



Service Discovery and Programme Metadata for DVB-I

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Foreword

The DVB Project is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulators and others from around the world committed to designing open, interoperable technical specifications for the global delivery of digital media and broadcast services. DVB specifications cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. The consortium came together in 1993.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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Introduction

DVB-I represents the intersection of linear broadcast television and internet media streaming, offering the possibility for linear television services to be delivered to internet connected devices. The present document defines the mechanisms to be used to find sets of linear television services delivered through broadband or broadcast mechanisms as well as methods to retrieve electronic programme data for those services.

1 Scope

The present document defines the following:

- signalling of linear TV or radio services and content that are delivered over broadband;
- access linear TV services that are delivered by broadband in a way that is consistent with their access to linear TV services delivered by RF-based DVB technologies;
- the metadata and mechanisms to present electronic programme guides;
- the integration of linear services delivered by the RF-based DVB tuner and linear services delivered by broadband into a single coherent offering that is accessed through a single consistent UI; and
- a method for national TV regulators or their representatives, operators and trademark licensors to offer a list of trusted/legitimate/authorized/regulated services.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- | | |
|-----|--|
| [1] | ETSI TS 103 285: "Digital Video Broadcasting (DVB); MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks". |
| [2] | CI Plus™ specification (V1.3.2): "Content Security Extensions to the Common Interface". |
| [3] | IETF RFC 4151: "The 'tag' URI Scheme". |
| [4] | ETSI TS 102 034: "Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks". |
| [5] | ETSI TS 102 809: "Digital Video Broadcasting (DVB); Signalling and carriage of interactive applications and services in Hybrid broadcast/broadband environments". |
| [6] | ETSI EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems". |
| [7] | ETSI TS 102 822-3-1: "Broadcast and On-line Services: Search, select, and rightful use of content ("TV-Anytime"); Part 3: Metadata; Sub-part 1: Phase 1 - Metadata schemas". |
| [8] | ISO/IEC 646: "Information technology - ISO 7-bit coded character set for information interchange". |
| [9] | National Imagery and Mapping Agency Technical Report 8350.2, Third Edition, 3 January 2000. |

NOTE: Available at <http://earth-info.nga.mil/GandG/publications/tr8350.2/wgs84fin.pdf>.

- [10] EN 50585: "Communications protocol to transport satellite delivered signals over IP networks", (2014-05) (produced by CENELEC).
 - [11] ETSI TS 101 162: "Digital Video Broadcasting (DVB); Allocation of identifiers and codes for Digital Video Broadcasting (DVB) systems".
 - [12] void.
 - [13] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".
 - [14] IETF RFC 9110: "HTTP Semantics".
 - [15] IETF RFC 9111: " HTTP Caching".
 - [16] ETSI TS 102 851: "Digital Video Broadcasting (DVB); Uniform Resource Identifiers (URI) for DVB Systems".
 - [17] ISO 639-2: "Codes for the representation of names of languages -- Part 2: Alpha-3 code".
 - [18] ISO 639-3: "Codes for the representation of names of languages -- Part 3: Alpha-3 code for comprehensive coverage of languages".
 - [19] ISO 8601-1: "Date and time -- Representations for information interchange -- Part 1: Basic rules".
 - [20] ISO/IEC 15938-5: "Information technology -- Multimedia content description interface -- Part 5: Multimedia description schemes".
 - [21] ETSI TS 102 796: "Hybrid Broadcast Broadband TV".
 - [22] ETSI TS 101 154: "Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcast and Broadband Applications".
 - [23] ISO/IEC 23001-7:2016, "Information technology -- MPEG systems technologies -- Part 7: Common encryption in ISO base media format files".
 - [24] void.
 - [25] IETF RFC 8446: "The Transport Layer Security (TLS) Protocol Version 1.3".
 - [26] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".
 - [27] IETF RFC 1918: "Address Allocation for Private Internets".
 - [28] ETSI TS 102 323: "Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams".
 - [29] W3C Recommendation: "HTML 5.1 2nd Edition".
- NOTE: Available at <https://www.w3.org/TR/html51/>.
- [30] IETF RFC 5646: (BCP 47) "Tags for Identifying Languages".
 - [31] IETF RFC 2397: "The 'data' URL Scheme".
 - [32] ETSI TS 103 205: "Digital Video Broadcasting (DVB); Extensions to the CI Plus™ Specification"
 - [33] CI Plus Specification v1.4.4 (2021-09): "Content Security Extensions to the Common Interface".
 - [34] DVB A184: "Implementation Guidelines for DVB-I"
 - [35] ETSI EN 302 307-2: "Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 2: DVB-S2 Extensions (DVB-S2X)"

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TS 103 769: "Digital Video Broadcasting (DVB); Adaptive media streaming over IP multicast".
 - [i.2] EN 50494: "Satellite signal distribution over a single coaxial cable in single dwelling installations" (produced by CENELEC).
 - [i.3] EN 50607: "Satellite signal distribution over a single coaxial cable - Second generation" (produced by CENELEC).
 - [i.4] List of EU Audiovisual Regulators - Audiovisual and Media Services Directive (AVMSD).
- NOTE: Available at <https://ec.europa.eu/digital-single-market/en/list-eu-audiovisual-regulators>.
- [i.5] W3C Recommendation: "Encrypted Media Extensions".
- NOTE: Available at <https://www.w3.org/TR/encrypted-media/>.
- [i.6] W3C Recommendation: "XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes".
- NOTE: Available at <https://www.w3.org/TR/xmlschema11-2/>.
- [i.7] W3C Recommendation: "XML Schema Definition Language (XSD) 1.1 Part 1: Structures".
- NOTE: Available at <https://www.w3.org/TR/xmlschema11-1/>.
- [i.8] ISO 3166: "Country Codes".
 - [i.9] ETSI TS 101 547-2: "Digital Video Broadcasting (DVB); Plano-stereoscopic 3DTV; Part 2: Frame Compatible Plano-stereoscopic 3DTV".
 - [i.10] ETSI TS 101 547-4: "Digital Video Broadcasting (DVB); Plano-stereoscopic 3DTV; Part 4: Service frame compatible Plano-stereoscopic 3DTV for HEVC coded services".
 - [i.11] Digital UK: "Freeview Play Business-to-Consumer Metadata Specification".
- NOTE: Additional information is available at <https://www.freeview.co.uk/corporate/platform-management/what-we-do>.
- [i.12] CTA-5001-B: "Web Application Video Ecosystem – Content Specification".
 - [i.13] IETF RFC 8216: "HTTP Live Streaming".
 - [i.14] CTA-5005: "Web Application Video Ecosystem – DASH-HLS Interoperability Specification".
 - [i.15] Directive (EU) 2018/1808 of the European Parliament and of the Council of 14 November 2018 amending Directive 2010/13/EU on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provision of audiovisual media services (Audiovisual Media Services Directive) in view of changing market realities.

NOTE: Available at <https://eur-lex.europa.eu/eli/dir/2018/1808/oj>.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 103 285 [1] and the following apply:

DVB-I client: implementation of the client side of the present document

NOTE: This may be integrated into the User Interface (UI) of a device such as a television or set-top box or part of an app on devices such as mobile phones or tablets.

DVB-I service: any service which is discovered using the mechanisms defined in the present document, and which is available using one or more delivery systems including at least DVB-DASH (ETSI TS 103 285 [1]) as well as traditional DVB broadcast

DVB-I service instance: single delivery mechanism with related information for the audiovisual content in a DVB-I service.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ABNF	Augmented Backus-Naur Form
ABR	Adaptive Bit Rate
AES	Advanced Encryption Standard
AIT	Application Information Table
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
AVC	Advanced Video Coding
BAT	Bouquet Association Table
CA	Conditional Access
CBC	Cypher Block Chaining
CCM	Constant Coding and Modulation
CDN	Content Delivery Network
CGSID	Content Guide Source Identifier
CI	Common Interface
CICAM	Common Interface Conditional Access Module
CRID	Content Reference Identifier
CS	Classification Scheme
CSR	Central SLR
DASH	Dynamic Adaptive Streaming over HTTP
DLNA	Digital Living Network Alliance
DNS	Domain Name System
DRM	Digital Rights Management
DVB-C	Digital Video Broadcasting - Cable
DVB-I	Digital Video Broadcasting - Internet
DVB-S	Digital Video Broadcasting - Satellite
DVB-SI	Digital Video Broadcasting - Service Information
DVB-T	Digital Video Broadcasting - Terrestrial
EBU-TT	European Broadcasting Union-Timed Text
EIT	Event Information Table

EME	Encrypted Media Extensions
EPG	Electronic Programme Guide
EU	European Union
FEC	Forward Error Correction
FEPG	Forward Electronic Program Guide
FM	Frequency Modulation
FTA	Free To Air
GIF	Graphics Interchange Format
HbbTV®	Hybrid Broadcast Broadband Television

NOTE: HbbTV® is a registered trademark of HbbTV Association.

HD	High Definition
HDMI	High-Definition Multimedia Interface
HDR	High Dynamic Range
HEVC	High Efficiency Video Coding
HLS	HTTP Live Streaming
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Secure
ID	Identifier
IETF	Internet Engineering Task Force
IGMP	Internet Group Management Protocol
IP	Internet Protocol
IPTV	Internet Protocol Television
ISAN	International Standard Audiovisual Number
ISO	International Organization for Standardization
ISP	Internet Service Provider
JPEG	Joint Photographic Experts Group
LCN	Logical Channel Numbering
LNB	Low Noise Block
MIME	Multipurpose Internet Mail Extensions
MPD	Media Presentation Description
MPEG	Moving Picture Experts Group
NGA	Next Generation Audio
NGO	Non-Governmental Organization
NIT	Network Information Table
NVOD	Near Video on Demand
ONID	Original Network Identifier
OSDT	Online Service Description Table
OTT	Over The Top
PIN	Personal Identification Number
PMT	Program Map Table
PNG	Portable Network Graphics
QR	Quick Response code
RF	Radio Frequency
RFC	Request For Comment
RTSP	Real Time Streaming Protocol
SAT>IP®	SATellite over Internet Protocol

NOTE: SAT>IP® is a registered trademark of the SAT>IP Alliance.

SD	Standard Definition
SDT	Service Description Table
SI	Service Information
SID	Service Identifier
SLR	Service List Registry

SP	Service Provider
SRS	Server-side Region Selection
STB	Set Top Box
TCP	Transport Control Protocol
TLS	Transport Layer Security
TOT	Time Offset Table
TS	Transport Stream
TSID	Transport Stream Identifier
TV	Television
UDP	User Datagram Protocol
UHD	Ultra High Definition
UI	User Interface
UK	United Kingdom
URI	Uniform Resource Identifier
URL	Universal Resource Locator
URN	Universal Resource Name
USB	Universal Serial Bus
UTC	Coordinated Universal Time
UTF-8	Unicode Transformation Format, 8 bit
VCM	Variable Coding and Modulation
VoD	Video on Demand
XML	eXtensible Markup Language

4 Architecture and System Considerations

4.1 DVB-I components and interfaces

Figure 1 below shows a simplified view of DVB-I components and the interfaces between them. Some missing elements include:

- i. CDNs;
- ii. service list server discovery;
- iii. encoding of the video and audio streams;
- iv. distributing video and audio streams from the content/service provider to the stream servers; and
- v. integration with classical DVB cable, satellite and terrestrial broadcasting.

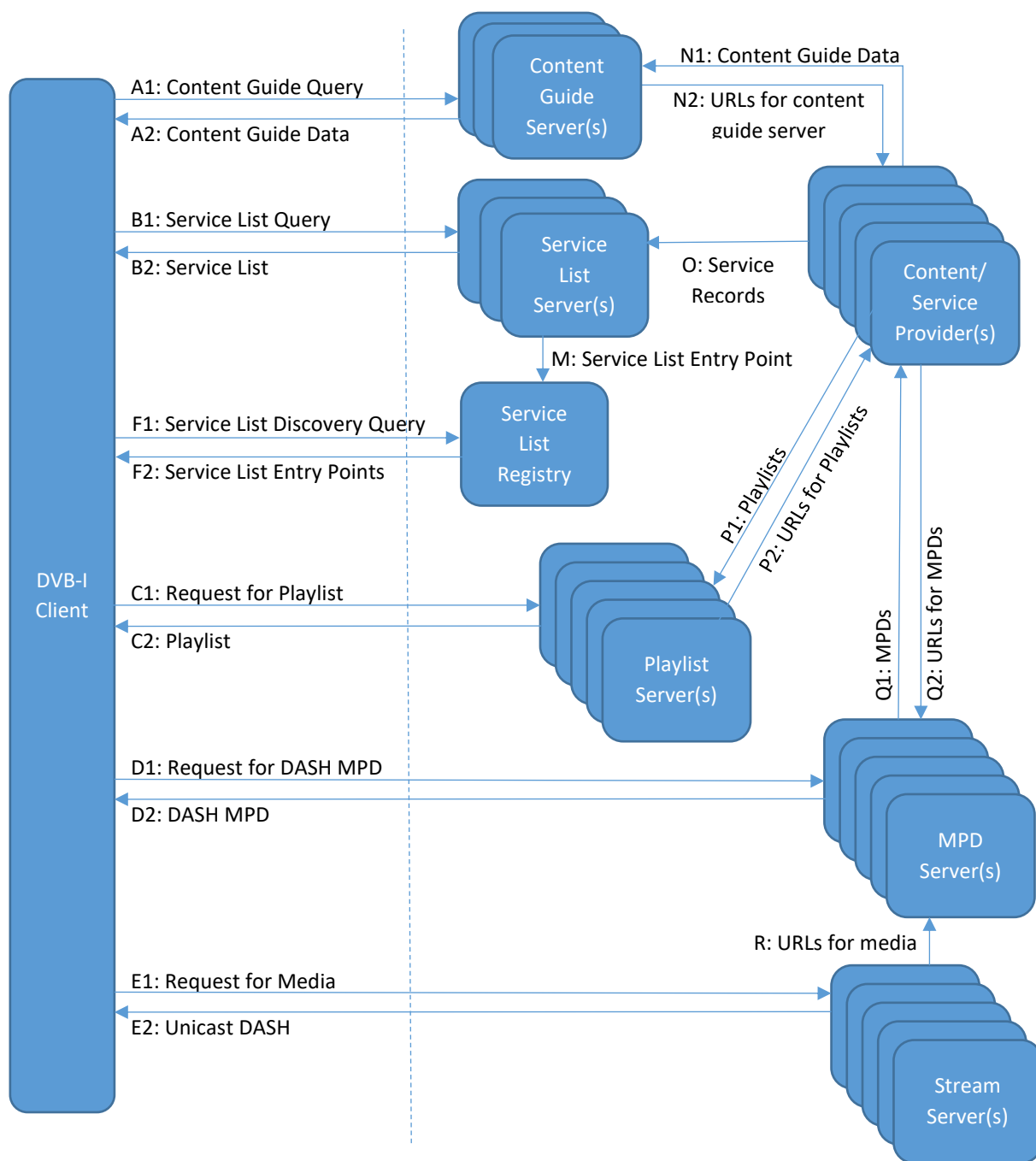


Figure 1: Simplified example DVB-I components and interfaces

Here is more detail on the components and interfaces.

- **DVB-I client:** A DVB-I client.
- **Service List Registry:** A function that provides the DVB-I client with a list of Service List Servers based on the provided query parameters (if any).
- **Service List Server(s):** One or more servers delivering service lists to a DVB-I client. An individual service list may contain services from multiple content/service providers.

NOTE 1: This is only one of 3 possible phases of service aggregation. A DVB-I client may offer a choice of service list servers or may aggregate service lists from multiple service list servers, see clause E.2. Some devices may support multiple instances of the DVB-I client.

- **Content Guide Server(s):** These respond to requests from a DVB-I client for content guide data. The content guide server(s) for an individual service are referenced in the service list entry for that service.
- **Content/Service Provider(s):** Organizations providing DVB-I services.
- **Playlist Server(s):** These provide the playlist for services that reference a playlist of (DVB-DASH) content items rather than directly referencing a single DASH MPD.
- **MPD Server(s):** These provide DASH MPDs.

NOTE 2: The MPD that is returned may be personalized to a specific end-user. This would imply additional interfaces omitted from this simple diagram for authenticating individual users or other forms of personalization.

- **Stream Server(s):** The server, including Multicast Gateways as defined in ETSI TS 103 769 [i.1], that delivers DASH media segments to a DVB-I client.
- **Multicast Server:** Outside the scope of the present document but shown here for information, is a server for adaptive-bitrate multicast.
- **Multicast Gateway:** Outside the scope of the present document but shown here for information, is a gateway for adaptive-bitrate multicast.
- **A1:** Content guide query: A request from a DVB-I client to a content guide server for some content guide data. See clause 6.
- **A2:** Content guide data: Content guide data in the format defined by the present document. See clause 6.
- **B1:** Service list query: A request from a DVB-I client to a service list server for a service list. The DVB-I client may ask for an entire service list and perhaps filter the service list locally and/or provide information enabling the service list server to provide an already filtered list.
- **B2:** A service list in the format defined by the present document. See clause 5.5.1.
- **C1:** Request for playlist: An HTTP GET request.
- **C2:** Playlist: A playlist in the format defined by the present document. See clause 5.2.7.
- **D1:** Request for DASH MPD: An HTTP GET request.
- **D2:** DASH MPD: DASH MPDs according to ETSI TS 103 285 [1].
- **E1:** Request for media: HTTP GET requests.
- **E2:** Unicast DASH: According to ETSI TS 103 285 [1].
- **F1:** Request to determine the entry point(s) of Service List Server(s). The request may support a query argument to perform subselection in the Service List Discovery function. See clause 5.1.3.2.
- **F2:** A list of Service List Entry Points that match the request criteria. See clause 5.3.2.
- **N1:** Content guide data: Content guide data that may be in the format defined by the present document.
- **N2:** URLs for content guide server: URLs for the content guide data for each of a content/service provider's services to be included in the corresponding service list entry for the service (interface O).
- **M:** Registration of the Service List Entry Points for the Service List Servers.
- **O:** Service records: Data on the services provided by a single content/service provider. These may be in the format for service lists defined by the present document.
- **P1:** Playlists: Playlists that may be in the format defined by the present document.

- **P2:** URLs for playlists: URLs for playlists to be included in the corresponding service list entry for the service (interface O).
- **Q1:** DASH MPDs that may be according to ETSI TS 103 285 [1].
- **Q2:** URLs for DASH MPDs to be included in either the service list entry for a service (interface O) or the playlist for a service (interface P1).
- **R:** URLs for media: URLs for the media to be included in DASH MPDs. These may be defined by an operational interface, (e.g. a naming convention) rather than a technical interface.

Interfaces A1, A2, B1, B2, C1, C2, F1 and F2 are defined in the present document. Interfaces D1, D2, E1 and E2 are required by the present document but defined in ETSI TS 103 285 [1]. Interfaces N1, N2, O, P1, P2, Q1, Q2 and R may re-use formats defined for interfaces A1, A2, B1, B2, C1, C2, D1 and D2 but this is not required.

4.2 Conceptual model of a DVB-I client

Figure 2 illustrates a conceptual model of a hypothetical DVB-I client.

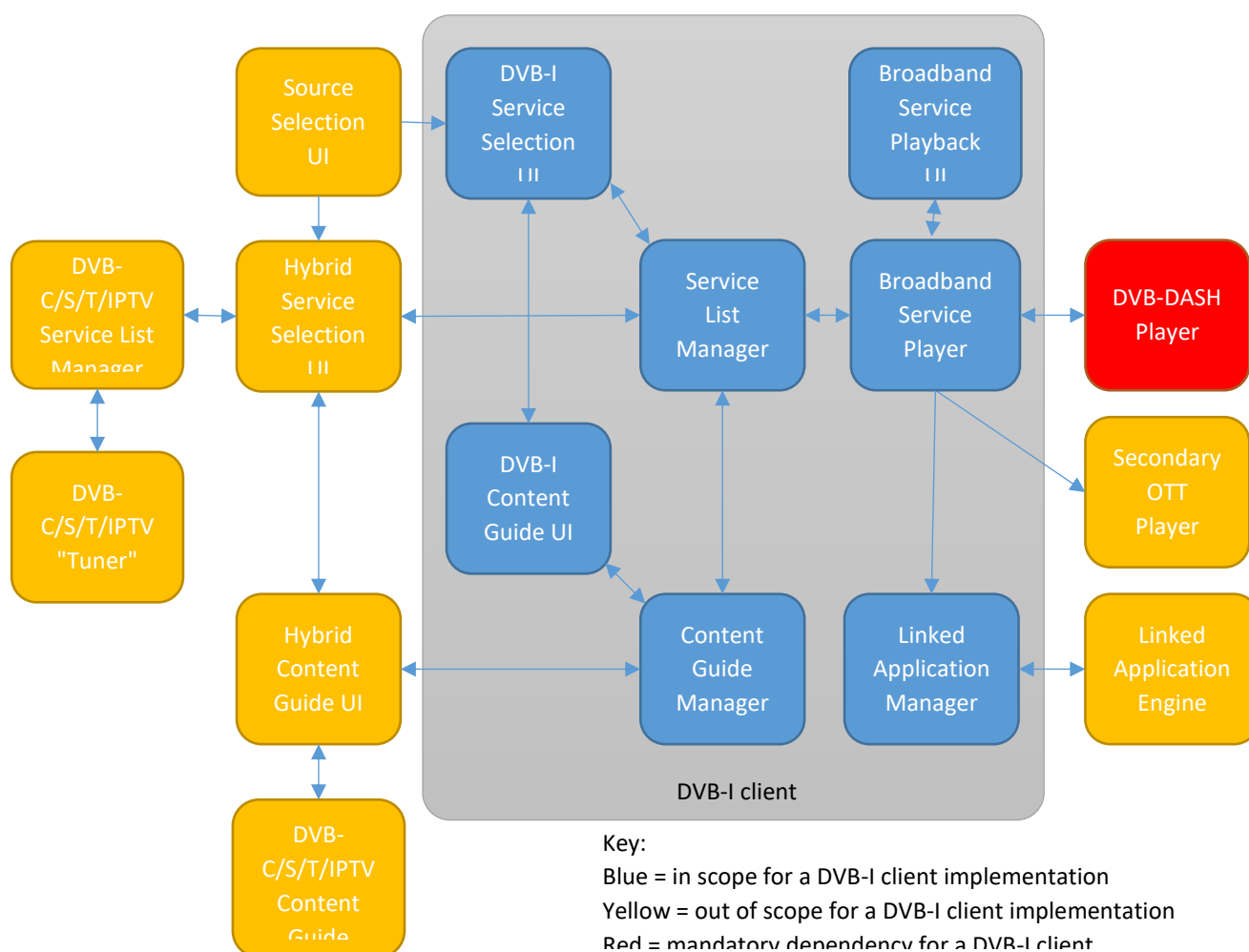


Figure 2: Conceptual model of a DVB-I client

Here is more detail on the components.

- **Source selection UI:** Devices hosting a DVB-I client will typically have some kind of UI allowing the user to choose between one or more inputs, sources or apps.
A device may support more than one DVB-I client (e.g. multiple apps).
A single DVB-I client may appear in this UI as more than one input or source (e.g. with different branding and

showing different service lists).

Some inputs or sources may combine DVB-I channels with DVB-C/S/T channels and/or IPTV channels.

This may be the same UI that allows users to choose inputs or sources completely unrelated to DVB-I such as HDMI or DLNA or global content providers.

- **DVB-I service selection UI:** The DVB-I client may include a UI that enables users to view a list of services and choose/change between them. Note that some DVB-I client implementations may not include such a UI and may rely on a hybrid service selection UI.
- **Hybrid service selection UI:** DVB-I services may be included in a single common service selection UI with DVB-C/S/T/IPTV channels (including potentially DVB-C/S/T services accessed via SAT>IP instead of a local tuner).
- **Service list manager:** This is responsible for discovering and querying service list server(s) and handling the service list(s) that are returned (interfaces B1 and B2 in figure 1). When a DVB-I service is selected, it is responsible for instructing the service player to play the service.
- **DVB-C/S/T/IPTV service list manager:** This is the function in a DVB-C/S/T or IPTV device that obtains service lists and presents services from those lists when they are selected. Some examples of what could be included include RF channel scans, tuning to a "homing mux" and acquiring a DVB-SI SDT or obtaining the (proprietary) list of channels used by a particular IPTV technology. This may potentially include DVB-C/S/T services available via SAT>IP.
- **DVB-I content guide UI:** The DVB-I client may include a UI that enables users to access information about the content in the services included in the service selection UI. Note that some DVB-I client implementations may not include such a UI and may rely on a hybrid content guide UI.
- **Hybrid content guide UI:** Information about content carried in DVB-I services may be included in a single common content guide UI with information about content carried in DVB-C/S/T/IPTV channels (including potentially DVB-C/S/T services accessed via SAT>IP instead of a local tuner).
- **Content guide manager:** This is responsible for accessing content guide server(s) and handling the content guide data that is returned (interfaces A1 and A2 in figure 1). There is no assumption that this caches content guide data on the DVB-I client in the same way that content guide data would be cached in a broadcast device. This functionality could be fully integrated into the DVB-I content guide UI (or hybrid content guide UI) without being a separate component.
- **DVB-C/S/T/IPTV content guide manager:** This is the function in a DVB-C/S/T or IPTV device which obtains and caches content guide data for the DVB-C/S/T or IPTV channels.
- **Broadband service player:** This is responsible for the complete lifecycle of playback of a service delivered on a broadband network. It controls the DVB-DASH player, any secondary OTT players and the linked application manager as appropriate. For services where the media content is described by a playlist, this is responsible for processing the playlist.
- **Broadband service playback UI:** Playback of broadband delivered services will need some kind of UI for features like playback control within the timeshift buffer, audio track selection, subtitle control and parental access control. It may also be used to present status/response codes from the DVB-DASH player. For broadcast services, this would typically already exist and hence be outside the scope of the DVB-I client. For DVB-DASH services, this could be part of the DVB-DASH player or of the DVB-I client - the latter of these is shown here.

NOTE: For a hybrid DVB-I client, a better user experience may result if the same look and feel is used for UIs related to DVB-DASH service presentation/playback and UIs related to broadcast service presentation/playback. While using the same UI implementation is possible in theory, in practice this may be unrealistically complex. Alternatively a broadband service playback UI could copy the look and feel of the equivalent UI used when broadcast services are being presented.

- **DVB-DASH player:** This is responsible for playing DVB-I services where the content is delivered by DVB-DASH. This interfaces D1, D2, E1, E2 in figure 1.
- **Secondary OTT player:** DVB-I service lists may include references to content that is (also) available OTT by means other than DVB-DASH. A DVB-I client may be able to interface to a player for non-DVB-DASH OTT content.
- **DVB-C/S/T/IPTV "Tuner":** This is responsible for playing DVB-C/S/T/IPTV services when these are selected. This could potentially include DVB-C/S/T services accessed via SAT>IP instead of a local tuner.
- **Linked application manager:** Where a service includes a linked application, this is responsible for identifying if (a version of) the application can be presented and if so, interfacing to the appropriate engine to make the presentation happen. Note that some services may require a linked application to be started before the video and audio of the service are presented.
- **Linked application engine:** This is responsible for running applications linked to a service that is being presented. For example, an HbbTV engine on a television set or an HTML5 webview on a phone or tablet or personal computer.

This model is purely informative and the architecture of an actual DVB-I client implementation may be completely different.

4.3 HTTP Requests

4.3.1 Introduction

This section describes the HTTP Requests and HTTP Error handling for all DVB-I endpoints: ServiceList Registries, ServiceLists, all Content Guide Server endpoints, Content Provider XML AIT Server, playlists and images.

The dialogue between the DVB-I client and ServiceList endpoints will differ where multiple ServiceList URIs have been defined in a ServiceListOffering.

4.3.2 HTTP Request Headers

4.3.2.1 Cache-Control Headers

The DVB-I client shall follow the cache control requirements in clause 7.3.2.6 of ETSI TS 102 796 [21].

For all responses to the DVB-I endpoints listed in clause 4.1, the lifetime of responses may be defined by a `Cache-Control: max-age` header (as defined in IETF RFC 9111 [15]). The DVB-I client shall honour this header when present and ensure that when repeating a request, the response is retrieved from the local cache if the object has not expired. This header shall be honoured when present. The expiration may be defined dynamically by a DVB-I endpoint, so the header shall be checked on the response to each request.

If the `max-age` header is present, the DVB-I client shall only request updates after the duration signalled in the header has passed. In this respect, the DVB-I client is not expected to implement a predefined update frequency, but instead rely upon the expiration information to provide a dynamic update frequency per-request. The DVB-I client shall honour the `max-age` header, where present, while the DVB-I client is powered on, and should continue to honour the header over reboots if IP delivered metadata is cached in non-volatile storage.

Different durations of expiry may be dynamically defined by a Content Guide Server depending on the specific endpoint and query called, and potentially to adapt to server load. Different queries to a single endpoint method (for example Schedule queries for various time periods) may be assigned differing expiry durations by a DVB-I endpoint, depending on the content. These shall be honoured individually. For example, the Now/Next Schedule end-point may provide a very short `max-age` if the Content Guide Server is able to update the information based on dynamic content playout integration. This allows the client to poll the Now/Next schedules end-point more frequently (see clause 6.5.3.2).

Where a specific response does not include a `max-age` header the DVB-I client may apply its standard caching behaviour.

Example header:

```
Cache-Control: max-age=3600
```

4.3.2.2 If-Modified-Since Headers

All HTTP requests to DVB-I endpoints listed in clause 4.1 shall include an `If-Modified-Since` header as defined in clause 13.1.3 of IETF RFC 9110 [14], specifying the time of the last update for the specific request. In the case that the requested resource has not changed since the last update, a 304 (Not Modified) response may be returned and the DVB-I client should continue to cache the existing data. If the requested resource has changed since the last update, then a 200 (OK) response shall be returned. The body of this response shall be used to update the cached data and the `Last-Modified` time in the response header, if present, should be held to use in the `If-Modified-Since` header of future requests for the same document.

In the scenario where a previous `Last-Modified` time is not available (e.g. upon device boot or restart, or where not provided in a previous response) then the `If-Modified-Since` header shall be omitted from the request and a DVB-I endpoint shall respond as per a standard GET request.

Example header:

```
If-Modified-Since: Wed, 19 Jun 2019 19:43:31 GMT
```

4.3.3 HTTP Responses

4.3.3.1 Introduction

The DVB-I endpoints listed in clause 4.1 are usually accessed by a client in a non-interactive way so this section describes the autonomous behaviour of a client when it receives the following types of HTTP response.

4.3.3.2 400 (Bad Request), 406 (Not Acceptable)

When received on a request to any DVB-I endpoint listed in clause 4.1 the DVB-I client shall not retry the same request and deem it to have failed.

4.3.3.3 401 (Authentication Required), 403 (Forbidden)

This response shall only be used where the DVB-I endpoints listed in clause 4.1 requires client authentication. The manner of authentication is outside the scope of the present document.

In the case where the request was made to a `ServiceList` endpoint and more than one `ServiceListURI` is defined in a `ServiceListOffering` the DVB-I Client shall attempt to make a connection to the next listed URI.

When received on a request to any DVB-I endpoint, the DVB-I client shall wait the period defined by the `Retry-After` header of the response and then attempt to re-authenticate. If no `Retry-After` header is provided the DVB-I client should attempt to re-authenticate immediately.

4.3.3.4 404 (Not Found)

If a 404 (Not Found) HTTP response code is received on a request to a `ServiceList` Registry or `ServiceList` endpoint and the DVB-I client fails to acquire the Service List then it should attempt to restart service discovery and/or notify the user.

In the case where the request was made to a `ServiceList` endpoint, a 404 (Not Found) HTTP response code is received and more than one `ServiceListURI` is defined in a `ServiceListOffering` the DVB-I Client shall attempt to make a connection to the next listed URI.

If a 404 (Not Found) HTTP response code is received on a request to any API URL listed in the `ContentGuideSource` object (see clause 5.5.7) then the client shall re-acquire the Service List (see clause 5.5.1), in order to re-acquire the `ContentGuideSource`. If a 404 (Not found) HTTP response is still received after re-acquiring the Service List the receiver shall use the back-off timing model described in clause 4.3.3.7. If the DVB-I client fails to acquire the Service List then it should attempt to restart service discovery and/or notify the user.

If a 404 (Not Found) HTTP response code is received on a request to an image server, playlist server or Content Provider XML AIT server the DVB-I client shall not retry the request and deem it to have failed.

4.3.3.5 500 (System Error), 502 (Bad Gateway), 504 (Gateway Timeout), Connection Failure

When occurring on any request to any DVB-I endpoint listed in clause 4.1 the DVB-I client may retry the request, but in doing so shall not retry the request at a rate faster than that defined by the back-off mechanism as described in clause 4.3.3.7. The DVB-I client may continue to retry until powered off and shall attempt to re-authenticate (if authentication is provided) before each retry.

In the case where the request was made to a `ServiceList` endpoint and more than one `ServiceListURI` is defined in a `ServiceListOffering` the DVB-I Client shall attempt to make a connection to the next listed URI.

4.3.3.6 301 (Moved Permanently) or 302 (Moved Temporarily) Response followed by 4xx or 5xx Response

If a 301 (Moved Permanently) or 302 (Moved Temporarily) redirect subsequently results in a 40x or 50x HTTP response code on any request to any DVB-I endpoint listed in clause 4.1 the DVB-I client shall deem the request to have failed.

In the case where the request was made to a `ServiceList` endpoint and more than one `ServiceListURI` is defined in a `ServiceListOffering` the DVB-I Client shall attempt to make a connection to the next listed URI.

4.3.3.7 Back-off algorithm

This clause describes the back-off algorithm to be used under situations covered in some of the preceding clauses when certain HTTP status code responses are received.

When the back-off mechanism is required, the DVB-I client shall wait for a random period before retrying the request, where the random period in milliseconds is between `minwait` and `maxwait` values given by:

$$\text{minwait} = 4^{\text{CurrentRetry}-1} \times 100 \text{ ms}$$

$$\text{maxwait} = 4^{\text{CurrentRetry}} \times 100 \text{ ms}$$

where:

- `CurrentRetry` has the value 1 after the first failure and increments for each failed retry up to a maximum value of 10

This algorithm therefore waits up to 400ms before the first retry, up to 1 600 ms before the second, and so on. In all cases once the value of `CurrentRetry` reaches 10 it shall not be incremented any further and the maximum retry period of 104 857 600 ms shall continue to be used for subsequent retries.

The retry count shall be reset when the device is powered off or restarted and does not need to be persisted.

5 Service Discovery

5.1 Concepts

5.1.1 Services

A DVB-I service is one which is discovered using the present document and which is available via one or more delivery mechanisms, called service instances, including DVB-DASH and traditional DVB broadcast. Such a DVB-I service:

- may be delivered over an IP network, either with or without ABR multicast, etc., or it may be replicated by DVB services delivered over existing DVB networks;
- may also be received by devices that do not have a DVB broadcast tuner, including mobile devices and others;
- may only be accessible under certain conditions (location, rating restrictions, conditional access, subscription, etc.);
- may be linear or on-demand;
- may include video, audio and subtitle components;
- may include access services;
- may have linked applications (similar to AIT in broadcast delivery);
- may be consumed on devices that have DVB tuners including DVB-T/S/C/IPTV as well as SAT>IP.

5.1.2 Service Lists

The DVB-I client accesses information about services through Service Lists.

Service Lists are published by Service List Providers. A Service List typically lists services from many content providers. The role of the Service List Provider is to curate and manage the Service List and provide service ordering and numbering information for ease of selection by users, particularly on television-like devices. It is also possible for a content provider to act as a Service List Provider themselves and publish a Service List containing only their own services.

A Service List Provider may target a Service List at a particular platform brand, geographical region, language or other market segment, or none of these.

The DVB-I client may choose and use Service Lists in many ways. For example:

- Clients marketed under a particular platform brand may make use of a single Service List for that platform.
- Clients may offer several Service Lists for the user to choose between, presenting the user with a view of services from only one Service List at any one time.
- Clients may make use of several Service Lists and combine them to provide the user with one set of services, with or without filtering options.

Each Service has a unique identifier that a client can use to determine if a service in one Service List is the same as a service in another. However, ordering and numbering information is only provided within the context of a specific Service List and any client wishing to combine Service Lists will need to consider how to order (and if appropriate, number) the combined list. How this is done is outside the scope of the present document.

A Service List shall be made available using HTTP according to clause 7.3 at a Service List URL, using the Media Type (MIME type) `application/vnd.dvb.dvbisl+xml`.

Some examples of how service lists may be used by the DVB-I client are provided in clause E.2.

5.1.3 Service List Discovery

5.1.3.1 Client options for service list discovery

A DVB-I client requires a means to find one or more Service Lists. This is referred to as Service List Discovery.

DVB-I supports three principal approaches to Service List Discovery:

- The client may have one or more built-in or privately provisioned Service List URLs for the specific Service List(s) that the client wishes to offer to the user.
- The client may make use of one or more Service List Registries.
- The client may obtain the Service List URL or the service list from the CICAM.

In all cases, a Service List (or Service Lists) may be selected using knowledge of the user's geographical location or language preferences, or by offering the user a choice, or by the users CICAM.

A Service List Registry is an HTTP endpoint made available at a Service List Registry URL that can return a list of Service Lists and their Service List URLs.

Service List Registries may be operated by, or on behalf of, various kinds of organizations. Possible examples are:

- The manufacturer of a device which implements the DVB-I client and is serving only those devices.
- A national or regional regulator, providing information for the benefit of clients operating within the relevant nation or region.
- An operator or platform brand serving only their own clients.
- A Central Service List Registry (CSR), operated for the benefit of all devices implementing the DVB-I client, providing information on a wide set of service lists known to that registry.
- A third-party service list aggregator.
- A CICAM operator serving only their own customers.

5.1.3.2 Service List Registry

A DVB-I Service List Registry (SLR) is an HTTP endpoint available at a known URL that, if queried, can return a list of Service List Entry Points. A DVB-I Service List Provider who wishes to enable the SLR discovery mechanism for their own Service Lists may register their Service List Entry Points in the SLR using the M interface in clause 4.1. The SLR also collects contact information of the Service List Providers. How the SLR collects and stores such information is out of scope of the present document.

The SLR shall be able to respond to queries issued by the DVB-I client.

All query parameters provided shall use the character set described in annex C of ETSI TS 102 809 [5]. Additionally, any "reserved" characters defined in clause 2.2 of IETF RFC 3986 [13] in the query string (within key/value pairs) shall be percent-encoded as defined in clause 2.1 of IETF RFC 3986 [13] before being submitted as a query parameter. A space may either be percent encoded (i.e. "%20"), or as a plus sign, "+".

The maximum length of a fully qualified web service URL including parameters shall not exceed 2 048 characters. It shall not be necessary to construct URLs in excess of this length to access any of the service lists provided by an SLR.

Queries can be issued with or without query parameters. Query parameters may take advantage of the DVB-I client's knowledge of the user's geographical location or preferences. Where multiple values are accepted for a query parameter these shall be provided as repeated parameters with "square bracket" notation to indicate that they are array variables,

the values shall be ordered alphabetically or in ascending numerical order. The square brackets "[" and "]" within the URL enable efficient parsing by a Service List Registry. The square brackets "[" and "]" shall be percent-encoded as defined in clause 2.1 of IETF RFC 3986 [13].

Multiple values for the same parameter shall be interpreted by the SLR using the OR logical operator, as alternatives. For example, if two `TargetCountry` parameter values are included in the query, for Country A and Country B, then service list offerings shall be included in the results that:

- specify Country A as their `TargetCountry`,
- specify Country B as their `TargetCountry`,
- specify Country A and Country B as their `TargetCountry`,
- do not specify a `TargetCountry`.

When a specific parameter is not included in the query, the SLR shall apply no filtering based on that parameter. Therefore, service list offerings that specify any value or no value for that parameter shall be included in the results. For example, if the parameter `TargetCountry` is not included in the query, service list offerings that specify any `TargetCountry` or have no `TargetCountry` elements shall be included in the results.

Query strings are included as part of the URL:

```
<ServiceListRegistryEndpoint>?<parameter1>=value1&<parameter2>=value2
```

Where `<ServiceListRegistryEndpoint>` contains only the scheme, authority and path syntax components of a URL as defined in clauses 3.1, 3.2 and 3.3 of IETF RFC 3986 [13].

The following query parameters can be used but shall be in the order presented (see clause 5.3 for description):

- `TargetCountry`
- `regulatorListFlag`
- `Delivery`
- `Language`
- `Genre`
- `ProviderName`
- `inlineImages`

When multiple parameters are provided, the values shall be ordered alphabetically or numerically increasing.

An HTTP 400 (Bad Request) response shall be returned:

- If an undefined query parameter is provided with a request to a Service List Registry endpoint, or
- If an invalid value is provided for a query parameter.

An HTTP 422 (Unprocessable Content) response shall be returned if the Service List Registry requires one of more query parameters but not were specified.

Examples of queries to a Service List Registry (see also clause C.4):

- `https://csr.dvbservices.com/query?TargetCountry=ITA®ulatorListFlag=true`
Query to the CSR for the official DVB-I service list published by the Italian National Authority.

- [https://dvbistr.private-service-list-registry.com/query?TargetCountry\[\]=AUT&TargetCountry\[\]=DEU&Language=en](https://dvbistr.private-service-list-registry.com/query?TargetCountry[]=AUT&TargetCountry[]=DEU&Language=en)
Query for all DVB-I service lists targeted at Germany or Austria and in English language.
- <https://dvbistr.private-service-list-registry.com/query?ProviderName=TVfromTheWorld>
Query for all DVB-I service lists published by a Service List Provider named "TVfromTheWorld".
- [https://dvbistr.national-service-list-registry.com/query?TargetCountry=ITA®ulatorListFlag=true&Delivery\[\]=dvb-dash&Delivery\[\]=dvb-t](https://dvbistr.national-service-list-registry.com/query?TargetCountry=ITA®ulatorListFlag=true&Delivery[]=dvb-dash&Delivery[]=dvb-t)
Query for all DVB-I service lists published by the Italian National Authority for hybrid terrestrial delivery.

Query response shall be in the form of an XML document according to the schema defined in clause 5.3, including the list of Service List Entry Points matching the query parameters (carrying the URL of the associated DVB-I service lists). When no service list offerings match with the SLR query parameters provided, the SLR query response shall contain no `ProviderOffering`.

The `&inlineImages` parameter provides a boolean value to indicate whether or not the response should include graphical elements formatted according to IETF RFC 2397 [31]. If not provided, the Service List Registry shall assume a value of `false` and only HTTP URLs to graphical elements will be provided in the response.

5.1.3.3 Announcement of a DVB-I Service List in a broadcast channel

Broadcasters may signal the HTTP URL of a DVB-I service list or a query to a Service List Registry in the DVB-SI metadata.

To this purpose, a URI linkage descriptor in the 1st loop of NIT or the 1st loop of BAT shall be used in accordance with the scoping rules defined in clause 6.5 of ETSI EN 300 468 [6], with `uri_linkage_type` = 0x03, as defined in ETSI TS 101 162 [11]. Where the `uri_linkage_type` = 0x03, the `private_data_byte` field of the URI linkage descriptor shall contain a DVB-I_info element according to table 1 to differentiate signalled URIs.

Table 1: private_data_byte loop for URI linkage descriptor

Syntax	Number of bits	Identifier
DVB-I_info() {		
end_point_type	8	uimsbf
if (end_point_type == 0x03) {		
service_list_name_length	8	uimsbf
for (i=0;i<N;i++) {		
char	8	uimsbf
}		
service_list_provider_name_length	8	uimsbf
for (i=0;i<N;i++) {		
char	8	uimsbf
}		
}		
for (i=0;i<N;i++) {		
reserved_zero_future_use	8	bslbf
}		
}		

Table 2: end_point_type values

end_point_type	Meaning
0x00	Not used
0x01	The signalled URI refers to a DVB-I Service List
0x02	The signalled URI contains a query to a Service List Registry
0x03	The signalled URI refers to a DVB-I Service List including its corresponding service name and service provider name
0x04 - 0xff	Reserved for future use

When signalling `end_point_type = 0x03`, a valid service list name shall be provided. This is intended to facilitate client UI representation of the corresponding service list when offering it to the user. If desired, a service list provider name may be omitted by setting the `service_list_provider_name_length` to 0.

DVB-I clients shall not spontaneously react to the appearance or change of such a linkage descriptor. They should only react if the user explicitly enters some kind of installation or setup mode. They should not prompt the user to enter such an installation or setup mode immediately when the appearance or change of such a linkage descriptor is detected, but include a delay in case of an error or an attack is in progress (see clause 7.2.1.5 for more information).

Where different Service Lists are signalled in different receivable networks and/or bouquets and the client has no mechanism to easily merge them or determine the most appropriate list then the client should install them all as separate lists or offer a mechanism to allow the user to choose which service list(s) to install.

5.1.3.4 Announcement of a DVB-I Service List by a CICAM

A CICAM may signal the HTTP URL of a DVB-I Service List or a query to a Service List Registry.

For this purpose, a URI linkage descriptor in the 1st loop of the CICAM NIT shall be used as defined in clause 15 of ETSI TS 103 205 [32], with `uri_linkage_type = 0x03` as defined in clause 5.9.3 of ETSI TS 101 162 [11], and with the `private_data_byte` field containing a "DVB-I_info" element as defined in clause 5.1.3.3.

5.1.3.5 Announcement of a DVB-I Service List hosted by a CICAM

A CICAM may signal the URL of a DVB-I Service List hosted by a CICAM auxiliary file system.

For this purpose, a URI linkage descriptor in the 1st loop of the CICAM NIT shall be used as defined in clause 15 of ETSI TS 103 205 [32], with `uri_linkage_type = 0x03` as defined in clause 5.9.3 of ETSI TS 101 162 [11], and with the `private_data_byte` field containing a "DVB-I_info" element with `end_point_type = 0x01`, as defined in table 1 and table 2 in clause 5.1.3.3.

The URI scheme "ci://" shall be used for the URLs of DVB-I Service List files hosted by an CICAM auxiliary file system.

A separate auxiliary file system shall be offered by the CICAM for hosting DVB-I Service List files, as defined in clause 9 of ETSI TS 103 205 [32], using the DomainIdentifier "DVBIServiceDiscoveryProfile1".

Examples of valid URLs to Service List files hosted by a CICAM:

- `ci://ServiceListFile.xml`
- `ci://dvbi/AnotherServiceListFile.xml`
- `ci://DVBIServiceDiscoveryProfile1/subfolder/servicelist.xml`

5.1.3.6 Announcement of an updated DVB-I Service List hosted by a CICAM

To notify the DVB-I client of an updated DVB-I Service List hosted by the CICAM auxiliary file system, the CICAM shall advertise an incremented `nit_version` in the `operator_status()` APDU as defined in clause 15 of

ETSI TS 103 205 [32], informing the DVB-I client of the updated CICAM NIT with an incremented `version_number`, where the URI linkage descriptor in the 1st loop with `uri_linkage_type = 0x03` references a DVB-I Service List, with `end_point_type = 0x01` in the "DVB-I_info" element, as defined in table 1 and table 2 in clause 5.1.3.3.

When a CICAM advertises a new version of the CICAM NIT, if the DVB-I client has already installed DVB-I services from a DVB-I Service List hosted by the CICAM, the DVB-I client shall retrieve the latest version of the Service List in order to update the associated DVB-I services.

5.1.3.7 Announcement of an updated DVB-I Service List HTTP URL by a CICAM

To notify the DVB-I client of a change to the DVB-I Service List HTTP URL, the CICAM shall advertise an incremented `nit_version` in the `operator_status()` APDU as defined in clause 15 of ETSI TS 103 205 [32], informing the DVB-I client of the updated CICAM NIT with an incremented `version_number`, where the URI linkage descriptor in the 1st loop with `uri_linkage_type = 0x03` references a DVB-I Service List, with `end_point_type = 0x01` in the "DVB-I_info" element, as defined in table 1 and table 2 in clause 5.1.3.3.

When a CICAM advertises a new version of the CICAM NIT, if the DVB-I client has already installed DVB-I services from a DVB-I Service List signalled by the CICAM, the DVB-I client shall update the HTTP URL used to retrieve the Service List, and shall retrieve the latest version of the Service List in order to update the associated DVB-I services.

NOTE: This mechanism is not intended to be used for DVB-I Service List updates, when there is no change to the DVB-I Service List HTTP URL. See clause 5.1.7.

