelines for related server operation are as follows:

(1) Cancellation setting document

- The authenticated state should be maintained by user authentication described in [Appendix V] "Annotation: User Authentication in Portal Service" using cookies in the cancellation setting document or the document used before the transition to the cancellation setting document.
- The service registration status should be verified in the cancellation setting document or the document used before the transition to the cancellation setting document.
- The means for the users to perform the cancellation operation should be provided, and a description should be inserted in the document to send a string indicating cancellation based on the user operation. Also, transition to the cancellation completion document can be made after the cancellation process is performed on the server by using `launchDynamicDocument()` for string transmission. Furthermore, `https` must be used as the reference URL schema when this function is used.

## (2) Cancellation completion document

- This is a destination document of `launchDynamicDocument()` in the cancellation setting document. The document is sent to the receiver after the cancellation process is completed on the server.
- The `X iptvf_setBSServiceRegistrationInfo()` function in which `expire_date` is set to the date when the service registration information is deleted is executed once. Consideration should be given to the expiration date of the IP retransmission service license for IP retransmission of BS digital satellite broadcasting to avoid mismatch when setting `expire_date`.
- The license ID for the service to be cancelled is specified, and the `getIPTVLicense()` function is executed once to obtain the MC license for the IP retransmission service of BS digital satellite broadcasting. Using this, the cancellation date is set as the expiration date of the license, to which license renewal is not applied.
- When the above processes are completed properly, it is desirable to display a message to notify the user that service registration cancellation is complete.

#### L.10 Integrated Process for Basic Registration, Service Subscription, Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting and Service Registration for IP Retransmission of BS Digital Satellite Broadcasting

In actual operation, functions can be integrated in one document, unlike the cases in which individual functions described in L.1 to L.9 are provided in separate documents. Especially, in the case where the registration verification document presented in `subscribe.bml` is started through selection of a service provider using the receiver's resident application, it is expected that users acknowledge the document as a registration-related entry screen. Therefore, various use cases based on various situations should be included as listed below.

- (1) The registration completion process is performed on the assumption that basic registration is carried out offline.
- (2) The registration completion process and subscription completion process are performed on the assumption that basic registration and service subscription are carried out offline.
- (3) The registration completion process is performed on the assumption that service registration for an IP retransmission service of digital terrestrial television broadcasting is carried out offline.
- (4) The registration completion process is performed on the assumption that basic registration and service registration for IP retransmission of digital terrestrial television broadcasting are carried out offline.
- (5) The registration completion process and subscription completion process are performed on the assumption that basic registration, service subscription and service registration for IP retransmission of digital terrestrial television broadcasting are carried out offline.
- (6) The registration completion process is performed on the assumption that service registration for an IP retransmission service of BS digital satellite broadcasting is carried out offline.
- (7) The registration completion process is performed on the assumption that basic registration and service registration of BS digital satellite broadcasting are carried out offline.

- (8) The registration completion process and subscription completion process are performed on the assumption that basic registration, service subscription and service registration for IP retransmission of BS digital satellite broadcasting are carried out offline.
- (9) The registration completion process is performed with the assumption that service registration for IP retransmission of digital terrestrial television broadcasting and service registration for IP retransmission of BS digital satellite broadcasting are carried out off-line.
- (10) The registration completion process is performed on the assumption that basic registration, service registration for IP retransmission of digital terrestrial television broadcasting and service registration for IP retransmission of BS digital satellite broadcasting are carried out offline.
- (11) The registration completion process and subscription completion process are performed on the assumption that basic registration, service subscription, service registration for IP retransmission of digital terrestrial television broadcasting and service registration for IP retransmission of BS digital satellite broadcasting are carried out offline.
- (12) The basic registration procedures including entry of personal information are completed using a portal.
- (13) Basic registration, service subscription, service registration for IP retransmission of digital terrestrial television broadcasting, or service registration for IP retransmission of BS digital satellite broadcasting is cancelled.

These use cases should be classified while the processes of the functions described in L.1 to L.9 should be performed collectively based on each case. Figure Appendix-19 shows the use case classification and the process flow for various types of registration when performing integrated processes using registration confirmation documents.

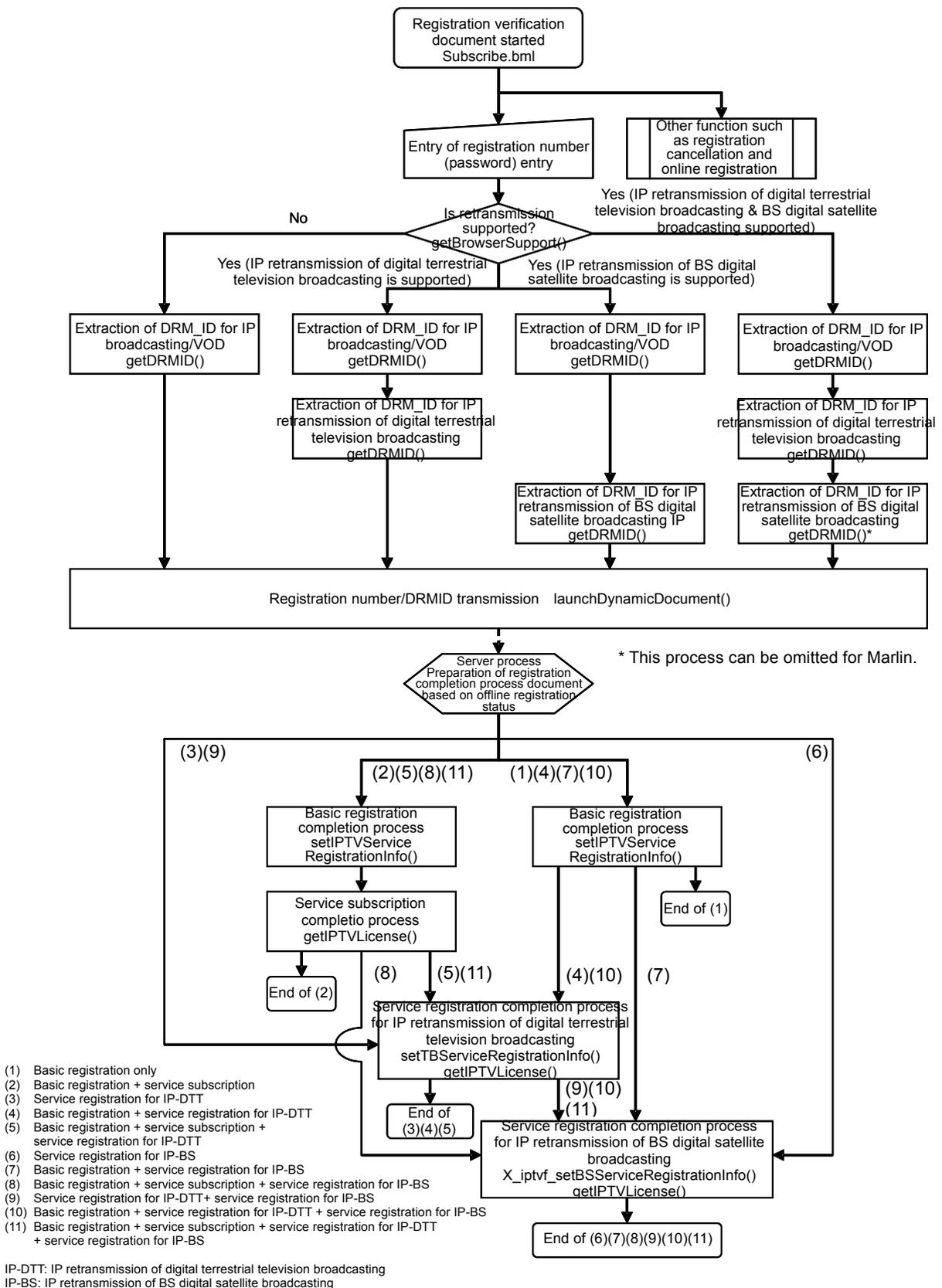


Figure Appendix-19 Example of Integrated Process Flow for Basic Registration/Service Subscription/Service Registration

The flow shown above is an example involving a service provider who provides all types of services (IP broadcasting/VOD services, IP retransmission services of digital terrestrial television broadcasting, and IP retransmission services of BS digital satellite broadcasting). Basically, subsets of the flow shown above can be used for providers who provide IP broadcasting/VOD services only, providers who provide IP retransmission services of digital terrestrial television broadcasting only and providers who provide IP retransmissions services of BS digital satellite broadcasting only.

#### L.11 Synchronization Process for Basic Registration/Service Subscription

Basic registration, service subscription and cancellation are provided as portal functions. In the result, registration and cancellation are processed on the server while settings are made on receivers to make ECG, EPG and contents available for use. Therefore, registration and subscription statuses should always be synchronized between the server and receiver. On the other hand, it is assumed that synchronization is not always possible in some cases such as when registration procedures are completed offline while the registration completion process based on the user's receiver operation is not performed. In order for receivers to behave as expected, it is desirable that portals support synchronization in these cases. For example, the following synchronization process can be performed after the receiver accessed a portal and performed user authentication. When it is found that basic registration is completed on the server side while registration is not completed on the receiver side using the `checkIPTVServiceRegistrationInfo()` function, the status of the receiver side should be changed to registered using the `setIPTVServiceRegistrationInfo()` function. Also, when it is found that a contract is concluded on the server side but it is not on the receiver side for an IP broadcasting service using the `getIPTVLicenseInfo()` function, the service becomes available only when license acquisition is performed by executing the `getIPTVLicense()` function. For a VOD service, it is possible to synchronize with the server by executing the `setContentPackageInfo()` function or the `setSelectedLicenseInfo()` function when a select package contract is effective, as the occasion may demand. Synchronization with the server is established by executing the `updatePackageLicenseInfo()` function once. These synchronization processes prevent inconsistency in content availability display and judgment in ECG and EPG, etc. in any case.

#### L.12 Portal Presentation According to Status of Service Registration/Subscription

In a portal, a service provider should provide a customized content navigation screen based on the user authentication result with renewed contract status information for each user that is managed by the provider without depending on the information preset on the receiver.

## [Appendix M] Guidelines for Parental Control Function in Portal

In a portal, the parental control function can restrict display and purchase, etc. of applicable contents based on the user's intention when a portal site contains contents with viewing age restrictions (adult-themed contents, R-rated contents). This function is based on the user's intention and relationship between the user and the provider based on preceding authentication and is essential to provide reliable contents and services. This section presents the guidelines to deliver the parental control function in a portal. It is desirable to deliver a function that is similar to the parental control function in a portal in resident applications such as ECG and EPG.

### M.1 Concept of Parental Control in IP Broadcasting/VOD Services

- (1) The parental control should allow people in parental authority to control the contents that they do not want to show to or allow to be purchased by users who share the same receiver and should be protected (mainly children).
- (2) The parental control should allow people in parental authority to choose not to view the contents themselves if they dislike the contents.  
This applies when "the viewing procedures for contents with viewing age restriction are verified" for each user (contractant) in advance when the provider transmits contents with viewing restrictions.

### M.2 Functional Overview of Parental Control in Portal

In order to deliver the parental control function in a portal, the following three items should be preset on the receiver.

- (1) Parental level (minimum age for viewing)
- (2) Parental password (security code)
- (3) Parental control restriction state

(The state in which display of contents with viewing age restriction is limited is referred to as "with viewing restriction", and the state in which display of contents with viewing age restriction is not limited is referred to as "no viewing restriction".)

In addition, the parental rate should be described as a script in the BML contents for portal display.

The parental control function compares the parental level and parental rate. When the value of the parental rate exceeds the value of the parental level, it partially restricts display in a portal such as the purchase button, preview button and content titles for contents with viewing age restriction according to the specifications including the following specifications described in the BML contents.

- (1) Hide
- (2) Rewrite content
- (3) Disable button selection
- (4) Mask display

M.3 Notice on Providing Parental Control Function in Portal

3.3.1.7 defines that the desirable factory default settings of receivers are "with viewing restriction" (parental control restriction) and equivalent to 19 (parental level). This does not guarantee that the parental level is always set to 19 in the factory default settings. A value other than 4 to 20 may be set. Therefore, portals need to acknowledge the possibility that a value other than 4 to 20 may be returned when the age setting value of a receiver is confirmed using readPersistentArray().

ReadPersistentArray() cannot be used in a site that is in the IPTVunmanaged state. Therefore, when transition is made from a site in the IPTVmanaged state to a site in the IPTVunmanaged state, the value of parental control restriction status and the value of parental level should be passed. When the handing over of these value is not guaranteed, it is desirable that the site in the IPTVunmanaged state manages the parental level independently.

M.4 Parental Control Status for Portal Service and Allowed Behavior of Receiver

Table Appendix-8 shows the relationship between the parental control restriction statuses of portal and allowed operations on receivers.

The meaning of the marks in the table is as follows:

○: Allowed, △: Parental password required, ×: Not allowed

Prerequisite: Viewing procedures for contents with viewing age restriction are completed				
Signal (R)	Receiver setting (*1) (age)		Display (list, link)	Play/preview
20 (*3) (adult-themed)	No viewing restriction		○	○
	With viewing restriction	20	○	○
		4~19	×	×
12~19	No viewing restriction		○	○
	With viewing restriction	age<R	○	△(*2)
		R≤age	○	○
4~11	No viewing restriction		○	○
	With viewing restriction	4~20	○	○

Table Appendix-8 Parental Control Restriction Status of Portal and Allowed Receiver Operation

- (\*1) The above table lists the control specifications for the parental control. GUIs to set the parental control function of receivers are implementation-dependent.
- (\*2) The period during which restriction can be removed temporarily by password authentication is implementation-dependent. However, with "age ≤ 19" setting, only R ≤ 19 contents can be presented, searched, and viewed when the restriction is removed temporarily by password authentication, and R20 (adult-themed) contents cannot be presented or used.
- (\*3) In IP broadcasting, R=20 is applied to general programs (digital TV services). For more information, see IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 3 "Receiver Model".

The parental control for presentation, playback, preview and purchase is used across ECG and EPG. However, the purchase process is performed only in portals. Table Appendix-8 does not mention about purchase, but whether a password is required or not for purchase varies depending on the provider.

## M.5 Example on Providing Parental Control Function in Portal

### M.5.1 Example of Sequence of Parental Control Status Confirmation (1)

Figure Appendix-20 is an example of a sequence to filter a content list shown on a receiver using a browser according to the parental control information that is set on the receiver. When a user selects BML contents in a portal, the browser accesses the portal server and obtains the BML contents including the parental rate. The browser starts the `readPersistentArray(parentallevel)` function, accesses the internal memory of the receiver (NVRAM) and reads the preset parental level value and parental control restriction status value. The browser presents appropriate BML contents using these read values according to the script described in the BML contents.

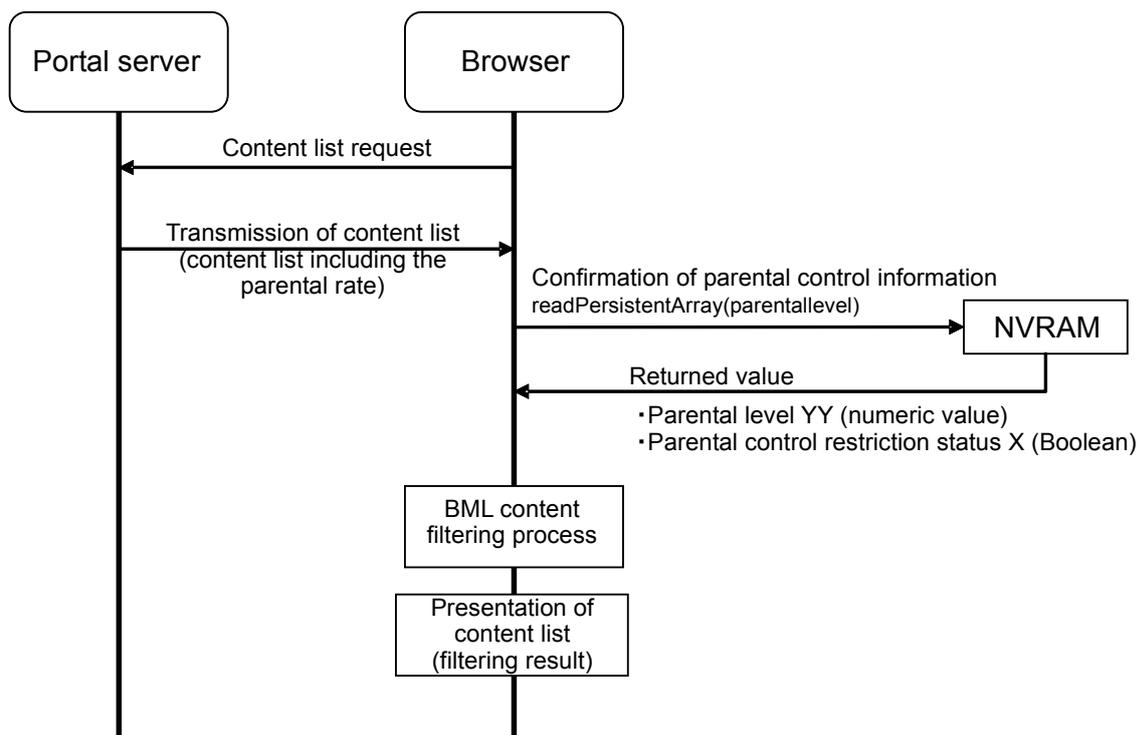


Figure Appendix-20 Example of Sequence of Parental Control Status Confirmation (1)

### M.5.2 Example of Sequence of Parental Control Status Confirmation (2)

Figure Appendix-21 is an example of a sequence to send the parental control information that is set on the receiver to the portal server and filters a content list (BML contents) to be presented in the receiver's browser on the portal server in advance. A feature of this sequence is that transmission of unnecessary contents can be prevented by sending the parental level and parental control restriction status as the BML content acquisition condition when accessing the portal server. However, sending information (parental control restriction status, etc.) each time the BML content is obtained is complicated, so sessions between the browser and the portal server must be retained using cookies to maintain the required user information continuously.

