Forward Link Only
System Information Specification

ARIB STANDARD

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Association of Radio Industries and Businesses

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Forward

1. Introduction

With participation of radio communication equipment manufacturers, broadcasting equipment manufacturers, telecommunication operators, broadcasters and general equipment users, Association of Radio Industries and Businesses (ARIB) defines basic technical requirements for standard specifications of radio equipment, etc. as an "ARIB STANDARD" in the field of various radio systems.

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An ARIB STANDARD herein is published as "Forward Link Only System Information Specification." In order to ensure fairness and transparency in the defining stage, the standard was set by consensus of the standard council with participation of interested parties including radio equipment manufacturers, telecommunication operators, broadcasters, testing organizations, general users, etc. with impartiality.

It is our sincere hope that the standard would be widely used by radio equipment manufacturers, testing organizations, general users, etc.

2. Scope

This standard applies to the multimedia broadcasting defined in Section 2 of Chapter 3-2, Ordinance No.26 of the Ministry of Internal Affairs and Communications, 2003.

3. Standard References for Forward Link Only

The following list identifies the current version of the standards in the FLO family of standards.

Standard#	Title
STD-B47	Forward Link Only Air Interface Specification for Terrestrial Mobile Multimedia Multicast
STD-B48	Forward Link Only Transport Specification
STD-B49	Forward Link Only Media Adaptation Layer Specification
STD-B50	Forward Link Only Open Conditional Access (OpenCA) Specification
STD-B51	Forward Link Only System Information Specification
STD-B52	Forward Link Only Messaging Transport Specification
STD-B32	Video Coding, Audio Coding and Multiplexing Specifications for Digital Broadcasting*

*NOTE: The original document of this standard is Japanese version. Part 3 of this standard is not applicable to Forward Link Only system.

4. Industrial Property Rights

This standard does not describe industrial property rights mandatory to this standard. However, the right proprietor of the industrial property rights has expressed that "Industrial property rights related to this standard, listed in the annexed table below, are possessed by the applicator shown in the list. However, execution of the right listed in the annexed table below is permitted indiscriminately, without exclusion, under appropriate condition, to the user of this standard. In the case when the user of this standard possesses the mandatory industrial property rights for all or part of the contents specified in this standard, and when he asserts his rights, it is not applied."

Annexed Table (Selection of Option 2)

Patent Applicant/Holder	Name of Patent	Registration No./ Application No.	Remarks
QUALCOMM Inc.	A comprehensive confirmation form has been submitted with regard to ARIB STD-B51 Ver.1.0.		
JVC KENWOOD Holdings, Inc.	A comprehensive confirmation form has been submitted with regard to ARIB STD-B51 Ver.1.0.		

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FOREWORD

(This foreword is not part of this Specification.)

This document is the first version of this specification. It does not cancel or replace any other document either in whole or in part.

This Specification is intended for use in Mobile Multimedia Multicast networks using ARIB STD-B47 [1] and ARIB STD-B48 [2]. This Specification makes use of certain standards and recommendations defined by TIA and other bodies as listed in sub clause 2.5.

The following Annexes to this Specification are normative: Annex A.

The following Annexes to this Specification are informative: None

No Text

1 INTRODUCTION AND SCOPE

This document specifies the functions and structure of the System Information (SI) associated with realtime and non-realtime broadcast and multicast services in Mobile Multimedia Multicast networks. SI provides the user or the Device with the advance information needed to make service subscription and service selection decisions. In particular, the SI specified in this document supports:

- Subscribing to Mobile Multimedia Multicast Services
- Describing the content provided in the Mobile Multimedia Multicast Services
- Locating the Mobile Multimedia Multicast Services within the Multiplex

The SI specified in this document is transport technology independent in the sense that it can be applied to any Network, regardless of the Mobile Multimedia Multicast transport technology, when coupled with extensions appropriate to that particular transport technology.

Chapter 2 is a normative chapter providing supporting apparatus for this specification, including: expansions of acronyms and abbreviations; definitions of terms; and a bibliography of standards and other documents incorporated in this standard by reference.

Chapter 3 is an informative chapter describing the reference architecture assumed for the SI.

Chapter 4 is an informative chapter describing the services provided by the SI in detail.

Chapter 5 is a normative chapter specifying the common formats of all messages used to convey SI to Devices.

Chapter 6 is a normative chapter specifying Sl Messages used to convey Marketplace Information.

Chapter 7 is a normative chapter specifying Sl Messages used to convey Service Definition Information.

Chapter 8 is a normative chapter specifying Sl Messages used to convey the Media Presentation Guide.

Chapter 9 is a normative chapter specifying the extensions for the SI for use with Networks based on the Forward Link Only Technology.

Annex A is a normative Annex specifying the XML for the SI Messages.

2 APPARATUS

2.1 Compliance Terminology

The key words “shall”, “shall not”, “should”, “should not”, “may”, “need not”, “can” and “cannot”, when used in this Standard, shall be interpreted as described in the TIA Style Manual [21].

2.2 Symbols and Abbreviations

The following symbols and abbreviations are used in this Standard:

ANSI: American National Standard Institute

ASN.1: Abstract Syntax Notation number 1

BCS: Billing and Customer Service

CA: Conditional Access

CRID: Content Reference Identifier

CR: Content Retailer

CSR: Customer Service Representative

EMM: Entitlement Management Message

EULA: End User License Agreement

HTML: Hypertext Markup Language

IETF: Internet Engineering Task Force

IP: Internet Protocol

IPv4: Internet Protocol version 4

IPv6: Internet Protocol version 6

ISAN: International Standard Audiovisual Number

ISO: International Organization for Standardization

KB: 1024 bytes

KMS: Key Management System

MIME: Multipurpose Internet Mail Extensions

MPAA: Motion Picture Association of America

MPEG: Moving Pictures Expert Group

MPG: Media Presentation Guide

RFC: Request For Comment

RIAA: Recording Industry Association of America

SI: System Information

SIM: Subscriber Identity Module

TIA: Telecommunications Industry Association

URI: Uniform Resource Identifier

URL: Uniform Resource Locator

UTC: Coordinated Universal Time

W3C: World Wide Web Consortium

XML: Extensible Markup Language

2.3 XML Schema

SI is specified herein as a set of XML schema. The schema are specified graphically in Chapters 5 - 8 and textually, in Annex A. The attributes and elements in the graphical schema are further specified and refined in explanatory text sections. Textual and graphic schema, and the textual explanations of the graphical schema, are all normative.

The elements of the graphical XML schema conform to the conventions described in Figure 2-1.

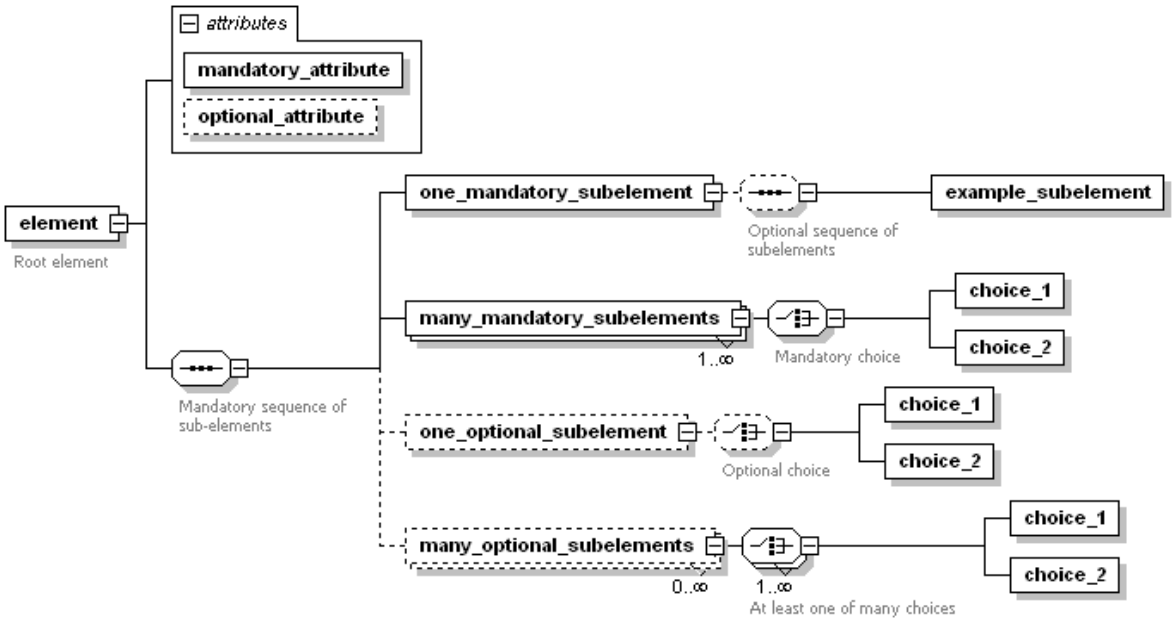

Figure 2-1: Conventions used in XML Schema

2.4 Definitions

The following definitions apply to capitalized terms used in this specification:

Term	Definition
Activation	The placement of a Device into a state that causes it to acquire SI and Mobile Multimedia Multicast Services.
Add-on Package	A Package that may be subscribed to only after a Parent Package is subscribed to.
Auto-Subscribed Package	A Package that the Device subscribes to without the user explicitly selecting it.
Base Service	The primary Service represented by a Channel.
BCS Provider	Entity that provides end user subscription, billing and customer support services on behalf of one or more Content Retailers. Each Device is associated with at least one BCS Provider.
Blackout	Access to a Presentation being forbidden in certain geographical areas for contractual reasons.
Channel	A view of a Base Service that may be customized through replacement of certain attributes of the Base Service.
Channel Weight	The Weight to be assigned to MPG Titles of Presentations delivered via the Channel.
Classification Scheme	A set of standard Terms that describes some domain [7].
Classification Scheme Table	An XML Table that gives mappings between short aliases and URIs of Classification Schemes.
Closed Package	A Package that is not accepting new subscriptions

Term	Definition
Contact Window	An interval of time in which Non Real Time Files are being distributed.
Content Provider	Entity that supplies content to the user through Services
Content Retailer	Entity that defines Packages and offers them for subscription through one or more associated BCS Providers.
Default Language	The language in which information is to be delivered to a user if the user has not selected some other language in which the information is available.
Device	Customer Equipment that can be activated to access Mobile Multimedia Multicast Services.
Device Profile	An identifier for a set of Device characteristics.
Distinguishing Attribute	An attribute of an SI Message which limits the scope of the Version field in that message to instances with a specified value of the attributed.
EULA	End User License Agreement – a contract between the User and the Content Retailer that specifies the terms of subscription to Packages, or to a specific Package, offered by the Content Retailer. It may supersede a Terms of Use Agreement for a particular BCS Provider.
Event	An Event is a Content Retailer customized view of a Presentation.
Event Block	An SI Message delivering the set of MPG Titles and Contact Windows available in a Multiplex for a defined time window, the Event Block Duration.
Excluded Package	A Package which a user is not permitted to subscribe to if it he has already subscribed to another Package
Excluded Channel	A Subscribed Channel that is not accessible via the MPG on the Device, typically as a result of a user action to block access to the Channel. See also Non-excludable Channel
Forward Link Only Technology	Mobile Multimedia Multicast technology standardized by TIA TR 47.1 subcommittee.
Flow	Logical transport stream within a Multiplex typically used to deliver a single Media component of a Realtime Presentation, or Non Real Time Files, or SI Messages.
IP Datacast Presentation	A Presentation consisting of content delivered as IP packets.
IP Datacast Service	A Service delivering IP Datacast Presentations to a defined set of IP multicast addresses.
Marketplace Common Message	An SI Message used to deliver information about the BCS Providers associated with the Network and certain Classification Schemes used in the Network.
Marketplace Content Retailer Message	An SI Message used to deliver information about Content Retailers and the Packages, Tiers and Channels available through the Content Retailers.
Marketplace Information	Information describing the BCS Providers, Content Retailers, Packages, Tiers and Channels.
Media	Formats for representing information, such as moving or still images, sound, or text, possibly associated with metadata used to assist in interpretation of the media content.
Media Presentation Guide	The schedule of MPG Titles available in the Network, delivered to the Device in a sequence of Event Blocks.

Term	Definition
MIME Type	A media type or format of data. The MIME type is identified by the conventions of RFCs 2045 – 2049 ([10] - [14]).
Mobile Multimedia Multicast Service	A mobile multimedia multicast service.
MPG Title	The description in the MPG of an instance of a Presentation that is available for viewing at a specified time.
Multiplex	A set of Services logically grouped together based on a common underlying transport criteria.
Network	A network responsible for delivery of Mobile Multimedia Multicast Services to Devices
Non-Excludable Channel	A Subscribed Channel that the user is not permitted to exclude from the display of the MPG on the Device. See also Excluded Channel.
Non Real Time File	Files that are delivered through Non Real Time Service.
Non Real Time Presentation	A Presentation that is stored for later retrieval and presentation to the user.
Non Real Time Service	A Service delivering files that are for consumption at a future time.
Package	A set of Tiers offered for purchase on the Network.
Package Weight	The Weight of a Package.
Parent Package	A Package that is required to be subscribed to enable subscription to an associated Add-on Package.
Presentation	A set of Media segments which may be presented to the user concurrently and/or consecutively and which can be described by a single MPG Title.
Rating	A classification of a Service or Presentation content that provides guidance on the suitability of the content, typically for younger viewers. A Rating is usually a level in an age-based scale, but may have other dimensions.
Real Time Presentation	A Presentation consisting of Media that is presented to the user as it is received and processed, and need not be stored for later retrieval.
Real Time Service	A Service delivering content consisting entirely of Real Time Presentations.
Resource	A Resource is a generic data entity associated with a Channel or a Base Service.
Service Definition Message	An SI Message delivering information about the Services available in the Network
Service	A service is an aggregation of one or more Flows and offers a sequence of Presentations.
Service Provider	Business entity responsible for providing one or more functional roles in the end-to-end delivery of Mobile Multimedia Multicast Services, such as content provisioning and/or retailing, subscription, billing, customer support and network transport, to the end user. The Service Provider may be manifested as any combination of Content Provider, Content Retailer, BCS Provider or Network Provider.
SI Message	An XML message instance of an SI XML schema element.
Subscribed Channel	A Channel that a user can access, having subscribed to a Package that includes access to the Channel.

Term	Definition
System Information	The set of information that enables a Device to locate Services or subscribe to Packages on behalf of the user, and to describe Marketplace Information, Services and MPG Titles to the user.
Term	A Term represents one well-defined concept in the domain covered by the Classification Scheme [7].
Terms of Use Agreement	A contract between the user and the BCS Provider that may specify, among other things, the default terms of subscription to a Package. See also EULA.
Term Reference	A reference to a term in a Classification Scheme [7].
Tier	A set of Channels grouped together for subscription purposes. Tiers are combined to create Packages.
Version	An attribute of an SI Message that identifies the particular set of attribute and element values transported by the SI Message, allowing it to be identified as a copy of another SI Message.
Weight	An attribute whose value controls the order in which information about an element is presented to the user in a list of elements of the same type.

2.5 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this specification. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. ANSI and TIA maintain registries of currently valid national standards published by them.

[1] ARIB STD-B47, *Forward Link Only Air Interface Specification for Terrestrial Mobile Multimedia Multicast*.

[2] ARIB STD-B48, *Forward Link Only Transport specification*.

[3] ARIB STD-B49, *Forward Link Only Media Adaptation Specification*.

[4] ISO[1)] 639-1. *Codes for the representation of names of languages -- Part 1: Alpha-2 code*, 2002.

[5] ISO/DIS 3166-1. *Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes*, 1997.

[6] ISO 4217. *Codes for the representation of currencies and funds,* 2001.

[7] ISO/IEC 15938-5. *Information technology -- Multimedia content description interface -- Part 5: Multimedia description schemes*, 2003.

[8] ISO/IEC 15706. *Information and documentation -- International Standard Audiovisual Number (ISAN)* 2002.

[9] RFC[2)] 791. Postel, Jon B., *Internet protocol*, 1981.

[10] RFC 2045. Freed, Ned; Borenstein, Nathaniel S., *Multipurpose internet mail extensions (MIME) part one: Format of message bodies*, 1996.

[11] RFC 2046. Freed, Ned; Borenstein, Nathaniel S., *Multipurpose internet mail extensions (MIME) part two: Media types*, 1996.

[12] RFC 2047. Moore, Keith, *MIME (multipurpose internet mail extensions) part three: Message header extensions for non-ASCII text*, 1996.

[13] RFC 2048. Freed, Ned; Borenstein, Nathaniel S.; Postel, Jon B., *MIME (multipurpose internet mail extensions) part four: Registration procedures*, 1996.

[14] RFC 2049. Freed, Ned; Borenstein, Nathaniel S., *MIME (multipurpose internet mail extensions) part five: Conformance criteria and examples*, 1996.

[15] RFC 2368. Hoffman, Paul E.; Masinter, Larry; Zawinski, Jamie, *The mailto URL scheme*, 1998.

[16] RFC 2396. Berners-Lee, Tim; Fielding, Roy T.; Masinter, Larry, *Universal resource identifiers (URI): Generic syntax*, 1998.

[17] RFC 2450. Deering, Stephen E.; Hinden, Robert M., *Internet protocol, version 6 (IPv6) specification*, 1998.

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1) ISO standards are issued by the International Organization for Standardization (ISO). The address of ISO is: ISO Central Secretariat, International Organization for Standardization (ISO), 1, rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland.

2) RFCs are issued by the Internet Engineering Task Force (IETF). The address of the IETF is: IETF Secretariat, c/o Corporation for National Research Initiatives, 1895 Preston White Drive, Suite 100, Reston, VA 20191-5434, USA.

[18] RFC 2616. Fielding, Roy T.; Gettys, James; Mogul, Jeffrey C.; Nielsen, Henrik F.; Masinter, Larry; Leach, Paul J.; Berners-Lee, Tim, *Hypertext transfer protocol – HTTP/1.1*, 1999.

[19] RFC 3966. Schulzrinne, Henning, *The tel URI for telephone numbers*, 2004.

[20] RFC 4078. Earnshaw, Nigel; Aoki, Shigeru; Ashley, Alex; Kameyama, Wateru, *The TV-Anytime content reference identifier*, 2005.

[21] TIA Engineering Committee Recommendation[3)], *TIA style manual (Internet Version),* 1992.

[22] W3C Recommendation[4)]. Bray, Tim; Paoli, Jean; Sperberg-McQueen, C. M.; Maler, Eve; Yergeau, François, *Extensible markup language (XML) 1.0 (Third Edition)*, 2004.

[23] ARIB STD-B50, Forward Link Only Open Conditional Access (OpenCA).

[24] RFC 2327. Handley, Mark; Jacobson Van, *SDP: Session Description Protocol*, 1998.

3) TIA standards and recommendations are issued by the Telecommunications Industry Association (TIA). The address of the TIA is: Telecommunications Industry Association, 2500 Wilson Blvd., Suite 300, Arlington, VA 22201 USA

4) W3C recommendations are issued by the World Wide Web Consortium (W3C). The address of the W3C is: World Wide Web Consortium, 32 Vassar St., Room 32-G515, Cambridge, MA02139, USA.

3 SI REFERENCE ARCHITECTURE

3.1 Introduction

SI provides users and devices in a Network with the advance information needed to make service subscription and service selection decisions.

The SI specified in this document is transport technology independent in the sense that it can be applied to any Network, when coupled with extensions appropriate for that particular Network's transport technology.

This chapter defines the reference architecture for the SI. It identifies and defines the entities involved and describes the information flows between those entities.

3.2 Reference Architecture Model

Figure 3-1 shows the reference architecture model assumed for purposes of defining the SI.

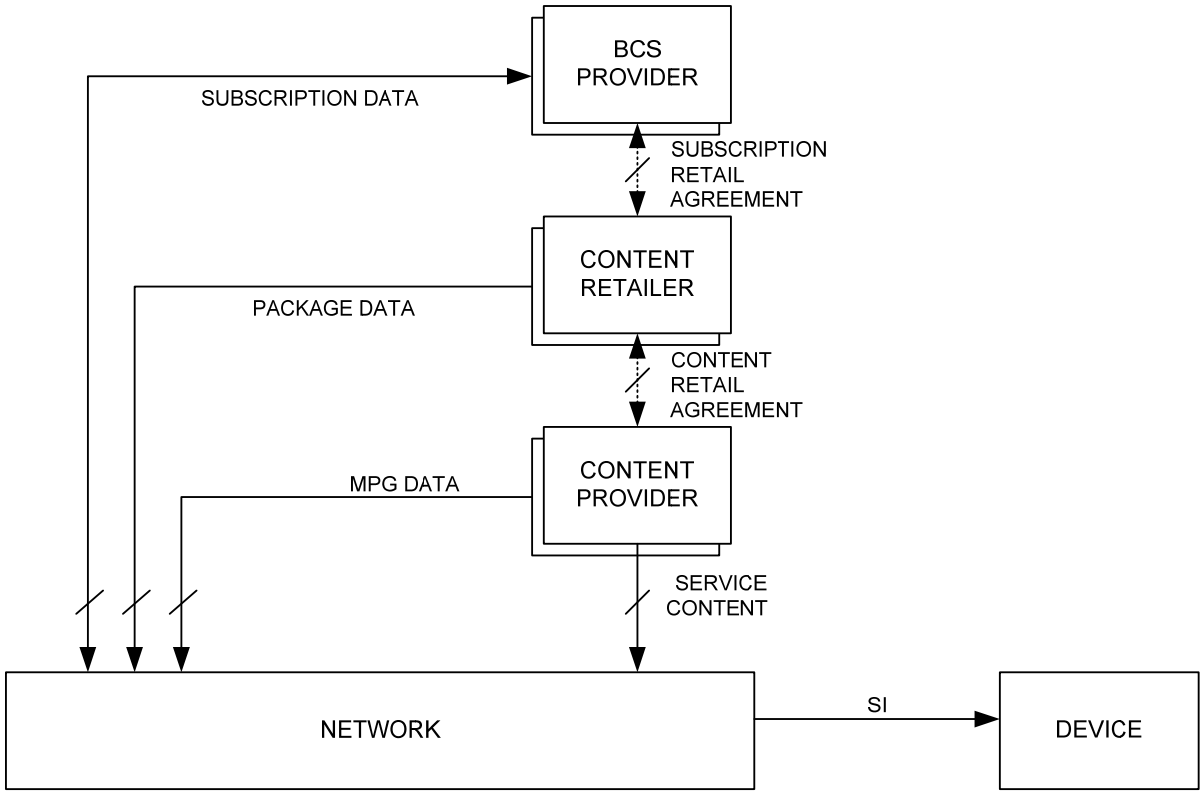

Figure 3-1: SI Reference Architecture Model

This specification defines the message formats and associated semantics of the SI delivered between the Network and the Device.

