



ATSC

ADVANCED TELEVISION
SYSTEMS COMMITTEE

ATSC Standard: Service Announcement

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Advanced Television Systems Committee
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The Advanced Television Systems Committee, Inc., is an international, non-profit organization developing voluntary standards for digital television. The ATSC member organizations represent the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries.

Specifically, ATSC is working to coordinate television standards among different communications media focusing on digital television, interactive systems, and broadband multimedia communications. ATSC is also developing digital television implementation strategies and presenting educational seminars on the ATSC standards.

ATSC was formed in 1982 by the member organizations of the Joint Committee on InterSociety Coordination (JCIC): the Electronic Industries Association (EIA), the Institute of Electrical and Electronic Engineers (IEEE), the National Association of Broadcasters (NAB), the National Cable Telecommunications Association (NCTA), and the Society of Motion Picture and Television Engineers (SMPTE). Currently, there are approximately 150 members representing the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries.

ATSC Digital TV Standards include digital high definition television (HDTV), standard definition television (SDTV), data broadcasting, multichannel surround-sound audio, and satellite direct-to-home broadcasting.

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Implementers with feedback, comments, or potential bug reports relating to this document may contact ATSC at <https://www.atsc.org/feedback/>.

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ATSC Standard: Service Announcement (A/332)

1. SCOPE

The normative portions of this document define a standard for announcement of services in an ATSC 3.0 broadcast.

1.1 Organization

This document is organized as follows:

- Section 1 – Outlines the scope of this document and provides a general introduction.
- Section 2 – Lists references and applicable documents.
- Section 3 – Provides a definition of terms, acronyms, and abbreviations for this document.
- Section 4 – System Overview: Service Announcement and Personalization
- Section 5 – Service Announcement: Service Guide
- Annex A – Schema

2. REFERENCES

All referenced documents are subject to revision. Users of this Standard are cautioned that newer editions might or might not be compatible.

2.1 Normative References

The following documents, in whole or in part, as referenced in this document, contain specific provisions that are to be followed strictly in order to implement a provision of this Standard.

- [1] ATSC: “ATSC Standard: Program and System Information Protocol for Terrestrial Broadcast and Cable,” Doc. A/65:2013, Advanced Television Systems Committee, Washington, D.C., 7 August 2013.
- [2] ATSC: “ATSC-Mobile DTV Standard, Part 4 – Announcement,” Doc. A/153 Part 4:2009, Advanced Television Systems Committee, Washington, D.C., 15 October 2009.
- [3] ATSC: “ATSC Standard: Signaling, Delivery, Synchronization, and Error Protection (A/331),” Doc. A/331:2017, Advanced Television Systems Committee, Washington, D.C., 6 December 2017.
- [4] IANA: “Hypertext Transfer Protocol (HTTP) Parameters,” <http://www.iana.org/assignments/http-parameters>.
- [5] IANA: “MIME Media Types,” <http://www.iana.org/assignments/media-types>.
- [6] IANA: “Reliable Multicast Transport (RMT) FEC Encoding IDs and FEC Instance IDs,” <http://www.iana.org/assignments/rmt-fec-parameters>.
- [7] IEEE: “Use of the International Systems of Units (SI): The Modern Metric System,” Doc. IEEE/ASTM SI 10, Institute of Electrical and Electronics Engineers, New York, N.Y., 2002.
- [8] IETF: “Hypertext Transfer Protocol – HTTP/1.1: Semantics and Content,” RFC 7231, Internet Engineering Task Force, June 2014.
- [9] IETF: “Augmented BNF for Syntax Specifications: ABNF,” RFC 5234, Internet Engineering Task Force, January 2008.

- [10] IETF: “UTF-8, A Transformation Format for ISO 10646,” RFC 3629, Internet Engineering Task Force, November 2003.
- [11] OMA: “Service Guide for Mobile Broadcast Services,” Version 1.0.1, document OMA-TS-BCAST_Service_Guide-V1_0_1-20130109-A, Open Mobile Alliance, 9 January 2013.
- [12] OMA: “Service Guide for Mobile Broadcast Services,” Version 1.1, document OMA-TS-BCAST_Service_Guide-V1_1-20131029-A, Open Mobile Alliance, 29 October 2013.
- [13] ATSC: “ATSC Standard: Video—HEVC (A/341),” Doc. A/341:2017, Advanced Television Systems Committee, Washington, D.C., 19 May 2017.
- [14] ATSC: “ATSC Standard: AC-4 System (A/342 Part 2),” Doc. A/342-2:2017, Advanced Television Systems Committee, Washington, D.C., 23 February 2017.
- [15] ATSC: “ATSC Standard: MPEG-H System (A/342 Part 3),” Doc. A/342-3:2017, Advanced Television Systems Committee, Washington, D.C., 3 March 2017.
- [16] ATSC: “ATSC Standard: Non-Real-Time Content Delivery,” Doc. A/103:2014, Advanced Television Systems Committee, Washington, D.C., 25 July 2014.
- [17] IETF: “RaptorQ Forward Error Correction Scheme for Object Delivery,” RFC 6330, Internet Engineering Task Force, August 2011.
- [18] ATSC: “ATSC Standard: Captions and Subtitles,” Doc. A/343:2016, Advanced Television Systems Committee, Washington, D.C., 21 December 2016.

3. DEFINITION OF TERMS

With respect to definition of terms, abbreviations, and units, the practice of the Institute of Electrical and Electronics Engineers (IEEE) as outlined in the Institute’s published standards [7] shall be used. Where an abbreviation is not covered by IEEE practice or industry practice differs from IEEE practice, the abbreviation in question will be described in Section 3.3 of this document.

3.1 Compliance Notation

This section defines compliance terms for use by this document:

shall – This word indicates specific provisions that are to be followed strictly (no deviation is permitted).

shall not – This phrase indicates specific provisions that are absolutely prohibited.

should – This word indicates that a certain course of action is preferred but not necessarily required.

should not – This phrase means a certain possibility or course of action is undesirable but not prohibited.

3.2 Treatment of Syntactic Elements

This document contains symbolic references to syntactic elements used in the audio, video, and transport coding subsystems. These references are typographically distinguished by the use of a different font (e.g., `restricted`), may contain the underscore character (e.g., `sequence_end_code`) and may consist of character strings that are not English words (e.g., `dynrng`).

3.2.1 Reserved Elements

One or more reserved bits, symbols, fields, or ranges of values (i.e., elements) may be present in this document. These are used primarily to enable adding new values to a syntactical structure without altering its syntax or causing a problem with backwards compatibility, but they also can be used for other reasons.

The ATSC default value for reserved bits is ‘1.’ There is no default value for other reserved elements. Use of reserved elements except as defined in ATSC Standards or by an industry standards setting body is not permitted. See individual element semantics for mandatory settings and any additional use constraints. As currently-reserved elements may be assigned values and meanings in future versions of this Standard, receiving devices built to this version are expected to ignore all values appearing in currently-reserved elements to avoid possible future failure to function as intended.

3.3 Acronyms and Abbreviation

The following acronyms and abbreviations are used within this document.

ABNF – Augmented Backus-Naur Form

ATSC – Advanced Television Systems Committee

IANA – Internet Assigned Numbers Authority

OMA – Open Mobile Alliance

OMA BCAST – Open Mobile Alliance Broadcast Mobile Services Enabler Suite

ROUTE – Real-time Object delivery over Unidirectional Transport

SG – Service Guide

SGDD – Service Guide Delivery Descriptor

SGDU – Service Guide Delivery Unit

XML – eXtensible Markup Language

3.4 Terms

The following terms are used within this document.

reserved – Set aside for future use by a Standard.

Content fragment – Portion of Service Announcement that describes ATSC program or content item, corresponding to Content fragment in OMA BCAST Service Guide model [11], with additions and constraints as described in this document.

Schedule fragment – Portion of Service Announcement that describes presentation scheduling of content in an ATSC service, corresponding to Schedule fragment in OMA BCAST Service Guide model [11], with additions and constraints as described in this document.