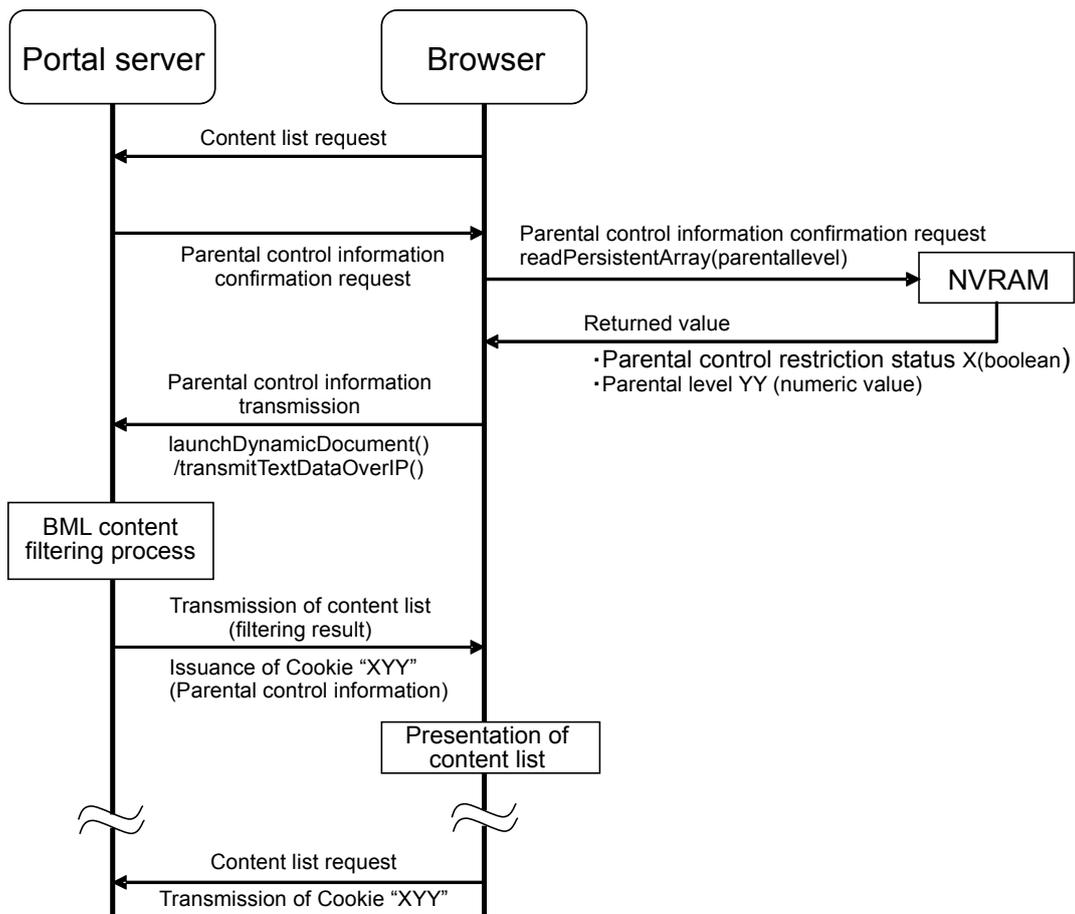


Figure Appendix-21 Example of Sequence of Parental Control Status Confirmation (2)

### M.5.3 Example Sequence of Parental Control Password Confirmation

Figure Appendix 22 shows an example of a sequence in which a user purchases contents with viewing age restriction (parental rate = 18) when the parental control restriction status is set to "with viewing restriction" and the parental level (minimum viewing age) is set to 15. Under the above conditions, the parental password must be verified when the contents are purchased according to the specifications listed in Table Appendix-8. In the following example, the contents can be viewed if the parental password is entered and verified even when the parental rate is larger than the parental level.

When the user selects to preview/play back contents with viewing age restriction in the browser, the portal server sends the BML document including `checkParentalCtrlPassword()` to the browser to request parental password confirmation. Upon receipt, the browser starts `checkParentalCtrlPassword()` and displays the parental password entry request in the resident application screen. When the user enters a parental password, the resident application verifies whether the value entered by the user matches the parental password saved in NVRAM. The parental password confirmation result is sent to the portal server via the browser. The portal server performs the preview and playback process according to the sent parental password confirmation result. Also, for the parental password confirmation result, the parental control

information can be stored as the session cookie information as with the sequence shown in Figure Appendix-21 to simplify the password confirmation sequence.

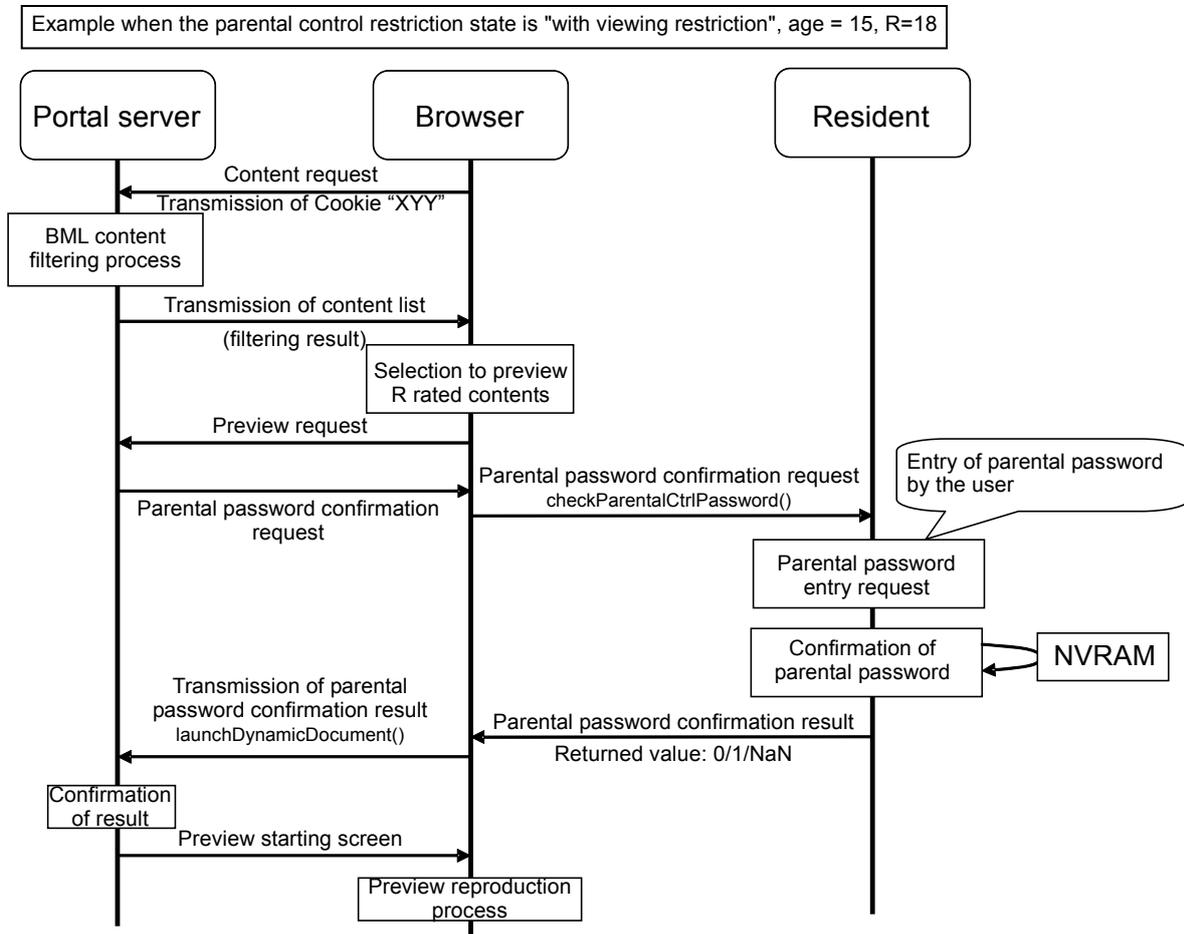


Figure Appendix 22 Example Sequence of Parental Control Password Confirmation

## [Appendix N] Guidelines on Decision Process in Portal Documents for *d* Button

### N.1 Role of *d* Button and Necessity of Decision Process

[Appendix S] "Annotation: Implementation Method of Pseudo BML Data Broadcasting" describes the implementation of pseudo BML data broadcasting using the *d* button. However, in this document, the *d* button is pressed by users in cases other than when pseudo BML data broadcasting is viewed.

In this document, it is defined that receivers should display a message to prompt users to connect to a portal by pressing the *d* button when the corresponding channel cannot be decoded using the MC license held by the DRM client due to lack of a contract or unrenewed status, etc. upon selection of the channel, unlike BS/110°CS digital broadcasting which guides users to a CA replacement service (information channel). (See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 3 "Receiver Model".)

In this case, the access destination is the same URL that is to be accessed by pressing the *d* button with the aim to select/view the channel under normal conditions and to simply display the pseudo BML data broadcasting screen (URL listed in the BIT hyperlink descriptor, see [Appendix S] "Annotation: Implementation Method of Pseudo BML Data Broadcasting"). Therefore, screens to be displayed should be differentiated in the portal contents (document) to be accessed.

The following situations exist in which the *d* button can be pressed to access a portal under normal conditions.

- (1) A user who has a license and view the channel properly presses the *d* button to display a pseudo BML data broadcasting screen described in [Appendix S] "Annotation: Implementation Method of Pseudo BML Data Broadcasting".
- (2) A user who hasn't subscribed to the service (including the viewing right for the channel) presses the *d* button by following the message displayed on a receiver when the channel is selected.
- (3) A user who has subscribed to the service (including viewing rights) but cannot view the channel due to the unrenewed license\* presses the *d* button by following the message displayed on a receiver when the channel is selected.

\* "Normal conditions" include when service subscription is performed offline and when a contractant owning multiple receivers subscribes to a service using another receiver.

The guidelines for judging the situations and displaying suitable screens are as follows.

### N.2 Guidelines on Decision Process in Portal Documents for *d* Button

Figure Appendix-23 presents a flow chart of a decision process to display suitable information in a portal content (document) to be obtained by a receiver with the *d* button according to different situations described in the previous section. The script including the decision process should be designed to be executed simultaneously when the document is read (onload) so that the decision process becomes transparent to users.

The series of decision processes shown in Figure Appendix-23 do not have to be completed in one document. If needed, they can be moved to and executed in other documents using `launchDocument()` and `launchDynamicDocument()` according to the circumstances of content production as long as the overall process is transparent to users.

(1) to (10) in the figure correspond to the explanations that follow the figure.

Browser is started by pressing the *d* button during IP broadcasting channel selection

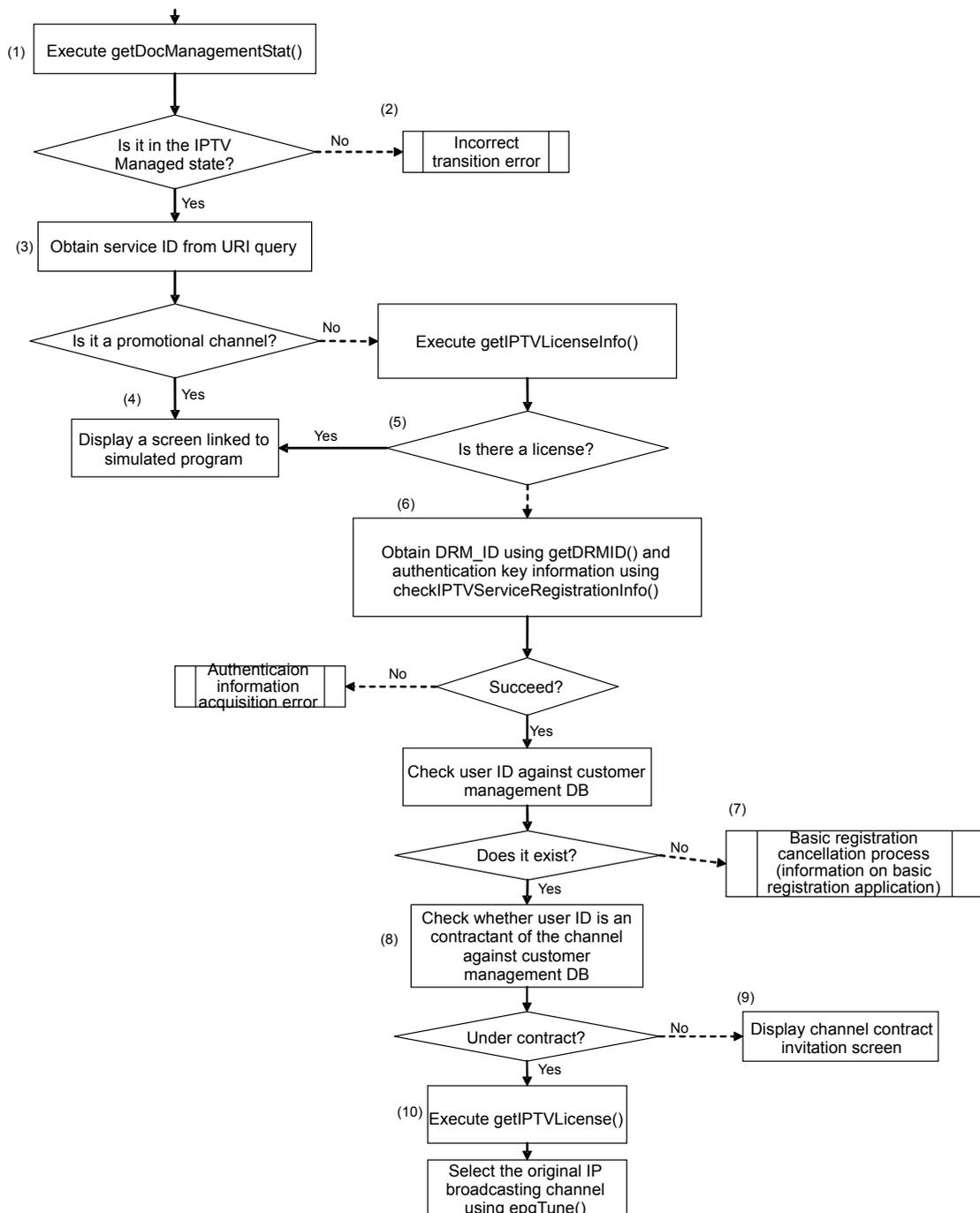


Figure Appendix-23 Guidelines on Decision Process in Portal Documents Displayed Using *d* Button

- (1) The IPTV managed state is confirmed using the `getDocManagementStat()` function to enable execution of functions that are only executable in the IPTV managed state in the following processes.
- (2) The IPTV unmanaged state is regarded as an error because all access made using the *d* button should be in the IPTV managed state.

- (3) The service ID added to the URI as a query string is obtained, and the selected channel is identified based on the specifications defined in 6.5.3.3 "Operation of Portal Access Following Pushing of Button While Viewing IP Broadcasting Service".
- (4) Unencrypted promotional channels can be decided as viewable regardless of the license status, so the pseudo BML data broadcasting screen can be displayed immediately for a promotional channel. \*1
- (5) Channels other than promotional channels are encrypted, and whether they can be decoded/viewed depends on the license status. Therefore, when the license status of a receiver is confirmed using `getIPTVLicenseInfo()` and the license indicates that the channel is viewable, the screen linked to pseudo BML data broadcasting is displayed. \*2
- (6) When it was decided to be not viewable in the preceding item, it can be judged as (1) or (2) as described in S.1. In order to identify which is applicable, the contractant must be identified. Perform the process related to user authentication described in [Appendix V] Annotation: User Authentication in Portal Service". Obtain DRM\_ID and authentication key information using the `getDRMID()` function and `checkIPTVServiceRegistrationInfo()` function, and send the obtained information using the `transmitTextDataOverIP()` function, etc.
- (7) When user authentication is not possible with the obtained user authentication information on the customer management DB, it is assumed that the basic registration application is not processed on the receiver or that an application for basic registration cancellation is lodged. Considering that the number of IP broadcasting service providers will increase in the future, it is desirable to make only promotional channels selectable for IP broadcasting provided by the service providers for which basic registration is not processed. However, depending on the implementation-dependent configuration, it is also possible that selection of a channel other than promotional channels is attempted without basic registration. Therefore, the screen displayed here should maintain a link to a basic registration application with on assumption that the screen is designed for receivers that have lodged an application for basic registration cancellation to the service provider, for which basic registration cancellation has not been processed in the receivers for some reason.
- (8) When basic registration is completed for the receiver, confirm whether the contractant has actually completed service subscription for the channel within the service provider.
- (9) When service subscription is not completed, it can be judged as (2) as described in S.1 "Overview of Pseudo BML Data Broadcasting", and the screen to request service subscription is displayed.
- (10) When service subscription is completed, it can be judged as (3) as described in S.1 "Overview of Pseudo BML Data Broadcasting" The license renewal is instructed using a script (the `getIPTVLicense()` function).

\*1: In cases such as when a contractant who is already using the service bought an additional receiver at home, and when the receiver only allows a user to select IP broadcasting promotional channels of service providers for which basic registration is not completed based on the receiver's implementation-dependent configuration, the contractant may have no choice but to select a promotional channel. Screens linked to simulated programs for promotional channel should take into account such cases.

\*2: It is assumed that there are cases in which the license status is not synchronized with the actual contract such as when cancellation is processed offline or when the contract was cancelled using a different receiver. Note that it is not technically guaranteed to prevent viewing until the license is renewed when cancellation is processed in these ways, and services should be provided accordingly.

## [Appendix O] Guidelines on Purchase Process Using ECG

### O.1 Contents Purchase Process on Portal Server

Based on the metadata obtained from the metadata server, users can search contents across service providers using ECG, which is a resident function. In ECG, purchased contents can be played back. For unpurchased contents, the purchase process should be performed in portal contents (BML) with the BML browser for IPTV which is started and ordered to connect to the server of PricingServerURL by the ECG according to 3.3.3.2.6 "Purchasing Content Packages". The main purpose of portal contents as transition destinations from ECG is to process purchase, and the following service requirements should be satisfied for content purchase.

- (1) Contents (packages) to be purchased can be identified.
- (2) Users can be identified through user authentication

Also, portal contents need to provide a means for the user to return to ECG from the BML browser for IPTV during the purchase process and after the purchase process is complete. Therefore, portal contents should provide a function and have a design that satisfies the following condition.

- (3) A mechanism to return to ECG from portal contents should be provided.

In order to satisfy (3), receiver functions related to ECG should be confirmed in portal contents, and by using the `getBrowserSupport()` function, the method to start ECG based on the receiver functions can be presented. However, the mechanism to return to ECG from portal contents should only be presented in portal contents switched from ECG and should not be used to start ECG as a transition destination in the portal content started using the portal button, the *d* button, etc.

Figure Appendix-24 shows examples of screens and transition when transition is made from ECG to a portal content for purchasing contents. For more details on the processes performed in a portal content during transition from (1) to (4) in the figure, see the next section O.2 "Guidelines on Decision Process for Contents Purchase on Portal Server".