3.3 Reference Architecture Entities

The functional components of the SI Reference Architecture model are the BCS Provider, the Content Retailer, the Content Provider, the Network and the Device. SI is generated within the Network based on inputs provided by the BCS Providers, the Content Retailers and the Content Providers, and delivered by the Network to the Devices.

These components correspond to functional roles. They carry no implications as to the commercial structures underlying any particular instantiation of the reference architecture. In particular, a user enters into an agreement with a BCS Provider in order for the Device to obtain access to Mobile Multimedia Multicast Services delivered across a Network.

The functions of the components of the reference architecture are described in the following subsections.

3.3.1 Device

The Device provides the user with access to the Services available on the Network. To obtain the services available on a Network, the Device is assumed to have implemented the protocol layers (such as [1], [2] and [3] in case of Forward Link Only Technology). The SI defined in this document is delivered to the Device using the protocols appropriate for the particular Network.

3.3.2 Network

The Network is responsible for delivery of Mobile Multimedia Multicast Services to the Devices using a bearer protocol layers (such as [1], [2] and [3] in case of Forward Link Only Technology). It is also responsible for the creation of the accompanying SI, as specified in this document, and for its delivery to the Devices.

The Services are organized as a set of logical components or Flows, e.g. to carry different media components of a Real Time Service, or IP streams addressed to different IP Ports in an IP Datacast Service. It is assumed that the BCS Providers, Content Retailers and Content Providers have entered into agreements that permit the exchange of information between each other and the Network.

3.3.3 Content Provider

The Content Providers supply the content of the Services to the Network. At any given time, the available Services consist of a mix of Real Time Services, Non Real Time Services, and IP Datacast Services. These Services are described further in section 4.2.3.

Content Providers also generate descriptions of the content available on the Services. These descriptions are provided to the Network in order to maintain the MPG. The means by which these notifications are provided to the Network are outside the scope of this specification.

The MPG provides a description to the user of the content available through the Services at any given time. For certain types of content, notably files downloaded over Non Real Time Services, the MPG also delivers information that allows the Device to acquire content which can be accessed by the user at a later time.

3.3.4 Content Retailer

The Content Retailers define and maintain Packages. In essence, a Package is a set of Services available on the Network which the user can subscribe to; they are described in more detail in section 4.1.4. The user obtains access to the Services by subscribing to the Package. A Package can be offered for subscription to any user who is associated with a BCS Provider that is also associated with the Content Retailer responsible for the Package.

The Content Retailers obtain the right to offer access to Services from the Content Providers through a content retail agreement, which is typically contractual in nature (hence shown as a dotted line in Figure 3-1). This agreement can include rights to customize the appearance of Services to the user, e.g. by renaming the Service or by associating it with auxiliary data such as advertisements.

The Content Retailers notify the Network of the definitions of Packages created by the Content Retailers, and certain related items, as defined in Section 6.2. The means by which these notifications are provided to the Network are outside the scope of this specification.

3.3.5 Billing & Customer Services (BCS) Provider

Billing and Customer Services (BCS) Providers accept and maintain user subscriptions to Mobile Multimedia Multicast Services. Each user (represented by a Device or SIM card as appropriate) is associated with at least one BCS Provider at or before Device Activation. This association is maintained on a long-term basis, typically through the lifetime of the Device.

The BCS Providers also establish relationships with one or more Content Retailers through subscription retail agreements, which are typically contractual in nature (hence shown as a dotted line in Figure 3-1). These agreements define the set of Content Retailers which can offer Packages that a Device can subscribe to through the BCS Provider.

The BCS Providers notify the Network which Content Retailers are associated with the BCS Providers and certain related items, as defined in Section 6.1.2. Also, Package definitions are provided to the BCS Provider by the Content Retailer in order to allow the BCS Provider to manage subscriptions. The means by which these notifications are provided to the Network, and between the BCS Provider and Content Retailer, are outside the scope of this specification.

4 SI OVERVIEW

This chapter is an overview of the services provided by SI.

SI falls into three classes:

- Marketplace Information, providing information which allows users to subscribe to Packages.
- Service Definition, providing information which allows the Device to locate and interpret a Service.
- Media Presentation Guide, providing information about the content available on the Network,

The relationships between various entities described by the SI are illustrated in Figure 4-1.

Note that the entities in Figure 4-1 represent functional entities, and the relationships between them are functional relationships. While each entity corresponds to an element or subelement in the XML specifications of the SI, Figure 4-1 does not show all elements described in the SI, and the functional relationships shown between the entities may not be directly reflected in the XML syntax, although most of these relationships can be derived from it.

The convention for interpreting cardinality is illustrated at the bottom of Figure 4-1: each instance of Entity A is associated with M to N instances of Entity B, while each instance of Entity B is associated with J to K instances of Entity A.

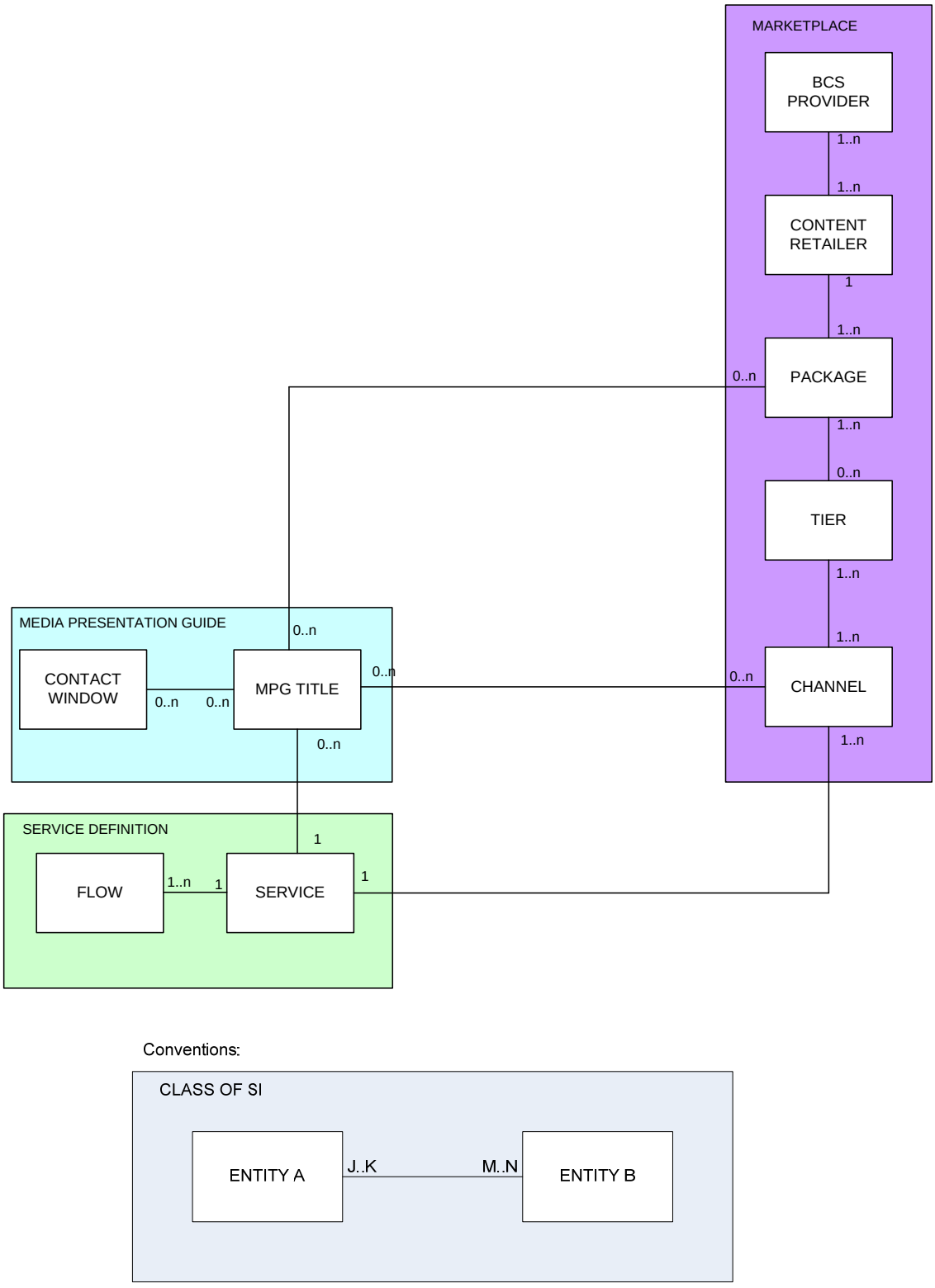

Figure 4-1: Entity Relationships for SI

4.1 Marketplace Information

Marketplace Information SI informs the Device of Classification Schemes, the capabilities of the BCS Providers, the set of Content Retailers associated with each BCS, and the Packages offered by the Content Retailers. The principal function is to communicate information about the Packages.

4.1.1 Classification Schemes

Classification Schemes are defined in ISO/IEC 15938-5 [7]. Classification Schemes contain a set of Terms that correspond to certain functional values in a domain. Classification Schemes are identified by their URI. Terms in a Classification Scheme are identified by their TermID. The means by which Classification Schemes are downloaded into the Device is outside the scope of this specification.

Term Reference defined in ISO/IEC 15938-5 [7], offers a succinct representation for an SI element or attribute to take the value of a Term in a Classification Scheme. Term Reference expresses the URI of the Classification Scheme (either directly or indirectly) and the TermID of the Term.

Term References indirectly expresses the URI of a Classification Scheme using a short alias. The mapping between these short aliases and URIs of Classification Schemes are given in Classification Scheme Tables. Marketplace Information SI defines the Classification Scheme Tables.

4.1.2 BCS Provider Information

Marketplace Information SI defines the characteristics and capabilities of the BCS Providers related to subscription services. In particular, it defines:

- The set of Content Retailers associated with a BCS Provider. The Device can only subscribe to Packages that are provided by Content Retailers associated with a BCS Provider which manages subscriptions for the Device.
- Contact details for access customer service facilities provided by the BCS Provider, such as a telephone number, email address or webpage URL.
- The Terms of Use agreement for the BCS Provider.

4.1.3 Content Retailer Information

Marketplace Information SI defines the characteristics and capabilities of the Content Retailer related to subscription services. In particular, it defines:

- The Name of the Content Retailer
- The Packages offered by the Content Retailer
- The End User License Agreement for the Content Retailer

4.1.4 Package Definitions

The principal information delivered by the Marketplace SI is the definition of the Packages offered by the individual Content Retailers.

In principle, a Package is a set of Services, or is a set of Presentations, or a set of Services and Presentations. A Package has characteristics such as the name of the Package and its price. The set of Services that can be accessed for the Package is identified by the Tiers that belong to the Package. In turn, each Tier is a set of Channels, where a Channel is a Content Retailer customized view of a Service. The set of Presentations that can be accessed for the Package is identified by Events that belong to the Package. Event is a Content Retailer customized view of a Presentation.

An example of the relationship between Packages, Tiers, Channels and Services is shown in Figure 4-2. In this example, a Content Retailer is creating Packages which are branded for certain operators (here, “Horizon” and “Flint”), while also creating Packages targeted at particular groups which could be offered by both operators (here, the “UK Expat” Package, targeted at a small but presumably high-end demographic). These Packages provide access to a number of Real Time Services which carry sports video and continuous reruns of popular television series, reformatted for Devices.

For the Premium SPorts Network service PSPN, two Channels are created, which provide different views of the Service that serve to brand it in a way that advertises a particular mobile

network operator (Horizon and Flint respectively in this example). Otherwise, the Channels are direct reflections of the Services. The Channels could also include access to auxiliary data not available on the original service, such as sport statistics, downloaded clips of past games, or targeted advertisements.

The Tiers are defined, in this example, to provide logical groupings of Channels according to the type of content offered. However, Tiers are not directly visible to the user in any way, so they can be defined according to any organizing principle that meets operational needs, typically to allow the Content Retailer to optimize the representation of the Packages offered by the Content Retailer.

The Packages then offer the users the opportunity to subscribe to combinations of Tiers that provide access to Services likely to be of interest. Thus, the “UK Expat” Package includes access to the “WestEnders” and “Boa” Channels of reruns and to “Wombledon Tennis”, but no access to general American sports channels, while the “Horizon” and “Flint” Packages include access to all sports of interest to their American subscribers, as well as access to reruns such as “Days & Nights of Our Lives” and “Boa” which have appeared in the US.

If Horizon and Flint operate different BCSes, the Content Retailer can choose to restrict access to Packages by BCS Provider ID, so that the “Horizon” Package is only offered through the Horizon BCS, and the “Flint” Package is only offered through the Flint BCS, but the “UK Expat” Package could be offered through both.

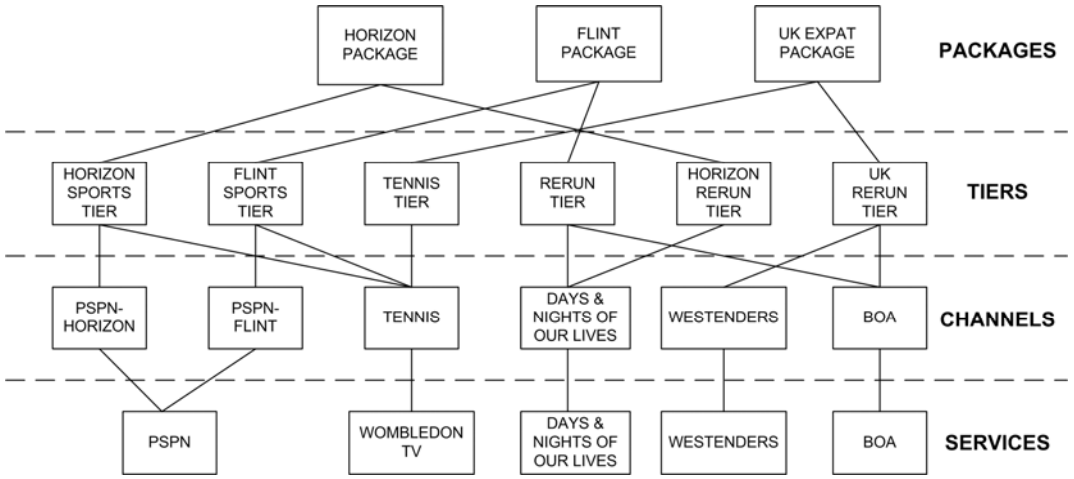

Figure 4-2: Example of Relationships between Packages, Tiers, Channels and Services

4.1.4.1 Tiers

A Tier is a set of Channels which is treated as a logical group for the purpose of constructing a Package. A Channel offered by a Content Retailer appears in at least one Tier, and can appear in more than one.

A Tier has no meaning outside the context of a Package. It is provided to allow compact representation of groups of Services, and to provide flexibility in service management. For example, if a Service which is accessible through multiple Packages becomes unavailable, it can be removed from the Packages by redefining the Tier(s) that include the Service rather than redefining the Packages themselves.

4.1.4.2 Channels

A Channel is a view of a Service presented to the user that is appropriate for a particular Package or Content Retailer.

Subscription to a Package automatically provides access to all Channels in the Package. However, for those users who do not wish to access certain Channels, a Device can include a capability that allows a user to exclude local access to such Channels by preventing their display in the MPG. The Content Retailer can indicate that certain Channels in the Package are not excludable, subject to other factors such as Parental Ratings. For example, a Content Retailer

may elect to prevent exclusion of a Channel which is considered to be the signature Channel of the Package.

The concept of a Channel allows the Content Retailer to customize the Service's appearance to the user. For example, the Content Retailer can replace the default name of the Service with a Channel Name, or it can override the service description with different text. Since a Service can be offered through more than one Package, it is possible to define several Channels which resolve to the same Service. The Service underlying a Channel is known as the Base Service.

4.1.4.3 Events

An Event is a version of a Presentation presented to the user that is appropriate for a particular Package or Content Retailer. Subscription to a Package automatically provides access to all Events in the Package.

4.1.4.4 Weights

Packages and Channels are each assigned a Weight. The Weight is an attribute used to manage the display order of Packages and Channels within a Device. It defines the default position of the Package or Channel relative to other Packages or Channels when they are displayed to the user in a list. Thus, if Packages from all Content Retailers are displayed to the user in a single list, the order of display, in the absence of other considerations such as a user preference, is determined by the Package Weight. Similarly, MPG Titles from the MPG are, by default, displayed to the user in order of Channel Weight.

The values of the weights should be agreed between all the Content Retailers and BCS Providers using the Network. The means by which this is done is a policy decision which is outside the scope of this document. For example, blocks of Weights could be assigned to different Content Retailers, allowing each Content Retailer to assign weights freely within its block.

4.1.4.5 Package Pricing

Each Package is assigned one or more Prices. The Price is associated with a subscription method (e.g. flat fee, weekly, monthly) that is agreed with the user when the user subscribes to the Package.

More than one subscription method can be offered. The semantics of the subscription methods are determined by the Content Retailers and the BCS Providers. However, all subscription methods used refer only to the Package being purchased. That is, the price associated with a subscription method does not represent an adjustment to the price of another subscription method, such as a percentage discount.

Each subscription method gives a price in a specified currency. A Package can be offered in more than one currency (e.g. Euros, UK Pounds, DKr, NKr, SKr) by offering separate subscription methods for each. Only Prices in currencies supported by the Device shall be offered to the user.

4.1.4.6 Package Management

Packages possess certain attributes that define their operation and relationship with other Packages.

4.1.4.6.1 Package States

Packages can be in one of two states: Open and Closed. In the Open state, the BCS Provider can accept new subscriptions to the Package. In the Closed state, no new subscriptions are accepted. However, the Package continues in existence for existing subscribers, and it is possible to change any and all characteristics of the Package.

The Closed state permits a Package to be smoothly retired. When the Package no longer has any subscribers, it can be removed from the SI.

4.1.4.6.2 Package Interdependencies

By default, Packages are offered à la carte. However, certain interdependencies can be defined between Packages that restrict the user's ability to subscribe to the Packages independently of each other, depending on the user's existing subscriptions. It is the responsibility of the Content Retailer to define interdependencies that are meaningful and consistent.

A Package can be configured to permit its subscription only if a user is already subscribed to another Package. Such a dependent Package is an Add-on Package. The independent Package whose subscription is a precondition is a Parent Package. An Add-on Package can have more than one Parent Package, in which case the user can only subscribe to the Package if a subscription already exists for at least one of the Parent Packages. A Package that does not have a Parent Package is a Root Package.

4.1.4.6.2.1 Autosubscribed Packages

An Autosubscribed Package is a Package that is subscribed to by the Device without user intervention. The Package is autosubscribed if the Device is associated with a BCS Provider associated with the Content Retailer offering the Package. Autosubscribed Packages allow a number of push scenarios to be supported, for example to cause the user to be given an initial set of Services after Activation of the Device, or to provide an initial offering for a new Content Retailer.

4.1.4.6.2.2 Excluded Packages

Subscription to a Package can prevent the user from subscribing to other Packages offered by the Content Retailer. This is achieved by associating a list of Excluded Packages with the definition of the Package that requires this condition.

4.1.4.6.3 Example of Package Interrelationships

An example of how the above interrelationships can be used to develop a suite of Packages is illustrated in Figure 4-3.