Service Announcement – Service Announcement is information regarding the ATSC services and content available.

Service fragment – Portion of Service Announcement that describes ATSC service, corresponding to Service fragment in OMA BCAST Service Guide model [11], with additions and constraints as described in this document.

Service Guide – Function of presenting Service Announcement.

4. SYSTEM OVERVIEW

The normative portions of this document define a standard for announcement of services in an ATSC 3.0 broadcast. The Service Announcement Specifications define the data formats and delivery mechanisms used to announce the content and services being delivered, or scheduled for delivery, in ATSC 3.0.

5. SERVICE ANNOUNCEMENT: SERVICE GUIDE

5.1 Introduction

In general, it is assumed that ATSC 3.0 services will be delivered by broadcast channel(s) and broadband channel(s) jointly leveraging the unidirectional one-to-many broadcast paradigm (either in fixed environment and/or mobile environment) and the bi-directional unicast paradigm in a broadband environment.

The Service Announcement function enables ATSC 3.0 Service providers to describe the ATSC 3.0 Services that they make available. From a user's point of view, the Service Announcement function enables an on-screen Service Guide that can be seen as an entry point to discover ATSC 3.0 services and to select services. Service Announcement provides descriptions of the content offerings and also may provide a filtering capability based on user preferences and content properties, such as the presence or absence of captioning, interactive enhancements, video formats (3D, SD, HD, UD), audio formats (stereo, 5.1, immersive), caption formats (IMSC1 text or image), content advisory ratings, genre, accessible audio tracks, alternate languages, etc. In the case of scheduled services, Service Announcement also provides information about the date and time each offering is scheduled to be broadcast.

This specification comprises the Service Announcement data model, data delivery format, and delivery mechanisms used to announce ATSC 3.0 services and content now being delivered, scheduled for delivery, or available on-demand, over both broadcast and broadband channels. This specification also includes the mechanisms for discovery of the Service Announcement data and mechanisms to signal updates to the Service Announcement data.

5.2 ATSC SG Data Model

5.2.1 Overview

The information available through the Service Announcement provides receivers with a robust description of the available services and content.

5.2.2 ATSC 3.0 Service Guide Data Model

This Section defines a set of constraints and extensions of the data model specified in the OMA BCAST Service Guide specification, Version 1.0.1 [11].

Service guide fragments used to announce information regarding ATSC 3.0 services and content shall conform to the data model described in this standard, which extends the OMA BCAST Service Guide specification, Version 1.0.1 [11] data model (and XML schema) in following distinct ways.

- The allowed values for existing OMA BCAST Service Guide elements are modified or constrained. These changes are intended to be consistent with the OMA BCAST SG schema.

- Additional data model elements not defined in the OMA BCAST SG are introduced. These are defined within the PrivateExt elements provided for such extensions in the OMA BCAST schema.

Service Guide data that include ATSC services is a collection of XML fragments whose syntax is described by OMA BCAST SG (using the OMA BCAST XML namespace), together with additional XML elements defined by this standard (using the ATSC 3 namespace).

Note: The following conventions apply to all tables in this Section:

- Metadata items which are represented as XML elements are shown in plain text.
- Metadata items which are represented as XML attributes are shown in *italics*.
- Additions to the data model from in OMA BCAST 1.1 [12] are **highlighted in gray and bold**.
- Additions to the data model specified in OMA BCAST (and therefore making use of the ATSC 3 namespace) are **highlighted in light gray and bold**.
- Meaning of “Type” and “Category” column is defined in OMA BCAST Service Guide specification, Version 1.0.1 [11].

The XML schema definitions for the new elements described in the tables in this document can be found in the XML schema file shown in Annex A of this document. The normative XML schema document for the schemas defined in this document can be found in Annex A.

The Service Announcement shall be represented as an XML document that conforms to the definitions in the XML schema that has namespace:

tag: atsc.org, 2016: XMLSchemas/ATSC3/SA/1.0/

When any of these elements appear in the service guide, their syntax shall conform to these XML schema definitions. When any of these elements appear in the service guide, their semantics shall be as defined in this section.

5.2.2.1 Service Fragment

Service fragment shall include elements as shown in Table 5.1. Use of the Service fragment of the service guide shall conform to the specifications in OMA BCAST Service Guide specification, Version 1.0.1 [11] with extensions as shown in Table 5.1.

Table 5.1 Service Fragment

Service
<i>id</i>
<i>version</i>
<i>validFrom</i>
<i>validTo</i>
<i>globalServiceID</i>
<i>weight</i>
<i>emergency</i>
ServiceType
Name
Description
AudioLanguage
<i>languageSDPTag</i>

TextLanguage
 *languageSDP*Tag
ContentAdvisoryRatings
OtherRatings [Table 5.4]
 TargetUserProfile
 Genre
 BroadcastArea
 PrivateExt
ATSC3ServiceExtension
 Icon
 MIMEType
 width
 height
 dataSize
 MajorChannelNum
 MinorChannelNum
 RatingRegionTables

The following constraints apply.

- The cardinality of **Name** is changed from 1..N to 0..N.
- The attribute *languageSDP*Tag for the elements **AudioLanguage** and **TextLanguage** is changed from “required” to “optional”.
- The element **BroadcastArea** shall not contain attribute *Polarity*. If *lev_conf* exists in the Service fragment for a target area type (as specified by the **TargetArea** sub-element) other than *shape*, it carries no meaning.

The following adaptations and extensions apply.

- For use of **ServiceType**, see Section 5.2.2.1.1.
- For use of **Genre**, see Section 5.2.2.1.2.
- Elements **Name** and **Description** shall be replaced with extended elements in Section 5.2.2.1.3.
- The target level of confidence is confidence level that the terminal is indeed located within the indicated **TargetArea**. If the terminal is not located within the indicated **TargetArea**, it should not present the service. When **TargetArea** is set to *shape*, the target confidence level is 67%. When **TargetArea** is not set to *shape*, the target confidence level is 100%

5.2.2.1.1 Service Type

The **ServiceType** element values are extended to include two proprietary ATSC 3.0 service types:

- A **ServiceType** element shall be included with value 228 to indicate that the Service fragment contains information regarding an ATSC 3.0 Linear service.
- A **ServiceType** element shall be included with value 229 to indicate that the Service fragment contains information regarding an ATSC 3.0 App-based service with app-based enhancement.

5.2.2.1.2 Genre

The Genre element shall be instantiated to describe the genre category for a service or for content. The 'href' attribute value shall select a particular genre category and be set as follows:

```
<classificationSchemeURI> “:” <termID>
```

where

<classificationSchemeURI> is <http://www.atsc.org/XMLSchemas/mh/2009/1.0/genre-cs/> and <termID> matches a termID value from the classification schema in Annex B of A/153 Part 4 [2]. The Genre element content shall be an empty string.

5.2.2.1.3 Name and Description Elements Extensions

Elements Name and Description elements from Service fragment are extended with addition of sub-elements and attributes related to speech phonetic information, as listed in Table 5.2.