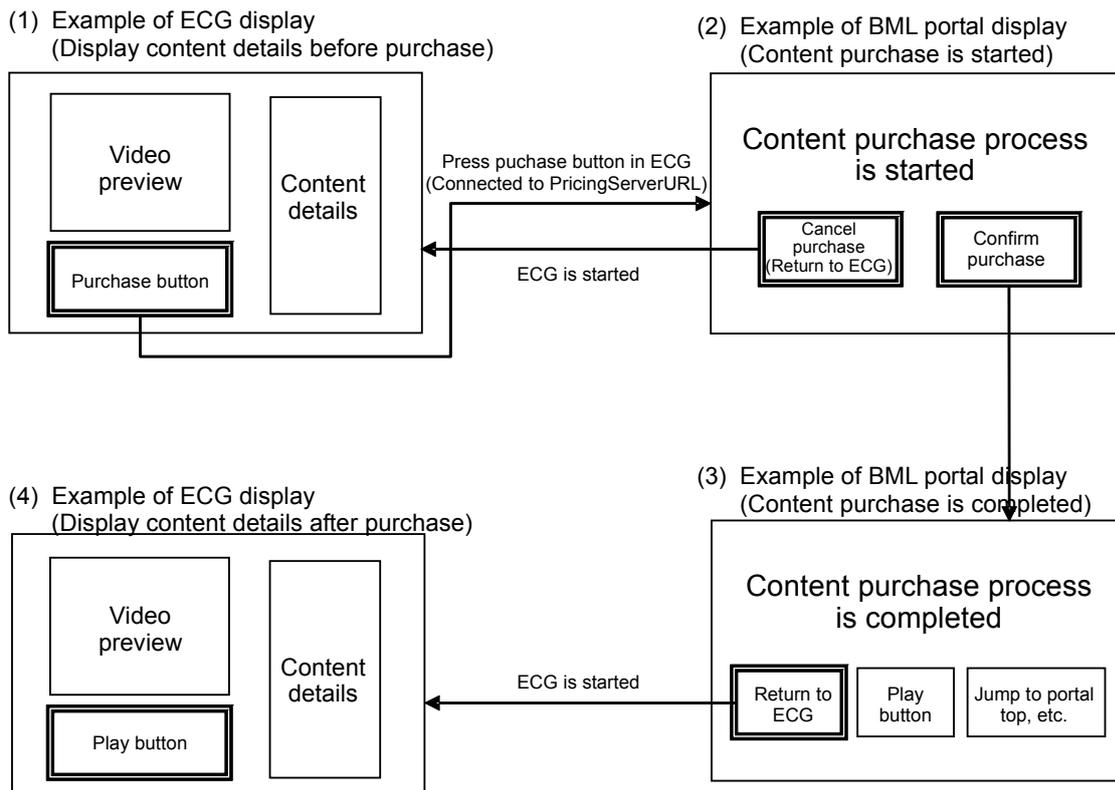


Figure Appendix-24 Example of Screen Transition for Content Purchase Using ECG

O.2 Guidelines on Decision Process for Contents Purchase on Portal Server

Figure Appendix-25 shows an example of the process performed when a receiver is connected to the portal server from ECG for content purchase.

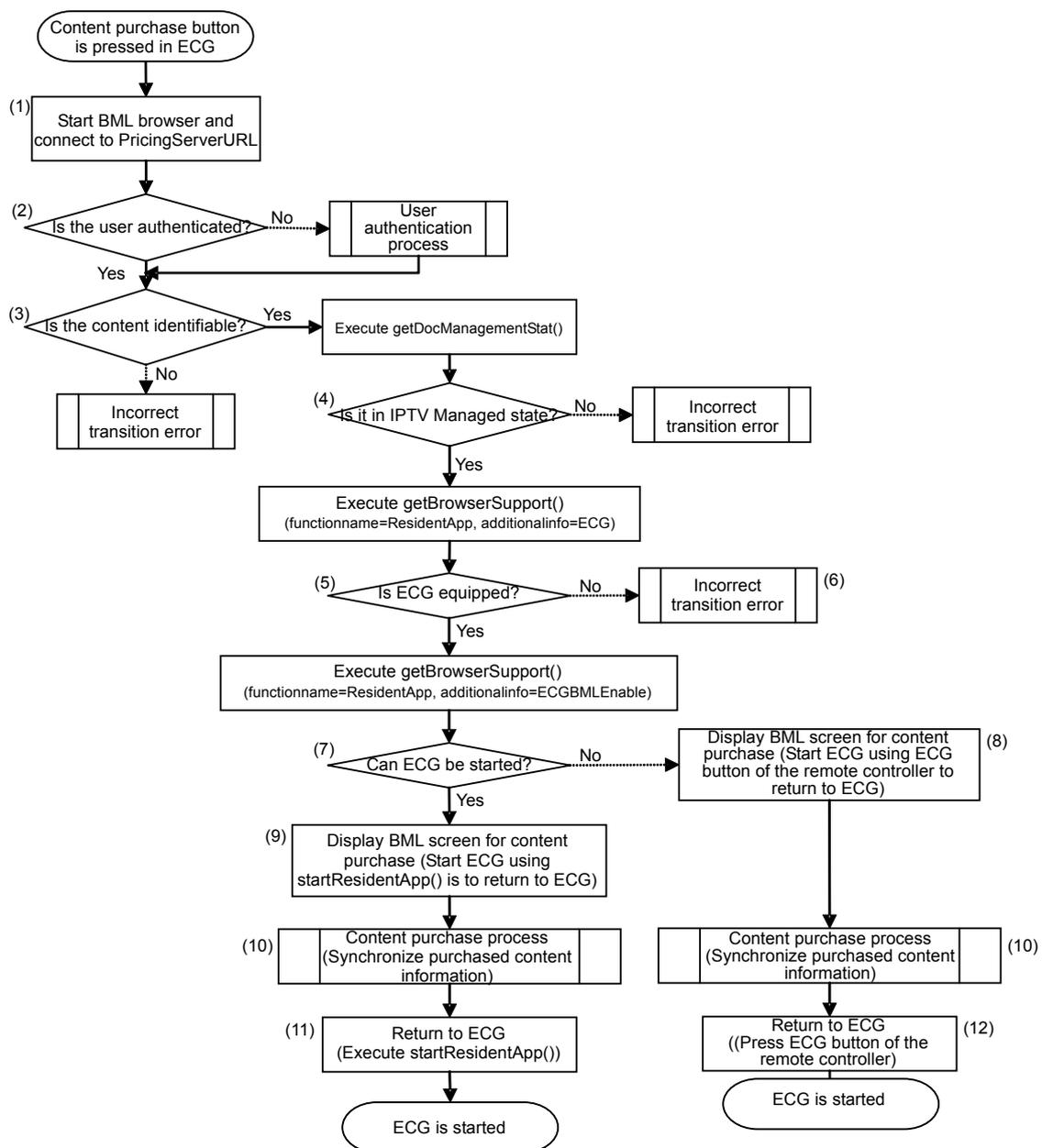


Figure Appendix-25 Guidelines on Decision Process for Contents Purchase on Portal Server

- (1) The BML browser for IPTV is started as the transition destination of ECG to connect to PricingServerURL as described in 3.3.3.2.6 "Purchasing Content Packages".
- (2) Whether the user is authenticated in advance or not is checked using cookies, etc. as user identification is required for content purchase. When the user is not authenticated in advance or when the authentication result is not stored as a cookie, the user authentication process is performed.
- (3) The content (package) for which the purchase process should be performed is identified based on the URL used for the portal server connection. When multiple content packages include the same content, the portal content display can provide such information so that the user can select and purchase from multiple content packages.

- (4) The IPTV managed state is confirmed using the `getDocManagementStat()` function to enable execution of functions that are only executable in the IPTV managed state in the following processes.
- (5) Whether the ECG function is equipped with the receiver is checked using the `getBrowserSupport()` function.
- (6) This flow assumes transition from ECG to the portal server through connection using `PricingServerURL`. If the ECG function is not equipped with the receiver in (5), it is regarded as an error.
- (7) Whether ECG can be started from the portal content using the `startResidentApp()` function is checked using the `getBrowserSupport()` function.
- (8) To return to ECG during the purchase process because the receiver cannot start ECG from the portal content, the user must press the ECG button of the remote controller. The portal contents should display that manner explicitly.
- (9) To return to ECG during the purchase process because the receiver can start the portal content in ECG, ECG is started in the portal content using the `startResidentApp()` function.
- (10) When the content purchase process is completed, the `setContentPackageInfo()` function, the `setSelectedLicenseInfo()` function and the `updatePackageLicenseInfo()` function are executed in the portal content as needed to synchronize the purchase information on the receiver with the server.
- (11) The `startResidentApp()` function is executed to return to ECG from the portal content.
- (12) The user presses the ECG button to return to ECG from the portal content.

### O.3 Guidelines for Creation of Purchase Process BML Document Sequence

The BML document that is obtained by connecting to `PricingServerURL` from ECG and a series of BML documents that serve as transition destinations for the obtained document for the purchase process are defined collectively as the purchase process BML document sequence. Points to note for creation of the purchase process BML document sequence are as follows.

- This is for the exclusive use of purchase. (Messages on ECG buttons such as "Proceed to purchase screen" should not sound unreasonable to users.)
- Whether ECG can be started from the portal content should be checked. If it is possible, more than one operational procedure to return to ECG must be provided for the browsers in the purchase process BML document sequence. Specifically, the `getBrowserSupport()` function in which `functionname` is set to "ResidentApp" and `additionalinfo` is set to "ECGBMLEnable" is executed. In the browsers that returned "1", an operational procedure such as "Return button" is presented. By this operation, the `startResidentApp()` function in which `appName` is set to "ECG" and `Ex_info` is set to "Resume" should be executed.
- Basically, the document sequence should be a closed sequence. However, links to an external BML document such as the top page of the provider's portal are allowed. Links to a BML document in the purchase process document sequence from an external BML document should not be set. Also, BML documents in the purchase process document sequence should not be shared with other BML documents in the portal.
- In the document sequence, transition can be made to the VOD playback screen (full-screen preview) using the `launchIPTVContent()` function. In this case, the BML document obtained from `ret_uri` that is set for the argument of the above function

should also be part of the purchase process document sequence. However, note that returning to the original ECG screen is not possible for some receiver implementations when Ex\_info is set to "Resume" if the startResidentApp() function is executed in the document obtained from ret\_uri and the document sequence to which transition is made. (Therefore, VOD playback using the object element is more desirable than using launchIPTVContent().)

## [Appendix P] Guidelines on Operation Model for ECG Metadata Information Element to Be Standardized among Service Providers

The operation model for information elements that should be standardized among service providers is as follows.

- Operating criteria for recommended contents  
(`"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPromotionalTypeCS:1"`)

Providers can specify contents as recommended contents by setting the classification dictionary item in the `PromotionalInformation/@href` attribute to `"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPromotionalTypeCS:1"`. As a guideline, the proportion of recommended contents should be 7% or less of all contents provided by a provider.

- Operating criteria for new contents  
(`"http://www.iptvforum.jp/cs/2008/07/IPTVSERVICEPromotionalTypeCS:2"`)

Providers can specify the new arrival period for contents using `Period[@type="new_arrival"]/Start`, End of PI and GI.

As a guideline, the new arrival period for contents should be 30 days or less since the contents (metadata) are published as new contents.

- Operating criteria for recommendation rating (Review/Rating/RatingValue element)

Providers can specify the recommendation rating for contents using the Review/Rating/RatingValue element. Follow the guidelines below when the recommendation rating is specified using the Rating/RatingValue element.

- The recommendation rating is presented as an integral value between 1 and 10. A content with a larger value is more recommended.
- Using the total number of contents for which the RatingValue element is registered as a parameter, the proportion of each RatingValue value should be as follows when setting the recommendation rating.

Table Appendix- 9 Applicable Proportion of Each RatingValue value

Value of RatingValue	Applicable proportion (%)
1	1 to 10, total of 100 or less
2	1 to 10, total of 100 or less
3	1 to 10, total of 100 or less
4	1 to 10, total of 100 or less
5	1 to 10, total of 100 or less
6	1 to 10, total of 100 or less
7	7 to 10, total of 93 or less
8	8 to 10, total of 69 or less

9	9 to 10, total of 31 or less
10	7 or less

## [Appendix Q] Annotation: Example Usage of Licensing Conditions Information for Select Package

When a user browses a content/content package list in a portal or ECG to purchase/view VOD contents, it is assumed that the licensing conditions information (whether the user has a license or not) for the corresponding contents and content packages is also displayed. The licensing conditions information can also be stored in receivers and presented to users as a ECG function. Figure Appendix-26 shows an example of the licensing conditions information operation when the content package sales type is "select" with monthly billing, monthly automatic contract renewal, 3 selectable contents and viewable period of 2 nights and 3 days.

When a user purchases a select package in a portal, information such as the package ID and the use start date is registered in the service provider's system and also written in the receiver. The use end date is not determined when the package is purchased, so it is not registered at this point. In the example shown in Figure Appendix-26, the user is given the right to view 3 contents when it turns April 1, and the user selects and views contents in April. When the user selects Content (a) in a portal, the content becomes available for viewing for 3 days. When the selection process is performed in the portal, the license ID, license expiration date and select expiration date for the license are registered on the service provider's system and receiver.

When the user selects Content (b) and Content (c) as well as Content (a), the number of selectable contents is reached, and the user needs to purchase other content packages such as a single item package to view more contents in April.

When it turns May 1, the record of having selected 3 contents in April is cleared based on the select expiration date of the license, and the user can again select up to 3 contents including Content (d) in the select package. In this example, the user has the right to view contents for 3 days for contents selected on April 30, like Content (c), as with other contents. In this case, the license expiration date becomes May 2. With this example, Content (c) should be available for viewing until May 2 even when the record of having selected 3 contents in April is cleared on May 1. Furthermore, the content superset from which contents are selected may be different between April and May, and Content (c) may become unselectable in May. In this case, the content should still be presented as an available content in the portal and ECG until May 2.

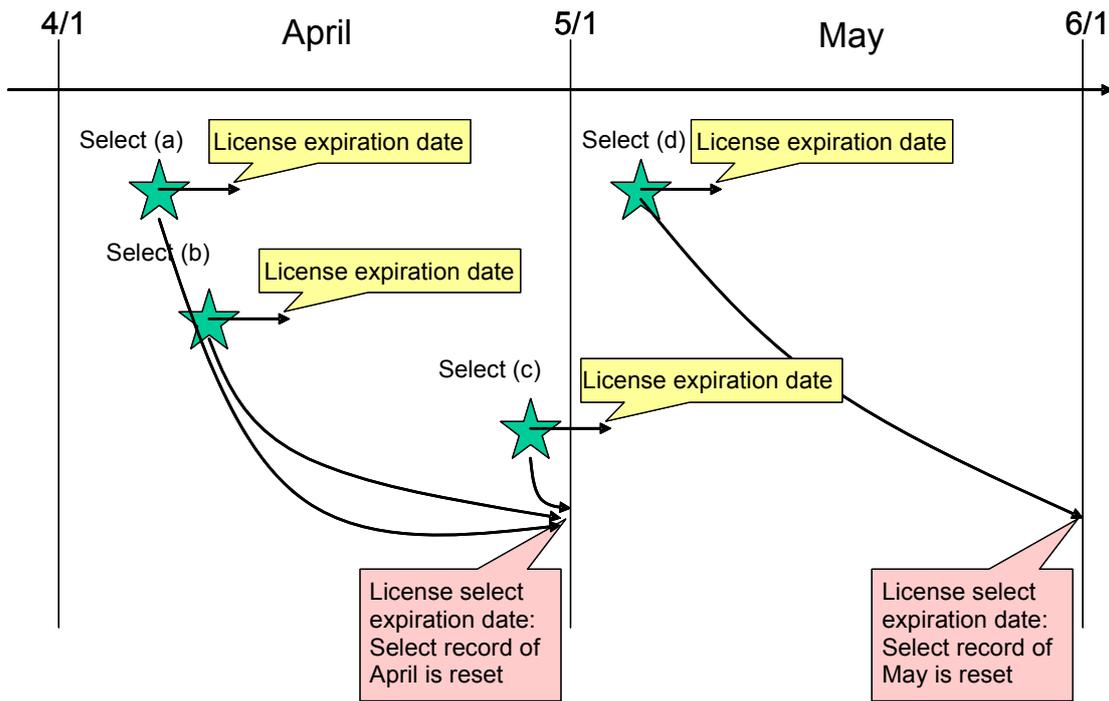


Figure Appendix-26 Example of Select Package Operation

[Appendix R] Annotation: Example of Content Playback Control Metafile

Content-Type: multipart/mixed; boundary="THIS\_STRING\_SEPARATES"  
Content-Length: 999

--THIS\_STRING\_SEPARATES

Content-Type: application/X-arib-resourceList;  
Content-Length: 999

<<Description of the resource list (binary)>>

--THIS\_STRING\_SEPARATES

Content-Type: text/xml; charset=UTF-8  
Content-Length: 999  
Content-Location: ContentA.eri

<<Description of ERI (XML)>>

--THIS\_STRING\_SEPARATES

Content-Type: text/xml; charset=UTF-8  
Content-Length: 999  
Content-Location: ContentA.lli

<<Description of LLI (XML)>>

--THIS\_STRING\_SEPARATES

Content-Type: text/xml; charset=UTF-8  
Content-Length: 999  
Content-Location: ContentA.nci

<<Description of NCI (XML)>>

--THIS\_STRING\_SEPARATES—

## [Appendix S] Annotation: Implementation Method of Pseudo BML Data Broadcasting

## S.1 Overview of Pseudo BML Data Broadcasting

This document does not include BML sent by the data carousel in the same TS streams as the main line broadcasting as with terrestrial/BS/110 degree CS digital broadcasting and data broadcasting closely linked to program contents using event messages.

However, this document includes service requirements that can be called "pseudo BML data broadcasting" shown below.

- Display an IP broadcast in the portal screen with an L-shaped display area based on user operation when the IP broadcast is selected and viewed in full screen.
- Provide moderate linkage between the information displayed in the portal screen and IP broadcast programs.
- Return to IP broadcast full-screen display based on user operation.

The above requirements are illustrated in Figure Appendix-27.

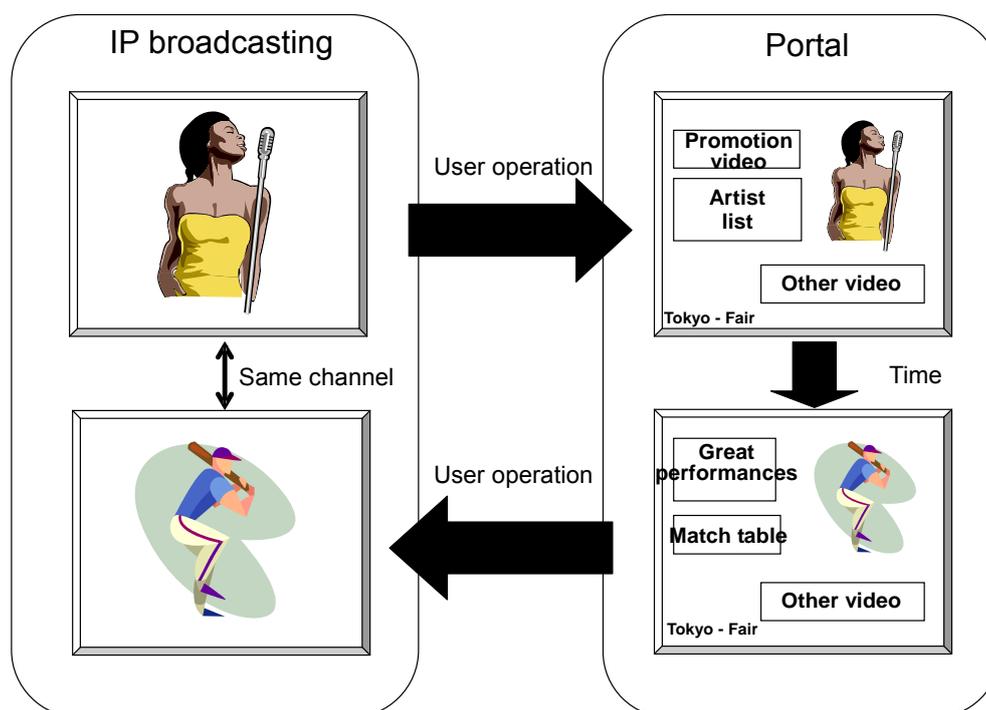


Figure Appendix-27 Illustration of Simulated Data Broadcasting

On the other hand, it does not mean that introduction of the "full-scale data broadcasting" used for terrestrial/BS/110 degree CS digital broadcasting in the future is denied. There is a possibility that it is added to the specifications in concert with a major revision of this document. In order to implement service transition smoothly from the pseudo BML data

broadcasting shown above, a requirement was added regarding the user operation shown in the figure that it should be performed using a special button (the *d* button of a remote control of a digital broadcasting receiver).