5.1.4 Relationships

Figure 3 summarizes the concepts of Service List Registry, Service List and Service.

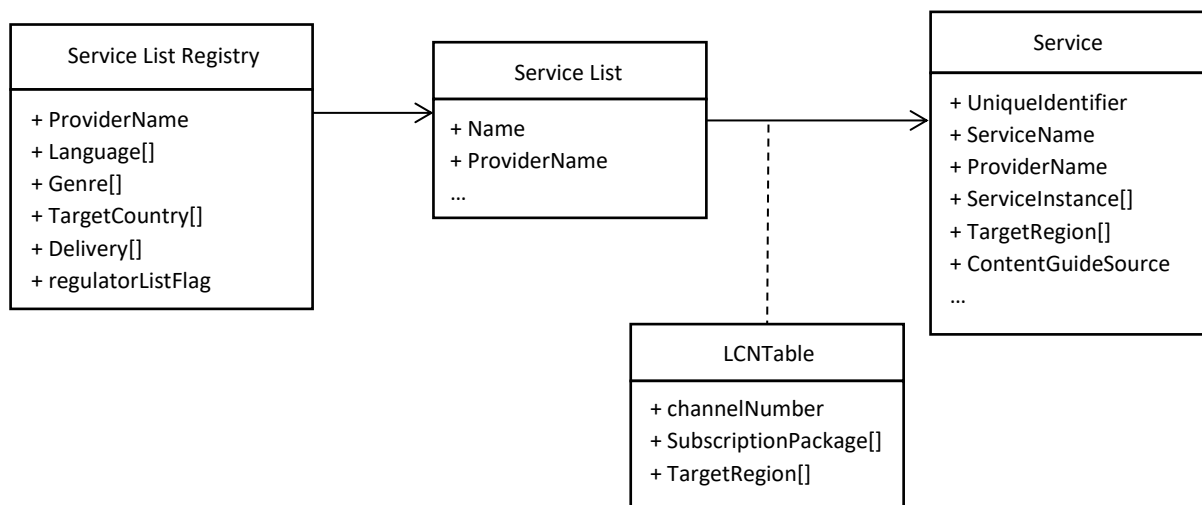


Figure 3: Relationships among Service List Entry Point, Service List, Service and LCN Table

A single Service can be listed in many different Service Lists and may have a different channel number in each.

A Service List can include many different Services.

A Service List may be discoverable using a Service List Registry and may be listed in several registries. It is also possible to have Service Lists which are not advertised by any Service List Registry and which are used only by clients that already know the Service List URL.

A Service List Registry can advertise many Service Lists.

A service shall only be defined once in a service list but may be referenced multiple times with different logical channel numbers.

5.1.5 Subscription Packages

WARNING: The definition of subscription packages according to this specification may lead to overly large service lists which although this can be somewhat mitigated using server side service list creation per region according to clause 5.6.4.4. The mechanism for describing the use of subscription packages is deprecated and likely to be replaced with alternative mechanisms in the future.

The optional element `SubscriptionPackage` contains a human readable label for a service provider defined subscription package, that applies to an LCN Table (see clause 5.5.12) or a service instance (see clause 5.5.4), and corresponds to the name of a package that a user can subscribe to. It can be used at different levels within the DVB-I service list to apply the desired policy of the service list provider. The service provider uses one or more `SubscriptionPackage` elements to denote a subscription that is required to be held by the viewer to successfully receive services in a service list or service instances in a service. The `SubscriptionPackage` element can be used to present alternative service lists to the viewer depending on the subscription package or alternative service instances depending on the subscription package.

When `SubscriptionPackage` elements are used in a service list, a `SubscriptionPackageList` element shall be defined (see clause 5.5.1 and 5.5.25), containing a list of all unique `SubscriptionPackage` elements present in the service list LCN tables and/or service instances.

When `SubscriptionPackage` elements are used in combination with LCN tables, there shall be only one corresponding `LCNTable` for each unique `SubscriptionPackage` when no `TargetRegion` is used, or for each unique combination of `TargetRegion` and `SubscriptionPackage` when both `TargetRegion` and `SubscriptionPackage` are used.

The following cases are envisaged in DVB-I deployments:

- A service list provider may wish to signal a different service order as part of a subscription package of a viewer. In that case, different `SubscriptionPackage` elements in the respective different LCN Tables would allow the selection of the LCN Table corresponding to the subscribed package.
- A service list provider may wish to indicate that a service instance is part of a subscription package, e.g. for a better-quality representation of the programming. This could allow a DVB-I client to omit the use of the service instance not matching the subscription package.
- A service list provider may wish to indicate that an LCN Table is available on several subscription packages (e.g. "Movie Package", "Movie Plus Package"). In that case, several `SubscriptionPackage` elements may be included at the LCN Table level. The DVB-I client assumes that the same `LCNTable` is available for each of the listed subscription packages.
- A service list provider may wish to indicate that a service instance is available on several subscription packages (e.g. "Movie Package", "Movie Plus Package"). In that case, several `SubscriptionPackage` elements may be included at service instance level. The DVB-I client assumes that the same service instance is available for each of the listed subscription packages.
- To describe a service instance with several DRM system identifiers and subscription packages, several `ServiceInstance` elements shall be used with their respective `SubscriptionPackage` elements.

The method of selecting the applicable `SubscriptionPackage` may be user choice, or the client may determine the applicable package automatically (out of scope of the present document). For example, based on a feature of the DRM system, common interface or application environment.

5.1.6 Linked applications

Services in a service list may have applications linked to them according to signalling defined in clause 5.2.3. Such linked applications may be used for a number of purposes including but not limited to the following:

- Adding value to linear television content in a similar way as "red button" applications add value to broadcast services. See "Application with media in parallel" in clause 5.2.3.2.
- Managing the presentation of a broadband-delivered service, for example in situations where the service requires technologies or features not found natively a DVB-I client. See "Application controlling media presentation".
- Performing tasks that need to be performed before presentation of some specific content can start. For example:
 - Obtaining a license from a DRM license server and passing it to a DRM system.
 - Presenting the viewer with terms and conditions relating to processing of private data and obtaining consent to such processing.

5.1.7 Service List Updates

A DVB-I client should check for an update of an installed Service List once every 24 hours. Cache-Control headers as defined in clause 4.3.2 may require more or less frequent updates.

Additionally, hybrid DVB-I clients should request an update of an installed Service List following an update of the associated broadcast signal(s) (e.g. an update to DVB-SI tables impacting service availability).

If updates are performed around a predetermined timeframe (e.g. 6am), a DVB-I client should randomise the exact update time, to spread out the impact on DVB-I service list servers.

5.2 Procedures

5.2.1 Service Instance Matching

A hybrid DVB-I client may have one or more tuners for receiving DVB-T/C/S services, in addition to DVB-DASH services discovered using the present document. Such a hybrid DVB-I client may receive instances of the same DVB service via different DVB broadcast delivery systems. Each DVB service instance may differ in quality (e.g. video resolution, encoding), language or accessibility attributes, among other qualities.

A hybrid DVB-I client shall match instances of the same DVB service. For example, after successfully matching DVB service instances, a DVB-I client should present a single service list combining DVB-I and DVB-T/C/S services received without duplicates. When the user selects a service from such a combined service list, a hybrid DVB-I client may present the DVB service instance based on certain criteria, such as instance priority, the user's preferences or encoding quality.

To match service instances, a hybrid DVB-I client shall use the metadata it gathers during DVB-T/C/S installation, together with metadata present in DVB-I service lists.

The primary aim is to prevent false matches. A hybrid DVB-I client shall only match a DVB-I service instance with a DVB-T/C/S service when the following conditions are fulfilled for a DVB-I service list:

- all mandatory DVB-I service list metadata elements listed in table 3 are present in the DVB-I service list; and
- all metadata elements listed in table 3 that are present in the DVB-I service list match with metadata the client gathered during DVB-T/C/S installation.

Additionally, a hybrid DVB-I client should only match a DVB-I service instance with a DVB-T/C/S service when the following conditions are fulfilled for a DVB-I service list:

- all metadata elements listed in table 4 that are present in the DVB-I service list match with metadata the client gathered during DVB-T/C/S installation.

To enable matching, a Service List Provider will need to include in a DVB-I service list, at least the metadata elements listed in table 3 that are needed to uniquely identify each DVB-T/C/S service instance.

Table 3: Metadata required to be present in the DVB-I service list for matching DVB service instances

DVB-I service list metadata elements required for DVB service instance matching		
DVB-S/S2	DVB Delivery System DVB-T/T2	DVB-C/C2
	Target Country	
		Network ID
DVB Triplet (ONID, TSID, SID) (see note)		
NOTE: ONID and TSID are interpreted as wildcards when no value is specified in the metadata. However, either one or both of these attributes should be provided together with the SID to ensure the service instance can be matched reliably. Service instance matching may not be valid if both TSID and ONID are omitted.		

Table 4: Additional metadata in the DVB-I service list for matching DVB service instances

Additional metadata elements		
DVB-S/S2	DVB Delivery System DVB-T/T2	DVB-C/C2
Orbital Position		
Frequency and Polarization (see note 1)		
Service Name (see note 2)		
Target Region (see note 3)		
NOTE 1: The frequency and polarization can only be used when it is possible to establish the correspondence between the Intermediate Frequency input from the LNB and the transmitted downlink frequency and polarization.		
NOTE 2: The service name(s) to use for service instance matching are the <i>ServiceName</i> and, if provided, one or more <i>ServiceInstance.AltServiceName</i> elements.		
NOTE 3: The Target Region is optional, as it may not be relevant for all DVB service instances. When no Target Region is present, the other metadata elements will suffice to uniquely identify the service instance.		

For DVB-S/S2 service instances, a device shall only use the frequency and polarization when it has established the correspondence between the Intermediate Frequency input from the LNB and the transmitted downlink frequency and polarization. In most installation cases, a device can establish this correspondence. For example, the correspondence can be established using satellite delivery system descriptors in the NIT together with the Intermediate Frequency, through detection or manual input of the LNB characteristics, or by using the Unicable [i.2] or Unicable 2 [i.3] standards. However, there may be cases (e.g. legacy single cable installations) where the device cannot establish that correspondence.

Different DVB service instances may use variations of the same service name, such as "Channel 1", "Channel One", "Channel 1 HD" or "Ch 1 HD". Therefore, all relevant Service Name variants should be provided for each DVB-T/C/S service instance in a DVB-I service list, using the `ServiceName` and one or more service instance `AltServiceName` elements.

It is recommended to only match a DVB-T/C/S service with a DVB-I service instance when the DVB-T/C/S Service Name matches with the DVB-I `ServiceName` element, or if provided, with one of the DVB-I service instance `AltServiceName` elements, particularly when the DVB-I service instance has a wildcard ONID or TSID.

Once a DVB-T/C/S service is matched with a DVB-I service instance, a DVB-I client shall prioritise metadata defined in the matched DVB-I service and service instance over DVB-SI metadata. For example, a DVB-I client should prioritise the use of `Service.ServiceInstance.DisplayName` over the DVB-SI `service_descriptor()` service name in its UI, when a `DisplayName` is defined.

Example of metadata elements provided for a DVB-S2 service instance:

Table 5: Example of the France 3 Reims DVB-S2 service instance

DVB Delivery System	DVB-S2
Orbital Position	5,0 °W
Frequency and Polarization	11 054,50 MHz Vertical Polarization
DVB Triplet (ONID, TSID, SID)	0x20FA, 0x5014, 0x1019
Service Name	"France 3 Reims"
Alternative Service Name	"Fr3 Reims"
Target Region	<i>(none)</i>

Example of metadata elements provided for DVB-T service instances:

Table 6: Example of the France 3 Reims DVB-T service instances

DVB Delivery System	DVB-T
Target Country	France
DVB Triplet (ONID, TSID, SID)	0x20FA, 0x0001, 0x0115; 0x20FA, 0x0001, 0x0144
Service Name	"France 3 Reims"
Alternative Service Name	"Fr3 Reims"
Target Region	<i>(none)</i>

5.2.2 Service Identifiers

Service identifiers shall use a registered URI scheme that allows independent allocation and ensures global uniqueness. Suitable URI schemes include the "tag" URI scheme as defined in IETF RFC 4151 [3].

5.2.3 Signalling of Applications in the Service List

5.2.3.1 General

A `RelatedMaterial` element can be used to signal the location of an application associated with the service or service instance. The `RelatedMaterial` element shall contain the following two subelements:

- A `HowRelated` element with an `@href` attribute carrying a value from the `urn:dvb:metadata:cs:LinkedApplicationCS:2019` classification scheme, defined in clause D.2.
- A `MediaUri` element whose value contains a URI for the application and whose `@contentType` attribute describes the type of application being referenced. The following values for `@contentType` are defined.

Table 7: MediaUri@contentType

MediaUri@contentType	Meaning
application/vnd.dvb.ait+xml	The MediaUri element carries the location of an XML AIT file which describes the application and its location. The semantics of the XML AIT file are defined in ETSI TS 102 809 [5].
text/html or application/xhtml+xml	The MediaUri element refers to an HTML5 webpage.

Multiple applications may be present with distinct MediaUri@contentType values. The DVB-I client may ignore any signalled application that has a MediaUri@contentType attribute that they do not understand.

There are two possible mechanisms for signalling arbitrary or different types of application.

- Application URIs with other MediaUri@contentType values than those in table 7 may be signalled as defined in the present document. The semantics of such URIs are not defined by the present document.
- Alternatively the XML AIT referenced above provides a means to signal applications of different types using the type element in the applicationDescriptor (see clauses 5.4.4.4, 5.4.4.11 and 5.2.2 of ETSI TS 102 809 [5]). The XML AIT format includes the possibility to signal multiple (alternative) instances of what is logically the same application, for example an HbbTV instance, a generic HTML5 instance targeted at a webview on a mobile phone, an Android application instance or an iOS application instance.

For a particular MediaUri@contentType, there shall be at most one RelatedMaterial element referencing an application with a HowRelated@href attribute set to urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.1 or urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.2. These are for use when the service is active, i.e. during the specified availability period for the service instance (see clause 5.2.5).

There may optionally be a separate RelatedMaterial element referencing an application with a HowRelated@href attribute set to urn:dvb:metadata:cs:LinkedApplicationCS:2019:2. This is for use when the service is not active (i.e. outside of the specified availability period, if included). Such an application shall be started in preference to the presentation of any still image signalled using a RelatedMaterial element with a HowRelated@href attribute set to urn:dvb:metadata:cs:HowRelatedCS:2021:1000.1 (see clause 5.2.5.3) where the application type is supported.

When a linked application is launched, the context in which the application was invoked may be passed to the application. For broadcast-independent HbbTV applications, this is defined in clause 6.2.2.6.2 of ETSI TS 102 796 [21].

- For linked applications where HowRelated@href is set to urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.2, the launch location "service" should be used.
- For linked applications where HowRelated@href is set to urn:dvb:metadata:cs:LinkedApplicationCS:2019:2, the launch location "availability" should be used.
- Linked applications where HowRelated@href is set to urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.1 correspond to broadcast-related applications where the launch location is not used.

The format of the applicationLocation and any service identifier used therein is at the discretion of the Content Provider, however, the Content Provider shall ensure that any included query parameters are distinct from the contextual parameters specified in clause 5.2.4.4.6. The URLBase and applicationLocation elements of the XML AIT may contain <![CDATA[]]> encapsulated text, UTF-8 or HTML entity encoded characters as defined in clause 8.5 of W3C HTML 5.1 [29].

5.2.3.2 Applications and Media Presentation

Application with media in parallel

Where an application (with any `MediaUri@contentType`) is signalled using a `RelatedMaterial` element with a `HowRelated@href` attribute set to `urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.1`, the `RelatedMaterial` element provides initial application signalling for use when the service, or a specific service instance is selected and is available (as defined in clause 5.2.5). The process to present media shall begin in parallel with, and decoupled from, the application signalling being processed and any signalled application being started. Any application signalling delivered as part of the service itself (see clause 5.2.3.3) that the DVB-I client supports shall be processed whilst the service is active. When the application is signalled within a service instance, if media presentation fails and the client chooses to fall back to a lower priority service instance that also includes application signalling, the client shall process the application signalling of the lower priority service instance. The relationship between the initial signalling delivered in the `RelatedMaterial` element, any application signalling delivered as part of the service itself or as part of other service instances, and the lifecycle of the signalled application(s) is outside the scope of the present document.

Application controlling media presentation

Where an application (with any `MediaUri@contentType`) is signalled using a `RelatedMaterial` element with a `HowRelated@href` attribute set to `urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.2`, media presentation is to be managed by the linked application and no media stream shall be presented by the DVB-I client when the service is selected. A service instance containing one of these applications should not include any delivery parameters elements. If delivery parameters elements are included then they shall be ignored by the DVB-I client. The processing of any application signalling delivered as part of the service itself (see clause 5.2.3.3) is outside the scope of the present document.

Linked applications may be notified by the DASH player of MPD events and inband events as defined in clause 9.1.3 of ETSI TS 103 285 [1].

5.2.3.3 Dynamic Application Signalling in Services

DVB-I metadata provides quasi-static application signalling. Certain service instance types can also carry dynamic application signalling. This clause describes those and their relationship with signalling carried in DVB-I metadata.

The DVB-I client that supports service instances delivered using MPEG-2 Transport Stream over DVB-C/S/T and supports an application type that can be signalled by means of a DVB AIT shall support both AITs referenced using a `RelatedMaterial` element and AITs delivered in MPEG section format (see clause 5.3 of ETSI TS 102 809 [5]). In the present document, the semantics of applications signalled using a `RelatedMaterial` element with a `HowRelated@href` attribute set to `urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.1` are not defined for broadcast service instances using `DVBTDeliveryParameters`, `DVBSDeliveryParameters` or `DVBCTDeliveryParameters`. Such elements should not be used. The DVB-I client shall ignore any application signalling using a `RelatedMaterial` element with this `HowRelated@href` attribute when selecting such a broadcast service instance and act solely on the broadcast AIT signalling.

NOTE: Co-existence between application signalling using a `RelatedMaterial` element as described in this clause and application signalling in a DVB-C, DVB-S or DVB-T service may be addressed in subsequent revisions of the present document or in the specification for a particular application technology.

The DVB-I client that supports service instances delivered using DVB-DASH and supports an application type that can be signalled by means of a DVB AIT shall support AITs referenced using a `RelatedMaterial` element and AITs referenced from a DVB-DASH `EventStream` (see clause 9.1.8 of ETSI TS 103 285 [1]).

When a DVB-DASH service instance is selected, application signalling using a `RelatedMaterial` element with a `HowRelated@href` attribute set to `urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.1` (app with media in parallel) shall take effect until superseded by presentation of a DVB-DASH `Period` that contains an `EventStream`

with `schemeIdUri` set to `urn:dvb:dash:appsignalling:2016`. Presentation of a DVB-DASH Period without such an `EventStream` shall have no effect on application signalling.

5.2.3.4 Application Signalling Precedence

Applications can be referenced at service or service instance level. A `RelatedMaterial` element within a `ServiceInstance` element referencing an application with a `HowRelated@href` attribute set to `urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.1` or `urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.2` overrides any `RelatedMaterial` element in the `Service` element that has either of those `HowRelated@href` values and has the same `MediaUri@contentType`. Similarly, a `RelatedMaterial` element in the `ServiceInstance` element with a `HowRelated@href` attribute set to `urn:dvb:metadata:cs:LinkedApplicationCS:2019:2` overrides any `RelatedMaterial` element in the `Service` element with that `HowRelated@href` value and has the same `MediaUri@contentType` value.

5.2.3.5 Example

An example of an XML AIT for a linked application is shown in figure 4.

```
<?xml version="1.0" encoding="UTF-8"?>
<mhp:ServiceDiscovery xmlns:mhp="urn:dvb:mhp:2009"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <mhp:ApplicationDiscovery DomainName="channel7.com">
    <mhp:ApplicationList>
      <mhp:Application>
        <mhp:appName Language="eng">Channel7 Player</mhp:appName>
        <mhp:applicationIdentifier>
          <mhp:orgId>123</mhp:orgId>
          <mhp:appId>0</mhp:appId>
        </mhp:applicationIdentifier>
        <mhp:applicationDescriptor>
          <mhp:type>
            <mhp:OtherApp>application/vnd.hbbtv.xhtml+xml</mhp:OtherApp>
          </mhp:type>
          <mhp:controlCode>AUTOSTART</mhp:controlCode>
          <mhp:visibility>VISIBLE_ALL</mhp:visibility>
          <mhp:serviceBound>false</mhp:serviceBound>
          <mhp:priority>0</mhp:priority>
          <mhp:version>01</mhp:version>
          <mhp:mhpVersion>
            <mhp:profile>0</mhp:profile>
            <mhp:versionMajor>1</mhp:versionMajor>
            <mhp:versionMinor>3</mhp:versionMinor>
            <mhp:versionMicro>1</mhp:versionMicro>
          </mhp:mhpVersion>
        </mhp:applicationDescriptor>
        <mhp:applicationTransport xsi:type="mhp:HTTPTransportType">
          <mhp:URLBase>https://www.channel7.com/</mhp:URLBase>
        </mhp:applicationTransport>
        <mhp:applicationLocation>player/service/channela</mhp:applicationLocation>
      </mhp:Application>
    </mhp:ApplicationList>
  </mhp:ApplicationDiscovery>
</mhp:ServiceDiscovery>
```

Figure 4: Example - XML AIT for a service list Linked Application

5.2.4 Signalling of Applications in the Content Guide

5.2.4.1 General

Signalling within the content guide metadata provides deep links to applications which control presentation of the content (on-demand and live streams). A DVB-I client shall determine both content availability and its capability of playing the content before an item of content is indicated as available to the user.

While the metadata described in clause 6 can be used by the DVB-I client to determine the availability of content, the AIT mechanism described in clause 5.2.4.4 is used to determine whether a device has the capability to play the content. In order to make this process efficient for the DVB-I client, a Template XML AIT is used which describes the attributes of an application (e.g. minimum HbbTV version) without providing the content specific or service specific deep link.

There are three XML AIT types that require different processing by a DVB-I client. These are:

- Linked application XML AIT - For applications in the service list which are signalled with `MediaUri@contentType="application/vnd.dvb.ait+xml"` according to clause 5.2.3.
- Content deep-linked XML AIT - For On Demand programmes, this is linked to via the `ProgramURL` element in an `OnDemandProgram` element of the content guide as described in clause 6.10.8. For Restart, this is linked to via the `MediaUri` element within a `RelatedMaterial` element in a `ScheduleEvent` element as described in clause 6.5.5. Context deep-linked XML AITs are described in greater detail in clause 5.2.4.3.
- Template XML AIT - For On Demand programmes, this is linked to via the `AuxiliaryURL` element in an `OnDemandProgram` element as described in clause 6.10.8. For Box Set Lists, this is linked to via the `AuxiliaryURI` element in a `RelatedMaterial` element in a `GroupInformation` element as described in clause 5.2.4.4.4. For Restart, this is linked to via the `AuxiliaryURI` element in a `HowRelated` element in a `ScheduleEvent` element as described in clause 6.5.5. Template XML AITs are described in greater detail in clause 5.2.4.4.

XML AIT files shall be delivered by Content Providers with the `Content-Type` header set to `application/vnd.dvb.ait+xml`.

XML AIT files shall also signal one of the following MIME type values to represent each application type within the `mhp:ApplicationDescription.mhp:type.mhp:OtherApp` element

- `application/vnd.hbbtv.xhtml+xml` for an HbbTV application as defined in clause 7.2.3.2 of ETSI TS 102 796 [21].
- `text/html` or `application/xhtml+xml` for an HTML5 webpage.

The format of the `applicationLocation` and any service identifier used therein is at the discretion of the Content Provider, however, the Content Provider shall ensure that any included query parameters are distinct from the contextual parameters specified in clause 5.2.4.4.6. The `URLBase` and `applicationLocation` elements of the XML AIT may contain `<![CDATA[]]>` encapsulated text, UTF-8 or HTML entity encoded characters as defined in clause 8.5 of W3C HTML 5.1 [29].

XML AIT files shall be served using HTTP according to clause 7.3.

NOTE: The use of the Template XML AIT mechanism allows a single cacheable document to be used to indicate the capability required to play a range of content. This means that in order to indicate availability (including capability) of on-demand content and services across a whole EPG/Content Guide the DVB-I client is not required to download and process an individual AIT for each individual item of content. Only when the user chooses to playback an on-demand asset does the DVB-I client fetch and process the content deep-linked AIT. This is illustrated in figure 5.

The "context" addition to the AIT request URL is described in clause 5.2.4.4.6.

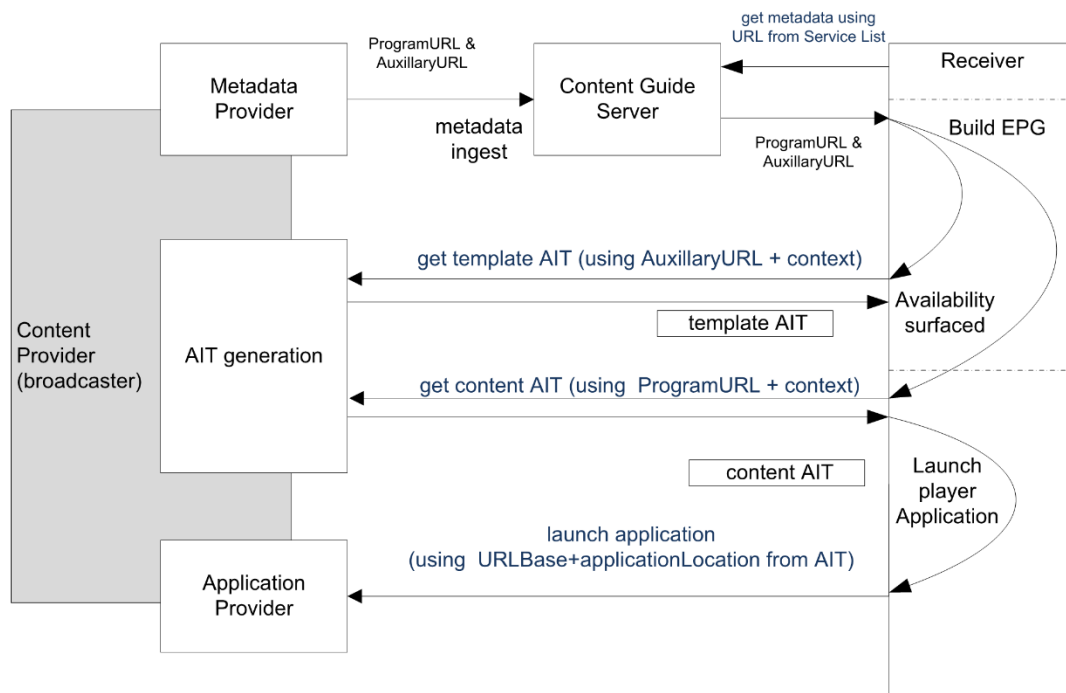


Figure 5: Template XML AIT and Content Deep-link XML AIT process

5.2.4.2 Application Priority

There may be multiple applications listed in an XML AIT. When determining which to launch the client shall process each application in turn and select the application with the highest `mhp:priority` value that meets all of the following criteria:

- Application type equals `application/vnd.hbbtv.xhtml+xml` or `text/html` or `application/xhtml+xml` - This shall be specified in the `mhp:ApplicationDescription.mhp:type.mhp:OtherApp` element. This is a MIME type defined in clause 7.2.3.2 of ETSI TS 102 796 [21]. The client shall ignore applications listed with values other than `application/vnd.hbbtv.xhtml+xml` or `text/html` or `application/xhtml+xml`.
- Platform profile - The platform profile value shall be specified in the child elements of the `mhp:mhpVersion` element. This shall be as defined in clause 7.2.3.1, table 5 of ETSI TS 102 796 [21]. The client shall launch applications signalled with values of `version.major`, `version.minor`, and `version.micro` according to table 5 of ETSI TS 102 796 [21]. The client shall ignore applications listed with other values.

Where an AIT is supplied for which the client is unable to determine an executable application then the client shall not issue an error to the user but instead shall show a service or content item as unavailable.

There may be cases where content is signalled as available in the `OnDemandProgram` element, but the content provider is unable to provide a suitable application based on device specific information (i.e. contextual parameters described in clause 5.2.4.4.6, or based on user-agent information), for example, regionally restricted content. In these situations, an XML AIT shall be returned where the `mhp:ApplicationDescriptor.mhp:type.mhp:OtherApp` shall be set to `application/vnd.dvbi.non`.

5.2.4.3 On Demand deep-linked XML AIT

The purpose of the On Demand deep-linked XML AIT is to provide a mechanism to launch directly to a specific piece of content within a Content Provider's player application. Within the XML AIT the concatenation of `URLBase` and `applicationLocation` shall form a URL specifying an application launch location that allows launching of a player

application directly. The format of the `applicationLocation` and any content identifier used therein is at the discretion of the Content Provider, however, the Content Provider shall ensure that any included query parameters are distinct from the contextual parameters specified in clause 5.2.4.4.6. Both `URLBase` and `applicationLocation` may contain `<![CDATA[]]>` encapsulated text, UTF-8 or HTML entity encoded characters as defined in clause 8.5 of W3C HTML 5.1 [29]. Client devices shall be able to decode/extract this text to establish the complete URL.

The client device shall append any specified contextual parameters to the XML AIT URL prior to calling it; see clause 5.2.4.4.6 for further details on these parameters.

For On Demand programmes, the content deep-linked XML AIT shall be referenced in the `OnDemandProgram.ProgramURL` element of responses. For Restart, the content deep-linked XML shall be referenced in a Schedule response filtered by Now/Next using a `HowRelated` element with an `@href` attribute carrying the value `urn:fvc:metadata:cs:HowRelatedCS:2018:restart` within a `Schedule.ScheduleEvent.InstanceDescription` element.

If the content deep-linked XML AIT is unavailable the client device shall consider the content to be unavailable and behave gracefully.

Multiple `mhp:Application` elements may exist within the `mhp:ApplicationList`. All applications in the AIT shall have the same `mhp:orgId` and `mhp:appId`. Where multiple `mhp:Application` elements are present the client device shall use the application with the highest `mhp:priority` value in the list that meets the device criteria it can support (see clause 5.2.4.2).

```
<?xml version="1.0" encoding="UTF-8"?>
<mhp:ServiceDiscovery xmlns:mhp="urn:dvb:mhp:2009"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <mhp:ApplicationDiscovery DomainName="channel7.com">
    <mhp:ApplicationList>
      <mhp:Application>
        <mhp:appName Language="eng">Channel7 Player</mhp:appName>
        <mhp:applicationIdentifier>
          <mhp:orgId>123</mhp:orgId>
          <mhp:appId>0</mhp:appId>
        </mhp:applicationIdentifier>
        <mhp:applicationDescriptor>
          <mhp:type>
            <mhp:OtherApp>application/vnd.hbbtv.xhtml+xml</mhp:OtherApp>
          </mhp:type>
          <mhp:controlCode>AUTOSTART</mhp:controlCode>
          <mhp:visibility>VISIBLE_ALL</mhp:visibility>
          <mhp:serviceBound>false</mhp:serviceBound>
          <mhp:priority>0</mhp:priority>
          <mhp:version>01</mhp:version>
          <mhp:mhpVersion>
            <mhp:profile>0</mhp:profile>
            <mhp:versionMajor>1</mhp:versionMajor>
            <mhp:versionMinor>3</mhp:versionMinor>
            <mhp:versionMicro>1</mhp:versionMicro>
          </mhp:mhpVersion>
        </mhp:applicationDescriptor>
        <mhp:applicationTransport xsi:type="mhp:HTTPTransportType">
          <mhp:URLBase>https://www.channel7.com/</mhp:URLBase>
        </mhp:applicationTransport>
        <mhp:applicationLocation>player/playback/b0101p3j</mhp:applicationLocation>
      </mhp:Application>
    </mhp:ApplicationList>
  </mhp:ApplicationDiscovery>
</mhp:ServiceDiscovery>
```

Figure 6: Example - Content Deep-Linked XML AIT

5.2.4.4 Template XML AIT

5.2.4.4.1 Introduction

The purpose of the template XML AIT is to allow a client device to determine if it has a compatible environment to play the associated content, allowing a generic way to determine support for all content from which it is referenced, and thus requiring the download and processing of just one XML AIT for all the referenced content items.

Client devices shall perform a textual comparison of the Template XML AIT URL against the Template XML AIT URL of AITs that have already been processed. Equivalence shall negate the need to fetch and process the Template XML AIT again.

Template XML AITs are provided for On Demand programmes, Restart streams and Box Sets. They are signalled in different ways, as defined below, but the behaviour is the same.

A single Template XML AIT may be referenced for all `OnDemandProgram` entities, Restart streams and/or Box Sets from a given Content Provider that require the same environment.

This allows a Content Provider to reference the same Template XML AIT from all content requiring the same environment (e.g. HbbTV/HTML), which in turn means that the client device only needs to analyse a single XML AIT for those `OnDemandProgram` elements, Restart streams and Box Sets before determining whether it is capable of displaying the content, and therefore whether to show the content as available. Content compatibility shall be determined by following the guidelines as defined in clause 5.2.4.2.

In the case that the client device does not have a compatible environment for the content, the content shall be marked as unavailable.

Multiple `mhp:Application` elements may exist within the `mhp:ApplicationList`. All applications in the AIT shall have the same `mhp:orgId` and `mhp:appId`. Where multiple `mhp:Application` elements are present the client device shall assume it can run the application if any of the applications listed meet the compatibility criteria above.

The client device shall append any specified contextual parameters to the XML AIT URL prior to calling it; see clause 5.2.4.4.6 for further details on these parameters.

5.2.4.4.2 On Demand Programmes

Within every `OnDemandProgram` element supplied through the content guide interface there shall be an `AuxiliaryURL` referencing a Template XML AIT. This XML AIT is identical to the content deep-linked XML AIT (provided via the `ProgramURL` element) except that the content specific identifiers have been removed. The `mhp:applicationLocation` element shall be ignored.

This format of XML AIT shall be referenced in the `OnDemandProgram.AuxiliaryURL` element of responses from the Schedule endpoint calls.

5.2.4.4.3 Restart

Alongside every Restart XML AIT supplied through the content guide interface there shall be a Template XML AIT. This is found in `RelatedMaterial` element with a `HowRelated` element with an `@href` attribute carrying the value `urn:fvc:metadata:cs:HowRelatedCS:2018:restart` within a `Schedule.ScheduleEvent.InstanceDescription` element.

5.2.4.4.4 Box Sets

Every Box Set in a Box Set List response shall have an associated Template XML AIT. This represents the Template AIT (i.e. required capability) for every content item in the Box Set. This is found in the `GroupInformation` fragment describing the Box Set, in a `RelatedMaterial` element with a `HowRelated` element with an `@href` attribute carrying the value `urn:fvc:metadata:cs:HowRelatedCS:2018:templateAIT`, for example:

```

<RelatedMaterial>
  <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2018:templateAIT"/>
  <MediaLocator>
    <MediaUri/>
    <AuxiliaryURI contentType="application/vnd.dvb.ait+xml">
      https://www.live.mybroadcastertvapps.co.uk/tap/iplayer/ait/launch/iplayer.aitx
    </AuxiliaryURI>
  </MediaLocator>
</RelatedMaterial>

```

5.2.4.4.5 Template XML AIT Refreshing

The client device shall respect the `Expires` header and/or `Cache-Control: max-age` header when retrieving Template XML AIT documents, refreshing any cached Template XML AITs at the next opportunity once the timestamp/duration is reached. If no `Expires` or `max-age` header is provided the client device shall assume an expiry of 24 hours from retrieval. If both an `Expires` and `max-age` header are present the client device shall use the `Cache-Control: max-age` to determine when to refresh the Template XML AIT.

If the Template XML AIT is unavailable and the client device has a cached version from an earlier request it shall continue to use the cached version, until it is available through the retry mechanisms described in clause 4.3.3. If no cached version is available, then all content referencing the Template XML AIT shall be considered unavailable until it is available through the retry mechanisms described in clause 4.3.3.

```

<?xml version="1.0" encoding="UTF-8"?>
<mhp:ServiceDiscovery xmlns:mhp="urn:dvb:mhp:2009"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <mhp:ApplicationDiscovery DomainName="channel7.com">
    <mhp:ApplicationList>
      <mhp:Application>
        <mhp:appName Language="eng">Channel7 Player</mhp:appName>
        <mhp:applicationIdentifier>
          <mhp:orgId>123</mhp:orgId>
          <mhp:appId>0</mhp:appId>
        </mhp:applicationIdentifier>
        <mhp:applicationDescriptor>
          <mhp:type>
            <mhp:OtherApp>application/vnd.hbbtv.xhtml+xml</mhp:OtherApp>
          </mhp:type>
          <mhp:controlCode>AUTOSTART</mhp:controlCode>
          <mhp:visibility>VISIBLE_ALL</mhp:visibility>
          <mhp:serviceBound>false</mhp:serviceBound>
          <mhp:priority>0</mhp:priority>
          <mhp:version>01</mhp:version>
          <mhp:mhpVersion>
            <mhp:profile>0</mhp:profile>
            <mhp:versionMajor>1</mhp:versionMajor>
            <mhp:versionMinor>3</mhp:versionMinor>
            <mhp:versionMicro>1</mhp:versionMicro>
          </mhp:mhpVersion>
        </mhp:applicationDescriptor>
        <mhp:applicationTransport xsi:type="mhp:HTTPTransportType">
          <mhp:URLBase>https://www.channel7.com/</mhp:URLBase>
        </mhp:applicationTransport>
        <mhp:applicationLocation/>
      </mhp:Application>
    </mhp:ApplicationList>
  </mhp:ApplicationDiscovery>
</mhp:ServiceDiscovery>

```

```

    </mhp:ApplicationList>
  </mhp:ApplicationDiscovery>
</mhp:ServiceDiscovery>

```

Figure 7: Example - Template XML AIT

5.2.4.4.6 Contextual Parameters

In order to allow applications to behave in a contextual and regionally aware manner, additional parameters are required to be passed in the URL when retrieving any Template XML AIT, OnDemand Deep-linked XML AIT or Service Deep-linked XML AIT. Client devices shall append all of the following parameters to the XML AIT URL provided in the metadata before attempting to retrieve the document:

- All `regionIDs` specific to the device.
- The UI location from which the application is being launched.

These contextual parameters shall be appended to the URL using either a "?" or a "&" character in order to maintain a legal URL structure as defined in IETF RFC 3986 [13]. For instance, assuming that the `AIT_URL` already includes at least one query parameter the format shall be:

```
<AIT_URL>&regionID[]=<region_id_1>&regionID[]=<region_id_2>...&lloc=<launch_location>
```

If no query parameter is already present in the `AIT_URL` then the format shall be:

```
<base_AIT_URL>?regionID[]=<region_id_1>&regionID[]=<region_id_2>...&lloc=<launch_location>
```

where:

- `region_id_x`: may be a single `regionID` as determined by the client device (see clause 5.6.2)
- `launch_location`: shall be as defined in clause 6.2.2.6.2 of ETSI TS 102 796 [21]

Example URL:

```
https://channel7.co.uk/ait.aitx?pid=b01myjsy&regionID[]=Piemonte&lloc=epg
```

5.2.5 Signalling of Part Time Services

5.2.5.1 General

Services are anticipated to operate all day, every day, however there are likely to be some exceptions to this, for example live services that may only be present during an actual event or regional services that supersede national services. A service, or a replacement for a service, can be specified as being only available for certain times of the day, certain days of the week, for certain periods of time or a combination of any of these factors. For such services, the hours and/or days that the service are available are expressed through the `Availability` element within the service instance and are referred to as the Scheduled Service Hours.

5.2.5.2 Scheduled Service Hours

For service instances that are not always available, an `Availability` element shall be added into the service instance to denote the hours of days, days of week and weekly cadence that the service instance is available. A description of the `Availability` element is given in clause 5.5.15.

Any number of `Period` elements can be specified to describe the overall availability of the service instance, for example:

A service instance that is only on air in July 2019 and September 2019

```
<Availability>
  <Period validFrom="2019-07-01T00:00:00Z" validTo="2019-07-31T23:59:59Z"/>
  <Period validFrom="2019-09-01T00:00:00Z" validTo="2019-09-30T23:59:59Z"/>
</Availability>
```

Within each `Period` element, multiple `Interval` elements can be specified, each covering a single block of time, denoted by the `@startTime` and `@endTime`, attributes on one or more days of the week. Times are expressed in UTC as indicated by "Z" (see clause 3.2.8.2 of W3C XML Schema Part 2: Datatypes [i.6] for additional syntax). For example:

A service instance that is only available on Mondays and Wednesdays between 5pm and 5:30pm Central European Time

```
<Availability>
  <Period>
    <Interval startTime="16:00:00Z" endTime="16:30:00Z" days="1 3"/>
  </Period>
</Availability>
```

The `Interval` element can optionally contain a `@recurrence` attribute that represents the weekly cadence. The cadence starts in the week indicated by the `@validFrom` attribute, the `Interval` element shall be ignored if `@recurrence` is specified but no `@validFrom` is specified in the containing `Period` element.

The intervals specified in the `Period` elements define a timeline describing when the service instance can be selected or used. The union of these intervals cumulatively define the availability of the service instance.

5.2.5.3 Service selection outside Scheduled Service Hours

If the DVB-I client selects a part time service at a time that is outside of the scheduled hours for all service instances or when all service instances of a currently selected service become unavailable, several options are possible:

- The application signalled for the service (refer to clause 5.2.3) can be started. This option should be used if the application type is supported by the DVB-I client.
- An out of service image that is specified in the `RelatedMaterial` for the service can be presented.
- Some implementation specific behaviour can be invoked.

An out of service image is signalled in a single `RelatedMaterial` element with the following:

- A `HowRelated` element with an `@href` attribute carrying the value `urn:dvb:metadata:cs:HowRelatedCS:2021:1000.1`. This classification scheme is defined in clause D.1.
- `MediaLocator` elements which include a `MediaUri` element whose value contains a URI to the image file and whose `@contentType` attribute carries the image Media Type (MIME type).

Multiple out of service images can be signalled where each has a `MediaLocator` element in the `RelatedMaterial` element and the natural language of any text contained in the image should be reflected in the `@contentLanguage` attribute such that the DVB-I client can present the most useful image. Other image formats can also be provided. The DVB-I client can request the image be scaled to a different resolution or appearance prior to delivery according to the method defined in clause 5.2.8.2.

5.2.6 Graphical Elements

5.2.6.1 Service List Logos

Logos for the service list shall be signalled in a single `RelatedMaterial` element within the service list with the following:

- A `HowRelated` element with an `@href` attribute carrying the value `urn:dvb:metadata:cs:HowRelatedCS:2021:1001.1`. This classification scheme is defined in clause D.1.
- `MediaLocator` elements which include a `MediaUri` element whose value contains a URI to the image file and whose `@contentType` attribute carries the image Media Type (MIME type).

Multiple service list logos can be signalled where each has a `MediaLocator` element in the `RelatedMaterial` element. At least one service list logo shall be provided with the Media Type `image/jpeg` or `image/png` for compatibility purposes and other image formats including `image/webp` may be optionally provided. The DVB-I client can request the image be scaled to a different resolution or appearance prior to delivery according to the method defined in clause 5.2.8.2.

5.2.6.2 Service Logos

Logos for the service shall be signalled in a single `RelatedMaterial` element within the service with the following:

- A `HowRelated` element with an `@href` attribute carrying the value `urn:dvb:metadata:cs:HowRelatedCS:2021:1001.2`. This classification scheme is defined in clause D.1.
- `MediaLocator` elements which include either
 - a `MediaUri` element whose value contains a URI to the image file and whose `@contentType` attribute carries the image Media Type (MIME type), or
 - a `MediaUri` element whose value contains an encoding of the service logo according to IETF RFC 2397 [31] and whose `@contentType` attribute carries the image Media Type (MIME type).

Conveying encoded images can result in very large XML documents. It is recommended that a dereferenceable URL be provided to ensure maximum compatibility. When an IETF RFC 2397 [31] data URL is used to convey the logo, the media type in the URI shall always be specified and shall match the value of the `@contentType` attribute.

Multiple service logos can be signalled where each has a `MediaLocator` element in the `RelatedMaterial` element. At least one service logo shall be provided with the Media Type `image/jpeg` or `image/png` for compatibility purposes and other image formats including `image/webp` may be optionally provided. Service logos can be signalled at the service and service instance levels. The DVB-I client can request the image be scaled to a different resolution or appearance prior to delivery according to the method defined in clause 5.2.8.2.

5.2.6.3 Content Guide Source Logos

Logos for the content guide source shall be signalled in a single `RelatedMaterial` element within the service list with the following:

- A `HowRelated` element with an `@href` attribute carrying the value `urn:dvb:metadata:cs:HowRelatedCS:2021:1002.1`. This classification scheme is defined in clause D.1.
- `MediaLocator` elements which include a `MediaUri` element whose value contains a URI to the image file and whose `@contentType` attribute carries the image Media Type (MIME type).

Multiple content guide source logos can be signalled where each has a `MediaLocator` element in the `RelatedMaterial` element. At least one content guide source logo shall be provided with the Media Type `image/jpeg` or `image/png` for compatibility purposes and other image formats including `image/webp` may be optionally provided. The DVB-I client can request the image be scaled to a different resolution or appearance prior to delivery according to the method defined in clause 5.2.8.2.

5.2.6.4 Service Banners

Banners for the service shall be signalled in a single `RelatedMaterial` element within the service list with the following:

- A `HowRelated` element with an `@href` attribute carrying the value `urn:dvb:metadata:cs:HowRelatedCS:2021:1001.3`. This classification scheme is defined in clause D.1.
- `MediaLocator` elements which include a `MediaUri` element whose value contains a URI to the image file and whose `@contentType` attribute carries the image Media Type (MIME type).

A service banner is intended to be interchangeable and complementary with the logo and could be used where more screen space is available to depict a scene or theme for the service is available. A service banner can also be used in conjunction with the service logo. Multiple service banners can be signalled where each has a `MediaLocator` element in the `RelatedMaterial` element. At least one service banner shall be provided with the Media Type `image/jpeg` or `image/png` for compatibility purposes and other image formats including `image/webp` may be optionally provided. Service banners can be signalled at the service level. The DVB-I client can request the image be scaled to a different resolution or appearance prior to delivery according to the method defined in clause 5.2.8.2.

5.2.7 Description of DVB-I linear services and playlists

5.2.7.1 General

A DASH service instance can be either a linear service, i.e. a broadcast of scheduled programmes not streamed to a specific user, or a sequence of VoD streams, i.e. a playlist.

A playlist can be static, i.e. the same sequence of audio/video assets is provided to all users, or dynamic/personalized, i.e. the sequence of audio/video assets is dynamically created by the playlist server (see figure 1) when requested. The playlist is signalled to the DVB-I client as a DASH service instance with a content type that differentiates it from a regular DVB-DASH manifest file. The DVB-DASH manifest or playlist should only be retrieved and processed when the service instance is selected.

Personalization may be enabled with the assistance of a service related application and/or using cookies (out of scope).

5.2.7.2 DVB-I client behaviour

The DVB-I client can discriminate among the above options by means of the `@contentType` attribute of `UriBasedLocation`:

- If `@contentType` attribute carries `application/dash+xml`, the URL refers to an MPD file, describing either a DVB-I linear service or a playlist generated server side transparently for the DVB-I client.
- If `@contentType` attribute carries `application/xml`, the URL refers to an XML file provided by a playlist server, which in turn describes a dynamic/personalized playlist (see example in clause 5.2.7.4).

5.2.7.3 Handling and end of playlist or VoD content

When the DVB-I client has played out the VoD MPD or all of the items in the playlist, it should present a Content Finished image if one is signalled.

A content finished image is signalled in a single `RelatedMaterial` element with the following:

- A `HowRelated` element with an `@href` attribute carrying the value `urn:dvb:metadata:cs:HowRelatedCS:2021:1000.2`. This classification scheme is defined in clause D.1.
- `MediaLocator` elements which include a `MediaUri` element whose value contains a URI to the image file and whose `@contentType` attribute carries the image Media Type (MIME type).

Multiple content finished images can be signalled where each has a `MediaLocator` element in the `RelatedMaterial` element and the natural language of any text contained in the image should be reflected in the `@contentLanguage` attribute such that the DVB-I client can present the most useful image. At least one content finished image shall be provided with the Media Type `image/jpeg` or `image/png` for compatibility purposes and other image formats including `image/webp` may be optionally provided. The DVB-I client can request the image be scaled to a different resolution or appearance prior to delivery according to the method defined in clause 5.2.8.2.