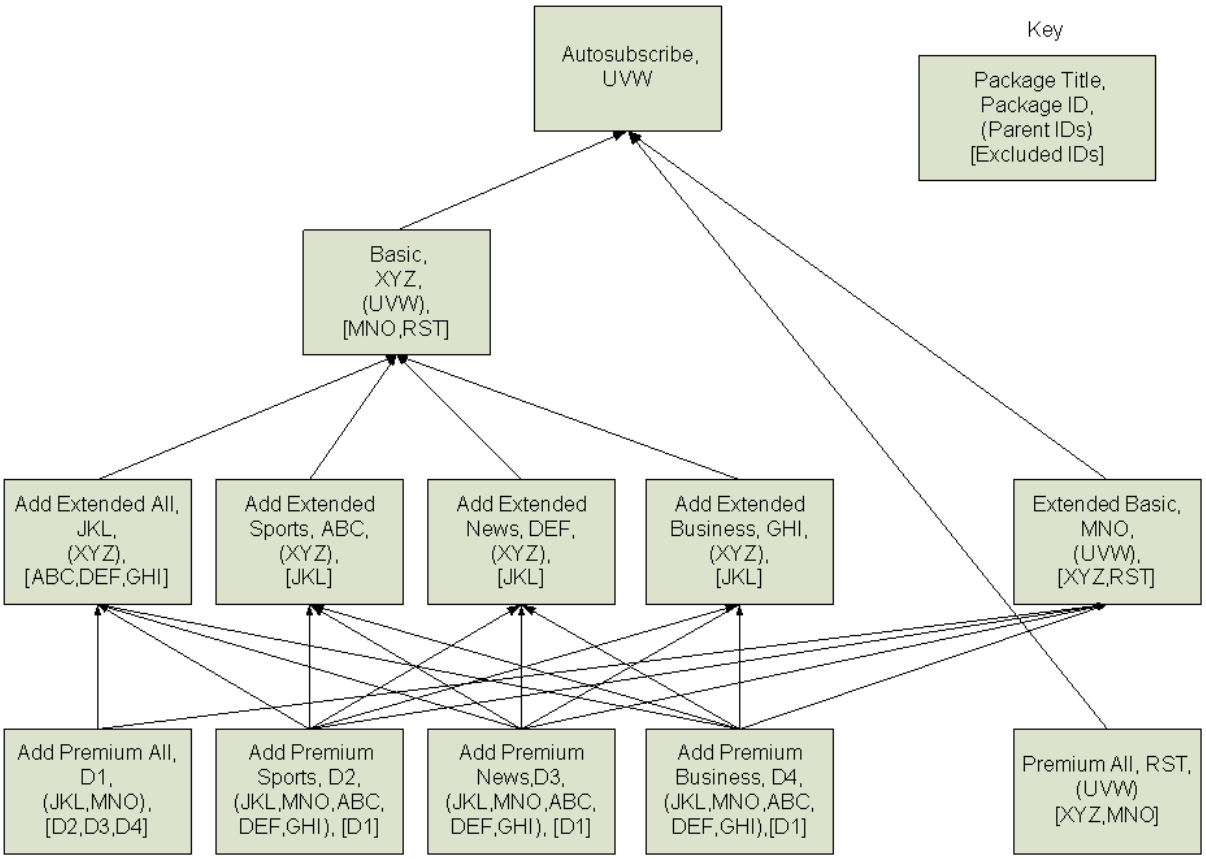

Figure 4-3: Example of Package Interrelationships

In this example, three levels of service are offered: Basic, Extended and Premium. Additionally, certain Services are categorized by content into Sports, Business and News. Packages are defined that represent various combinations of level and category.

A minimum level of service is autosubscribed through the Root Package UVW. A subscribed user can then be offered subscriptions to Packages XYZ, offering Basic Services, MNO, offering

subscription to all Basic and Extended Services, and RST, offering subscription to all Services. However, once a user subscribes to any one of these three Packages, it is no longer possible to subscribe to either of the other two Packages.

If the user subscribes to Package XYZ, it now becomes possible to offer subscriptions to certain Extended Services as add-ons through Packages JKL, ABC, DEF and GHI, since XYZ is a Parent Package to these Packages. Three of these Packages offer subscriptions to certain classes of Extended Service: ABC to Sports, DEF to News and GHI to Business. Package JKL offers subscriptions to all of them. If the user subscribes to JKL, the other three are all excluded. Similarly, if the user subscribes to any of the other three, JKL is excluded. However, the Packages which offer subscriptions to the other two categories of content are still available for subscription.

A user who has subscribed to any of the Packages offering Extended Service can additionally subscribe to Premium Services, since all the Packages offering Extended Service are Parent Packages to all the Packages offering subscriptions to Premium Service (except for Package RST). The four Premium Packages D1, D2, D3 and D4 are structured in a similar way to the Extended Packages JKL, ABC, DEF and GHI, so that subscription to Package D1 excludes Packages D2, D3 and D4, while subscription to any of these three Packages excludes subscription to Package D1 while still permitting subscription to the other two Packages.

This structure allows pricing for the Packages to be managed so that each Package is independently priced; with subscription prices being set that take into account the subscriber's existing subscriptions. For example, Packages JKL and MNO both provide subscriptions to all Extended Services. However, the price of JKL is set to take into account the user's existing subscription to Basic Services through Package XYZ, while the price of MNO assumes that the user is only subscribed to Package UVW.

4.2 Service Definition

Service Definition SI describes the Services available on the Network. It also provides information for the Device to discover the Services in a Multiplex; the Service Definition SI specifies important characteristics of the Service, such as its temporal characteristics.

4.2.1 Flow Records

A Service consists of a set of Flows. Each Flow transports the data comprising a component of the Service that shares some common characteristic, e.g. Real Time audio data. The Service Definition SI provides the means to extend Flow Record Definition for a particular Mobile Multimedia Multicast transport technology to describe the Flows belonging to a Service. The definition of Flow Record for Forward Link Only Technology is covered in Chapter 9.

4.2.2 Available Areas

The Service Definition SI provides the means to extend Available Area definition for a particular Mobile Multimedia Multicast transport technology to describe the geographical areas where a Service is available. The definition of Available Area for Forward Link Only Technology is covered in Chapter 9.

4.2.3 Service Types

A Service is classified according to the temporal nature of its components as a Real Time, Non Real Time or IP Datacast Service [3]. This classification can be used, for example, to distinguish Channels based on the Service by type when displaying information about the Channel to the user. Additional information is provided by a Service Subtype. For example, a Real Time Service can be a video+audio Service or an audio-only Service.

4.2.3.1 Real Time Service

A Real Time Service only provides Real Time components such as video and audio, which are presented to the user as they are received and decoded. An example of a Real Time Service is a mobile TV service. The Real Time content shown in a time window specified in the Media Presentation Guide is a Real Time Presentation.

Devices can export Real Time content through external ports, or record it for later retrieval. Control of such functionality, including the digital rights management capabilities required to support it, is outside the scope of this document.

4.2.3.2 Non Real Time Service

A Non Real Time Service consists of downloading files, across the Mobile Multimedia Multicast bearer protocol layers. The files are stored for processing and consumption at a future time. Such files are called Non Real Time Files. Non Real Time Files typically contain encoded media but can contain data of different types. A Non Real Time File could be a generic file or could be a file that contains one or more Non Real Time Presentations.

In order to ensure successful operation of a Non Real Time Service, it is necessary for the Device to allocate sufficient memory to store files downloaded from the Network until they have been presented. Conversely, the amount of memory reserved for the Service determines the number of files that can be downloaded. The memory needed for subscribers is specified as part of the Service Definition SI for the Non Real Time Service. Further, in order to guarantee that a Device can store and process a downloaded file, download times and access times are constrained according to memory requirements specified by the Content Provider. See further under section 4.3.1.2.

Devices can exist which provide more than the minimum memory requirements for Non Real Time Services, or which can export downloaded files to external memory, allowing them to be stored or processed outside the constrained access times. Control of such functionality, including the digital rights management capabilities required to support it, is outside the scope of this document.

4.2.3.3 IP Datacast Services

An IP Datacast Service supplies IP Datagrams addressed to one or more ports at a defined IPv4 or IPv6 multicast address. The interpretation of the IP datagrams is determined by the application process in the Device. The means by which the application is loaded into the Device, and any digital rights management capabilities required to support it, or to control export or storage of the data delivered via the IP Datacast Service, are outside the scope of this document.

4.2.4 Service Ratings

A Service can be provided with a Rating. The Service Rating is defined according to the Rating standards applicable to the regions in which the Service is available and according to the standards applicable to the type of service (e.g. MPAA, RIAA ratings). The value of the Rating represents an average or typical value for material on the Service. Individual Presentations can have higher or lower Ratings.

4.3 Media Presentation Guide

The Media Presentation Guide (MPG) provides information to the Device about the Presentations available on the Channels or Events to which the Device is subscribed at specified times. The description of a particular instance of a Presentation is known as an MPG Title.

The main information supplied is descriptive information about the Presentations, such as the Start Time and Duration of the MPG Title. In this respect, the MPG is similar to a program guide on a cable television service. The services covered by the MPG can be a subset of the services available on the network.

4.3.1 Presentation Types

4.3.1.1 Real Time Presentations

For Presentations on Real Time Services, an MPG could be presented to the user in a fashion similar to a cable television program guide. For these Presentations, the Name, Start Time, Duration and Service for the Presentation are provided. Additionally, Rating information can be provided if appropriate. For tracking purposes, an ISAN or CRID identifier can also be provided.

4.3.1.2 Non Real Time Presentations

Presentations on Non Real Time Services can be provided with all the descriptive attributes given to Real Time Presentations. However, these Presentations are managed according to a different model.

Non Real Time Presentations are downloaded to the Device before presentation to the user. The times at which they are downloaded are advertised in advance through the Event Block Message in one or more Contact Windows. The Presentation is downloaded in a file which could include multiple Presentations for coding efficiency. The Device can initiate acquisition of the file at any time during the Contact Window.

Viewing of the Presentation can occur at any time after the file is downloaded. Alternately if uniform user experience is preferred between Real Time and Non Real Time Services, a deployment may limit the viewing of the Non Real Time Presentation to a time duration, which is provided in the MPG as a Start Time and Duration for the associated MPG Title

4.3.2 MPG Title Customization

The MPG Title Record provides the characteristics of the MPG Title as specified by the Content Provider. However, the user accesses the Presentation through a Channel to which the user has subscribed or an Event to which the user has subscribed. As a result, the MPG can provide additional information which customizes the representation of the MPG Title as seen by the user, according to the Channel or Event through which it is being accessed.

5 SI MESSAGE STRUCTURES

SI information is transmitted as a set of SI Messages. This chapter specifies the structure that is common to all SI Messages.

5.1 SI Message Types

The SI Messages are organized into three classes

- Marketplace Information, related to the packaging of service offerings to which a user may subscribe. There are two types of SI Message supporting delivery of Marketplace Information. These are specified in detail in chapter 6.
  - The Marketplace Common Message delivers information about BCSes.
  - The Marketplace Content Retailer Message delivers information about Content Retailers.
- Service Information, providing information about the attributes of the available Services and their location within the signal. Service information is delivered in the Service Definition Message, which is specified in detail in chapter 7.
- Media Presentation Guide (MPG), providing information about individual Presentations on the Services. The MPG is delivered in a set of Event Blocks. Event Blocks are specified in detail in chapter 8.

5.2 SI Message Syntax

The structures of the SI Messages are defined as a set of XML schema conformant to XML 1.0 [22]. Normative specifications of the XML structures are provided in Annex A.

5.3 General Message Structure

The general structure of an SI Message is shown in Figure 5-1.

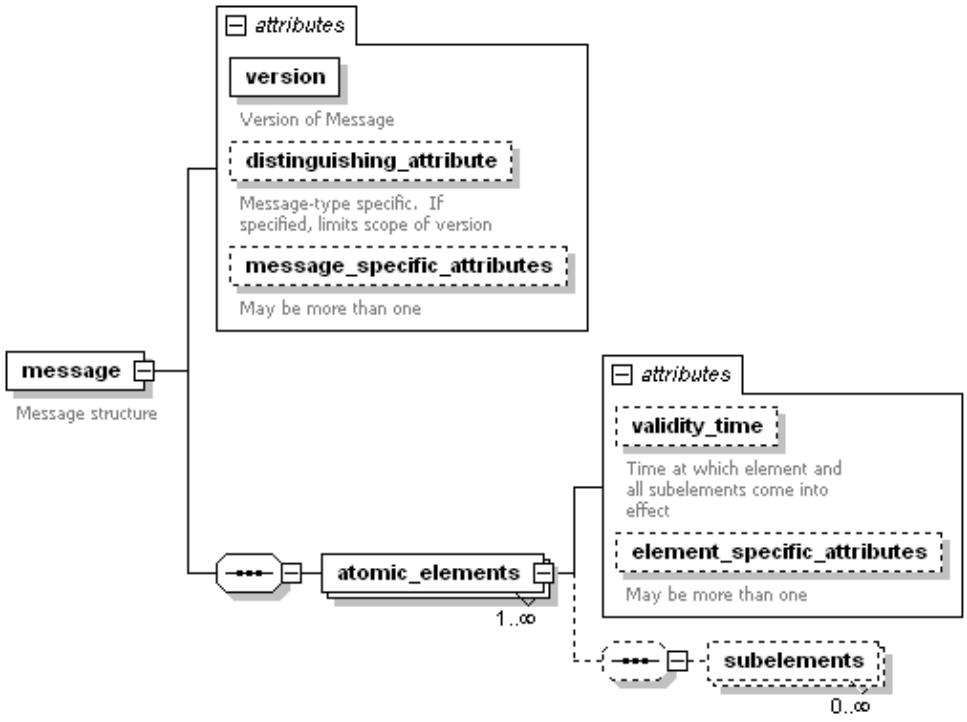

Figure 5-1: General Structure of SI Messages

An SI Message consists of a set of attributes and one or more Atomic Elements. The message attributes shall include a Version, and may include a Distinguishing Attribute in addition to other type-specific attributes.

The Atomic Elements likewise consist of a set of element attributes and a set of zero or more subelements. The element attributes may include a Validity Time in addition to any element-specific attributes.

The Atomic Elements of an SI Message depend on the type of SI Message. Each direct subelement of an SI Message is an Atomic Element. Table 1 lists the Atomic Elements for each SI Message type.

Table 1: Atomic Elements

SI Message type	Atomic Elements
Marketplace Common	Classification Scheme Table BCS Record
Marketplace Content Retailer	CR Classification Scheme Table Basic Info Package Record Tier Record Channel Record
Service Definition	Service Record
Event Block	MPG Title Record Contact Window

The Version, the Distinguishing Attributes and the Validity Time attributes are used to control updates of SI Messages and Atomic elements, as is explained in more detail in the following subsections.

5.3.1 SI Message Versions and Distinguishing Attributes

Each transmitted SI Message contains a Version attribute. The value of this attribute distinguishes different versions of SI Messages of the same message type. If an SI Message is defined to include a Distinguishing Attribute, the value of the Version attribute further distinguishes different versions of SI Messages of that message type with the same value of the Distinguishing Attribute.

The Distinguishing Attributes are as follows:

– Marketplace Content Retailer Message: Content Retailer ID (see section 6.2.1)

– Event Block Message: Start Time (see section 8.2.1).

The Version attribute is a 16-bit unsigned integer. The value of the Version attribute shall be the same for all SI Messages representing a single set of element and attribute values. The value of the Version attribute shall be incremented when any attribute or element of the SI Message, other than the Distinguishing Attribute, is modified or created.

Once the version has changed, the value of the Version attribute associated with that version of the SI Message shall not be reused for a time T_{UPDATE} . The value of T_{UPDATE} is in seconds. T_{UPDATE} is a configurable system parameter.

5.3.2 Identification of Current SI Message Versions

More than one Version of an SI Message may be transmitted at any time. The values of the Version field for the current versions of SI Messages shall be signaled to Devices by means specific to each Mobile Multimedia Multicast transport technology. For SI Message types with a Distinguishing Attribute, the value of the Version field for the current version of the SI Message for each value of the Distinguishing Attribute currently in use shall be signaled to Devices by the same means.

5.3.3 Update of SI Message Versions

An update to an SI Message is signaled by changing the value of the current Version of the SI Message signaled as specified in section 5.3.2. Unless an element of the new version contains a Validity Time attribute, the element values in the new Version shall take effect immediately upon receipt. If an element in the new version contains a Validity Time attribute, the value of the Validity Time shall indicate the time at which the new value of the element takes effect. The Validity Time is a 32-bit count of seconds in UTC time since 00:00:00 UTC January 1, 1970.

6 MARKETPLACE INFORMATION

The marketplace information is provided in two messages:

- Marketplace Common Message
- Marketplace Content Retailer Message

6.1 Marketplace Common Message

The Marketplace Common message defines the marketplace information that is not specific to a Content Retailer. The Marketplace Common message defines:

- Aliases for the Classification Schemes that are used network-wide
- Attributes of the Billing and Customer Service (BCS) Providers configured within the Network
- References to Content Retailers associated with each BCS Provider

Each version of a Marketplace Common Message shall be uniquely identified by the value of its Version attribute, as specified in section 5.3.1.

Figure 6-1 shows the Marketplace Common Message schema.

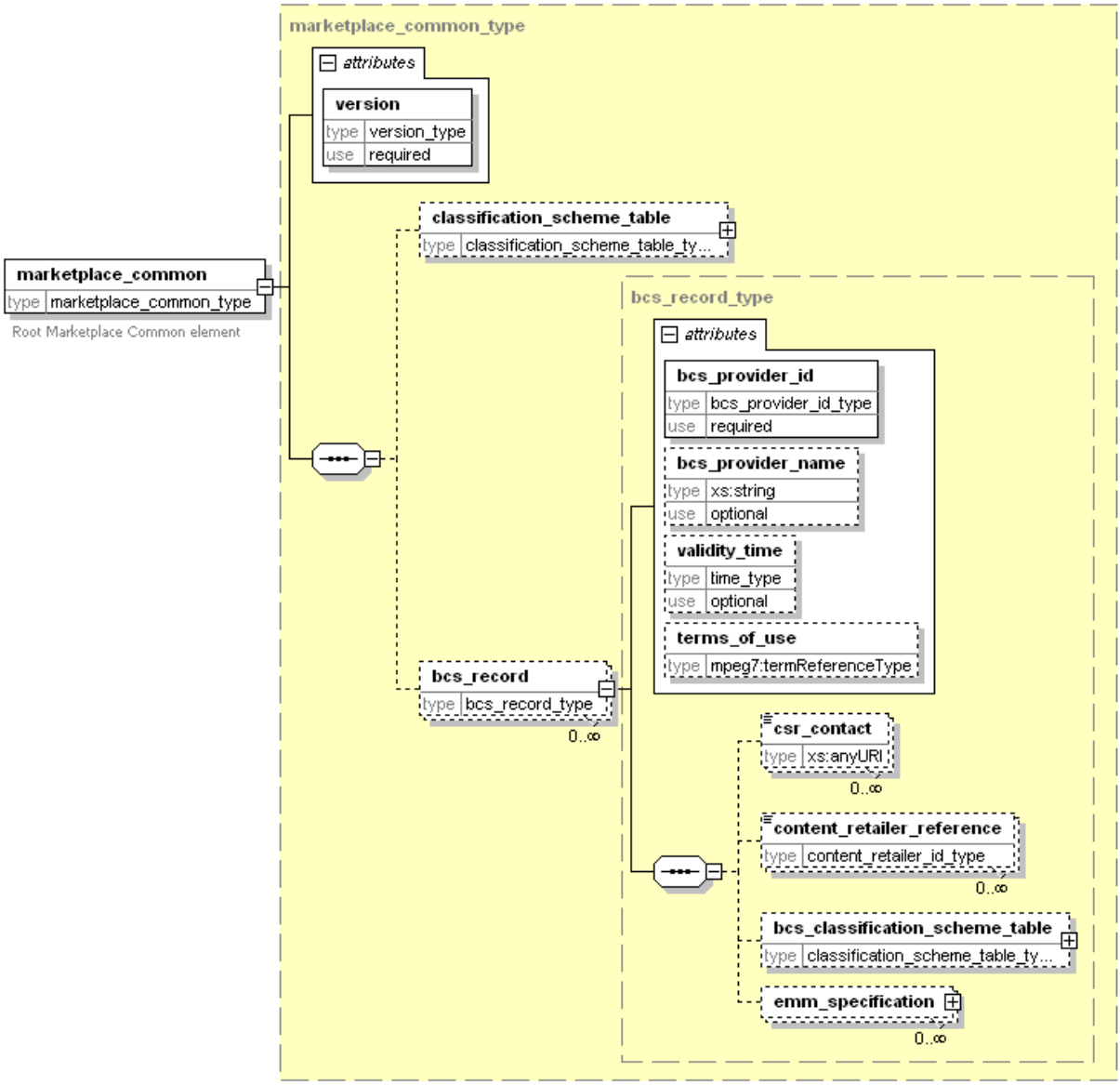

Figure 6-1: Marketplace Common Message Schema

6.1.1 Classification Scheme Table

The Classification Scheme Table element is an instance of Classification Scheme Table Type. The Classification Scheme Table Type is shown in Figure 6-2.