## S.2 Related Specifications and Background

In order to meet the service requirements described in the previous section, several technical specifications were added. By combining these technical specifications, the requirements can be met.

The first requirement (IP broadcast selection -> L-shaped display) can be met as follows.

- Use hyperlink descriptors in BIT. See IPTVFJ STD-0004 "IP Broadcasting Specifications", Chapter 7 "PSI/SI".
- When the *d* button is pressed while an IP broadcast is selected, start the browser, add a query string according to the specifications defined in 6.5.3.3 "Operation of Portal Access Following Pushing *d* Button While Viewing IP Broadcasting Service" and connect to the URI portal content described in the above hyperlink descriptor.
- In the above portal content, obtain the service ID of the IP broadcasting channel that was selected when the *d* button was pressed using the query string.
- Additionally, present the L-shaped display area in the portal screen by specifying the IP broadcasting channel identified above for the data attribute of the object element in which the type attribute is set to "application/X-arib-mpeg2-tts".

The second requirement (moderate linkage with programs) can be met as follows.

- Renew the above portal content information based on program schedule.
- Set automatic reacquisition of portal contents with the reloadActiveDocument() function using the timer functions of the ECMA script in portal contents to renew the information that is already displayed in the browser.

The third requirement (L-shaped display -> IP broadcast full-screen display) can be met as follows.

- Obtain the event that the *d* button is pressed with the portal contents and call an event handler. The event that the *d* button is pressed can be detected using the onoccur attribute of the beitem element in which the type attribute is set to "DataButtonPressed".
- Create a script to re-select the IP broadcasting channel shown in the L-shaped display with the epgTune() function as an event handler called in the above process.

In preparation for the above solutions, special consideration was given to the fact that hyperlink descriptors in BIT are set for each IP broadcaster and that screens should be configured according to the channel being viewed when the *d* button is selected for portal contents indicated by the same URI to provide pseudo BML data broadcasts on multiple channels. Therefore, in order to provide a means to obtain the channel number (service ID) selected last, an operation specification was defined in 6.5.3.3 "Operation of Portal Access Following Pushing *d* Button While Viewing IP Broadcasting Service" to add the service ID to URI as a query string on receivers.

However, the above means is only an example and does not deny other methods such as eliminating the need for distinction.

### S.3 Notice on Provisioning Service

Whether a portal is started from an IP broadcast using the *d* button or not is not defined for each channel. Therefore, service providers should assume that the *d* button is likely to be pressed and create portal contents even if they do not intend to provide pseudo BML data broadcasts on their channel.

Additionally, even when "full-scale data broadcasting" is added to the specifications in the future, portal contents for pseudo BML data broadcasting should be provided continuously for receivers that were manufactured before the addition. (However, this does not mean that the portal contents should be identical to "full-scale data broadcasts".) The *d* button may be pressed in cases other than pseudo BML data broadcasting described in this section. A distinction should be made between cases in the portal content that is accessed first when the *d* button is pressed. For information on the necessity of distinction and guidelines for the decision process, see [Appendix N] "Guidelines on Decision Process in Portal Documents for *d* Button".

## [Appendix T] Annotation: VOD Playback Control on Portal Service

### T.1 Type and Method of VOD Playback on Portal Service

The following two scenarios are assumed as methods to provide VOD to users from a portal.

- (1) To view VOD contents that are sold as products.
- (2) To embed and display VOD in an L-shaped frame as part of portal contents.

Simply stated, the above scenarios can be associated with the following descriptions in Chapter 6 "Specifications of BML for IPTV", respectively.

- (i) Starting an AV player using the `launchIPTVContent()` function  
(Specify the content playback control metafile URI for the first argument.)
- (ii) Display using the type attribute=`application/X-arib-contentPlayControl` of the object element  
(Specify the content playback control metafile URI for the data attribute.)

In both cases, the content playback control metafile URL should be specified as the starting point including ERI when VOD contents are referenced.

The relationship between the scenarios and technical specifications are as shown above. However, this does not necessarily mean that the scenario (1) cannot take reference method (ii). For example, VOD can be displayed in full screen over "transparent" portal contents containing no other display elements.

### T.2 Startup of Contents Playback

#### T.2.1 Playback Sequence

Figure Appendix-28 shows a model sequence from purchase of VOD to viewing of VOD in a portal. The section following the figure describes the sequence using the numbers in the figure.

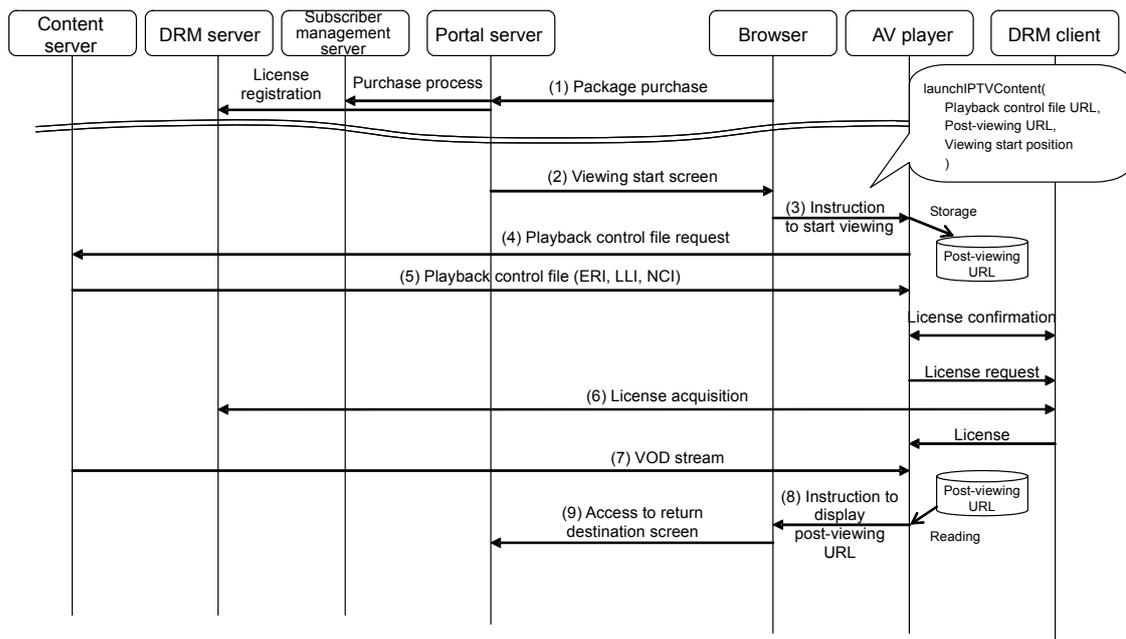


Figure Appendix-28 Model Sequence of VOD Viewing Using Portal

- (1) Prior to viewing of paid content, the user purchases a package including the right to view the content. For a detailed flow of package purchase and related processes, see [Appendix L] L.2 "Service Subscription".
- (2) When the service provider judges that the user has viewing rights based on the purchase information the service provider manages, the portal server issues the trigger to start viewing (the `launchIPTVContent()` function, etc.) to the browser. When the `launchIPTVContent()` function is used, at least, the URL to obtain the content playback control metafile for VOD, the URL of the portal server that browser should connect to after viewing, and the playback start position in the content should be specified as arguments. Also, when multiple licenses to play back the content exist, the license to be used by the receiver should be specified as needed.
- (3) When the `launchIPTVContent()` function is called, the browser starts the resident application (AV player) and passes the arguments.
- (4) The AV player stores the URL of the portal server that the browser should connect after viewing, connects to the URL of the specified video content server using HTTPS, and requests the content playback control metafile.
- (5) The video content server generates control information that includes ERI according to the contents based on the URL and the receiver, converts the information into multipart format and delivers it to the receiver.
- (6) The receiver obtains the license based on LLI in the content playback control metafile (and information specified by the portal, if any) via the DRM client.
- (7) The AV player connects to the server of video content server URL described in ERI using RTSP, requests VOD delivery and receives data.
- (8) After viewing, the AV player reads the portal server URL stored on the AV player, adds the process related to resume as described in [Appendix T] T.4.3 "Collecting/Storing Resume Information".

- (9) The browser connects to the portal server URL passed from the AV player and resumes the portal service.

### T.2.2 License Selection

The scheme to select a license to be obtained by a receiver is judged actively on the receiver with ECG when multiple licenses are included in LLI as described in Chapter 3 "Receiver Specifications". However, when contents are started from a portal, the provider should select a license to be acquired and clearly indicate it to the receiver. As described in the previous section on the sequence, the license ID to be used by a receiver can be specified as an argument of the `launchIPTVContent()` function. Therefore, it is possible to clearly indicate the license that can actually be obtained using a function.

On the other hand, when VOD is started as an object element in portal contents, there is no mechanism to specify a license as an attribute of the object element. When multiple licenses exist for one content, the scenario (1) (viewing of paid contents) in T.1 of this appendix is assumed, in which the starting method using `launchIPTVContent()` is typically employed.

However, it is possible to start contents supported by multiple licenses as object elements using the following solutions.

- Prepare multiple URLs for the content playback control metafile (including when distinctions are made on the query parameter level) while only 1 license ID is listed in LLI, respectively. Describe a proper URL in the data attribute of the object element based on the user's purchase status on the portal server and provide it to the browser.
- Identify the user, and generate LLI containing a proper license ID that corresponds to the user's purchase status when the content playback control metafile is obtained.

### T.3 Playback Control of VOD Content with Object Element

When VOD content is played back as an object element, it is desirable that one of the following two policies is selected exclusively as the content playback control for the VOD content.

- (1) Control using DOM API from the BML contents.
- (2) Control by operating the VOD playback control keys on a remote controller.

It is desirable that selection is exclusive to avoid confusion among users by causing inconsistency in the information displayed using the BML contents due to the transition of video statuses through remote control operations.

When playback is controlled exclusively from the BML contents, the `used-key-list` property must be used to mask the key-group showing the VOD playback control keys defined in 6.4.1.7 "Operation of `used-key-list`".

The following section describes the case in which playback is controlled from the BML contents using DOM API.

### T.3.1 Playback

VOD contents can be started automatically on the browser by specifying the value of the streamstatus attribute to "play" when portal contents are delivered.

On the other hand, to stop portal contents in the initial display and start playback using operation of keys and timer that can be obtained by the browser as a trigger, start of VOD content playback can be controlled from portal contents by specifying the streamstatus attribute to "stop" initially, using a script after the trigger to access the streamstatus attribute using DOM API and changing the attribute to "play".

### T.3.2 Pause

As with starting playback, It is possible to pause during playback of VOD contents based on user operation, by changing the streamstatus attribute to "pause" using DOM API and, for example, by providing a pause button as an image in the portal contents.

### T.3.3 Stop

When playback is finished on an AV player such as when a content is played back until the end, the streamstatus attribute is changed to "stop" automatically. (See 6.4.3.2.1 "Operation of Attributes" Table 6-15 Note 3.)

Also, an AV player can be stopped from portal contents by changing the streamstatus attribute to "stop" using DOM API as with starting playback and pausing.

### T.3.4 Trick Playback

This section explains the two playback controls related to trick play described in IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol" and their behaviors when contents are started as object elements.

#### (1) Jump playback

Jump playback enables playback of contents from any point by performing the control in which the time to start delivery on the content server is specified by the AV player. Derived functions include reviewing (resume) from the position where viewing was stopped previously and jumping to a chapter start point based on chapter information provided by providers. T.4 "Implementation Method of Resume " describes details of resume.

The playback start position can be specified as the streamposition attribute from portal contents. However, the streamposition attribute can only be specified as the initial value as defined in 6.4.3.2.1 "Operation of Attributes" Table 6-15 and 6.4.3.2.2 "Guidelines on Presentation Behavior" Table 6-17, and accessing/writing the attribute using DOM API is not allowed. Therefore, the function enabled by jump playback that can be controlled from portal contents is limited.

Contents can be started from the beginning of a chapter (chapter jump) by specifying the chapter start position as the initial value of the streamposition attribute. However, in order to provide the jump function during content playback that is already started, playback must be

stopped, and portal contents for which the streamposition attribute is re-specified should be read again. In this case, information such as the content playback control metafile and DRM license must be obtained again, and it is assumed that it requires time to resume viewing.

(2) Fast-forwarding/fast-rewinding

Fast-forwarding/fast-rewinding cannot be controlled from portal contents.

### T.3.5 Displaying Progress Bar During Playback

In IPTVFJ STD-0002 "VOD Specifications", Chapter 4 "Video Streaming Protocol", it is defined that the time position in contents being played back (NPT: Normal Play Time) is notified only in the PAUSE response from the server, and no specification is defined on the technical method to allow AV players to acknowledge it in real time. Also, it is defined in 6.4.3.2.2 "Guidelines on Presentation Behavior" Table 6-17 that browsers do not read the streamposition attribute when the streamstatus attribute is set to "play". Therefore, strictly speaking, a progress bar cannot be displayed in real time while paused positions and stopped positions can be displayed in portal contents.

## T.4 Implementation Method of Resume Playback

### T.4.1 Concept of Resume Playback

The resume service is to provide a function to start VOD contents that were viewed partway from the position where viewing was stopped previously without the need to seek operations by users. Resume is different from pause in the sense that it involves a long break (sometimes days) and other operations such as viewing other contents.

Furthermore, the resume function provided as a portal service does not need to be designed for one user vs. one receiver considering its characteristics. A single user should be able to receive the service on multiple receivers using the user's resume information. In other words, a user can watch a movie partway in the living room and resume it later in the bedroom in the same household (a single contractant).

### T.4.2 Resume Playback and ECG

In addition to a button to start viewing a content (using launchIPTVContent()) in a portal, a link to start viewing the content from ECG is also assumed. It is also possible to provide 2 links, for example, to view the content in a portal immediately after purchase and view the content using ECG when resuming. However, basically, ECG is an independent function of receivers while portal services are planned by service providers and can handle multiple receivers under the same contract. Advanced linkage related to the resume function between ECG and portal services is not expected as it is regarded as an issue that requires no special specification.

### T.4.3 Collecting/Storing Resume Information

As shown in Figure Appendix-28, the time that the user stopped playback is only known to the video content server or the AV player in the system model.

On the other hand, the resume function as a portal service can be provided across receivers as described at the end of T.4.1 "Concept of Resume". Also, the video content server delivers AV resources using RTSP/RTP and is physically comprised of multiple servers to share load and increase failure tolerance. It is generally believed that there is no guarantee that contents are delivered from the same server when playback is resumed.

Therefore, it is justified that resume information is managed on the subscriber management server behind the portal server, which necessitates information transmission from the video content server or AV player.

Another issue is that no specification is defined on the mechanism to identify users when the video content server delivers contents to the AV player after RTSP communication. Therefore, a mechanism to associate the playback stop position information (resume position information) and the user must be formulated based on the user identification information obtained as a result of authentication in the previous step using service's own implementation (such as URL encoding using the RTSP schema) according to the existing specifications.

It is natural that collection of playback stop position information from the video content server is included in provider's service categories. However, it is generally believed that video content servers (RTSP/RTP servers) are dispersed geographically, and it is easy to imagine that collection of information in real time becomes more difficult as the system scale increases.

Also, it is not a realistic solution to define a scheme to upload information directly from an AV player because it requires an additional process that is largely different from a simple content playback process, making the resume service itself an option.

Given these factors, the specifications described in 7.3.2.3 "Setting Additional Parameters to URI for Reopening Browser after Termination of " were defined, in which the AV player adds stop position information to the post-viewing return destination URL as a parameter (StopPos) on the browser when contents are started using the launchIPTVContent() function. Figure Appendix-29 illustrates the sequence model for playback position collection that is enabled by these specifications. By using this method, the stop position is sent via a browser, an application loaded with a number of user identification mechanisms. This method also provides many simple solutions to another issue about linking user information and stop position information.

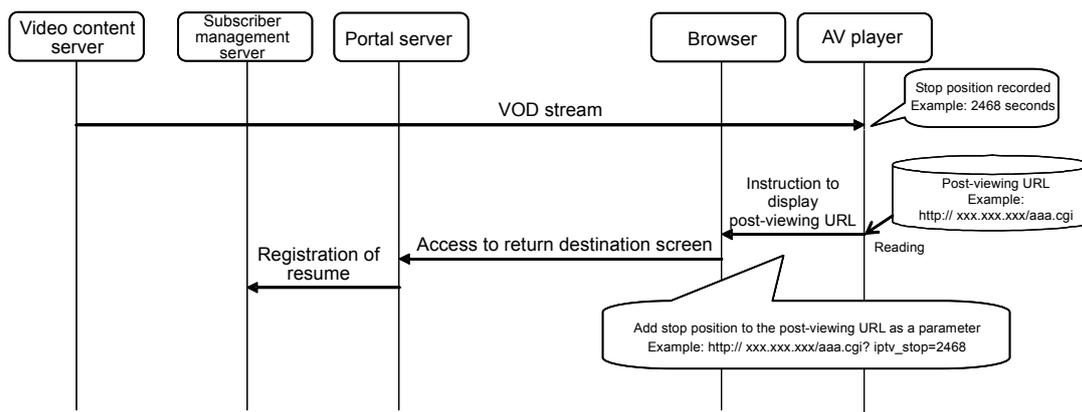


Figure Appendix-29 Collection of Playback Stop Position Information

On the other hand, when VOD is played back as an object element, the stop position information can be obtained by reading the streamposition attribute value when playback is stopped. The playback stop timing can be detected using the beitem element in which the type attribute is set to "MediaStopped". For detailed explanation, see [Appendix U] U.3 "Implementation Method Based on Playlist Playback Using Object Element".

As with other examples, this does not mean that the model presented here must be used to collect playback position information. For a small scale system, it is still possible to employ a method to collect stop position information from the video content server without using receivers as mentioned in the previous section. It is also possible to manage resume information on a "closed" video content server depending on the service specifications.

#### T.4.4 Starting Resume Playback

In order to resume playback, resume positions must be collected on the portal server when playback is terminated the previous time as described in T.4.3 and sent to the receiver when contents are started from the portal. This section describes the case in which contents are played back using the `launchIPTVContent()` function and the case in which contents are played back as an object element.