5.2.7.4 Examples

- a) Description of a DVB-I linear service:

```
<ServiceInstance>
  <DisplayName>Linear Service 24/7</DisplayName>
  <DASHDeliveryParameters>
    <UriBasedLocation contentType="application/dash+xml">
      <URI>
        https://www.broadcaster.com/mpd/linear_service_24x7.mpd
      </URI>
    </UriBasedLocation>
  </DASHDeliveryParameters>
</ServiceInstance>
```

- b) Description of a dynamic/personalised playlist:

```
<ServiceInstance>
  <DisplayName>Dynamic/Personalised Playlist</DisplayName>
  <DASHDeliveryParameters>
    <UriBasedLocation contentType="application/xml">
      <URI>
        http://www.playlist_provider.com/playlists/MyPlaylist.xml
      </URI>
    </UriBasedLocation>
  </DASHDeliveryParameters>
</ServiceInstance>
```

where the `MyPlaylist.xml` file contains:

```
<?xml version="1.0" encoding="UTF-8"?>
<Playlist xmlns="urn:dvb:metadata:servicediscovery:2023"
  xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2023 ../dvbi_v5.0.xsd" >
  <PlaylistEntry>https://www.broadcaster.com/mpd/my_first_clip.mpd</PlaylistEntry>
  <PlaylistEntry>https://www.broadcaster.com/mpd/my_second_clip.mpd</PlaylistEntry>
  <PlaylistEntry>https://www.broadcaster.com/mpd/my_third_clip.mpd</PlaylistEntry>
</Playlist>
```

- c) Description of a static or dynamic playlist generated server-side (i.e. the service provider server takes care of preparing a specific multi-period MPD, transparently for the DVB-I client):

```
<ServiceInstance>
  <DisplayName>Playlist generated server-side</DisplayName>
  <DASHDeliveryParameters>
    <UriBasedLocation contentType="application/dash+xml">
      <URI>
        https://www.broadcaster.com/mpd/first+second+third_clip.mpd
      </URI>
    </UriBasedLocation>
  </DASHDeliveryParameters>
</ServiceInstance>
```

5.2.8 Images

5.2.8.1 Introduction

Provides an image linked from the service list or content guide sourced metadata and scaled according to the provided width parameter in pixels.

Service Lists, services, applications, and programmes may have an associated image, referenced in the `ServiceList` element, `GroupInformation` fragment or `ProgramInformation` fragment within a `RelatedMaterial` element.

NOTE: Client UI designs vary, for example some clients may have monochrome colour scheme; others may have a richly coloured scheme. The layout of client UI means that a particular image (e.g. service logo) may be required in different shapes and sizes. In order to get the best visual experience, it is preferred that shape and scheme are controlled at the source as part of the editorial process. With regard to size, it is usual that server-side scaling produces better image appearance.

The image variant query mechanisms allow a client to specify the most appropriate shape and colour scheme for its UI. This allows for streamlined metadata only containing the most appropriately formatted image. When requesting an image, the horizontal size of the image may be specified to allow the server to scale on behalf of the client.

5.2.8.2 Image Processing Requests

5.2.8.2.1 Image Variants

A range of variants may be available for certain image categories as defined below. The DVB-I client may append an optional `image_variant` query parameter to requests to certain endpoints to request a particular variant.

Only the requested variant, if available for an item, shall be returned by a Service List Server or Content Guide Server. If the requested variant is unavailable for an item, then the response shall not contain any image for that item.

Table 8 shows permissible `image_variant` query parameters.

Table 8: Image variants

Image variant	Query parameter image_variant=
16:9 colour	16x9_colour
1:1 colour	square_colour
4:3 colour	4x3_colour
16:9 white on transparent	16x9_white
1:1 white on transparent	square_white
16:9 colour light on transparent	16x9_colour_light
1:1 colour light on transparent	square_colour_light
16:9 colour dark on transparent	16x9_colour_dark
1:1 colour dark on transparent	square_colour_dark

NOTE: The colour_dark and colour_light variants refer to the colours of the image so colour_light is a light coloured image for use on a dark background and colour_dark is a dark coloured image for use on a light background.

All images shall have a pixel aspect ratio of 1:1.

The list of image_variant query parameters listed in table 8 shall be used by ALL endpoints to validate image_variant query parameters. If a valid value from this list is used, the response shall not error but is not required to contain an image. If any other value is provided, then an HTTP 400 Bad Request error shall be returned.

The DVB-I client shall explicitly check that the response contains a HowRelated term that matches the requested image variant. Additional image variants may be added in the future so any RelatedMaterial elements with an unexpected or unrecognized HowRelated term shall be ignored.

If no image_variant is specified, then a backwards-compatible default variant shall be assumed by a Content Guide Server. If an image variant is requested the default variant shall not be included in the response, including in the case where the requested variant is unavailable.

The RelatedMaterial.HowRelated@href for a default image shall be set as
urn:tva:metadata:cs:HowRelatedCS:2012:19

5.2.8.2.2 Image Resolution

The value of RelatedMaterial.MediaLocator.MediaUri shall represent the image_url for the image request. The client may request that the server perform image scaling by using the following query parameter:

<image_URL>?w=<width>

where:

- width is the width in pixels of the requested image. The original aspect ratio of the image shall determine the resulting image width - no cropping will be performed by the image resizing service.

5.2.8.3 Image Response

A Content Guide Server shall return an image of the required dimensions in JPEG or PNG format as specified in clause 7.1.1 of ETSI TS 102 796 [21], with the exception that GIF images are not supported. The format shall be specified in the MediaUri@contentType attribute. All images shall meet the following restrictions:

- Format: JPEG or PNG
- Colour Space: sRGB (either explicitly signalled or assumed if not)
- Colour Depth: 32 bits (8 bits per component)

The DVB-I client shall robustly handle situations where a referenced image is not available, i.e. an HTTP response code is returned indicating an unsuccessful request or retrieval fails for another reason.

For example, taking the following example section of a response from clause 5.2.8.2.2.

```
<RelatedMaterial>
  <!-- Promotional still image -->
  <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
  <MediaLocator>
    <MediaUri contentType="image/png">
      https://img-ctv.mdata.co.uk/channel7/service_a_linear.png</MediaUri>
    </MediaLocator>
  </RelatedMaterial>
```

Figure 8: Example - Image Response

In this instance, the complete image URL for the Service A image 200 pixels wide would be:

```
https://img-ctv.example.tv/channel7/service_a_linear.png?w=200
```

Assuming that the request is for a valid image, the response shall be a 200 (OK) HTTP response containing the requested image.

In the case that an unsupported width parameter is provided, a Content Guide Server shall respond with an HTTP 400 (Bad Request) response.

5.2.9 Extensibility

5.2.9.1 Introduction

Certain aspects of the DVB-I Service List Entry Points schema (see clause 5.3) and DVB-I Service List schema (see clause 5.5) are extensible. Rather than the general extensibility offered through the use of the XML `<any>` and `<anyAttribute>` Wildcard Schema Components defined in W3C XML Schema [i.7], the present document defines a fixed extensibility mechanism based on inheritance of datatypes.

5.2.9.2 Extensibility Base

The `ExtensionBaseType` defined in clause 5.5.23 is an abstract base type that 3rd parties extend to define concrete data types that can then be used to define elements in the XML instance document. This is a complexType and all 3rd party defined attributes and elements need to be contained within it. The `ExtensionBaseType@extensionName` attribute is mandatory and is used to convey information about the extension that can then aid validator functions.

5.2.10 Natural Language Processing

A DVB-I Service List or Service List Entry Points List allows certain elements to be repeated to convey the same information in different natural languages. Such elements use the `mpeg7:TextualType` datatype which allows the optional inclusion of an `xml:lang` attribute, the value of which shall be a language code as defined by IETF BCP 47 RFC 5646 [30]. Each such element shall only be repeated once per language code. If more than one language is provided for an element, each such element shall include the `xml:lang` attribute.

Processing of `xml:lang` attributes in DVB-I Content Guide Metadata is described in clause 6.4.3.

5.2.11 Interpreting Service Prominence

Article 7a of the European Audiovisual Media Services Directive [i.15] (AVMSD) allows for appropriate prominence to be applied to certain services, although makes no stipulation into how that prominence is to be reflected to the consumer which is determined by local regulations.

To convey the desired prominence of a service, the `ProminenceList` element, as defined in clause 5.5.27 is used. This element enables several schemes

- simple flagging of a service as being prominent when none of the attributes of the `Prominence` sub-element are specified
- prominence relative to other prominent services with the `@ranking` attribute of the `Prominence` sub-element is used
- geographic applicability of equal prominence when the `@country` and/or `@region` attributes of the `Prominence` sub-element is used.
- relative prominence within specific viewing regions when the `@ranking` attribute is used in conjunction with the `@country` and/or `@region` attributes of the `Prominence` sub-element.

Note that the `@country` and `@region` attributes pertain to the location selected by the user as being their viewing region. If prominence is not defined for the selected viewing region, any prominence should be determined from the nearest ancestor region in the `RegionList`.

Depending on local regulations, it may be possible to realize prominence through the use of LCN numbers.

5.2.12 Instant Setup and Direct Tuning for DVB-S/S2/S2X Services

5.2.12.1 Introduction

A hybrid DVB-I client with one or more satellite tuners (IRD for DVB-S/S2/S2X) may use the mechanism described in clause 5.2.1 to attain the channel list or may use the mechanism described in the present section to access services purely based on information contained in the `DVBSDeliveryParameters` element of DVB-I Service instances.

The mechanism hereunder is based on providing sufficient tuning information directly in the DVB-I Service List and specifically in the `DVBSDeliveryParameters` element of each service instance to be able to tune to services without a separate DVB-SI based network scan. This enhances both the speed of the initial IRD first time installation and allows tuning to services that have not been part of previous broadcast network scans. It also guarantees that IRDs always have the latest tuning information available to them.

Any combination of the two methods in described in this clause 5.2.12 and clause 5.2.1, with in particular fallback mechanisms implemented, may guarantee that end-users can always access services in a reliable manner even if any one of the two mechanisms fails. This may be the case e.g. when new temporary services appear that have not been previously scanned, when DVB-I Service Lists contain errors in the delivery parameters of a given service, in specific Satellite Master Antenna TV (SMATV) installations or when services change satellite transponders and therefore are no longer tuneable as long as the IRD service database is out-of-date.

5.2.12.2 First Time Installation: Instant setup

The Hybrid DVB-I DVB-S/S2/S2X IRD may build the receiver service list directly from a DVB-I Service List by:

- discarding instances that are not supported (see `ContentAttribute` element)
- using the tuning parameters contained in the `DVBSDeliveryParameters` element of selected instances and the `LCNTable` of the service for the selected `Region` and `SubscriptionPackage` (if applicable)

The IRD may support service instances with availability windows and multiple instances and behave accordingly, i. e. at the time of unavailability of the instance of highest priority the IRD shall switch to a service instance with a lower priority.

5.2.12.3 Direct Tuning

With traditional DVB-S/S2/S2X network scans, the information gathered during the initial setup phase tends to become outdated over time and services which have changed parameters e.g. different TSID and frequency (i.e. different triplet) are no longer receivable. As it is likely that DVB-I service lists are kept more recent and are updated more frequently by hybrid DVB-I clients, they are more likely to contain up-to-date tuning information.

Up-to-date tuning information is especially important for temporary timed event channels, which may not be discovered by traditional DVB network scans. It is therefore recommended to provide sufficient information in the DVB-I Service List to allow for a direct tuning based on the parameters contained in the `DVBSDeliveryParameters` of a service instance.

5.2.12.4 DVBSDeliveryParameters for Instant Setup and Direct Tuning

In order to allow the Instant Setup and Direct Tuning mechanism for DVB-S/S2/S2X services to be implemented in the context of DVB-I satellite service instances the tuning metadata elements shall be provided according to the following table:

Table 8a: Metadata elements required for Instant Setup and Direct Tuning

Metadata element	DVB-S/S2	DVB-S2X
DVBTriplet	M	M
OrbitalPosition	M	M
Frequency	M	M
Polarization	M	M
SymbolRate	M	M
RollOff	R	R
ModulationSystem	R	R
ModulationType	R	R
FEC	R	R
ModcodMode	n/a	M
InputStreamIdentifier	n/a	M
ChannelBonding	n/a	O

Key: M – mandatory, R – highly recommended, n/a – not applicable, O – optional.

The use of metadata elements shall be consistent for all satellite service instances that are part of a DVB-I Service List.

5.3 Service List Entry Points

5.3.1 Service List Entry Point schema

```
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:dvbisd="urn:dvb:metadata:servicelistdiscovery:2023"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2023" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
targetNamespace="urn:dvb:metadata:servicelistdiscovery:2023" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2023" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.xsd"/>
  <import namespace="urn:dvb:metadata:servicediscovery:2023" schemaLocation="dvbi_v5.0.xsd"/>
  <import namespace="http://www.w3.org/XML/1998/namespace" schemaLocation="xml.xsd"/>
  <element name="ServiceListEntryPoints" type="dvbisd:ServiceListEntryPointsType"/>
</schema>
```


5.3.2 ServiceListEntryPoints

An XML instance document containing a `ServiceListEntryPoints` element is returned on interface F2 in response to a Service List Discovery query (see clause 5.1.3).

```
<element name="ServiceListEntryPoints" type="dvbisd:ServiceListEntryPointsType"/>
<complexType name="ServiceListEntryPointsType">
  <sequence>
    <element name="ServiceListRegistryEntity" type="dvbisd:OrganizationType"/>
    <element name="ProviderOffering" type="dvbisd:ProviderOfferingType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="Extension" type="dvbisd:ExtensionBaseType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute ref="xml:lang" use="required"/>
</complexType>
```

Table 9: Service List Entry Point Fields

Name	Semantic Definition	Constraints
<code>ServiceListEntryPoints</code>	The reference element that points to one or more Service Lists hosted by one or more providers. This element is given as a response to a query on the F2 interface.	Mandatory
<code>@xml:lang</code>	Specifies the natural language when not explicitly provided in a multilingual element.	Mandatory
<code>ServiceListRegistryEntity</code>	The name and contact info of the organization managing the queried Service List Registry.	Mandatory
<code>ProviderOffering</code>	A list of Service List Providers with the associated Service Lists. See note.	Optional 0 .. ∞
<code>Extension</code>	Additional elements and attributes defined by 3rd parties	Optional 0 .. ∞
NOTE: If <code>ProviderOffering</code> element is not present, it means that the query does not match any entry in the Service List Registry.		

5.3.3 OrganizationType

```
<complexType name="OrganizationType">
  <complexContent>
    <extension base="mpeg7:AgentType">
      <sequence>
        <element name="Name" maxOccurs="unbounded">
          <complexType>
            <complexContent>
              <extension base="mpeg7:TextualType">
                <attribute name="type" use="optional">
                  <simpleType>
                    <restriction base="NMToken">
                      <enumeration value="former"/>
                      <enumeration value="variant"/>
                      <enumeration value="main"/>
                    </restriction>
                  </simpleType>
                </attribute>
              </extension>
            </complexContent>
          </complexType>
        </element>
        <element name="Kind" type="mpeg7:TermUseType" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

```

<element name="ContactName" type="mpeg7:PersonNameType" minOccurs="0"/>
<element name="Jurisdiction" type="mpeg7:PlaceType" minOccurs="0"/>
<element name="Address" type="mpeg7:PlaceType" minOccurs="0"/>
<element name="ElectronicAddress" type="mpeg7:ElectronicAddressType" minOccurs="0"/>
</sequence>
<attribute name="regulatorFlag" type="boolean" default="false"/>
</extension>
</complexContent>
</complexType>

```

Table 10: Organization Fields

Name	Semantic Definition	Constraints
Name	The name by which the organization is known. Multiple names can be specified as long as they are official variants of the main name. The optional @type attribute can be used to qualify the nature of each specified name: - former - The name is no longer used. - variant - The name is a variation of the official or most commonly used name. For example, an abbreviated form of the official name, or an informal nickname. - main - The name is either the official one or is widely known and used.	Mandatory 1 .. ∞
Kind	The nature of the organization (e.g. "company", "NGO", and so forth), which may be expressed using a controlled term.	Optional 0 .. 1
ContactName	The person who acts as the contact for the organization.	Optional 0 .. 1
Jurisdiction	A place that corresponds to the jurisdiction under which this organization is entered.	Optional 0 .. 1
Address	The address where the organization is located.	Optional 0 .. 1
ElectronicAddress	The electronic address information for this organization.	Optional 0 .. 1
@regulatorFlag	Boolean value indicating if this is a recognized regulator for a country (e.g. according to the List of EU Audiovisual Regulators [i.4]). If not specified the default value is false.	Optional

5.3.4 ProviderOfferingType

```

<complexType name="ProviderOfferingType">
  <sequence>
    <element name="Provider" type="dvbisd:OrganizationType"/>
    <element name="ServiceListOffering" type="dvbisd:ServiceListOfferingType" maxOccurs="unbounded"/>
  </sequence>
</complexType>

```

Table 11: Provider Offering Fields

Name	Semantic Definition	Constraints
Provider	The name and contact information of a Service List Provider whose offering is discoverable via the Service List Registry.	Mandatory
ServiceListOffering	A list of details and locations of the Service List(s) offered by the Service List Provider at the specific Service List Entry Point.	Mandatory 1 .. ∞

5.3.5 ServiceListOfferingType

```

<complexType name="ServiceListOfferingType">
  <sequence>
    <element name="ServiceListName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
    <element name="ServiceListURI" type="dvbisd:ExtendedURIType" maxOccurs="unbounded"/>
    <element name="Delivery" type="dvbisd:DeliveryType"/>
    <element name="Language" type="tva:AudioLanguageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="Genre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="TargetCountry" type="tva:ISO-3166-List" minOccurs="0" maxOccurs="unbounded"/>
    <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="SRSSupport" minOccurs="0">
      <complexType>
        <attribute name="postcode" type="boolean" default="false"/>
        <attribute name="regionId" type="boolean" default="false"/>
        <attribute name="receivedMultiplex" type="boolean" default="false"/>
      </complexType>
    </element>
  </sequence>
  <attribute name="regulatorListFlag" type="boolean" default="false"/>
  <attribute ref="xml:lang"/>
</complexType>

```

Table 12: Service List Offering Fields

Name	Semantic Definition	Constraints
ServiceListName	The name of the service list in a human readable form. Multiple service list names can be specified as long as they have different @xml:lang values. See note 1. This shall be the same as ServiceListName as in the ServiceList.Name element.	Mandatory 1 .. ∞
ServiceListURI	The URI where the Service List may be retrieved. Multiple URIs can be specified if the same Service List can be obtained from different servers.	Mandatory 1 .. ∞
Delivery	Identifies the delivery methods used to deliver the services in the Service List. Indicating which of the delivery methods are required in order to offer an acceptable experience, as defined by the service list provider. This enables a client to determine if all required delivery sources are available before attempting installation of the Service List.	Mandatory 1
Language	The audio language of the Service List's services. Multiple Language elements can be specified in case of multilingual contents. If no language is specified, responses to service list registry queries shall include the service list offering.	Optional 0 .. ∞
Genre	The genre of the contents available for the service list according to the TV-Anytime standard. If no genre are specified, responses to service list registry queries shall include the service list offering. A finer grain approach is possible by specifying the genre at the service level (ServiceList.Service.ServiceGenre). Similar to ServiceGenre, possible values are taken from: - ContentCS defined in ETSI TS 102 822-3-1 [7] - FormatCS defined in ETSI TS 102 822-3-1 [7] - ContentSubject defined in clause D.5	Optional 0 .. ∞

Name	Semantic Definition	Constraints
TargetCountry	The country code or a list of country codes indicating the countries where the service is intended to be received. If not specified, no regional constraints exist and the service can be received anywhere. See note 2.	Optional 0 .. ∞
RelatedMaterial	Additional material related to the service. Use to signal the following: Service list logos, see clause 5.2.6.1	Optional 0 .. ∞
SRSSupport	Indicates which methods the Service List Server supports for server-side composing of service lists based on client provided information.	Optional 0 .. 1
@postcode	Indicates the server support postcode query (see clause 5.6.4.2)	Optional
@regionId	Indicates the server supports query through regionId (see clause 5.6.4.4)	Optional
@receivedMultiplex	Indicates the server supports query through receivable multiplex (see clause 5.6.4.3)	Optional
@regulatorListFlag	Boolean value indicating if this is the "default list" for a country (e.g. according to the List of EU Audiovisual Regulators [i.4]). If not specified the default value is <i>false</i>	Optional
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional
NOTE 1: Refer to clause 5.2.10 for processing of multiple language elements.		
NOTE 2: Particular attention shall be paid when using @regulatorList in conjunction with multiple target countries.		

5.3.6 DeliveryType

5.3.6.1 Overview

```

<complexType name="DeliveryType">
  <sequence>
    <element name="DASHDelivery" type="dvbisd:NoAdditionalIPParametersType" minOccurs="0"/>
    <element name="DVBTDelivery" type="dvbisd:DVBTDeliveryType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="DVBCDelivery" type="dvbisd:DVBCDeliveryType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="DVBSDelivery" type="dvbisd:DVBSDeliveryType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="RTSPDelivery" type="dvbisd:NoAdditionalIPParametersType" minOccurs="0"/>
    <element name="MulticastTSDelivery" type="dvbisd:NoAdditionalIPParametersType" minOccurs="0"/>
    <element name="ApplicationDelivery" type="dvbisd:ApplicationTypeListType" minOccurs="0"/>
    <element name="OtherDeliveryParameters" type="dvbisd:ExtensionBaseType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>

```

Table 12a: DeliveryType Fields

Name	Semantic Definition	Constraints
DASHDelivery	Indicates that DVB-DASH delivery is used for one or more service instances in the Service List.	Optional 0 .. 1
DVBTDelivery	Indicates that DVB-T delivery is used for one or more service instances in the Service List.	Optional 0 .. ∞
DVBCDelivery	Indicates that DVB-C delivery is used for one or more service instances in the Service List.	Optional 0 .. ∞
DVBSDelivery	Indicates that DVB-S delivery is used for one or more service instances in the Service List.	Optional 0 .. ∞
RTSPDelivery	Indicates that RTSP delivery is used for one or more service instances in the Service List.	Optional 0 .. 1
MulticastTSDelivery	Indicates that multicast UDP delivery is used for one or more service instances in the Service List.	Optional 0 .. 1

Name	Semantic Definition	Constraints
ApplicationDelivery	Indicates that an application is used to manage content delivery or is considered essential to the user experience by the service list provider, for one or more services in the Service List. Describes the types of application available. Each application type shall be a valid alternative for a client to use. A DVB-I client need only support one of the listed application types. This enables the provision of different application types for different DVB-I client platforms (e.g. TV, mobile).	Optional 0 .. 1
OtherDeliveryParameters	Parameters defined for other delivery systems.	Optional 0 .. ∞

For Service List Registry queries, the Delivery values defined in table 12b shall be used, for each of the corresponding DeliveryTypes.

Table 12b: Delivery Parameters for Service List Registry Queries

Delivery	DeliveryType(s) required in query response Service List Offerings
dvb-dash	DASHDelivery optionally in combination with MulticastTSDelivery
dvb-t	DVBTDelivery
dvb-c	DVBCTDelivery
dvb-s	DVBSDelivery
dvb-iptv	MulticastTSDelivery and/or RTSPDelivery
application	ApplicationDelivery

5.3.6.2 AbstractDeliveryType

```
<complexType name="AbstractDeliveryType" abstract="true">
  <attribute name="required" type="boolean" default="false"/>
</complexType>
```

Table 12c: AbstractDeliveryType Fields

Name	Semantic Definition	Constraints
@required	Indicates whether the delivery type must be supported by the DVB-I client and installed, in order to offer an acceptable experience as defined by the service list provider. A delivery type is installed when the related broadcast signal or IP network can be used by the client to retrieve DVB services. When set to <code>true</code> , the DVB-I client should only install the service list offering if the broadcast signal, IP network or application related to the delivery type can be used by the client to retrieve DVB services. When set to <code>false</code> , the delivery type is used by one or more service instances, but is not required (not essential) to offer an acceptable experience as defined by the service list provider. The DVB-I client can install the service list offering even if it does not support the delivery type.	Optional

5.3.6.3 AbstractIPDeliveryType

```
<complexType name="AbstractIPDeliveryType" abstract="true">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <attribute name="minimumBitRate" type="unsignedInt"/>
    </extension>
  </complexContent>
</complexType>
```

Table 12d: AbstractIPDeliveryType Fields

Name	Semantic Definition	Constraints
@minimumBitRate	Threshold bit-rate, in bits per second, under which a DVB-I client won't be able to offer an acceptable experience, as defined by the service list provider.	Optional

5.3.6.4 NoAdditionalIPParametersType

```
<complexType name="NoAdditionalIPParametersType">
  <complexContent>
    <extension base="dvbisd:AbstractIPDeliveryType">
      <!-- no additional elements or attributes -->
    </extension>
  </complexContent>
</complexType>
```

5.3.6.5 DVBTDeliveryType

```
<complexType name="DVBTDeliveryType">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <attribute name="originalNetworkID" type="dvbisd:NetworkIDType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
```

Table 12e: DVBTDeliveryType Fields

Name	Semantic Definition	Constraints
@originalNetworkID	Identifies the original network to which one or more service instances in the service list belong.	Optional

5.3.6.6 DVBCDeliveryType

```
<complexType name="DVBCDeliveryType">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <attribute name="networkID" type="dvbisd:NetworkIDType" use="required"/>
    </extension>
  </complexContent>
</complexType>
```

Table 12f: DVBCDeliveryType Fields

Name	Semantic Definition	Constraints
@networkID	Identifies the cable network that delivers one or more service instances in the service list.	Mandatory

5.3.6.7 DVBSDeliveryType

```

<complexType name="DVBSDeliveryType">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <sequence>
        <element name="OrbitalPosition" type="dvbisd:LongitudeType" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="originalNetworkID" type="dvbisd:NetworkIdType" use="optional"/>
      <annotation><documentation>The use of this attribute is deprecated.</documentation></annotation>
    </attribute>
  </extension>
</complexContent>
</complexType>

```

Table 12g: DVBSDeliveryType Fields

Name	Semantic Definition	Constraints
OrbitalPosition	Identifies the orbital position of a satellite delivering one or more service instances in the service list. Expressed in positive or negative degrees representing east and west directions respectively.	Mandatory 1 .. ∞
@originalNetworkId	Identifies the original network to which one or more service instances in the service list belong. The use of this attribute is deprecated as its meaning is historic and no longer used.	Optional

5.3.6.8 ApplicationTypeListType

```

<complexType name="ApplicationTypeListType">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <sequence>
        <element name="ApplicationType" type="dvbisd:ApplicationType" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>

```

Table 12h: ApplicationTypeListType Fields

Name	Semantic Definition	Constraints
ApplicationType	Describes the type of an application used to manage content delivery for one or more services in the Service List, as defined in clause 5.2.3. If @contentType="application/vnd.dvb.ait+xml", the @xmlAitApplicationType attribute shall be included with a value as defined in ETSI TS 102 809 [5], clauses 5.2.2, 5.4.4.4 and 5.4.4.11.	Mandatory 1 .. ∞

5.3.6.9 ApplicationType

```
<complexType name="ApplicationType">
  <attribute name="contentType" type="mpeg7:mimeType" use="required"/>
  <attribute name="xmlAitApplicationType" type="mpeg7:mimeType"/>
</complexType>
```

Table 12i: ApplicationType Fields

Name	Semantic Definition	Constraints
@contentType	The MIME type of the application or application signalling, as defined in clause 5.2.3, table 7.	Mandatory
@xmlAitApplicationType	The Application Type as defined in ETSI TS 102 809 [5] clause 5.4.4.11 for an XML Application Information Table.	Optional

5.4 Schema

5.4.1 Schema Declaration

```
<schema xmlns="http://www.w3.org/2001/XMLSchema" targetNamespace="urn:dvb:metadata:servicediscovery:2023"
xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023" xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2023"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2023" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.xsd"/>
  <import namespace="http://www.w3.org/XML/1998/namespace" schemaLocation="xml.xsd"/>
  <element name="ServiceList" type="dvbisd:ServiceListType"/>
</schema>
```

5.4.2 Entity Definitions

The following entities are defined in this schema for readability, maintainability and refined faceting.

```
<!DOCTYPE schema [
  <ENTITY PostcodeChar      "A-Za-z0-9">
  <ENTITY PostcodeSep      "\- ">
  <ENTITY Postcode         "[&PostcodeChar;]+([&PostcodeSep;][&PostcodeChar;])? ">
  <ENTITY PostcodeWildFirst "\*([&PostcodeChar;]*&PostcodeSep;)[&PostcodeChar;]+">
  <ENTITY PostcodeWildMiddle
    "([&PostcodeChar;]*&PostcodeSep;)[&PostcodeChar;]+([&PostcodeChar;][&PostcodeSep;])*&PostcodeChar;]+">
  <ENTITY PostcodeWildLast  "[&PostcodeChar;][&PostcodeSep;][&PostcodeChar;]*\* ">

  <ENTITY DecimalByte      "([1-9]?[0-9])|(1[0-9][0-9])|(2[0-4][0-9])|(25[0-5])">
  <ENTITY IPv4Address      "{&DecimalByte;}.{3}&DecimalByte;">

  <ENTITY HexDigit         "[0-9A-Fa-f]">
  <ENTITY Hex32             "&HexDigit;{1,8}">
  <ENTITY Hex16             "&HexDigit;{1,4}">
  <ENTITY Hex8              "&HexDigit;{1,2}">
]>
```


Table 13: Service List XML Entities

Name	Definition
PostcodeChar	The set of characters that are permitted in a postal code
PostcodeSep	The separator characters that may be used in a postcode, generally only one separator is permitted in a postcode
Postcode	One or more characters, and optional separator and then one or more characters
PostcodeWildFirst	A postcode with the wildcard matching character in the first position
PostcodeWildMiddle	A postcode with the wildcard matching character in middle. This is defined as being one of two options, before the separator or after it
PostcodeWildLast	A postcode with the wildcard matching character in the last position
DecimalByte	The decimal representation of a byte
IPv4Address	Four decimal bytes separated by periods
HexDigit	The set of characters that are permitted in the hexadecimal representation of a number
Hex32	1 to 8 hexadecimal digits representing the values 0 through FFFFFFFF
Hex16	1 to 4 hexadecimal digits representing the values 0 through FFFF
Hex8	1 or 2 hexadecimal digits representing the values 0 through FF

5.5 Service Lists

5.5.1 ServiceList

An XML instance document containing a `ServiceList` element is returned on interface B2 in response to a service list query.

```

<element name="ServiceList" type="dvbisd:ServiceListType"/>
<complexType name="ServiceListType">
  <sequence>
    <element name="Name" type="mpeg7:TextualType" maxOccurs="unbounded"/>
    <element name="ProviderName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
    <element name="LanguageList" type="dvbisd:LanguageListType" minOccurs="0"/>
    <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="RegionList" type="dvbisd:RegionListType" minOccurs="0"/>
    <element name="TargetRegion" type="dvbisd:RegionIdRefType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="LCNTableList" type="dvbisd:LCNTableListType" minOccurs="0"/>
    <choice minOccurs="0">
      <element name="ContentGuideSourceList" type="dvbisd:ContentGuideSourceListType"/>
      <element name="ContentGuideSource" type="dvbisd:ContentGuideSourceType"/>
    </choice>
    <choice minOccurs="0" maxOccurs="unbounded">
      <element name="Service" type="dvbisd:ServiceType"/>
      <element name="TestService" type="dvbisd:ServiceType"/>
    </choice>
    <element name="SubscriptionPackageList" type="SubscriptionPackageListType" minOccurs="0"/>
    <any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="version" type="positiveInteger" use="required"/>
  <attribute name="responseStatus" use="optional"/>
  <simpleType>
    <restriction base="string">
      <enumeration value="OK"/>
      <enumeration value="ERROR_INVALID_MUX_INFO"/>
      <enumeration value="ERROR_INVALID_REQUEST"/>
      <enumeration value="ERROR_BUSY"/>
      <enumeration value="ERROR_GENERIC_FAILURE"/>
      <enumeration value="ERROR_INVALID_POSTCODE"/>
      <enumeration value="ERROR_INVALID_REGION_ID"/>
    </restriction>
  </simpleType>
</complexType>

```

```

    </restriction>
  </simpleType>
</attribute>
<attribute ref="xml:lang" use="required"/>
</complexType>
<complexType name="LanguageListType">
  <sequence>
    <element name="Language" type="tva:AudioLanguageType" maxOccurs="unbounded"/>
  </sequence>
</complexType>

```

Table 14: Service List Fields

Name	Semantic Definition	Constraints
ServiceList	A list of the details and locations of IP services offered by the service provider. A service provider can divide their services into multiple service lists for administrative convenience.	Mandatory
Name	The name of this service list in a human readable form. Multiple service list names can be specified as long as they have different @xml:lang values. See note.	Mandatory 1 .. ∞
ProviderName	The name of the provider of this service list in a human readable form. Multiple values for the provider name can be specified as long as they have different @xml:lang values. See note.	Mandatory 1 .. ∞
LanguageList	A list of audio languages related to the Service List's services. The list of languages will be the same as those shown when the ServiceList is returned as a ServiceListOffering in a ServiceList Registry response (see clause 5.3.5).	Optional 0 .. 1
RelatedMaterial	Additional material related to the service. Use to signal the following: Service list logos, see clause 5.2.6.1.	Optional 0 .. ∞
RegionList	A list of geographic regions with logical identifiers that are used to provide regionalization of the service list or services in the service list.	Optional
TargetRegion	The identifiers of those regions specified in the RegionList for which this service list is targeted.	Optional 0 .. ∞
LCNTableList	The list of tables that define regionalized and packaged logical channel numbers for the services in this service list.	Optional
ContentGuideSourceList	A list of content guide sources providing schedule and programme metadata for one or more services, through the ContentGuideSourceRef element, in this service list.	Optional 0 .. 1
ContentGuideSource	The details of a content guide source providing schedule and programme metadata for all services in this service list that do not have their own ContentGuideSource element.	Optional 0 .. 1
Service	The services that are part of this service list.	Optional 0 .. ∞
TestService	The services that are provided for testing purposes within this service list. Note that these services should not generally be selectable unless some specific capability is enabled in the DVB-I Client.	Optional 0 .. ∞
SubscriptionPackageList	The list of subscription packages that apply to one or more LCN tables in the service list and/or to one or more service instances in the service list (see clause 5.1.5).	Optional 0 .. 1
@version	The version number of the service list. Shall be incremented for every published change.	Mandatory
@responseStatus	Indicate if the query was successfully processed by the server or otherwise (see clause 5.6.4.5).	Optional
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Mandatory

NOTE: Refer to clause 5.2.10 for processing of multiple language elements.

5.5.2 ServiceType

```

<complexType name="ServiceType">
  <sequence>
    <element name="UniqueIdentifier" type="dvbisd:ServiceIdentifierType"/>
    <element name="ServiceInstance" type="dvbisd:ServiceInstanceType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="TargetRegion" type="dvbisd:RegionIdRefType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ServiceName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
    <element name="ProviderName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
    <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ServiceGenre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ServiceType" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="ServiceDescription" type="tva:SynopsisType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="RecordingInfo" type="tva:ControlledTermType" minOccurs="0"/>
    <choice minOccurs="0">
      <element name="ContentGuideSource" type="dvbisd:ContentGuideSourceType"/>
      <element name="ContentGuideSourceRef" type="dvbisd:ContentGuideProviderRefIdType"/>
    </choice>
    <element name="ContentGuideServiceRef" type="string" minOccurs="0"/>
    <element name="AdditionalServiceParameters" type="dvbisd:ExtensionBaseType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="NVOD" type="dvbisd:NVODType" minOccurs="0"/>
    <element name="ProminenceList" type="dvbisd:ServiceProminenceListType" minOccurs="0"/>
    <element name="ParentalRating" type="dvbisd:ParentalRatingType" minOccurs="0"/>
  </sequence>
  <attribute name="dynamic" type="boolean" default="false"/>
  <attribute name="version" type="positiveInteger" use="required"/>
  <attribute name="replayAvailable" type="boolean" default="false"/>
  <attribute ref="xml:lang"/>
</complexType>

```

Table 15: ServiceType Fields

Name	Semantic Definition	Constraints
UniqueIdentifier	The unique ID of the service. This ID should never be changed for a service, even if all other parameters of the service are changed. Refer to clause 5.2.2 for the suitable formats of the service identifier.	Mandatory
ServiceInstance	The instances(s) where the A/V content for the service may be found. If multiple elements of this type are present and available (refer to clause 5.2.5), the one with the lowest value of the @priority attribute has the highest priority. All service instances for a given service carry the same editorial content.	Optional 0 .. ∞
TargetRegion	The region identifier(s), as denoted by Region@regionId, of the regions where the service is intended to be received. If not specified, no regional constraints exist and the service can be received anywhere.	Optional 0 .. ∞
ServiceName	The name of the service. Multiple service names can be specified as long as they have different @xml:lang values. See note 1.	Mandatory 1 .. ∞
ProviderName	The name of the provider of this service in a human readable form. This element should include an @xml:lang attribute to identify the language being used. See note 1.	Mandatory 1 .. ∞
RelatedMaterial	Additional material related to the service. Use to signal the following: • Out of service banners, see clause 5.2.5.3 • Service related applications, see clause 5.2.3 • Service logos, see clause 5.2.6.2 • Service banner, see clause 5.2.6.4 • Content finished banner, see clause 5.2.7.3	Optional 0 .. ∞

Name	Semantic Definition	Constraints
ServiceGenre	A genre that characterizes the programming on the service. Possible values are taken from: - ContentCS defined in ETSI TS 102 822-3-1 [7] - FormatCS defined in ETSI TS 102 822-3-1 [7] - ContentSubject defined in clause D.5	Optional 0 .. ∞
ServiceType	Identifies the representation of the service, selected from the values available in the ServiceTypeCS classification scheme (see clause D.4). If not specified, the service contains linear television.	Optional 0 .. 1
ServiceDescription	A description of the service. Multiple descriptions can be specified as long as they have different @xml:lang and @length values. See note 1.	Optional 0 .. ∞
RecordingInfo	In some territories this signalling may help a DVB-I client determine whether or not the content from this service may be recorded, time-shifted and/or redistributed. How clients make use of this signalling is not defined by the present document. The value for this element should be taken from the RecordingInfoCS defined in clause D.3.	Optional 0 .. 1
ContentGuideSource	The details of a content guide source providing schedule and programme metadata for this service. Overrides a ContentGuideSource defined at ServiceList level.	Optional 0 .. 1
ContentGuideSourceRef	The ID referencing a ContentGuideSource defined in the ContentGuideSourceList.	
ContentGuideServiceRef	The identifier to be used in queries to the Content Guide Server to obtain programme metadata for this service, instead of the unique ID.	Optional 0 .. 1
AdditionalServiceParameters	Elements and attributes that are defined by 3rd parties to convey additional information about the service.	Optional 0 .. ∞
NVOD	Defines the role of the service in regards to a NVOD offering. Refer to clause 5.5.26 for a description of the values conveyed in this element.	Optional 0 .. 1
ProminenceList	List of geographic regions where prominence, according to article 7a of the EU Audiovisual Media Services Directive ("AVMSD") [i.15], is applied for this service.	Optional 0 .. 1
ParentalRating	The parental rating of the service. Defines the minimum age required in order to view the service (see clause 5.5.28). Different minimum age ratings may be defined for different countries.	Optional 0 .. 1
@dynamic	Indicates whether the programme content on the service is reactive and dynamically scheduled (see clause 6.5.3.2).	Optional
@version	The version number of the service. Shall be incremented for every published change.	Mandatory
@replayAvailable	Indicates that the service provides on demand playback of one or more previously aired programs. See note 2.	Optional
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional
NOTE 1: Refer to clause 5.2.10 for processing of multiple language elements.		
NOTE 2: Previous versions of this specification signalled restart availability through the ServiceGenre element.		

5.5.3 Convenience Types

5.5.3.1 ServiceIdentifierType

```
<simpleType name="ServiceIdentifierType">
  <restriction base="anyURI"/>
</simpleType>
```

5.5.3.2 SubscriptionPackageType

```
<complexType name="SubscriptionPackageType">
  <simpleContent>
    <extension base="mpeg7:TextualType"/>
  </simpleContent>
</complexType>
```

5.5.4 ServiceInstanceType

```
<complexType name="ServiceInstanceType">
  <sequence>
    <element name="DisplayName" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ContentProtection" type="dvbisd:ContentProtectionType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ContentAttributes" type="dvbisd:ContentAttributesType" minOccurs="0"/>
    <element name="Availability" type="dvbisd:ServiceAvailabilityType" minOccurs="0"/>
    <element name="SubscriptionPackage" type="dvbisd:SubscriptionPackageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="FTACContentManagement" type="dvbisd:FTACContentManagementType" minOccurs="0"/>
    <element name="SourceType" type="anyURI" minOccurs="0"/>
    <element name="AltServiceName" type="string" minOccurs="0" maxOccurs="unbounded"/>
    <choice minOccurs="0">
      <sequence>
        <element name="DVBTDeliveryParameters" type="dvbisd:DVBTDeliveryParametersType"/>
        <element name="SATIPDeliveryParameters" type="dvbisd:SATIPDeliveryParametersType" minOccurs="0"/>
      </sequence>
      <sequence>
        <element name="DVBSDeliveryParameters" type="dvbisd:DVBSDeliveryParametersType"/>
        <element name="SATIPDeliveryParameters" type="dvbisd:SATIPDeliveryParametersType" minOccurs="0"/>
      </sequence>
      <element name="DVBCDeliveryParameters" type="dvbisd:DVBCDeliveryParametersType"/>
      <element name="RTSPDeliveryParameters" type="dvbisd:RTSPDeliveryParametersType"/>
      <element name="MulticastTSDeliveryParameters" type="dvbisd:MulticastTSDeliveryParametersType"/>
      <sequence>
        <element name="DASHDeliveryParameters" type="dvbisd:DASHDeliveryParametersType"/>
        <element name="MulticastTSDeliveryParameters" type="dvbisd:MulticastTSDeliveryParametersType"
          minOccurs="0"/>
      </sequence>
      <element name="OtherDeliveryParameters" type="dvbisd:ExtensionBaseType"/>
    </choice>
  </sequence>
  <attribute name="priority" type="nonNegativeInteger" default="0"/>
  <attribute name="id" type="string" default="0"/>
  <attribute ref="xml:lang"/>
</complexType>
```

Table 16: ServiceInstanceType Fields

Name	Semantic Definition	Constraints
DisplayName	Human-readable name of the service associated to this service instance. Multiple names may be provided as long as they all have different <code>@xml:lang</code> attributes. When not present, <code>ServiceName</code> is used. See note.	Optional 0 .. ∞

Name	Semantic Definition	Constraints
RelatedMaterial	Additional material related to the service. Use to signal the following: - Out of service banners, see clause 5.2.5.3 - Service related applications, see clause 5.2.3 - Service logos, see clause 5.2.6.2 - Content finished banner, see clause 5.2.7.3 Any related material with a particular value of <code>HowRelated</code> that is provided within a <code>ServiceInstance</code> element supersedes any corresponding related material with that value of <code>HowRelated</code> that is provided within a <code>Service</code> element.	Optional 0 .. ∞
ContentProtection	Denotes the content protection schemes being used for this service instance, together with their corresponding identifiers.	Optional 0 .. ∞
ContentAttributes	The attributes of the audio, video, captioning and signing of this service instance.	Optional 0 .. 1
Availability	Indicates the period(s) in time when this service instance is expected to be active.	Optional 0 .. 1
SubscriptionPackage	Identifies the subscription packages in which this service instance is included (see clause 5.1.5). If present, this service instance is selectable only by a DVB-I client that is associated to one of the <code>SubscriptionPackage</code> elements listed here. If not specified, no subscription package constraints exist and the service instance can be selected regardless of any subscription package associated with the DVB-I client (e.g. selected during installation of the service list).	Optional 0 .. ∞
FTAContentManagement	DVB-I service instances not using DRM may carry a <code>FTAContentManagement</code> element to define the content management policy for the service instance. The semantics of each attribute are those defined for the correspondingly named fields of the <code>FTA_content_management_descriptor</code> defined in clause 6.2.18.0 of ETSI EN 300 468 [6].	Optional 0 .. 1
SourceType	Identifies the primary delivery source for this service instance and thus determines the required delivery parameters according to table 17. The use of this element is deprecated in this version of the specification, in favour of the client application making a delivery system determination based on the specified delivery parameters.	Deprecated! Optional 0 .. 1
AltServiceName	Name(s) to use in combination with <code>ServiceName</code> when matching this service instance with a service from a broadcast signal. Multiple alternative names can be specified, for broadcasts that may use different service name variants (e.g. Channel 1, Channel One, Channel 1 HD). When not present, only <code>ServiceName</code> is used for service instance matching.	Optional 0 .. ∞
DVBTDeliveryParameters	Delivery parameters for DVB-T services.	Optional Choice
DVBSDeliveryParameters	Delivery parameters for DVB-S services.	
DVBCTDeliveryParameters	Delivery parameters for DVB-C services.	
RTSPDeliveryParameters	Delivery parameters for RTSP based services.	
MulticastTSDeliveryParameters	Delivery parameters for services delivered using multicast UDP.	
DASHDeliveryParameters	Delivery parameters for services using ETSI TS 103 285 [1] delivery.	
SATIPDeliveryParameters	Provides parameters that a DVB-I client supporting SAT>IP as a "thin client" can use to receive the service instance from a SAT>IP server.	
OtherDeliveryParameters	Parameters defined for other delivery systems.	

Name	Semantic Definition	Constraints
@priority	The priority of this service instance relative to the other service instances of the service. Lower values of this attribute indicate a higher priority. Selection between service instances which have the same priority is implementation dependant.	Optional
@id	An identifier of this service instance, primarily used to link with program metadata defined in ETSI TS 102 822-3-1 [7].	Optional
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional
NOTE: Refer to clause 5.2.10 for processing of multiple language elements.		

Table 17: Required Delivery Parameters for each Source Type

SourceType	Required Delivery Parameters
urn:dvb:metadata:source:dvb-t	DVBTDeliveryParameters with optional SATIPDeliveryParameters
urn:dvb:metadata:source:dvb-s	DVBSDeliveryParameters with optional SATIPDeliveryParameters
urn:dvb:metadata:source:dvb-c	DVBCTDeliveryParameters
urn:dvb:metadata:source:dvb-iptv	MulticastTSDeliveryParameters or RTSPDeliveryParameters
urn:dvb:metadata:source:dvb-dash	DASHDeliveryParameters with optional MulticastTSDeliveryParameters
urn:dvb:metadata:source:application	None (application signalled by means of a RelatedMaterial element)

5.5.5 ContentAttributesType

```

<complexType name="ContentAttributesType">
  <sequence>
    <element name="AudioAttributes" type="tva:AudioAttributesType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="AudioConformancePoint" type="tva:ControlledTermType" minOccurs="0" maxOccurs="unbounded">
      <annotation><documentation>The use of this element is deprecated</documentation></annotation>
    </element>
    <element name="VideoAttributes" type="dvbisd:VideoAttributesType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="VideoConformancePoint" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="CaptionLanguage" type="tva:CaptionLanguageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="SignLanguage" type="tva:SignLanguageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>

```

Table 18: ContentAttributesType Fields

Name	Semantic Definition	Constraints
AudioAttributes	The attributes of any audio component in the service. Only leaf term values from the following classification schemes are permitted values for Coding@href (see also note 1) - urn:dvb:metadata:cs:AudioCodecCS:2007 - urn:dvb:metadata:cs:AudioCodecCS:2020 - urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001	Optional 0 .. ∞
AudioConformancePoint	The conformance point, according to urn:dvb:metadata:cs:AudioConformancePointsCS:2017 (see note 2) as defined in ETSI TS 101 154 [22], denoting audio formats that may be used in the service. The use of this element is deprecated in favour of the AudioAttributes element which more precisely conveys the properties of audio components within the service.	Deprecated! Optional 0 .. ∞

Name	Semantic Definition	Constraints
VideoAttributes	The attributes of any video components the service. Only leaf term values from the following classification schemes are permitted values for Coding@href (see also note 1) - urn:dvb:metadata:cs:VideoCodecCS:2007 - urn:dvb:metadata:cs:VideoCodecCS:2021 - urn:dvb:metadata:cs:VideoCodecCS:2022 - urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001	Optional 0 .. ∞
VideoConformancePoint	The conformance point, according to the leaf terms values from either of the following classification schemes (see notes 1 and 2) as defined in ETSI TS 101 154 [22], denoting the video format that may be used in the service - urn:dvb:metadata:cs:VideoConformancePointsCS:2017 - urn:dvb:metadata:cs:VideoConformancePointsCS:2021 - urn:dvb:metadata:cs:VideoConformancePointsCS:2022	Optional 0 .. 1
CaptionLanguage	The language of captions in the service. The format and use of the caption information is provided in the delivery system metadata.	Optional 0 .. ∞
SignLanguage	The language of the signing with the service.	Optional 0 .. ∞
NOTE 1: Subsequent versions of the DVB classification schemes will carry the same main part of the namespace up to the year which denotes a revision in order to permit wildcard based disambiguation of identifiers.		
NOTE 2: Classification schemes in the urn:dvb namespace can be found at https://www.dvb.org/metadata/ .		

Note that all audio formats expressed through the `AudioAttributes` and `AudioConformancePoint` elements may be present in the service and that all visual formats specified through the `VideoAttributes` and `VideoConformancePoint` elements may be present in the service, i.e. the values from the elements are combinatorial.

5.5.6 ContentGuideSourceListType

```
<complexType name="ContentGuideSourceListType">
  <sequence>
    <element name="ContentGuideSource" type="dvbisd:ContentGuideSourceType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute ref="xml:lang"/>
</complexType>
```

Table 19: ContentGuideSourceListType Fields

Name	Semantic Definition	Constraints
ContentGuideSource	The details of a content guide source providing metadata for one or more services in the service list.	Optional 0 .. ∞
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional

5.5.7 ContentGuideSourceType

```
<complexType name="ContentGuideSourceType">
  <sequence>
    <element name="Name" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ProviderName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
    <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ScheduleInfoEndpoint" type="dvbisd:ExtendedURIType"/>
    <element name="ProgramInfoEndpoint" type="dvbisd:ExtendedURIType" minOccurs="0"/>
    <element name="GroupInfoEndpoint" type="dvbisd:ExtendedURIType" minOccurs="0"/>
    <element name="MoreEpisodesEndpoint" type="dvbisd:ExtendedURIType" minOccurs="0"/>
  </sequence>
  <attribute name="CGSID" type="dvbisd:ContentGuideProviderIdType" use="required"/>
</complexType>
```



```

<attribute name="minimumMetadataUpdatePeriod" type="duration"/>
<attribute ref="xml:lang"/>
</complexType>

<simpleType name="ContentGuideProviderIdType">
  <restriction base="ID"/>
</simpleType>
<simpleType name="ContentGuideProviderRefIdType">
  <restriction base="IDREF"/>
</simpleType>

```

Table 20: ContentGuideSourceType Fields

Name	Semantic Definition	Constraints
Name	The name of the content guide source. Multiple content guide names can be specified as long as they have different @xml:lang values. See note.	Optional 0 .. ∞
ProviderName	The name of the provider of this content guide source in a human readable form. This element should include an @xml:lang attribute to identify the language being used. See note.	Mandatory 1 .. ∞
RelatedMaterial	Additional material related to the content guide as a whole. Used to signal the following: Content Guide Source logos, see clause 5.2.6.3	Optional 0 .. ∞
ScheduleInfoEndpoint	The scheme, authority and path syntax components of a URL for the endpoint of the API providing schedule metadata from this content guide source. The @contentType attribute should be set to application/xml denoting that the endpoint will provide an XML document according to clause 6.5.4.	Mandatory
ProgramInfoEndpoint	The scheme, authority and path syntax components of a URL for the endpoint of the API providing detailed programme metadata for specific programmes from this content guide source. This metadata provides additional details to complement basic programme details provided by a schedule endpoint. The @contentType attribute should be set to application/xml denoting that the endpoint will provide an XML document according to clause 6.6.3.	Optional 0 .. 1
GroupInfoEndpoint	The scheme, authority and path syntax components of a URL for the endpoint of the API providing programme grouping data (e.g. series) from this content guide source. The @contentType attribute should be set to application/xml denoting that the endpoint will provide an XML document according to clauses 6.8.2.3, 6.8.3.3 and 6.8.4.3.	Optional 0 .. 1
MoreEpisodesEndpoint	The scheme, authority and path syntax components of a URL for the endpoint of the API providing programme metadata and group metadata for programmes in the same group as the programme used to make the request. The @contentType attribute should be set to application/xml denoting that the endpoint will provide an XML document according to clause 6.7.3.	Optional 0 .. 1
@CGSID	The unique ID of the ContentGuideSource in the ContentGuideSourceList. This ID can be used to reference a common ContentGuideSource definition in the ContentGuideSourceList, when multiple services in the service list use the same source of content guide data.	Mandatory
@minimumMetadataUpdatePeriod	This indicates the minimum update period for metadata provided by the ContentGuideSource for end-points that may require polling (see clause 6.5.3.2).	Optional
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional
NOTE: Refer to clause 5.2.10 for processing of multiple language elements.		

5.5.8 DVBTripIetType

This definition of DVBTripIetType is adapted from the DVBTripIet defined in ETSI TS 102 034 [4].