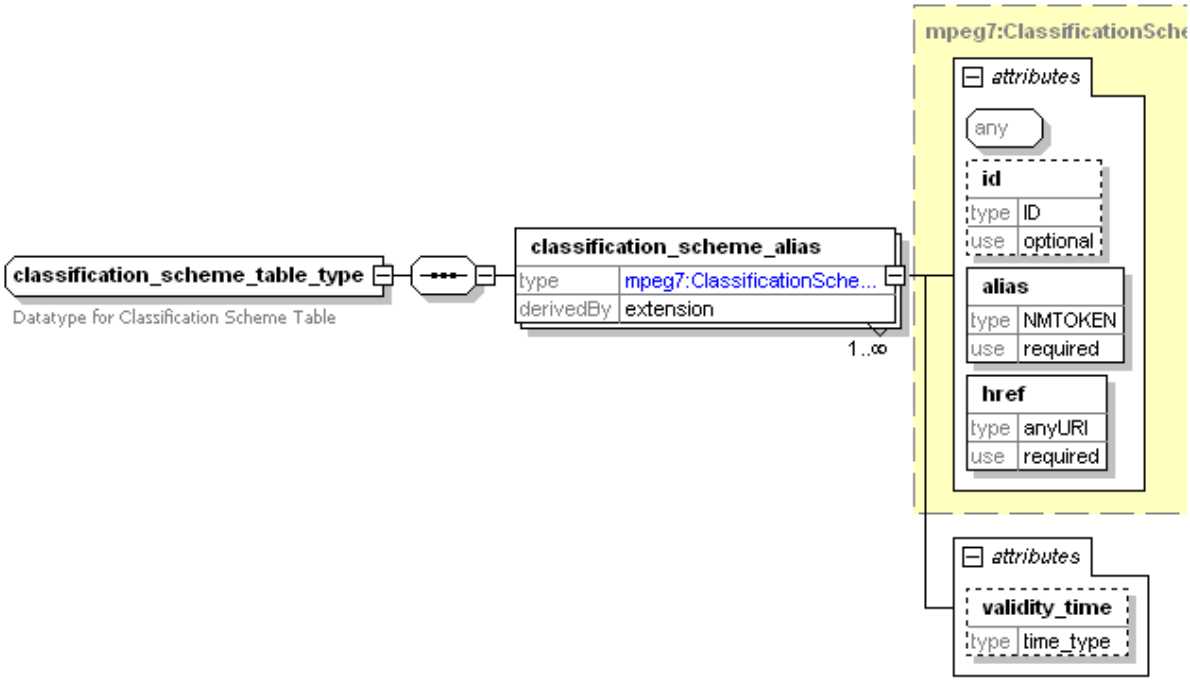

Figure 6-2: Classification Scheme Table Type Schema

The Classification Scheme Table defines aliases for Classification Schemes used by all BCS Providers in the network. These may include:

- Subscription Method (see section 6.2.6.7.1)
- Genre (see section 7.1.5)
- MIME type (see section 9.3.1.3)
- Rating levels (see section 7.1.10)

6.1.1.1 Classification Scheme Alias Type

Classification Scheme Alias Type is extended from ClassificationSchemeAliasType as defined in ISO/IEC 15938-5 [7]. In addition, each alias may be associated with a Validity Time, as defined in section 5.3.3, which shall be used if the definition of an alias is changed.

6.1.2 BCS Record

The Marketplace Common message shall define a BCS Record for each BCS Provider in the Network. The BCS Record defines the attributes of the BCS Provider. The BCS Record supplies the following items:

- BCS Provider ID
- BCS Provider Name
- Validity Time
- Terms of Use
- CSR Contact
- Content Retailer Reference
- BCS Classification Scheme Table
- EMM specification

6.1.2.1 BCS Provider ID

The BCS Record shall include a BCS Provider ID. The BCS Provider ID identifies an individual BCS Provider.

The BCS Provider ID is an unsigned 16 bit integer.

6.1.2.2 BCS Provider Name

The BCS Record may include a BCS Provider Name. The BCS Provider Name is a string attribute which supplies a name for the BCS Provider that may be presented to the user, if appropriate.

6.1.2.3 Validity Time

The Validity Time is defined in section 5.3.3.

6.1.2.4 Terms of Use

The BCS Record may include a Terms of Use attribute. The Terms of Use attribute is a Term Reference. It provides the Terms of Use which the BCS Provider requires a user to agree to before providing the user with access to Packages offered by the Content Retailer.

6.1.2.5 CSR Contact

The BCS Record should provide at least one CSR contact.

The CSR Contact element describes possible ways to contact the customer service representatives for the BCS. Each CSR Contact is a URI, as specified in RFC 2396 [16].

The following examples show how different classes of URI may be used for a CSR contact:

– A tel: URI defines a telephone number the subscriber may call for customer assistance. The valid formats for a tel: URI are specified in RFC 3966 [19].

– A mailto: URI specifies an email address the subscriber may use for customer assistance. The valid formats for the mailto: URI are specified in RFC 2368 [15].

– An http: URI specifies a web site the subscriber may use for customer assistance. The valid formats for the http: URI are specified in RFC 2616 [18].

6.1.2.6 Content Retailer References

The BCS Record shall include a list of Content Retailer References identifying the Content Retailers associated with the BCS Provider. A subscriber associated with the BCS Provider may only subscribe to Packages offered by Content Retailers included in the Content Retailer Reference.

The Content Retailer ID is specified in section 6.2.1.

6.1.2.7 BCS Classification Scheme Table

The BCS Record may include a BCS Classification Scheme Table. The BCS Classification Scheme defines aliases for Classification Schemes used by the BCS Provider, which may differ from corresponding Classification Schemes used by other BCS Providers in the network, such as Terms of Use agreements. BCS Classification Scheme Table is an instance of Classification Scheme Table Type. The Classification Scheme Table Type is shown in Figure 6-2.

6.1.2.8 EMM specification

The EMM specification sub-element of the BCS Record contains the following attributes and elements.

- CA System ID
- Operator ID
- EMM Interactive URL

- SDP Info
- Private Data

The CA specification element is shown in Figure 6-3

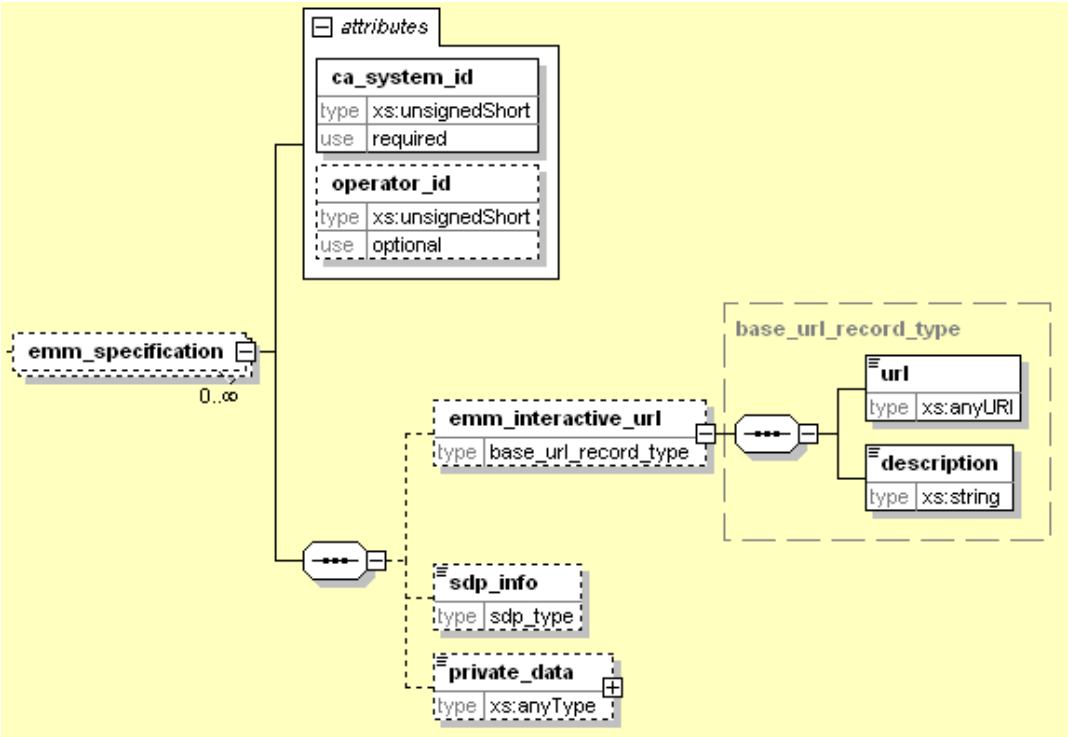

Figure 6-3: CA Specification in Common Marketplace

6.1.2.8.1 CA System ID

The CA_System_Id identifies the KMS provider [23] and it shall be globally unique.

6.1.2.8.2 Operator ID

Operator_Id is optional and is managed by each KMS provider, and allows the operator of the KMS to be identified.

6.1.2.8.3 EMM Interactive URL

The EMM Interactive URL gives the URL where EMMs can by obtained using the unicast network for the associated KMS. The URL subelement gives the link and the Description subelement gives information text about the link.

6.1.2.8.4 SDP Info

This element gives the SDP description of the session containing broadcast EMMs for the associated KMS. SDP description conforming to [24] shall be embedded as CDATA in this element.

6.1.2.8.5 Private Data

The Private Data element is intended for conveying KMS specific information for the BCS Record.

6.2 Marketplace Content Retailer Message

The information specific to a Content Retailer is sent in the Marketplace Content Retailer message.

The Marketplace Content Retailer message contains the following elements:

– Content Retailer ID

- Version
- Default Language
- CR Classification Scheme Table
- Basic Info
- Package records
- Tier records
- Channel records

Figure 6-4 shows the Marketplace Content Retailer message schema.

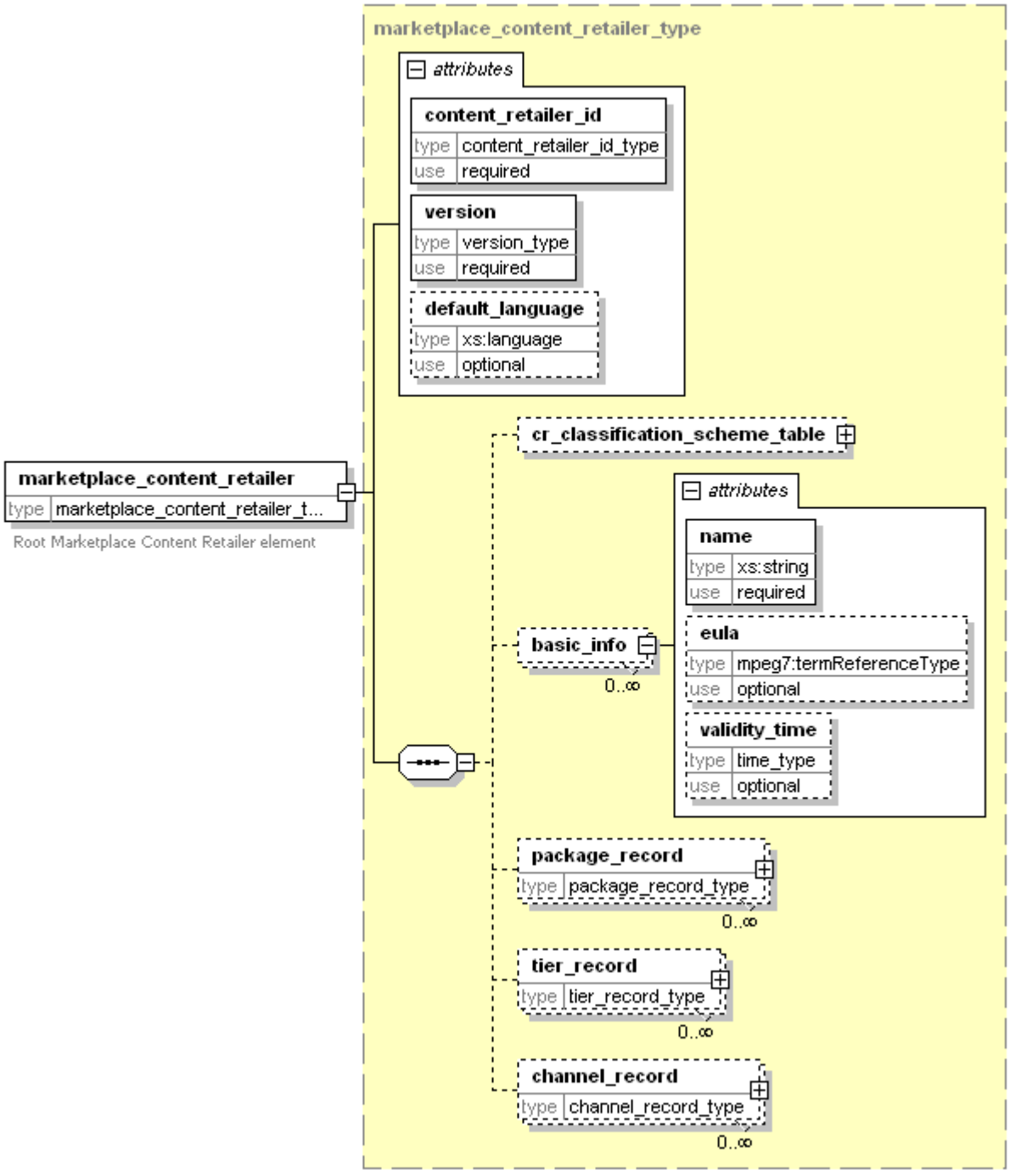

Figure 6-4: Marketplace Content Retailer Message Schema

6.2.1 Content Retailer ID

Each Content Retailer is uniquely distinguished from all other Content Retailers in the Network by a Content Retailer ID. The Content Retailer ID is a Distinguishing Attribute (see section 5.3.1).

The Content Retailer shall be associated with at least one BCS Provider.

The Content Retailer ID is an unsigned 16 bit integer.

6.2.2 Version

Each version of a Marketplace Content Retailer message shall be uniquely identified by the values of its Content Retailer ID and Version attributes, as specified in section 5.3.1.

6.2.3 Default Language

The Content Retailer may specify a Default Language. The Default Language attribute specifies the language in which the Content Retailer EULA, and other information associated with the Content Retailer, shall be presented to the user if the user's preferred language is not available. The Default Language shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

A Default Language shall be provided if the EULA, or other information associated with the Content Retailer, is available in more than one language.

6.2.4 CR Classification Scheme Table

The Marketplace Content Retailer message may include a CR Classification Scheme Table. The CR Classification Scheme Table defines aliases for Classification Schemes used by the Content Retailer, which may differ from corresponding Classification Schemes used by other Content Retailers in the network, such as EULAs. CR Classification Scheme Table is an instance of Classification Scheme Table Type. The Classification Scheme Table Type is shown in Figure 6-2.

6.2.5 Basic Info

The Basic Info record provides:

- The Content Retailer Name.
- The EULA.
- Validity Time

6.2.5.1 Content Retailer Name

The Content Retailer Name is a string that may be used to identify the content retailer to a user.

If the Basic Info element is present, the Content Retailer shall have a Content Retailer Name.

The Content Retailer Name should be unique among Content Retailers carried in the network.

6.2.5.2 EULA

The EULA attribute is a Term Reference. It provides the EULA which the Content Retailer requires a user to agree to before providing the user with access to Packages.

6.2.5.3 Validity Time

The Validity Time is defined in section 5.3.3.

6.2.6 Package Records

The Marketplace Content Retailer Message should include at least one Package Record.

The Package Record defines a set of content offerings available through the Content Retailer, and certain associated attributes:

- Package ID
- Package Version
- Validity Time
- Package Weight
- Default Language
- Language-specific Data
- Package Pricing and subscription methods
- Tiers associated with the Package
- Events associated with the Package

- Package Characteristics
- Included or excluded Device Profiles associated with the Package
- Available Areas
- EULA Link
- BCS Provider IDs associated with the Package
- CA specific extension

Figure 6-5 shows the Package Record schema.

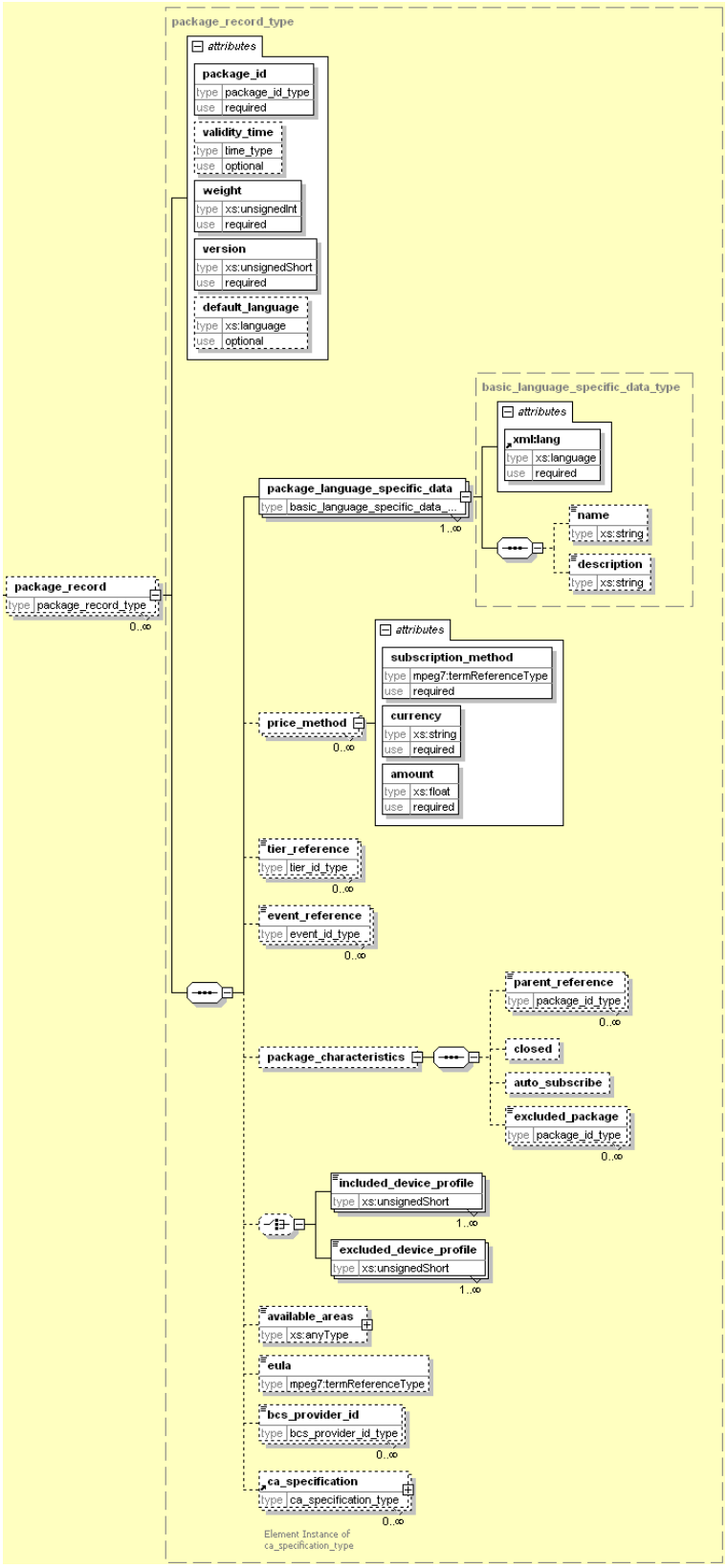

Figure 6-5: Package Record Schema

6.2.6.1 Package ID

The Package ID is an identifier that distinguishes the Package from other Packages offered by the same Content Retailer.

The Package ID is an unsigned 16 bit integer.

There shall be one Package ID associated with each Package.

6.2.6.2 Validity Time

The Validity Time is defined in section 5.3.3.

6.2.6.3 Package Weight

Each Package Record shall assign a Package Weight to the Package. The Package Weight is an unsigned 32 bit integer.

The Package Weight shall be used by the device to determine the order in which Packages are presented to the user. Packages with the lower weight shall be presented first.

The Package Weight shall be unique amongst all Packages offered by all Content Retailers associated with a BCS Provider.

There shall be one Package Weight associated with each Package Record.

6.2.6.4 Version

The Package Version field distinguishes different versions of the Package offered by the Content Retailer. It allows the device to determine whether a user is subscribing to the most recent definition of the Package.

The Package Version is an unsigned 16 bit integer.

The Package Version shall be incremented whenever there is a change to the definition of the Package.

6.2.6.5 Default Language

The Package Record may specify a Default Language. The Default Language attribute specifies the language in which information about the Package and, if present, its EULA shall be presented to the user if the user's preferred language is not available. The Default Language attribute shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

A Package Default Language shall be provided if the Package Record supports more than one language.

6.2.6.6 Package Language-specific Data

The Package Language Specific Data element shall specify the Name and Description of the Package associated with a specific language.

Each Package Record shall contain at least one Package Language-specific Data Element.

Each Package Record shall contain at most one Package Language-specific Data Element per Package Language.

6.2.6.6.1 Package Language

The Package Language attribute specifies the language of the Package Language Specific Data element. The Package Language shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

6.2.6.6.2 Package Name

The Package Name attribute is a string that specifies a name for the Package that may be displayed to the user.

6.2.6.6.3 Package Description

The Package Description attribute is a string that specifies a description for the Package that may be displayed to the user.

6.2.6.7 Price Method

The Price Method of a Package specifies a cost associated with a given subscription method for the Package. It consists of a Subscription Method, a Currency and an Amount.

6.2.6.7.1 Subscription Method

The Subscription Method identifies a subscription method (e.g. monthly, weekly) associated with the Cost.

The Subscription Method is a Term Reference.

6.2.6.7.2 Currency

The Currency identifies the currency applicable to the Amount.

The Currency is a string conforming to ISO 4217 [6].

6.2.6.7.3 Amount

The Amount is the actual price of the Package in the case of a Root Package, or the incremental price of the Package additional to the price of the Parent Package in the case of an Add-on Package.

The Amount attribute is a floating point value conforming to the requirements of the associated Currency.

6.2.6.8 Tier References

The Package Record may specify the set of Tiers that describe the Package offering. The Tiers are defined in the Tier Record associated with the Content Retailer. See section 6.2.7.

6.2.6.9 Event References

The Package Record may specify the set of Event Reference elements that describe the Package offering.

6.2.6.10 Package Characteristics

The Package Record may include a Package Characteristics element. If present, it specifies certain attributes of the Package. The element may specify any combination of the following attributes:

- Parent Package.
- Autosubscribe Package
- Closed Package.
- Excluded Packages.

6.2.6.10.1 Parent Package

The Package Characteristics element may specify a list of one or more Package IDs representing Parent Packages. If a Package is associated with a Parent Package then the Package is an Add-on Package, and the user may only subscribe to the Package if the user is already subscribed to at least one Package among the Parent Packages.

If no Parent Packages are listed then the Package is defined to be a Root Package.