Table 5.2 Speech Phonetic Information Extensions in Service Fragment

Name	Type	Category	Cardinality	Description	Data Type
Name	E1	NM/TM	0..N	Extended Name element which includes sub-elements to indicate name and phonetic information about name. Contains the following elements: SpeechInfoURI SpeechInfo Contains following attribute: text xml:lang	
text	A	NM/TM	1	Name of the Service.	String
xml:lang	A	NM/TM	0..1	The language of the text attribute expressed with XML attribute 'xml:lang'	String
SpeechInfoURI	E2	NM/TM	0..N	The URI address where SpeechInfo object for parent Name element is acquired. Speech file may be encoded in SSML format (http://www.w3.org/TR/speech-synthesis11/) or similar types of mark-up languages. Contains following attribute: content-type content-enc	anyURI
content-type	A	NM/TM	0..1	Content-type of SpeechInfo object referenced by SpeechInfoURI.	String
content-enc	A	NM/TM	0..1	Content encoding of SpeechInfo object referenced by SpeechInfoURI.	String
SpeechInfo	E2	NM/TM	0..N	Embedded Speech information object for parent Name element. Contains following attribute: content-type content-enc	anyURI
content-type	A	NM/TM	0..1	Content-type of SpeechInfo object.	String
content-enc	A	NM/TM	0..1	Content encoding of SpeechInfo object.	String
Description	E1	NM/TM	1..N	Extended Description element which includes sub-elements to indicate description and phonetic information about description. Contains the following elements: SpeechInfoURI SpeechInfo Contains following attribute: text	

				xml:lang	
text	A	NM/TM	1	Description of the Service.	String
xml:lang	A	NM/TM	0..1	The language of the text attribute expressed with XML attribute 'xml:lang'	String
SpeechInfoURI	E2	NM/TM	0..N	The URI address where SpeechInfo object for parent Name element is acquired. Speech file may be encoded in SSML format (http://www.w3.org/TR/speech-synthesis11/) or similar types of mark up languages. Contains following attribute: content-type content-enc	anyURI
content-type	A	NM/TM	0..1	Content-type of SpeechInfo object referenced by SpeechInfoURI.	String
content-enc	A	NM/TM	0..1	Content encoding of SpeechInfo object referenced by SpeechInfoURI.	String
SpeechInfo	E2	NM/TM	0..N	Embedded Speech information object for parent Name element. Contains following attribute: content-type content-enc	anyURI
content-type	A	NM/TM	0..1	Content-type of SpeechInfo object.	String
content-enc	A	NM/TM	0..1	Content encoding of SpeechInfo object.	String

Additionally, the following constraints apply.

- When more than one SpeechInfoURI element and SpeechInfo element are present inside a parent Name or Description element in the service guide, the value of content-type attribute of each of the SpeechInfoURI element and SpeechInfo element shall be different.
- The semantics of content-type attribute for SpeechInfoURI element and SpeechInfo element shall obey the semantics of Content-Type header of HTTP/1.1 protocol RFC 7231 [8].
- When the content-type attribute is not present for SpeechInfoURI element or SpeechInfo element it is inferred to have a value of “application/ssml+xml” for that element.
- The semantics of content-enc attribute for SpeechInfoURI element and SpeechInfo element shall obey the semantics of Content-Encoding header of HTTP/1.1 protocol RFC 7231 [8].
- When the content-enc attribute is not present for SpeechInfoURI element or SpeechInfo element the associated speech information object for the corresponding SpeechInfoURI element or SpeechInfo is assumed to have no additional content encoding applied.

5.2.2.1.4 Content Advisory Ratings Information

This section describes content advisory rating information corresponding to a rating system defined by a Rating Region Table (RRT). RRT is defined in Annex of A/331 [3]. RRT RatingRegionTables element may be signaled in Service fragment as described in section 5.2.2.1.4. Content advisory rating not corresponding to defined RRT are described in section 5.2.2.1.5. The content advisory rating is indicated for each rating region. For each rating region, rating value is provided for one or more rating dimensions. The content advisory rating is indicated as listed in Table 5.3.

Table 5.3 Content Advisory Rating Information

Name	Type	Category	Cardinality	Description	Data Type
ContentAdvisoryRatings	E1	NM/TM	0..N	Content advisory rating - one for each rating region. Contains the following elements: RegionIdentifier RatingDescription RatedDimensions RatingDimVal	
RegionIdentifier	E2	NM/TM	0..1	Specifies the rating region for which the following rating description, rated dimensions, rating dimension, and rating value data is specified. If not present, the value of RegionIdentifier is inferred to be 1.	unsignedByte
RatingDescription	E2	NM/TM	1	Rating description text which represents the rating suitable for on-screen display. Contains the following attribute: xml:lang	string
xml:lang	A	NM/TM	0..1	The language of the RatingDescription expressed with XML attribute 'xml:lang'	string
RatedDimensions	E2	NM/TM	0..1	The number of region specific rating dimensions for which content advisory rating is specified.	unsignedByte
RatingDimVal	E2	NM/TM	1..N	Content advisory rating dimension and rating value for each rated dimension. Contains the following elements: RatingDimension RatingValueString	
RatingDimension	E3	NM/TM	0..1	Rating dimension index for which the rating value is specified.	unsignedByte
RatingValueString	E3	NM/TM	1	Rating value text string for the rating dimension specified in the associated RatingDimension element.	String

Additionally, the following constraints apply.

- The number of occurrences of the **RatingDimVal** element must be equal to the value inside the **RatedDimensions** element.
- The value of the element **RatingDimension** shall be less than or equal to the number of rating dimensions defined in the rating region table.
- The value of the element **RatingValueString** shall be equal to one of the values defined in the rating region table for the rating dimension indicated by the value of the associated **RatingDimension** element.
- When not present the value of **RatingDimension** is inferred to be equal to 0.
- When not present the value of **RatedDimensions** is inferred to be equal to 1.

The content advisory rating information can be indicated in service announcement at one or more of the following locations:

- Inside a Service fragment for a service
The content advisory rating information (`ContentAdvisoryRatings` element) can be indicated inside a Service fragment.
- Inside a Content fragment for a program or content
The content advisory ratings information (`ContentAdvisoryRatings` element) can be included in Content fragment instead of in Service fragment or in addition to in the Service fragment. When content advisory information is included in both the Service fragment and the Content fragment then the information in the Content fragment overrides the information in the Service fragment.

5.2.2.1.5 Non-RRT Content Advisory Rating

Content advisory rating not corresponding to defined RRT are carried as described by appropriate regional authorities using the structure described in **Table 5.4**.

Table 5.4 Non-RRT Content Advisory Rating Information

Name	Type	Category	Cardinality	Description
<code>OtherRatings</code>	E1	NM/TM	0..N	Content advisory rating – not corresponding to defined RRT. Contains the following attribute: <code>ratingScheme</code> Contains one of the following elements (inside XML schema <code>choice</code> element): <code>RatingInformationString</code> <code>RatingInformationData</code>
<code>ratingScheme</code>	A	NM/TM	1	Specifies the scheme URI for the rating described by <code>RatingInformationString/</code> <code>RatingInformationData</code> element
<code>RatingInformationString</code>	E2	NM/TM	0..1	Rating information value string corresponding to the rating scheme defined by <code>ratingScheme</code> . The interpretation of this element is specified by appropriate regional authorities.
<code>RatingInformationData</code>	E2	NM/TM	0..1	Container element for rating information value data corresponding to the rating scheme defined by <code>ratingScheme</code> . The interpretation of the child element(s) of this element is specified by appropriate regional authorities. Contains <code>xs:any</code> element(s).

Additionally, the following constraints apply.

- Each `OtherRatings` element inside the Service fragment shall have a unique `ratingScheme` value.
- Each `OtherRatings` element inside the Content fragment shall have a unique `ratingScheme` value.

The non-RRT content advisory rating information can be indicated in service announcement at one or more of the following locations:

- Inside a Service fragment for a service
The non-RRT content advisory rating information (`OtherRatings` element) can be indicated inside a Service fragment.

- Inside a Content fragment for a program or content
The non-RRT content advisory ratings information (**OtherRatings** element) can be included in Content fragment instead of in Service fragment or in addition to in the Service fragment. When non-RRT content advisory information is included in both the Service fragment and the Content fragment then the information in the Content fragment over-rides the information in the Service fragment.

5.2.2.1.6 Service-Level Private Extensions

Elements from the ATSC 3 namespace are used within the OMA **PrivateExt** element, to indicate ATSC 3 service related elements and attributes, as listed in Table 5.5.