```
<complexType name="DVBTripIetType">
  <attribute name="origNetId" type="dvbisd:OrigNetId" use="optional"/>
  <attribute name="tsId" type="dvbisd:TSId" use="optional"/>
  <attribute name="serviceId" type="dvbisd:ServiceId" use="required"/>
</complexType>
```

Table 21: DVBTripIetType Fields

Name	Semantic Definition	Constraints
@origNetId	Refer to clause 5.2.12.8 of ETSI TS 102 034 [4] for semantic definition of the OrigNetId attribute. The present document allows this attribute to be omitted.	Optional
@tsId	Refer to clause 5.2.12.8 of ETSI TS 102 034 [4] for semantic definition of the TSId attribute. The present document allows this attribute to be omitted.	Optional
@serviceId	Refer to clause 5.2.12.8 of ETSI TS 102 034 [4] for semantic definition of the ServiceId attribute.	Mandatory

5.5.9 ExtendedURIType

A type used to provide a URI with additional information.

```
<complexType name="ExtendedURIType">
  <sequence>
    <element name="URI" type="anyURI"/>
  </sequence>
  <attribute name="contentType" type="mpeg7:mimeType" use="required"/>
</complexType>
```

Table 22: ExtendedURIType Fields

Name	Semantic Definition	Constraints
URI	The URI providing the location of the service.	Mandatory
@contentType	The MIME type of the object identified by the URI.	Mandatory

5.5.10 LCNTableEntryType

```
<complexType name="LCNTableEntryType">
  <attribute name="channelNumber" type="positiveInteger" use="required"/>
  <attribute name="serviceRef" type="dvbisd:ServiceIdentifierType" use="required"/>
  <attribute name="selectable" type="boolean" default="true"/>
  <attribute name="visible" type="boolean" default="true"/>
</complexType>
```

Table 23: LCNTableEntryType Fields

Name	Semantic Definition	Constraints
@channelNumber	The logical channel number. The semantics for this attribute are the same as for the logical_channel_number field in the ciplus_service_descriptor (see annex N.1.2.3 of CI Plus™ [2]).	Mandatory
@serviceRef	Reference to the service identified by UniqueIdentifier defined in this service list for the logical channel number.	Mandatory

Name	Semantic Definition	Constraints
@selectable	A flag indicating whether the service should be selectable via direct numerical entry of the logical channel number. This flag is only interpreted when the <code>visible</code> flag is set to <code>false</code> . When set to <code>true</code> , the flag indicates that the hidden service is selectable by direct entry of the logical channel number; when set to <code>false</code> , then the hidden service is not directly selectable by the user (but may be selectable by LCN from an application environment).	Optional
@visible	A flag indicating whether the service should be included in any service list or EPG presented to the viewer. When set to <code>true</code> , this flag indicates that the service is normally visible via the Host service or channel list and EPG etc. When set to <code>false</code> , this indicates that the receiver is not expected to offer the service to the user in normal navigation modes but the receiver shall provide a mechanism to access these services by direct entry of the logical channel number, depending on the setting of the <code>selectable</code> flag.	Optional

5.5.11 LCNTableListType

```
<complexType name="LCNTableListType">
  <sequence>
    <element name="LCNTable" type="dvbisd:LCNTableType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

Table 24: LCNTableListType Fields

Name	Semantic Definition	Constraints
LCNTable	A channel number table representing an ordered sequence of services irrespective of the position of the service in the service list.	Optional 0 .. ∞

5.5.12 LCNTableType

```
<complexType name="LCNTableType">
  <sequence>
    <element name="TargetRegion" type="dvbisd:RegionIdRefType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="SubscriptionPackage" type="dvbisd:SubscriptionPackageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="LCN" type="dvbisd:LCNTableEntryType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

Table 25: LCNTableType Fields

Name	Semantic Definition	Constraints
TargetRegion	The region identifier(s), as denoted by <code>Region@regionId</code> , of the regions where the LCN table applies. If not specified, no regional constraints exist and the LCN table is applicable anywhere.	Optional 0 .. ∞
SubscriptionPackage	Identifies the subscription packages to which this LCN table applies (see clause 5.1.5). If not specified, the LCN table is applicable to any subscription package, though more suitable LCN tables for particular subscription packages could also be present.	Optional 0 .. ∞
LCN	Describes a channel number to service mapping.	Optional 0 .. ∞

When installing a DVB-I service list that uses LCN tables, following selection of the region and/or subscription package (if either or both are specified), a single `LCNTable` shall be selected. Different LCN tables are not intended to be combined by the DVB-I client. Therefore, there shall be **only one** applicable `LCNTable` in the service list:

- in total, when no `TargetRegion` and `SubscriptionPackage` are used,
- for each unique `TargetRegion` when no `SubscriptionPackage` is used,
- for each unique `SubscriptionPackage` when no `TargetRegion` is used,
- for each unique combination of `TargetRegion` and `SubscriptionPackage`, when both `TargetRegion` and `SubscriptionPackage` are used.

5.5.13 McastType

For semantic and syntax definitions, refer to clause 5.2.12.14 of ETSI TS 102 034 [4].

5.5.14 RTSPURLType

For semantic and syntax definitions, refer to clause 5.2.12.30 of ETSI TS 102 034 [4].

5.5.15 ServiceAvailabilityType

```
<complexType name="ServiceAvailabilityType">
  <sequence>
    <element name="Period" maxOccurs="unbounded">
      <complexType>
        <sequence>
          <element name="Interval" minOccurs="0" maxOccurs="unbounded">
            <complexType>
              <attribute name="days" type="dvbisd:ServiceDaysList" default="1 2 3 4 5 6 7"/>
              <attribute name="recurrence" type="positiveInteger" default="1"/>
              <attribute name="startTime" type="dvbisd:ZuluTimeType" default="00:00:00Z"/>
              <attribute name="endTime" type="dvbisd:ZuluTimeType" default="23:59:59.999Z"/>
            </complexType>
          </element>
        </sequence>
        <attribute name="validFrom" type="dateTime"/>
        <attribute name="validTo" type="dateTime"/>
      </complexType>
    </element>
  </sequence>
</complexType>
```

Table 26: ServiceAvailabilityType Fields

Name	Semantic Definition	Constraints
Period		Mandatory 1 .. ∞
@validFrom	The time and date that this service will become or became available. If not specified, it is assumed that the service is already available.	Optional
@validTo	The time and date that this service will cease to be available. If not specified, it is assumed that the service will be available indefinitely.	Optional

Name	Semantic Definition	Constraints
Interval		Optional 0 .. ∞
@days	Defines which days in a calendar week the service is available. If not specified then the service is available on all days. For example @days="1 4 7" means that the service is only available on Monday, Thursday and Sunday.	Optional
@recurrence	Specifies the weekly cadence of the scheduled availability for the service. If not specified then the recurrence occurs every week.	Optional
@startTime	The time of day that the service becomes available. If not specified the service starts at midnight at the start of the day.	Optional
@endTime	The time of day that the service ceases to be available. If this value is less than or equal to the value of @startTime the service ends on the following day. If not specified the service ends at midnight of the present day.	Optional

5.5.16 ServiceDaysList

```

<simpleType name="ServiceDaysList">
  <list>
    <simpleType>
      <restriction base="integer">
        <minInclusive value="1">
          <annotation><documentation xml:lang="en">Monday</documentation></annotation>
        </minInclusive>
        <maxInclusive value="7">
          <annotation><documentation xml:lang="en">Sunday</documentation></annotation>
        </maxInclusive>
      </restriction>
    </simpleType>
  </list>
</simpleType>

```

5.5.17 ZuluTimeType

This datatype restricts the XML `time` type, permitting only Zulu time to be specified. Zulu time, denoted by "Z" is equivalent to UTC (see clause 3.2.8.2 of W3C XML Schema Part 2: Datatypes [i.6]).

```

<simpleType name="ZuluTimeType">
  <restriction base="time">
    <pattern value="(((01|d|2[0-3]):[0-5]\d:[0-5]\d(\.\d+)?)Z"/>
  </restriction>
</simpleType>

```

5.5.18 Delivery Parameters

5.5.18.1 DVBTDeliveryParametersType

```

<complexType name="DVBTDeliveryParametersType">
  <sequence>
    <element name="DVBTripLet" type="dvbisd:DVBTripLetType" />
    <element name="TargetCountry" type="tva:ISO-3166-Code" />
  </sequence>
</complexType>

```

Table 27: DVBTDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service. @tsId or @origNetId may be omitted to indicate a wildcard. Service instance matching may not be valid if both @tsId and @origNetId are omitted.	Mandatory
TargetCountry	The country where the broadcast service is delivered.	Mandatory

5.5.18.2 DVBSDeliveryParametersType

```

<complexType name="DVBSDeliveryParametersType">
  <sequence>
    <element name="DVBTriplet" type="dvbisd:DVBTripletType"/>
    <element name="OrbitalPosition" type="dvbisd:LongitudeType" minOccurs="0"/>
    <sequence minOccurs="0">
      <element name="Frequency" type="positiveInteger" />
      <element name="Polarization">
        <simpleType>
          <restriction base="string">
            <enumeration value="horizontal"/>
            <enumeration value="vertical"/>
            <enumeration value="left circular"/>
            <enumeration value="right circular"/>
          </restriction>
        </simpleType>
      </element>
    <sequence minOccurs="0">
      <element name="SymbolRate" type="positiveInteger"/>
      <sequence minOccurs="0">
        <element name="RollOff">
          <simpleType>
            <restriction base="string">
              <enumeration value="0.35"/>
              <enumeration value="0.25"/>
              <enumeration value="0.20"/>
              <enumeration value="0.15"/>
              <enumeration value="0.10"/>
              <enumeration value="0.05"/>
            </restriction>
          </simpleType>
        </element>
        <element name="ModulationSystem">
          <simpleType>
            <restriction base="string">
              <enumeration value="DVB-S"/>
              <enumeration value="DVB-S2"/>
              <enumeration value="DVB-S2X"/>
            </restriction>
          </simpleType>
        </element>
        <element name="ModulationType">
          <simpleType>
            <restriction base="string">
              <enumeration value="QPSK"/>
              <enumeration value="8PSK"/>
              <enumeration value="8PSK-L"/>
              <enumeration value="16APSK"/>
            </restriction>
          </simpleType>
        </element>
      </sequence>
    </sequence>
  </sequence>
</complexType>

```

```

        <enumeration value="16APSK-L"/>
        <enumeration value="32APSK"/>
        <enumeration value="32APSK-L"/>
        <enumeration value="64APSK"/>
        <enumeration value="64APSK-L"/>
    </restriction>
</simpleType>
</element>
<element name="FEC">
    <simpleType>
        <restriction base="string">
            <enumeration value="1/2"/>
            <enumeration value="2/3"/>
            <enumeration value="3/4"/>
            <enumeration value="5/6"/>
            <enumeration value="7/8"/>
            <enumeration value="8/9"/>
            <enumeration value="3/5"/>
            <enumeration value="4/5"/>
            <enumeration value="9/10"/>
            <enumeration value="1/4"/>
            <enumeration value="1/3"/>
            <enumeration value="2/5"/>
            <enumeration value="13/45"/>
            <enumeration value="9/20"/>
            <enumeration value="11/20"/>
            <enumeration value="23/36"/>
            <enumeration value="25/36"/>
            <enumeration value="13/18"/>
            <enumeration value="5/9"/>
            <enumeration value="26/45"/>
            <enumeration value="28/45"/>
            <enumeration value="7/9"/>
            <enumeration value="77/90"/>
            <enumeration value="8/15"/>
            <enumeration value="32/45"/>
            <enumeration value="11/15"/>
        </restriction>
    </simpleType>
</element>
</sequence>
<sequence minOccurs="0">
    <annotation>
        <documentation>DVB-S2X only</documentation>
    </annotation>
    <element name="ModcodMode">
        <simpleType>
            <restriction base="string">
                <enumeration value="ccm"/>
                <enumeration value="vcm"/>
            </restriction>
        </simpleType>
    </element>
    <element name="InputStreamIdentifier" type="unsignedByte" minOccurs="0"/>
    <element name="ChannelBonding" minOccurs="0">
        <complexType>
            <sequence>
                <element name="Frequency" minOccurs="2" maxOccurs="unbounded">
                    <complexType>

```

```

    <simpleContent>
      <extension base="positiveInteger">
        <attribute name="primary" type="boolean" default="false"/>
      </extension>
    </simpleContent>
  </complexType>
</element>
</sequence>
</complexType>
</element>
</sequence>
</sequence>
</sequence>
</sequence>
</complexType>

```

Table 28: DVBSDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service. @tsId or @origNetId may be omitted to indicate a wildcard. Service instance matching may not be valid if both @tsId and @origNetId are omitted.	Mandatory
OrbitalPosition	The orbital position expressed in positive or negative degrees representing east and west directions respectively.	Optional {0..1}
Frequency	The carrier frequency expressed in units of 10 kHz. This unit size is also used in the frequency provided in the satellite delivery system descriptor, clause 6.2.13.2 of ETSI EN 300 468 [6].	Optional {0..1}
Polarization	The polarization of the transmitted signal.	
SymbolRate	The symbol rate in kSymbol/s.	Optional {0..1}
RollOff	Specifies the roll-off factor. For DVB-S this value shall be set to "0.35". For DVB-S2 this value shall be set to "0.35", "0.25" or "0.20". For DVB-S2X, this value shall be set to "0.35", "0.25", "0.20", "0.15", "0.10" or "0.05".	Optional {0..1}
ModulationSystem	Specifies the broadcast scheme used: DVB-S, DVB-S2 or DVB-S2X.	
ModulationType	Specifies the modulation scheme used. For DVB-S this value shall be set to "QPSK". For DVB-S2 this value shall be set to "QPSK" or "8PSK". For DVB-S2X, the possible combinations of ModulationType and FEC shall be according to table 1 of ETSI EN 302 307-2 [35].	
FEC	Specifies the FEC inner scheme used.	
ModcodMode	For DVB-S2X, this value shall be set to "ccm" or "vcm". Not used for DVB-S and DVB-S2.	Optional {0..1}
InputStreamIdentifier	For DVB-S2X, this value identifies an Input Stream Identifier. Not used for DVB-S or DVB-S2.	
ChannelBonding	For a DVB-S2X delivery system part of a channel bond, centre frequencies of the bonded transponders shall be listed. Attribute @primary indicates the role in the channel bond. Not used for DVB-S and DVB-S2.	

5.5.18.3 DVBCDeliveryParametersType

```

<complexType name="DVBCDeliveryParametersType">
  <sequence>
    <element name="DVBTriplet" type="dvbisd:DVBTripletType" />
    <element name="TargetCountry" type="tva:ISO-3166-Code" />
  </sequence>
</complexType>

```



```

    <element name="NetworkID" type="dvbisd:NetworkIdType" />
  </sequence>
</complexType>

<simpleType name="NetworkIdType">
  <restriction base="unsignedShort"/>
</simpleType>

```

Table 29: DVBCDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service. @tsId or @origNetId may be omitted to indicate a wildcard. Service instance matching may not be valid if both @tsId and @origNetId are omitted.	Mandatory
TargetCountry	The country identifier where the broadcast service is delivered.	Mandatory
NetworkID	Identifies the terrestrial network that supports the service.	Mandatory

5.5.18.4 RTSPDeliveryParametersType

```

<complexType name="RTSPDeliveryParametersType">
  <sequence>
    <element name="DVBTriplet" type="dvbisd:DVBTripletType"/>
    <element name="RTSPURL" type="dvbisd:RTSPURLType"/>
    <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
  </sequence>
</complexType>

```

Table 30: RTSPDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service. @tsId or @origNetId may be omitted to indicate a wildcard. Service instance matching may not be valid if both @tsId and @origNetId are omitted.	Mandatory
RTSPURL	Signals the use of RTSP to access the service and provides the URL at which the service description may be accessed. This URL is also the aggregate URL when control URLs are present for FEC streams.	Mandatory
MinimumBitRate	Threshold bit-rate under which an alternative source for the same service should be preferred, if available.	Optional

5.5.18.5 MulticastTSDeliveryParametersType

```

<complexType name="MulticastTSDeliveryParametersType">
  <sequence>
    <element name="DVBTriplet" type="dvbisd:DVBTripletType" minOccurs="0"/>
    <element name="IPMulticastAddress" type="dvbisd:McastType"/>
    <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
  </sequence>
</complexType>

```

Table 31: MulticastTSDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service. @tsId or @origNetId may be omitted to indicate a wildcard. Service instance matching may not be valid if both @tsId and @origNetId are omitted.	Optional
IPMulticastAddress	Signals the use of IGMP to access the service and provides the transport address and other parameters at which the service may be accessed.	Mandatory
MinimumBitRate	Threshold bit-rate under which an alternative source for the same service should be preferred, if available.	Optional

5.5.18.6 DASHDeliveryParametersType

```

<complexType name="DASHDeliveryParametersType">
  <sequence>
    <element name="UriBasedLocation" type="dvbisd:ExtendedURIType"/>
    <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
    <element name="Extension" type="dvbisd:ExtensionBaseType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>

```

Table 32: DASHDeliveryParametersType Fields

Name	Semantic Definition	Constraints
UriBasedLocation	Provides the URI where the service is located, where the target of the URI has the MIME type as provided in the @contentType attribute.	Mandatory
MinimumBitRate	Threshold bit-rate under which an alternative source for the same service should be preferred, if available.	Optional
Extension	Elements and attributes that are defined by 3rd parties applicable to broadband content delivery using DVB-DASH.	Optional 0 .. ∞

5.5.18.7 SATIPDeliveryParametersType

```

<complexType name="SATIPDeliveryParametersType">
  <sequence>
    <element name="QueryParameters" type="string"/>
  </sequence>
</complexType>

```

Table 33: SATIPDeliveryParametersType Fields

Name	Semantic Definition	Constraints
QueryParameters	Contains a list of query parameters formatted for SAT>IP according to clauses 3.5.10 and 3.5.11 for DVB-S/S2 and annexes C and D for DVB-C and T/T2 of EN 50585 [10] except the "src" query parameter. The SAT>IP client is responsible for determining the local address of an appropriate SAT>IP server and for determining the correct "src" parameter, based on information from the corresponding DVBSDeliveryParameters element. A DVB-I client shall not choose a SAT>IP delivered service instance in preference to other available service instances unless either: a) it can verify, using local configuration or other means, that the SAT>IP server is receiving broadcasts from the orbital position described in the DVBSDeliveryParameters.OrbitalPosition element; or b) it is able to perform the service instance matching rules defined in clause 5.2.1.	Mandatory

5.5.19 FTACContentManagementType

```

<complexType name="FTACContentManagementType">
  <attribute name="userDefined" type="boolean" use="required"/>
  <attribute name="doNotScramble" type="boolean" use="required"/>
  <attribute name="controlRemoteAccessOverInternet" use="required">
    <simpleType>
      <restriction base="unsignedByte">
        <minInclusive value="0"/>
        <maxInclusive value="3"/>
      </restriction>
    </simpleType>
  </attribute>
  <attribute name="doNotApplyRevocation" type="boolean" use="required"/>
</complexType>

```

Table 34: FTACContentManagementType Fields

Name	Semantic Definition	Constraints
@userDefined	The semantics of each attribute are those defined for the correspondingly named fields of the FTA_content_management_descriptor defined in clause 6.2.18.0 of ETSI EN 300 468 [6].	Mandatory
@doNotScramble		Mandatory
@controlRemoteAccessOverInternet		Mandatory
@doNotApplyRevocation		Mandatory

5.5.20 ContentProtectionType

```

<complexType name="ContentProtectionType">
  <sequence>
    <element name="CASystemId" type="dvbisd:CASystemType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="DRMSystemId" type="dvbisd:DRMSystemType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="ProtectionSystemType" abstract="true">
  <simpleContent>

```

```

    <extension base="string">
      <attribute name="cpsIndex" type="string"/>
    </extension>
  </simpleContent>
</complexType>
<complexType name="CASystemType">
  <complexContent>
    <extension base="dvbisd:ProtectionSystemType"/>
  </complexContent>
</complexType>
<complexType name="DRMSystemType">
  <complexContent>
    <extension base="dvbisd:ProtectionSystemType">
      <attribute name="encryptionScheme" type="dvbisd:EncryptionSchemeType" use="required"/>
    </extension>
  </complexContent>
</complexType>
<simpleType name="EncryptionSchemeType">
  <restriction base="string">
    <enumeration value="cenc"/>
    <enumeration value="cbcs"/>
    <enumeration value="cbcs-10"/>
  </restriction>
</simpleType>

```

Table 35: ContentProtectionType Fields

Name	Semantic Definition	Constraints
CASystemId	Denotes the Conditional Access system(s) being used for this service instance. The value(s) shall consist of CA System ID(s) as defined in clause 5.2 of ETSI TS 101 162 [11].	Optional 0 .. ∞
@cpsIndex	The index of the content protection scheme, unique for a service, across all service instances. Enables a specific content protection scheme to be referenced within the content guide metadata. For instance, a service may only use content protection for specific events.	Optional
DRMSystemId	Denotes the content protection scheme(s) being used for this service instance. The value(s) shall consist of DRM SystemIDs as described in clause 8.2 of ETSI TS 103 285 [1].	Optional 0 .. ∞
@encryptionScheme	Indicates the encryption scheme, as defined for @value in clause 8.4 of ETSI TS 103 285 [1]. For interoperability with client devices that only support a specific pattern of encrypted/unencrypted bytes such as that described in clause 4.5.2 of CTA-5001-B [i.12], the additional 'cbcs-10' value can be used to identify AES-128 CBC with a 1:9 encrypt:skip pattern (10 % partial encryption) as recommended in clause 10.4.2 of ISO/IEC 23001-7:2016 [23].	Mandatory
@cpsIndex	The index of the content protection scheme, unique for a service, across all service instances. Enables a specific content protection scheme to be referenced within the content guide metadata. For instance, a service may only use content protection for specific events.	Optional
NOTE 1: Registered CA System IDs can be found here: https://www.dvbservices.com/identifiers/ca_system_id .		
NOTE 2: Registered DRM SystemIDs can be found here: https://dashif.org/identifiers/content_protection/ .		

NOTE: The present document does not define a dedicated mechanism for delivering licenses to content protection systems. This may be done using a linked application, see clause 5.1.6.

5.5.21 void

void.

5.5.22 void

void.

Table 36: void

5.5.23 ExtensionBaseType

```
<complexType name="ExtensionBaseType" abstract="true">
  <attribute name="extensionName" use="required">
    <simpleType>
      <restriction base="string">
        <pattern value="[A-Za-z0-9][A-Za-z0-9:\-\.]*[A-Za-z0-9]"/>
      </restriction>
    </simpleType>
  </attribute>
</complexType>
```

Table 37: ExtensionBaseType Fields

Name	Semantic Definition	Constraints
@extensionName	Identifies the definition for the extension. Specifications or organizations defining extensions to the present document should take care to use this attribute in way that provides both identification and uniqueness.	Mandatory

5.5.24 VideoAttributesType

```
<complexType name="VideoAttributesType">
  <complexContent>
    <extension base="tva:VideoAttributesType">
      <sequence>
        <element name="Colorimetry" type="tva:ControlledTermType" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
```

Table 37a: VideoAttributesType Fields

Name	Semantic Definition	Constraints
Colorimetry	The colorimetric parameters of the video image. This term should be taken from the "ColorimetryCS" classification scheme defined in clause D.6. When this element is absent the colorimetry of the video can be assumed to be "BT.709".	Optional 0 .. 1

5.5.25 SubscriptionPackageListType

```
<complexType name="SubscriptionPackageListType">
  <sequence>
    <element name="SubscriptionPackage" type="dvbisd:SubscriptionPackageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="allowNoPackage" type="boolean" default="true"/>
</complexType>
```

Table 37b: SubscriptionPackageListType Fields

Name	Semantic Definition	Constraints
SubscriptionPackage	Identifies a subscription package (see clause 5.1.5) that applies to one or more LCN tables in the service list (see clause 5.5.12) and/or to one or more service instances in the service list (see clause 5.5.4).	Optional 0 .. ∞
@allowNoPackage	Specifies whether one of the subscription packages from the list must be selected to install the service list or not. When set to <code>true</code> , it shall be possible to select none of the subscription packages in the list when installing the service list.	Optional

5.5.26 NVODType

```

<complexType name="NVODType">
  <attribute name="mode" use="required">
    <simpleType>
      <restriction base="string">
        <enumeration value="reference"/>
        <enumeration value="timeshifted"/>
      </restriction>
    </simpleType>
  </attribute>
  <attribute name="reference" type="dvbisd:ServiceIdentifierType"/>
  <attribute name="offset" default="PT0S">
    <simpleType>
      <restriction base="duration">
        <minInclusive value="PT0S"/>
      </restriction>
    </simpleType>
  </attribute>
</complexType>

```

Table 37c: NVODType Fields

Name	Semantic Definition	Constraints
@mode	Identifies the service as being either an NVOD reference service or an NVOD timeshifted service.	Mandatory
@reference	Applies only when @mode="timeshifted". The unique identifier of the reference service in the service list that this service is	Optional
@offset	Applies only when @mode="timeshifted". Specifies the time difference of programs shown on the time-shifted service in relation to the reference service. If this attribute is omitted it should be interpreted as zero duration.	Optional

5.5.27 Service Prominence

```

<complexType name="ServiceProminenceListType">
  <sequence>
    <element name="Prominence" type="dvbisd:ServiceProminenceEntryType" maxOccurs="unbounded"/>
  </sequence>
</complexType>

<complexType name="ServiceProminenceEntryType">
  <simpleContent>
    <extension base="string">
      <attribute name="country" type="tva:ISO-3166-Code"/>
      <attribute name="region" type="dvbisd:RegionIdRefType"/>
      <attribute name="ranking">

```

```

<simpleType>
  <restriction base="integer">
    <minInclusive value="1"/>
    <maxInclusive value="4095"/>
  </restriction>
</simpleType>
</attribute>
</extension>
</simpleContent>
</complexType>

```

Table 37d: ServiceProminenceListType Fields

Name	Semantic Definition	Constraints
Prominence	A list of prominence entries for the service.	Mandatory 1 .. ∞

Table 37e: ServiceProminenceEntryType Fields

Name	Semantic Definition	Constraints
@country	The code for the country where this prominence entry applies.	Optional
@region	The region identifier (@regionID as defined in clause 5.6.2.1) for the region where this prominence entries applies.	Optional
@ranking	Indicates the relative prominence to be attributed to the service within the specified country or region. Lower values of this attribute indicate a higher priority. If this attribute is not provided, then the service can be considered as prominent, but its correlation with other prominent services is indeterminant.	Optional

5.5.28 ParentalRatingType

```

<complexType name="ParentalRatingType">
  <sequence>
    <element name="MinimumAge" maxOccurs="unbounded">
      <complexType>
        <simpleContent>
          <extension base="nonNegativeInteger">
            <attribute name="countryCodes" type="tva:ISO-3166-List" use="optional"/>
          </extension>
        </simpleContent>
      </complexType>
    </element>
  </sequence>
</complexType>

```

Table 37f: ParentalRatingType Fields

Name	Semantic Definition	Constraints
MinimumAge	The minimum age required by the parental rating attributed to the service. Different ratings may be defined for different countries or groups of countries. For example, MinimumAge=7 means viewers should be at least 7 years old. A maximum of one MinimumAge shall be defined per country.	Mandatory 1 .. ∞

Name	Semantic Definition	Constraints
@countryCodes	Optionally the country or countries to which the associated minimum age rating applies may be defined, by specifying one or more ISO 3166 [i.8] country codes as a comma-separated list. When no country is defined, the minimum age rating shall apply irrespective of the country. Different minimum ages ratings may be defined for different countries.	Optional

Signalling the parental rating at the service level can be a more efficient way of enforcing parental rating for services that consist predominantly or exclusively of programmes of a certain age rating, and for which no content guide metadata is available.

When selecting a service, the client shall enforce its current parental rating criteria using the `Service.ParentalRating` when it is defined for that service. Except when parental rating information provided by content guide metadata (see clause 6.10.15) is available, then the content guide metadata shall take precedence over `Service.ParentalRating` when selecting the service during the corresponding programme.

For example, with a client parental rating configured to restrict content for ages 16+, when selecting a service with `Service.ParentalRating.MinimumAge = 12` applicable to the user's country, the client shall permit access to the service.

However, when a programme on that service has a minimum age rating of 18+ as signalled via the content guide metadata, the client shall prohibit access to the service during that specific programme.

Conversely, with a client parental rating configured to restrict content for ages 16+, when selecting a service with `Service.ParentalRating.MinimumAge = 18` applicable to the user's country, the client will prohibit access to the service.

However, when a programme on that service has a minimum age rating of 12+ as signalled via the content guide metadata, the client shall allow access to the service during that specific programme.

5.6 Service Regionalization

5.6.1 General

DVB services are generally targeted at a specific region. There are multiple reasons for this, including the characteristics of the DVB delivery system used which limit the geographic area where the service may be received, the carriage of information tailored to a specific geographic region, content licensing restrictions or regulatory requirements, e.g. requirements relating to parental access control.

To meet these needs, DVB services described in a DVB-I service list can be associated with one or more target regions.

5.6.2 RegionList

5.6.2.1 General

When a DVB-I service list contains services that have target regions, a region list shall be provided together with the service list. The region list contains a definition of every region that can be targeted by one or more DVB services in the service list. The service list can then reference the regions defined in the region list using their unique `regionID`.

Regions can be grouped hierarchically. At the top level, a region list shall contain one or more regions that represent different countries. Each of these regions representing countries, may contain zero, one or more primary sub-regions, each containing zero, one or more secondary sub-regions, that may each contain zero, one or more tertiary sub-regions. Therefore, a region list hierarchy shall consist of up to four levels in total, equivalent to the target region descriptor hierarchy (defined in clause 6.4.12 of ETSI EN 300 468 [6]):

- Region List
 - Region (Country) [1 .. n]
 - Primary sub-region [0 .. n]
 - Secondary sub-region [0 .. n]
 - Tertiary sub-region [0 .. n]

Services may not be targeted at every region. Some regions may only be defined to structure the region list. When a region is only used to structure the region list, and no services or LCN tables are targeted at that region, then `@selectable=false` shall be specified for the region. This enables clients to determine which regions can be selected for installing the service list, i.e. those with `@selectable=true`. Regions at the lowest levels, i.e. regions that are leaves in the region list tree structure, shall always be selectable to prevent navigation in user interfaces leading to no selectable region.

When regions are used in combination with LCN tables, there shall be only one corresponding `LCNTable` for each unique `TargetRegion` when no `SubscriptionPackage` is used, or for each unique combination of `TargetRegion` and `SubscriptionPackage` when both `TargetRegion` and `SubscriptionPackage` are used.

Table 38 provides the semantic definition of `RegionListType` fields.

Table 38: RegionListType Fields

Name	Semantic Definition	Constraints
<code>PostcodeType</code>	A string containing one postcode, defined by the following pattern expressed in ABNF: <code>Postcode = 1*(ALPHA / DIGIT) [SP / "-"] 1*(ALPHA / DIGIT)</code> A postcode may be composed of alphanumeric characters (upper- and lower-case ASCII letters and decimal digits defined in ISO/IEC 646 [8]). A single whitespace (7-bit ASCII as defined in ISO/IEC 646 [8] code point 0x20) or hyphens (7-bit ASCII as defined in ISO/IEC 646 [8] code point 0x2D) may occur in the middle.	
<code>WildcardPostcodeType</code>	A string containing part(s) of a postcode combined with one wildcard character, defined by the following pattern expressed in ABNF: <code>WcPostcode = "*" *(ALPHA / DIGIT) [SP / "-"] 1*(ALPHA / DIGIT)</code> <code>WcPostcode /= 1*(ALPHA / DIGIT) [SP / "-"] "*" 1*(ALPHA / DIGIT)</code> <code>WcPostcode /= 1*(ALPHA / DIGIT) "*" [SP / "-"] 1*(ALPHA / DIGIT)</code> <code>WcPostcode /= 1*(ALPHA / DIGIT) [SP / "-"] *(ALPHA / DIGIT) "*"</code> An asterisk character "*" (7-bit ASCII as defined in ISO/IEC 646 [8] code point 0x2A) shall be used as a wildcard, that shall match with one or more alphanumeric characters. A wildcard character shall only be used once within a single wildcard postcode string.	
<code>PostcodeRangeType</code>	A type used to define a range of postcodes. Postcode order shall follow ASCII-code as defined in ISO/IEC 646 [8] order.	
<code>@from</code>	The postcode defining the start of the range.	Mandatory
<code>@to</code>	The postcode defining the end of the range.	Mandatory
<code>LatitudeType</code>	A type used to define the latitude of a set of coordinates, expressed in decimal degrees and defined as follows in ABNF: <code>Latitude = 0*1(- / +) lat-value</code> <code>lat-value = 0*1(1-8) DIGIT ["." 1*DIGIT]</code> <code>lat-value /= 90 ["." 1*(0)]</code>	
<code>LongitudeType</code>	A type used to define the longitude of a set of coordinates, expressed in decimal degrees and defined as follows in ABNF: <code>Longitude = 0*1(- / +) lng-value</code> <code>lng-value = 180 ["." 1*(0)]</code> <code>lng-value /= ((1 (0-7) DIGIT) / ([1-9] DIGIT)) ["." 1*DIGIT]</code>	
<code>RadiusType</code>	A type used to define the radius of a circular region, expressed in meters and defined as follows in ABNF: <code>Radius = 1*DIGIT</code>	

Name	Semantic Definition	Constraints
CoordinatesType	A type used to provide the centre coordinates and radius of a circular geographical region. The geographic coordinate reference system used is the World Geodetic System [9].	
Latitude	The latitude of the region.	Mandatory 1
Longitude	The longitude of the region.	Mandatory 1
Radius	The radius of the region.	Mandatory 1
CountryRegionType	A type used to provide the name and location of a region.	
Region	The details of the primary sub-regions within the country.	Optional 0 .. ∞
@regionID	A unique ID used to identify the region within a DVB-I service list XML document.	Mandatory
@countryCodes	The list of countries that make up the region which may be further defined by the Region element. This attribute shall not be used for sub-regions.	Optional
PrimaryRegionType	A type used to provide the name and location of a primary region.	
RegionName	The human-readable name of the primary region. Mandatory for a region targeted by one or more services and/or an LCN table, to enable selection of the region by the DVB-I client. Multiple elements of this type shall only be provided if they have different languages, indicated using the @xml:lang attribute. See note.	Optional 0 .. ∞
Region	The details of a secondary sub-region within the region.	Optional 0 .. ∞
Postcode	A postcode defining the geographical location of the primary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
WildcardPostcode	Postcodes defining the geographical location of the primary region. Defines a set of postcodes by including a wildcard character. May be provided to facilitate automatic region selection by the server or client or manual regional selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
PostcodeRange	A postcode range defining the geographical location of the primary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
Coordinates	Coordinates and radius defining the geographical location of the primary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
@regionID	A unique ID used to identify the primary region within a DVB-I service list XML document.	Mandatory
@selectable	Indicates whether the region is selectable in the UI for subsequent use in LCN tables, subscription packages and services. When not specified the region shall be selectable.	Optional
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional
SecondaryRegionType	A type used to provide the name and location of a secondary region.	
RegionName	The human-readable name of the secondary region. Mandatory for a region targeted by one or more services and/or an LCN table, to enable selection of the region by the DVB-I client. Multiple elements of this type shall only be provided if they have different languages, indicated using the @xml:lang attribute. See note.	Optional 0 .. ∞
Region	The details of a tertiary sub-region within the region. The use of sub-regions shall be limited to at most four levels in detail. Up to three levels of sub-regions may be defined below a top-level region (country): primary sub-regions, containing secondary sub-regions, containing tertiary sub-regions.	Optional 0 .. ∞

Name	Semantic Definition	Constraints
Postcode	A postcode defining the geographical location of the secondary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
WildcardPostcode	Postcodes defining the geographical location of the secondary region. Defines a set of postcodes by including a wildcard character. May be provided to facilitate automatic region selection by the server or client or manual regional selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
PostcodeRange	A postcode range defining the geographical location of the secondary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
Coordinates	Coordinates and radius defining the geographical location of the secondary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
@regionID	A unique ID used to identify the secondary region within a DVB-I service list XML document.	Mandatory
@selectable	Indicates whether the region is selectable in the UI for subsequent use in LCN tables, subscription packages and services. When not specified the region shall be selectable.	Optional
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional
TertiaryRegionType	A type used to provide the name and location of a tertiary region.	
RegionName	The human-readable name of the tertiary region. Mandatory for a region targeted by one or more services and/or an LCN table, to enable selection of the region by the DVB-I client. Multiple elements of this type shall only be provided if they have different languages, indicated using the @xml:lang attribute. See note.	Optional 0 .. ∞
Postcode	A postcode defining the geographical location of the tertiary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
WildcardPostcode	Postcodes defining the geographical location of the tertiary region. Defines a set of postcodes by including a wildcard character. May be provided to facilitate automatic region selection by the server or client or manual regional selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
PostcodeRange	A postcode range defining the geographical location of the tertiary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
Coordinates	Coordinates and radius defining the geographical location of the tertiary region. May be provided to facilitate automatic region selection by the server or client or manual region selection by the client. Any service with which this region is associated shall be applicable to a client within this geographical location.	Optional 0 .. ∞
@regionID	A unique ID used to identify the region within a DVB-I service list XML document.	Mandatory
@selectable	Indicates whether the region is selectable in the UI for subsequent use in LCN tables, subscription packages and services. As a tertiary region in which no sub-regions exist, this value shall always be <code>true</code> .	Mandatory
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional

Name	Semantic Definition	Constraints
RegionListType	A type used to define a list of one or more regions.	
Region	The details of a top-level region within the region list representing one or more countries. May contain up to 3 additional levels of sub-region (primary sub-regions, containing secondary sub-regions, containing tertiary sub-regions).	Mandatory 1 .. ∞
@version	The version number of the region list. Shall be incremented for every published change.	Mandatory
@xml:lang	Specifies the natural language when not explicitly provided in a multilingual element.	Optional
NOTE: Refer to clause 5.2.10 for processing of multiple language elements.		

XML example illustrating the hierarchy of a region list, from a service list where only the tertiary sub-region is targeted by services and/or an LCN table, and therefore only the tertiary sub-region is selectable in a user interface as indicated by @selectable=true:

```

<RegionList version="1">
  <Region countryCodes="CHE">
    <!-- Top-level region [1 .. n] representing one or more countries, with one or more
         corresponding ISO 3166 country codes in @countryCodes. In this example, the country
         codes for Switzerland is used. -->
    <RegionName>Top-Level Region (Country) Name</RegionName>
    <Region regionId="PrimarySubRegionID" selectable="false">
      <!-- Primary sub-region [0 .. n] -->
      <RegionName>Primary Sub-Region Name</RegionName>
      <Region regionId="SecondarySubRegionID" selectable="false">
        <!-- Secondary sub-region [0 .. n] -->
        <RegionName>Secondary Sub-Region Name</RegionName>
        <Region regionID="TertiarySubRegionID">
          <!-- Tertiary sub-region [0 .. n] -->
          <RegionName>Tertiary Sub-Region Name</RegionName>
        </Region>
      </Region>
    </Region>
  </Region>
</RegionList>

```

5.6.2.2 RegionListType XML Schema

The XML schema for the RegionListType is defined as follows:

```

<simpleType name="PostcodeType">
  <restriction base="string">
    <pattern value="&Postcode;"/>
  </restriction>
</simpleType>

<simpleType name="WildcardPostcodeType">
  <restriction base="string">
    <pattern value="(&PostcodeWildFirst;)|(&PostcodeWildMiddle;)|(&PostcodeWildLast;)/>
  </restriction>
</simpleType>

<complexType name="PostcodeRangeType">
  <attribute name="from" type="dvbisd:PostcodeType" use="required"/>
  <attribute name="to" type="dvbisd:PostcodeType" use="required"/>

```

```

</complexType>

<simpleType name="LatitudeType">
  <restriction base="double">
    <minInclusive value="-90.0"/>
    <maxInclusive value="90.0"/>
  </restriction>
</simpleType>

<simpleType name="LongitudeType">
  <restriction base="double">
    <minInclusive value="-180.0"/>
    <maxInclusive value="180.0"/>
  </restriction>
</simpleType>

<simpleType name="RadiusType">
  <restriction base="positiveInteger"/>
</simpleType>

<complexType name="CoordinatesType">
  <sequence>
    <element name="Latitude" type="dvbisd:LatitudeType"/>
    <element name="Longitude" type="dvbisd:LongitudeType"/>
    <element name="Radius" type="dvbisd:RadiusType"/>
  </sequence>
</complexType>

<simpleType name="RegionIdType">
  <restriction base="ID"/>
</simpleType>
<simpleType name="RegionIdRefType">
  <restriction base="IDREF"/>
</simpleType>

<complexType name="RegionListType">
  <sequence>
    <element name="Region" type="dvbisd:CountryRegionType" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="version" type="positiveInteger" use="required"/>
  <attribute ref="xml:lang"/>
</complexType>

<complexType name="CountryRegionType">
  <complexContent>
    <extension base="dvbisd:RegionBaseType">
      <sequence>
        <element name="Region" type="dvbisd:PrimaryRegionType" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="countryCodes" type="tva:ISO-3166-List" use="required"/>
      <attribute name="regionID" type="dvbisd:RegionIdType" use="required"/>
    </extension>
  </complexContent>
</complexType>

<complexType name="PrimaryRegionType">
  <complexContent>
    <extension base="dvbisd:RegionBaseType">
      <sequence>

```

```

        <element name="Region" type="dvbisd:SecondaryRegionType" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
</extension>
</complexContent>
</complexType>

<complexType name="SecondaryRegionType">
    <complexContent>
        <extension base="dvbisd:RegionBaseType">
            <sequence>
                <element name="Region" type="dvbisd:TertiaryRegionType" minOccurs="0" maxOccurs="unbounded"/>
            </sequence>
        </extension>
    </complexContent>
</complexType>

<complexType name="TertiaryRegionType">
    <complexContent>
        <extension base="dvbisd:RegionBaseType"></extension>
    </complexContent>
</complexType>

<complexType name="RegionBaseType" abstract="true">
    <sequence>
        <element name="RegionName" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
        <choice minOccurs="0" maxOccurs="unbounded">
            <element name="Postcode" type="dvbisd:PostcodeType"/>
            <element name="WildcardPostcode" type="dvbisd:WildcardPostcodeType"/>
            <element name="PostcodeRange" type="dvbisd:PostcodeRangeType"/>
            <element name="Coordinates" type="dvbisd:CoordinatesType"/>
        </choice>
    </sequence>
    <attribute name="regionID" type="dvbisd:RegionIdType" use="required"/>
    <attribute name="selectable" type="boolean" default="true"/>
    <attribute ref="xml:lang"/>
</complexType>

```

5.6.2.3 Region List Examples

Combination of individual postcodes with wildcards and ranges