##### Resume playback using `launchIPTVContent()`

As defined in 6.4.4.5.2 "Content Startup Function", providers can specify playback start positions freely using the 3rd argument "start\_npt" of `launchIPTVContent()`. Using this function, playback can be resumed from the position where playback was terminated the previous time (NPT value).

##### Resume playback when VOD is played back as an object element

As defined in 6.4.4.1.1 "Methods that Are Not Operated", only reading is allowed for the streamposition attribute using DOM. However, providers can set the attribute freely as the initial value of the document. Playback can be resumed by setting the streamposition attribute of the object element to the position where playback was terminated the previous time (NPT value) in a portal document in advance and sending it to the receiver.

#### T.4.5 Notice on Resume Playback Service on Portal Service

Whether a resume function is provided or not depends on the service planning. Mechanisms that do not require receivers to perform a special resume playback process were suggested. Therefore, if a resume function is provided, portals should clearly notify users that playback can be resumed.

Also, as defined in 7.3.2.3 "Setting Additional Parameters to URI for Reopening Browser after Termination of", the playback stop position is always added to the post-viewing return destination URL as an argument of the `launchIPTVContent()` function when the process is terminated successfully regardless of whether a resume service is provided or not. Therefore, if a resume service is not provided (collection of resume information is not intended), the portal application should be set to ignore the information properly. Furthermore, care must be taken regarding URL length limits when setting an argument, considering that stop position information is added to URL as a parameter.

#### T.5 Guidelines for Providing Portal Document Specified as `return_uri` of `launchIPTVContent()`

As defined in 7.3.2.3 "Setting Additional Parameters to URI for Reopening Browser after Termination of", the termination status is added to `return_uri` as a query parameter (`Status`) after the process of the AV player started using `launchIPTVContent()` terminates. The portal server should interpret the query string, generate a proper document corresponding to the end status of the AV player and return it. For example, when the playlist playback described in [Appendix U] "Annotation: Playlist Playback Implementation Method" is also performed and playback of the next content is expected to terminate in an error based on the error termination status of the previous content playback, a message can be displayed as a BML document to abort continuous playback.

## [Appendix U] Annotation: Playlist Playback Implementation Method

### U.1 Concept of Playlist Playback and Scope of Implementation

Playlist playback is a function to play back multiple contents continuously in the order set by a service provider. Playlist playback refers to combination of content files and is different from segment playback in a storage type service.

In a storage type service, this kind of function is handled as a multimedia content function to instruct coupling and playback of multiple contents freely using a BML document. However, multimedia contents are not discussed in this document, and BML documents other than portal contents are not included in this document.

Therefore, it is possible to implement playlist playback using BML documents as portal contents based to the specifications covered in this document. However, in the sequence to start playback, playlists are implementation-dependent for content playback using ECG that directly references the content playback control metafile without going through a portal.

The following section describes playlist implementation methods using the two playback methods listed in [Appendix T] T.1 "Type and Method of VOD Playback on Portal".

### U.2 Implementation Method Based on Playlist Playback Using launchIPTVContent()

Assumed service forms include an advertisement content inserted before the premium content (product) and a preview content played back after the premium content is finished.

In order to implement these services, a script can be written in the portal document specified as an argument of the launchIPTVContent() function to automatically start playback of the next content.

Figure Appendix-30 illustrates this method.

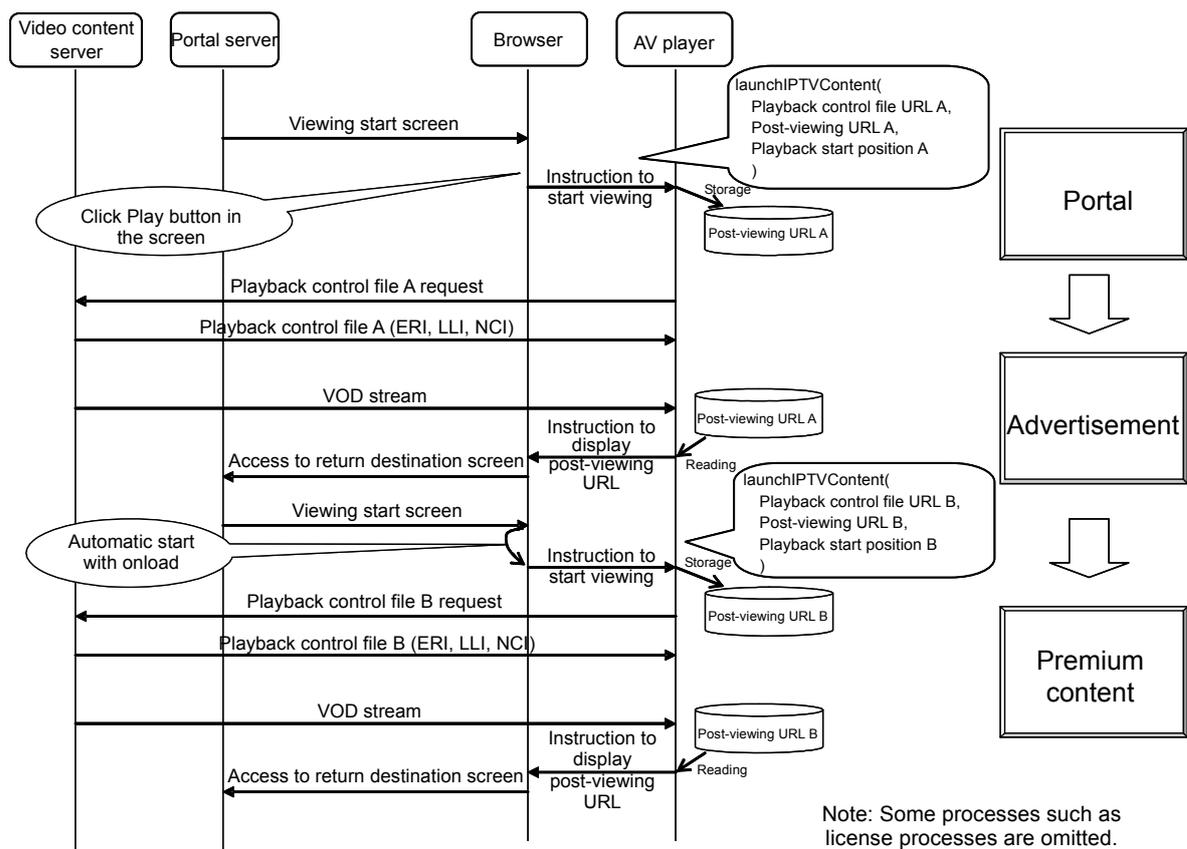


Figure Appendix-30 Playlist Based on Playback Using launchIPTVContent()

- (1) In the playback start screen for playlist type contents, "play" button should be presented to trigger the launchIPTVContent() function in which the 1st argument is set to the content playback control metafile (content playback control metafile A) URL of the content played back first (Content A or advertisement in this example).
- (2) The AV player obtains the content playback control metafile A and plays back Content A (advertisement) according to its instruction.
- (3) When playback of Content A is finished, the AV player returns the post-viewing URL passed from the browser when it was started to the browser, and the browser sends a request to display the post-viewing URL A.
- (4) In the post-viewing URL A, the launchIPTVContent() function in which the argument is set to the content playback control metafile (content playback control metafile B) URL of the content played back second (Content B or Premium content in this example) is described, and the function is started automatically through the onload event handler of the body element.
- (5) The AV player obtains the content playback control metafile B and plays back Content B (premium content) according to its instruction.

As shown above, it is possible to implement playlist playback by instructing playback of the next content in the post-viewing URL for each content as needed.

However, with this method only, inconvenience may occur where the next content is played back after the user stops playback on purpose. Therefore, it should be possible to judge in the portal document of the post-viewing URL whether the user stopped playback actively or it was stopped passively after all contents were played back.

As a solution, the value of the stop position information parameter (StopPos) explained in, [Appendix T] T.4.3 "Collecting/Storing Resume Information" as information actively added to the URL by receivers can be used to judge whether it was stopped actively or passively (whether the value reaches the full length of the content). In other words, it can be judged indirectly as passively stopped when stopped time is nearly equal to content length in the npt-sec notation and actively stopped when is smaller than content length in the npt-sec notation.

### U.3 Implementation Method Based on Playlist Playback Using Object Element

Assumed service forms include preview video for each content in the content list screen played back continuously in the L-shaped frame and promotion video specific to the portal played back in a loop.

In order to implement these services, the following actions are required as a minimum.

- (1) Detect the termination of VOD playback as an object element in a portal document.
- (2) Judge "active stop or passive stop" described at the end of the previous section.
- (3) Change the data attribute if needed and start playback again.

First, in (1), the beitem element should be allocated in the document, the type attribute should be specified to "MediaStopped" and the id set for the object element should be set for object\_id. When streamstatus attribute of the object element turns into "stop", which in turn triggers the event handler set for the onoccur attribute to be started.

In (2), judgments can be made indirectly by regarding stopped time as described in the previous section. Stopped time can be obtained by reading streamposition of the object element using the DOM interface.

Also in (3), it is possible to start playback again by rewriting the streamstatus attribute from "stop" to "play" using the DOM interface. Continuous playback is enabled for a playlist combining different contents by rewriting the content playback control metafile URL of the data attribute to that of the next content and then setting the attribute to "play".

Figure Appendix-31 shows the essence of a document used to play back a playlist.

```