Table 5.5 Service Level Private Extensions

Name	Type	Category	Card- inality	Description	Data Type
ATSC3ServiceExtension	E1	NM/TM	1	Additional information about ATSC 3.0 service. Contains the following elements: Icon MajorChannelNum MinorChannelNum	
Icon	E2	NM/TM	0..N	URL pointing to icon used to represent the service in ESG. Multiple URLs could be used to point to icons of different width and height or different representation formats. Contains the following optional attributes: MIMEType width height dataSize	anyURI
MIMEType	A	NM/TM	0..1	The optional MIME type of the icon allowing receivers to preemptively ignore fetching image types they are not capable of presenting.	String
width	A	NM/TM	0..1	Width of the referenced image in pixels	unsignedInt
height	A	NM/TM	0..1	Height of the referenced image in pixels	unsignedInt
dataSize	A	NM/TM	0..1	Size of the image data in bytes.	unsignedInt
MajorChannelNum	E2	NM/TM	0..1	Major channel number of the service. The language is expressed using built-in XML attribute 'xml:lang' with this element.	String
MinorChannelNum	E2	NM/TM	0..1	Minor channel number of the service. The language is expressed using built-in XML attribute 'xml:lang' with this element.	String
RatingRegionTables	E2	NM/TM	0..1	Rating Region Table. Syntax of RatingRegionTables shall be as specified in Annex of A/331 [3]. The contents of this element in the service announcement shall match those sent in the service signaling.	

Note: The attributes associated with the `Icon` element are optional. They can be provided as hints to allow the receiver ESG system to avoid accessing image data that it cannot process.

5.2.2.2 Schedule Fragment

Schedule fragment shall include elements as shown in Table 5.6. Use of the Schedule fragment of the service guide shall conform to the specifications in OMA BCAS T Service Guide specification, Version 1.0.1 [11] with extensions as specified in this section.

Table 5.6 Schedule Fragment

Schedule
<i>id</i>
<i>version</i>
<i>validFrom</i>
<i>validTo</i>
ServiceReference
<i>idRef</i>
ContentReference
<i>idRef</i>
<i>contentLocation</i>
PresentationWindow
<i>startTime</i>
<i>endTime</i>
<i>duration</i>
<i>id</i>
TermsOfUse
PrivateExt

The following constraints apply.

- The attributes `defaultSchedule`, `onDemand`, of the element `Schedule` shall not be present.
- The elements `InteractivityDataReference`, `AutoStart`, `DistributionWindow`, `PreviewDataReference` shall not be present. When an element is not present all its sub-elements and attributes are also not present.
- The sub-element `PreviewDataIDRef` of the element `TermsOfUse` shall not be present.

5.2.2.3 Content Fragment

Content fragment shall include elements as shown in Table 5.7. Use of the Content fragment of the service guide shall conform to the specifications in OMA BCAS T Service Guide specification, Version 1.0.1 [11] and for elements **highlighted in gray and bold** to the specifications of OMA BCAS T Service Guide specification, Version 1.1 [12] with additional extensions as shown in Table 5.7.

Table 5.7 Content Fragment

Content
<i>id</i>
<i>version</i>
<i>validFrom</i>
<i>validTo</i>
<i>globalContentID</i>
<i>baseCID</i>
ServiceReference
<i>idRef</i>
<i>weight</i>
Name
Description
AudioLanguage
<i>languageSDPTag</i>
TextLanguage
<i>languageSDPTag</i>
Length
ContentAdvisoryRatings [Table 5.3]
OtherRatings [Table 5.4]
TargetUserProfile
Genre
BroadcastArea
TermsOfUse
Popularity
<i>rating</i>
<i>noOfViews</i>
<i>noOfDiscussions</i>
<i>samplingDate</i>
Freshness
<i>releasDate</i>
<i>broadcastDate</i>
PrivateExt
Components
AudioComponent
<i>language</i>
VideoComponent
<i>language</i>
CCComponent
<i>language</i>
AppComponent
<i>language</i>
Capabilities
ContentIcon
MIMEType
<i>width</i>
<i>height</i>

```

    dataSize
  Preview
    usage
    PreviewIcon
      MIMEType
      width
      height
      dataSize
    Description
    PreviewContent
      MIMEType
      width
      height
      dataSize
  
```

The following constraints apply.

- The elements of `StartTime` and `EndTime` shall not be present.
- The sub-element `PreviewDataIDRef` of the element `TermsOfUse` shall not be present.
- The attribute `languageSDPtag` for the elements `AudioLanguage` and `TextLanguage` is changed from “required” to “optional”.
- The element `BroadcastArea` shall not contain attribute `Polarity`. If `lev_conf` exists in the Content fragment for a target area type (as specified by the `TargetArea` sub-element) other than `shape`, it carries no meaning.

The following adaptations and extensions apply.

- Elements `Name` and `Description` shall be replaced with extended elements in Section 5.2.2.3.1.
- For use of `Genre`, see Section 5.2.2.1.2.
- The target level of confidence is confidence level that the terminal is indeed located within the indicated `TargetArea`. If the terminal is not located within the indicated `TargetArea`, it should not present the service. When `TargetArea` is set to `shape`, the target confidence level is 67%. When `TargetArea` is not set to `shape`, the target confidence level is 100%

5.2.2.3.1 Name and Description Elements Extensions

Elements `Name` and `Description` elements from Content fragment are extended with addition of sub-elements and attributes related to speech phonetic information, as listed in Table 5.8.

Table 5.8 Speech Phonetic Information Extensions in Content Fragment

Name	Type	Category	Cardinality	Description	Data Type
Name	E1	NM/TM	0..N	Extended Name element which includes sub-elements to indicate name and phonetic information about name. Contains the following elements: SpeechInfoURI SpeechInfo Contains following attribute: text	

				xml:lang	
text	A	NM/TM	1	Name of the 'Content' fragment.	String
Xml : lang	A	NM/TM	0..1	The language of the text attribute expressed with XML attribute 'xml:lang'	String
SpeechInfoURI	E2	NM/TM	0..N	The URI address where SpeechInfo object for parent Name element is acquired. Speech file may be encoded in SSML format (http://www.w3.org/TR/speech-synthesis11/) or similar types of mark-up languages. Contains following attribute: content-type content-enc	anyURI
Content - type	A	NM/TM	0..1	Content-type of SpeechInfo object referenced by SpeechInfoURI.	String
Content - enc	A	NM/TM	0..1	Content encoding of SpeechInfo object referenced by SpeechInfoURI.	String
SpeechInfo	E2	NM/TM	0..N	Embedded Speech information object for parent Name element. Contains following attribute: content-type content-enc	anyURI
Content - type	A	NM/TM	0..1	Content-type of SpeechInfo object.	String
Content - enc	A	NM/TM	0..1	Content encoding of SpeechInfo object.	String
Description	E1	NM/TM	1..N	Extended Description element which includes sub-elements to indicate description and phonetic information about description. Contains the following elements: SpeechInfoURI SpeechInfo Contains following attribute: text xml:lang	
text	A	NM/TM	1	Description of the Content	String
Xml : lang	A	NM/TM	0..1	The language of the text attribute expressed with XML attribute 'xml:lang'	String
SpeechInfoURI	E2	NM/TM	0..N	The URI address where SpeechInfo object for parent Description element is acquired. Speech file may be encoded in SSML format (http://www.w3.org/TR/speech-synthesis11/) or similar types of mark-up languages. Contains following attribute: content-type content-enc	anyURI
content - type	A	NM/TM	0..1	Content-type of SpeechInfo object referenced by SpeechInfoURI.	String
content - enc	A	NM/TM	0..1	Content encoding of SpeechInfo object referenced by SpeechInfoURI.	String
SpeechInfo	E2	NM/TM	0..N	Embedded Speech information object for parent Description element. Contains following attribute: content-type content-enc	anyURI
content - type	A	NM/TM	0..1	Content-type of SpeechInfo object.	String
content - enc	A	NM/TM	0..1	Content encoding of SpeechInfo object.	String

Additionally, the following constraints apply.