6.2.6.10.2 Autosubscribe Package

The Package Characteristics element may specify the Autosubscribe attribute to cause the user to be automatically subscribed to the Package.

6.2.6.10.3 Closed Package

The Package Characteristics element may specify the Closed attribute to indicate that new subscriptions are no longer being accepted for the Package.

6.2.6.10.4 Excluded Package

The Package Characteristics element may specify a list of one or more Package IDs representing Excluded Packages. A user subscribed to the Package specified in the Package Record shall not be permitted to subscribe to any Package in the list of Excluded Packages and vice versa. It is the responsibility of the Content Retailer to define relationships between Packages in such a way that the user cannot be offered the Package if the user is already subscribed to a Package in the Excluded Packages list.

6.2.6.11 Device Profiles

The types of Devices which can subscribe to the Package may be restricted through the use of Device Profiles. A Device Profile is an identifier for a set of Device characteristics. The management of Device Profile values and provisioning of Device Profile value on Devices are outside the scope of this specification. A Device Profile is a 16-bit unsigned integer.

If subscription access to a Package is limited to certain types of Device, the Package Record shall include either a list of Included Device Profiles or a list of Excluded Device Profiles. If neither Included Device Profiles nor Excluded Device Profiles are present, then the Package access is not limited based on characteristics of the Device.

6.2.6.11.1 Included Device Profiles

An Included Device Profile identifies the types of Devices which are capable of accessing the Package. All other Devices are not capable of accessing the Package.

6.2.6.11.2 Excluded Device Profiles

An Excluded Device Profile identifies the types of Devices which are not capable of accessing the Package. All other Devices are capable of accessing the Package.

If Included Device Profiles and Excluded Device Profiles are not present then all Devices are capable of accessing the Package.

6.2.6.12 Available Areas

The Package Record may include an Available Areas element. The Available Areas element is intended to describe the geographical areas where the content offered by the Package is available. The definition of the Available Areas element depends on the Mobile Multimedia Multicast transport technology. The format of the Available Areas element for Forward Link Only Technology is given in Chapter 9.

6.2.6.13 EULA

The EULA is a Term Reference. It provides the EULA which the Content Retailer requires a user to agree to before providing the user with access to this Package.

6.2.6.14 BCS Provider References

The Package Record may specify a list of BCS Provider IDs associated with the Package. The BCS Provider ID identifies a BCS Provider (see section 6.1.2.1). Only BCS Providers associated with the Content Retailer may be included in the list.

If the list is provided then only users associated with an identified BCS Provider are permitted to subscribe to the Package. If the list is not provided then users associated with any BCS Provider that is also associated with the Content Retailer are permitted to subscribe to the Package.

6.2.6.15 CA specification

The CA specification sub-element of the Package Record contains the following elements.

- CA System Identifier
- Operator ID
- Private Data

The CA specification element is shown in Figure 6-6

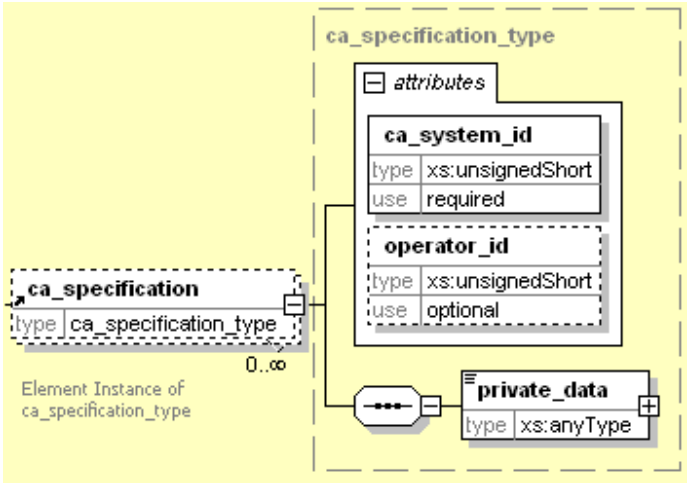

Figure 6-6: CA Specification in Package Record

6.2.6.15.1 CA System ID

The CA System ID identifies the KMS provider [23] and it shall be globally unique.

6.2.6.15.2 Operator ID

Operator ID is optional and is managed by each KMS provider, and allows the operator of the KMS to be identified.

6.2.6.15.3 Private Data

The Private Data element is intended for conveying KMS specific information for the Package.

6.2.7 Tier Record

The Marketplace Content Retailer message shall include a Tier Record for each Tier referenced by any Package.

Figure 6-7 shows the Tier Record schema. The Tier Record definition includes the following attributes and elements:

- The Tier ID
- The Validity Time of the Record
- The set of Channels included in the Tier.
- The set of Channels excluded by the Tier

The Tier Record shall include either or both of the set of included Channels and the set of Excluded Channels.

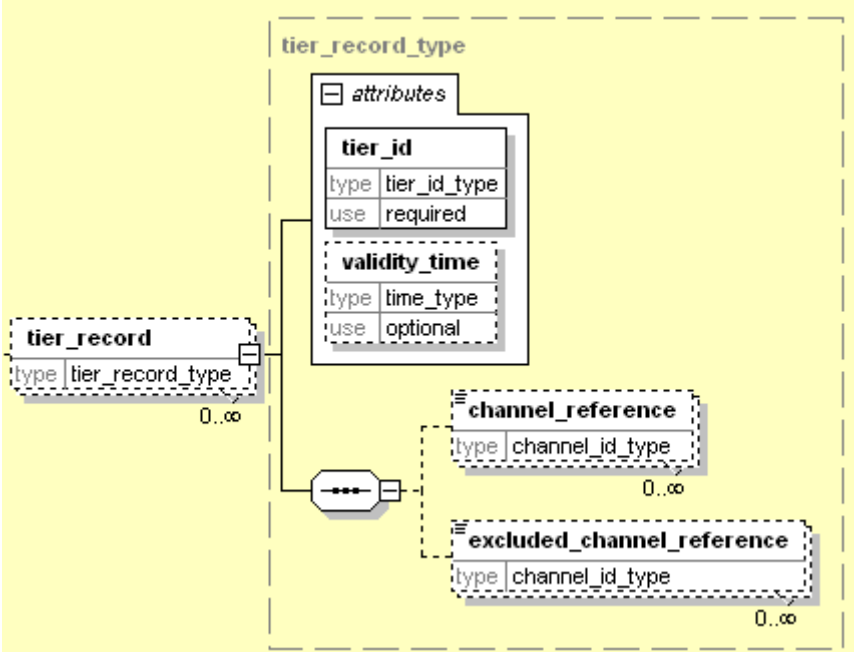

Figure 6-7: Tier Record Schema

6.2.7.1 Tier ID

The Tier ID is an identifier that uniquely distinguishes the Tier from all other Tiers offered by the same Content Retailer.

The Tier ID is an unsigned 16 bit integer.

6.2.7.2 Validity Time

The Validity Time is defined in section 5.3.3.

6.2.7.3 Channel References

The Tier Record may specify a set of Channels that are included in the Tier. The Channels are identified by their Channel ID, and are defined in the Channel Record associated with the Content Retailer. See section 6.2.7.4.

6.2.7.4 Excluded Channel References

The Tier Record may specify a set of Channels that are excluded by the Tier. The Channels are identified by their Channel ID, and are defined in the Channel Record associated with the Content Retailer. See section 6.2.8

If a Channel is excluded by a Tier, and the user subscribes to a Package containing the Tier, the Device shall not provide the user with access to the excluded Channel, even if the user is otherwise subscribed to the Channel, unless the user becomes unsubscribed to all Packages including the Tier, or the Tier is redefined.

6.2.8 Channel Record

The Marketplace Content Retailer message shall include a Channel Record for each Channel referenced by any Tier.

The Channel Record defines a Channel, which is a customization of a Service for the Content Retailer. Figure 6-8 shows the Channel Record schema.

The Channel Record definition includes the following elements and attributes:

– Channel ID

– Base Service

- Validity Time
- Channel Weight
- Default Language
- Excludability
- Channel Language-specific Data
- Resource
- CA specific extension

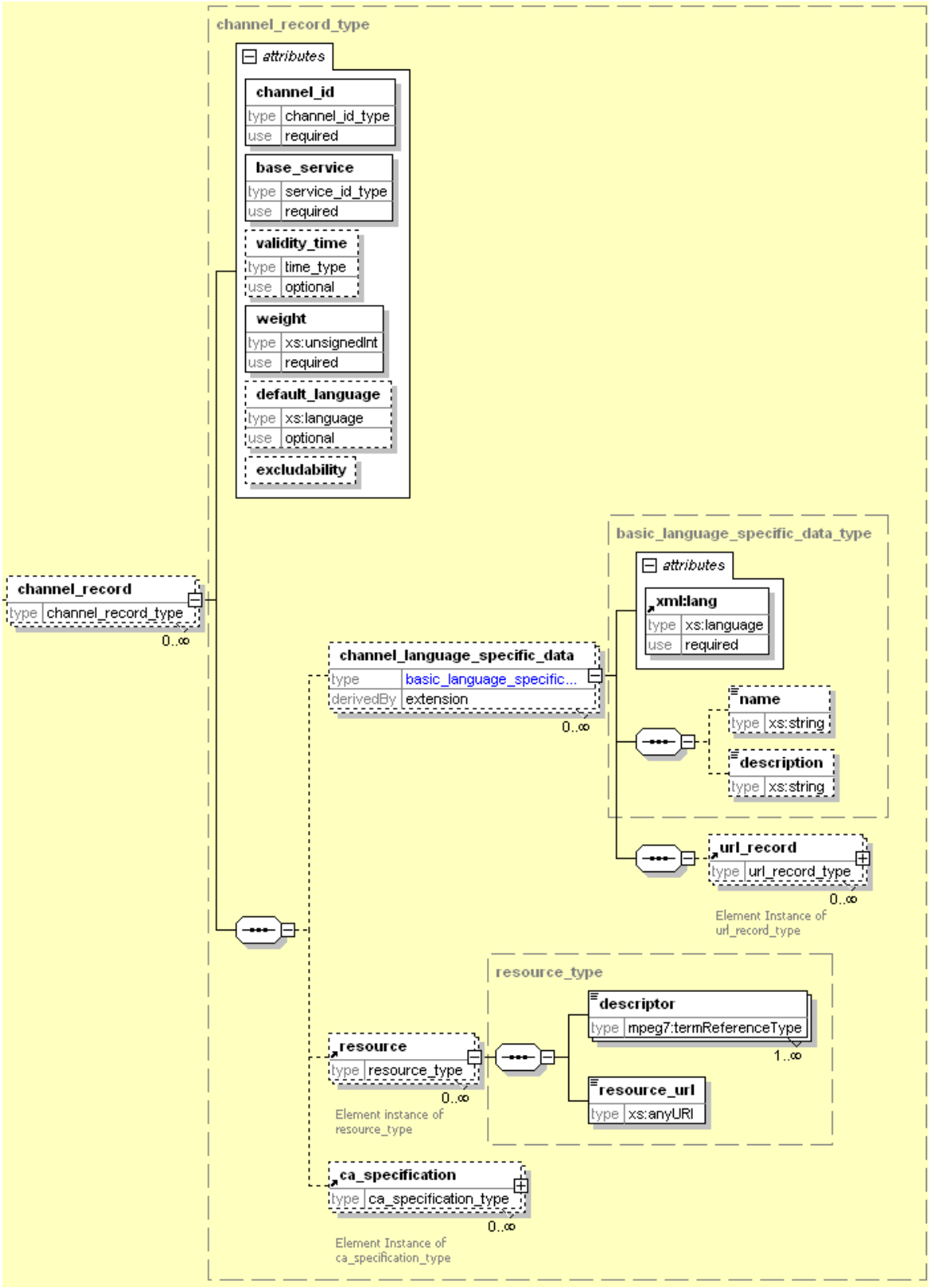

Figure 6-8: Channel Record Schema

6.2.8.1 Channel ID

The Channel ID is an identifier that uniquely distinguishes the Channel from other Channels offered by the same Content Retailer in the same Network.

The Channel ID is an unsigned 16 bit integer.

6.2.8.2 Base Service Record

The Channel Record shall specify the Base Service identifier for the Channel. The Base Service identifier is the Service identifier for the Service that the Channel customizes. See section 7.1.1.

6.2.8.3 Validity Time

The Validity Time is defined in section 5.3.3.

6.2.8.4 Channel Weight

Each Channel Record shall assign a Channel Weight to the Channel. The Channel Weight is an unsigned 32 bit integer.

The Channel Weight shall be used by the device to determine the order in which Channels are presented to the user when displaying the Media Presentation Guide. Channels with the lower weight shall be presented first.

The Channel Weight shall be unique amongst all Channels offered by all Content Retailers associated with the BCS Provider.

There shall be one Channel Weight associated with each Channel Record.

6.2.8.5 Default Language

The Channel Record may specify a Default Language. The Default Language attribute specifies the language in which information about the Channel and MPG Titles on the Channel shall be presented to the user if the user's preferred language is not available. It also specifies the language in which audio or text for the Channel shall be presented to the user if the user's preferred language is not available. The Default Language shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

A Default Language shall be provided if information about the Channel or content provided in the Channel is available in more than one language.

6.2.8.6 Excludability

The Channel Record may specify Excludability. If the excludability attribute is present, a user subscribing to the Package providing access to the Channel is permitted to suppress display of information related to the Channel in the MPG. If the excludability attribute is not present, a user subscribing to the Package providing access to the Channel is not permitted to suppress display of information related to the Channel in the MPG.

6.2.8.7 Channel Language-specific Data

The Channel Language Specific Data element shall specify the Name and Description of the Channel associated with a specific language, and may define URLs where the user can obtain further information about the Channel.

Each Channel record may contain one or more Channel Language-specific Data Elements. If a Channel Language-specific Data Element is present, its content supersedes the Service Language-specific Data Element for the Base Service in the same language. If there is no Channel Language-specific Data Element in a given language, the device shall use the Service Language-specific Data Element for the Base Service in that language.

Each Channel record shall contain at most one Channel Language-specific Data Element per Channel Language.

6.2.8.7.1 Channel Language

The Channel Language attribute specifies the language of the Channel Language Specific Data element. The Channel Language shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

The Package Default Language (see section 6.2.6.5) shall be used as the default language for the Channel if no language preference is defined on the device.

6.2.8.7.2 Channel Name

The Channel Name attribute is a string that specifies a name for the Channel that may be displayed to the user.

6.2.8.7.3 Channel Description

The Channel Description attribute is a string that specifies a description for the Channel that may be displayed to the user.

6.2.8.7.4 Channel URL

The Channel record may contain one or more Channel URL records per language.

The URL record consists of

– The Subscribed URL

– The Unsubscribed URL

Each URL is associated with a URL Description.

Figure 6-9 shows the Channel URL Record schema.

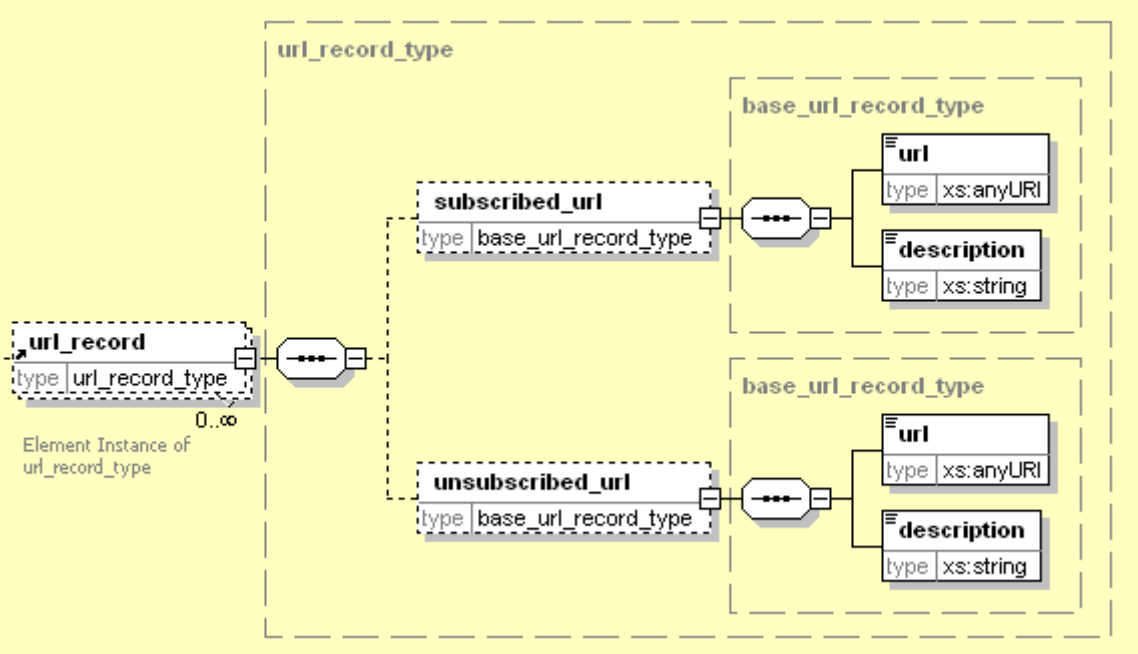

Figure 6-9: URL Record Schema

6.2.8.7.4.1 Subscribed URL

The Subscribed URL identifies a resource which provides further information in the associated language about the Channel suitable for presentation to a User who is subscribed to the Channel. The URL may point to an external reference (e.g. an HTML link) or to an internal file.

6.2.8.7.4.2 Unsubscribed URL

The Unsubscribed URL identifies a resource which provides further information in the associated language about the Channel suitable for presentation to a User who is not subscribed to the Channel. The URL may point to an external reference (e.g. an HTML link) or to an internal file.

6.2.8.7.4.3 URL Description

The URL Description attribute is a string in the associated language that describes the resource accessed through the associated URL.

6.2.8.8 Resource

A Resource element describes a generic data entity that is associated with the Channel. A Resource element may be used to convey auxiliary data for the Channel. An example use case for Resource is Channel icons that can be used in the display of the Channel in the MPG to the user.

6.2.8.8.1 Descriptor

The Descriptor is a Term Reference that indicates the usage of the Resource.

6.2.8.8.2 Resource URL

The Resource URL gives the location to obtain the Resource. It could be an HTML link or any URI string that has associated semantics to obtain the Resource.

6.2.8.9 CA specification

The CA specification sub-element of the Channel Record contains the following elements.

- CA System ID
- Operator ID
- Private Data

The CA specification element is shown in Figure 6-10

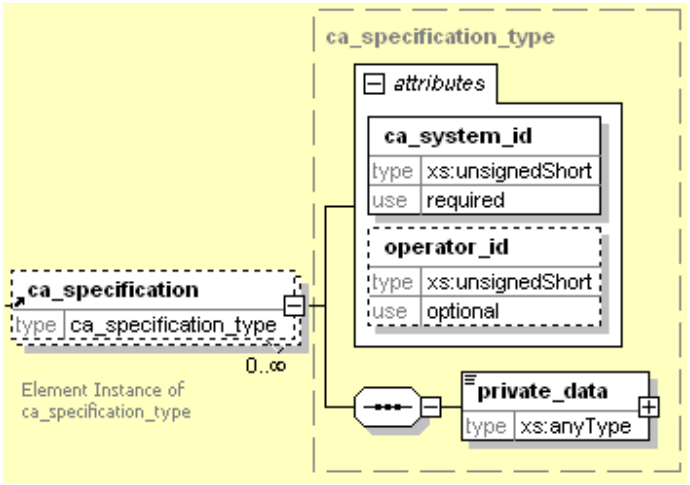

Figure 6-10: CA Specification in Package Record

6.2.8.9.1 CA System ID

The CA System ID identifies the KMS provider [23] and it shall be globally unique.

6.2.8.9.2 Operator ID

Operator ID is optional and is managed by each KMS provider, and allows the operator of the KMS to be identified.

6.2.8.9.3 Private Data

The Private Data element is intended for conveying KMS specific information for the Channel.

7 SERVICE INFORMATION

The Service information is provided in a single SI message, the Service Definition Message.

The Service Definition Message defines those content attributes of a Service which are shared between Channels offered by different Content Retailers that use the Service as a Base Service. It also defines default content attributes that may be used in the event that a Content Retailer does not define customized values for the corresponding attributes in the Channel Definition record.

Each version of a Service Definition Message is uniquely identified by the value of its Version attribute, as specified in section 5.3.1.

The Service Definition message shall consist of one or more Service Records.

Figure 7-1 shows the Service Definition Message schema.

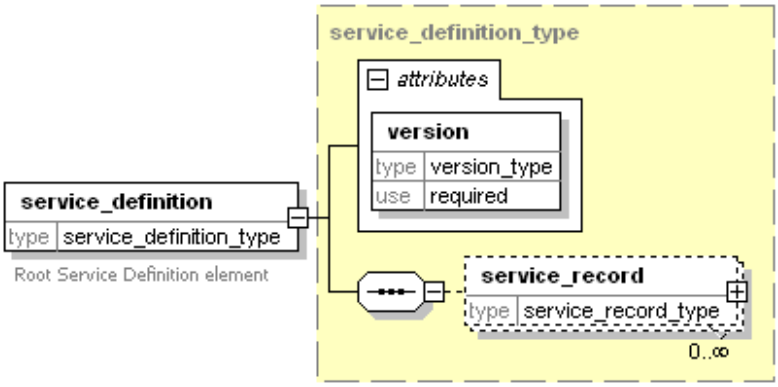

Figure 7-1: Service Definition Message Schema

7.1 Service Record

The System Information for a Multiplex shall provide one Service Record for each Service offered by the Multiplex.