~~~~~Omitted~~~~~
<script>
~~~~~Omitted~~~~~
function playNextContent(){
/* Write the process related to continuous playback/loop reproduction.
1. Judge whether streamposition reaches the end of the content length.
2. Rewrite the data attribute to change the content.
3. Change streamstatus to "play" to start reproduction.
*/
~~~~~Omitted~~~~~
}
~~~~~Omitted~~~~~
</script>
~~~~~Omitted~~~~~
<bevent>
<beitem type="MediaStopped" object_id="promo_video" onoccur="playNextContent();" />
</bevent>
~~~~~Omitted~~~~~
<object id="promo_video" data="http://xxx.xxx.xxx/aaa.cpc"
type=" video/X-arib-contentPlayControl"/>
~~~~~Omitted~~~~~

```

Figure Appendix-31 Sample of a Document for VOD Playlist Playback in L-shaped Frame

[Appendix V] Annotation: User Authentication in Portal Service

V.1 Subscriber Management System of Assumed Service Provider

The IP broadcasting/VOD service contract management unit is a household, and it is assumed that households are typically billed based on the payment method registered during basic registration. In other words, user IDs to identify contracts on the subscriber management database represent households.

On the other hand, implementation of a model in which multiple receivers exist in a household and services are provided seamlessly through a single basic registration using these receivers is aimed for. In other words, multiple receivers are associated with a user ID, but receivers are not associated with the user ID directly. Instead, DRM\_IDs that are associated with the user ID in basic registration are managed. (For the association between DRM\_ID and user ID, see [Appendix L] "Guidelines on BML Document for Basic Registration, Service Subscription, Service Registration for IP Retransmission of Digital Terrestrial Television Broadcasting and Service Registration for IP Retransmission of BS Digital Satellite ".)

Furthermore, as an advanced version of this service model, it is possible to provide a service that identifies each member of a household (to differentiate recommended contents, etc.). However, it is not covered in this document, and service providers should invent their own ways to implement such services by introducing sub-user IDs that are associated with the user ID and used to identify members of the household, etc.

Figure Appendix-32 illustrates the above subscriber management system model.

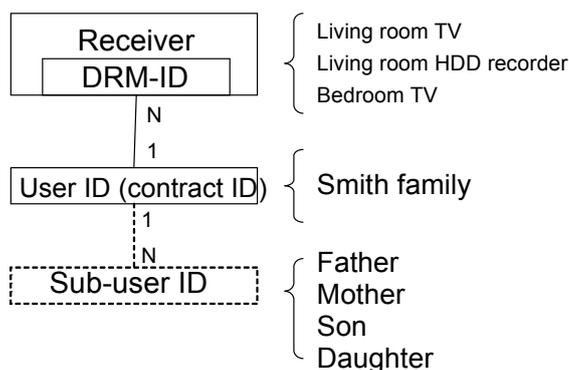


Figure Appendix-32 Provider's Subscriber Management System Model

V.2 Requirements for User Authentication Method

In order to display user-specific information and provide a billing/payment method in a portal, user authentication is required. The following two main properties should be satisfied for user authentication.

### V.2.1 Simplicity

In terms of user-friendliness, it is not desirable to require entry of complicated information that is only known to the user for user authentication every time the user accesses a provider's portal. Preparation of an environment in which users can browse products in a portal as easily as possible should be promoted as the top priority when providing IP broadcasting/VOD services. Therefore, ideally, it is desirable to implement user authentication that does not require user operation when possible.

### V.2.2 Security

In order to be successful as a business, the purchase operation should not be difficult and troublesome in billing/payment. Basically, it is assumed that a model in which an identified user simply confirms purchases and is billed using the preregistered payment method will be used generally.

While prevention of unauthorized viewing is guaranteed, users should not be billed with malicious intent. A technical method to prevent spoofing is required to implement the above model.

### V.3 Example of User Authentication

Entering a user ID and password each time a user access a portal to satisfy the security requirement reduces simplicity. Figure Appendix-32 shows a management system that utilizes the association that user IDs can be identified once DRM\_IDs are identified.

In other words, user IDs are obtained by extracting DRM\_ID using the `getDRMID()` function as with basic registration, sending is to the server using functions such as the `transmitTextDataOverIP()` function the `launchDynamicDocument()` function, and checking it against the customer management database.

However, the mutual authentication scheme used between a CAS/DRM server and a CAS/DRM client cannot be used between a portal server and a browser. Therefore, obtaining DRM\_ID from a receiver is not much different from automatically sending only the ID part in the initial ID/password authentication. In order to ensure security, not only an ID but also an alternative to a password should be stored in a receiver and automatically sent. To enable this, extended functions are defined to save the authentication key information in receivers and read it when needed.

Specifically, the authentication key information is positioned as part of basic registration information, and it is defined that the authentication key information is stored in a receiver using the `setIPTVServiceRegistrationInfo()` function when the basic registration information is registered. As a reading function, it is defined that the authentication key information is obtained using the `checkIPTVServiceRegistrationInfo()` function, which is a function to confirm the basic registration information.

Figure Appendix-33 shows a sequence model of user authentication in a portal combining the authentication key information and DRM\_ID, which is followed by the explanation of the sequence.

- (1) In a screen where user authentication is required (such as the purchase history screen), whether the session has gone through user authentication is checked using Cookies, etc. When the user is not authenticated, the user is guided (redirected, etc.) to the authentication information request document.
- (2) In the authentication information request document, DRM\_ID is obtained using the `getDRMID()` function, the authentication key information stored in NVRAM is obtained using the `checkIPTVServiceRegistrationInfo()` function, and the obtained information is sent to the authentication information inquiry document using the `launchDynamicDocument()` function. The authentication information inquiry document URL should be specified using the HTTPS schema, and the sent DRM\_ID and authentication key information should be protected by SSL/TLS.
- (3) The portal server inquires the subscriber management server about the user ID using the DRM\_ID and authentication key information.
- (4) When the DRM\_ID is registered with the subscriber management server and the authentication key information is matched, the subscriber management server returns the corresponding user ID to the portal server.  
When the authentication key information is obtained but the DRM\_ID is not registered with the subscriber management server (including the case in which the DRM\_ID is registered but has a cancelled status in the DB), the receiver is regarded as not having completed the basic registration cancellation process (such as when the registration is cancelled offline). In this case, it is desirable to perform the basic registration cancellation process described in [Appendix L] L.3 "Cancellation setting document". It is also possible to prompt users to start the basic registration procedure again.
- (5) When the portal server receives the result that the user ID verification was successful from the subscriber management server, the user-specific status of the portal service is continued by retaining the corresponding session using Cookies, etc.

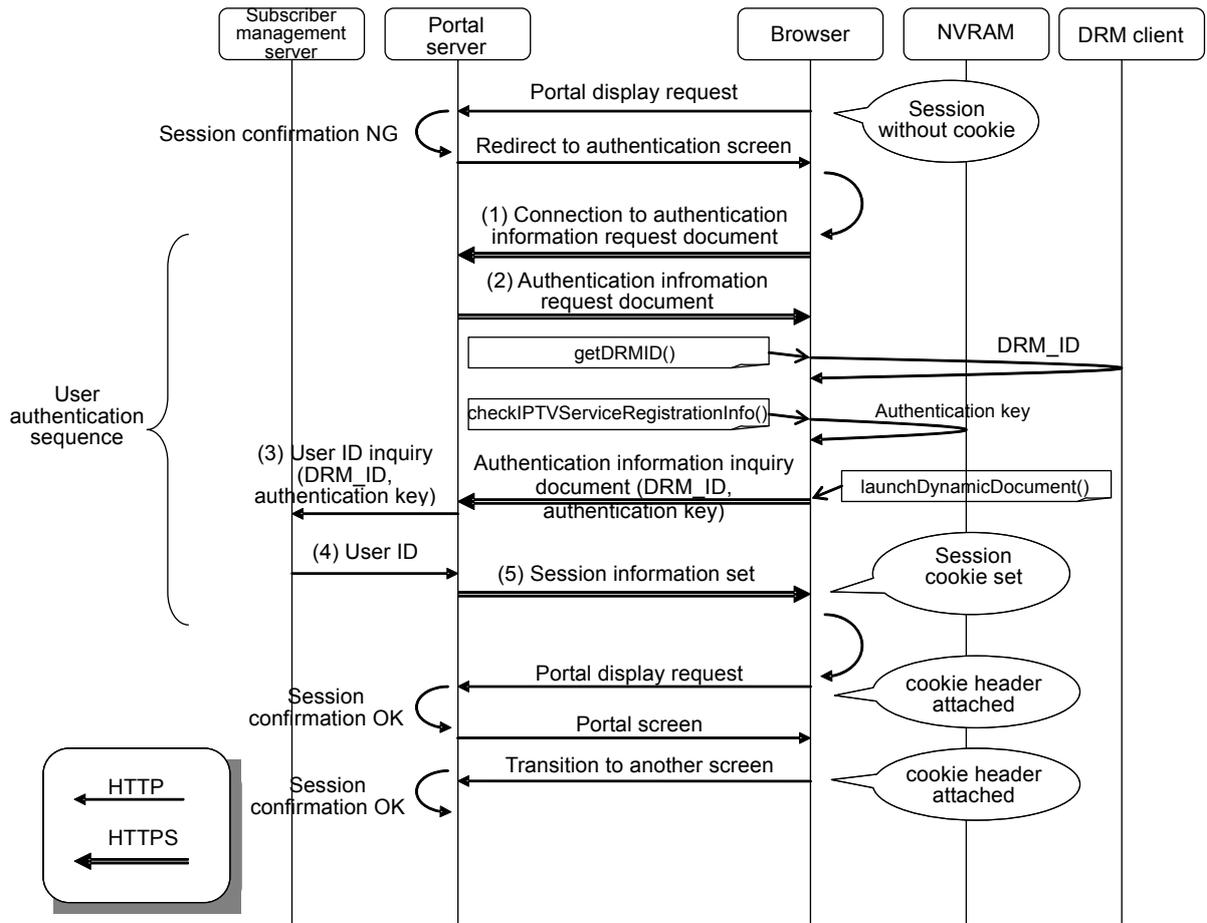


Figure Appendix-33 Example of Portal User Authentication Sequence

## [Appendix W] Annotation: Cache Control

This section describes the cache control between a receiver (browser) and a portal server (origin server). Whether to equip a cache function on a receiver or not is implementation-dependent, but this section describes both cases.

### W.1 Behavior of Receivers without Cache Function

#### (1) Receiver's behavior while sending a request

When there is no cache function in a receiver, the receiver sends a request to the portal server each time. When a receiver sends a request related to cache control, the following HTTP header should be used.

- Cache-Control: no-cache (required)
- Pragma: no-cache (optional)

"Cache-Control: no-cache" is required. Therefore, a request from the receiver reaches the origin server to obtain the latest BML document each time.

#### (2) Receiver's behavior while receiving a response

A receiver may receive no-store, no-cache, max-age for the Cache-Control header and the Expires header when a response is sent. However, since there is no cache function, the receiver does not cache any headers that are received.

#### (3) Cache function using setCacheResourceOverIP()

Since there is no cache function, the receiver does not perform caching when setCacheResourceOverIP() is specified in a BML document.

### W.2 Behavior of Receivers with Cache Function

#### (1) Behavior of receiver when a request is sent

It is a common feature for both receivers with a cache function and without a cache function that "Cache-Control: no-cache" is required to send a request to the origin server. Furthermore, a receiver with a cache function can support If-Modified-Since, If-Match, If-None-Match, If-Unmodified-Since, etc., to check the validity of the resources that are cached on the receiver using HTTP request headers (implementation-dependent). The response time for browser display can be shortened by reducing communication traffic using the above header.

Figure Appendix-34 shows the cache scheme used when resources are displayed in a browser. Cases (1) to (3) are assumed when a request is sent.

#### Case (1): The cache max-age value is in the validity period

When the value of Cache-Control: max-age or Expires (implementation-dependent) for the resource cached in the receiver is checked and is within the validity period, the browser can display the cached resource without inquiring to the origin server.

#### Case (2): The max-age value is expired and the cache is valid

When the max-age value/Expires value is not attached or when the resource cached in the receiver is expired, the browser needs to check the validity of the resource with the origin server. When the receiver compares the resource on the server and the cache in the receiver using If-Modified-Since, etc., the server returns the status code "304 Not Modified" to the receiver for matched cache, and the receiver can display the cached resource.

Case (3): The max-age value is expired and the cache is invalid

When the validity needs to be checked with the origin server as with Case (2) and when the resource on the origin server and the cache in the receiver do not match, the receiver should discard the cache and display the resource received from the origin server.

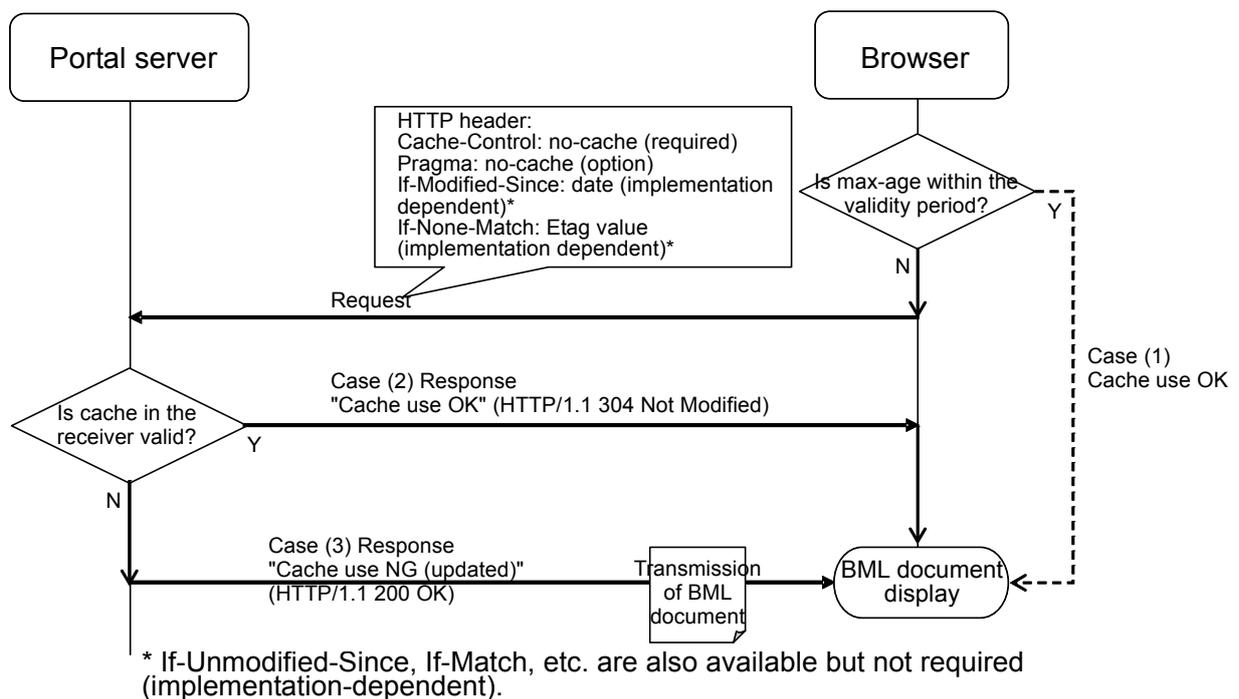


Figure Appendix-34 Behavior of Receiver when an HTTP Request Is Sent

(2) Behavior of receiver when a response is sent

The following behaviors using the HTTP header included in a response from the portal server are expected in a receiver with a cache function. Figure Appendix-35 shows an overview. Multiple specifiers are not specified in the response header from "no-store", "no-cache" and "max-age" of Cache-Control.

Case (1): Cache is prohibited

When the "Cache-Control: no-store" is specified in the response header of a received resource, the receiver must not store or cache the received resource.

Case (2): Cache is allowed conditionally

When "Cache-Control: no-cache" is specified in the response header of a received resource, the receiver may cache the received resource but should not redisplay the cached resource without checking its validity.

Case (3): Cache is allowed

When the Cache-Control header is not included in the response header of a received resource, the receiver is allowed to cache the received resource. However, the receiver cannot redisplay the cached resource without checking its validity with the origin server since the cached resource does not have the max-age value. The specification in this document specifies that use of "Cache-Control: no-cache" in the request header is required when a receiver sends a request. Therefore, for a receiver, there is no behavioral difference between Case (2) and Case (3).

Case (4): Cache is recommended

When the value of Cache-Control: max-age (option) and the value of Expires (implementation-dependent) are specified in the response header of a received resource, it is recommended that the receiver cache the resource. However, the cache function of a receiver is implementation-dependent, and it does not need to be guaranteed that a receiver caches and stores resources during their validity periods. A receiver with a cache function may display a cached resource in its validity period without checking its validity with the portal server but must not redisplay an expired cached resource without checking its validity.

(3) Cache function using setCacheResourceOverIP()