- When more than one `SpeechInfoURI` element and `SpeechInfo` element are present inside a parent `Name` or `Description` element in the service guide, the value of `content-type` attribute of each of the `SpeechInfoURI` element and `SpeechInfo` element shall be different.
- The semantics of `content-type` attribute for `SpeechInfoURI` element and `SpeechInfo` element shall obey the semantics of `Content-Type` header of HTTP/1.1 protocol RFC 7231 [8].
- When the `content-type` attribute is not present for `SpeechInfoURI` element or `SpeechInfo` element it is inferred to have a value of “`application/ssml+xml`” for that element.
- The semantics of `content-enc` attribute for `SpeechInfoURI` element and `SpeechInfo` element shall obey the semantics of `Content-Encoding` header of HTTP/1.1 protocol RFC 7231 [8].
- When the `content-enc` attribute is not present for `SpeechInfoURI` element or `SpeechInfo` element the associated speech information object for the corresponding `SpeechInfoURI` element or `SpeechInfo` is assumed to have no additional content encoding applied.

5.2.2.3.2 Content-Level Private Extensions

Elements from the ATSC 3 namespace may be used within the `OMA PrivateExt` element, to indicate ATSC 3 content components related elements and attributes, as listed in Table 5.9.

Table 5.9 Content-Level Private Extensions

Name	Type	Category	Cardinality	Description	Data Type
<code>Components</code>	E2	NM/TM	0..1	Component sub-element. Contains the following elements: AudioComponent VideoComponent CCComponent AppComponent	
<code>AudioComponent</code>	E3	NM/TM	0..N	Role of the component. Textual description intended for human consumption regarding role of the component. Strings which could be used to describe role of component of ATSC3.0 service include: “Complete main” “Music” “Dialog” “Effects” “Visually impaired” “Hearing impaired” “Commentary” Any other useful description for a viewer can be provided. Contains the following attribute: language	String
<code>Language</code>	A	NM/TM	0..1	This element declares for the end users that this component is available in the language represented by the value of this element. The textual value of this element can be made available for the end users in different languages. In such a case the language used to represent the value of this element is	String

				signaled using the built-in XML attribute 'xml:lang'. See section 7 [11], Multi-language support.	
VideoComponent	E3	NM/TM	0..N	<p>Role of the component.</p> <p>Textual description intended for human and/or application consumption regarding role of the component.</p> <p>Strings which could be used to describe role of component of ATSC3.0 service include:</p> <p>“Alternative camera view”</p> <p>“Sign language inset”</p> <p>“Quarterback Helmet Cam”</p> <p>“3D video”</p> <p>Any other useful description for a viewer can be provided.</p> <p>Contains the following attribute:</p> <p>language</p>	String
Language	A	NM/TM	0..1	<p>This element declares for the end users that this component is available in the language represented by the value of this element.</p> <p>The textual value of this element can be made available for the end users in different languages. In such a case the language used to represent the value of this element is signaled using the built-in XML attribute 'xml:lang'. See section 7 [11], Multi-language support.</p>	String
CCComponent	E3	NM/TM	0..N	<p>Role of the component.</p> <p>Textual description intended for human consumption regarding role of the component.</p> <p>Strings which could be used to describe role of component of ATSC3.0 service include:</p> <p>“Normal”</p> <p>“Easy reader”</p> <p>Any other useful description for a viewer can be provided.</p> <p>Contains the following attribute:</p> <p>language</p>	
Language	A	NM/TM	0..1	<p>This element declares for the end users that this component is available in the language represented by the value of this element.</p> <p>The textual value of this element can be made available for the end users in different languages. In such a case the language used to represent the value of this element is signaled using the built-in XML attribute 'xml:lang'. See section 7 [11] Multi-language support.</p>	String
AppComponent	E2	NM/TM	0..N	<p>Role of the component.</p> <p>Textual description intended for human consumption regarding role of the component.</p> <p>Strings which could be used to describe role of component of ATSC3.0 service include:</p> <p>“On Demand”</p> <p>Any other useful description for a viewer can be provided.</p> <p>Contains the following attribute:</p> <p>language</p>	
Language	A	NM/TM	0..1	<p>This element declares for the end users that this component is available in the language</p>	String

				represented by the value of this element. The textual value of this element can be made available for the end users in different languages. In such a case the language used to represent the value of this element is signaled using the built-in XML attribute 'xml:lang'. See section 7 [11] Multi-language support.	
ContentIcon	E2	NM/TM	0..N	URL pointing to an icon (image) used to represent the content element in the ESG. Multiple URLs could be used to point to icons (images) of different width and height or different representation formats. Contains the following optional attributes: MIMEType width height dataSize	anyURI
MIMEType	A	NM/TM	0..1	The optional MIME type of the icon allowing receivers to preemptively ignore fetching image types they are not capable of using.	String
width	A	NM/TM	0..1	Width of the referenced image in pixels	unsignedInt
height	A	NM/TM	0..1	Height of the referenced image in pixels	unsignedInt
dataSize	A	NM/TM	0..1	Size of the image data in bytes.	unsignedInt
Preview	E2	NM/TM	0..N	The preview element provides a way to reference promotional content for a particular ESG content element. Examples include movie trailers, news promos and banner images. Multiple preview items can be included in a content element extension. It is expected that each item would provide different types of promotional material as described in the Description element. Contains the following elements: PreviewIcon Description PreviewContent Contains the following optional attribute: usage	
usage	A	NM/TM	0..1	The optional usage attribute describes how the preview item is intended to be used within the ESG. Preview items specifying usage values that are not known to the ESG implementation shall be ignored. The following values are defined: "promo" – The default value indicating that the preview is promotional and likely video content. "preface" – Indicates that the preview material is intended to be display during a channel change to the particular content element. See section 5.2.2.3.2.1. "banner" – Indicates that the preview element represents a banner ad and may be displayed in the appropriate area.	String
PreviewIcon	E3	NM/TM	0..N	URI pointing to an icon (image) used to represent the preview element in the ESG. Multiple URIs could be used to point to icons (images) of different width and height or different representation formats.	anyURI

				Contains the following optional attributes: MIMEType width height dataSize	
MIMEType	A	NM/TM	0..1	The optional MIME type of the icon allowing receivers to preemptively ignore fetching image types they are not capable of using.	String
width	A	NM/TM	0..1	Width of the referenced image in pixels	unsignedInt
height	A	NM/TM	0..1	Height of the referenced image in pixels	unsignedInt
dataSize	A	NM/TM	0..1	Size of the image data in bytes.	unsignedInt
Description	E3	NM/TM	1..N	Extended Description element which includes sub-elements to indicate description and phonetic information about description. Contains the following elements: SpeechInfoURI SpeechInfo Contains the following attributes: text xml:lang	
text	A	NM/TM	1	Description of the Preview	String
Xml:lang	A	NM/TM	0..1	The language of the text attribute expressed with XML attribute 'xml:lang'	String
SpeechInfoURI	E4	NM/TM	0..N	The URI address where SpeechInfo object for parent Description element is acquired. Speech file may be encoded in SSML format (http://www.w3.org/TR/speech-synthesis11/) or similar types of mark-up languages. Contains the following attributes: content-type content-enc	anyURI
content-type	A	NM/TM	0..1	Content-type of SpeechInfo object referenced by SpeechInfoURI.	String
content-enc	A	NM/TM	0..1	Content encoding of SpeechInfo object referenced by SpeechInfoURI.	String
SpeechInfo	E4	NM/TM	0..N	Embedded Speech information object for parent Description element. Contains the following attributes: content-type content-enc	anyURI
content-type	A	NM/TM	0..1	Content-type of SpeechInfo object.	String
content-enc	A	NM/TM	0..1	Content encoding of SpeechInfo object.	String
PreviewContent	E3	NM/TM	0..N	URI pointing to content that can be displayed as preview data for the content element within the ESG. Multiple URIs could be used to reference content of different width and height or different representation formats. It is also possible to reference other types of data besides multimedia but it is expected that the URIs referenced here would reference similar semantic content with differing representations for example images of different encoding formats; i.e., png, jpg, or gif. Contains the following optional attributes: MIMEType width height dataSize	anyURI

MIMEType	A	NM/TM	0..1	The optional MIME type of the content specified by PreviewContent element allowing receivers to preemptively ignore fetching image types they are not capable of using.	String
width	A	NM/TM	0..1	Width of the referenced content specified by PreviewContent element in pixels	unsignedInt
height	A	NM/TM	0..1	Height of the referenced content specified by PreviewContent element in pixels	unsignedInt
dataSize	A	NM/TM	0..1	Size of the content specified by PreviewContent element data in bytes.	unsignedInt

Note: The attributes associated with the **ContentIcon**, **PreviewIcon**, and **PreviewContent** elements are optional. They can be provided as hints to allow the receiver ESG system to avoid accessing image and preview data that it cannot process.