The Service Record definition includes the following attributes and elements:

- Service ID
- Corporate Affiliation
- Validity Time
- Abbreviated Name
- Service Genre
- Default Language
- Service Type
- Service Language Specific Data
- Capability Requirements
- Ratings
- Flow Records
- Available Areas
- Multi Presentation Record
- Resource

Figure 7-2 shows the Service Record schema.

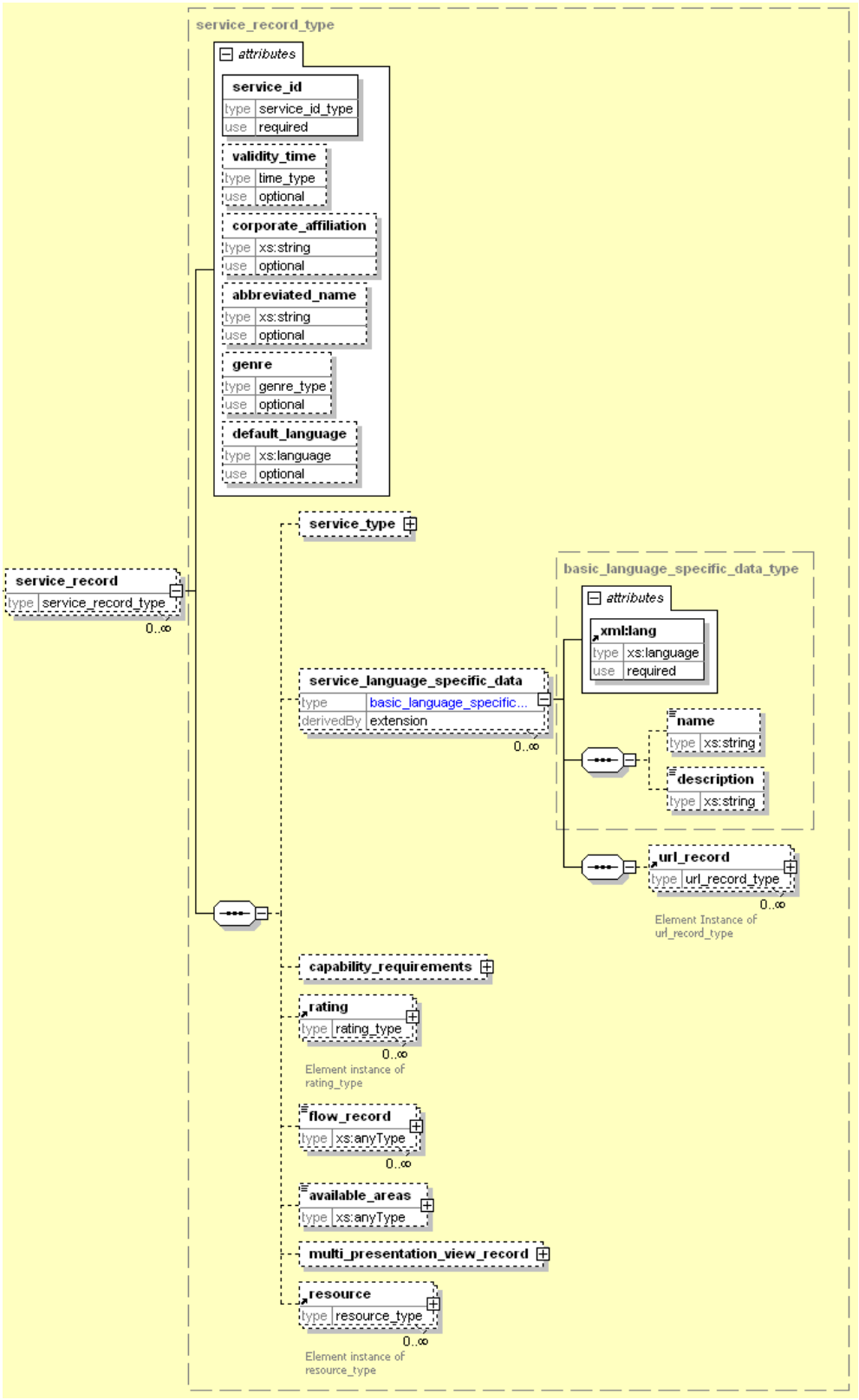

Figure 7-2: Service Record Schema

7.1.1 Service ID

The Service Record shall provide a Service ID. The Service ID is an identifier that uniquely distinguishes the Service from other Services in a Network.

The Service ID is an unsigned 16-bit integer.

7.1.2 Validity Time

The Validity Time is defined in section 5.3.3.

7.1.3 Corporate Affiliation

The Service Record may provide the Corporate Affiliation. The Corporate Affiliation attribute is a string that defines a corporate name associated with the Service.

Multiple Services may share the same value of Corporate Affiliation.

7.1.4 Abbreviated Name

The Service Record may provide the Abbreviated Name. The Abbreviated Name attribute is a string that defines a short name for the Service that may be displayed to the user.

7.1.5 Genre

The Service Record may provide the Genre. The Genre attribute is a Term Reference that describes the semantic class of content provided by the Service.

7.1.6 Default Language

The Service Record may specify a Default Language. The Default Language attribute specifies the language in which information about the Service and MPG Titles on the Service shall be presented to the user if the user's preferred language is not available. It also specifies the language in which audio or text for the Service shall be presented to the user if the user's preferred language is not available. The Default Language shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

A Default Language shall be provided if information about the Service or content provided in the Service is available in more than one language.

7.1.7 Service Type

The Service Record may provide the Service Type. The Service Type indicates the temporal nature of the content provided by the Service.

There are three possible Service Types: Real Time, Non-Real Time or IP Datacast.

Figure 7-3 shows the Service Type schema.

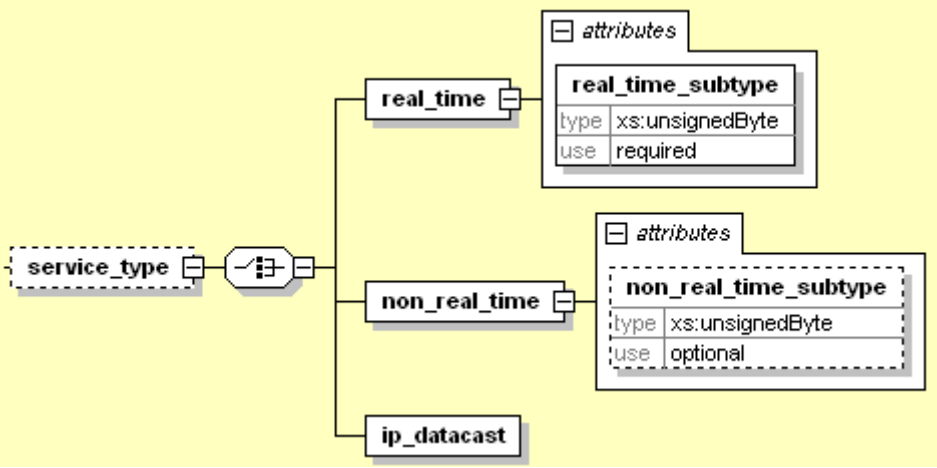

Figure 7-3: Service Type Schema

7.1.7.1 Real Time Service

All content on a Real Time Service consists of Real Time streaming media.

A Real Time Service shall have a Real Time Subtype which may be used on the Device user interface to classify the content of the service.

7.1.7.1.1 Real Time Subtype

The Real Time Subtypes are defined in Table 2.

Table 2: Real Time Subtypes

Value	Meaning
0x00	Video + Audio
0x01	Audio + Slide Show
0x02	Audio only
All other values are reserved.	

All identified subtypes may have an associated timed text component (see section 9.3.1.2).

7.1.7.2 Non Real Time Service

A Non Real Time Service delivers Non Real Time Files. A Non Real Time File could be a generic file or could be a file that contains one or more Non Real Time Presentations.

A Non Real Time Service shall have a Non Real Time Access Subtype if the Service delivers Non Real Time Files that contain Presentations. The Non Real Time Access Subtype may be used on the Device user interface to classify the limits placed on the availability of the Non Real Time Presentations contained in the files.

7.1.7.2.1 Non Real Time Subtype

The Non Real Time Subtypes are defined in Table 3.

Table 3: Non Real Time Subtypes

Value	Meaning
0x00	Access for presentation limited in MPG title duration
0x01	Access limited to most recently downloaded presentation
0x02	Access for multiple presentations allowed
All other values are reserved.	

7.1.7.3 IP Datacast Service

The content of an IP Datacast Service consists of one or more Flows transporting generic IP packets.

7.1.8 Service Language Specific Data

The Service Record may contain Service Language Specific Data element. The Service Language Specific Data element shall specify the Name and Description of the Service associated with a specific language and a set of URLs where the user can find further information.

7.1.8.1 Service Language

The Service Language attribute specifies the language of the Service Language Specific Data element. The Service Language shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

7.1.8.2 Service Name

The Service Name attribute is a string that specifies a name for the Service that may be displayed to the user.

7.1.8.3 Service Description

The Service Description attribute is a string that specifies a description for the Service that may be displayed to the user.

7.1.8.4 Service URL

The structure of the Service URL Record is defined in section 6.2.8.7.4.

7.1.9 Capability Requirements

The Service Record may provide Capability Requirements for the Service. If the Device does not meet the Capability Requirements for Subscribed Users and the Channel using the Service is not Excludable then the user shall not be permitted to subscribe to the Package containing the Channel.

The Capability Requirements may consist of Storage Requirement.

Figure 7-4 shows the Capability Requirements schema.

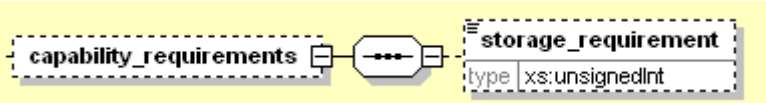

Figure 7-4: Capability Requirements Schema

The Storage Requirement element, if present, specifies the maximum amount of memory needed by a Device to support access to the Service, in units of KB.

The Subscribed Storage Requirements is an unsigned 32 bit integer.

7.1.10 Rating

The Service Record may provide one or more Ratings for the Service. The Rating defines the parental advisory information for this Service. It typically corresponds to an average or typical Rating level for MPG Titles offered on the Service.

The Rating consists of:

– A Level

– A set of Modifiers

Figure 7-5 shows a diagram of the rating schema.

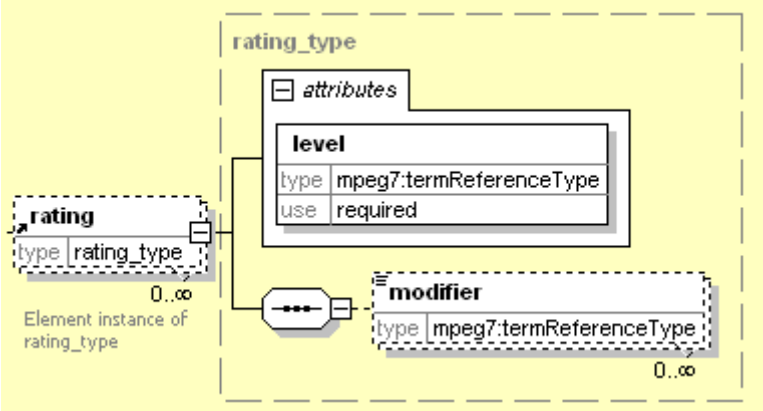

Figure 7-5: Rating Schema Diagram

7.1.10.1 Level

The Level identifies an age level (or equivalent) within a rating system applicable to the Service, e.g. MPAA, TV-Parental Guidance or RIAA systems in the United States, or provincial film board ratings in Canada. A level shall be supplied in each Rating element.

The Level is a Term Reference.

7.1.10.2 Modifier

The Modifier element may specify one or more Modifiers to provide additional information applicable to a specific Rating system. For example, the US TV Parent Guidance system allows content-ratings according to levels of sex, violence, bad language etc.

The Modifier is a Term Reference.

7.1.11 Available Areas

The Available Areas element is intended for indicating the geographical areas where the Service is available. The definition of the Available Areas element depends on the Mobile Multimedia Multicast transport technology. The format of the Available Areas element for Forward Link Only Technology is given in Chapter 9.

7.1.12 Flow Record

The Flow Record element is intended to describe the characteristics of flows that belong to the Service. The definition of this element depends on the Mobile Multimedia Multicast transport technology. For Forward Link Only Technology the definition is covered in Chapter 9.

7.1.13 Multi Presentation View Record

The Multi Presentation View Record shall be present in Service Records that correspond to the Non Real Time subtype (0x02). This record shall provide the following attributes

7.1.13.1 Maximum Cache Depth

Maximum Cache Depth indicates the maximum number of Non Real Time Presentations of the service that a user will be able to access at any given time. Maximum Cache depth is an unsigned 8 bit integer.

7.1.13.2 Maximum Presentation Size

Maximum Presentation size indicates the maximum size of Non Real Time Presentation (in KB) for the service. Maximum Presentation Size is an unsigned 32 bit integer.

7.1.14 Resource

A Resource element describes a generic data entity that is associated with the Service. A Resource element may be used to convey auxiliary data for the Service. An example use case for Resource is Service icons that can be used in the display of the Service in the MPG to the user.

7.1.14.1.1 Descriptor

The Descriptor is a Term Reference that indicates the usage of the Resource.

7.1.14.1.2 Resource URL

The Resource URL gives the location to obtain the Resource. It could be an HTML link or any URI string that has associated semantics to obtain the Resource.

8 MEDIA PRESENTATION GUIDE

The Media Presentation Guide (MPG) provides information about the contents of the Channels which may be displayed to the user or downloaded to the device. MPG Title provides a description of a Presentation that is available for viewing at a specified time. The MPG Title is associated with the Base Service for the Channel.

8.1 MPG Structure

The MPG for a Multiplex shall provide MPG Title Records for all Services of that Multiplex.

The MPG is provided as a set of Event Block messages. Each Event Block contains information for all the MPG Titles which are accessible in a given time interval. The time covered by any two Event Blocks for a Multiplex shall not overlap. Information about MPG Titles which span the boundary of multiple Event Blocks is present in each Event Block that covers part of the time of the event, as shown in Figure 8-1. Additionally, the Event Block Message specifies the Contact Windows for downloading Non Real Time Files (see section 8.2.4).

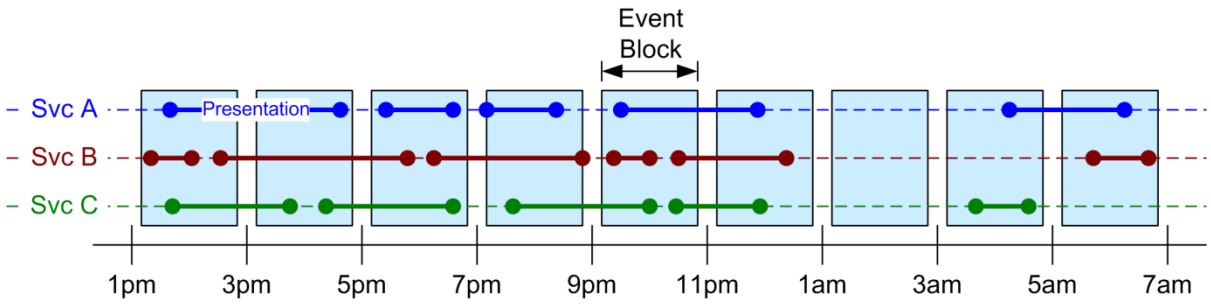

Figure 8-1: Services and MPG Titles Spanning Multiple Event Blocks

The time covered by an Event Block is specified in seconds by MPG_Block_Duration. MPG_Block_Duration is a configurable parameter whose value shall be signaled to the devices by means which are specific to an individual Mobile Multimedia Multicast transport technology. All Event Blocks for a Multiplex shall use the same value of MPG_Block_Duration.

The number of Event Block messages available at any time shall be signaled by means which are specific to an individual Mobile Multimedia Multicast transport technology. If there is no information for a given time interval, the corresponding Event Block shall be transmitted but shall be empty.

The Start Time attribute of the Event Block is a Distinguishing Attribute (see section 5.3.1). Each version of an Event Block message is uniquely identified by the values of its Version and Start Time attributes, as specified in section 5.3.1.

8.2 Event Block Message

Each Event Block Message defines:

- The start time of the Event Block
- The version of the Event Block
- MPG Title Records for all MPG Titles shown in the time covered by the Event Block.
- Contact Windows for all Non Real Time Files downloaded during the time covered by the Event Block.

Figure 8-2 shows the Event Block schema.

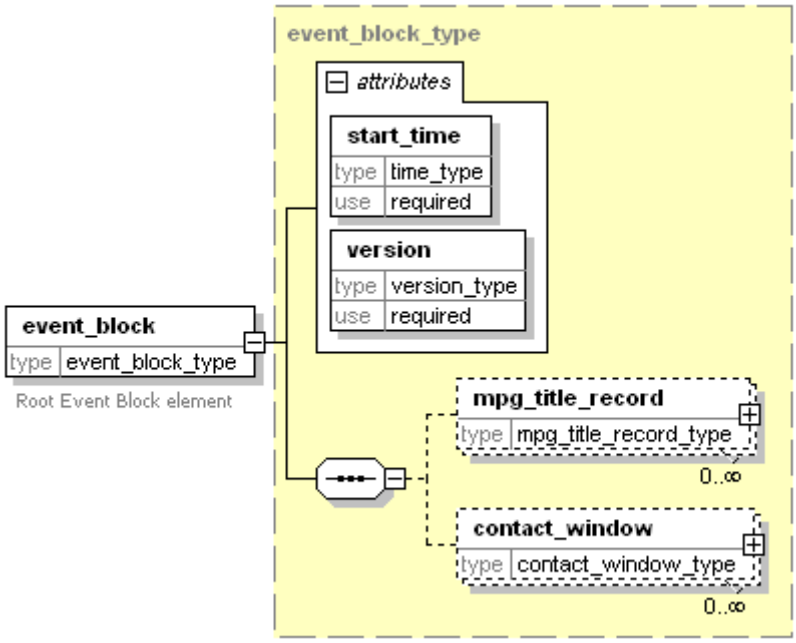

Figure 8-2: Event Block Schema

8.2.1 Event Block Start Time

The Event Block Message shall specify the Event Block Start Time, which is the earliest time covered by the Event Block. The Event Block Start Time of each Event Block shall correspond to the end of the interval covered by the previous Event Block.

The Event Block Start Time attribute is a 32-bit count of seconds in UTC time since 00:00:00 UTC January 1, 1970.

8.2.2 Version

Each version of an Event Block message shall be uniquely identified by the values of its Start Time and Version attributes, as specified in section 5.3.1.

8.2.3 MPG Title Record

An Event Block message shall define MPG Title Records for all the MPG titles for all Services in the MPG over the specified time interval.

An MPG Title Record shall be included in an Event Block if any part of the time interval starting at the MPG Title Start Time and of length given by the MPG Title Duration is included in the time covered by the Event Block.

Each MPG Title Record definition includes the following attributes and elements:

- MPG Title Start Time
- Validity Time
- MPG Title Duration
- MPG Title Service Reference
- MPG Title Genre
- MPG Title Rating(s)
- MPG Title Language Specific Data
- Specifications for the set of Presentations comprising the MPG Title
- Blackout specification for the MPG Title.

– Content Retailer Specific Information

– Figure 8-3 shows the MPG Title Record schema.

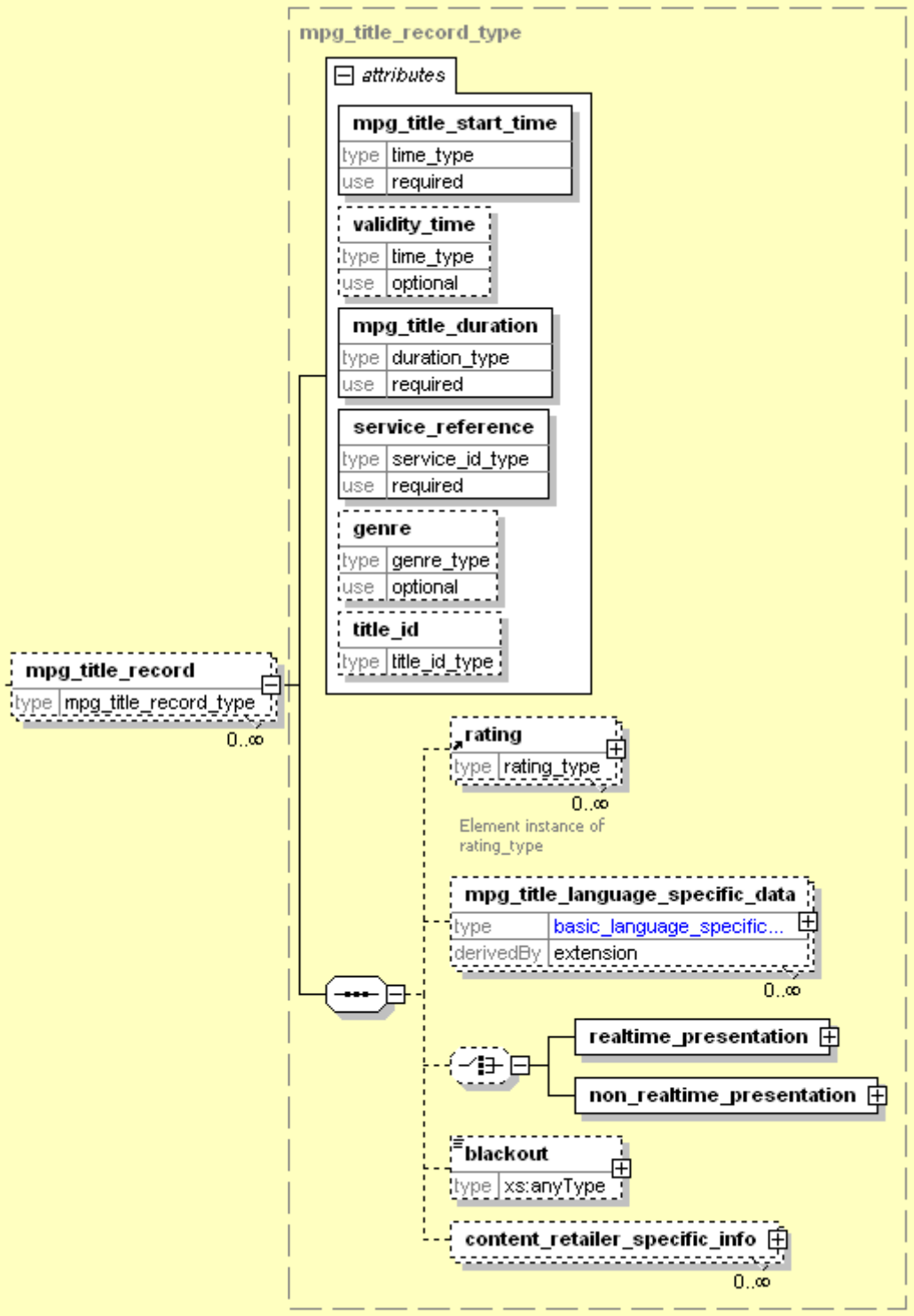

Figure 8-3: MPG Title Record Schema

8.2.3.1 MPG Title Start Time

The MPG Title Record shall specify the MPG Title Start Time, which is the time at which presentation of the content covered by the MPG Title can begin.