```

<RegionList version="1">
    <Region countryCodes="ITA" regionID="Italy-Ranges">
        <Region regionID="Piemonte">
            <RegionName>Piemonte</RegionName>
            <PostcodeRange from="15010" to="15122"/>
            <PostcodeRange from="14010" to="14100"/>
            <PostcodeRange from="13811" to="13900"/>
            <PostcodeRange from="12010" to="12025"/>
            <PostcodeRange from="28010" to="28100"/>
            <PostcodeRange from="10100" to="10156"/>
            <PostcodeRange from="28801" to="28925"/>
            <PostcodeRange from="13010" to="13100"/>
        </Region>
    </Region>
    <Region countryCodes="ITA" regionID="Italy-Wildcards">
        <Region regionID="Lombardia">
            <RegionName>Lombardia</RegionName>

```

```

<Region regionID="BG">
  <RegionName>BG</RegionName>
  <WildcardPostcode>24*</WildcardPostcode>
</Region>
<Region regionID="BS">
  <RegionName>BS</RegionName>
  <WildcardPostcode>25*</WildcardPostcode>
</Region>
<Region regionID="CO">
  <RegionName>CO</RegionName>
  <WildcardPostcode>22*</WildcardPostcode>
</Region>
<Region regionID="CR">
  <RegionName>CR</RegionName>
  <WildcardPostcode>260*</WildcardPostcode>
  <WildcardPostcode>261*</WildcardPostcode>
</Region>
<Region regionID="LC">
  <RegionName>LC</RegionName>
  <WildcardPostcode>238*</WildcardPostcode>
  <WildcardPostcode>239*</WildcardPostcode>
</Region>
<Region regionID="LO">
  <RegionName>LO</RegionName>
  <WildcardPostcode>268*</WildcardPostcode>
  <WildcardPostcode>269*</WildcardPostcode>
</Region>
<Region regionID="MN">
  <RegionName>MN</RegionName>
  <WildcardPostcode>46*</WildcardPostcode>
</Region>
<Region regionID="MI">
  <RegionName>MI</RegionName>
  <WildcardPostcode>200*</WildcardPostcode>
  <WildcardPostcode>201*</WildcardPostcode>
</Region>
<Region regionID="MB">
  <RegionName>MB</RegionName>
  <WildcardPostcode>208*</WildcardPostcode>
  <WildcardPostcode>209*</WildcardPostcode>
</Region>
<Region regionID="PV">
  <RegionName>PV</RegionName>
  <WildcardPostcode>27*</WildcardPostcode>
</Region>
<Region regionID="SO">
  <RegionName>SO</RegionName>
  <WildcardPostcode>230*</WildcardPostcode>
  <WildcardPostcode>231*</WildcardPostcode>
</Region>
<Region regionID="VA">
  <RegionName>VA</RegionName>
  <WildcardPostcode>21*</WildcardPostcode>
</Region>
</Region>
</Region>

```

```
</RegionList>
```

Combination of individual postcodes with wildcards and ranges

```
<RegionList version="1">
  <Region regionID="R1" countryCodes="FRA">
    <Region regionID="R1.1">
      <RegionName>Mulhouse</RegionName>
      <PostcodeRange from="68100" to="68299"/>
      <Coordinates>
        <Latitude>47.75</Latitude>
        <Longitude>7.34</Longitude>
        <Radius>30000</Radius>
      </Coordinates>
    </Region>
    <Region regionID="R1.2">
      <RegionName>Bordeaux</RegionName>
      <PostcodeRange from="33000" to="33899"/>
      <Coordinates>
        <Latitude>44.84</Latitude>
        <Longitude>-0.58</Longitude>
        <Radius>30000</Radius>
      </Coordinates>
    </Region>
    <Region regionID="R1.3">
      <RegionName>Rennes</RegionName>
      <WildcardPostcode>350*</WildcardPostcode>
      <WildcardPostcode>352*</WildcardPostcode>
      <WildcardPostcode>357*</WildcardPostcode>
      <Coordinates>
        <Latitude>48.1147</Latitude>
        <Longitude>-1.6794</Longitude>
        <Radius>30000</Radius>
      </Coordinates>
    </Region>
    <Region regionID="R1.4">
      <RegionName>Perpignan</RegionName>
      <PostcodeRange from="66000" to="66199"/>
      <Coordinates>
        <Latitude>42.6986</Latitude>
        <Longitude>2.8956</Longitude>
        <Radius>30000</Radius>
      </Coordinates>
    </Region>
    <Region regionID="R1.5">
      <RegionName>Amiens</RegionName>
      <PostcodeRange from="80000" to="80099"/>
      <Coordinates>
        <Latitude>49.892</Latitude>
        <Longitude>2.299</Longitude>
        <Radius>30000</Radius>
      </Coordinates>
    </Region>
  </Region>
</RegionList>
```


5.6.3 Region Selection (informative)

5.6.3.1 General

The region list is used by the DVB-I client to identify the most relevant services for a viewer. It does not restrict the availability of services. If geographical restrictions are required, separate methods such as DRM or geo-IP restrictions can be used. Where such restrictions are used, the region list should describe a region within which the content can be expected to be available.

Selection of the appropriate region may be performed by the DVB-I Service List Server, the client or a combination of both.

5.6.3.2 Server-side Region Selection

The DVB-I Service List Server may determine the region based on information known about the client requesting the service list. For example, based on the IP address the client is connecting from or any other information available, shared in accordance with privacy regulation. In such a case, the server may provide the client with a DVB-I service list adapted to the client's region. The client may not need to perform any additional region selection or only a narrow region selection.

The client may provide additional information to the server in order to allow the server to produce a regional service list tailored to the client (see clause 5.6.4).

5.6.3.3 Client-side Region Selection

A DVB-I client may use the region list provided in a DVB-I service list to enable selection of a region. This selection may be performed manually by the user or automatically by the DVB-I client.

Following region selection, the DVB-I client should use the selected region to filter the services in the service list or, if there are region specific LCN tables, select the respective LCN table. The DVB-I client should provide a channel list to the user following installation which includes services targeted at the selected regions, as well as services not targeted at any specific region. A DVB-I client may present additional channel lists to the user, which may include all services or may apply different filtering.

Region selection is expected to be performed during installation of services defined in a DVB-I service list, typically following country selection.

Regions with `@selectable=true` (the default value) can be selected to install the service list. When the user selects such a region, the client should enable the user to proceed with installation of the service list.

Regions with `@selectable=false` are only used for the purpose of organising regions hierarchically in the client's user interface. Upon selection of such a region, a client should display the sub-regions below it, at the next level down in the region list hierarchy.

Regions with `@selectable=false` cannot be selected to install the service list as none of the services and/or LCN tables in the service list are targeted at such regions.

The DVB-I client may use a variety of methods to select a region including manual selection, matching against a known postcode location for the viewer, matching based on other position data, IP geolocation etc. The most appropriate method may depend on the type of device that is hosting the DVB-I client.

Manual region selection

When offering manual region selection, a DVB-I client should display the hierarchical list of regions available for the selected country, as defined in the region list. A DVB-I client should be able to display a hierarchy of regions in the region list consisting of up to 4 levels (e.g. top-level regions representing countries, containing primary sub-regions, containing secondary sub-regions, containing tertiary sub-regions). Regions to display to the user will have a region

name that the DVB-I client should use to represent the region in its user interface. The DVB-I client should use region names corresponding to its current menu language when available.

Postcode entry

A DVB-I client may ask the user to enter their postcode. A DVB-I client can check for matches between the user entered postcode and the postcodes associated with regions in the region list. The region that matches with the user's postcode should automatically be selected by the DVB-I client. When there is more than one region matching the user's postcode, the DVB-I client should offer manual selection between those regions.

Geolocation (including IP geolocation)

A DVB-I client may use geolocation, with permission of the user, to determine the location of the DVB-I client and associated postcode. A DVB-I client can then compare the client location with coordinates provided for regions in the region list. If no coordinates are provided in the region list, a DVB-I client may also derive a postcode from the client location and check for matches with the postcodes associated with regions in the region list.

Client implementations should take into account that any automatically determined position may have a degree of uncertainty. To ensure that viewers located near the edge of a region are able to find services for that region, it is recommended that clients err on the side of reducing false negatives, accepting that this may result in some viewers outside the region being offered the service. When a client determines that there are multiple regions appropriate for the client's location, a client should offer manual selection between those regions. In the case of automatic region selection, clients should provide a means for an alternative region to be selected manually, in case geolocation failed to determine the correct location.

The following is an example of an installation sequence:

- 1) User selects their country.
- 2) User chooses to install services and selects the service (list) provider.
- 3) Client retrieves the service list.
- 4) Client determines the region to use from the region list by:
 - a) showing the user a list of regions, enabling the user to select one; or
 - b) asking the user to enter their postcode and matching that with a postcode (or postcode range) in the region list; or
 - c) asking the user for permission to automatically detect their location then, if the user accepts, matching the geolocation result with location metadata in the region list.
- 5) Client offers the resulting channel list, containing regional services targeted at the user's region, as well as services not targeted at any specific region.

5.6.4 Server-side Region Selection using Client Provided Information

5.6.4.1 General

A Service List Server may optionally provide the facility to regionalise service lists before providing them to the client using geographic or other information. This results in an XML document containing a `ServiceList` element and embedded `RegionList` and `LCNList` elements being tailored to the client (requiring no, or minimal, processing of the information client side).

The information the client may supply to the Service List Server are:

- Postcode information – a user entered country specific string of characters that denotes the user's address.

- Receivable multiplex information – a list of ids acquired from broadcast (i.e. received SDT, NIT tables) including `network_id`, `transport_stream_id` and potentially `original_network_id` (see ETSI EN 300 468 [6]).
- User selected `regionId` from a previously acquired `ServiceList` or by means outside the scope of the present document.

If the Service List Server supports Server-side Region Selection it shall support the postcode method (see clause 5.6.4.2) or the `regionId` method (see clause 5.6.4.4) or both. Additionally, it may support the method based on receivable multiplex (see clause 5.6.4.3). If the Service List Server supports Server-side Region Selection it shall indicate the methods available by including the `SRSSupport` element in the `ServiceListOffering`.

A Service List Server shall provide a `ServiceList` element (and associated `RegionList`), as described in clause 5.5, if the client does not provide any of the above information.

5.6.4.2 Server-side Region Selection using Postcode Information

A DVB-I client may request a DVB-I service list using a user provided postcode.

Request

The request URL SHALL be composed as shown:

```
<ServiceList_URL>?postcode=<postcode>
```

where:

- `ServiceList_URL` is value of the `ServiceListURI` provided in the `ServiceListOffering` from the `ServiceListRegistry`.
- `postcode` is a full or partial postcode. If a postcode of type `WildcardPostcodeType` is supplied the asterisk '*' must be encoded as %2A. Only a single wildcard character (*) may be used.

Response

The SRS Service List Server returns a response in of 2 basic forms:

- Default/Error Response: Indicates an error in the request (see clause 5.6.4.5). The DVB-I `ServiceList` returned will not be regionalised to the specific postcode.
- a DVB-I Service List tailored for the specific region. Note that the `ServiceList` may contain multiple `LCNTable` elements which will require user selection.

5.6.4.3 Server-side Region Selection using reception information

5.6.4.3.1 Introduction

A DVB-I client may request a DVB-I service list using a device's receivable broadcast multiplexes.

Where a client is requesting multiplex information from multiple mediums (i.e. T/C/S) in order to request a combined service list all receivable multiplexes shall be included in the request (i.e. not just from a single medium).

5.6.4.3.2 SRS ServiceList Multiplex Info Endpoint

Request

In order to perform a service list request to a server supporting SRS the client requires information for every multiplex it can detect reliably during the process of scanning the RF frequency band:

- transport_stream_id and original_network_id (see clause 5.2.1 of ETSI EN 300 468 [6]) ideally derived from SDT *actual*, see note below, and
- network_id derived from NIT actual (see clause 5.2.1 of ETSI EN 300 468 [6]).

NOTE: for terrestrial services it is normal for the client to confirm it is able to receive the multiplex before installing services from that multiplex hence the use of SDT actual.

The request URL SHALL be composed of a ServiceList_URL and a multiplex list parameter:

<ServiceList_URL>?muxlist=<muxlist>

where:

- ServiceList_URL is value of the ServiceListURI provided in the ServiceListOffering from the ServiceListRegistry.
- muxlist: an ordered list of the multiplexes the device can receive.

The <muxlist> parameter indicates a list receivable multiplexes available to the device in the following manner:

- If the device has an active tuner but no multiplexes are receivable, the <muxlist> parameter shall be absent; *or*
- The <muxlist> parameter shall consist of a list of receivable multiplexes

A list of multiplexes shall be presented in the following format:

<Mux1>_<Mux2>_<...>_<MuxN>

Where <Mux1> to <MuxN> are Multiplex Identifiers, indicating the multiplexes the device can receive in the order specified below. The Multiplex Identifiers are separated by the underscore character, '_'.

Each Multiplex Identifier is represented in one of two possible ways, either:

- Where only a single originalNetworkId is indicated in the ServiceListOffering: for multiplexes that are within the originalNetworkId listed in the ServiceListOffering, the Multiplex Identifier consists of the network id followed by transport stream id. Each is encoded as a 4-character hexadecimal lower-case zero-prefixed string and separated by a period, '.'. For example 0abc.1044 represents network Id 2748, transport stream id 4164, original network id equal to the single originalNetworkId in the ServiceListOfferingType.
- Where multiple originalNetworkIds are indicated in the ServiceListOffering:
 - for multiplexes that are within one of the originalNetworkId listed in the ServiceListOffering, the Multiplex Identifier consists of the Network id followed by transport stream id, followed by the original network id. Each is encoded as a 4-character hexadecimal lower-case zero-prefixed string and separated by a period, '.'.
 - for multiplexes not within the originalNetworkId, the client may choose not to supply the multiplex at all, or supply the Multiplex Identifier consisting of the network id, followed by the transport stream id, followed by the original network id. Each is encoded as a 4-character hexadecimal lower-case zero-prefixed string and separated by periods. For example: 0abc.1044.abcd represents network id 2748, transport stream id 4164, original network id 43981.

Response

The SRS Service List Server returns a response in of 2 basic forms:

- Default/Error Response: Indicates an error in the request (see clause 5.6.4.5). The DVB-I *ServiceList* returned will not be tailored to the multiplexes received.
- A single *ServiceList*. Note that the *ServiceList* may contain multiple *LCNTable* elements which will require user selection.

5.6.4.4 Server-side Region Selection using region id

A DVB-I client may request a DVB-I service list using a *regionId* chosen by the user from a previous service list (or by means outside the scope of the current document).

Request

The request URL shall be composed as shown:

<ServiceList_URL>?region=<regionId>

where:

- *ServiceList_URL* is value of the *ServiceListURI* provided in the *ServiceListOffering* from the *ServiceListRegistry*.
- *regionId* is a *regionId* provided in the *RegionList* (see Section 5.6.2) from a previous *ServiceList* response or derived by other means outside the scope of the present document.

Response

The SRS Service List Server returns a response in of 2 basic forms:

- Default/Error Response: Indicates an error in the request (see clause 5.6.4.5). The DVB-I *ServiceList* returned will not be regionalised to the specific postcode.
- a DVB-I *Service List* tailored for the specific region.

5.6.4.5 SRS Response Status

A response from the SRS Service List Server shall indicate if the query was successfully processed by the server or otherwise. This is indicated in the *@responseStatus* attribute of the *ServiceList* element. Only Service List Servers supporting SRS will include a *@responseStatus*.

The *@responseStatus* attribute shall take one of the values in Table 38a.

Table 38a: Error Response Values

Status values	Description
OK	Response is complete, no errors were encountered.
ERROR_INVALID_MUX_INFO	Request did not correctly format the multiplex information. Invalid postcode provided. The returned <i>ServiceList</i> may not be tailored.
ERROR_INVALID_REQUEST	Request was not valid, or was formatted incorrectly.
ERROR_BUSY	Server was too busy to send a full response, retry later. Device should follow any Retry-After header, else use the back-off algorithm. The returned <i>ServiceList</i> should still be usable
ERROR_GENERIC_FAILURE	Any other error occurred.

Status values	Description
ERROR_INVALID_POSTCODE	Invalid postcode provided. The returned ServiceList may not be tailored.
ERROR_INVALID_REGION_ID	Invalid regionId provided. The returned ServiceList may not be tailored.

5.7 Play Lists

5.7.1 Playlist

```

<element name="Playlist" type="dvbisd:DASHPlaylistType"/>
<complexType name="DASHPlaylistType">
  <sequence>
    <element name="PlaylistEntry" type="anyURI" maxOccurs="unbounded"/>
  </sequence>
</complexType>

```

Table 39: DASHPlaylistType Fields

Name	Semantic Definition	Constraints
Playlist	A sequence of audio/video assets, statically or dynamically created by a Playlist Server when requested by the DVB-I client	Mandatory
PlaylistEntry	Reference to the URL of a DVB-DASH MPD manifest file that is part of the playlist	Mandatory 1 .. ∞

6 Content Guide Metadata

6.1 Introduction

This clause describes the HTTP based API that a DVB-I client uses to acquire content guide metadata. A DVB-I client can operate as a hybrid client (broadcast DVB-C/S/T and IP) so this API may be used to enhance metadata received via a DVB-C/S/T broadcast network.

The metadata available via the API contains:

- the basic and enhanced linear schedule information (forwards 28 days)
- catch-up schedule information (backwards 28 days)
- metadata queries for more episodes in a search/series and content grouping into categories, series and brands allowing for "box set" user offerings
- deep links to IP streams and applications to play content
- channel and content images

The DVB-I metadata profile described here is based on the TV-Anytime schema and classification schemes. It also includes classification schemes bespoke to DVB-I. This profile is drawn from the Freeview Play specification [i.11].

6.2 Access and Query Language

6.2.1 Introduction

This clause describes the HTTP query mechanisms illustrated in figure 1 for interfaces A1, B1 and F1.

6.2.2 URL Format

The DVB-I client shall make requests against API resources, using URLs based on the following generic structure:

```
<api_endpoint_URL>[?<query_params>]
```

The `api_endpoint_URL` is given by the `ContentGuideSource` element (see clause 5.5.7). Query parameters shall be used to apply filters to the result of a query. In some instances, there may be mandatory query parameters required. The details of each parameter shall be included in the relevant section of each API method. If an unprofiled query parameter is provided with a request to a DVB-I server endpoint a 400 (Bad Request) HTTP response may be returned.

All query parameters provided in requests to a Service List Server or Content Guide Server shall use the character set described in annex C of ETSI TS 102 809 [5]. Additionally, any "reserved" characters defined in clause 2.2 of IETF RFC 3986 [13] in the query string (within key/value pairs) shall be percent-encoded as defined in clause 2.1 of IETF RFC 3986 [13] before being submitted as a query parameter to the API. A space may either be percent encoded (i.e. "%20"), or as a plus sign, "+".

The maximum length of a fully qualified web service URL including parameters shall not exceed 2 048 characters. It shall not be necessary to construct URLs in excess of this length to access any of the services provided by a Service list server or Content Guide Server.

Where multiple values are accepted for a query parameter these shall be provided as repeated parameters with "square bracket" notation to indicate that they are array variables. For instance, when providing multiple service identifiers to in a request for scheduled programme metadata as in clause 6.5. The square brackets "[" and "]" within the URL enable efficient parsing by a Content Guide Server. The square brackets "[" and "]" shall be percent-encoded as defined in IETF RFC 1738 [12] and clause 2.1 of IETF RFC 3986 [13].

6.2.3 HTTP Request Headers

Refer to clause 4.3.24.3.2.

6.2.4 HTTP Responses

Refer to clause 4.3.3.

6.3 Regionalization

In order for a DVB-I server endpoint to perform server-side region tailoring of service and content guide information and only deliver the relevant data to a DVB-I client, it is possible to provide a means of regionalization on some of the API calls.

For schedule information, region is linked to the service identifier used in queries to a DVB-I server endpoint. The service identifier may be either a service's `UniqueIdentifier` or a `ContentGuideServiceRef` that may be either shared by multiple services, refer to another service or carry a value that is only applicable to the DVB-I server endpoint.

By providing a `UniqueIdentifier` for each service in a schedule information request, a client enables a DVB-I server endpoint to uniquely identify the services, including region-specific services, as regionalization is linked to a service's definition (see clause 5.6).

When multiple services share the same schedule information, e.g. regional variants of the same service, a `ContentGuideServiceRef` may be defined for those services in the service list. When defined, a client will use this instead of a service's `UniqueIdentifier` when requesting schedule information, enabling a DVB-I server endpoint to provide the same schedule information for those services.

6.4 Endpoint Queries

6.4.1 Introduction

This clause describes the various requests a DVB-I client can make in order to populate its UI. The data returned from the API endpoints is based on the TV-Anytime specification, ETSI TS 102 822-3-1 [7], please see clause 6.10 for further details.

6.4.2 ContentGuideSource Example

```
<ContentGuideSourceList>
  <ContentGuideSource CGSID="cgs-dvbi-01">
    <Name xml:lang="en">A-Z Content Guide</Name>
    <ProviderName xml:lang="en">A-Z Metadata</ProviderName>
    <RelatedMaterial>
      <tva:HowRelated href="urn:dvb:metadata:cs:HowRelatedCS:2021:1002.1"/>
      <tva:MediaLocator contentLanguage="en">
        <tva:MediaUri contentType="image/png">
          https://cgs.az.metadata/static/logo.png
        </tva:MediaUri>
      </tva:MediaLocator>
      <tva:MediaLocator contentLanguage="fr">
        <tva:MediaUri contentType="image/png">
          https://cgs.az.metadata/static/logo_fr.png
        </tva:MediaUri>
      </tva:MediaLocator>
    </RelatedMaterial>
    <ScheduleInfoEndpoint contentType="application/xml">
      <URI>https://cgs.az.metadata/schedule</URI>
    </ScheduleInfoEndpoint>
    <ProgramInfoEndpoint contentType="application/xml">
      <URI>https://cgs.az.metadata/program</URI>
    </ProgramInfoEndpoint>
    <GroupInfoEndpoint contentType="application/xml">
      <URI>https://cgs.az.metadata/group</URI>
    </GroupInfoEndpoint>
  </ContentGuideSource>
</ContentGuideSourceList>
```

6.4.3 Language Information

TV-Anytime requires that the default language used in a TV-Anytime document is specified with the `TVAMain` element using the `@xml:lang` attribute. The normal rules for scoping `@xml:lang`, and cascading to subelements applies.

A TV-Anytime, ETSI TS 102 822-3-1 [7], document may contain text fields in multiple languages. The cardinality of any text element (e.g. `Title`) given in this metadata profile only refers to a single language. For example, multiple `Title` elements may exist within `ProgramInformation.BasicDescription` each with `@type` of `main` but with different `@xml:lang` values.

6.5 Schedule Information Requests

6.5.1 Introduction

The `ScheduleInfoEndpoint` endpoint returns combined schedule, programme and on-demand programme information for a single service identified by a Service ID.

The API endpoints allow some flexibility in the time spans for which data is requested.

NOTE: There are some restrictions on time-periods in order to maintain the efficiency of a Content Guide Server.

The format of the response shall be the same for all schedule queries and is defined in clause 6.5.4.

As stated in clause 4.3.2.1, the expiry time contained in the `Cache-Control: max-age` header in returned schedule results shall be respected, however, the DVB-I client should not wait indefinitely before attempting to refresh the schedule.

6.5.2 Timestamp Filtered Schedule Request

6.5.2.1 Introduction

This provides schedule information between specified timestamps (multiples of 10 800 seconds) for a single service based on a Service ID.

In order to populate the backwards and forwards EPG for a service the request for a schedule between two specific timestamps can be constructed as follows. The DVB-I client shall request the schedule for specific services using the URL format below.

In all cases the following limitation shall apply:

- `start_unixtime:`
 - shall identify one of the following times of day (0:00, 3:00, 6:00, 9:00, 12:00, 15:00, 18:00, 21:00) i.e. the Unix timestamp shall be a whole multiple of 10 800
 - shall not be less than the Unix time of midnight at the start of the current day minus 28 full days (672 hours), represented as Unix time
- `end_unixtime:`
 - shall identify one of the following times of day (0:00, 3:00, 6:00, 9:00, 12:00, 15:00, 18:00, 21:00) i.e. the unix timestamp shall be a whole multiple of 10 800
 - shall be greater than `start_unixtime`, by a value of either 21 600 seconds (6 hours) or 43 200 seconds (12 hours).
 - shall not be greater than the Unix time of midnight at the end of the present day plus 28 full days (672 hours), represented as Unix time.

In the case that a request is received using a start or end Unix time that does not match the format and restrictions defined above, a Content Guide Server shall return a 400 (Bad Request) HTTP response status. Likewise, if a request does not contain either a start or end Unix time, or if the value of either of these parameters is not a valid timestamp then a 400 (Bad Request) HTTP response shall be returned by a Content Guide Server. The DVB-I client shall not retry the same request without modifying the request parameters to meet the requirements above.

The returned document shall only contain `ScheduleEvent` elements with:

- `PublishedStartTime` equal to or greater than `start_unixtime`
- `PublishedStartTime` prior to `end_unixtime`

NOTE: The end time (`PublishedStartTime + Duration`) of the final `ScheduleEvent` is likely to be later than `end_unixtime`. The first `ScheduleEvent` within a schedule segment may have a `PublishedStartTime` some period after the `start_unixtime` defined in the request. The previous `ScheduleEvent` which spans `start_unixtime` can be retrieved by querying earlier schedule periods. The actual period covered by a `Schedule` element may be determined using the `Schedule@start` and `Schedule@end` attributes.

When including the optional parameter `inclusive=true` in the request URL, if supported by the Content Guide Server, the returned document shall only contain `ScheduleEvent` elements with `PublishedStartTime` prior to `end_unixtime` and end time (`PublishedStartTime + Duration`) greater than `start_unixtime`.

NOTE: The start time (`PublishedStartTime`) of the first `ScheduleEvent` may be earlier than `start_unixtime`, if any part of a program occurs in the requested interval, it shall be provided as a `ScheduleEvent` element in the response. The end time (`PublishedStartTime + Duration`) of the final `ScheduleEvent` may be later than `end_unixtime`. The actual period covered by a `Schedule` element is determined using the `Schedule@start` and `Schedule@end` attributes.

By comparing the `Schedule@start` value with the requested start time, the DVB-I client can determine if the Content Guide Server has returned the schedule events using the inclusive method.

6.5.2.2 Request Schedule by Service ID

This request shall include a service ID. Combining the results of multiple calls is the responsibility of the DVB-I client. A DVB-I client shall only request information for services that are listed in a DVB-I provided service list.

URL format:

```
<ScheduleInfoEndpoint>?start=<start_unixtime>&end=<end_unixtime>
&sid=<service_id>&image_variant=<variant>&inclusive=<inclusive>
```

where:

- `start_unixtime`: the start time for the range of scheduled programmes.
- `end_unixtime`: the end time for the range of scheduled programmes.
- `service_id`: shall be a single service identifier as derived from the service list information. Either the `UniqueIdentifier` or the `ContentGuideServiceRef` of the service. `ContentGuideServiceRef`, when specified, takes precedence over `UniqueIdentifier`:
 - only a single occurrence of the `sid` parameter shall be passed.
- `variant`: (Optional) shall specify an image variant (see clause 5.2.8.2.1) for the image URLs provided in the response.
- `inclusive`: (Optional) by default false, the value true denotes that events starting before `start_unixtime` (and ending after `start_unixtime`) should be included in the response, if supported by the Content Guide Server.

Example URL:

```
<ScheduleInfoEndpoint>?start=1433246400&end=1433268000&sid=12345
```

Request for the schedule of programmes on 2 June 2015 between 12:00pm (noon) and 6:00pm for the service with either a `UniqueIdentifier` or `ContentGuideServiceRef` of 12345

Assuming that the Service ID provided is known to a Content Guide Server, the response shall be a 200 (OK) HTTP response with content as defined in clauses 6.5.4 and 6.10.

If the requested Service ID is not known to a Content Guide Server then a 200 (OK) HTTP response shall still be returned but the `ProgramInformationTable` and `ProgramLocationTable` shall not contain any elements.

6.5.3 Now/Next Filtered Schedule Request

6.5.3.1 Introduction

This provides schedule information containing only now and adjacent events for a given service.

In addition to retrieving sections of the entire schedule as described in clause 6.5.2, it is also possible for a DVB-I client to retrieve schedule information only for the current event and events adjacent to it.

A DVB-I client wishing to retrieve only the current event and one future event shall query the schedules endpoint without start and end times but with the query parameter `now_next=true`.

A DVB-I client wishing to retrieve the current event and up to ten previous and ten future events shall query the schedules endpoint without start and end times but with the query parameter `now_next=window`.

URL format:

```
<ScheduleInfoEndpoint>?sid=<service_id>&now_next=<window_type>&image_variant=<variant>
```

where:

- `service_id`: shall be a single service identifier as derived from the service list information. Either the `UniqueIdentifier` or the `ContentGuideServiceRef` of the service. `ContentGuideServiceRef`, when specified, takes precedence over `UniqueIdentifier`:
 - only a single occurrence of the `sid` parameter shall be passed.
- `window_type`: denotes the set of events provided in addition to the current event; `true` denotes only the current event and next scheduled event are requested, `window` denotes that up to 10 previous events and 10 future events can be provided with the current event.
- `variant`: (Optional) shall specify an image variant (see clause 5.2.8.2.1) for the image URLs provided in the response.

NOTE: In previous versions of this specification the `&now_next` query parameter in the URL format above was incorrectly specified as `&nownext`.

Example URL:

```
<ScheduleInfoEndpoint>?sid=12345&now_next=true
```

NOTE: For hybrid devices, EIT p/f from DVB-C/S/T is usually the primary source of metadata for the forwards EPG and the DVB-I client should determine the present and following events from EIT p/f and match them against the now/next events returned by a Content Guide Server.

6.5.3.2 Polling of Now/Next Filtered Schedule Request end-point

If the `ContentGuideSource` includes a value for `@minimumMetadataUpdatePeriod` and the `Service` is indicated as dynamic (`@dynamic=true`) then the client may poll the Now/Next Filtered Schedule Request end-point in order to get accurate Now/Next metadata. This may be used to control the recording of IP delivered services (i.e. where EIT p/f is not available). It is expected that Now/Next channel banner use-case should not require polling and instead get the information on user initiation.

6.5.4 Response

6.5.4.1 Introduction

The schedule period included in the response will vary depending on the request, but the structure and following attributes of the response will be the same for all schedule requests.

A Content Guide Server shall return a well-formed XML document consisting of the following tables (see clause 6.10.1):

- `ProgramLocationTable`
- `ProgramInformationTable`
- `GroupInformationTable` (for responses to Now/Next and Window requests)

When the `GroupInformationTable` is provided in a response, the order of previous, present and future programs shall be determined by the structural CRIDs specified in the `ProgramInformation.MemberOf` elements within the `ProgramInformationTable`. If the `GroupInformationTable` is not provided, then the sequence of programs in time order can be determined by the `PublishedStartTime` of the `ScheduleEvent` elements.

The following attributes may be used to associate `ProgramInformation` elements, `ScheduleEvent` elements and `OnDemandProgram` elements within the schedule response:

- `ProgramInformation@programId`
- `ScheduleEvent.Program@crid`
- `OnDemandProgram.Program@crid`

CRIDs used to provide linkage between TV-Anytime XML fragments shall not be assumed to be consistent with any CRIDs provided in DVB-C/S/T broadcast Service Information (i.e. carried in the Content Identifier Descriptor as defined in ETSI TS 102 323 [28]).

If the CRID within an updated element has been changed to reference a new/different `ProgramInformation` element, it will be necessary to assess whether the prior `ProgramInformation` element is still referenced by other `ScheduleEvent` or `OnDemandProgram` elements. If not then it may be discarded.

All events in the returned `ProgramLocation` table shall have a matching entry in the returned `ProgramInformation` table. The `ProgramInformation` table shall only describe events present in the `ProgramLocationTable`.

If there are no matching schedule events for a requested service and the service is recognized by a Content Guide Server, then an empty `Schedule` element shall be returned for the service.

Where a `ScheduleEvent` in the `ProgramLocation` table is also available as an on-demand item then an `OnDemandProgram` element shall also be returned in the `ProgramLocationTable`.

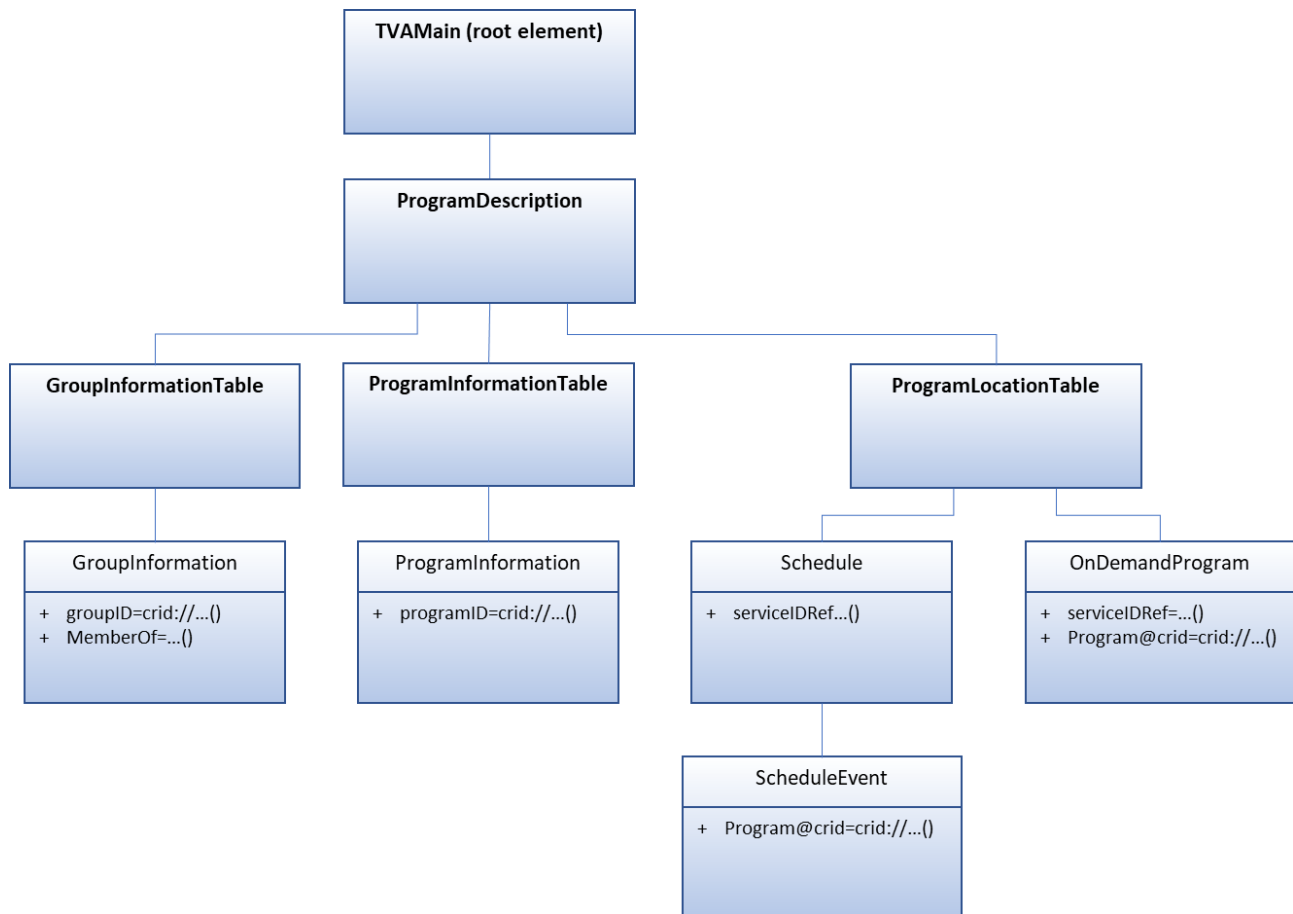


Figure 9: Schedule Information response data structure

6.5.4.2 Metadata Merging for Hybrid platforms

The `Schedule@serviceIDRef` attribute shall be used to associate the `Schedule` element with a specific service. It shall match `UniqueIdentifier` in the `Service` element (see clause 5.5.2). Programme guide information received for a selected broadcast service instance may be used in preference to DVB-SI EIT according to the precedence rules defined in clause 6.12.

A hybrid DVB-I client shall perform service instance matching as defined in clause 5.2.1, thereby linking installed DVB-T/C/S services with DVB-I service list entries. While the `ScheduleEvent.ProgramURL` element may be used to associate `ScheduleEvent` items with broadcast SI scheduled events, in the form of a DVB Event Locator as defined in clause 6.4 of ETSI TS 102 851 [16], a hybrid client has already associated the service identifier from the DVB-I service list with the corresponding broadcast service. Consequently, such a client is not required to perform additional verification that the Original Network ID and Service ID are matched between the DVB-I content guide and DVB-SI event data, as the matching has already been done at a service instance level.

The `ScheduleEvent` entities within a `ProgramLocation` table are not necessarily returned in chronological order. The DVB-I client should ensure any re-ordering is appropriate for the UI layout.

There may be services in the broadcast metadata for which metadata is not available from Content Guide Server, the DVB-I client shall continue to use broadcast metadata for these services. For services supported by a Content Guide Server, there may still be events present in the broadcast metadata that are not represented in a Content Guide Server metadata. The device should continue to use the broadcast EIT metadata for these events.

6.5.4.3 Example Schedule responses

6.5.4.3.1 Timestamp Filtered Schedule Response

```
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2023"
  xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" xml:lang="en">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="en">
      <ProgramInformation programId="crid://channel7.co.uk/b01myjsy">
        <BasicDescription>
          <Title type="main">Bargain Hunt</Title>
          <Title type="secondary">01/01/2014</Title>
          <Synopsis length="short">
            The Bargain Hunt teams head to Staffordshire's County Showground.</Synopsis>
          <Synopsis length="medium"> The Bargain Hunt teams head to
            Staffordshire's County Showground, where both experts face double
            trouble.</Synopsis>
          <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:3" type="main"/>
          <ParentalGuidance>
            <mpeg7:MinimumAge>15</mpeg7:MinimumAge>
          </ParentalGuidance>
          <ParentalGuidance>
            <mpeg7:ParentalRating href="urn:fvc:metadata:cs:ContentRatingCS:2014-07:fifteen"/>
            <ExplanatoryText length="long">Contains strong language and flash photography
            </ExplanatoryText>
          </ParentalGuidance>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
              <MediaUri contentType="image/png">
                https://img-ctv.mdata.co.uk/channel7/bargain_hunt.png
              </MediaUri>
            </MediaLocator>
          </RelatedMaterial>
        </BasicDescription>
      </ProgramInformation>
      <ProgramInformation programId="crid://channel7.co.uk/b03bhc3n">
        <BasicDescription>
          <Title type="main">News at One</Title>
          <Synopsis length="medium">The latest national and international
            news stories from the News team, followed by weather</Synopsis>
          <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:2" type="main"/>
          <ParentalGuidance>
            <mpeg7:MinimumAge>13</mpeg7:MinimumAge>
          </ParentalGuidance>
          <ParentalGuidance>
            <mpeg7:ParentalRating
              href="urn:fvc:metadata:cs:ContentRatingCS:2014-07:no_parental_controls"/>
            <ExplanatoryText length="long">
              May contain upsetting scenes.</ExplanatoryText>
            </ParentalGuidance>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
```

```

        <MediaUri contentType="image/png">
            https://img-ctv.mdata.co.uk/channel17/mybroadcaster_news.png</MediaUri>
        </MediaLocator>
    </RelatedMaterial>
</BasicDescription>
</ProgramInformation>
</ProgramInformationTable>
<ProgramLocationTable xml:lang="en">
    <Schedule serviceIDRef="3039" start="2013-09-25T11:15:00Z" end="2013-09-25T12:30:00.000Z">
        <ScheduleEvent>
            <Program crid="crid://channel17.co.uk/b01myjsy"/>
            <ProgramURL>dvb://233a..3039;b2e3</ProgramURL>
            <InstanceDescription>
                <CaptionLanguage closed="true">en</CaptionLanguage>
                <SignLanguage closed="false">sgn</SignLanguage>
                <AVAttributes>
                    <AudioAttributes>
                        <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:1">
                            en</AudioLanguage>
                        </AudioAttributes>
                        <AudioAttributes>
                            <MixType href="urn:mpeg:mpeg7:cs:AudioPresentationCS:2001:3"/>
                            <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6">
                                en</AudioLanguage>
                            </AudioAttributes>
                        <VideoAttributes>
                            <HorizontalSize>1920</HorizontalSize>
                            <VerticalSize>1080</VerticalSize>
                            <AspectRatio>16:9</AspectRatio>
                        </VideoAttributes>
                        <CaptioningAttributes>
                            <Coding href="urn:tva:metadata:cs:CaptionCodingFormatCS:2015:2.1"/>
                        </CaptioningAttributes>
                    </AVAttributes>
                    <OtherIdentifier type="eit-programme-crid">
                        crid://channel17.co.uk/23VD4Q</OtherIdentifier>
                    <OtherIdentifier type="eit-series-crid">
                        crid://channel17.co.uk/KM9T8E</OtherIdentifier>
                </InstanceDescription>
                <PublishedStartTime>2013-09-25T11:15:00Z</PublishedStartTime>
                <PublishedDuration>PT45M</PublishedDuration>
            </ScheduleEvent>
            <ScheduleEvent>
                <Program crid="crid://channel17.co.uk/b03bhc3n"/>
                <ProgramURL>dvb://233a..3039;b2e4</ProgramURL>
                <InstanceDescription>
                    <AVAttributes>
                        <VideoAttributes>
                            <HorizontalSize>576</HorizontalSize>
                            <VerticalSize>512</VerticalSize>
                            <AspectRatio>16:9</AspectRatio>
                        </VideoAttributes>
                    </AVAttributes>
                    <OtherIdentifier type="eit-programme-crid">
                        crid://channel17.co.uk/5A795M</OtherIdentifier>
                    <OtherIdentifier type="eit-series-crid">

```

```

        crid://channel7.co.uk/KCI4LM</OtherIdentifier>
    </InstanceDescription>
    <PublishedStartTime>2013-09-25T12:00:00Z</PublishedStartTime>
    <PublishedDuration>PT30M</PublishedDuration>
</ScheduleEvent>
</Schedule>
<OnDemandProgram serviceIDRef="3039">
    <Program crid="crid://channel7.co.uk/b01myjsy"/>
    <ProgramURL contentType="application/vnd.dvb.ait+xml">
        https://channel7.co.uk/ait.aitx?pid=b01myjsy</ProgramURL>
    <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
        https://channel7.co.uk/ait.aitx?template</AuxiliaryURL>
    <InstanceDescription>
        <Genre href="urn:fvc:metadata:cs:MediaAvailabilityCS:2014-07:media_available"
            type="other"/>
        <Genre href="urn:fvc:metadata:cs:FEPGAvailabilityCS:2014-10:fepg_unavailable"
            type="other"/>
        <CaptionLanguage closed="true">en</CaptionLanguage>
    <AVAttributes>
        <VideoAttributes>
            <HorizontalSize>576</HorizontalSize>
            <VerticalSize>512</VerticalSize>
            <AspectRatio>16:9</AspectRatio>
        </VideoAttributes>
    </AVAttributes>
</InstanceDescription>
<PublishedDuration>PT1H</PublishedDuration>
<StartOfAvailability>2013-09-25T12:03:09Z</StartOfAvailability>
<EndOfAvailability>2013-10-02T09:59:00Z</EndOfAvailability>
<DeliveryMode>streaming</DeliveryMode>
<Free value="true"/>
</OnDemandProgram>
</ProgramLocationTable>
</ProgramDescription>
</TVAMain>

```

Figure 10: Example - Timestamp Filtered Schedule Response

6.5.4.3.2 Now/Next Filtered Schedule Response

```

<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xml:lang="en" xmlns="urn:tva:metadata:2023" xmlns:mpeg7="urn:tva:mpeg7:2008"
xmlns:tva="urn:tva:metadata:2023" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:tva:metadata:2023
../tva_metadata_3-1.xsd">
    <ProgramDescription>
        <ProgramInformationTable>
            <ProgramInformation programId="crid://example/12019073">
                <BasicDescription>
                    <Title type="main">Cities</Title>
                    <Synopsis length="medium">
                        Cities serve as places of surprising opportunity for animals to
                        thrive.</Synopsis>
                    <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:2" type="main"/>
                <RelatedMaterial>
                    <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
                </RelatedMaterial>
            </ProgramInformation>
        </ProgramInformationTable>
    </ProgramDescription>

```



```

        <MediaLocator>
            <MediaUri contentType="image/png">
                http://tmsimg.com/assets/p13469377_e_h13_aa.jpg</MediaUri>
            </MediaLocator>
        </RelatedMaterial>
    </BasicDescription>
    <MemberOf crid="crid://dvb.org/metadata/schedules/now-next/now" index="1"/>
</ProgramInformation>
<ProgramInformation programId="crid://example/12019074">
    <BasicDescription>
        <Title type="main">Jason Peterson's Into The Wild</Title>
        <Synopsis length="medium">
            Jason Peterson hunts the most dangerous animals across North America and the
            around the world.</Synopsis>
        <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
                <MediaUri contentType="image/png">
                    http://tmsimg.com/assets/p10870905_i_h13_aa.jpg</MediaUri>
                </MediaLocator>
            </RelatedMaterial>
        </BasicDescription>
        <MemberOf crid="crid://dvb.org/metadata/schedules/now-next/later" index="1"/>
    </ProgramInformation>
</ProgramInformationTable>
<GroupInformationTable>
    <GroupInformation groupId="crid://dvb.org/metadata/schedules/now-next/now"
        numOfItems="1" ordered="true">
        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription/>
    </GroupInformation>
    <GroupInformation groupId="crid://dvb.org/metadata/schedules/now-next/later"
        numOfItems="1" ordered="true">
        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription/>
    </GroupInformation>
</GroupInformationTable>
<ProgramLocationTable xml:lang="en">
    <Schedule serviceIDRef="cgsid_1" start="2020-06-14T08:30:00Z"
        end="2020-06-14T10:00:00Z">
        <ScheduleEvent>
            <Program crid="crid://example/12019073"/>
            <PublishedStartTime>2020-06-14T08:30:00Z</PublishedStartTime>
            <PublishedDuration>PT1H</PublishedDuration>
        </ScheduleEvent>
        <ScheduleEvent>
            <Program crid="crid://example/12019074"/>
            <PublishedStartTime>2020-06-14T09:30:00Z</PublishedStartTime>
            <PublishedDuration>PT30M</PublishedDuration>
        </ScheduleEvent>
    </Schedule>
</ProgramLocationTable>
</ProgramDescription>
</TVAMain>

```

Figure 10a: Example – Now/Next Filtered Schedule Response

6.5.4.3.3 Now/Next (window) Filtered Schedule Response

```

<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xml:lang="en" xmlns="urn:tva:metadata:2023" xmlns:mpeg7="urn:tva:mpeg7:2008"
xmlns:tva="urn:tva:metadata:2023" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:tva:metadata:2023
../tva_metadata_3-1.xsd">
  <ProgramDescription>
    <ProgramInformationTable>
      <ProgramInformation programId="crid://example/12019073">
        <BasicDescription>
          <Title type="main">Cities</Title>
          <Synopsis length="medium">
            Cities serve as places of surprising opportunity for animals to
            thrive.</Synopsis>
          <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:2" type="main"/>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
              <MediaUri contentType="image/png">
                http://tmsimg.com/assets/p13469377_e_h13_aa.jpg</MediaUri>
            </MediaLocator>
          </RelatedMaterial>
        </BasicDescription>
        <MemberOf crid="crid://dvb.org/metadata/schedules/now-next/earlier" index="1"/>
      </ProgramInformation>
      <ProgramInformation programId="crid://example/12019074">
        <BasicDescription>
          <Title type="main">Jason Peterson's Into The Wild</Title>
          <Synopsis length="medium">
            Jason Peterson hunts the most dangerous animals across North America
            and the around the world.
          </Synopsis>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
              <MediaUri contentType="image/png">
                http://tmsimg.com/assets/p10870905_i_h13_aa.jpg</MediaUri>
            </MediaLocator>
          </RelatedMaterial>
        </BasicDescription>
        <MemberOf crid="crid://dvb.org/metadata/schedules/now-next/now" index="1"/>
      </ProgramInformation>
      <ProgramInformation programId="crid://example/12019075">
        <BasicDescription>
          <Title type="main">Jungles</Title>
          <Synopsis length="medium">
            From the jungles of Brazil to Costa Rica, animals face life in the most
            competitive place on Earth.
          </Synopsis>
          <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:2" type="main"/>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
              <MediaUri contentType="image/png">

```

```

        http://tmsimg.com/assets/p13451731_e_h13_aa.jpg
    </MediaUri>
</MediaLocator>
</RelatedMaterial>
</BasicDescription>
<MemberOf crid="crid://dvb.org/metadata/schedules/now-next/later" index="1"/>
</ProgramInformation>
<ProgramInformation programId="crid://example/12019076">
    <BasicDescription>
        <Title type="main">We Bought a Zoo</Title>
        <Synopsis length="medium">Following his wife's death, Los Angeles journalist
            Benjamin Mee (Matt Damon) decides to make a fresh start by quitting his job and
            moving his children (Colin Ford, Maggie Elizabeth Jones) to an 18-acre property
            containing the Rosemoor Wildlife Park.</Synopsis>
        <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:5" type="main"/>
        <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
                <MediaUri contentType="image/png">
                    http://tmsimg.com/assets/p8768802_i_h13_ab.jpg</MediaUri>
                </MediaLocator>
            </RelatedMaterial>
        </BasicDescription>
        <MemberOf crid="crid://dvb.org/metadata/schedules/now-next/later" index="2"/>
    </ProgramInformation>
    <ProgramInformation programId="crid://example/12019077">
        <BasicDescription>
            <Title type="main">Scaly Adventures</Title>
            <Synopsis length="medium">
                The Scaly Adventures Crew journeys the world in search of amazing animals and
                incredible adventures.</Synopsis>
            <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:5" type="main"/>
            <RelatedMaterial>
                <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
                <MediaLocator>
                    <MediaUri contentType="image/png">
                        http://tmsimg.com/assets/p10162104_i_h13_ab.jpg</MediaUri>
                    </MediaLocator>
                </RelatedMaterial>
            </BasicDescription>
            <MemberOf crid="crid://dvb.org/metadata/schedules/now-next/later" index="3"/>
        </ProgramInformation>
    </ProgramInformationTable>
</GroupInformationTable>
    <GroupInformation groupId="crid://dvb.org/metadata/schedules/now-next/earlier"
        numOfItems="1" ordered="true">
        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription/>
    </GroupInformation>
    <GroupInformation groupId="crid://dvb.org/metadata/schedules/now-next/now"
        numOfItems="1" ordered="true">
        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription/>
    </GroupInformation>
    <GroupInformation groupId="crid://dvb.org/metadata/schedules/now-next/later"
        numOfItems="3" ordered="true">

```

```

        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription/>
    </GroupInformation>
</GroupInformationTable>
<ProgramLocationTable xml:lang="en">
    <Schedule serviceIDRef="cgsid_1" start="2020-06-14T08:30:00Z"
        end="2020-06-14T16:00:00Z">
        <ScheduleEvent>
            <Program crid="crid://example/12019073"/>
            <PublishedStartTime>2020-06-14T08:30:00Z</PublishedStartTime>
            <PublishedDuration>PT1H</PublishedDuration>
        </ScheduleEvent>
        <ScheduleEvent>
            <Program crid="crid://example/12019074"/>
            <PublishedStartTime>2020-06-14T09:30:00Z</PublishedStartTime>
            <PublishedDuration>PT30M</PublishedDuration>
        </ScheduleEvent>
        <ScheduleEvent>
            <Program crid="crid://example/12019075"/>
            <PublishedStartTime>2020-06-14T10:00:00Z</PublishedStartTime>
            <PublishedDuration>PT1H</PublishedDuration>
        </ScheduleEvent>
        <ScheduleEvent>
            <Program crid="crid://example/12019076"/>
            <PublishedStartTime>2020-06-14T11:00:00Z</PublishedStartTime>
            <PublishedDuration>PT2H30M</PublishedDuration>
        </ScheduleEvent>
        <ScheduleEvent>
            <Program crid="crid://example/12019077"/>
            <PublishedStartTime>2020-06-14T13:30:00Z</PublishedStartTime>
            <PublishedDuration>PT30M</PublishedDuration>
        </ScheduleEvent>
    </Schedule>
</ProgramLocationTable>
</ProgramDescription>
</TVAMain>

```

Figure10b: Example – Now/Next Window Filtered Schedule Response

6.5.4.4 Grouping in a Now/Next Filtered Schedule Response

Now/Next filtered scheduled responses have additional `GroupInformation` tables to indicate whether an event is the current on-air event, in the future, or in the past, see clauses 6.10.4 and 6.10.17.3.

A `ScheduleEvent` becomes a transitory member of one of these groups as a programme becomes close to transmission time and becomes on-air.

Informative: the use of structural group CRIDs to wrap the `ScheduleEvent` allows a client to unambiguously identify an order list of on-air and upcoming events.

`GroupInformation` tables are defined with a `groupId` from the following:

- `crid://dvb.org/metadata/schedules/now-next/now`
- `crid://dvb.org/metadata/schedules/now-next/later`
- `crid://dvb.org/metadata/schedules/now-next/earlier`

The `ProgramInformation.MemberOf@crid` attribute is used to associate `ProgramInformation` elements with `GroupInformation` elements.

The relative position of an event shall be determined by the `ProgramInformation.MemberOf@index` attribute:

- Where the `@groupId` is `crid://dvb.org/metadata/schedules/now-next/now` there shall only be one event, the current on-air event, with an index of 1.
- Where the `@groupId` is `crid://dvb.org/metadata/schedules/now-next/later` there shall be up to ten events. Events are forward order, so the event following the current on-air event shall have an index of 1.
- Where the `@groupId` is `crid://dvb.org/metadata/schedules/now-next/earlier` there shall be up to ten events. Events are in reverse order, so the event immediately prior to the current on-air event shall have an index of 1.

The number of events in the later and earlier groups depends on the `now_next` query parameter in the request:

- For `now_next=true` there shall be one event in the latter group and none in the earlier group.
- For `now_next=window` there shall be up to ten events in each of the later and earlier groups.

6.5.5 Restart Application Linking

Restart, sometimes known as Start Again, offers a viewer the ability to watch a programme currently in progress on a linear broadcast channel from the beginning. If Restart is available for a programme, the Content guide Server provides the link to an IP delivered asset as part of the Now/Next filtered Schedule response.

Restart information may be provided within the `InstanceDescription` of a `ScheduleEvent` in the `ProgramLocationTable` for a current on-air event. There are two parts to Restart information, a `Genre` element and a `RelatedMaterial` element, as shown in figure 11.