5.2.2.3.2.1 Preview Usage Discussion

The preview element allows one or more previews to be associated with a content item. It is expected that, for ESG implementations that support promotional previews, when a content element is selected within the ESG, access to the previews would be provided in some way. It is further expected that the preview description and icon, if present, would allow the user to determine if they are interested in accessing the preview.

The usage attribute on each preview gives the ESG system a hint as to how the preview data is intended to be used. The default value, “promo”, would indicate that the preview contains audio and video content promoting the content item. Examples of these types of previews would be movie trailers, news promos, and other types of familiar promotional material.

The “preface” usage value indicates that the referenced preview data can be displayed during service changes. This would typically be an image slate or single frame that can be displayed when the user selects the particular content item for viewing—if the selection is going to take more than a receiver-defined time limit (e.g., 1-2 seconds).

The “banner” usage indicates that the preview material was created in an aspect ratio optimal for banner ads. In this case, the banner would simply be displayed when the user selected the content on the ESG. Note that a banner and various other preview items could be provided for the same content item within the ESG.

5.2.2.3.3 Device Capabilities

5.2.2.3.3.1 Device Capabilities Related Content-Level Private Extensions

Elements from the ATSC 3.0 namespace may be used within the **OMA PrivateExt** element, to indicate an ATSC 3.0 device capabilities related element, as given in Table 5.10. The **sa:Capabilities** XML element specifies the capabilities and capability groups¹ required in the receiver to be able to create a meaningful presentation of the content. Using this element, it is possible to express multiple alternate sets of required capabilities and capability groups, the support for any one of the multiple alternate sets is sufficient to create a meaningful presentation. This is done by using a logical or expression in the **sa:Capabilities** element.

¹ A capability group is a set of capabilities

Table 5.10 Device Capabilities Related Content-Level Private Extensions

Name	Type	Category	Cardinality	Description	Data Type
Content	E			'Content' fragment ...	
PrivateExt	E1	NO/TO	0..1	An element serving as a container for proprietary or application-specific extensions.	
sa:Capabilities	E3	NO/TM	0..1	Capabilities and capability groups required for decoding and presenting the content signaled using capability codes, capability strings and Boolean operators (and/or). This string shall conform to the normative syntax defined for capabilities described in section 5.2.2.3.3.2	string

5.2.2.3.3.2 Device Capabilities Syntax and Semantics

This section defines the syntax for the required device capabilities and capability groups indicated by `capabilities`. The syntax is described using the Augmented Backus-Naur Form (ABNF) grammar defined in RFC 5234 [9], and UTF-8 as defined in RFC 3629 [10] (Section 4). Rules are separated from definitions by an equal "=", indentation is used to continue a rule definition over more than one line, literals are quoted with "", parentheses "(" and ")" are used to group elements, optional elements are enclosed in "[" and "]" brackets, and elements may be preceded with `<n>*` to designate n or more repetitions of the following element; n defaults to 0.

Syntax of `capabilities` shall be as specified below:

```

ccode                = 1*4HEXDIG
capability_string_code = ubyte "=" 1*utf8
ubyte                = 1*3DIGIT
utf8                 = *( UTF8-char )

boperator            = and / or
and                  = "&"
or                   = "|"
expr                 = ccode
                    / capability_string_code
                    / expr WSP expr WSP boperator
capabilities         = expr

```

The semantics of `capabilities` shall be as specified below.

`ccode` – This terminal symbol represents a certain capability or capability group. This symbol evaluates as “true” if and only if the device has the capability or capability group identified. Values of `ccode` shall be a code point from Table 5.11.

`capability_string_code` – The first operand `ubyte` represents the registry identified by the capability category code. Values of `ubyte` shall be from Table 5.12 `capability_category_code` column. The second operand specifies the capability or capability group within that registry, and shall be as specified in that registry. This symbol evaluates as true if and only if the device has the capability or capability group identified. Characters chosen from UTF8-char shall not include Whitespace (WSP).

`boperator` – This nonterminal symbol represents a Boolean operator.

and – This nonterminal symbol represents the logical-and symbol.

or – This nonterminal symbol represents the logical-or symbol.

expr – This recursive nonterminal symbol represents a sequence of `c_code` symbols, `capability_string_code` symbols, and postfix logical operations. In an `expr`, when the `boperator` is `and`, this symbol evaluates as “true” if and only if both the first and second operands evaluate as “true”; and when the `boperator` is `or`, this symbol evaluates as true if and only if one or both of the first and second operands evaluate as “true.”

capabilities – This nonterminal represents capabilities and capability groups required for decoding and presenting the content signaled. If this nonterminal evaluates as “true”, capabilities and capability groups required to be able to create a meaningful presentation of the content are present. Using this nonterminal it is possible to express multiple alternate sets of capabilities and capability groups, the support for any one set of which is sufficient to create a meaningful presentation.

Table 5.11 Capability Codes

capability_code	Meaning	Reference
0x0000	Forbidden	
Capability Category: Download Protocols		
0x0100-0x01FF	Reserved for future ATSC use.	
Capability Category: FEC Algorithms		
0x0200	RFC 6330 Repair-only	Section 5.3.3
0x0201-0x02FF	Reserved for future ATSC use.	
Capability Category: Wrapper/Archive Formats		
0x0300-0x03FF	Reserved for future ATSC use.	
Capability Category: Compression Algorithms		
0x0400-0x04FF	Reserved for future ATSC use.	
Capability Category: Media Types		
0x0500	AVC standard definition video	Section A.2.8 [16]
0x0501	AVC high definition video	Section A.2.9 [16]
0x0502	AC-3 audio	Section A.2.10 [16]
0x0503	E-AC-3 audio	Section A.2.11 [16]
0x0504	DTS-HD audio	Section A.2.18 [16]
0x0505	HE AAC v2 with MPEG Surround	Section A.2.21 [16]
0x0506	HE AAC v2 Level 6 audio	Section A.2.22 [16]
0x0507	Frame-compatible 3D video (Side-by-Side)	Section A.2.23 [16]
0x0508	Frame-compatible 3D video (Top-and-Bottom)	Section A.2.24 [16]
0x0509	ATSC 3.0 SHVC Video	Section 5.3.1
0x050A	ATSC 3.0 HDR Video	Section 5.3.2
0x050B	Dolby® AC4 Audio	A/342 Part 2 [14]
0x050C	MPEG-H Audio	A/342 Part 3 [15]
0x050D	IMSC1 Text Profile	A/343 [18]
0x050E	IMSC1 Image Profile	A/343 [18]
0x050F-0x05FF	Reserved for future ATSC use.	
Capability Category: Internet Link		
0x0600	Internet link, downward rate 56,000 bps or better	Section A.2.25 [16]
0x0601	Internet link, downward rate 512,000 bps or better	Section A.2.26 [16]

capability_code	Meaning	Reference
0x0602	Internet link, downward rate 2,000,000 bps or better	Section A.2.27 [16]
0x0603	Internet link, downward rate 10,000,000 bps or better	Section A.2.28 [16]
0x0604-0x06FF	Reserved for future ATSC use.	
ATSC Reserved		
0x001-0x00FF, 0x0700-0xFFFF	Reserved for future ATSC use.	