If the Service is a Real Time Service, the MPG Title Start Time is the time at which the presentation commences.

If the Service is a Non Real Time Service of subtype 0x00 as defined in Table 3, the MPG Title Start Time is the earliest time at which display of the Presentation may commence.

The MPG Title Start Time is a 32-bit count of seconds in UTC time since 00:00:00 UTC January 1, 1970. It is a Distinguishing Attribute.

8.2.3.2 Validity Time

The Validity Time is defined in section 5.3.3.

8.2.3.3 MPG Title Duration

The MPG Title Record shall specify the MPG Title Duration. For Non Real Time Services of subtype 0x00 as defined in Table 3, MPG Title Duration along with the MPG Title Start Time gives the time window during which the Presentation can be accessed. If the Service is a Real Time Service, the MPG Title Duration added to the MPG Title Start Time gives the time at which the Presentation is intended to end. If the value of the MPG Title Duration is set to 0, there is no defined end to the MPG Title.

The MPG Title Duration is a 32-bit count of seconds.

8.2.3.4 MPG Title Service Reference

The MPG Title Record shall provide a Service ID. The Service ID identifies the Service associated with the MPG Title.

8.2.3.5 MPG Title Genre

The MPG Title Record should provide the Genre of the MPG Title. The Genre attribute is a Term Reference that describes the semantic class of content provided by the MPG Title.

8.2.3.6 Title ID

Title ID uniquely identifies the MPG Title in the Network. Title ID is an unsigned 32 bit integer.

8.2.3.7 MPG Title Rating

The MPG Title Record should provide one or more Ratings for the MPG Title. The Rating defines the parental advisory information for this MPG Title.

The Rating consists of:

– A Level

– A set of Modifiers

Figure 7-5 shows a diagram of the rating schema.

8.2.3.7.1 Level

The Level identifies an age level (or equivalent) within a rating system applicable to the Service, e.g. MPAA, TV-Parental Guidance or RIAA systems in the United States, or provincial film board ratings in Canada. A level shall be supplied in each Rating element.

The Level is a Term Reference.

8.2.3.7.2 Modifier

The Modifier element may specify one or more Modifiers to provide additional information applicable to a specific Rating system. For example, the US TV Parent Guidance system allows content-ratings according to levels of sex, violence, bad language etc.

The Modifier is a Term Reference.

8.2.3.8 MPG Title Language Specific Data

The MPG Title Specific Data element specifies the Name and Description of the MPG Title associated with a specific language, and may provide Additional Description and define URLs where a user can obtain further information about the MPG Title.

Figure 8-4 shows the MPG Title Language Specific Data schema.

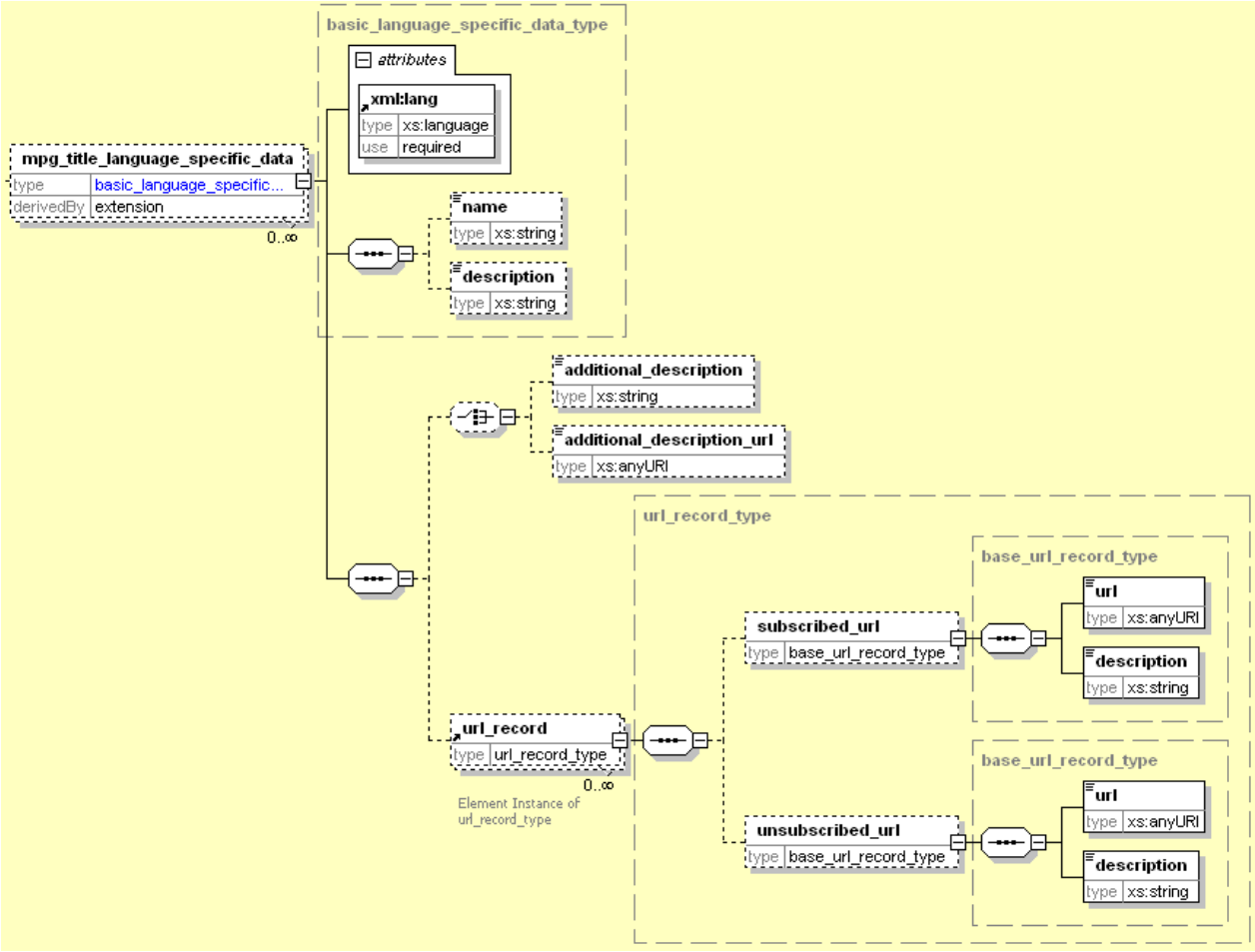

Figure 8-4: MPG Title Language Specific Data Schema

8.2.3.8.1 MPG Title Language

The MPG Title Language attribute specifies the language of the MPG Title Language Specific Data element. The MPG Title Language attribute shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the "-" character.

8.2.3.8.2 MPG Title Name

The MPG Title Name attribute is a string that specifies a name for the MPG Title that may be displayed to the user.

8.2.3.8.3 MPG Title Description

The MPG Title Description attribute is a string that specifies a description for the MPG Title that may be displayed to the user.

8.2.3.8.4 MPG Title Additional Description

The MPG Title Additional Description attribute specifies additional description for the MPG Title that may be displayed to the user. It may be a string or a URL. If it is a URL, the URL may point to an external reference (e.g. an HTML link) or to an internal file.

8.2.3.8.5 MPG Title URLs

The MPG Title record may contain one or more MPG Title URL records per language.

Each URL record shall specify a Subscribed URL, an Unsubscribed URL, and a description.

8.2.3.8.5.1 Subscribed URL

The Subscribed URL identifies a resource which provides further information in the associated language about the MPG Title suitable for presentation to a User who is subscribed to the Channel. The URL may point to an external reference (e.g. an HTML link) or to an internal file.

8.2.3.8.5.2 Unsubscribed URL

The Unsubscribed URL identifies a resource which provides further information in the associated language about the MPG Title suitable for presentation to a User who is not subscribed to the Channel. The URL may point to an external reference (e.g. an HTML link) or to an internal file.

8.2.3.8.5.3 URL Description

The URL Description attribute is a string in the associated language that describes the resource accessed through the associated URL.

8.2.3.9 Presentation Description

The MPG Title Record may provide a description of the Presentation associated with the MPG Title. The description consists of:

– A Real Time Presentation

– A Non Real Time Presentation

8.2.3.9.1 Real Time Presentation

A Real Time Presentation element may supply Presentation identification information for media tracking, namely one or more ISANs or CRIDs.

Figure 8-5 shows the Real Time Presentation schema.

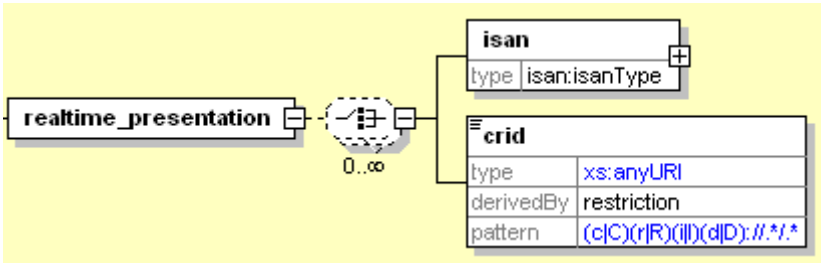

Figure 8-5: Realtime Presentation Schema

8.2.3.9.1.1 ISAN

The International Standard Audiovisual Number (ISAN) is specified in ISO/IEC 15706 [8].

8.2.3.9.1.2 CRID

The Content Reference IDentifier (CRID) is specified in RFC 4078 [20].

8.2.3.9.2 Non Real Time Presentation

A Non Realtime Presentation element shall define a Presentation Reference and a Presentation Duration.

Figure 8-6 shows the Non Realtime Presentation schema.

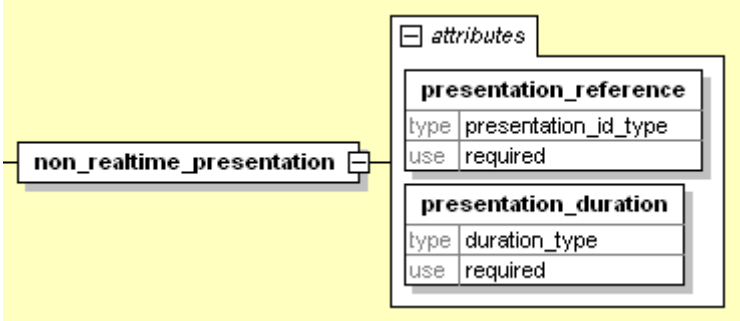

Figure 8-6: Non Realtime Presentation Schema

8.2.3.9.2.1 Presentation Reference

The Presentation Reference is an identifier that uniquely distinguishes the Presentation from all other Presentations on the same Network.

The Presentation Reference is a 32-bit unsigned integer.

8.2.3.9.2.2 Presentation Duration

The Presentation Duration specifies the amount of time needed to view the Non Real Time Presentation.

The Presentation Title Duration is a 32-bit count of seconds.

8.2.3.10 Blackout

The Blackout element is intended for indicating the geographical areas where the MPG Title is blacked out. The definition of the Blackout element depends on the Mobile Multimedia Multicast transport technology. The format of the Blackout element for Forward Link Only Technology is given in Chapter 9.

8.2.3.11 Content Retailer Specific Info

The Content Retailer Specific Info provides Content Retailer customization information for a particular MPG Title and its associated Presentation.

Figure 8-7 shows the Content Retailer Specific Info schema

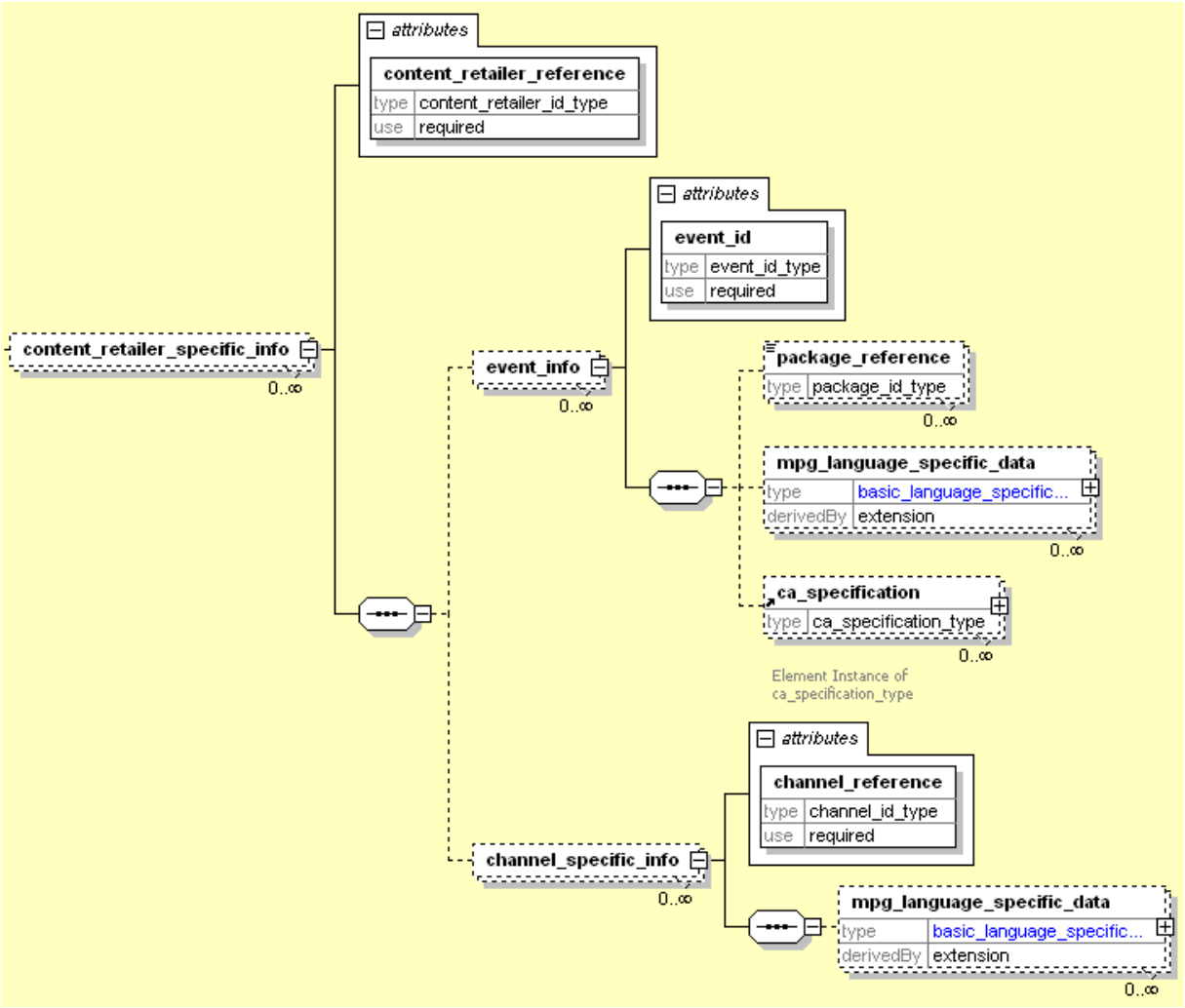

Figure 8-7: Content Retailer Specific Info Schema

8.2.3.11.1 Content Retailer Reference

Content Retailer Reference attribute identifies the Content Retailer whose information is provided in the element.

8.2.3.11.2 Event Info

Event Info element provides information about an Event associated with the MPG Title. Multiple instances of this element are allowed since multiple Events of a Content Retailer could be associated with the MPG Title.

8.2.3.11.2.1 Event ID

Event ID attribute uniquely identifies the Event. Event ID is an unsigned 32 bit integer. The scope of the Event ID is a Content Retailer. That is all Events defined by a Content Retailer shall have unique Event IDs.

8.2.3.11.2.2 Package Reference

Package Reference element identifies the Packages that can subscribed to gain access to viewing this Event. Multiple instances of this element are allowed since multiple Packages can be subscribed to access this Event. This element serves as a mapping between Events and Packages. This mapping information should be used in addition to the information of mapping between Packages and Events provided by the Event Reference element in Package Record (see 6.2.6.9).

8.2.3.11.2.3 MPG Language Specific Data

The MPG Title Specific Data element specifies the customized Name and Description of the MPG Title associated with a specific language. It may also provide Additional Description and define URLs where a user can obtain further information about the MPG Title. The element definition is same in as Section 8.2.3.8.

8.2.3.11.2.4 CA specification

CA specification element provides Conditional Access specific extensions for the Event. The definition of the element is same as in Section 6.2.6.15 and Section 6.2.8.9.

8.2.3.11.3 Channel Specific Info

Channel Specific Info element provides information about customizations of the Channel associated with the MPG Title. Multiple instances of this element are allowed since multiple Channels of a Content Retailer could be associated with the MPG Title.

8.2.3.11.3.1 Channel Reference

Channel Reference attribute identifies the Channel whose customization is provided in the element.

8.2.3.11.3.2 MPG Language Specific Data

The MPG Title Specific Data element specifies the customized Name and Description of the MPG Title associated with a specific language. It may also provide Additional Description and define URLs where a user can obtain further information about the MPG Title. The element definition is same in as Section 8.2.3.8.

8.2.4 Contact Window

A Contact Window represents an interval of time during which Non Real Time files of a Non Real Time Service are transmitted. A Non Real Time file may be delivered by more than one Contact Window. A Contact Window may deliver more than one Non Real Time file. A Non Real Time file could be a generic file or could be a file that contains one or more Non Real Time Presentations.

A Contact Window element shall be included in an Event Block if any part of the time interval starting at the Contact Window Start Time and ending at the Contact Window End Time is included in the time covered by the Event Block.

The Contact Window consists of:

- Service Reference
- Validity Time
- Contact Window Start Time
- Contact Window End Time
- Contact Duration
- Presentation References
- File Info

Figure 8-8 shows the Contact Window schema.

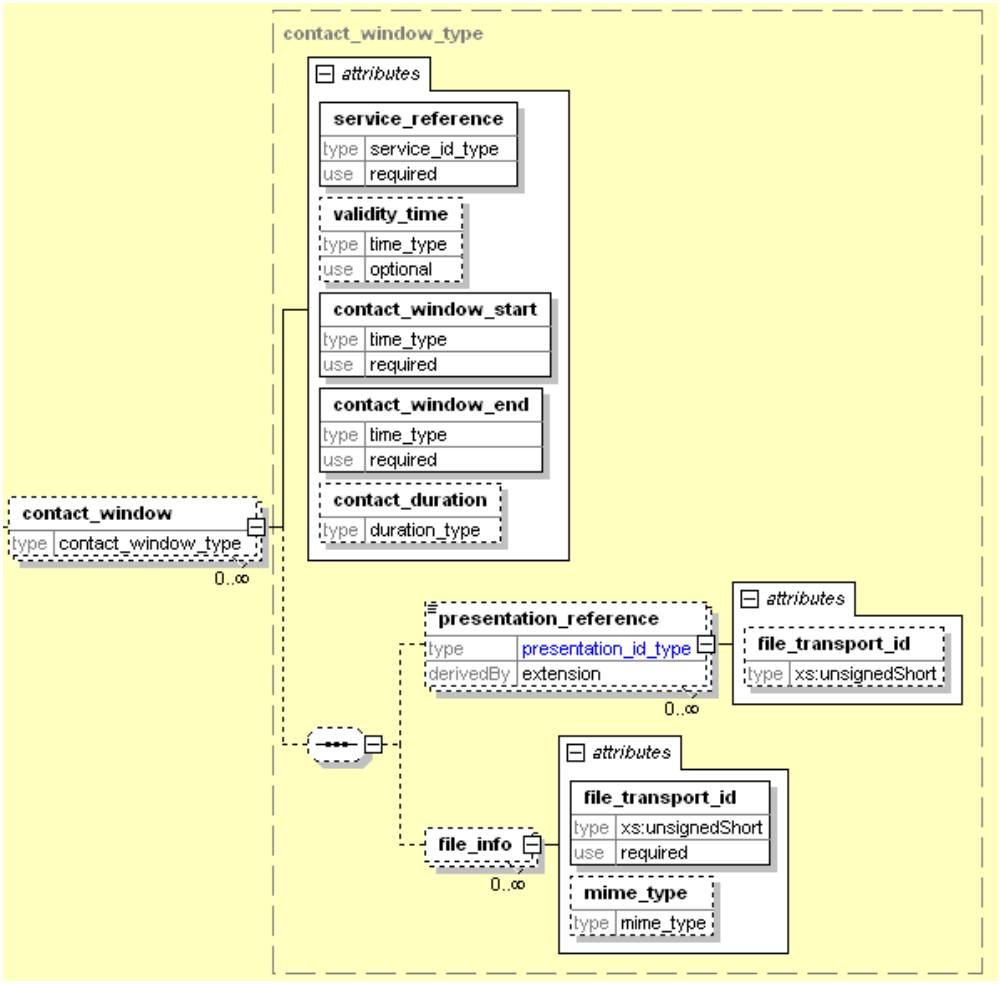

Figure 8-8: Contact Window Schema

8.2.4.1 Service Reference

The Service Reference identifies the Service on which Non Real Time files are downloaded during the Contact Window.