When the portal server recommends the receiver to cache resources, setCacheResourceOverIP() can be used in the BML document in addition to Case (4) above. An URL is specified as an argument of setCacheResourceOverIP(), and information related to the cache expiration date is not specified. Therefore, the receiver references the value of Cache-Control: max-age specified in the response header used when the resource was obtained using setCacheResourceOverIP(). The cache storage in a receiver itself is implementation-dependent, but additionally, the priority of cache can be enhanced more than when only max-age is used.

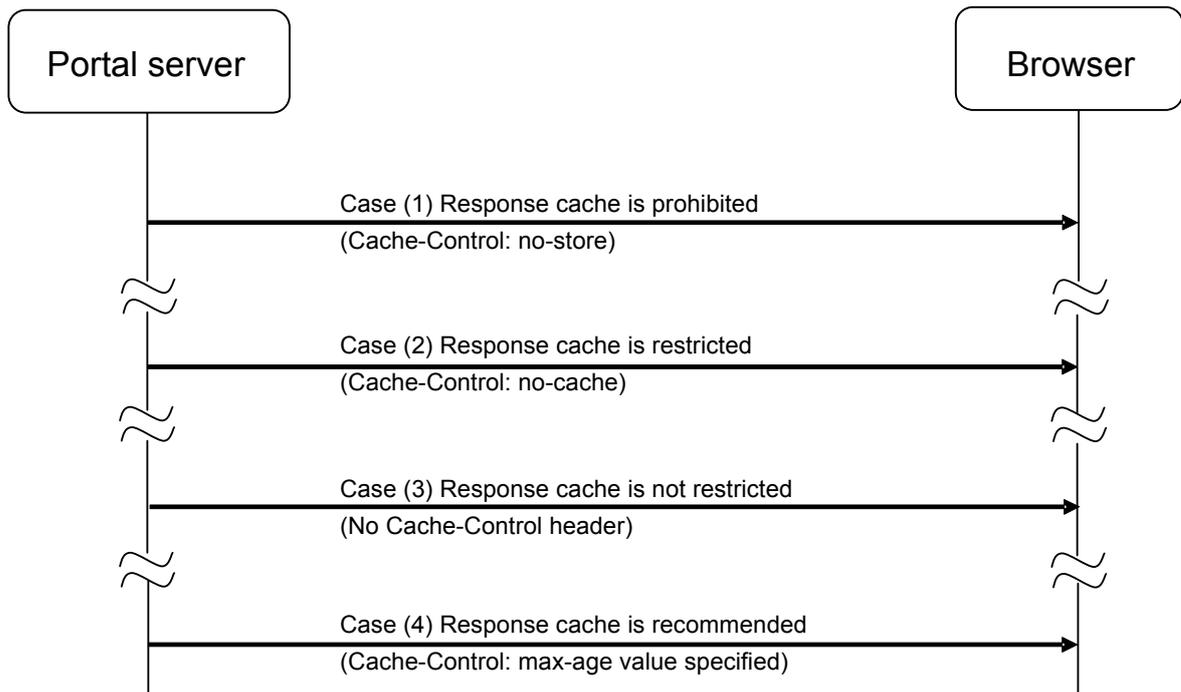


Figure Appendix-35 Example of Cache-Related Header for HTTP Response

[Appendix X] Annotation: Broadcasting BML and Transition (TBD)

This section describes the assumed relationship between broadcasting BML and IP broadcasting/VOD services. The specifications in this document do not assume traditional broadcasting services, but the following state transition is expected when linkage with the traditional broadcasting services is considered.

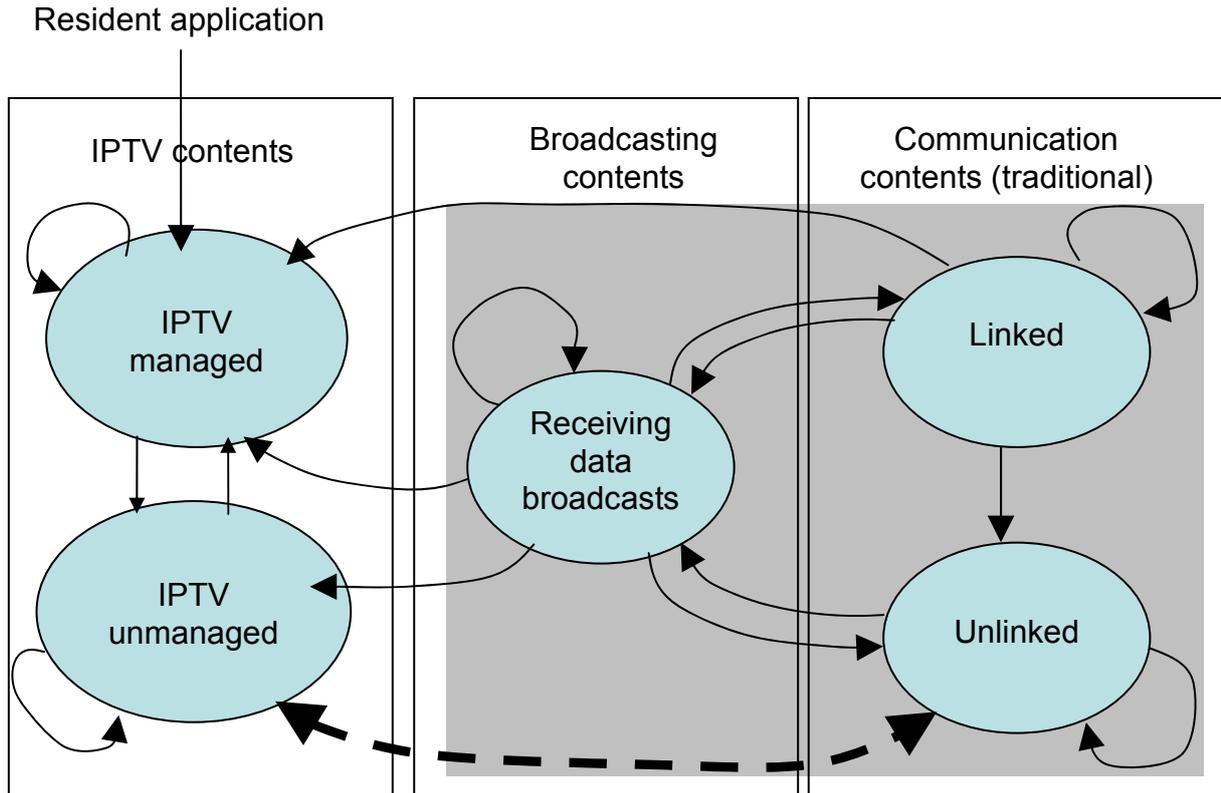


Figure Appendix-36 Relationship with Broadcasting Contents

The operation in the shaded area in Figure Appendix-36 is the same as the operation of the existing broadcasting contents. Consideration should be given to transitions from data broadcasts and linked communication contents (linked BML contents) to contents of IP broadcasting/VOD services. The contents in the IPTVmanaged state defined in this document represent "reliable" contents in broadcasting contents, which are equivalent to the linked state of broadcasts and communication. Therefore, these transitions should be notified to receivers using a new function (for example, launchManagedDocument()). The function regards the transition destination as IPTVmanaged and triggers transition. The function behaves in the same way as launchDocument() and launchContent() when it is called in the IPTVmanaged state. In the IPTVunmanaged state, the function should not be available for use.

Similarly, the IPTVunmanaged state and unlinked communication state are considered equivalent. However, unlinked communication contents are not managed as contents at all

while contents in the IPTVunmanaged states return to the return URLs when `quitDocument()` is called. It is not technically ensured that IPTVunmanaged contents call `quitDocument()`, but transitions can be controlled to some extent through contacts based on such service operations. This is based on the service environment and requirements and should not be covered by the technical specifications, but this difference should be acknowledged when receivers are designed.

There is no technical difference in terms of the content framework. Therefore, for example, when transition is made from an IPTVunmanaged content to an unlinked communication content and `quitDocument()` is called, the action to return to the return URI is not interrupted.

When transition is made from a broadcasting content to a VOD service that is considered typical among IP broadcasting/VOD services, it is possible to use transition via `launchContent()`. However, the status cannot be managed if transition is made directly from the broadcast content, so it is necessary to move to the IPTVmanaged state once. In other words, transition should be made from the broadcast content to an IP broadcasting/VOD service (IPTVmanaged) using the above new function, and the VOD content should be started using `launchIPTVContent()` in the service.

[Appendix Y] Annotation: I-Frame Extraction Method

Figure Appendix-37 illustrates how to extract I-frames in regard to the "I-frame extraction method".

- (1) From a content in the normal format, a section between the TS\_packet including the beginning of PES\_packet loaded with I-frame (\*) and TS\_packet at the end is extracted and transmitted. If non-video TS\_packet exists between them, it is also extracted together.
- (2) Not all I-frame PES are transmitted and some may be ignored, to enable a natural decoding process that moves along in the time corresponding to the viewing rate, and to transmit content at the same bit rate as normal playback.

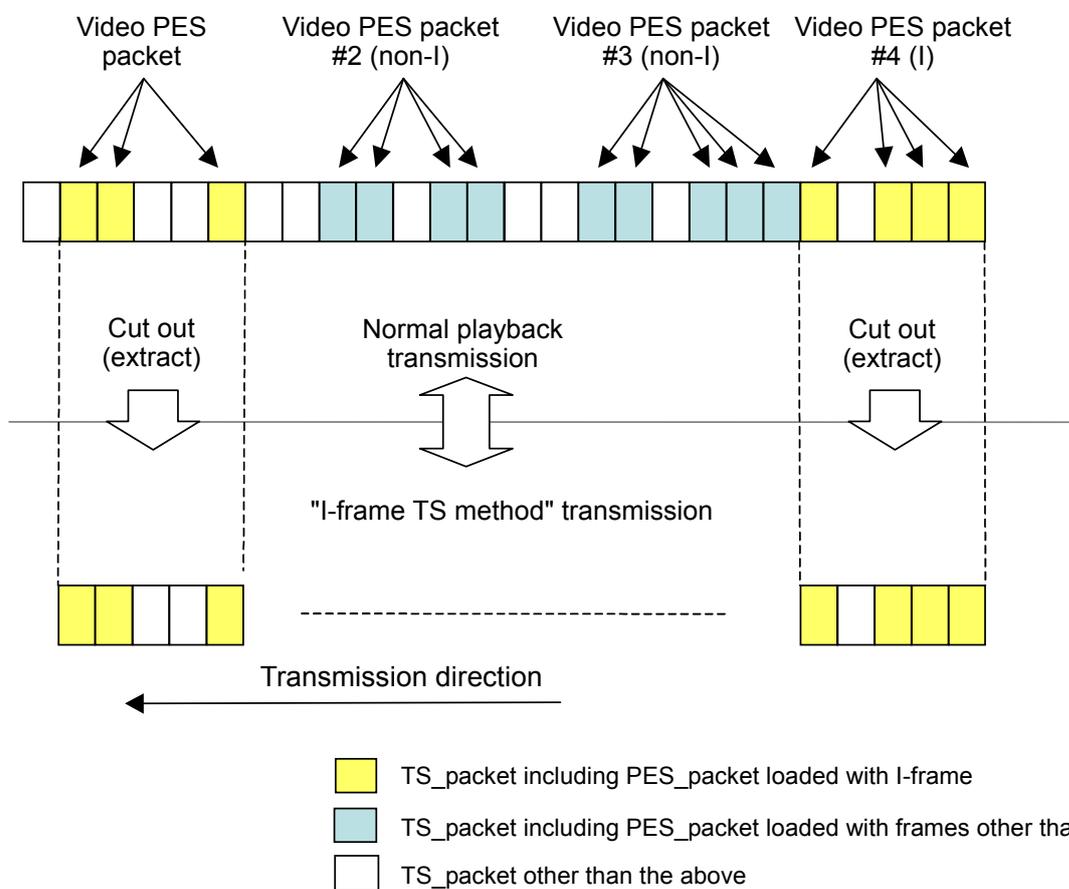


Figure Appendix-37 I-Frame Extraction Method

In a TS file (original file targeted for extraction), PES\_packet always starts from the beginning of the TS\_payload (cf. ISO/IEC 13818-1 2.4.1), so when extraction is performed using the above method, information is not mixed other than I-frames. Therefore, when only TS\_packets of video ES\_PID are extracted and demultiplexed on the receiver side, only PES\_packets (ES) including I-frames can be obtained (however, the time stamp is unreliable).

## [Appendix Z] Annotation: Correspondence between ECG Screen Items and ECG Metadata Elements

This section describes the relationship between display items and ECG metadata elements when a receiver obtains ECG metadata and displays part or all of the metadata. The following screen is an example, and actual screen details are implementation-dependent.

### Z.1 ECG Menu Screen

Figure Appendix-38 shows an example of a screen that displays a list of functions provided in ECG. The display method and whether to provide a screen or not are implementation dependent.

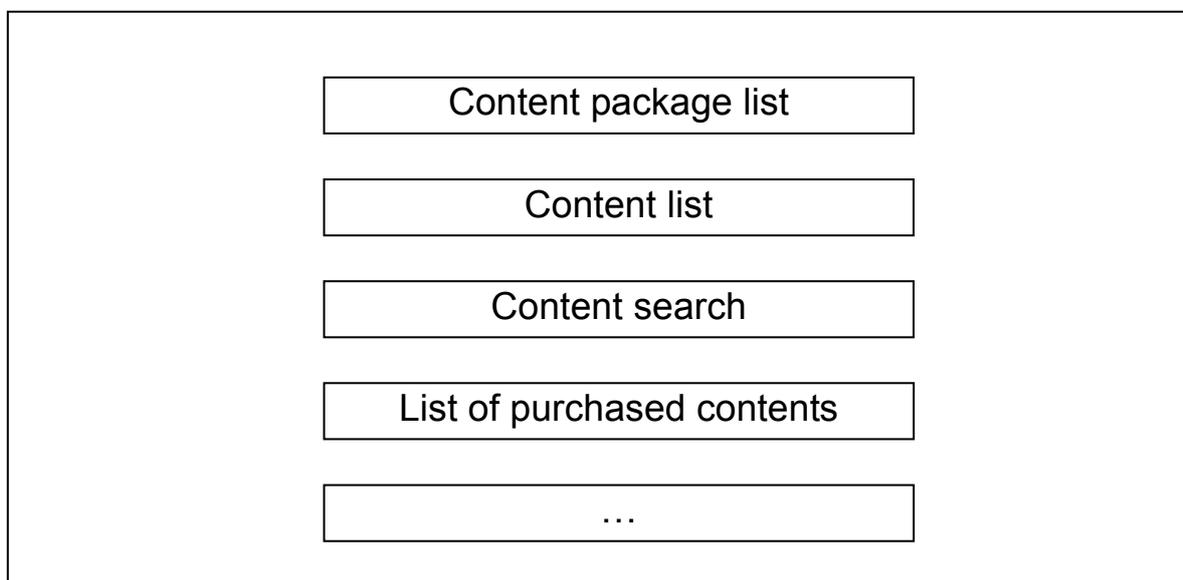


Figure Appendix-38 Example of ECG Menu Screen

Z.2 List Screen for Content Packages, Contents and Series

Figure Appendix-39, Figure Appendix-40 and Figure Appendix-41 show examples of screens to display a package list, content list and series list using metadata, respectively. This screen can also be used to display content packages, contents and series query results.

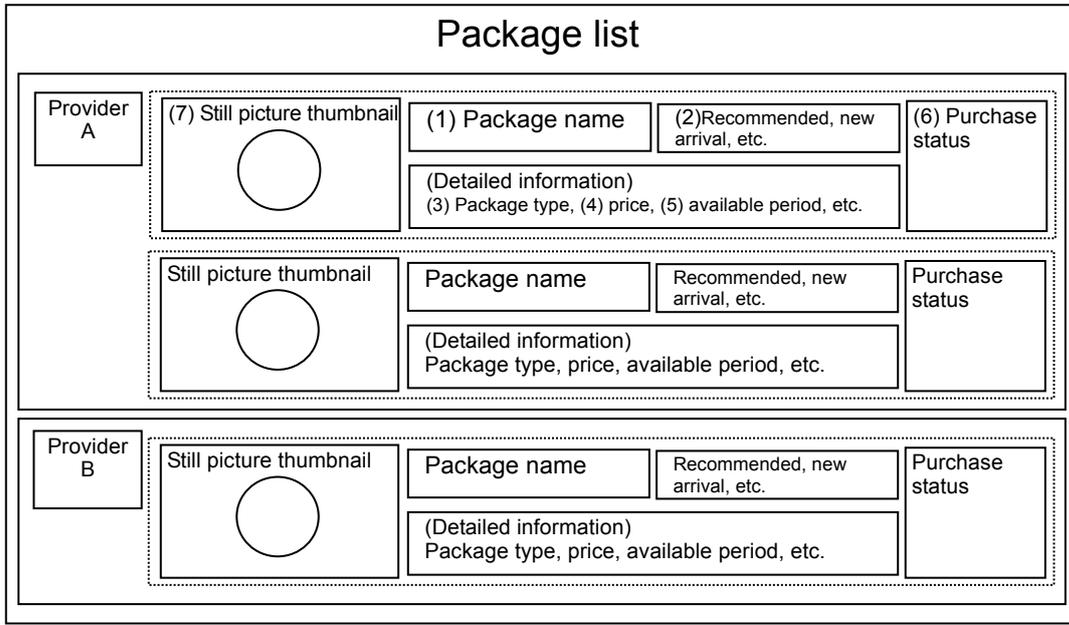


Figure Appendix-39 Example of Content Package List Screen

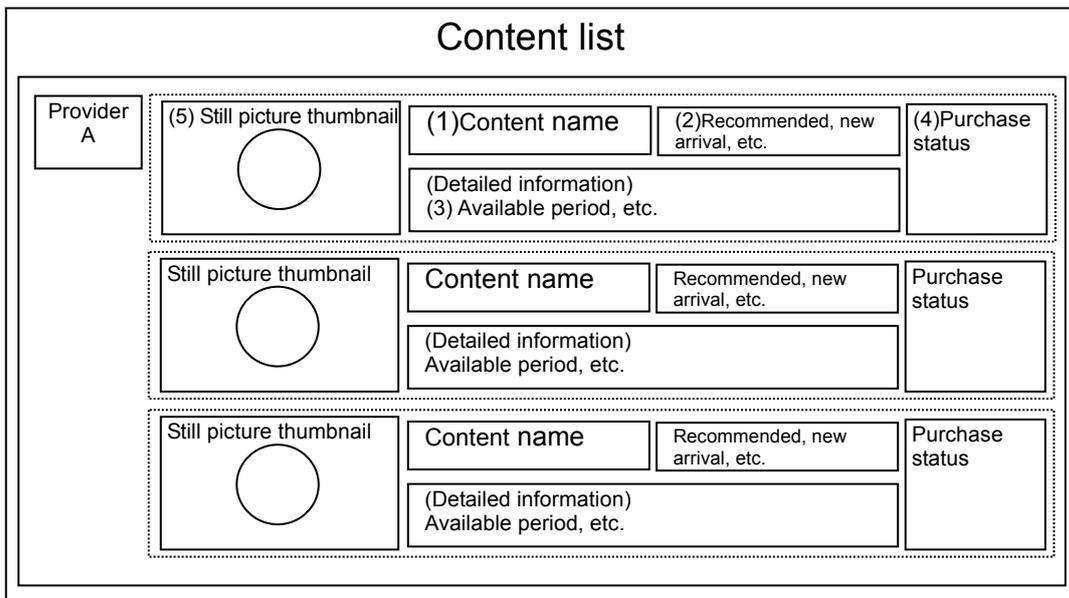


Figure Appendix-40 Example of Content List Screen

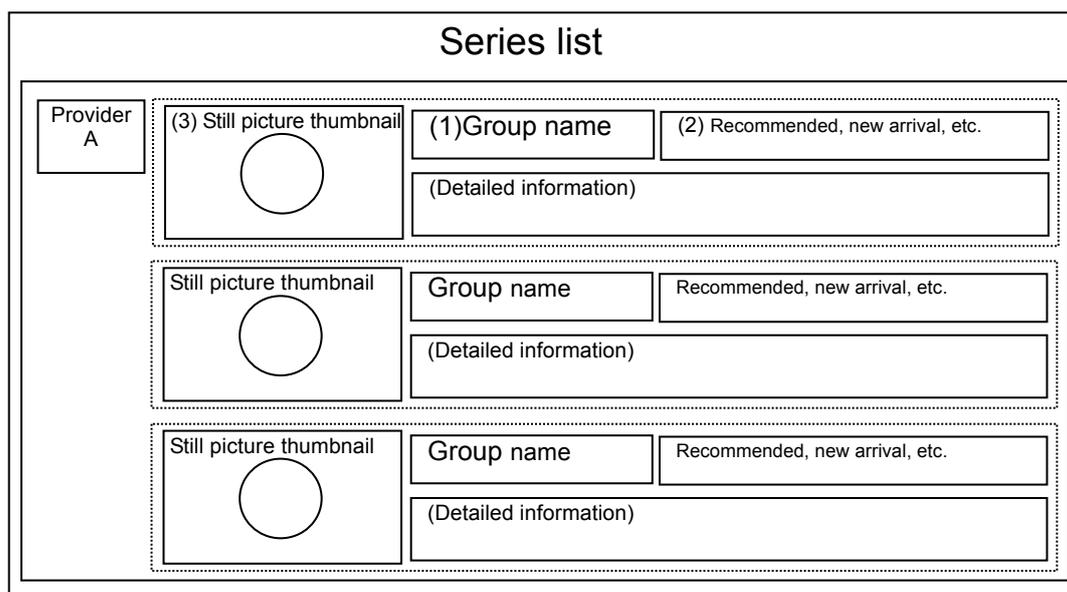


Figure Appendix-41 Example of Series List Screen

Table Appendix-10, Table Appendix-11 and Table Appendix-12 show the relationship between the display elements shown in Figure Appendix-39, Figure Appendix-40 and Figure Appendix-41 and ECG metadata elements, respectively.

Table Appendix-10 Relationship between Display Items in Content Package List Screen and Metadata (Example)

Content Package list screen display item	ECG metadata element
(1) Package name	Single item: ProgramInformation/BasicDescription/Title[@type="main"] Other package (GroupType="package"): GroupInformation/BasicDescription/Title[@type="main"]
(2) New arrival/recommended	Single item: ProgramInformation/BasicDescription/PromotionalInformation Other package (GroupType="package"): GroupInformation/BasicDescription/PromotionalInformation
(3) Package type	PurchaseInformation/PurchaseType
(4) Price	PurchaseInformation/Price
(5) Available period	PurchaseInformation/Purchase/QuantityUnit, QuantityRange
(6) Purchase status	(Information related to purchased packages stored in the receiver is referenced)
(7) Thumbnail	Single item: ProgramInformation/BasicDescription//MediaTitle/TitleImage Other package (GroupType="package"): GroupInformation/BasicDescription/MediaTitle/TitleImage

Table Appendix-11 Relationship between Display Items in Content List Screen and Metadata  
(Example)

Content list screen display item	ECG metadata element
(1) Content name	ProgramInformation/BasicDescription/Title[@type="main"]
(2) New arrival/recommended	ProgramInformation/BasicDescription/PromotionalInformation
(3) Available period	PurchaseInformation/Purchase/QuantityUnit, QuantityRange
(4) Purchase status	(Information related to purchased packages stored in the receiver is referenced)
(5) Thumbnail	ProgramInformation/BasicDescription/MediaTitle/TitleImage

Table Appendix-12 Relationship between Display Items in Content List Screen and Metadata  
(Example)

Series list screen display item	ECG metadata element
(1) Group name	GroupInformation/BasicDescription/Title[@type="main"] (Other than GroupType="package")
(2) New arrival/recommended	GroupInformation/BasicDescription/PromotionalInformation
(3) Thumbnail	GroupInformation/BasicDescription/MediaTitle/TitleImage

Z.3 Examples of Detailed Screens for Content Packages, Contents and Series

Figure Appendix-42, Figure Appendix-43 and Figure Appendix-44 show examples of screens that display detailed information about a content package, content or series when the content package, content or series is selected in a list screen, respectively.

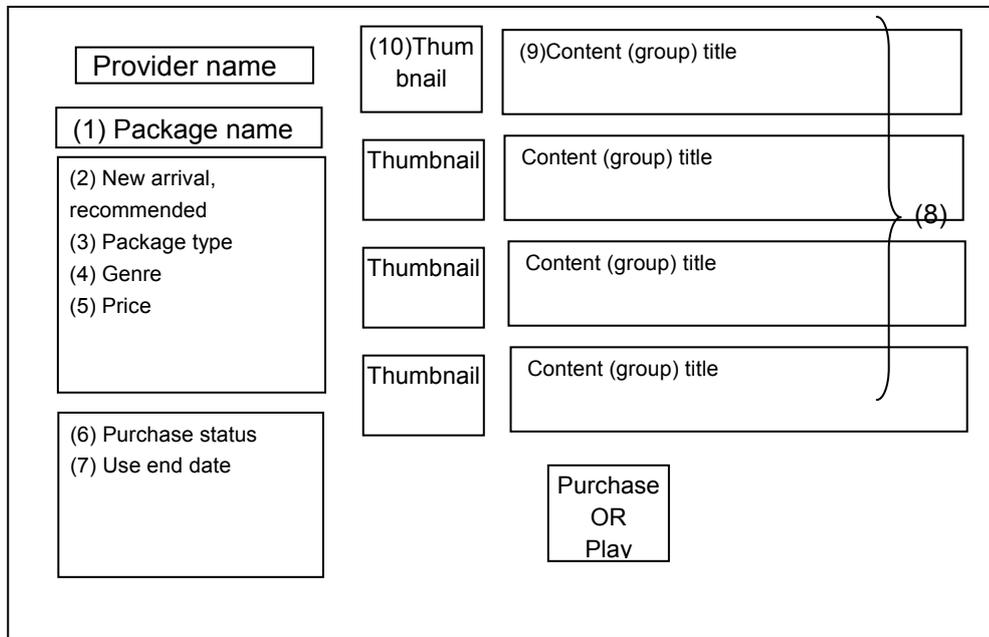


Figure Appendix-42 Example of Content Package Detail Screen

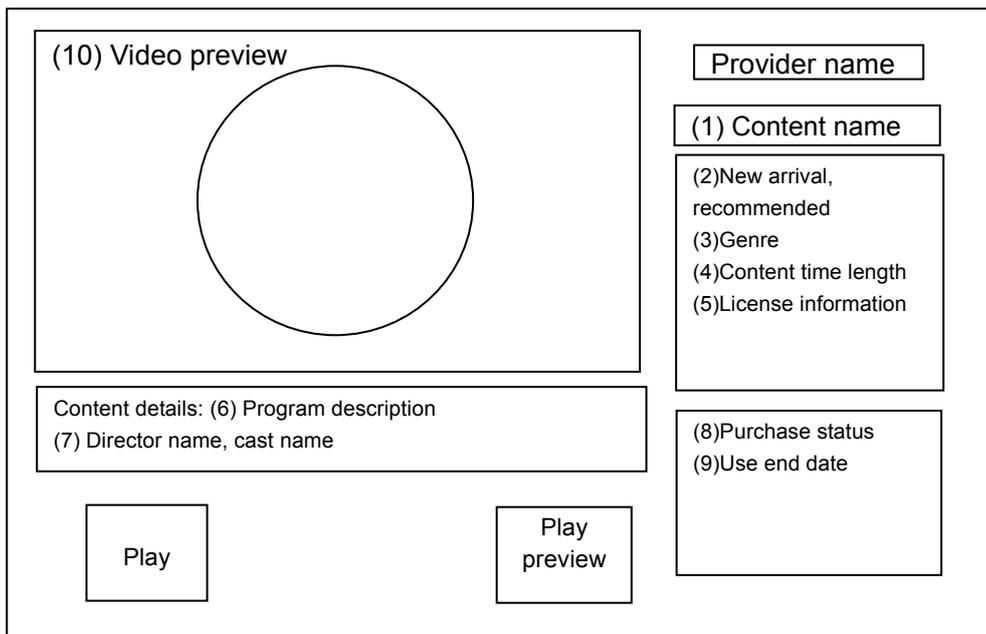


Figure Appendix-43 Example of Content Detail Screen

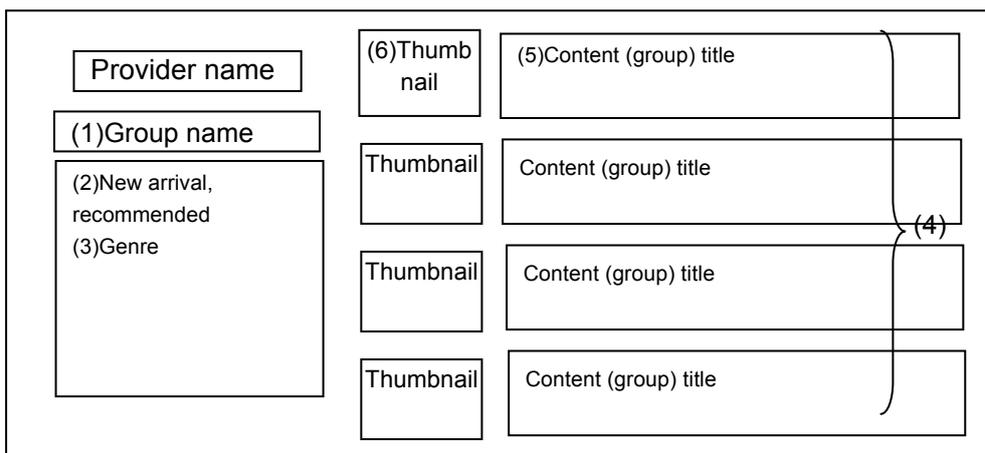


Figure Appendix-44 Example of Series Detail Screen

Table Appendix-13, Table Appendix-14 and Table Appendix-15 show the relationship between the display elements shown in Figure Appendix-42, Figure Appendix-43 and Figure Appendix-44 and ECG metadata elements.

Table Appendix-13 Relationship between Display Items in Content Package Detail Screen and Metadata (Example)

Content Package detail screen display item	ECG metadata element
(1) Package name	Single item: ProgramInformation/BasicDescription/Title[@type="main"] Other package (GroupType="package"): GroupInformation/BasicDescription/Title[@type="main"]
(2) New arrival/recommended	Single item:ProgramInformation/BasicDescription/PromotionalInformation Other package (GroupType="package"): GroupInformation/BasicDescription/PromotionalInformation
(3) Package type	PurchaseInformation/PurchaseType
(4) Genre	Single item: ProgramInformation//BasicDescription/Genre Other package (GroupType="package"): GroupInformation/BasicDescription/Genre
(5) Price	PurchaseInformation/Price
(6) Purchase status	(Information related to purchased packages stored in the receiver is referenced)
(7) Use end date	(Information related to purchased packages stored in the receiver is referenced)

(8) List of content/group included in the package	contents/groups with CRID described in GroupInformation/BasicDescription/RelatedMaterial/[@href=IPTVSERVICEHowRelatedCS:21.1 or 21.2]/MediaLocator/mpeg7:MediaUri of the package (contents for which CRID of the package is specified in ProgramInformation/MemberOf/@crid for a single item)
(9) Content/group title	ProgramInformation/BasicDescription/Title[@type="main"] or GroupInformation/BasicDescription/Title[@type="main"]
(10) Thumbnail	ProgramInformation/BasicDescription/MediaTitle/TitleImage or GroupInformation/BasicDescription/MediaTitle/TitleImage

Table Appendix-14 Relationship between Display Items in Content Detail Screen and Metadata (Example)

Content detail screen display item	ECG metadata element
(1) Content name	ProgramInformation/BasicDescription/Title[@type="main"]
(2) New arrival/recommended	ProgramInformation/BasicDescription/PromotionalInformation
(3) Genre	ProgramInformation/BasicDescription/Genre
(4) Content time length	ProgramInformation/BasicDescription/Duration
(5) License information	LicenseInformation
(6) Program detail information	ProgramInformation/BasicDescription/Synopsis
(7) Director name, cast name	ProgramInformation/BasicDescription/CreditsList/CreditsItem/PersonName/mpeg7:GivenName
(8) Purchase status	(Information related to purchased packages stored in the receiver is referenced)
(9) Use end date	(Information related to purchased packages stored in the receiver is referenced)
(10) Video preview	ProgramInformation/BasicDescription/MediaTitle/TitleVideo

Table Appendix-15 Relationship between Display Items in Series Detail Screen and Metadata (Example)

Series detail screen display item	ECG metadata element
(1) Group name	GroupInformation/BasicDescription/Title[@type="main"]
(2) New arrival/recommended	GroupInformation/BasicDescription/PromotionalInformation
(3) Genre	GroupInformation/BasicDescription/MediaTitle/TitleImage
(4) List of content/group included in the group	Contents/groups specifying the group using ProgramInformation/MemberOf/@crid or GroupInformation/MemberOf/@crid
(5) Content/group title	ProgramInformation/BasicDescription/Title[@type="main"] or GroupInformation/BasicDescription/Title[@type="main"]

(6) Thumbnail	ProgramInformation/BasicDescription/MediaTitle/TitleImage or GroupInformation/BasicDescription/MediaTitle/TitleImage
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[Appendix AA] Annotation: Example of ECG Metadata Query

The metadata query protocol is described in 7.11.5 "Operation of Metadata Delivery Method". This section describes how to use metadata query using a simple screen transition example.

AA.1 Example of Metadata Query and Acquisition on Receiver without Large-Capacity Cache

Figure Appendix-45 shows examples of inquiries by a receiver without a large-capacity cache to obtain the metadata required for screen transitions. Transitions from the top screen to the new arrival list and title search are used as examples.

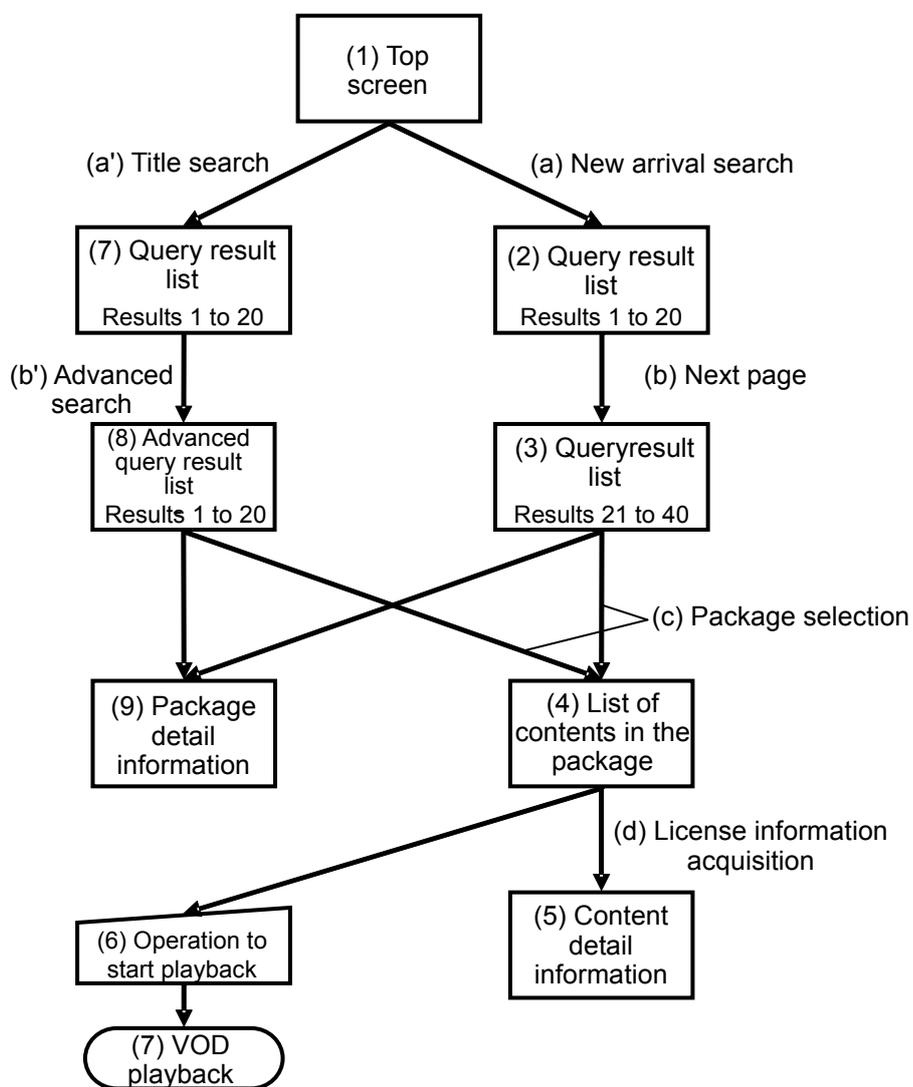


Figure Appendix-45 Example of Search in Content Navigation

- (a) The content package information marked as new arrival is searched for, and the first 20 query results are obtained excluding adult-themed contents. A query statement example is shown below.

\*In the following query statement example, line feeds are inserted to make it easy to read.

\*Actual query statements are encoded in the x-www-form-urlencoded format.