Table 5.12 Capability Categories and Registries

capability_category_code	Capability Category	Registry
0x00	reserved	
0x01	Download Protocol	No registry – use widely used industry name
0x02	FEC Algorithm	IANA registry of FEC encoding IDs and instance IDs [6]
0x03	Wrapper/Archive Format	IANA registry of media types and subtypes [5]
0x04	Compression Algorithm	IANA registry of HTTP Content-Coding values [4]
0x05	Media Type	IANA registry of media types and subtypes [5]
0x06-0xFF	reserved	

5.3 Description of Code Points

5.3.1 Capability Code 0x0509: ATSC 3.0 SHVC Video

The `capability_code` value 0x0509 shall represent the receiver ability to support HEVC or HEVC scalable video encoded in conformance with the ATSC specification A/341 [13] but not requiring ability to support the constraints related to HDR in A/341 [13].

5.3.2 Capability Code 0x050A: ATSC 3.0 HDR Video

The `capability_code` value 0x050A shall represent the receiver ability to support HEVC video encoded in conformance with the ATSC specification A/341 [13]. In this case the receiver shall support HEVC video encoded in conformance with all constraints including constraints regarding HDR in A/341 [13].

5.3.3 Capability Code 0x0200: AL-FEC as defined by RFC 6330

The `capability_code` value 0x0200 shall represent the receiver ability to support the AL-FEC protocol in conformance to RFC 6330 [17] and referenced by the ATSC specification A/331 [3]. The receiver must support this capability code in order to acquire the service contents delivered on the repair flow/ protocol as specified in Annex of A/331 [3].

Other Code Points in Table 5.11 shall follow the description specified in the section referred in the column “Reference”.

Note: User private data, including capability codes, can be added with user-defined-namespace elements or attributes.

5.4 SG Data Encapsulation

The Service Guide fragments specified in Section 5.3 of the present document shall be encapsulated in Service Guide Delivery Units (SGDUs), and the SGDUs shall be described in Service Guide Delivery Descriptors (SGDDs), as specified in Section 5.4.1 of the OMA BCASST SG specification [11]. The Service Guide Delivery Unit (SGDU) structure is the transport container for ATSC 3.0 service guide fragments. Broadcast Systems and the Reference Receiver

shall support the Service Guide Delivery Unit structure as specified by Section 5.4.1.3 of the OMA BCAS 1.0.1 Service Guide [11], with the following constraints:

- The value of `extension_offset` field of the `UnitHeader` structure shall be equal to zero in SGDUs conforming to this version of this specification. The Reference Receiver shall be able to process an SGDU with a non-zero value for `extension_offset` (e.g., by ignoring the `extensions` field).
- The `fragmentEncoding[i]` field shall not take value of 1 or 2 or 3 for any value of `i` in the range 0 to `n_o_service_guide_fragments` in a SGDU. There shall be at least one value of `i` in the range 0 to `n_o_service_guide_fragments` for which value of `fragmentEncoding[i]` shall be equal to 0 in each SGDU conforming to this version of this specification. The reference receiver shall ignore fragment data associated with a non-zero `fragmentEncoding[i]` value for any value of `i` in the range 0 to `n_o_service_guide_fragments`.
- For any value of `i` in the range 0 to `n_o_service_guide_fragments`, when value of `fragmentEncoding[i]` is equal to 0, the `fragmentType` field shall not take value of 4, 5, 6, 7, 8, 9 for a SGDU. There shall be at least one value of `i` in the range 0 to `n_o_service_guide_fragments` for which `fragmentType` value shall be equal to 0 or 1 or 2 or 3 and `fragmentEncoding[i]` value shall be equal to 0 in each SGDU conforming to this version of this specification. The reference receiver shall ignore data in `XMLFragment` field with associated `fragmentType` field with value equal to 0 or greater than 3 for any value of `i` in the range 0 to `n_o_service_guide_fragments` when `fragmentEncoding[i]` is equal to 0.

5.5 SG Delivery

5.5.1 SG delivery over Broadcast

When SG data are delivered via broadcast, the SGDUs and SGDDs shall be delivered as specified in Section 5.4.2 of the OMA BCAS 1.0.1 SG specification [11], except that a single LCT component of a ROUTE [3] session (called the Service Guide Announcement Channel) shall be used for delivery of the SGDDs. SGDUs are referenced from within SGDDs by means of the **ServiceGuideDeliveryDescriptor.DescriptorEntry.Transport** element. If AL-FEC coding is not employed, SGDUs shall be transported using the modified Compact No-Code FEC scheme defined in A/331 [3] where the FEC Payload ID is formatted as a 32-bit `start_offset`. If AL-FEC coding is employed, SGDUs shall be transported using the RaptorQ scheme [17]. EFDTs shall be transmitted in the transport session delivering the Service Guide fragments.

5.5.2 SG delivery over Broadband

When SG data are delivered via broadband, the delivery shall conform to the specifications of section 5.4.3 of the OMA BCAS 1.0.1 SG specification [11].

5.6 SG Data Update and Management

Update and management of the SG data shall conform to the specifications of Section 5.5 of the OMA BCAS 1.0.1 SG specification [11].

Annex A Schema

This Annex contains the normative XML Schema for elements and attributes defined in this specification.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:sa="tag:atsc.org,2016:XMLSchemas/ATSC3/SA/1.0/"
xmlns:rrt="tag:atsc.org,2016:XMLSchemas/ATSC3/RRT/1.0/"
targetNamespace="tag:atsc.org,2016:XMLSchemas/ATSC3/SA/1.0/"
elementFormDefault="qualified">
<xs:import namespace="http://www.w3.org/XML/1998/namespace"
schemaLocation="W3C/xml.xsd"/>
<xs:import namespace="tag:atsc.org,2016:XMLSchemas/ATSC3/RRT/1.0/"
schemaLocation="RRT-1.0-20170209.xsd"/>
<xs:annotation>
<xs:documentation>
```

The definition of this schema can also be found in an XML schema file, SA-1.0-20170921.xsd at the ATSC website. The XML schema file RRT-1.0-20170209.xsd can also be found at the ATSC website.

```
</xs:documentation>
</xs:annotation>
<xs:element name="Capabilities" type="sa:CapabilitiesType" />
<xs:simpleType name="CapabilitiesType"><xs:restriction base="xs:string"/></xs:simpleType>
<xs:annotation>
<xs:documentation>
```

Name and Description elements in Service and Content Fragments of OMA BCAS service guide will be replaced with following extended elements

```
</xs:documentation>
</xs:annotation>
<xs:element name="Name" type="sa:NameDescriptionType" />
<xs:element name="Description" type="sa:NameDescriptionType" />
```

```
<xs:complexType name="NameDescriptionType">
<xs:sequence>
<xs:element name="SpeechInfoURI" minOccurs="0" maxOccurs="unbounded">
<xs:complexType>
<xs:simpleContent>
<xs:extension base="xs:anyURI">
<xs:attribute name="content-type" type="xs:string" use="optional"/>
<xs:attribute name="content-enc" type="xs:string" use="optional"/>
<xs:anyAttribute processContents="skip"/>
</xs:extension>
</xs:simpleContent>
</xs:complexType>
</xs:sequence>
</xs:complexType>
```

```

        </xs:complexType>
    </xs:element>
    <xs:element name="SpeechInfo" minOccurs="0" maxOccurs="unbounded">
        <xs:complexType>
            <xs:simpleContent>
                <xs:extension base="xs:string">
                    <xs:attribute name="content-type" type="xs:string" use="optional"/>
                    <xs:attribute name="content-enc" type="xs:string" use="optional"/>
                    <xs:anyAttribute processContents="skip"/>
                </xs:extension>
            </xs:simpleContent>
        </xs:complexType>
    </xs:element>
    <xs:any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded"/>
</xs:sequence>
<xs:attribute name="text" type="xs:string" use="required"/>
<xs:attribute ref="xml:lang" use="optional"/>
<xs:anyAttribute processContents="skip"/>
</xs:complexType>