8.2.4.2 Validity Time

The Validity Time is defined in section 5.3.3.

8.2.4.3 Contact Window Start Time

The Contact Window Start Time is the time at which transmission of Non Real Time files shall commence.

The Contact Window Start Time is a 32-bit count of seconds in UTC time since 00:00:00 UTC January 1, 1970.

8.2.4.4 Contact Window End Time

The Contact Window End Time indicates the time at which transmission of Non Real Time files ends.

The Contact Window End Time is a 32-bit count of seconds in UTC time since 00:00:00 UTC January 1, 1970.

8.2.4.5 Contact Duration

Contact Duration attribute may be present if only one Non Real Time file is transmitted in the Contact Window and if the file is transmitted only in this Contact Window. The Contact Duration is

the estimate of the amount of time that a Device needs to listen during the Contact Window to complete the acquisition of the Non Real Time file.

The Contact Duration is a 32-bit count of seconds.

8.2.4.6 Presentation Reference

The Contact Window shall specify a set of Non Real Time Presentations downloaded by the Non Real Time Files during the Contact Window. Also see section 8.2.3.9.2.1.

8.2.4.6.1 File Transport ID

File Transport ID gives the identifier for the Non Real Time File that contains the Presentation. The Network shall ensure that no two files delivered during a Contact Window have the same File Transport ID.

8.2.4.7 File Info

The File Info element provides information for a Non Real Time File delivered in the Contact Window. Multiple instances of this element could be present since a Contact Window could deliver multiple Non Real Time Files. This element is optional and may not be present if the information of the Non Real Time File is signaled by other means.

8.2.4.7.1 File Transport ID

File Transport ID gives the identifier for the File whose information is carried in the File Info element.

8.2.4.7.2 Mime Type

Mime Type attribute gives the format or MIME type of the Non Real Time file. This attribute is optional. For Forward Link Only Technology, if this attribute is not present then the MIME type specified in the Flow Record (see 9.3.1.3) is the MIME type of the file. If both this attribute and the Flow Record's attribute are present, the value of this attribute in the File Info element supersedes.

9 SI EXTENSIONS FOR FORWARD LINK ONLY NETWORKS

This chapter specifies the specific extensions to SI for its use in Networks using the Forward Link Only Technology.

9.1 Available Areas

Available Areas element defined in Service Record (Section 7.1.11) and Package Record (Section 6.2.6.12) shall be of Areas Type datatype .

Areas Type element consists of a list of LOI IDs and WOI IDs. See [1] for details on LOI ID and WOI ID. The LOI ID and WOI IDs are 16-bit unsigned integers. Figure 9-1 shows the Areas Type schema.

If the Device is present in a geographical area whose LOI ID or WOI ID matches one of the LOI IDs or WOI IDs respectively in the list, then the Service or Package is available in that area. Forward Link Only Network shall populate a non empty Available Areas element, that is at least one LOI ID or WOI ID shall be present in the Available Areas element.

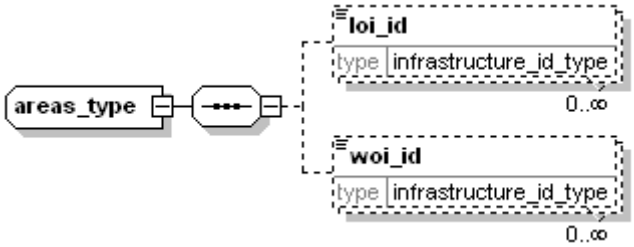

Figure 9-1: Areas Type Schema

9.2 Blackout

Blackout element defined in the MPG Title Record (Section 8.2.3.10) shall be of Areas Type datatype. If the Device is present in a geographical area whose LOI ID or WOI ID matches one of the LOI IDs or WOI IDs respectively in the list, then the content associated with that Title is indicated to be blacked out in that area. If the Blackout element is empty, then it implies that the content is not indicated to be blacked out in any area.

9.3 Flow Record

A Flow Record element defined in Service Record (Section 7.1.12) shall convey information for each Flow used to transport a component of the Service. The Flow Record element shall be of Flow Record Type datatype.

The Flow Record Type includes the following attributes and elements:

- Flow ID
- Flow Routing Type
- Flow MIME Type
- Flow Language
- IP Datacast specification.

Figure 9-2 shows the Flow Record Type schema.

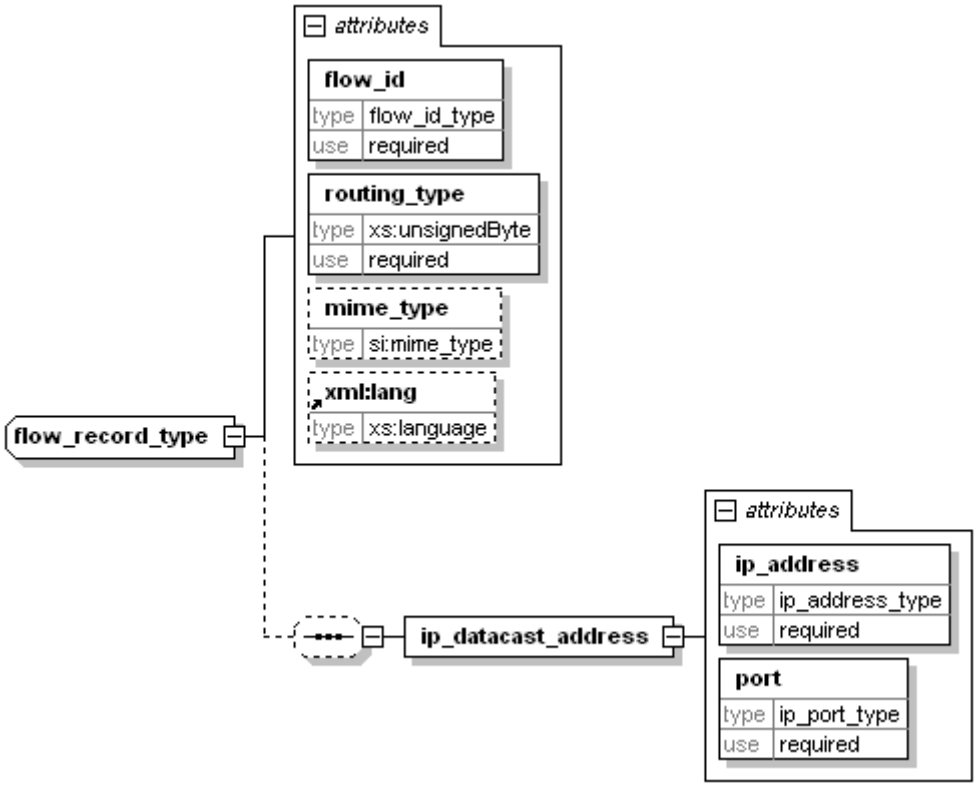

Figure 9-2: Flow Record Type Schema

9.3.1.1 Flow ID

The Flow Record shall provide a Flow ID. The Flow ID is an identifier that uniquely distinguishes the Flow from other Flows transported in a Forward Link Only Network. Though the Flow ID is an unsigned 32 bit integer datatype in the schema, Flow ID can only take values 0 to 2^{20}-1 as defined in [1].

9.3.1.2 Flow Routing Type

The Flow Record shall provide a Flow Routing Type. The Flow Routing Type is an 8-bit value. The defined values of the Flow Routing Type are specified in Table 4.

Table 4: Flow Routing Type Values

Value	Meaning
0x00	[Reserved]
0x01	Video
0x02	Audio
0x03	Timed text
0x04	Non real-time bearer
0x05	Non real-time signaling
0x06	IP Datacast
0x07	Test Application
0x08	Video freeze frame
All other values are reserved.	

9.3.1.3 Flow MIME Type

The Flow Record should provide a Flow MIME type. The Flow MIME type shall be used to define the type of media offered over this Flow. For Non Real Time bearer flow, the MIME type conveys the default format or MIME type of all the Non Real Time files delivered by the flow. This MIME type can be superseded on a per-file basis as described in Section 8.2.4.7.2.

The MIME type is a Term Reference or a string. It shall conform to the MIME Specifications ([10] - [14]).

9.3.1.4 Flow Language

The Flow Record should provide a Flow Language. The Flow Language shall specify the Language used for the Service Component transported by the Flow.

The Flow Language attribute shall conform to ISO 639-1 [4], which may be extended by an alpha-2 country code conforming to ISO 3166-1 [5], separated by the “-“ character.

9.3.1.5 IP Datacast

If the Flow transports IP Datacast Content, the Flow Record may specify the IP Multicast Address and Port to which the IP Datacast Content is addressed. If this element is present it supersedes the static mapping from (IP address, Port) to Flow ID specified in [3].

9.3.1.5.1 IP Address

The IP Address of the Flow shall be either an IPv4 multicast address as specified in RFC 791 [9] or an IPv6 multicast address as specified in RFC 2450 [17]. All IP Addresses associated with the Flows of a single IP Datacast Service shall be of the same version (i.e. IPv4 or IPv6).

9.3.1.5.2 Port

The Port shall be either an IPv4 Port as specified in RFC 791 [9] or an IPv6 Port as specified in RFC 2450 [16], as appropriate.

ANNEX A. (NORMATIVE)

SI MESSAGE XML SCHEMA

This Annex defines XML Schema for the SI Messages specified in this document. The Annex also defines SI extensions for Forward Link Only Technology.

A.1 Namespaces

The XML Schema definition for SI messages defined in this specification that can be applied to any Network is assigned the namespace urn:tia:tr47.1:si

The XML Schema definition for SI extension for Forward Link Only technology defined in Chapter 9 of this specification is assigned the namespace urn:tia:tr47.1:si:flo-ext

A.2 Schema Extensibility and Device Forward Compatibility

Devices shall ignore unknown elements or attributes present in SI messages defined in this specification. This is necessary for forward compatibility of those Devices with a Network that complies with a future version of this specification. A future version of this specification may introduce additional elements or attributes.

A.3 SI XML Schema Definition

The following is the text of the .xsd file that defines SI XML Schema.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns="urn:tia:tr47.1:si"
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001" xmlns:isan="http://www.isan.org/ISAN"
targetNamespace="urn:tia:tr47.1:si" elementFormDefault="qualified"
attributeFormDefault="unqualified">
	<xs:import namespace="http://www.w3.org/XML/1998/namespace"
schemaLocation="xml.xsd"/>
	<xs:import namespace="urn:mpeg:mpeg7:schema:2001"
schemaLocation="mpeg7_parts.xsd"/>
	<xs:import namespace="http://www.isan.org/ISAN"
schemaLocation="isan.xsd"/>
	<xs:annotation>
		<xs:documentation xml:lang="en"> ======== Common SI datatypes
=========</xs:documentation>
	</xs:annotation>
	<xs:simpleType name="time_type">
		<xs:annotation>
			<xs:documentation>Datatype for representing time in SI
elements</xs:documentation>
		</xs:annotation>
		<xs:restriction base="xs:unsignedInt"/>
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elements</xs:documentation>
		</xs:annotation>
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ID</xs:documentation>
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ID</xs:documentation>
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                </xs:annotation>
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                </xs:annotation>
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use="required"/>
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definitions</xs:documentation>
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minOccurs="0"/>
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Table</xs:documentation>
                </xs:annotation>
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type="time_type"/>
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Specification</xs:documentation>
                </xs:annotation>
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==========</xs:documentation>
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                </xs:annotation>
        </xs:element>
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                </xs:annotation>
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ca_specification_type</xs:documentation>
                </xs:annotation>
        </xs:element>
        <xs:annotation>
                <xs:documentation xml:lang="en"> ======== Media Presentation Guide
(MPG) related definitions ==========</xs:documentation>
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minOccurs="0" maxOccurs="unbounded">
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minOccurs="0"/>
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minOccurs="0"/>
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1
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6           </xs:sequence>
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8           </xs:extension>
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26  use="required"/>
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28                  <xs:attribute name="mpg_title_duration" type="duration_type"
29  use="required"/>
30                  <xs:attribute name="service_reference" type="service_id_type"
31  use="required"/>
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38  Window</xs:documentation>
39                  </xs:annotation>
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49                                          </xs:simpleContent>
50                                  </xs:complexType>
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type="mime_type"/>
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use="required"/>
                <xs:attribute name="contact_window_end" type="time_type"
use="required"/>
                <xs:attribute name="contact_duration" type="duration_type"/>
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definitions =========</xs:documentation>
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element</xs:documentation>
                </xs:annotation>
        </xs:element>
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                <xs:sequence>
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use="optional"/>
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definitions =========</xs:documentation>
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definitions</xs:documentation>
            </xs:annotation>
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element</xs:documentation>
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</xs:documentation>
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type="xs:anyType" minOccurs="0"/>
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use="required"/>
                <xs:attribute name="bcs_provider_name" type="xs:string"
use="optional"/>
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related definitions</xs:documentation>
        </xs:annotation>
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type="mpeg7:termReferenceType" use="optional"/>
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type="time_type" use="optional"/>
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minOccurs="0" maxOccurs="unbounded"/>
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minOccurs="0" maxOccurs="unbounded"/>
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use="required"/>
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                        <xs:element name="event_reference" type="event_id_type"
minOccurs="0" maxOccurs="unbounded"/>
                        <xs:element name="package_characteristics" minOccurs="0">
                                <xs:complexType>
                                        <xs:annotation>
                                                <xs:documentation>The attributes associated
with the package.</xs:documentation>
                                        </xs:annotation>
                                        <xs:sequence>
                                                <xs:element name="parent_reference"
type="package_id_type" minOccurs="0" maxOccurs="unbounded"/>
                                                <xs:element name="closed"
minOccurs="0"/>
                                                <xs:element name="auto_subscribe"
minOccurs="0"/>
                                                <xs:element name="excluded_package"
type="package_id_type" minOccurs="0" maxOccurs="unbounded"/>
                                        </xs:sequence>
                                </xs:complexType>
                        </xs:element>
                        <xs:choice minOccurs="0">
                                <xs:element name="included_device_profile"
type="xs:unsignedShort" maxOccurs="unbounded"/>
                                <xs:element name="excluded_device_profile"
type="xs:unsignedShort" maxOccurs="unbounded"/>
                        </xs:choice>
                        <xs:element name="available_areas" type="xs:anyType"
minOccurs="0"/>
                        <xs:element name="eula" type="mpeg7:termReferenceType"
minOccurs="0"/>
                        <xs:element name="bcs_provider_id"
type="bcs_provider_id_type" minOccurs="0" maxOccurs="unbounded"/>
                        <xs:element ref="ca_specification" minOccurs="0"
maxOccurs="unbounded"/>
                </xs:sequence>
                <xs:attribute name="package_id" type="package_id_type"
use="required"/>
                <xs:attribute name="validity_time" type="time_type" use="optional"/>
                <xs:attribute name="weight" type="xs:unsignedInt" use="required"/>
                <xs:attribute name="version" type="xs:unsignedShort" use="required"/>
```

```
                <xs:attribute name="default_language" type="xs:language"
use="optional"/>
        </xs:complexType>
        <xs:complexType name="tier_record_type">
                <xs:annotation>
                        <xs:documentation>Datatype for Tier Record</xs:documentation>
                </xs:annotation>
                <xs:sequence>
                        <xs:element name="channel_reference" type="channel_id_type"
minOccurs="0" maxOccurs="unbounded"/>
                        <xs:element name="excluded_channel_reference"
type="channel_id_type" minOccurs="0" maxOccurs="unbounded"/>
                </xs:sequence>
                <xs:attribute name="tier_id" type="tier_id_type" use="required"/>
                <xs:attribute name="validity_time" type="time_type" use="optional"/>
        </xs:complexType>
        <xs:complexType name="channel_record_type">
                <xs:annotation>
                        <xs:documentation>Datatype for Channel
Record</xs:documentation>
                </xs:annotation>
                <xs:sequence>
                        <xs:element name="channel_language_specific_data"
minOccurs="0" maxOccurs="unbounded">
                                <xs:complexType>
                                        <xs:complexContent>
                                                <xs:extension
base="basic_language_specific_data_type">
                                                        <xs:sequence>
                                                                <xs:element ref="url_record"
minOccurs="0" maxOccurs="unbounded"/>
                                                        </xs:sequence>
                                                </xs:extension>
                                        </xs:complexContent>
                                </xs:complexType>
                        </xs:element>
                        <xs:element ref="resource" minOccurs="0"
maxOccurs="unbounded"/>
                        <xs:element ref="ca_specification" minOccurs="0"
maxOccurs="unbounded"/>
                </xs:sequence>
                <xs:attribute name="channel_id" type="channel_id_type"
use="required"/>
                <xs:attribute name="base_service" type="service_id_type"
use="required"/>
                <xs:attribute name="validity_time" type="time_type" use="optional"/>
                <xs:attribute name="weight" type="xs:unsignedInt" use="required"/>
                <xs:attribute name="default_language" type="xs:language"
use="optional"/>
                <xs:attribute name="excludability"/>
```

```
        </xs:complexType>
</xs:schema>
```

A.4 Forward Link Only SI Extension XML Schema Definition

The following is the text of the .xsd file that defines Forward Link Only SI Extension XML Schema.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:mpeg7="urn:mpeg:mpeg7:schema:2001" xmlns="urn:tia:tr47.1:si:flo-ext"
xmlns:si="urn:tia:tr47.1:si" targetNamespace="urn:tia:tr47.1:si:flo-ext"
elementFormDefault="qualified" attributeFormDefault="unqualified">
        <xs:import namespace="http://www.w3.org/XML/1998/namespace"
schemaLocation="xml.xsd"/>
        <xs:import namespace="urn:tia:tr47.1:si" schemaLocation="si.xsd"/>
        <xs:simpleType name="infrastructure_id_type">
                <xs:annotation>
                        <xs:documentation>Datatype for Infrastructure
ID</xs:documentation>
                </xs:annotation>
                <xs:restriction base="xs:unsignedShort"/>
        </xs:simpleType>
        <xs:simpleType name="flow_id_type">
                <xs:annotation>
                        <xs:documentation>Datatype for Flow ID</xs:documentation>
                </xs:annotation>
                <xs:restriction base="xs:unsignedInt"/>
        </xs:simpleType>
        <xs:simpleType name="ip_address_type">
                <xs:annotation>
                        <xs:documentation>Datatype for IP address</xs:documentation>
                </xs:annotation>
                <xs:restriction base="xs:string">
                        <xs:maxLength value="75"/>
                        <xs:pattern value="(([0-9]|[1-9][0-9]|[2][0-4][0-9]|[2][5][0-
5])\.){3}([0-9]|[1-9][0-9]|[2][0-4][0-9]|[2][5][0-5])">
                                <xs:annotation>
                                        <xs:documentation>IPv4
Address.</xs:documentation>
                                </xs:annotation>
                        </xs:pattern>
                        <xs:pattern value="([A-Fa-f0-9]{1,4}:){7}[A-Fa-f0-9]{1,4}">
                                <xs:annotation>
                                        <xs:documentation>IPv6
Address</xs:documentation>
                                </xs:annotation>
                        </xs:pattern>
                </xs:restriction>
        </xs:simpleType>
        <xs:simpleType name="ip_port_type">
                <xs:annotation>
```

```
                        <xs:documentation>Datatype for IP port
number</xs:documentation>
                </xs:annotation>
                <xs:restriction base="xs:unsignedInt">
                        <xs:maxInclusive value="65535"/>
                </xs:restriction>
        </xs:simpleType>
        <xs:complexType name="areas_type">
                <xs:sequence>
                        <xs:element name="loi_id" type="infrastructure_id_type"
minOccurs="0" maxOccurs="unbounded"/>
                        <xs:element name="woi_id" type="infrastructure_id_type"
minOccurs="0" maxOccurs="unbounded"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="flow_record_type">
                <xs:sequence minOccurs="0">
                        <xs:element name="ip_datacast_address">
                                <xs:complexType>
                                        <xs:attribute name="ip_address"
type="ip_address_type" use="required"/>
                                        <xs:attribute name="port" type="ip_port_type"
use="required"/>
                                </xs:complexType>
                        </xs:element>
                </xs:sequence>
                <xs:attribute name="flow_id" type="flow_id_type" use="required"/>
                <xs:attribute name="routing_type" type="xs:unsignedByte"
use="required"/>
                <xs:attribute name="mime_type" type="si:mime_type"/>
                <xs:attribute ref="xml:lang"/>
        </xs:complexType>
</xs:schema>
```

Forward Link Only System Information Specification

ARIB STANDARD

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