```
<Genre href="urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_check" type="other"/>
<RelatedMaterial>
  <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2018:restart"/>
  <MediaLocator>
    <MediaUri>https://channel7.co.uk/channel7/restart/programme.aitx</MediaUri>
    <AuxiliaryURI>
      https://channel7.co.uk/channel7/restart/template.aitx
    </AuxiliaryURI>
  </MediaLocator>
</RelatedMaterial>
```

Figure 11: Example - Restart Output - InstanceDescription of ScheduleEvent (part)

The `RelatedMaterial` element with an `@href` attribute carrying the value `urn:fvc:metadata:cs:HowRelatedCS:2018:restart` and provides two links. The `MediaUri` is the Restart XML AIT which is a deeplink to the Restart stream in a Content Provider's player. The `AuxiliaryURI` is the Restart Template XML AIT that a device shall use to determine compatibility with the Restart stream. The Template XML AIT rules of clause 5.2.4.4 apply.

The `Genre` provides information about the availability of Restart. Depending on the supplied URN, the DVB-I client shall behave according to the following rules:

- **restart_available**
`urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_available`
 Subject to Template AIT rules of clause 5.2.4.4, the DVB-I client shall assume that the Restart stream is available. The option to Restart shall be displayed without checking the Restart AIT first. The Restart AIT

shall only be requested if the user chooses to restart. A DVB-I client shall be robust to the possibility that a request for the Restart AIT fails - for example, an error message should be displayed to the user.

- **restart_check**

urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_check

Restart may be available, but the DVB-I client needs to check with the Content Provider. Assuming the Template AIT rules of clause 5.2.4.4 have been satisfied, the DVB-I client shall request the Restart AIT from the Content Provider before displaying the option to restart to the user. If a valid Restart AIT is returned, then the DVB-I client shall display the option to restart to the user but if an invalid Restart AIT is returned then the DVB-I client shall not display the option to restart to the user.

- **restart_pending**

urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_pending

Restart may be available later but is not currently. A DVB-I client shall not request the Restart AIT and shall not display the option to restart to the user.

The option to restart shall not be presented to the user in any case other than when *restart_available* or *restart_check* is signalled, and in the case of *restart_check* if a successful response has been received to requesting the Restart AIT.

A DVB-I client shall obey cache control headers on Now/Next and AIT responses. In particular, if checking the Restart AIT for an event with a status of *restart_check* results in failure, the Restart AIT shall not be requested again until the original response has expired.

6.6 Programme Information Request

6.6.1 Introduction

The `ProgramInfoEndpoint` provides detailed information on a single programme identified by programme identifier.

6.6.2 Request

The following API endpoint allows a DVB-I client to retrieve detailed information on a specific programme, including additional enhanced metadata such as a longer synopsis, list of credits and keywords that are not provided via the `ScheduleInfo` endpoint. The intention is that this method may be used to provide more in-depth information on a programme prompted by user interaction.

The identifier used to request information on a programme shall be a programme identifier, taken from a response to the `ScheduleInfo` endpoint. Therefore, the expectation is that discovery of available programmes is still achieved via the `ScheduleInfo` endpoint to provide additional information only when required.

The programme identifier shall take the form of a CRID (see clause 6.10.4). Query strings shall use those characters and encoding rules defined in clause 6.2.2.

The request URL shall be composed as follows:

```
<ProgramInfoEndpoint>?pid=<program_id>&image_variant=<variant>
```

where:

- `program_id`: shall be a single CRID as retrieved from the `@programId` attribute of a `ProgramInformation` element or a `@crid` attribute taken from `ScheduleEvent` or `OnDemandProgram`. Relevant reserved characters shall be percent-encoded as defined in clause 6.2.2.
- `variant`: (Optional) shall specify an image variant (see clause 5.2.8.2.1) for the image URLs provided in the response.

In the case where the CRID provided is known to a Content Guide Server, the response shall be a 200 (OK) HTTP response containing a well-formed XML document consisting of a `ProgramInformationTable` and `ProgramLocationTable` (see clause 6.10.1).

- The `ProgramInformationTable` shall contain a single `ProgramInformation` element and the `ProgramInformation` element shall contain all data on the requested programme including both the additional data supported by this endpoint and all programme data provided in the Schedules endpoint response.
- The `ProgramLocationTable` may contain a single `OnDemandProgram` element representing the current On Demand availability of this programme, if relevant. If the programme is not currently available On Demand, the `ProgramLocationTable` shall still be present but shall not contain any child elements.

In the case where the CRID is not known to a Content Guide Server then a 200 (OK) HTTP response shall be returned but the `ProgramInformationTable` and `ProgramLocationTable` shall not contain any elements.

As stated in clause 4.3.2.1, the expiry time contained in the `Cache-Control: max-age` header in returned programme results shall be respected.

6.6.3 Response

A Content Guide Server shall return a well-formed XML document consisting of the following tables (see clause 6.10.1):

- `ProgramInformationTable`
- `ProgramLocationTable`

The following attributes may be used to associate `ProgramInformation` and `OnDemandProgram` elements provided by this endpoint with `ScheduleEvent` elements and `OnDemandProgram` elements provided in other responses:

- `ProgramInformation@programId`
- `ScheduleEvent.Program@crid`
- `OnDemandProgram.Program@crid`

CRIDs used to provide linkage between TV-Anytime XML fragments shall not be assumed to be consistent with any CRIDs provided in DVB-C/S/T broadcast Service Information (i.e. carried in the Content Identifier Descriptor as defined in ETSI TS 102 323 [28]).

The Programme Information endpoint method shall return an extended `ProgramInformation` fragment meaning that it shall contain all of the programme metadata provided in a Schedule and may contain additional extended information if available. The `OnDemandProgram` information provided via this endpoint shall be complete and as extensive as that provided via any other endpoint. Therefore, the data from this API endpoint may safely be used to replace any programme metadata previously stored by the DVB-I client from a Schedules response if necessary.

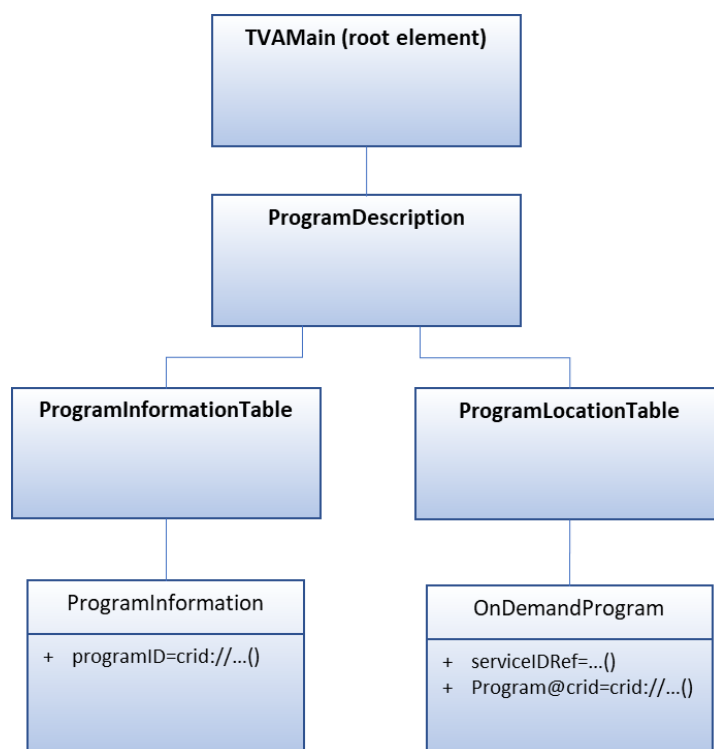


Figure 12: Detailed Programme Information response data structure

Example URL:

<ProgramInfoEndpoint>?pid=crid://channel7.co.uk/b01myjsy

```

<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2023"
  xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" xml:lang="en">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="en">
      <ProgramInformation programId="crid://channel7.co.uk/b01myjsy">
        <BasicDescription>
          <Title type="main">Bargain Hunt</Title>
          <Title type="secondary">01/01/2014</Title>
          <Synopsis length="short">The Bargain Hunt teams head to
            Staffordshire's County Showground.</Synopsis>
          <Synopsis length="medium">The Bargain Hunt teams head to
            Staffordshire's County Showground, where both experts face double trouble.</Synopsis>
          <Synopsis length="long">The Bargain Hunt teams head to
            Staffordshire's County Showground, where both experts face double trouble.
            David Harper heads up two Toms for the red team, while twin sisters
            Elizabeth and Rachel are guided by Jonathan Pratt for the blue team. Tim
            Wonnacott travels to Bath to visit one of the city's greatest architectural
            delights.</Synopsis>
          <Keyword>FAMILY LIFE</Keyword>
          <Keyword>RELATIONSHIPS</Keyword>
          <Keyword type="other">Critic's Choice</Keyword>
          <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:3" type="main"/>
          <ParentalGuidance>
            <mpeg7:MinimumAge>15</mpeg7:MinimumAge>
          </ParentalGuidance>
        </ProgramInformation>
      </ProgramInformationTable>
    </ProgramDescription>
  </TVAMain>

```



```

    <mpeg7:ParentalRating
      href="urn:fvc:metadata:cs:ContentRatingCS:2014-07:fifteen"/>
    <ExplanatoryText length="long">Contains strong language and flash
      photography</ExplanatoryText>
  </ParentalGuidance>
  <CreditsList>
    <CreditsItem role="urn:tva:metadata:cs:TVARoleCS:2011:V20">
      <OrganizationName>International Studios Limited</OrganizationName>
    </CreditsItem>
    <CreditsItem role="urn:tva:metadata:cs:TVARoleCS:2011:AD6">
      <PersonName>
        <mpeg7:GivenName>Jeremy</mpeg7:GivenName>
        <mpeg7:FamilyName>Brown</mpeg7:FamilyName>
      </PersonName>
    </CreditsItem>
    <CreditsItem role="urn:mpeg:mpeg7:cs:RoleCS:2001:ACTOR">
      <PersonName>
        <mpeg7:GivenName>William</mpeg7:GivenName>
        <mpeg7:FamilyName>Johnson</mpeg7:FamilyName>
      </PersonName>
      <Character>
        <mpeg7:GivenName>Billy</mpeg7:GivenName>
        <mpeg7:FamilyName>Johns</mpeg7:FamilyName>
      </Character>
    </CreditsItem>
  </CreditsList>
  <RelatedMaterial>
    <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
    <MediaLocator>
      <MediaUri contentType="image/png">
        https://img-ctv.mdata.co.uk/channel7/bargain_hunt.png
      </MediaUri>
    </MediaLocator>
  </RelatedMaterial>
</BasicDescription>
</ProgramInformation>
</ProgramInformationTable>
<ProgramLocationTable xml:lang="en">
  <OnDemandProgram serviceIDRef="https://channel7.co.uk/service_a_app">
    <Program crid="crid://channel7.co.uk/b01myjsy"/>
    <ProgramURL contentType="application/vnd.dvb.ait+xml">
      https://channel7.co.uk/ait.aitx?pid=b01myjsy</ProgramURL>
    <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
      https://channel7.co.uk/ait.aitx?template</AuxiliaryURL>
    <InstanceDescription>
      <Genre
        href="urn:fvc:metadata:cs:MediaAvailabilityCS:2014-07:media_available" type="other"/>
      <Genre
        href="urn:fvc:metadata:cs:FEPGAvailabilityCS:2014-10:fepg_unavailable" type="other"/>
    <CaptionLanguage closed="true">en</CaptionLanguage>
    <AVAttributes>
      <VideoAttributes>
        <HorizontalSize>576</HorizontalSize>
        <VerticalSize>512</VerticalSize>
        <AspectRatio>16:9</AspectRatio>
      </VideoAttributes>
    </AVAttributes>
  </OnDemandProgram>
</ProgramLocationTable>

```

```

        </AVAttributes>
    </InstanceDescription>
    <PublishedDuration>PT1H</PublishedDuration>
    <StartOfAvailability>2013-09-25T12:03:09Z</StartOfAvailability>
    <EndOfAvailability>2013-10-02T09:59:00Z</EndOfAvailability>
    <DeliveryMode>streaming</DeliveryMode>
    <Free value="true"/>
</OnDemandProgram>
</ProgramLocationTable>
</ProgramDescription>
</TVAMain>

```

Figure 13: Example - Detailed Programme Information Response

6.7 More Episodes Request

6.7.1 Introduction

The `MoreEpisodesEndpoint` provides a list of more episodes related to a single programme identified by programme identifier, filtered for regional relevance and paginated. This may be referred to elsewhere as "Siblings Group Information".

6.7.2 Request

The More Episodes endpoint allows a DVB-I client to retrieve a list of more episodes related to a specific programme. The programme episodes may be available from more than one service within the `ServiceList`.

The identifier used to request more episodes related to a programme shall be a programme identifier, taken from a response to the Schedules, Programme Information, endpoints. This programme identifier shall take the form of a CRID (see clause 6.10.4).

More Episodes results shall be provided in TV-Anytime, ETSI TS 102 822-3-1 [7], compliant data structures, similar to the other API endpoints described within the present document. This format is defined in clause 6.7.3 while details on the pagination of these results can be found in clause 6.9.

More Episodes results shall be filtered by a Content Guide Server to be regionally relevant based on region information (`@regionID` from the provided `RegionList`, see clause 5.6.2) provided by the DVB-I client in the query. As such, the DVB-I client should not filter any results returned by the query.

More Episode requests including query strings shall be bounded by the encoding rules defined in clause 6.2.2.

URL format:

```

<MoreEpisodesEndpoint>?pid=<program_id>&type=ondemand&regionID[]=<region_id_1>&regionID[]
=<region_id_2>...&image_variant=<variant>

```

where:

- `program_id`: shall be a single CRID as retrieved from the `@programId` attribute of a `ProgramInformation` element or a `@crid` attribute taken from `ScheduleEvent` or `OnDemandProgram`. Relevant reserved characters shall be percent-encoded as defined above.
- `region_id_x`: (Optional) shall be a `regionID` as determined by the DVB-I client (see clause 5.6.2). More than one `regionID[]` parameter may be passed.
- `variant`: (Optional) shall specify an image variant (see clause 5.2.8.2.1) for the image URLs provided in the response.

Assuming the request is correctly formatted the response shall be a 200 (OK) HTTP response containing an XML body as defined in clause 6.7.3.

Behaviour regarding Cache-Control support (clause 4.3.2.1) and If-Modified-Since conditional requests (clause 4.3.2.2) shall be supported for More Episode requests as described in the relevant clauses of the present document.

6.7.3 Response

A Content Guide Server shall return a well-formed XML document consisting of the following tables (see clause 6.10.1):

- ProgramInformationTable
- GroupInformationTable
- ProgramLocationTable

The following attributes should be matched in order to associate ProgramInformation elements and OnDemandProgram elements within the response:

- ProgramInformation@programId
- OnDemandProgram.Program@crid

CRIDs used to provide linkage between TV-Anytime XML fragments shall not be assumed to be consistent with any CRIDs provided in broadcast Service Information (i.e. carried in the Content Identifier Descriptor as defined in ETSI TS 102 323 [28]).

All OnDemandProgram elements in the returned ProgramLocation table shall have a matching entry in the returned ProgramInformation table. The ProgramInformation table shall only describe content present in the ProgramLocationTable.

The response shall contain the following information for each item of matching content:

- ProgramInformation (see clause 6.10.4)
- OnDemandProgram (see clause 6.10.8.3)

The details of the "minimal" data provided in More Episodes results may be found in the relevant portions of the profile tables in clause 6.10 and a complete example is provided in figure 14.

Each response shall contain a single structural Results Group GroupInformation fragment to which all results are a member.

The response may be paginated as defined in clause 6.9. The number of results provided per page of results shall be managed by the Content Guide Server. The GroupInformation@numOfItems attribute shall indicate the total number of results across all pages within a Content Guide Server, however the value may not reflect the number of results visible to the user due to content compatibility or availability signalled in the Template XML AIT.

All ProgramInformation fragments shall be associated with this Results Group through the ProgramInformation.MemberOf element. A DVB-I client shall display results in ascending order using the values from the MemberOf@index attribute. These values shall indicate ordering of the total set of results, rather than within the scope of a page.

Each OnDemandProgram element shall contain a @serviceIdRef attribute referencing the Service.UniqueIdentifier or Service.ContentGuideServiceRef of a service. This association may be used by a DVB-I client, for example to decorate results with the logo of the service.

All OnDemandProgram fragments returned from a More Episodes query shall be assumed to be currently available from the Content Provider or available in the near future. Before displaying the result to the user, the DVB-I client shall

process the Template XML AIT for each `OnDemandProgram` as specified in clause 5.2.4.4 to ensure that the content is supported by the device. In the event that this process indicates incompatibility between the content and the DVB-I client or the XML AIT request fails, the result shall be hidden from the user.

The `ProgramInformation` and `OnDemandProgram` data provided in More Episodes responses is limited in comparison to that retrieved from the Schedules or Detailed Programme Information endpoints. This is to ensure that results documents are of a manageable size whilst providing sufficient information to present a basic set of results to a user and directly launch On Demand content if required. A complete `ProgramInformation` and `OnDemandProgram` fragment for any result may be requested using the Detailed Programme Information endpoint (see clause 6.6).

In the case that no results are available for the provided query string, the response shall be a 200 (OK) HTTP status and consist of an XML document containing an empty `ProgramInformationTable` and empty `ProgramLocationTable`. In this situation, the `GroupInformationTable` shall contain a Results Group where the `GroupInformation@numOfItems` attribute has a value of 0 (see clause 6.9 for further detail).

The response may contain `ScheduleEvent` elements indicating future broadcasts/streaming events. The response shown below depicts a request for the third page (refer to clause 6.9) of results.

```
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2023" xmlns:mpeg7="urn:tva:mpeg7:2008"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" xml:lang="en">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="en">
      <ProgramInformation programId="crid://channel7.co.uk/n19alrr1">
        <BasicDescription>
          <Title type="main">Roland Rat</Title>
          <Title type="secondary">Series 1, Episode 1</Title>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
              <MediaUri contentType="image/jpeg">
                https://img-ctv.mdata.co.uk/channel7/rat1.jpeg</MediaUri>
              </MediaLocator>
            </RelatedMaterial>
          </BasicDescription>
          <MemberOf xsi:type="MemberOfType" index="5"
            crid="crid://mdata.co.uk/more-episodes/results"/>
        </ProgramInformation>
        <ProgramInformation programId="crid://channel7.co.uk/n19alrr2">
          <BasicDescription>
            <Title type="main">Roland Rat</Title>
            <Title type="secondary">Series 1, Episode 2</Title>
            <RelatedMaterial>
              <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
              <MediaLocator>
                <MediaUri contentType="image/jpeg">
                  https://img-ctv.mdata.co.uk/channel7/rat2.jpeg</MediaUri>
                </MediaLocator>
              </RelatedMaterial>
            </BasicDescription>
            <MemberOf xsi:type="MemberOfType" index="6"
              crid="crid://mdata.co.uk/more-episodes/results"/>
          </ProgramInformation>
        </ProgramInformationTable>
      <GroupInformationTable>
        <GroupInformation groupId="crid://mdata.co.uk/more-episodes/results" ordered="true"
          numOfItems="115">
          <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection" />
          <BasicDescription>
```

```

    <RelatedMaterial>
      <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:first"/>
      <MediaLocator><MediaUri>
        https://api-ctv.mdata.co.uk/programs/more-
        episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2Fn19alr19&type=ondemand&regionID%5B%5D=1234&
        regionID%5B%5D=5678
      </MediaUri></MediaLocator>
    </RelatedMaterial>
    <RelatedMaterial>
      <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:prev"/>
      <MediaLocator><MediaUri>
        https://api-ctv.mdata.co.uk/programs/more-
        episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2Fn19alr19&type=ondemand&regionID%5B%5D=1234&
        ;regionID%5B%5D=5678&page=2
      </MediaUri></MediaLocator>
    </RelatedMaterial>
    <RelatedMaterial>
      <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:next"/>
      <MediaLocator><MediaUri>
        https://api-ctv.mdata.co.uk/programs/more-
        episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2Fn19alr19&type=ondemand&regionID%5B%5D=1234&
        ;regionID%5B%5D=5678&page=4
      </MediaUri></MediaLocator>
    </RelatedMaterial>
    <RelatedMaterial>
      <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:last"/>
      <MediaLocator><MediaUri>
        https://api-ctv.mdata.co.uk/programs/more-
        episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2Fn19alr19&type=ondemand&regionID%5B%5D=1234&
        ;regionID%5B%5D=5678&page=4
      </MediaUri></MediaLocator>
    </RelatedMaterial>
  </BasicDescription>
</GroupInformation>
</GroupInformationTable>
<ProgramLocationTable xml:lang="en">
  <OnDemandProgram serviceIDRef="http://channel7.co.uk/service_a_app">
    <Program crid="crid://channel7.co.uk/n19alrr1"/>
    <ProgramURL contentType="application/vnd.dvb.ait+xml">
      https://channel7.co.uk/ait.aitx?pid=crid://channel7.co.uk/n19alrr1</ProgramURL>
    <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
      https://channel7.co.uk/ait.aitx?template</AuxiliaryURL>
    <PublishedDuration>PT1H00M00S</PublishedDuration>
    <StartOfAvailability>2013-09-25T12:03:09Z</StartOfAvailability>
    <EndOfAvailability>2013-10-02T09:59:00Z</EndOfAvailability>
    <Free value="true"/>
  </OnDemandProgram>
  <OnDemandProgram serviceIDRef="http://channel7.co.uk/service_a_app">
    <Program crid="crid://channel7.co.uk/n19alrr2"/>
    <ProgramURL contentType="application/vnd.dvb.ait+xml">
      https://channel7.co.uk/ait.aitx?pid=crid://channel7.co.uk/n19alrr2</ProgramURL>
    <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
      https://channel7.co.uk/ait.aitx?template</AuxiliaryURL>
    <PublishedDuration>PT1H00M00S</PublishedDuration>
    <StartOfAvailability>2013-01-05T00:02:01Z</StartOfAvailability>
    <EndOfAvailability>2013-11-02T23:59:00Z</EndOfAvailability>
    <Free value="true"/>
  </OnDemandProgram>
</ProgramLocationTable>

```

```
</ProgramDescription>
</TVAMain>
```

Figure 14: Example - More Episodes Response

6.8 Group Information (Box Set) Request

6.8.1 Introduction

The `GroupInfoEndpoint` is used to provide three APIs to support content Grouping (Box Sets) on the DVB-I client, providing metadata for On Demand and scheduled content that has been curated into box sets for promotion and allowing this content to be discovered via a set of curated categories. These endpoints are listed here and described in detail in the subsequent clauses:

- Box Set Categories, providing a list of categories for Box Sets
- Box Set Lists, providing a list of Box Sets available within a category
- Box Set Contents, providing a list of episodes within a specific Box Set

6.8.2 Box Set Categories

6.8.2.1 Introduction

This provides a list of categories to which Box Sets may belong.

6.8.2.2 Request

The Box Set Categories endpoint is provided in order to allow the DVB-I client to present a list of available categories a user may select in order to subsequently filter Box Sets. The categories themselves may be static and long running, or short-lived (seasonal).

Box Set Categories requests may optionally include one of more service identifiers which will return only Categories related to those Service(s).

URL Format:

```
<GroupInfoEndpoint>categories?sid[]=<service_id_1>&sid[]=<serviceID_id_2>&...&regionID[]=<region_id_1>&regionID[]=<region_id_2>...&image_variant=<variant>
```

where:

- `service_id_x`: (Optional) shall be a `Service.UniqueIdentifier` or `Service.ContentGuideServiceRef` of a service. More than one `sid[]` parameter may be passed.
- `region_id_x`: (Optional) shall be a `regionID` as determined by the DVB-I client (see clause 5.6.2). More than one `regionID[]` parameter may be passed.
- `variant`: (Optional) shall specify an image variant (see clause 5.2.8.2.1) for the image URLs provided in the response.

If the request is correctly formatted the response shall be a 200 (OK) HTTP response containing an XML body as defined in clause 6.8.2.3 while details on the pagination of these results can be found in clause 6.9..

For response codes during error conditions and expected DVB-I client behaviour, see clause 4.3.2.2 with reference to any content guide API endpoint.

Behaviour regarding Cache-Control support (clause 4.3.2.1) and If-Modified-Since conditional requests (clause 4.3.2.2) shall be supported for Box Sets Categories requests.

6.8.2.3 Response

A Content Guide Server shall return a well-formed XML document containing only the following table (see clause 6.10.1):

- GroupInformationTable

The GroupInformationTable shall consist of a set of GroupInformation fragments which comply with the schema definition detailed in clause 6.10.17.2. This shall include a 'parent' GroupInformation fragment to group the categories and a GroupInformation fragment for each available category.

The parent GroupInformation fragment shall indicate the number of categories present in the response using the @numOfItems attribute. This group shall not be displayed in the user interface and shall be identified by a structural @groupId attribute whose value shall be `crid://dvb.org/metadata/collections/boxsets/categories`.

The DVB-I client may use the MemberOf@index attribute to determine the order of categories presented in the user interface.

The value of the GroupInformation@groupId attribute shall be provided in the CRID format. The value of this attribute shall be specified as a value for the @groupId parameter of the Box Set Lists endpoint as defined in clause 6.8.3.

```
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2023" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:mpeg7="urn:tva:mpeg7:2008" xml:lang="en">
  <ProgramDescription>
    <GroupInformationTable>
      <GroupInformation groupId="crid://dvb.org/metadata/collections/boxsets/categories"
        ordered="true" numOfItems="2">
        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription>
          <Title>Category Group</Title>
        </BasicDescription>
      </GroupInformation>
      <GroupInformation
        groupId="crid://dvb.org/metadata/collections/boxsets/categories/decent_comedy">
        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription>
          <Title>Decent Comedy</Title>
          <Synopsis length="short">
            Quality cult comedies from the likes of Armando Iannucci, Chris
            Morris and Stewart Lee</Synopsis>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
              <MediaUri contentType="image/png">
                https://img-ctv.mdata.co.uk/decent-comedy.png
              </MediaUri>
            </MediaLocator>
          </RelatedMaterial>
        </BasicDescription>
        <MemberOf xsi:type="MemberOfType" index="1"
          crid="crid://dvb.org/metadata/collections/boxsets/categories"/>
      </GroupInformation>
```

```

<GroupInformation
  groupId="crid://mdata.co.uk/collections/boxsets/categories/popularist_comedy">
  <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
  <BasicDescription>
    <Title>Popularist Comedy</Title>
    <Synopsis length="short">
      Popularist comedy featuring such turns as Michael McIntyre and Mrs Brown
    </Synopsis>
    <RelatedMaterial>
      <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
      <MediaLocator>
        <MediaUri contentType="image/png">
          https://img-ctv.mdata.co.uk/popularist-comedy.png
        </MediaUri>
      </MediaLocator>
    </RelatedMaterial>
  </BasicDescription>
  <MemberOf xsi:type="MemberOfType" index="2"
    crid="crid://dvb.org/metadata/collections/boxsets/categories"/>
</GroupInformation>
</GroupInformationTable>
</ProgramDescription>
</TVAMain>

```

Figure 15: Example - Box Set Categories Response

6.8.3 Box Set Lists

6.8.3.1 Introduction

This provides the list of curated Box Sets in a category obtained from the Box Set Categories endpoint. Nested box sets are not supported.

6.8.3.2 Request

The Box Set Lists endpoint is provided in order to allow a DVB-I client to present the list of Box Sets available in a particular Box Set category.

Lists of Box Sets shall be requested by category by providing a single CRID as a query parameter. The CRID shall be the value of a `GroupInformation@groupId` attribute drawn from a Box Set Categories endpoint response, as specified in clause 6.8.2.3.

Box Sets shall be filtered by the Content Guide Server to be regionally relevant based on region identifiers and/or service identifiers provided by the DVB-I client in the query. The DVB-I client shall not filter the results, whether by region ID or other means.

URL format:

```

<GroupInfoEndpoint>/?groupId=<Group_ID>&sid[]=<service_id_1>&sid[]=<serviceID_id_2>&...
&regionID[]=<region_id_1>&regionID[]=<region_id_2>...&image_variant=<variant>

```

where:

- `Group_ID`: (Mandatory) shall be a single CRID as retrieved from the `@groupId` attribute of a `GroupInformation` fragment from a Box Sets Categories response (see clause 6.8.2.3). Relevant reserved characters shall be percent-encoded as defined in clause 6.2.2.

- `service_id_x`: (Optional) shall be a `Service.UniqueIdentifier` or `Service.ContentGuideServiceRef` of a service.. More than one `sid[]` parameter may be passed.
- `region_id_x`: (Optional) shall be a `regionID` as determined by the DVB-I client (see clause 5.6.2). More than one `regionID[]` parameter may be passed.
- `variant`: (Optional) shall specify an image variant (see clause 5.2.8.2.1) for the image URLs provided in the response.

If the request for a Box Set List is correctly formatted the response shall be a 200 (OK) HTTP response containing an XML body as defined in clause 6.8.3.3 while details on the pagination of these results can be found in clause 6.9..

For response codes in error conditions and expected DVB-I client behaviour, see clause 4.3.3 with reference to any content guide API endpoint.

Behaviour regarding Cache-Control (clause 4.3.2.1) and If-Modified-Since conditional requests (clause 4.3.2.2) shall be supported for Box Set Group requests.

6.8.3.3 Response

The Content Guide Server shall return a well-formed XML document containing only the following table (see clause 6.10.1):

- `GroupInformationTable`

The `GroupInformationTable` shall consist of a set of `GroupInformation` fragments which comply with the schema definition detailed in clause 6.10.17.2.

The position of the individual Box Set shall be indicated in the `GroupInformation.MemberOf@index` attribute.

The same Box Set may be present in the response for different query filters requested by the DVB-I client. In this case, the Box Set item shall carry the same CRID value in the `GroupInformation@groupId` attribute and may contain a different value in the `MemberOf@index` attribute between requests.

The response may be paginated as defined in clause 6.9. The number of results provided per page of results shall be managed by the Content Guide Server. The `@numOfItems` attribute in the parent `GroupInformation` fragment shall indicate the total number of results across all pages within the Content Guide Server, however the value may not reflect the number of items visible to the user due to content compatibility or availability signalled in the Template XML AIT. This group shall be identified by a structural `@groupId` attribute whose value represents the CRID of a category group.

Information (title, synopsis and image) about each Box Set shall be contained in a `GroupInformation.BasicDescription` fragment (see clause 6.10.17.2). The identifier of the service, i.e. the value of `Service.UniqueIdentifier` or `Service.ContentGuideServiceRef`, shall be conveyed in the `GroupInformation@serviceIDRef` attribute.

In the case that no Box Sets are available for a specified Box Set Category, the response shall be a 200 (OK) HTTP status and consist of an XML document containing a single `GroupInformation` fragment in which the `@numOfItems` attribute shall contain a value of 0.

```
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2023" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:mpeg7="urn:tva:mpeg7:2008" xml:lang="en">
  <ProgramDescription>
    <GroupInformationTable>
      <GroupInformation
        groupId="crid://mdata.co.uk/collections/boxsets/categories/decent_comedy"
        ordered="true" numOfItems="2">
        <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
        <BasicDescription>
```

```

    <Title>Decent Comedy</Title>
  </BasicDescription>
</GroupInformation>
<GroupInformation
  groupId="crid://mdata.co.uk/collections/boxsets/stewart_lee"
  serviceIDRef="http://www.mybroadcaster.co.uk/mdata/service/apps/broadcast_two">
  <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
  <BasicDescription>
    <Title>Stewart Lee's Comedy Vehicle</Title>
    <Synopsis length="medium">
      Stand-up series from one of Britain's most highly regarded comedians.
    </Synopsis>
    <RelatedMaterial>
      <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2018:templateAIT"/>
      <MediaLocator>
        <MediaUri/>
        <AuxiliaryURI contentType="application/vnd.dvb.ait+xml">
          https://www.live.mybroadcastertvapps.co.uk/tap/iplayer/ait/launch/iplayer.aitx
        </AuxiliaryURI>
      </MediaLocator>
    </RelatedMaterial>
    <RelatedMaterial>
      <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
      <MediaLocator>
        <MediaUri contentType="image/png">
          https://img-ctv.mdata.co.uk/stewart_lee.png
        </MediaUri>
      </MediaLocator>
    </RelatedMaterial>
  </BasicDescription>
  <MemberOf xsi:type="MemberOfType" index="1"
    crid="crid://mdata.co.uk/collections/boxsets/categories/decent_comedy"/>
</GroupInformation>
<GroupInformation
  groupId="crid://mdata.co.uk/recommendations/collections/boxsets/green_wing"
  serviceIDRef="http://www.channel4.com/vps/dtt/service/apps/c4">
  <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
  <BasicDescription>
    <Title>Green Wing</Title>
    <Synopsis length="medium">
      Quick-fire (and occasionally slow motion) genre-defying comedy, set in a surreal
      hospital but lacking medical content. From the award-winning team behind
      Smack the Pony.
    </Synopsis>
    <RelatedMaterial>
      <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2018:templateAIT"/>
      <MediaLocator>
        <MediaUri/>
        <AuxiliaryURI contentType="application/vnd.dvb.ait+xml">
          https://ait.channel4.com/ait/template
        </AuxiliaryURI>
      </MediaLocator>
    </RelatedMaterial>
    <RelatedMaterial>
      <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
      <MediaLocator>
        <MediaUri contentType="image/png">

```

```

        https://img-ctv.mdata.co.uk/green_wing.png
    </MediaUri>
</MediaLocator>
</RelatedMaterial>
</BasicDescription>
    <MemberOf xsi:type="MemberOfType" index="2"
        crid="crid://mdata.co.uk/collections/boxsets/categories/decent_comedy"/>
</GroupInformation>
</GroupInformationTable>
</ProgramDescription>
</TVAMain>

```

Figure 16: Example - Box Set Lists Response

6.8.4 Box Set Contents

6.8.4.1 Introduction

This provides a list of episodes available in a Box Set (obtained from the Box Set Lists endpoint), including basic details about each episode, filtered for regional relevance and optionally paginated.

6.8.4.2 Request

The Box Set Contents endpoint is provided in order to allow the DVB-I client to present a list of episodes available in a particular Box Set.

Lists of episodes in a Box Set shall be requested providing a single CRID as a query parameter. The CRID shall be the value of a `GroupInformation@groupId` attribute drawn from a Box Set Lists endpoint response, as specified in clause 6.8.3.3.

The episodes shall be filtered by the Content Guide Server to be regionally relevant based on regionIDs provided by the DVB-I client in the query. The DVB-I client shall not filter the results, whether by region ID or other means.

An optional parameter allows the selection of either a response which supports grouping within the Box Set Contents, for example as series or seasons, or a paginated response, as described in clause 6.9. If a paginated response is selected then only a single `GroupInformation` element, of which all `ProgramInformation` elements are members, is allowed.

URL format:

```

<GroupInfoEndpoint>contents?groupId=<Group_ID>&type=<results_type>&format=<format_option>
&regionID[]=<region_id_1>&regionID[]=<region_id_2>...&image_variant=<variant>

```

where:

- `Group_ID`: (Mandatory) shall be a single CRID as retrieved from the `@groupId` attribute of a `GroupInformation` fragment from a Box Set Lists Response (see clause 6.8.3.3). Relevant reserved characters shall be percent-encoded as defined in clause 6.2.2.
- `results_type`: (Optional) shall carry a value of `ondemand` or `linear` to filter the results to `OnDemand` or `ScheduleEvent` respectively.
- `format`: (Optional) shall carry a value of `paginated` or `grouped` to select the format of the response. The default is `paginated`.
- `region_id_x`: (Optional) shall be a `regionID` as determined by the DVB-I client (see clause 5.6.2). More than one `regionID[]` parameter may be passed.

- **variant:** (Optional) shall specify an image variant (see clause 5.2.8.2.1) for the image URLs provided in the response.

Example URL:

```
<GroupInfoEndpoint>/contents?groupId=crid://mdata.co.uk/comedy
&type=ondemand&format=grouped&regionID[]=1234&regionID[]=5678
```

Assuming the request is correctly formatted the response shall be a 200 (OK) HTTP response containing an XML body as defined in clause 6.8.4.3 while details on the pagination of these results can be found in clause 6.9..

For response codes in error conditions and expected DVB-I client behaviour, see clause 4.3.3 with reference to any content guide API endpoint.

Behaviour regarding Cache-Control (clause 4.3.2.1) and If-Modified-Since conditional requests (clause 4.3.2.2) shall be supported for Box Set Contents requests.

6.8.4.3 Response

The Content Guide Server shall return a well-formed XML document consisting of the following tables (see clause 6.10.1):

- ProgramInformationTable
- GroupInformationTable
- ProgramLocationTable

The following attributes should be matched in order to associate ProgramInformation elements and OnDemandProgram elements within the response:

- ProgramInformation@programId
- OnDemandProgram.Program@crid

CRIDs used to provide linkage between TV-Anytime XML fragments shall not be assumed to be consistent with any CRIDs provided in broadcast Service Information (i.e. carried in the Content Identifier Descriptor as defined in ETSI TS 102 323 [28]).

All On Demand programmes in the returned ProgramLocation table shall have a matching entry in the returned ProgramInformation table. The ProgramInformation table shall only describe content present in the ProgramLocationTable.

The response shall contain the following information for each item of matching content:

- ProgramInformation (see clauses 6.10.4 and 6.10.5.4)
- OnDemandProgram (see clause 6.10.8)

The details of the elements provided in Box Set results may be found in the relevant portions of the profile tables in clause 6.10 and complete examples are provided below.

Each response shall contain at least one Results Group GroupInformation fragment. The Results Group shall be identified by a structural @groupId attribute.

One Results Group GroupInformation fragment shall represent the whole Box Set to which all ProgramInformation elements will belong. Optionally, if the format parameter is set to grouped, one or more GroupInformation fragments will represent series or other groupings, each of these groups shall belong to the parent GroupInformation fragment. Where the second level of grouping is used, all ProgramInformation elements shall belong to both the parent and one of the second level groups.

When the `format` parameter is to `paginated` in the request, the response may be paginated as defined in clause 6.9. The number of results provided per page of results shall be managed by the Content Guide Server. The `GroupInformation@numOfItems` attribute shall indicate the total number of results for each group across all pages within the Content Guide Server, however the value may not reflect the number of items visible to the user due to content compatibility or availability signalled in the Template XML AIT.

All `ProgramInformation` fragments shall be associated with one or two Results Groups through the `ProgramInformation.MemberOf` element. The DVB-I client shall display results in ascending order using the values from the `MemberOf@index` attribute. These values shall indicate ordering of the total set of results, rather than within the scope of a page of results returned by the Content Guide Server.

Each `OnDemandProgram` element shall contain a `@serviceIDRef` attribute referencing the `Service.UniqueIdentifier` or `Service.ContentGuideServiceRef` of a service. This association may be used by the DVB-I client, for example, to decorate episodes with the logo of the service.

The `ProgramInformation` and `OnDemandProgram` data provided in Box Set Contents responses is limited in comparison to that retrieved from the Schedules or Detailed Programme Information endpoints. This is to ensure that results documents are of a manageable size whilst providing sufficient information to present a basic set of results to a user and directly launch On Demand content if required. A complete `ProgramInformation` and `OnDemandProgram` fragment for any result may be requested using the Detailed Programme Information endpoint (see clause 6.6).

In the case that no results are available for the provided query string, the response shall be a 200 (OK) HTTP status and consist of an XML document containing an empty `ProgramInformationTable` and empty `ProgramLocationTable`. In this situation, the `GroupInformationTable` shall contain a Results Group where the `GroupInformation@numOfItems` attribute has a value of 0 (see clause 6.9 for further detail).