<xs:element name="ContentAdvisoryRatings" type="sa:CARatingType"/>
<xs:complexType name="CARatingType">
    <xs:sequence>
        <xs:element name="RegionIdentifier" type="xs:unsignedByte"
            minOccurs="0" maxOccurs="1"/>
        <xs:element name="RatingDescription" maxOccurs="1">
            <xs:complexType>
                <xs:simpleContent>
                    <xs:extension base="xs:string">
                        <xs:attribute ref="xml:lang" use="optional"
                            default="en"/>
                        <xs:anyAttribute processContents="skip"/>
                    </xs:extension>
                </xs:simpleContent>
            </xs:complexType>
        </xs:element>
        <xs:element name="RatedDimensions" type="xs:unsignedByte"
            minOccurs="0" maxOccurs="1"/>
        <xs:element name="RatingDimVal" type="sa:RatingDimValType"
            minOccurs="1" maxOccurs="unbounded"/>
        <xs:any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:anyAttribute processContents="skip"/>
</xs:complexType>
<xs:complexType name="RatingDimValType">
    <xs:sequence>
        <xs:element name="RatingDimension" type="xs:unsignedByte"
            minOccurs="0" maxOccurs="1"/>
        <xs:element name="RatingValueString" type="xs:string"

```

```

        minOccurs="1"/>
        <xs: any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded"/>
</xs: sequence>
        <xs: anyAttribute processContents="skip"/>
</xs: complexType>

<xs: element name="OtherRatings" type="sa:OtherRatingType" />
        <xs: complexType name="OtherRatingType">
                <xs: sequence>
                        <xs: choice>
                                <xs: element name="RatingInformationString" type="xs:string" minOccurs="1"/>
                                <xs: element name="RatingInformationData" type="sa:RatingContainerType" minOccurs="1"/>
                        </xs: choice>
                                <xs: any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded"/>
                </xs: sequence>
                <xs: attribute name="ratingScheme" type="xs:anyURI" use="required" />
                <xs: anyAttribute processContents="skip"/>
        </xs: complexType>

<xs: complexType name="RatingContainerType">
        <xs: sequence>
                <xs: any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
        </xs: sequence>
        <xs: anyAttribute processContents="skip"/>
</xs: complexType>

<xs: element name="ATSC3ServiceExtension" type="sa:ATSC3ServiceExtensionType" >
        <xs: annotation>
                <xs: documentation>
This element is a wrapper for ATSC service extensions to OMA BCAS T SG Service fragments. It shall only be
used inside a PrivateExt element within a Service fragment.
                </xs: documentation>
        </xs: annotation>
</xs: element>

<xs: complexType name="ATSC3ServiceExtensionType">
        <xs: sequence>
                <xs: element name="Icon" minOccurs="0" maxOccurs="unbounded">
                        <xs: complexType>
                                <xs: simpleContent>
                                        <xs: extension base="xs:anyURI">
                                                <xs: attribute name="MIMEType" type="xs:string" use="optional" />
                                                <xs: attribute name="width" type="xs:unsignedInt" use="optional" />
                                                <xs: attribute name="height" type="xs:unsignedInt" use="optional" />
                                                <xs: attribute name="dataSize" type="xs:unsignedInt" use="optional" />
                                                <xs: anyAttribute processContents="skip"/>
                                        </xs: extension>
                                </xs: simpleContent>
                        </xs: complexType>
                </xs: element>

```

```

<xs:element name="MajorChannelNum" type="sa:LangString" minOccurs="0" maxOccurs="1" />
<xs:element name="MinorChannelNum" type="sa:LangString" minOccurs="0" maxOccurs="1" />
<xs:element name="RatingRegionTables" type="rrt:RRsType" minOccurs="0" maxOccurs="1" />
<xs:any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded" />
</xs:sequence>
</xs:complexType>

```

```
<xs:element name="Components" type="sa:ComponentsType" >
```

```
<xs:annotation>
```

```
<xs:documentation>
```

This element is a wrapper for ATSC media extensions to OMA BCASST SG Content fragments. It shall only be used inside a PrivateExt element within a Content fragment.

```
</xs:documentation>
```

```
</xs:annotation>
```

```
</xs:element>
```

```
<xs:complexType name="ComponentsType">
```

```
<xs:sequence>
```

```
<xs:element name="VideoComponent" type="sa:IndividualComponentType" minOccurs="0"
maxOccurs="unbounded" />
```

```
<xs:element name="AudioComponent" type="sa:IndividualComponentType" minOccurs="0"
maxOccurs="unbounded" />
```

```
<xs:element name="CCComponent" type="sa:IndividualComponentType" minOccurs="0"
maxOccurs="unbounded" />
```

```
<xs:element name="AppComponent" type="sa:IndividualComponentType" minOccurs="0"
maxOccurs="unbounded" />
```

```
<xs:any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded" />
```

```
</xs:sequence>
```

```
<xs:anyAttribute processContents="skip" />
```

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

```
<xs:complexType name="IndividualComponentType">
```

```
<xs:complexContent>
```

```
<xs:extension base="sa:LangString">
```

```
<xs:attribute name="language" type="xs:string" use="optional" default="en" />
```

```
<xs:anyAttribute processContents="skip" />
```

```
</xs:extension>
```

```
</xs:complexContent>
```

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

```
<xs:complexType name="LangString">
```

```
<xs:simpleContent>
```

```
<xs:extension base="xs:string">
```

```
<xs:attribute ref="xml:lang" use="optional" default="en" />
```

```
<xs:anyAttribute processContents="skip" />
```

```
</xs:extension>
```

```
</xs:simpleContent>
```

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

```
<xs:element name="ContentIcon" >
```

<xs:annotation><xs:documentation>This element is only used inside a PrivateExt element within a Content fragment as defined in Table 5.7 and its cardinality is defined in Table 5.9.


```

</xs:documentation></xs:annotation>
  <xs:complexType>
    <xs:simpleContent>
      <xs:extension base="xs:anyURI">
        <xs:attribute name="MIMEType" type="xs:string" use="optional" />
        <xs:attribute name="width" type="xs:unsignedInt" use="optional" />
        <xs:attribute name="height" type="xs:unsignedInt" use="optional" />
        <xs:attribute name="dataSize" type="xs:unsignedInt" use="optional" />
        <xs:anyAttribute processContents="skip"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
</xs:element>

<xs:element name="Preview" type="sa:PreviewType" />
  <xs:complexType name="PreviewType">
    <xs:sequence>
      <xs:element name="PreviewIcon" minOccurs="0" maxOccurs="unbounded">
        <xs:complexType>
          <xs:simpleContent>
            <xs:extension base="xs:anyURI">
              <xs:attribute name="MIMEType" type="xs:string" use="optional" />
              <xs:attribute name="width" type="xs:unsignedInt" use="optional" />
              <xs:attribute name="height" type="xs:unsignedInt" use="optional" />
              <xs:attribute name="dataSize" type="xs:unsignedInt" use="optional" />
              <xs:anyAttribute processContents="skip"/>
            </xs:extension>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
      <xs:element name="Description" type="sa:NameDescriptionType" minOccurs="1"
maxOccurs="unbounded"/>
      <xs:element name="PreviewContent" minOccurs="0" maxOccurs="unbounded">
        <xs:complexType>
          <xs:simpleContent>
            <xs:extension base="xs:anyURI">
              <xs:attribute name="MIMEType" type="xs:string" use="optional" />
              <xs:attribute name="width" type="xs:unsignedInt" use="optional" />
              <xs:attribute name="height" type="xs:unsignedInt" use="optional" />
              <xs:attribute name="dataSize" type="xs:unsignedInt" use="optional" />
              <xs:anyAttribute processContents="skip"/>
            </xs:extension>
          </xs:simpleContent>
        </xs:complexType>
      </xs:element>
      <xs:any namespace="##other" processContents="skip" minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
    <xs:attribute name="usage" type="xs:string" use="optional" default="promo"/>
    <xs:anyAttribute processContents="skip"/>
  </xs:complexType>

```

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

End of Document