```
predicate=
period(new_arrival,2008040100,2008040101),
!parentalrating(http://www.arib.or.jp/cs/2006/03/ARIBParentalRatingCS/R-20),
grouptype(package),
expirationdate(2008-04-01T00:00:00)&range=1,20&fragment=GIT
```

(b) The next 20 query results following (a) are obtained. A query statement example is shown below. The value of the range is changed.

```
predicate=
period(new_arrival,2008040100,2008040101),
!parentalrating("http://www.arib.or.jp/cs/2006/03/ARIBParentalRatingCS/R-20"),
grouptype(package)
expirationdate(2008-04-01T00:00:00)&range=21,20&fragment=GIT
```

(a) Content packages with a title starting with "Star Bozu" are searched for, and the first 20 query results are obtained. A query statement example is shown below.

```
predicate=title(Star Bozu*),
!parentalrating(http://www.arib.or.jp/cs/2006/03/ARIBParentalRatingCS/R-20),
grouptype(package),
expirationdate(2008-04-01T00:00:00)&range=1,20&fragment=GIT
```

(b') Advanced search is performed using multiple conditions by adding a condition that "3" is included in the title, and the first 20 query results are obtained. A query statement example is shown below.

```
predicate=title (Star Bozu*),title(*3*),
!parentalrating(http://www.arib.or.jp/cs/2006/03/ARIBParentalRatingCS/R-20),
grouptype(package),
expirationdate(2008-04-01T00:00:00)&range=1,20&fragment=GIT
```

(c) Information about the contents included in the selected package is obtained using memberOf search. A query statement example is shown below.

```
predicate=memberof(crid://example.co.jp/group/1245124_1369457_12834756),
expirationdate(2008-04-01T00:00:00)&fragment=PIIT
```

(d) The license reference information is obtained to display detailed information of the specified content. A query statement example is shown below. PurchaseId described in :PurchaseList/PurchaseIdRef of the package (GIT) is specified as well to uniquely specify the license information.

```
predicate=crid(crid://example.co.jp/video/0654381_5792573_04158457),
field(PurchaseId,pack000001),
expirationdate(2008-04-01T00:00:00) &fragment=LIT
```

Figure Appendix-46 shows an example of a detailed query sequence that is used to display screens for "(2) - (3) New arrival information list" and "(4) List of contents in the package"

processes in Figure Appendix-45. Basically, only the inquiry statement is different in "(7) - (8) Search result list" process.

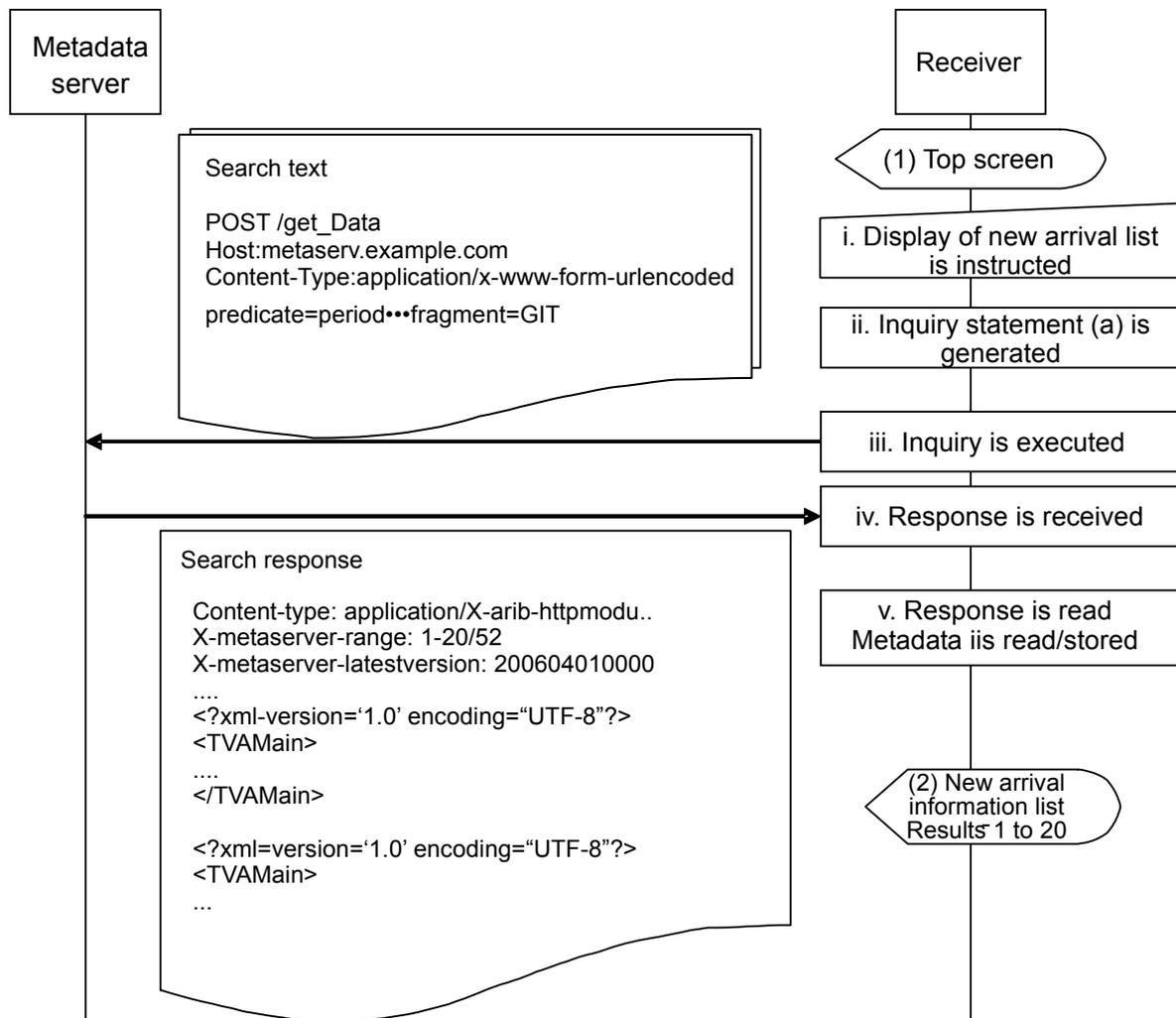


Figure Appendix-46 Metadata Search Sequence for Content Navigation

- i. The user requests a new arrival content information list.
- ii. An inquiry statement ((a) in Figure Appendix-45) used to request the metadata server to send the metadata required to display a new arrival content information list is generated.
- iii. The inquiry is submitted to the metadata server.
- iv. A response from the metadata server is received.
- v. The received data is parsed and data is retrieved.

#### AA.2 Example of Metadata Query and Acquisition on Receivers with Large-Capacity Cache

Receivers with a large-capacity cache store all metadata in the cache and basically perform the sequence described in AA.1 internally. These receivers request the metadata server to send not only the data required for individual screens but the entire data. This section describes the sequence of such a case. For more information on how the obtained metadata is handled in a receiver, see 7.11.6 "Metadata Cache Control".

## AA.2.1 Getting Initial Data

When metadata is not stored, etc., the receiver requests the metadata server to send all data that is valid at a given time. Figure Appendix-47 shows an example of a sequence in this case.

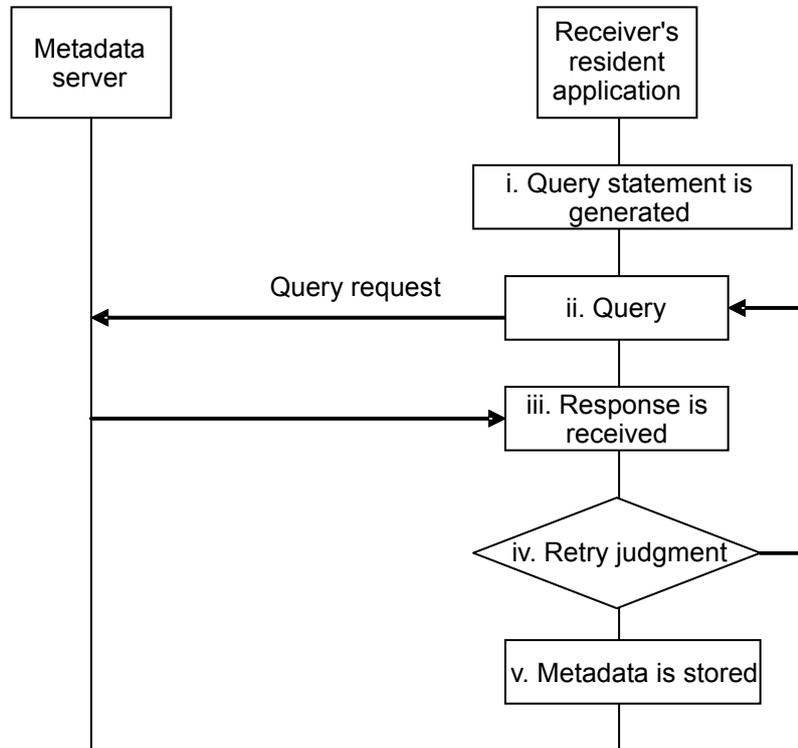


Figure Appendix-47 Metadata Initial Acquisition Sequence

- i. A query statement to obtain all metadata that is valid at a given time is generated for each table type. Inquiry statement examples are shown below.

```

predicate=expirationdate(2008-04-01T00:00:00)&fragment=PIT
predicate=expirationdate(2008-04-01T00:00:00)&fragment=GIT
predicate=expirationdate(2008-04-01T00:00:00)&fragment=PLT
predicate=expirationdate(2008-04-01T00:00:00)&fragment=PRT
predicate=expirationdate(2008-04-01T00:00:00)&fragment=LIT
  
```

- ii. A query request is made by sending the query statement generated in i above to the metadata server.
- iii. A response from the metadata server is received.
- iv. When data cannot be returned immediately due to overload of the metadata server, etc., 503 (Service Unavailable) with the Retry-After header may be returned. In this case, retry is performed after the specified time passes. In some cases, the retry standby time is specified in units of hours.
- v. The received metadata is stored in the cache area.

### AA.2.2 Difference Renewal

After the receiver performs initial data acquisition described in AA.2.1, the receiver renews the internal data at certain intervals. Figure Appendix-48 shows the renewal sequence.

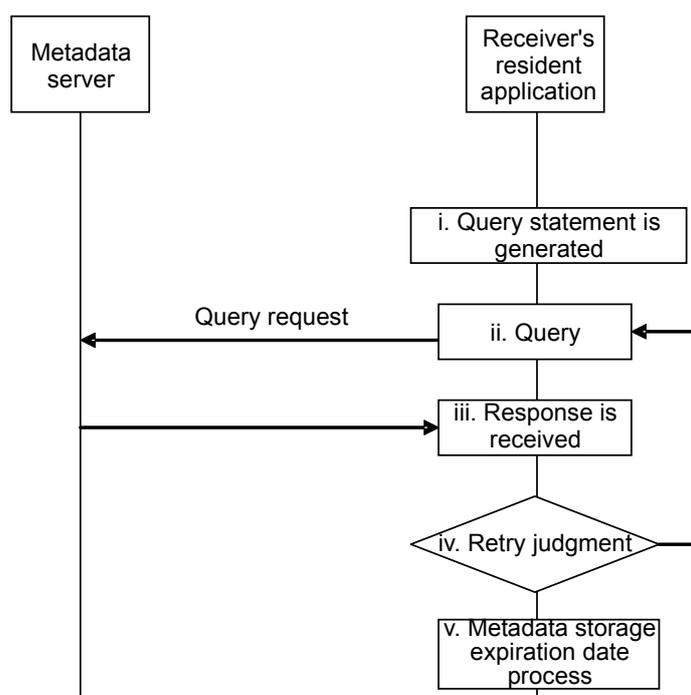


Figure Appendix-48 Difference Renewal for Metadata in Large-Capacity Cache

- i. A query statement to perform fragmentversion query using the maximum value (latestversion) of fragmentVersion of the fragment currently stored in the receiver as a parameter is generated for each table type.

```

predicate=fragmentversion(latestversion+1,)&fragment=PIT
predicate=fragmentversion(latestversion+1,)&fragment=GIT
predicate=fragmentversion(latestversion+1,)&fragment=PLT
predicate=fragmentversion(latestversion+1,)&fragment=PRT
predicate=fragmentversion(latestversion+1,)&fragment=LIT
  
```

In this case, expirationdate is not specified. This is because the receiver needs to obtain a fragment with a past fragmentExpirationDate, as a cached fragment may be nullified when it is overwritten by a past fragmentExpirationDate.

For more information, see 7.11.6 "Metadata Cache Control".

- ii. A query request is made by sending the query statement generated in i above to the metadata server.

- iii. iv. A response from the metadata server is received. The same processes as in Figure Appendix-47 iv and v including the retry process are performed.
- v. The cache is renewed based on the data received from the metadata server. For more information , see 7.11.6 "Metadata Cache Control".

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