```
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2023" xmlns:mpeg7="urn:tva:mpeg7:2008" xml:lang="en"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="en">
      <ProgramInformation programId="crid://mybroadcaster.co.uk/mdata/episode/b00jd8gp">
        <BasicDescription>
          <Title type="main">Stewart Lee's Comedy Vehicle</Title>
          <Title type="secondary">Series 1: 1. Toilet Books</Title>
          <Synopsis length="medium">Stand-up comedy show. Stewart looks at the modern
            phenomenon of toilet books. Where did they come from and who thought they
            were needed? And who is reading them?
          </Synopsis>
          <ParentalGuidance>
            <mpeg7:MinimumAge>255</mpeg7:MinimumAge>
          </ParentalGuidance>
          <ParentalGuidance>
            <mpeg7:ParentalRating
              href="urn:dtg:metadata:cs:DTGContentWarningCS:2011:W"/>
            <ExplanatoryText length="long">Contains some strong language.</ExplanatoryText>
          </ParentalGuidance>
          <RelatedMaterial>
            <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
            <MediaLocator>
              <MediaUri contentType="image/jpeg">
                https://img-ctv.mdata.co.uk/images/c5/7e/c57e/image8c.jpeg
              </MediaUri>
            </MediaLocator>
          </RelatedMaterial>
        </BasicDescription>
      </ProgramInformation>
    </ProgramInformationTable>
  </ProgramDescription>
</TVAMain>
```

```

    <MemberOf xsi:type="MemberOfType" index="1"
      crid="crid://mdata.co.uk/collections/boxsets/stewart_lee"/>
    <MemberOf xsi:type="MemberOfType" index="1"
      crid="crid://mdata.co.uk/collections/boxsets/stewart_lee/series_1"/>
  </ProgramInformation>
  <ProgramInformation programId="crid://mybroadcaster.co.uk/mdata/episode/b00jhp6">
    <BasicDescription>
      <Title type="main">Stewart Lee's Comedy Vehicle</Title>
      <Title type="secondary">Series 1: 2. Television</Title>
      <RelatedMaterial>
        <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
        <MediaLocator>
          <MediaUri contentType="image/jpeg">
            https://img-ctv.mdata.co.uk/images/3b/32/3b32/image09.jpeg
          </MediaUri>
        </MediaLocator>
      </RelatedMaterial>
    </BasicDescription>
    <MemberOf xsi:type="MemberOfType" index="2"
      crid="crid://mdata.co.uk/collections/boxsets/stewart_lee"/>
    <MemberOf xsi:type="MemberOfType" index="2"
      crid="crid://mdata.co.uk/collections/boxsets/stewart_lee/series_1"/>
  </ProgramInformation>
</ProgramInformationTable>
<GroupInformationTable>
  <GroupInformation groupId="crid://mdata.co.uk/collections/boxsets/stewart_lee"
    ordered="true" numOfItems="1"
    serviceIDRef="http://www.mybroadcaster.co.uk/mdata/service/apps/broadcast_2">
    <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
    <BasicDescription/>
  </GroupInformation>
  <GroupInformation groupId="crid://mdata.co.uk/collections/boxsets/stewart_lee/series_1"
    ordered="true" numOfItems="2"
    serviceIDRef="http://www.mybroadcaster.co.uk/mdata/service/apps/broadcast_2">
    <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
    <BasicDescription/>
    <MemberOf xsi:type="MemberOfType" index="1"
      crid="crid://mdata.co.uk/collections/boxsets/stewart_lee"/>
  </GroupInformation>
</GroupInformationTable>
<ProgramLocationTable xml:lang="en">
  <OnDemandProgram
    serviceIDRef="http://www.mybroadcaster.co.uk/mdata/service/apps/broadcast_2">
    <Program crid="crid://mybroadcaster.co.uk/mdata/episode/b00jd8gp"/>
    <ProgramURL contentType="application/vnd.dvb.ait+xml">
      https://www.live.tvapps.co.uk/ait/launch/iplr.aitx?deeplink=tv/playback/b00jd8gp
    </ProgramURL>
    <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
      https://www.live.mybroadcaster.co.uk/ait/launch/iplayer.aitx
    </AuxiliaryURL>
    <PublishedDuration>PT00H30M00S</PublishedDuration>
    <StartOfAvailability>2018-07-13T08:00:00Z</StartOfAvailability>
    <EndOfAvailability>2019-01-12T09:00:00Z</EndOfAvailability>
    <Free value="true"/>
  </OnDemandProgram>
</OnDemandProgram>

```

```

serviceIDRef="http://www.mybroadcaster.co.uk/mdata/service/apps/broadcast_2">
<Program crid="crid://mybroadcaster.co.uk/mdata/episode/b00jhp6"/>
<ProgramURL contentType="application/vnd.dvb.ait+xml">
  https://www.live.mytvapps.co.uk/ait/launch/iplr.aitx?deeplink=tv/playback/b00jhp6
</ProgramURL>
<AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
  https://www.live.mybroadcastertvapps.co.uk/ait/launch/iplayer.aitx
</AuxiliaryURL>
<InstanceDescription>
  <Genre href="urn:fvc:metadata:cs:MediaAvailabilityCS:2014-07:media_available"
    type="other"/>
  <Genre href="urn:fvc:metadata:cs:FEPGAAvailabilityCS:2014-10:fepg_available"
    type="other"/>
  <CaptionLanguage closed="true">qaa</CaptionLanguage>
  <AVAttributes>
    <AudioAttributes>
      <MixType href="urn:mpeg:mpeg7:cs:AudioPresentationCS:2001:3"/>
      <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6">
        en
      </AudioLanguage>
    </AudioAttributes>
    <VideoAttributes>
      <HorizontalSize>1920</HorizontalSize>
      <VerticalSize>1080</VerticalSize>
      <AspectRatio>16:9</AspectRatio>
    </VideoAttributes>
  </AVAttributes>
</InstanceDescription>
<PublishedDuration>PT00H30M00S</PublishedDuration>
<StartOfAvailability>2018-07-13T08:00:00Z</StartOfAvailability>
<EndOfAvailability>2019-01-12T09:00:00Z</EndOfAvailability>
<Free value="true"/>
</OnDemandProgram>
</ProgramLocationTable>
</ProgramDescription>
</TVAMain>

```

Figure 17: Example - Box Set Contents Response showing series grouping

6.9 Pagination of results

In this clause, a 'page' of results refers to how a Content Guide Server subdivides results, while a 'screen' of results refers to how a manufacturer displays these results in their UI.

Due the variability in the number of response documents, a Content Guide Server may need to paginate the results. The size of pages will be controlled by a Content Guide Server configuration. The DVB-I client shall be capable of handling page sizes containing up to a maximum of 30 results. The number of results provided on each page may vary up to this maximum and therefore the DVB-I client shall behave gracefully where a smaller page size is returned. It is not intended that there is a connection between the page size returned by a Content Guide Server and the number of items displayed on a single screen of results within a manufacturer's UI.

Notwithstanding the pagination model provided in the previous paragraph, a DVB-I client may request a different pagination technique be used by the Content Guide Server. Adherence to the client request is at the discretion of the Content Guide Server which may provide a different pagination model to that being requested. Specifically, the DVB-I client can include a `page_size=number` query parameter in the following request types.

- More Episodes request (clause 6.7)
- Box Set Categories request (clause 6.8.2.2)
- Box Set Lists request (clause 6.8.3.2)
- Box Set Contents request (clause 6.8.4.2)

If the `page_size` query parameter is included in the request, the Content Guide Server should attempt to provide the results using the requested pagination.

Parameter format:

`page_size=<nn> | all`

where:

- `nn`: denotes the number of entries that should be included in each page of results.
- `all`: denotes that all entries should be provided without any pagination.

If the Content Guide Server cannot satisfy the requested number of entries in each page of results, then it can apply its own pagination model.

Links between pages shall be provided in each results document to allow navigation within the paginated set of results. The navigation links are held as `RelatedMaterial` elements in the `GroupInformation` fragment of the response and the presence of these links shall be used to determine whether there are further pages of results available.

The relative links can be identified by the `HowRelated@href` attribute.

Table 40: Pagination links

Relative page name	HowRelated@href attribute
First	<code>urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:first</code>
Previous	<code>urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:prev</code>
Next	<code>urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:next</code>
Last	<code>urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:last</code>

By default, the first page of results shall be returned when a request is executed and navigation shall always begin from this point.

A DVB-I client shall only use the provided relative links, without modification, in order to traverse the results set. Where pagination is possible, the `GroupInformation` fragment shall include all links defined in table 40 with the following exceptions:

- The "First" and "Previous" links shall be omitted from the first page.
- The "Next" and "Last" links shall be omitted from the last page.
- All links shall be omitted when the total number of search results is less than or equal to the maximum number of results per page (30).

The `GroupInformation@numOfItems` attribute shall indicate the total number of results across all pages within a Content Guide Server, however the value may not reflect the number of items visible to the user due to content compatibility or availability signalled in the Template XML AIT. For this reason, the DVB-I client shall not display the value of `GroupInformation@numOfItems` to the user.

The DVB-I client shall only request pages of results from a Content Guide Server as required for display to the user. Some requests can result in exceedingly large result sets (> 1 000 programmes) so the DVB-I client shall not pre-emptively request all pages from a Content Guide Server.

If the number of results visible to the user is less than the maximum number of results displayed within a screen of a DVB-I client's UI, and a Content Guide Server indicates a 'next' pagination link, the DVB-I client shall retrieve and display the next page of results from a Content Guide Server. The DVB-I client may pre-emptively request the next page to allow seamless display of results to the user.

When dealing with result pages, the DVB-I client shall obey retrieval rules as for other resources by observing the Cache-Control mechanisms defined in clause 4.3.2.1 and providing conditional request headers as defined in clause 4.3.2.2.

NOTE: It is possible that there may be duplicate results provided, including but not limited to around paging boundaries. The DVB-I client should cater for this in their implementation. Duplicate results may be identified by the `ProgramInformation@programId` attribute. The total number of results for a given request may also change between paging operations as available content changes.

6.10 Metadata Profile

6.10.1 Schema Overview

6.10.1.1 Introduction

The DVB-I metadata profile is based on TV-Anytime and the Freeview Play specifications [i.11].

The set of TV-Anytime Metadata Description Fragments that may appear in a TV-Anytime XML instance document are specified in ETSI TS 102 822-3-1 [7]. The present document further profiles this set down to the following element types and their enclosing tables.

The DVB-I client may ignore any classification schemes, classification scheme terms, elements and attributes not specified within the present document in order to be robust to backwards-compatible changes to the API.

The ordering of elements used in the examples provided within the present document shall not be taken to be explicit unless specified within the corresponding schemas. The DVB-I client implementations shall be robust to alternate ordering of elements or inclusion of additional elements where allowed within the bounds of the schemas.

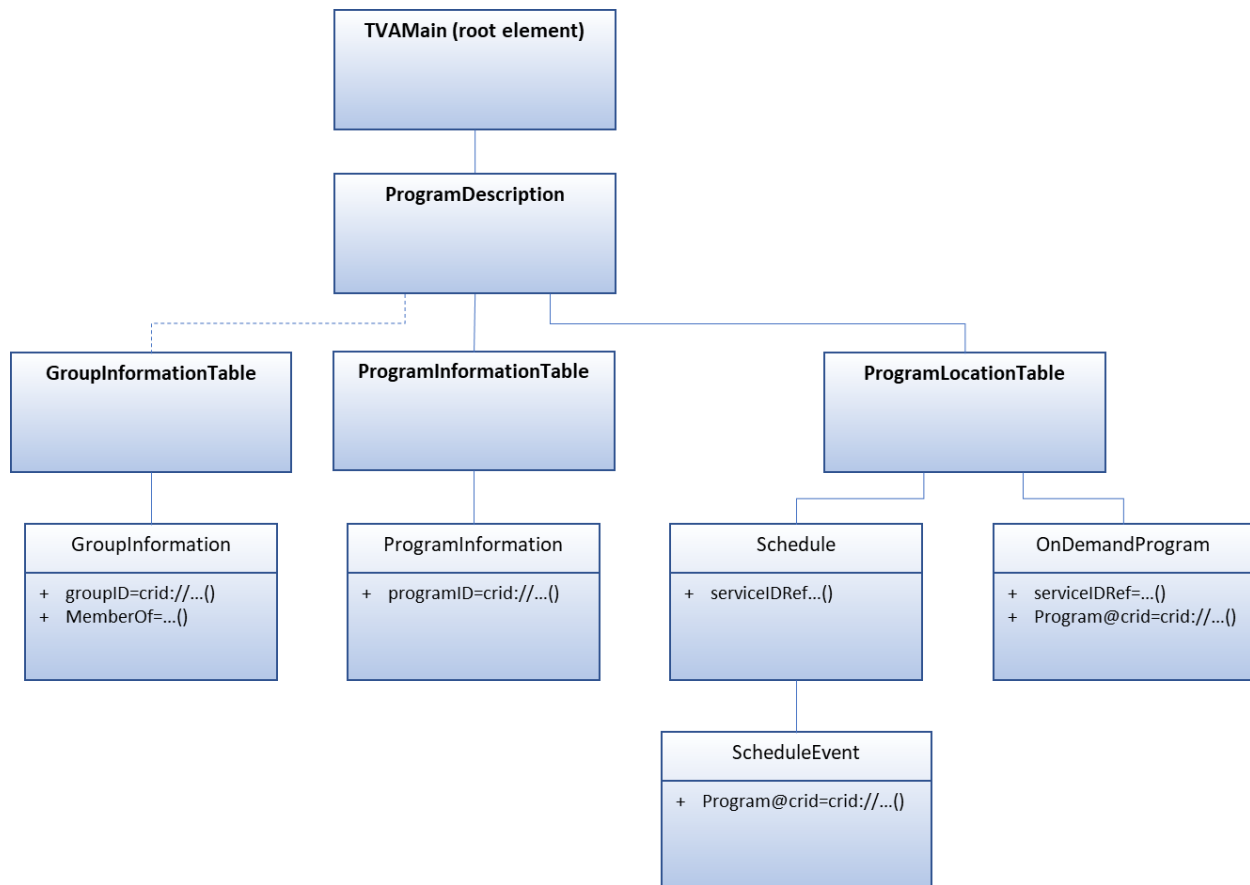


Figure 18: DVB-I TV-Anytime data structure overview

1. GroupInformationTable
 - GroupInformation fragment (schema type: GroupInformationType)
2. ProgramInformationTable
 - ProgramInformation fragment (schema type: ProgramInformationType)
3. ProgramLocationTable
 - Schedule fragment (schema type: ScheduleType)
 - ScheduleEvent fragment (schema type: ScheduleEventType)
 - OnDemandProgram fragment (schema type: OnDemandProgramType)

Other tables or fragment types not listed by this TV-Anytime profile may be ignored by the client. Content guide providers should not expect a client to process and display other metadata not listed in this profile. Clients shall be robust to the presence of other valid TV-Anytime metadata not listed in this profile.

6.10.1.2 Language Information

TV-Anytime requires that the default language used in a TV-Anytime document is specified at the top level with the TVAMain element using the @xml:lang attribute. The normal rules for scoping @xml:lang, and cascading to sub-elements applies. A TV-Anytime document, ETSI TS 102 822-3-1 [7], may contain text fields in multiple languages. The cardinality of any text element given in this metadata profile only refers to a single language. For example, multiple Title elements may exist within ProgramInformation.BasicDescription, each with @type="main" but with different @xml:lang values.

6.10.2 Access Services

6.10.2.1 Introduction

This clause describes the indication of Access Services in the metadata provided by a Content Guide Server.

6.10.2.2 Signed Content

The presence of in-vision signed content shall be indicated by the presence of the `InstanceDescription.SignLanguage` element. The `SignLanguage@closed` attribute shall be set to false. The indicated language shall be set as `sgn` according to ISO 639-2 [17] or a sign language listed in ISO 639-3 [18].

The indication of Sign Language shall only be provided in `InstanceDescription` for both `ScheduleEvents` and `OnDemandPrograms`. It is not indicated in the `ProgramInformation.BasicDescription` element.

6.10.2.3 Subtitles

The presence of subtitles shall be determined by the presence of an `InstanceDescription.CaptionLanguage` element. The `CaptionLanguage` element shall also provide additional details including the language and open/closed nature of the included subtitles.

If subtitles are indicated in this manner, a `CaptioningAttributes.Coding` element may be present, indicating the type of captioning via the `@href` attribute. For possible values refer to clause 6.11.4. Omission of a `CaptioningAttributes.Coding@href` value shall imply subtitles are proprietary and managed by the application for On Demand content. If a `CaptioningAttributes.Coding@href` value is present and contains a classification scheme term that is not known by or is otherwise unsupported by the DVB-I client, subtitles shall be assumed to be unavailable.

The indication of subtitles shall only be provided in `InstanceDescription` for both `ScheduleEvents` and `OnDemandPrograms`. It is not indicated in the `ProgramInformation.BasicDescription` element.

The metadata model does not support complex descriptions of captioning languages with coding formats. Any correlation between `CaptionLanguage` and `CaptioningAttributes.Coding` can only occur if a single caption language or single coding format is specified. In all other situations, the combinations can only be determined by inspecting the delivered media.

6.10.2.4 Audio Description

The presence of audio description shall be indicated by the presence of an `AudioAttributes.AudioLanguage` element with `@purpose` attribute set to `urn:tva:metadata:cs:AudioPurposeCS:2007:1`. For possible values refer to clause 6.11.3.

Up to two `AudioAttributes` elements may be present, one representing the main audio and the other indicating the presence of audio description.

The indication of audio description shall only be provided in `InstanceDescription` for both `ScheduleEvent` and `OnDemandProgram` elements. It is not indicated in the `ProgramInformation` element.

6.10.3 Table Syntax

In the following tables each element/attribute is provided with a Mandatory/Optional value in the "Required" column indicating whether it shall or may be included in the data returned from a Content Guide Server.

Cardinality information is also included in the "Required" column in curly braces (e.g. {0..1}), specifying how many times this element/attribute may appear. In cases where the upper limit is unbounded the letter "n" is used to indicate an undefined positive integer. For text elements that contain a `@xml:lang` attribute the cardinality applies to a single language only. Multiple languages can be specified.

Individual elements within common tables that are only relevant in specific cases are identified by the inclusion of information in square braces below the element/attribute name e.g. [Schedules].

6.10.4 ProgramInformation Element

Table 41: ProgramInformation Element

Element Name/ Required	Description	Example
@programId Mandatory {1}	The CRID of the programme. See note.	<code><ProgramInformation programId="crid://channel7.co.uk/b01myjsy"></code>
BasicDescription Mandatory {1}	Complex type describing the ProgramInformation. See clause 6.10.5 for further information.	See clause 6.10.5.
OtherIdentifier Optional {0..n}	A code that can be used in addition to the CRID to identify a piece of content (e.g. an ISAN to identify a piece of content or an episode or a version thereof) as different CRIDs can be allocated to identical content. This element shall not be present in More Episodes responses.	
MemberOf Optional {0..n}	In the Schedules response this may indicate group association. For the Now/Next Filtered Schedules response, the @crid shall indicate whether the event is currently on-air, in the future or in the past, by being a transitory member of the structural groups described in clause 6.5.3. For the More Episodes response, the @crid shall indicate the results group in the GroupInformationTable. The @index attribute defines the programme's position within the list defined by @crid and shall be an integer of 0 or greater. The @xsi:type attribute shall always be set to MemberOfType.	<code><MemberOf xsi:type="MemberOfType" index="5" crid="crid://dvbi.org/search/results"/></code>
EpisodeOf Optional {0..n}	Indicates a groupId of a Box Set List from which the current programme is an episode.	<code><EpisodeOf crid="crid://mda.co.uk/collections/boxsets/stewart_lee"/></code>
NOTE: As described in clause 6.5.4, the CRID may change value as Content Providers supply enhanced metadata to override the original broadcast EIT metadata.		

6.10.5 BasicDescription Elements

6.10.5.1 Introduction

The BasicDescription element is used in a number of locations and the included metadata is different depending on context. The variations are therefore displayed in individual subsections below; the applicable endpoint is indicated in square [] brackets.

6.10.5.2 ProgramInformation.BasicDescription Element [Schedules]

Table 42: ProgramInformation.BasicDescription Element [Schedules]

Element Name/ Required	Description	Example
Title Mandatory {1..2} per language	The title to describe the content. A Title element with @type attribute set to main is mandatory. A second Title element with @type attribute set to secondary is optional. The character length shall not exceed 80 characters for either. See note.	<Title type="main">Bargain Hunt</Title> <Title type="main" xml:lang="de">Schnäppchenjagd</Title> <Title type="secondary">01/01/2014</Title>
Synopsis Mandatory {1..2} per language	Descriptive text about the entity. The @length attribute shall be mandatory. The possible values of this enumerated attribute are as follows: - short - the length of the synopsis shall not exceed 90 characters. - medium - the length of the synopsis shall not exceed 250 characters. A minimum of one synopsis shall be provided and this shall have the @length attribute of medium . Additionally, a synopsis of length short may optionally be provided. There shall not be more than one synopsis element with the same @length attribute for a specified language. See note.	<Synopsis length="short">Amanda helps three homeowners in Wokingham.</Synopsis> <Synopsis length="medium">Amanda helps three homeowners in Wokingham. Can Raj and Maria fix their decking? Margaret's red and white interior could do with some maintenance. And can Bob and Geraldine update their home?</Synopsis>
Genre Optional {0..1}	The genre or classification for the programme. Possible values are taken from: - ContentCS defined in ETSI TS 102 822-3-1 [7] - FormatCS defined in ETSI TS 102 822-3-1 [7] - ContentSubject defined in clause D.5 The @type attribute shall always contain the value of main as the primary instance. The @type attribute shall not permit the value of secondary or other . The DVB-I client shall be robust to handling the addition of Genre elements in future by using the term given in the @href attribute.	<Genre href="urn:dvb:metadata:cs:ContentSubject:2019:4" type="main"/>
ParentalGuidance Optional {0..2} per country	The minimum age rating or guidance/watershed indicators and optional text. When ParentalGuidance is defined, a ParentalGuidance element with a minimum age rating shall always be provided. An additional ParentalGuidance element with guidance/watershed indicators and optional text may be provided.	See clause 6.10.15

Element Name/ Required	Description	Example
RelatedMaterial Optional {0..1}	An image related to the content. A maximum of one RelatedMaterial element identifying an image shall be specified - see clauses 5.2.8.2.1 and 6.10.13 for further information. Elements with HowRelated@href values that do not refer to an image shall be ignored. The DVB-I client shall be robust to handling the addition of RelatedMaterial elements in future by using the term given in RelatedMaterial.HowRelated@href attribute.	See clause 6.10.13
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29].		

6.10.5.3 ProgramInformation.BasicDescription Element [Detailed Programme Information]

Table 43: ProgramInformation.BasicDescription Element [Detailed Programme Information]

Element Name/ Required	Description	Example
Title Mandatory {1..2} per language	The title to describe the content. A Title element with @type attribute set to main is mandatory. A second Title element with @type attribute set to secondary is optional. The character length shall not exceed 80 characters for either. See note.	<Title type="main">Bargain Hunt</Title> <Title type="main" xml:lang="de">Schnäppchenjagd</Title> <Title type="secondary">01/01/2014</Title>
Synopsis Mandatory {1..3} per language	Descriptive text about the entity. The @length attribute shall be mandatory. The possible values of this enumerated attribute are as follows: - short - the length of the synopsis shall not exceed 90 characters. - medium - the length of the synopsis shall not exceed 250 characters. - long - the length of the synopsis shall not exceed 1 200 characters. A minimum of one synopsis shall be provided and this shall have the @length attribute of medium. Additionally, one each of short and/or long may optionally also be provided. There shall not be more than one synopsis element with the same @length attribute. See note.	<Synopsis length="short">Amanda helps three homeowners in Wokingham. </Synopsis> <Synopsis length="medium">Amanda helps three homeowners in Wokingham. Can Raj and Maria fix their decking? Margaret's red and white interior could do with some maintenance. And can Bob and Geraldine update their home?</Synopsis> <Synopsis length="long">Amanda helps three homeowners in Wokingham. Can Raj and Maria fix their decking? Margaret's red and white interior could do with some maintenance. And can Bob and Geraldine update their home?</Synopsis>

Element Name/ Required	Description	Example
Keyword Optional {0..20} per language	A keyword associated to a programme. Each individual keyword is provided in a separate element, although keywords may contain spaces. The character length of any <i>Keyword</i> shall not exceed 32 characters. The <i>@type</i> attribute on the <i>Keyword</i> element shall carry the value of <i>main</i> unless it is an editorial label, in which case a value of <i>other</i> shall be carried. The maximum number of <i>Keyword</i> elements that may be specified is 20.	<Keyword>FAMILY LIFE</Keyword> <Keyword>RELATIONSHIPS</Keyword>
Genre Optional {0..1}	The genre or classification for the programme. A genre that characterizes the programming on the service. Possible values are taken from: • <i>ContentCS</i> defined in ETSI TS 102 822-3-1 [7] • <i>FormatCS</i> defined in ETSI TS 102 822-3-1 [7] • <i>ContentSubject</i> defined in clause D.5 The <i>@type</i> attribute shall always contain the value of <i>main</i> as the primary instance. The <i>@type</i> attribute shall not permit the value of <i>secondary</i> or <i>other</i> . The DVB-I client shall be robust to handling the addition of <i>Genre</i> elements in future by checking the term given in the <i>@href</i> attribute and ignoring those that are not described in the present document.	<Genre href="urn:dvb:metadata:cs:ContentSubject:2019:4" type="main"/>
ParentalGuidance Optional {0..2} per country	The minimum age rating or guidance/watershed indicators and optional text. When <i>ParentalGuidance</i> is defined, a <i>ParentalGuidance</i> element with a minimum age rating shall always be provided. An additional <i>ParentalGuidance</i> element with guidance/watershed indicators and optional text may be provided.	See clause 6.10.15
CreditsList Optional {0..1}	The list of credits for the specified programme. A maximum of 40 individual <i>CreditsItem</i> elements shall be provided within this <i>CreditsList</i> element.	See clause 6.10.14
RelatedMaterial Optional {0..1}	An image related to the content. A maximum of one <i>RelatedMaterial</i> element identifying an image shall be specified - see clauses 5.2.8.2.1 and 6.10.13 for further information. Elements with <i>HowRelated@href</i> values that do not refer to an image shall be ignored. The DVB-I client shall be robust to handling the addition of <i>RelatedMaterial</i> elements in future by checking the term given in <i>RelatedMaterial.HowRelated@href</i> attribute and ignoring those that are not described in the present document.	See clause 6.10.13
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29].		

6.10.5.4 ProgramInformation.BasicDescription Element [Box Set Contents]

Table 44: ProgramInformation.BasicDescription Element [Box Set Contents]

Element Name/ Required	Description	Example
Title Mandatory {1..2} per language	The title to describe the content. A <code>Title</code> element with <code>@type</code> attribute set to <code>main</code> is mandatory. A second <code>Title</code> element with <code>@type</code> attribute set to <code>secondary</code> is optional. The character length shall not exceed 80 characters for either. See note.	<pre><Title type="main">Bargain Hunt</Title> <Title type="main" xml:lang="de">Schnäppchenjagd </Title> <Title type="secondary">01/01/2014</ Title></pre>
Synopsis Optional {0..1} per language	Descriptive text about the entity. The <code>@length</code> attribute shall be mandatory. The possible value of this enumerated attribute is as follows: <code>medium</code> - the length of the synopsis shall not exceed 250 characters. See note.	<pre><Synopsis length="medium">Amanda helps three homeowners in Wokingham. Can Raj and Maria fix their decking? Margaret's red and white interior could do with some maintenance. And can Bob and Geraldine update their home?</Synopsis></pre>
ParentalGuidance Optional {0..2} per country	The minimum age rating or guidance/watershed indicators and optional text. When <code>ParentalGuidance</code> is defined, a <code>ParentalGuidance</code> element with a minimum age rating shall always be provided. An additional <code>ParentalGuidance</code> element with guidance/watershed indicators and optional text may be provided.	See clause 6.10.15
RelatedMaterial Optional {0..1}	An image related to the content. A maximum of one <code>RelatedMaterial</code> element identifying an image shall be specified - see clauses 5.2.8.2.1 and 6.10.13 for further information. Elements with <code>HowRelated@href</code> values that do not refer to an image shall be ignored. The DVB-I client shall be robust to handling the addition of <code>RelatedMaterial</code> elements in future by checking the term given in <code>RelatedMaterial.HowRelated@href</code> attribute and ignoring those that are not described in the present document.	See clause 6.10.13
RelatedMaterial for pagination Optional {0, 2, 4}	A link to a relative page of results. There may be up to 4, depending on the current page. See clause 6.9 for further details.	See clause 6.10.13
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29].		

6.10.5.5 ProgramInformation.BasicDescription Element [More Episodes]

Table 45: ProgramInformation.BasicDescription Element [More Episodes]

Element Name/ Required	Description	Example
Title Mandatory {1..2} per language	A label identifying the name of the Box Set. A Title element with @type attribute set to main is mandatory. A second Title element with @type attribute set to secondary is optional. The character length shall not exceed 80 characters for either. See note.	<Title type="main">Bargain Hunt</Title> <Title type="main" xml:lang="de">Schnäppchenjagd</Title> <Title type="secondary">01/01/2014</Title>
RelatedMaterial Optional {0..1}	An image related to the content. A maximum of one RelatedMaterial element identifying an image shall be specified - see clauses 5.2.8.2.1 and 6.10.13 for further information. Elements with HowRelated@href values that do not refer to an image shall be ignored. The DVB-I client shall be robust to handling the addition of RelatedMaterial elements in future by checking the term given in RelatedMaterial.HowRelated@href attribute and ignoring those that are not described in the present document.	See clause 6.10.13.
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29].		

6.10.5.6 GroupInformation.BasicDescription Element [Box Set List, Box Set Contents]

Table 46: GroupInformation.BasicDescription Element [Box Set Lists, Box Set Contents]

Element Name/ Required	Description	Example
Title Mandatory {1} per language	A label identifying the name of the Box Set. The @type attribute shall only carry a value of main . The character length of the Title shall not exceed 80 characters.	<Title type="main">The Best of Roland Rat</Title>
Synopsis Mandatory {1} per language	Describes the content of the Box Set. The @length attribute shall be mandatory. The possible value of this enumerated attribute is as follows: medium - the length of the synopsis shall not exceed 250 characters. See note.	<Synopsis length="medium">Showcasing the amazing talents of the rodent superstar.</Synopsis>
Keyword Optional {0..20} per language	A keyword associated with a Box Set. Each individual keyword is provided in a separate element, although keywords may contain spaces. The character length of any Keyword shall not exceed 32 characters. The @type attribute on the Keyword element shall carry the value of main unless it is an editorial label, in which case a value of other shall be carried. The maximum number of Keyword elements that may be specified is 20.	<Keyword>FAMILY LIFE</Keyword> <Keyword>RELATIONSHIPS</Keyword>

Element Name/ Required	Description	Example
RelatedMaterial for image Optional {0..1}	Defines the image of the Box Set. A maximum of one RelatedMaterial element identifying an image shall be specified - see clauses 5.2.8 and 6.10.13 for further information. Elements with HowRelated values that do not refer to an image shall be ignored. Client devices shall be robust to handling the addition of RelatedMaterial elements in future by using the term given in RelatedMaterial.HowRelated@href attribute.	See clause 6.10.13.
RelatedMaterial for Template AIT Mandatory {1}	A Template AIT for the Box Set to determine device compatibility. This shall have a RelatedMaterial.HowRelated@href attribute of urn:fvc:metadata:cs:HowRelatedCS:2018:templateAIT	See clause 6.10.13.
RelatedMaterial for pagination Optional {0, 2, 4}	A link to a relative page of results. There may be up to 4, depending on the current page. See clause 6.9 for further details.	See clause 6.10.13.
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29].		

6.10.5.7 GroupInformation.BasicDescription Element [More Episodes]

Table 47: GroupInformation.BasicDescription Element [More Episodes]

Element Name/ Required	Description	Example
RelatedMaterial for pagination Optional {0, 2, 4}	A link to a relative page of results. There may be up to 4, depending on the current page. See clause 6.9 for further details.	See clause 6.10.13 for further details.

6.10.5.8 GroupInformation.BasicDescription Element [Box Set Categories]

Table 48: GroupInformation.BasicDescription Element [Box Set Categories - parent category]

Element Name/ Required	Description	Example
Title Mandatory {1} per language	A label identifying the name of the Box Set. The @type attribute shall only carry a value of main. The character length of the Title shall not exceed 80 characters.	<Title type="main">The Best of Roland Rat</Title>
RelatedMaterial for pagination Optional {0, 2, 4}	A link to a relative page of results. There may be up to 4, depending on the current page. See clause 6.9 for further details.	See clause 6.10.13

Table 49: GroupInformation.BasicDescription Element [Box Set Categories - child categories]

Element Name/ Required	Description	Example
Title Mandatory {1} per language	A label identifying the name of the Box Set. The @type attribute shall only carry a value of main. The character length of the Title shall not exceed 80 characters.	<Title type="main">The Best of Roland Rat</Title>
Synopsis Mandatory {1} per language	Describes the content of the Box Set Category. The @length attribute shall be mandatory. The possible value of this enumerated attribute is as follows: short - the length of the synopsis shall not exceed 90 characters. See note.	<Synopsis length="short"> Showcasing the amazing talents of the rodent superstar.</Synopsis>
Genre Optional {0..1}	Specifies the classification of a box set category. The @type attribute shall always contain the value of main as the primary instance. The value for the @href attribute shall be taken from ContentSubject classification scheme in clause D.5.	<Genre href="urn:dvb:metadat a:cs:ContentSubject:2 019:5.0" type="main"/>
RelatedMaterial for image Optional {0..1}	Defines the image of the Box Set. A maximum of one RelatedMaterial element identifying an image shall be specified - see clauses 5.2.8 and 6.10.13 for further information. Elements with HowRelated values that do not refer to an image shall be ignored. Client devices shall be robust to handling the addition of RelatedMaterial elements in future by using the term given in RelatedMaterial.HowRelated@href attribute.	See clause 6.10.13.
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29].		

6.10.6 Schedule Element

The *Schedule* element provides an envelope for a number of individual *ScheduleEvent* elements associated with a single service. The attributes of the *Schedule* element provide information on which service the schedule is associated with and the period covered.

Table 50: Schedule Element

Element Name/ Required	Description	Example
@serviceIDRef Mandatory {1}	It shall match UniqueIdentifier or ContentGuideServiceRef in the Service element (see clause 5.5.2) used in the query parameter.	<Schedule serviceIDRef="tag:rai.it,201 9:rai-3" start="2013-09- 25T11:15:00Z" end="2013-09- 25T12:30:00.000Z">
@start Mandatory {1}	Specifies the start time of the earliest <i>ScheduleEvent</i> within the provided schedule which may be later than the start time specified in the request. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19].	<Schedule serviceIDRef="tag:rai.it,201 9:rai-3" start="2013-09- 25T11:15:00Z" end="2013-09- 25T12:30:00.000Z">
@end Mandatory {1}	Specifies the end time of the latest <i>ScheduleEvent</i> within the provided schedule which may be later than the end time specified in the request. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19].	<Schedule serviceIDRef="tag:rai.it,201 9:rai-3" start="2013-09- 25T11:15:00Z" end="2013-09- 25T12:30:00.000Z">

Element Name/ Required	Description	Example
ScheduleEvent Optional {0..n}	Individual ScheduleEvent elements are contained within the schedule wrapper. See clause 6.10.7 for details of the ScheduleEvent element.	See clause 6.10.7.

6.10.7 ScheduleEvent Element

Multiple ScheduleEvent elements are wrapped within a Schedule element, with a Schedule element per service in Schedule endpoint responses. Each ScheduleEvent element identifies an individual programme within the schedule period and there may be gaps in the schedule.

Table 51: ScheduleEvent Element

Element Name/ Required	Description	Example
Program Mandatory {1}	Specifies the CRID of the matching ProgramInformation@programId attribute.	<Program crid="crid://www.channel7.com/ version/57984/005/V"/>
ProgramURL Optional {0..1}	Contains a DVB locator as specified in clause 6.4.2 of ETSI TS 102 851 [16] containing only a DVB service URL and event_id, but no time duration, in the following hexadecimal format: dvb:// <original_network_id>.. <service_id> ; <event_id> This locator specifies the event that the Schedule Event relates to. This may be used to match events present within the EIT data where a schedule represents a DVB-C/S/T service.	<ProgramURL>dvb://233a..1044;c3bf</ProgramURL>
InstanceDescription Optional {0..1}	Indicates the caption language, sign language and audio/video attributes of the programme. See clauses 6.10.9 and 6.10.16 for more information.	See clauses 6.10.9 and 6.10.16.
PublishedStartTime Mandatory {1}	The time at which the programme is advertised as starting, to be displayed to the viewer. This is typically be different from the actual exact start time. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. Where relevant, broadcast mechanisms such as the Time Offset Table (TOT) shall be used to adjust all Content Guide Server-provided timestamps to local time.	<PublishedStartTime>2014-07-15T20:42:40Z </PublishedStartTime>
PublishedDuration Mandatory {1}	The duration of the programme as displayed to viewers which will typically be different from the actual exact duration. The format shall adhere to clause 5.3.3.2 of ISO 8601-1 [19]. Partial representations are also permitted.	<PublishedDuration>PT1H00M00S</PublishedDuration>

Element Name/ Required	Description	Example
ActualStartTime Optional {0..1}	The actual start time of the scheduled event. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. This time is intended to be used for managing the playout of programmes and is not expected to be displayed to the viewer. If the time is in the future it is the expected actual start of the programme (though schedules are often subject to change). If the time is in the past it may represent an accurate reflection of the actual start time of the programme. When not provided, the <code>PublishedStartTime</code> represents the actual start time of the programme.	<code><ActualStartTime>2014-07-15T20:42:30Z</ActualStartTime></code>
ActualDuration Optional {0..1}	The actual duration of the programme. The format shall adhere to clause 5.3.3.2 of ISO 8601-1 [19]. Partial representations are also permitted. This duration is intended to be used for managing the playout of programmes and is not expected to be displayed to the viewer. If <code>ActualStartTime+ActualDuration</code> is in the future it is the expected actual duration of the programme (though schedules are often subject to change). If <code>ActualStartTime+ActualDuration</code> is in the past it may represent an accurate reflection of the actual duration. When not provided, the <code>PublishedDuration</code> represents the actual duration of the programme.	<code><ActualDuration>PT1H00M03S</ActualDuration></code>
FirstShowing Optional {0..1}	A boolean flag that specifies this <code>ScheduleEvent</code> as the first showing of the related programme on this service. This may be used to indicate this information to viewers. The value of this element shall be <code>true</code> if this <code>ScheduleEvent</code> is the first showing. If the element is omitted or provided with the value <code>false</code> then this is not the first showing.	<code><FirstShowing value="false" /></code>
Free Optional {0..1}	Indicates if access to this instance of the programme is free. The <code>@value</code> attribute is mandatory and shall be <code>true</code> or <code>false</code> . If this element is not present, assume <code>true</code> .	<code><Free value="true"/></code>

6.10.8 OnDemandProgram Element

6.10.8.1 Introduction

The `OnDemandProgram` element is used in a number of locations and the included metadata is different depending on context. The variations are therefore displayed in individual subsections below; the applicable endpoint is indicated in square [] brackets.

6.10.8.2 OnDemandProgram Element [Schedules, Detailed Programme Information]

Table 52: OnDemandProgram Element [Schedules, Detailed Programme Information]

Element Name/ Required	Description	Example
@serviceIDRef Mandatory {1}	It shall match UniqueIdentifier or ContentGuideServiceRef in the Service element (see clause 5.5.2).	<OnDemandProgram serviceIDRef="http://www.channel7.com/services/dtt/ChannelA/London">
Program Mandatory {1}	Specifies the CRID of the matching ProgramInformation@programId attribute.	<Program crid="crd://www.channel7.com/version/57984/005/V"/>
ProgramURL Mandatory {1}	A URL location of a content deep-linked XML AIT for the on-demand programme. The XML AIT shall be used to launch the on-demand player. Please see clause 5.2.4 for the format of the XML AIT content and information on how the DVB-I client shall append contextual parameters. The @contentType attribute of the element shall carry the value application/vnd.dvb.ait+xml.	<ProgramURL contentType="application/vnd.dvb.ait+xml">https://broadcasterr.co.uk:8085/ait?pid=tb0101p3j</ProgramURL>
AuxiliaryURL Optional {0..1}	A URL location of a Template XML AIT that can be used to determine whether the content instance specified by ProgramURL is compatible with the device. Please see clause 5.2.4 for the format and usage of the Template XML AIT. The @contentType attribute of the element shall carry the value application/vnd.dvb.ait+xml.	<AuxiliaryURL contentType="application/vnd.dvb.ait+xml">https://broadcasterr.co.uk:8085/ait?template</AuxiliaryURL>
InstanceDescription Mandatory {1}	Used for indicating media asset availability and audio/video attributes - see clause 6.10.16.	See clause 6.10.16.
PublishedDuration Mandatory {1}	The advertised duration of the On Demand programme which will typically be different from the actual exact duration. The format shall adhere to clause 5.3.3.2 of ISO 8601-1 [19]. Partial representations are also permitted.	<PublishedDuration>PT1H00M00S</PublishedDuration>
StartOfAvailability Mandatory {1}	The time and date that this programme will first be available for on-demand viewing. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. Where relevant, broadcast mechanisms such as the Time Offset Table (TOT) shall be used to adjust all Content Guide Server-provided timestamps to local time.	<StartOfAvailability>2014-03-18T22:00:00Z</StartOfAvailability>
EndOfAvailability Mandatory {1}	The time and date that this programme will no longer be available for on-demand viewing. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. Where relevant, broadcast mechanisms such as the Time Offset Table (TOT) shall be used to adjust all Content Guide Server-provided timestamps to local time.	<EndOfAvailability>2014-04-17T21:00:00Z</EndOfAvailability>
DeliveryMode Mandatory {1}	Indicates the delivery mode and shall contain the value streaming.	<DeliveryMode>streaming</DeliveryMode>
Free Mandatory {1}	Indicates if access to this instance of the programme is free. The @value attribute is mandatory and shall be true or false.	<Free value="true"/>

6.10.8.3 OnDemandProgram Element [More Episodes]

Table 53: OnDemandProgram Element [More Episodes]

Element Name/ Required	Description	Example
@serviceIDRef Mandatory {1}	It shall match UniqueIdentifier in the Service element (see clause 5.5.2). The ServiceInstance element of Service element may be used to provide DVB-I Content guide for a linear broadcast channel.	<OnDemandProgram serviceIDRef="http://channel7.co.uk/service_a_app">
Program Mandatory {1}	Specifies the CRID of the matching ProgramInformation@programId attribute.	<Program crid="crd://channel7.co.uk/n19alrr1"/>
ProgramURL Mandatory {1}	A URL location of a content deep-linked XML AIT for the on-demand programme. The XML AIT shall be used to launch the on-demand player. Please see clause 5.2.4 for the format of the XML AIT content and information on how the DVB-I client shall append contextual parameters. The @contentType attribute of the element shall carry the value application/vnd.dvb.ait+xml.	<ProgramURL contentType="application/vnd.dvb.ait+xml">https://broadcaste r.co.uk:8085/ait?pid =tb0101p3j</ProgramU RL>
AuxiliaryURL Optional {0..1}	A URL location of a Template XML AIT that can be used to determine whether the content instance specified by ProgramURL is compatible with the device. Please see clause 5.2.4 for the format and usage of the Template XML AIT. The @contentType attribute of the element shall carry the value application/vnd.dvb.ait+xml.	<AuxiliaryURL contentType="application/vnd.dvb.ait+xml">https://broadcaste r.co.uk:8085/ait?tem plate</AuxiliaryURL>
PublishedDuration Mandatory {1}	The advertised duration of the On Demand programme which will typically be different from the actual exact duration. The format shall adhere to clause 5.3.3.2 of ISO 8601-1 [19]. Partial representations are also permitted.	<PublishedDuration>PT1H00M00S</Published Duration>
StartOfAvailability Mandatory {1}	The time and date that this programme will first be available for on-demand viewing. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. Where relevant, broadcast mechanisms such as the Time Offset Table (TOT) shall be used to adjust all Content Guide Server-provided timestamps to local time.	<StartOfAvailability>2014-03- 18T22:00:00Z</StartO fAvailability>
EndOfAvailability Mandatory {1}	The time and date that this programme will no longer be available for on-demand viewing. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. Where relevant, broadcast mechanisms such as the Time Offset Table (TOT) shall be used to adjust all Content Guide Server-provided timestamps to local time.	<EndOfAvailability>2014-04- 17T21:00:00Z</EndOfA vailability>
Free Mandatory {1}	Indicates if access to this instance of the programme is free. The @value attribute is mandatory and shall be true or false.	<Free value="true"/>

6.10.8.4 OnDemandProgram Element [Box Set Contents]

Table 54: OnDemandProgram Element [Box Set Contents]

Element Name/ Required	Description	Example
@serviceIDRef Mandatory {1}	It shall match UniqueIdentifier in the Service element (see clause 5.5.2). The ServiceInstance element of Service element may be used to provide DVB-I Content guide for a linear broadcast channel.	<OnDemandProgram serviceIDRef="http://channel17.co.uk/service_a_app">
Program Mandatory {1}	Specifies the CRID of the matching ProgramInformation@programId attribute.	<Program crid="crid://bbc.co.uk/nitro/episode/b00jd8gp"/>
ProgramURL Mandatory {1}	A URL location of a content deep-linked XML AIT for the on-demand programme. The XML AIT shall be used to launch the on-demand player. Please see clause 5.2.4 for the format of the XML AIT content and information on how the DVB-I client shall append contextual parameters. The @contentType attribute of the element shall carry the value application/vnd.dvb.ait+xml.	<ProgramURL contentType="application/vnd.dvb.ait+xml"> https://www.live.bbc.tvapps.co.uk/ait/launch/iplayer.aitx?deeplink=tv/playback/b00jd8gp</ProgramURL>
AuxiliaryURL Optional {0..1}	A URL location of a Template XML AIT that can be used to determine whether the content instance specified by ProgramURL is compatible with the device. Please see clause 5.2.4 for the format and usage of the Template XML AIT. The @contentType attribute of the element shall carry the value application/vnd.dvb.ait+xml.	<AuxiliaryURL contentType="application/vnd.dvb.ait+xml"> https://www.live.mybroadcaster.co.uk/ait/launch/iplayer.aitx</AuxiliaryURL>
InstanceDescription Optional {0..1}	Indicates the caption language, sign language and audio/video attributes of the programme. See clauses 6.10.9 and 6.10.16 for more information.	See clauses 6.10.9 and 6.10.16.
PublishedDuration Mandatory {1}	The advertised duration of the On Demand programme which will typically be different from the actual exact duration. The format shall adhere to clause 5.3.3.2 of ISO 8601-1 [19]. Partial representations are also permitted.	<PublishedDuration>PT00H30M00S</PublishedDuration>
StartOfAvailability Mandatory {1}	The time and date that this programme will first be available for on-demand viewing. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. Where relevant, broadcast mechanisms such as the Time Offset Table (TOT) shall be used to adjust all Content Guide Server-provided timestamps to local time.	<StartOfAvailability>2018-07-13T08:00:00Z</StartOfAvailability>
EndOfAvailability Mandatory {1}	The time and date that this programme will no longer be available for on-demand viewing. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to clause 5.3.3 of ISO 8601-1 [19]. Where relevant, broadcast mechanisms such as the Time Offset Table (TOT) shall be used to adjust all Content Guide Server-provided timestamps to local time.	<EndOfAvailability>2019-01-12T09:00:00Z</EndOfAvailability>
Free Mandatory {1}	Indicates if access to this instance of the programme is free. The @value attribute is mandatory and shall be true or false.	<Free value="true"/>

6.10.9 AVAttributes Element

Table 55: AVAttributes Element

Element Name/ Required	Description	Example
AudioAttributes Optional {0..2} per language	Describes the audio characteristics. See clause 6.10.10. A separate AudioAttributes element may be provided for each AudioLanguage@purpose (Main and Audio Described). Multiple languages may be provided.	See clause 6.10.10.
VideoAttributes Optional {0..n}	Describes the video characteristics. See clause 6.10.11. If one or more VideoAttributes elements are present then the DVB-I client shall assume the content is only available at the resolution(s) specified (i.e. SD, HD, 4K, 8K).	See clause 6.10.11.
CaptioningAttributes Optional {0..n}	Describes the technical attributes of subtitles. See clause 6.10.12 for further details.	<CaptioningAttributes><Coding href="urn:tva:metadata:cs:CaptionCodingFormatCS:2015:2.1"/></CaptioningAttributes>

6.10.10 AudioAttributes Element

Table 56: AudioAttributes Element

Element Name/ Required	Description	Example
MixType Optional {0..1}	The type of the audio mix. An item from the AudioPresentationCS vocabulary shall be assigned to the @href attribute of the element to indicate mono, stereo and 5.1. See clause 6.11.2.	<MixType href="urn:mpeg:mpeg7:cs:AudioPresentationCS:2001:3"/>
AudioLanguage Optional {0..1}	An item from the AudioPurposeCS vocabulary shall be assigned to the @purpose attribute of the element. See clause 6.11.3 for allowable CS terms. This element may indicate the presence of audio description. See clause 6.10.2.4 for further details.	<AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6">en</AudioLanguage>

6.10.11 VideoAttributes Element

Table 57: VideoAttributes Element

Element Name/ Required	Description	Example
HorizontalSize Optional {0..1}	The horizontal size in pixels of the video. The value specified shall be used to determine SD/HD/4K/8K content descriptors. By default, content may be assumed to be SD resolution if this element is not present. To indicate that the content is HD resolution, 4K resolution or a resolution lower than SD, the HorizontalSize and VerticalSize elements shall be set to the appropriate values (e.g. 1920 and 1080 respectively for HD). The DVB-I client shall only use the VerticalSize to determine if a piece of content is SD, HD, 4K, etc.	<!--SD --> <HorizontalSize>576</HorizontalSize> <!--HD --> <HorizontalSize>1920</HorizontalSize>

VerticalSize Optional {0..1}	The vertical size in pixels of the video. The value specified shall be used to determine SD/HD/4K/8K content descriptors. By default, content may be assumed to be SD resolution if this element is not present. To indicate that the content is HD resolution, 4K resolution or a resolution lower than SD, the <code>HorizontalSize</code> and <code>VerticalSize</code> elements shall be set to the appropriate values (e.g. 1920 and 1080 respectively for HD). The DVB-I client shall only use the <code>VerticalSize</code> to determine if a piece of content is SD, HD, 4K, etc., with the following thresholds: • SD if < 720 • HD if >= 720 and < 2160 • 4K if >= 2160 and < 4320 • 8K if >= 4320	<pre><!--SD --> <VerticalSize>512</VerticalSize> <!--HD --> <VerticalSize>1080</VerticalSize></pre>
AspectRatio Optional {0..1}	The aspect ratio of the video.	<pre><AspectRatio>16:9</AspectRatio></pre>

6.10.12 CaptioningAttributes Element

Table 58: CaptioningAttributes Element

Element Name/ Required	Description	Example
Coding Optional {0..1}	The coding format used for captioning. The <code>@href</code> attribute shall carry a value specified in clause 6.11.4. See clause 6.10.2.3 for more information.	<pre><Coding href="urn:tva:metadata:cs:CaptionCodingFormatCS:2015:2.1"/></pre>

6.10.13 RelatedMaterial Element

Table 59: RelatedMaterial Element

Element Name/ Required	Description	Example
HowRelated Mandatory {1}	Describes the type of related material to the content. An item from the <code>HowRelatedCS</code> vocabulary shall be assigned to the <code>@href</code> attribute of the element. The <code>@href</code> attribute shall carry a value specified in clause D.1 where the <code>RelatedMaterial</code> fragment contains a link to an application, an application logo, service logo or programme image in the <code>MediaLocator.MediaUri</code> element. The <code>@href</code> attribute shall carry one of the values defined in clause 6.9 where links to other pages in a results set are returned.	<pre><!-- Service Logo (Promotional Still image) --> <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19" /> <!-- Programme Image (Promotional Still image) --> <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19" /></pre>
Format Optional {0..1}	Only the <code>StillPictureFormat</code> sub-element is permitted.	

MediaLocator Mandatory {1..n}	Specifies the location of the media asset or content. Defined as an MPEG-7 datatype, <i>MediaLocatorType</i> (see clause 6.5.2 of ISO/IEC 15938-5 [20] for a detailed description). Multiple images can be signalled where each has a <i>MediaLocator</i> element. At least one image shall be provided with the Media Type image/jpeg or image/png for compatibility purposes and other image formats including image/webp may be optionally provided.	<MediaLocator> <MediaUri contentType="image/ png" >https://www.channe l7.com/channela/ima ge.png</MediaUri> </MediaLocator>
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6.10.14 CreditsItem Element

A maximum of 40 *CreditsItem* elements shall be present within a *CreditsList* element.

NOTE: The default behaviour is to present the *CreditsItem* elements using the order they appear in the *CreditsList* element

CreditsItem elements shall be specified in one of the following ways:

- *PersonName*
- *PersonName* and *Character*
- *OrganizationName*

Table 60: CreditsItem Element

Element Name/ Required	Description	Example
@role Mandatory {1}	Identifies the type of credit that this <i>CreditsItem</i> relates to. The value shall be an item from either the <i>RoleCS</i> or <i>TVARoleCS</i> classification schemes. See clause 6.11.6 for allowed terms and the display text to use for each.	<CreditsItem role="urn:mpeg:mpeg7:cs:Ro leCS:2001:INTERVIEWER">
PersonName Optional {0..1}	The name of the person. This element shall only be supplied if <i>OrganizationName</i> is not present.	
PersonName.mpeg7: GivenName Mandatory if PersonName present {1} per language	The name used to address the person or character - typically first name. The length of the text shall not exceed 32 characters. See note.	<PersonName> <mpeg7:GivenName>Jeremy</m peg7:GivenName> </PersonName>
PersonName.mpeg7: FamilyName Optional {0..1} per language	The surname of the person. The length of the text shall not exceed 32 characters. See note.	<PersonName> <mpeg7:GivenName>Jeremy </mpeg7:GivenName> <mpeg7:FamilyName>Brown</m peg7:FamilyName> </PersonName>
Character Optional {0..1}	The name of the character. This element shall only be supplied if <i>PersonName</i> is also present.	
Character.mpeg7: GivenName Mandatory if Character present {1} per language	The name used to address the character - typically first name. The length of the text shall not exceed 32 characters. See note.	<Character> <mpeg7:GivenName>Billy </mpeg7:GivenName> </Character>

Element Name/ Required	Description	Example
Character.mpeg7: FamilyName Optional {0..1} per language	The surname of the character. The length of the text shall not exceed 32 characters. See note.	<Character> <mpeg7:GivenName>Billy </mpeg7:GivenName> <mpeg7:FamilyName>Johns </mpeg7:FamilyName> </Character>
OrganizationName Optional {0..1} per language	The name of an organization referenced in a CreditsItem. This element shall only be supplied if PersonName is not present. The length of the text shall not exceed 32 characters. See note.	<OrganizationName>International Studios Limited</OrganizationName>
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29].		

6.10.15 ParentalGuidance Element

Parental rating or guidance information provided in the programme metadata is used in the user interface when presenting and/or hiding parts of the electronic programme guide, selecting a service and presenting a programme within a service. The DVB-I client shall not permit playback of programmes that do not meet the parental rating or guidance criteria.

It is outside the scope of the present document whether a service is selectable that either

- 1) **not-applicable**; does not have any parental rating or guidance information in a scheme supported by the DVB-I Client,
- 2) **not-available**; is known by the client not to have any available content guide metadata, or
- 3) **not-specified**; does not have any parental rating or guidance information in the content guide metadata provided.

The ability to select the service under these conditions is typically covered through regional legislation.

NOTE: It is recommended that a DVB-I Client pre-caches content guide metadata for at least the current programme, in as many services as far as reasonably possible, to avoid needing to block or delay the selection of a service while waiting for content guide metadata.

Table 61: ParentalGuidance Element

Element Name/ Required	Description	Example
mpeg7:MinimumAge Mandatory for the first ParentalGuidance element defined	When ParentalGuidance is defined, this element shall indicate the minimum age required by the parental rating attributed to the content. In markets where age-based ratings are not used, the minimum age shall be set to a value of 255, which signals that a Content Rating classification scheme is required, and a classification-based term shall be provided in an additional ParentalGuidance element containing an mpeg7:ParentalRating element.	<mpeg7:MinimumAge>12</MinimumAge>

Element Name/ Required	Description	Example
mpeg7:ParentalRating Mandatory for the second ParentalGuidance element defined, in addition to the ParentalGuidance element containing mpeg7:MinimumAge	Additional ParentalGuidance may be defined, in which this element indicates the classification-based parental rating attributed to the content. A term from a Content Rating classification scheme such as urn:tva:metadata:cs:ContentAlertCS:2005, urn:dvb:metadata:cs:ParentalGuidanceCS:2007, or a scheme defined by local profile, e.g. urn:dtg:metadata:cs:DTGContentWarningCS shall be used. A mix of classification schemes may be used for programmes on a service.	<pre><!-- ContentRatingCS --> <mpeg7:ParentalRating href="urn:fvc:metadata:cs:ContentRatingCS:2014-07:no_parental_controls" /> <!-- DTGContentWarningCS --> <mpeg7:ParentalRating href="urn:dtg:metadata:cs:DTGContentWarningCS:2011:W"/></pre>
ExplanatoryText Mandatory if DTGContentWarningCS specified, otherwise optional {0..1} per language	Describes warnings within the programme e.g. Contains adult language and mature themes. There shall only be one element and a @length attribute shall be provided which will have the value long. The length limit is 160 characters. See note.	<pre><ExplanatoryText length="long">Contains strong language and flash photography</ExplanatoryText></pre>
CountryCodes Optional	The country or countries to which the associated rating applies may be defined, by specifying one or more ISO 3166 [i.8] country codes as a comma-separated list. When no country is defined, the rating shall apply irrespective of the country. Different ratings may be defined for different countries.	<pre><CountryCodes>ITA,CHE</CountryCodes></pre>
NOTE: This field may contain UTF-8 encoded characters and/or HTML character entity references as defined in clause 8.5 of W3C HTML 5.1 [29]		

6.10.16 InstanceDescription Element

Table 62: InstanceDescription Element

Element Name/ Required	Description	Example
Genre [ScheduleEvent] Optional {0..1}	The genre or classification for the programme. The @href attribute of the Genre element shall indicate the availability of Restart. See clauses 6.5.5 and 6.11.11 for further information.	<pre><Genre href="urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_available" type="main"/></pre>

Element Name/ Required	Description	Example
Genre [OnDemandProgram] Mandatory {2}	The genre or classification for the programme. The @href attribute of the Genre element shall indicate one or more of the following: • availability of the media asset • availability of on-demand programme in a forwards EPG The possible values shall be taken from the MediaAvailabilityCS and FEPGAavailabilityCS. The default values shall be media_unavailable and fepg_unavailable. See clauses 6.11.7 and 6.11.8 for information on how these indicators shall be used. The @type attribute shall carry the value other or may be omitted.	<pre><!-- media availability --> <Genre href="urn:fvc:metadata:c s:MediaAvailabilityCS:20 14-07:media_available" type="other"/> <!-- FEPA availability - --> <Genre href="urn:fvc:metadata:c s:FEPAavailabilityCS:201 4-10:fepeg_unavailable" type="other"/></pre>
CaptionLanguage Optional {0..1}	Identifies the presence of captions/subtitles for the associated event or content. Describes one language of the caption information included with the programme. The type of the caption information associated with the programme is denoted by the @closed attribute. Closed captions can be turned on or off by the user, while open captions (or subtitles) are part of the picture itself and remain visible. See clause 6.10.2 for further details.	<pre><CaptionLanguage closed="true">en</CaptionLanguage></pre>
SignLanguage Optional {0..1}	Indicates the inclusion of sign language in the video. The @closed attribute shall be set to false and the value shall be set to sgn as defined in ISO 639-2 [17] or the language of the sign language as defined in ISO 639-3 [18]. See clause 6.10.2.2 for further details.	<pre><SignLanguage closed="false">sgn</SignLanguage></pre>
AVAttributes Optional {0..1}	The Audio, Video and Captioning attributes.	See clause 6.10.9.
OtherIdentifier [ScheduleEvent] Optional {0..n}	The identifiers of schedule events including the programme CRID (@type="eit-programme-crid") and series CRID (@type="eit-series-crid") carried in broadcast EIT Content Identifier Descriptor(s) (see ETSI TS 102 323 28) as well as the identifier(s) of the content protection scheme(s) used for this scheduled event (@cpsIndex of the related content protection scheme(s) declared for the associated service in the service list).	<pre><OtherIdentifier type="eit-programme-crid">crid://channel7.co .uk/5A795M</OtherIdentifier> <OtherIdentifier type="eit-series-crid">crid://channel7.co .uk/KCI4LM</OtherIdentifier> <OtherIdentifier type="CPSIndex">cas- cp1</OtherIdentifier> <OtherIdentifier type="CPSIndex">dash- cp3</OtherIdentifier></pre>

Element Name/ Required	Description	Example
OtherIdentifier [OnDemandProgram] Optional {0..n}	The identifier(s) of the content protection scheme(s) used for this On Demand programme (@cpsIndex of the related content protection scheme(s) declared for the associated service in the service list).	<OtherIdentifier type="CPSIndex">dash- cp1</OtherIdentifier> <OtherIdentifier type="CPSIndex">dash- cp2</OtherIdentifier>
RelatedMaterial [ScheduleEvent] Optional {0..1}	A maximum of one RelatedMaterial element identifying Restart URLs shall be specified - see clause 6.11.10 for the HowRelated@href values and clause 6.5.5 for further information.	See clause 6.5.5.

6.10.17 GroupInformation Element

6.10.17.1 Introduction

The GroupInformation element is used in a number of locations and the included metadata is different depending on context. The variations are therefore displayed in individual subsections below; the applicable endpoint is indicated in square [] brackets.

6.10.17.2 GroupInformation Element [Box Set Categories, Box Set Lists, Box Set Contents]

Table 63: GroupInformation Element [Box Set Categories, Box Set Lists, Box Set Contents]

Element Name/ Required	Description	Example
@groupId Mandatory {1}	The CRID of the group. For Box Set Categories responses this shall represent the CRID of the parent group or a category group. For Box Set Lists and Box Set Contents responses this shall represent the CRID of the corresponding Box Set.	<GroupInformation groupId="crid://duk.c o.uk/search/results" ordered="true" numOfItems="47">
@ordered Optional {0..1}	Defines whether the members of the group are ordered. This shall always be set to true. For Box Set Categories and Box Set Lists responses, this attribute shall not be present in GroupInformation elements except for the parent groups.	<GroupInformation groupId="crid://duk.c o.uk/search/results" ordered="true" numOfItems="47">
@numOfItems Optional {0..1}	Defines the number of members within a group. This value shall define the total number of items, not the number present on the current page. The value shall always be set to 0 or a positive integer. For Box Set Categories and Box Set Lists responses, this attribute shall not be present in GroupInformation elements except for the parent groups.	<GroupInformation groupId="crid://duk.c o.uk/search/results" ordered="true" numOfItems="47">
@serviceIDRef [Box Set Lists & Box Set Contents] Optional {0..1}	In Box Set Lists and Box Set Contents responses, the service identifier of the service to which the Box Set relates (either UniqueIdentifier or ContentGuideServiceRef). This shall not be present in responses other than Box Set Lists and Box Set Contents.	<OnDemandProgram serviceIDRef="http:// www.channel17.com/serv ices/dtt/ChannelA/Lon don">
GroupType Mandatory {1}	The @xsi:type attribute shall always be ProgramGroupTypeType. The @value attribute shall always have the value otherCollection.	<GroupType xsi:type="ProgramGrou pTypeType" value="otherCollectio n"/>

Element Name/ Required	Description	Example
BasicDescription Optional {0..1}	Contains a number of RelatedMaterial elements for page links (see clause 6.10.5), in which case this element shall only be present where there is more than one page of results. For Box Set Categories, the value contains metadata related to each category. For Box Set Lists, the value shall contain metadata related to each individual Box Set, except for the parent group of the Box Set Lists response, for which the value shall contain the title of the selected category, in addition to a number of RelatedMaterial elements for page links (see clause 6.10.5) when there is more than one page of results.	<BasicDescription> <RelatedMaterial> <HowRelated href= ... </RelatedMaterial> </BasicDescription>
MemberOf [Box Set Lists & Box Set Categories] Optional {0..1}	For non-parent groups in Box Set Lists and Box Set Categories responses, identifies the category group to which the box set is a part of. The @index attribute denotes the box set's position within the category. The @xsi:type attribute shall always be set to MemberOfType.	<MemberOf xsi:type="MemberOfType" index="1" crid="crid://dvb.org/metadata/collections/boxsets/categories"/>

6.10.17.3 GroupInformation Element [Now/Next Filtered Schedules]

Table 64: GroupInformation Element [Now/Next Filtered Schedules]

Element Name/ Required	Description	Example
@groupId Mandatory {1}	The CRID of the group, identifying whether the group represents the current, future or previous events. This shall be one of: - crid://dvb.org/metadata/schedules/now-next/now - crid://dvb.org/metadata/schedules/now-next/later - crid://dvb.org/metadata/schedules/now-next/earlier	<GroupInformation groupId="crid://dvb.org/metadata/schedules/now-next/now" ordered="true" numItems="1">
@ordered Mandatory {1}	Defines whether the members of the group are ordered. This shall always be set to true.	
@numItems Mandatory {1}	Defines the number of members within a group.	
GroupType Mandatory {1}	The @xsi:type attribute shall always be ProgramGroupType. The @value attribute shall always have the value otherCollection.	<GroupType xsi:type="ProgramGroupType" value="otherCollection"/>
BasicDescription Mandatory {1}	Not used, the BasicDescription element shall be present but empty.	<BasicDescription/>

6.10.17.4 GroupInformation Element [More Episodes]

Table 65: GroupInformation Element [More Episodes]

Element Name/ Required	Description	Example
@groupId Mandatory {1}	The CRID of the results group, identifying that the group represents the response to a More Episodes request.	<GroupInformation groupId="crid://mdata.co.uk/more-episodes/results" ordered="true" numOfItems="115">
@ordered Mandatory {1}	Defines whether the members of the group are ordered. This shall always be set to <code>true</code> .	
@numOfItems Mandatory {1}	Defines the total number of members within a group.	
GroupType Mandatory {1}	The @xsi:type attribute shall always be ProgramGroupTypeType. The @value attribute shall always have the value <code>otherCollection</code> .	<GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
BasicDescription Mandatory {1}	Contains a number of RelatedMaterial elements for page links (see clause 6.10.5), in which case this element shall only be present where there is more than one page of results.	See clause 6.10.5.7 for further details.

6.11 Classification Terms

6.11.1 Introduction

This clause details the Classification Scheme (CS) terms used for the DVB-I content guide. The CS terms are profiled from MPEG-7 as defined in ISO/IEC 15938-5 [20], TV-Anytime as defined in ETSI TS 102 822-3-1 [7] and the Freeview Play specification [i.11].

6.11.2 Audio Mix Types

The values identified in Table 66 are profiled from MPEG-7, ISO/IEC 15938-5 [20].

Table 66: Audio Mix Types

XPath(s)	
.../InstanceDescription/AVAttributes/AudioAttributes/MixType[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:mpeg:mpeg7:cs:AudioPresentationCS:2001:2	Mono
urn:mpeg:mpeg7:cs:AudioPresentationCS:2001:3	Stereo
urn:mpeg:mpeg7:cs:AudioPresentationCS:2001:5	Home theatre 5.1

6.11.3 Audio Purpose

The values identified in Table 67 are profiled from TV-Anytime, ETSI TS 102 822-3-1 [7].

Table 67: Audio Purpose

XPath(s)	
.../InstanceDescription/AVAttributes/AudioAttributes/AudioLanguage[@purpose]	
Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:AudioPurposeCS:2007:1	Audio description for the visually impaired
urn:tva:metadata:cs:AudioPurposeCS:2007:2	Audio description for the hard of hearing
urn:tva:metadata:cs:AudioPurposeCS:2007:6	Main programme audio
urn:tva:metadata:cs:AudioPurposeCS:2007:8	Dialogue Enhancement

6.11.4 Caption Coding Format

The values identified in Table 68 are profiled from TV-Anytime, ETSI TS 102 822-3-1 [7].

Table 68: Caption Coding Format

XPath(s)	
.../InstanceDescription/AVAttributes/CaptioningAttributes/Coding[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:CaptionCodingFormatCS:2015:2.1	DVB Subtitles (bitmaps)
urn:tva:metadata:cs:CaptionCodingFormatCS:2015:2.2	DVB Subtitles (characters)
urn:tva:metadata:cs:CaptionCodingFormatCS:2015:3.2	EBU-TT-D

6.11.5 Content Genre

All values from the TV-Anytime ContentCS (urn:tva:metadata:cs:ContentCS:2011) or FormatCS (urn:tva:metadata:cs:FormatCS:2011) defined in ETSI TS 102 822-3-1 [7] or the DVB ContentSubject defined in clause D.5 are applicable.

6.11.6 Credit Role

The values identified in Table 69 are profiled from MPEG-7, ISO/IEC 15938-5 [20], and TV-Anytime, ETSI TS 102 822-3-1 [7].

Table 69: Credit Role

XPath(s)	
.../BasicDescription/CreditsList/CreditsItem[@role]	
Fully Qualified Classification Scheme Term	Term Name
urn:mpeg:mpeg7:cs:RoleCS:2001:ACTOR	Actor
urn:mpeg:mpeg7:cs:RoleCS:2001:AGGREGATOR	Aggregator
urn:mpeg:mpeg7:cs:RoleCS:2001:ANCHOR	Anchor
urn:mpeg:mpeg7:cs:RoleCS:2001:ANIMATOR	Animator
urn:mpeg:mpeg7:cs:RoleCS:2001:ART-DIRECTOR	Art Director
urn:mpeg:mpeg7:cs:RoleCS:2001:ASSISTANT-DIRECTOR	Assistant Director
urn:mpeg:mpeg7:cs:RoleCS:2001:AUTHOR	Author
urn:mpeg:mpeg7:cs:RoleCS:2001:BROADCASTER	Broadcaster
urn:mpeg:mpeg7:cs:RoleCS:2001:CAMERA-ASSISTANT	Camera Assistant
urn:mpeg:mpeg7:cs:RoleCS:2001:CAMERA-OPERATOR	Camera Operator
urn:mpeg:mpeg7:cs:RoleCS:2001:CG-ARTIST	Computer Graphics Artist
urn:mpeg:mpeg7:cs:RoleCS:2001:COMPOSER	Composer
urn:mpeg:mpeg7:cs:RoleCS:2001:CONTINUITY-PERSON	Continuity Person
urn:mpeg:mpeg7:cs:RoleCS:2001:COSTUMER	Costumer
urn:mpeg:mpeg7:cs:RoleCS:2001:COSTUME-SUPERVISOR	Costume Supervisor
urn:mpeg:mpeg7:cs:RoleCS:2001:DANCER	Dancer
urn:mpeg:mpeg7:cs:RoleCS:2001:DIRECTOR	Director
urn:mpeg:mpeg7:cs:RoleCS:2001:DISSEMINATOR	Disseminator
urn:mpeg:mpeg7:cs:RoleCS:2001:DISTRIBUTOR	Distributor
urn:mpeg:mpeg7:cs:RoleCS:2001:EXECUTIVE-PRODUCER	Executive Producer
urn:mpeg:mpeg7:cs:RoleCS:2001:INTERVIEWER	Interviewer
urn:mpeg:mpeg7:cs:RoleCS:2001:LIGHTING-OPERATOR	Lighting Operator
urn:mpeg:mpeg7:cs:RoleCS:2001:LIGHTING-SUPERVISOR	Lighting Supervisor
urn:mpeg:mpeg7:cs:RoleCS:2001:MAKEUP-ARTIST	Makeup Artist
urn:mpeg:mpeg7:cs:RoleCS:2001:MAKEUP-SUPERVISOR	Makeup Supervisor
urn:mpeg:mpeg7:cs:RoleCS:2001:MUSICIAN	Musician
urn:mpeg:mpeg7:cs:RoleCS:2001:MUSIC-SUPERVISOR	Music Supervisor

XPath(s)	
.../BasicDescription/CreditsList/CreditsItem[@role]	
Fully Qualified Classification Scheme Term	Term Name
urn:mpeg:mpeg7:cs:RoleCS:2001:NARRATOR	Narrator
urn:mpeg:mpeg7:cs:RoleCS:2001:PERFORMER	Performer
urn:mpeg:mpeg7:cs:RoleCS:2001:PRODUCER	Producer
urn:mpeg:mpeg7:cs:RoleCS:2001:PRODUCTION-ASSISTANT	Production Assistant
urn:mpeg:mpeg7:cs:RoleCS:2001:PRODUCTION-DESIGNER	Production Designer
urn:mpeg:mpeg7:cs:RoleCS:2001:PROPERTY-ASSISTANT	Property Assistant
urn:mpeg:mpeg7:cs:RoleCS:2001:PROPERTY-MASTER	Property Master
urn:mpeg:mpeg7:cs:RoleCS:2001:PUBLISHER	Publisher
urn:mpeg:mpeg7:cs:RoleCS:2001:REPORTER	Reporter
urn:mpeg:mpeg7:cs:RoleCS:2001:SCRIPTWRITER	Scriptwriter
urn:mpeg:mpeg7:cs:RoleCS:2001:SET-DESIGNER	Set Designer
urn:mpeg:mpeg7:cs:RoleCS:2001:SET-MAKER	Set Maker
urn:mpeg:mpeg7:cs:RoleCS:2001:SFX-ASSISTANT	Special Effects Assistant
urn:mpeg:mpeg7:cs:RoleCS:2001:SFX-SUPERVISOR	Special Effects Supervisor
urn:mpeg:mpeg7:cs:RoleCS:2001:SINGER	Singer
urn:mpeg:mpeg7:cs:RoleCS:2001:SOUND-EFFECTS-PERSON	Sound Effects Person
urn:mpeg:mpeg7:cs:RoleCS:2001:SOUND-ENGINEER	Sound Engineer
urn:mpeg:mpeg7:cs:RoleCS:2001:SOUND-SUPERVISOR	Sound Supervisor
urn:mpeg:mpeg7:cs:RoleCS:2001:STAFF	Staff
urn:mpeg:mpeg7:cs:RoleCS:2001:SWITCHER	Switcher
urn:mpeg:mpeg7:cs:RoleCS:2001:SYNDICATOR	Syndicator
urn:mpeg:mpeg7:cs:RoleCS:2001:TECHNICAL-DIRECTOR	Technical Director
urn:mpeg:mpeg7:cs:RoleCS:2001:TIMEKEEPER	Timekeeper
urn:mpeg:mpeg7:cs:RoleCS:2001:TRANSPORTATION-CAPTAIN	Transportation Captain
urn:mpeg:mpeg7:cs:RoleCS:2001:UNKNOWN	Unknown
urn:mpeg:mpeg7:cs:RoleCS:2001:VIDEO-ENGINEER	Video Engineer
urn:mpeg:mpeg7:cs:RoleCS:2001:VISUAL-EFFECTS-SUPERVISOR	Visual Effects Supervisor
urn:mpeg:mpeg7:cs:RoleCS:2001:WEBCASTER	Webcaster

XPath(s)	
.../BasicDescription/CreditsList/CreditsItem[@role]	
Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:TVARoleCS:2011:AD1	Advertising Agency
urn:tva:metadata:cs:TVARoleCS:2011:AD2	Advertising Production Company
urn:tva:metadata:cs:TVARoleCS:2011:AD3	Advertiser
urn:tva:metadata:cs:TVARoleCS:2011:AD4	Commissioning Channel
urn:tva:metadata:cs:TVARoleCS:2011:AD5	Commissioning Brand
urn:tva:metadata:cs:TVARoleCS:2011:AD6	Presenter
urn:tva:metadata:cs:TVARoleCS:2011:AD7	Studio Manager
urn:tva:metadata:cs:TVARoleCS:2011:AD8	Assistant Studio Manager
urn:tva:metadata:cs:TVARoleCS:2011:AD9	Caption Author
urn:tva:metadata:cs:TVARoleCS:2011:AD10	Electrician
urn:tva:metadata:cs:TVARoleCS:2011:AD11	Judge
urn:tva:metadata:cs:TVARoleCS:2011:AD12	Series Editor
urn:tva:metadata:cs:TVARoleCS:2011:AD13	Series Producer
urn:tva:metadata:cs:TVARoleCS:2011:V2	Scenario
urn:tva:metadata:cs:TVARoleCS:2011:V19	Commissioning Broadcaster
urn:tva:metadata:cs:TVARoleCS:2011:V20	Production Company
urn:tva:metadata:cs:TVARoleCS:2011:V22	Production Department
urn:tva:metadata:cs:TVARoleCS:2011:V30	Editor-in-chief
urn:tva:metadata:cs:TVARoleCS:2011:V31	Editor-of-the-Day
urn:tva:metadata:cs:TVARoleCS:2011:V32	Commentary or Commentator
urn:tva:metadata:cs:TVARoleCS:2011:V42	Conductor
urn:tva:metadata:cs:TVARoleCS:2011:V43	Participant
urn:tva:metadata:cs:TVARoleCS:2011:V44	Illustrator
urn:tva:metadata:cs:TVARoleCS:2011:V45	Photographer
urn:tva:metadata:cs:TVARoleCS:2011:V49	Sound Recordist
urn:tva:metadata:cs:TVARoleCS:2011:V55	Manufacturer
urn:tva:metadata:cs:TVARoleCS:2011:V76	Adaptor
urn:tva:metadata:cs:TVARoleCS:2011:V77	Set Dresser

XPath(s)	
.../BasicDescription/CreditsList/CreditsItem[@role]	
Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:TVARoleCS:2011:V79	Consultant
urn:tva:metadata:cs:TVARoleCS:2011:V80	Choreographer
urn:tva:metadata:cs:TVARoleCS:2011:V82	Visual Editor
urn:tva:metadata:cs:TVARoleCS:2011:V83	Director of photography
urn:tva:metadata:cs:TVARoleCS:2011:V88	Orchestra
urn:tva:metadata:cs:TVARoleCS:2011:V94	Treatment/Programme Proposal
urn:tva:metadata:cs:TVARoleCS:2011:V95	Translation
urn:tva:metadata:cs:TVARoleCS:2011:V96	Expert
urn:tva:metadata:cs:TVARoleCS:2011:V97	Interviewed Guest
urn:tva:metadata:cs:TVARoleCS:2011:V103	Announcer
urn:tva:metadata:cs:TVARoleCS:2011:V105	Special Effects
urn:tva:metadata:cs:TVARoleCS:2011:V106	Key talent
urn:tva:metadata:cs:TVARoleCS:2011:V110	Casting
urn:tva:metadata:cs:TVARoleCS:2011:V117	Witness
urn:tva:metadata:cs:TVARoleCS:2011:V483	Correspondent
urn:tva:metadata:cs:TVARoleCS:2011:V484	Costume designer
urn:tva:metadata:cs:TVARoleCS:2011:V485	Dresser
urn:tva:metadata:cs:TVARoleCS:2011:V486	Editor/Producer (News)
urn:tva:metadata:cs:TVARoleCS:2011:V487	Floor Manager
urn:tva:metadata:cs:TVARoleCS:2011:V488	Graphic Assistant
urn:tva:metadata:cs:TVARoleCS:2011:V489	Graphic Designer
urn:tva:metadata:cs:TVARoleCS:2011:V490	Post-Production editor
urn:tva:metadata:cs:TVARoleCS:2011:V491	Production Manager
urn:tva:metadata:cs:TVARoleCS:2011:V492	Production Secretary
urn:tva:metadata:cs:TVARoleCS:2011:V493	Programme Production Researcher
urn:tva:metadata:cs:TVARoleCS:2011:V494	Rigger
urn:tva:metadata:cs:TVARoleCS:2011:V495	Runner
urn:tva:metadata:cs:TVARoleCS:2011:V496	Scenic Operative

XPath(s)	
.../BasicDescription/CreditsList/CreditsItem[@role]	
Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:TVARoleCS:2011:V497	Assistant Producer
urn:tva:metadata:cs:TVARoleCS:2011:V498	Broadcast Assistant
urn:tva:metadata:cs:TVARoleCS:2011:V708	Dubber
urn:tva:metadata:cs:TVARoleCS:2011:V709	Key character
urn:tva:metadata:cs:TVARoleCS:2011:V710	Stunts
urn:tva:metadata:cs:TVARoleCS:2011:V714	Fight Director
urn:tva:metadata:cs:TVARoleCS:2011:V715	Script Supervisor
urn:tva:metadata:cs:TVARoleCS:2011:V716	Second Assistant Director
urn:tva:metadata:cs:TVARoleCS:2011:V717	Second Unit Director
urn:tva:metadata:cs:TVARoleCS:2011:V718	Sound Designer
urn:tva:metadata:cs:TVARoleCS:2011:V719	Music Arranger
urn:tva:metadata:cs:TVARoleCS:2011:V720	Causeur
urn:tva:metadata:cs:TVARoleCS:2011:V721	News Reader
urn:tva:metadata:cs:TVARoleCS:2011:V724	Assistant Chief Lighting Technician
urn:tva:metadata:cs:TVARoleCS:2011:V725	Carpenter
urn:tva:metadata:cs:TVARoleCS:2011:V727	Dialogue Coach
urn:tva:metadata:cs:TVARoleCS:2011:V728	Draughtsman
urn:tva:metadata:cs:TVARoleCS:2011:V729	Hairdresser
urn:tva:metadata:cs:TVARoleCS:2011:V730	Leadman
urn:tva:metadata:cs:TVARoleCS:2011:V734	Assistant Visual Editor
urn:tva:metadata:cs:TVARoleCS:2011:V735	Clapper Loader
urn:tva:metadata:cs:TVARoleCS:2011:V736	Focus Puller
urn:tva:metadata:cs:TVARoleCS:2011:V737	Foley Artist
urn:tva:metadata:cs:TVARoleCS:2011:V738	Foley Editor
urn:tva:metadata:cs:TVARoleCS:2011:V739	Foley Mixer
urn:tva:metadata:cs:TVARoleCS:2011:V740	Grip
urn:tva:metadata:cs:TVARoleCS:2011:V741	Key Grip
urn:tva:metadata:cs:TVARoleCS:2011:V742	Matte Artist

XPath(s)	
.../BasicDescription/CreditsList/CreditsItem[@role]	
Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:TVARoleCS:2011:V743	Pyrotechnician
urn:tva:metadata:cs:TVARoleCS:2011:V744	Second Assistant Camera
urn:tva:metadata:cs:TVARoleCS:2011:V745	Sound Mixer
urn:tva:metadata:cs:TVARoleCS:2011:V746	Vision mixer
urn:tva:metadata:cs:TVARoleCS:2011:V748	Animal Trainer
urn:tva:metadata:cs:TVARoleCS:2011:V749	Armourer
urn:tva:metadata:cs:TVARoleCS:2011:V750	Greensman
urn:tva:metadata:cs:TVARoleCS:2011:V751	Location Manager
urn:tva:metadata:cs:TVARoleCS:2011:V753	Sign Language
urn:tva:metadata:cs:TVARoleCS:2011:V754	Subtitles
urn:tva:metadata:cs:TVARoleCS:2011:V755	Transportation Manager
urn:tva:metadata:cs:TVARoleCS:2011:V807	Choir
urn:tva:metadata:cs:TVARoleCS:2011:V808	Ensemble
urn:tva:metadata:cs:TVARoleCS:2011:V809	Music Group
urn:tva:metadata:cs:TVARoleCS:2011:V810	Librettist
urn:tva:metadata:cs:TVARoleCS:2011:V811	Lyricist
urn:tva:metadata:cs:TVARoleCS:2011:V812	Computer programmer
urn:tva:metadata:cs:TVARoleCS:2011:V813	Puppeteer

6.11.7 Media Availability

The values identified in Table 70 are profiled from Freeview Play [i.11].

Table 70: Media Availability

XPath(s)	
.../OnDemandProgram/InstanceDescription/Genre[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:fvc:metadata:cs:MediaAvailabilityCS:2014-07:media_available	Media Available
urn:fvc:metadata:cs:MediaAvailabilityCS:2014-07:media_unavailable	Media Unavailable

6.11.8 Forward EPG Availability

The values identified in Table 71 are profiled from Freeview Play [i.11].

Table 71: Forward EPG Availability

XPath(s)	
.../OnDemandProgram/InstanceDescription/Genre[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:fvc:metadata:cs:FEPGAvailabilityCS:2014-10:fepg_available	Forwards EPG OnDemand Available
urn:fvc:metadata:cs:FEPGAvailabilityCS:2014-10:fepg_unavailable	Forwards EPG OnDemand Unavailable

6.11.9 Relationship

The values identified in Table 72 are profiled from TV-Anytime, ETSI TS 102 822-3-1 [7].

Table 72: Relationship

XPath(s)	
.../BasicDescription/RelatedMaterial/HowRelated[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:HowRelatedCS:2012:19	Promotional Still Image
urn:tva:metadata:cs:HowRelatedCS:2012:10.5	Interactive Enhancement

6.11.10 Restart Links

The values identified in Table 74 are profiled from Freeview Play [i.11].

Table 74: Restart Links

XPath(s)	
.../ScheduleEvent/RelatedMaterial/HowRelated[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:fvc:metadata:cs:HowRelatedCS:2018:restart	Restart links

6.11.11 Restart Availability

The values identified in Table 75 are profiled from Freeview Play [i.11].

Table 75: Restart Availability

XPath(s)	
.../ScheduleEvent/Genre[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_available	Restart is available
urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_check	The DVB-I client should check restart availability with Content Provider
urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_pending	Restart is not currently available but is expected to be

6.11.12 Box Sets

The values identified in Table 76 are profiled from Freeview Play [i.11].

Table 76: Restart Application Type

XPath(s)	
.../GroupInformation/RelatedMaterial/HowRelated[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:fvc:metadata:cs:HowRelatedCS:2018:templateAIT	Box Set Template AIT

6.11.13 More Episodes Available Genre

The values identified in Table 77 are profiled from Freeview Play [i.11].

Table 77: More Episodes Available

XPath(s)	
.../GroupInformation/BasicDescription/Genre[@href] .../Service/ServiceGenre[@href]	
Fully Qualified Classification Scheme Term	Term Name
urn:fvc:metadata:cs:MoreEpisodesAvailabilityCS:2019-06:ondemand_available	More on-demand episodes available
urn:fvc:metadata:cs:MoreEpisodesAvailabilityCS:2019-06:ondemand_unavailable	More on-demand episodes not available

6.12 Metadata Precedence

The DVB-I client will receive multiple sources of metadata, each with a particular scope and granularity.

Among the sources of DVB-I metadata, programme content guide metadata (see clause 6) should take precedence over Service List metadata (see clause 5.5) when there is overlap, due to its higher granularity and typically higher update frequency. Metadata delivered in-band with the content of a service, as well as the properties of the content itself (e.g. ETSI TS 103 285 [1] DVB-DASH manifest, bitstreams or MPEG2-TS and elementary streams according to ETSI TS 101 154[22], service information in the transport stream according to ETSI EN 300 468 [6]), should take precedence over both content guide metadata and DVB-I service list metadata when there is overlap, as they are inherent to the actual content of the service, and as such provide the most accurate and up-to-date information for the DVB-I client.

For example, consider the following service within a service list, containing `ContentAttributes.AudioAttributes` defining the service's audio language:

```
<Service version="1">
  <UniqueIdentifier>tag:example.com,2020:Channel1</UniqueIdentifier>
  <ServiceInstance priority="1">
    <DisplayName>Channel One</DisplayName>
    <ContentAttributes>
      <AudioAttributes>
        <tva:Coding href="urn:dvb:metadata:cs:AudioCodecCS:2007:1.2.4">
          <tva:Name>MPEG-4 High Efficiency Advanced Audio Profile @ Level 4</tva:Name>
        </tva:Coding>
        <tva:AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6"
          type="original">en</tva:AudioLanguage>
      </AudioAttributes>
      <VideoAttributes>
        <tva:Coding href="urn:dvb:metadata:cs:VideoCodecCS:2007:1.4.14">
          <tva:Name>H264 High Profile @ Level 4.2</tva:Name>
        </tva:Coding>
      </VideoAttributes>
    </ContentAttributes>
    <DASHDeliveryParameters>
      <UriBasedLocation contentType="application/dash+xml">
        <URI>https://cdn.example.com/channel1/dash/manifest.mpd</URI>
      </UriBasedLocation>
    </DASHDeliveryParameters>
  </ServiceInstance>
  <ServiceName>Channel 1</ServiceName>
  <ProviderName>Example Provider</ProviderName>
  <ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
  <ContentGuideSource CGSID="cgs-example-01">
    <ProviderName xml:lang="en">Example Metadata</ProviderName>
    <ScheduleInfoEndpoint contentType="application/xml">
      <URI>https://cgs.example.com/schedule</URI>
    </ScheduleInfoEndpoint>
  </ContentGuideSource>
</Service>
```

Additional audio languages may be available for specific programmes on this service. Consequently programme content guide metadata containing such details would take precedence, for example:

```
<ProgramLocationTable xml:lang="en">
  <Schedule serviceIDRef="tag:example.com,2020:Channel1"
    start="2020-05-05T11:00:00Z" end="2020-05-05T11:30:00.000Z">
    <ScheduleEvent>
      <Program crid="crid://channel1.example.com/e03b3c3f"/>
      <InstanceDescription>
        <CaptionLanguage closed="true">en</CaptionLanguage>
        <AVAttributes>
          <AudioAttributes>
            <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6"
              type="original">en</AudioLanguage>
          </AudioAttributes>
          <AudioAttributes>
            <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:1"
              type="original">en</AudioLanguage>
          </AudioAttributes>
          <AudioAttributes>
            <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6"
              type="dubbed">fr</AudioLanguage>
          </AudioAttributes>
          <AudioAttributes>
            <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6"
              type="dubbed">de</AudioLanguage>
          </AudioAttributes>
          <VideoAttributes>
            <HorizontalSize>1280</HorizontalSize>
            <VerticalSize>720</VerticalSize>
            <AspectRatio>16:9</AspectRatio>
          </VideoAttributes>
        </AVAttributes>
      </InstanceDescription>
      <PublishedStartTime>2020-05-05T11:00:00Z</PublishedStartTime>
      <PublishedDuration>PT30M</PublishedDuration>
    </ScheduleEvent>
  </Schedule>
</ProgramLocationTable>
```

Finally, when playing the DVB-DASH stream of the service in this example, the DASH manifest and the audio/video bitstreams will inform the client of the exact audio/video coding used, as well as the specific audio streams available. These may differ from the associated service and programme content guide metadata, and take precedence upon playback of the service.

The DVB-I client in a hybrid device will have access to metadata from both DVB-I endpoints over IP (defined in the present document) and broadcast DVB-SI (defined in ETSI EN 300 468 [6]). In a DVB-I installation context, the DVB-I metadata should take precedence over DVB-SI of the same scope and granularity, in the event of overlap. However, the abovementioned principle of precedence should still apply between DVB-I and DVB-SI metadata of different granularity and scope. Consequently, regardless of DVB-I service list and content guide metadata, when playing a broadcast stream, the MPEG2-TS elementary streams and the metadata directly related to their composition (i.e. PMT) will inform the client of the exact audio/video coding used, as well as the specific audio streams available, as they are inherent to the actual content of the service and therefore take precedence.

7 Security

7.1 Introduction

This clause covers security, including risks and mitigations and the use of TLS as a security mechanisms.

7.2 Risks and mitigations (informative)

7.2.1 Ensuring users get the expected (correct) service

7.2.1.1 One Service List Provider impersonating another

If the DVB-I client permits the user to choose a service list based on information from the Service List Provider (e.g. `ServiceList.Name` and/or `ServiceList.ProviderName`) then a Service List Provider may mis-represent their service list such that users choose that service list and not the intended one. Extreme examples of this may be addressed as trademark infringement but there may also be social engineering attacks which stop short of trademark violation.

Mitigation: Service list registry operators need operational procedures to address this. For example, manual examination of the contents of these fields and checking that they reasonably reflect the identity of the Service List Provider.

7.2.1.2 One service impersonating another - social engineering

Users will choose services based on information from a service list (e.g. `Service.ServiceName` and/or `Service.ProviderName`). A service provider may mis-represent their services in a service list so that users choose that service and not the intended one. Extreme examples of this may be addressed as trademark infringement but there may also be social engineering attacks which stop short of trademark violation.

Mitigation: Organizations compiling service lists need operational procedures to address this. For example, manual examination of the contents of these fields and checking that they reasonably reflect the identity of the service provider.

7.2.1.3 One service impersonating another - hybrid

A service provider may mis-represent a DASH service such that a false positive match is created with an existing broadcast service and indicates the DASH service instance has higher priority (i.e. lower value). This would result in users not getting the expected service.

Mitigation: Organizations compiling service lists need operational procedures to address this. For example, manual review that the broadcast service instance and the DASH service instance match.

7.2.1.4 Compromising service list registry servers or service list servers

An attacker who was able to compromise the server hosting a service list registry or one or more service lists would be able to replace the service lists or contents of them.

Mitigation: Service list registry operators need to follow best practice security for the web. The same applies for organizations hosting service lists and content referenced from them.

7.2.1.5 Man in the middle attack on Service List Provider - broadcast

Where DVB-I service lists are announced in the broadcast channel (see clause 5.1.3.3 of the present document), there is a risk of a man in the middle attack on the broadcast replacing the signalled URI.

Mitigation: None.

NOTE 1: The techniques defined in clause 9 of ETSI TS 102 809 [5] can be used to protect elementary streams in a broadcast DVB service from man in the middle attacks. However, the NIT and BAT used to signal DVB-I service lists are carried outside a service and cannot be protected using these techniques.

NOTE 2: A man in the middle attack on the NIT or BAT would likely reach far more victims by replacing a broadcast service with a modified broadcast version of that service than replacing DVB-I service list signalling.

7.2.2 Ensuring content is only available to users allowed to consume it

There are many different reasons why some users may not be allowed to consume particular content. Some examples include the following:

- The content needs to be paid for and an individual user has not done so.
- A particular device may not meet security requirements for the consumption of particular content.
- The service provider may not wish (or may not be allowed) to deliver the content to consumers in a particular location, e.g.:
 - The service provider may not have obtained the rights to deliver the content to consumers in that location from the content owner.
 - The service provider may not meet the legal and/or regulatory requirements to offer content to users in that location.

Mitigation: Service providers may use any of the techniques used with internet delivered video in order to ensure content is only available to users allowed to consume it. Different techniques have different costs and benefits which are outside the scope of the present document. Different content owners may have their own specific requirements. Some examples include the following:

- IP geo-blocking
- DRM. Clause 8 of ETSI TS 103 285 [1] addresses content protection including DRM
- TLS according to clause 7.3 or W3C EME [i.5] Clear Key

NOTE: In the present document, EME Clear Key can only be used by an HTML5 linked application, see clause 5.1.6.

7.2.3 Leakage of content

Some content providers will impose requirements on service providers to ensure that some content is protected from leaking beyond the users who are permitted to consume it and the device(s) on which those users are permitted to consume that content. For example, ensuring that a user does not use tools such as Wireshark to capture content. Different content will have different requirements depending on the content provider and/or service provider.

Mitigation: Service providers will need to choose appropriate solutions for the content to be protected. Some content may need to be protected with DRM - see clause 8 of ETSI TS 103 285 [1]. Weaker protection may be permitted for other content, e.g. TLS according to clause 7.3 or W3C EME [i.5] Clear Key.

7.2.4 Protecting user identification information

There will be some services where users need to identify themselves and/or pay for. This is outside the scope of the present document. Some examples of how this could be done include the following:

- A linked application may offer the user a UI for payment in the same way as is done in the web today.
- The user may make payments on a different device (e.g. a personal computer) and copy some kind of identifier(s) into the DVB-I client.
- The user may make payments using a different application on the same device and copy some kind of identifier(s) into the DVB-I client.

NOTE: Mechanisms by which identifiers could be copied into a DVB-I client are outside the scope of the present document. Devices supporting multiple applications may permit copy/paste between applications. The DVB-I client on a device with a camera may support QR codes.

All of these will result in some kind of identification information being held by the DVB-I client. Such identifiers will need to be protected.

Mitigation: Implementers of the DVB-I client need to securely store any such identifiers. Requirements for how this is done are outside the scope of the present document.

7.3 Use of HTTP over TLS

All HTTP transactions and connections between the DVB-I client and DVB-I metadata endpoints, specifically Service List Registries, Service List Servers, Content Guide Servers, described in the present document shall be performed using HTTP over TLS as defined in IETF RFC 9110 [14], using root certificates, cipher suites, signature algorithms, key sizes and elliptic curves as defined in clause 11.2 of ETSI TS 102 796 [21], as applicable for the TLS version used.

For the specific case that a DVB-I client connects to a DVB-I metadata endpoint located on the same private subnet (see clause 3 of IETF RFC 1918 [27]), HTTP may be used without TLS.

The DVB-I client shall support TLS version 1.3 defined in IETF RFC 8446 [25] or later, and TLS version 1.2 defined in IETF RFC 5246 [26] for interoperability.

DVB-I metadata endpoint servers shall support TLS version 1.2 defined in IETF RFC 5246 [26] and should support TLS version 1.3 defined in IETF RFC 8446 [25] or later.

8 Interoperability Points

8.1 Introduction

Consumers, accustomed to the user experience offered today when watching TV services delivered over broadcast networks, will legitimately expect an equivalent or better user experience when accessing services on a DVB-I receiver.

This clause describes the minimum set of functionalities required for delivery and consumption of free-to-view DVB-I services providing a user experience that is indistinguishable from current live/linear services as delivered over broadcast networks (i.e. DVB-S/T/C/IPTV) in most markets.

DVB-I service lists can include metadata relevant to both broadcast and broadband services, thus enabling hybrid service list management. However, the specific receiver requirements depend on the category of the receiving device hosting the DVB-I client, as described below.

8.2 Interoperability Point - IP0

The minimum feature receiver allows service providers and receivers to deliver and access free-to-view DVB-I services that consist of video, audio, and subtitles without personalization. For this interoperability point no distinction is made between mobile/nomadic and hybrid device. The required features of the DVB-I client are:

- Retrieve a service list from a preconfigured location.
- Process and store the service list in the receiver.
- The client should allow the customer to:
 - Display to the user the list of channels
 - Enable the user to navigate and select a channel using an appropriate method for the receiver
 - Enable the user to display and select the available programme components such as subtitles and accessibility options

8.3 Interoperability Point - IP1

This interoperability point identifies service features of a typical television viewing experience, one which is richer in user features and more in line with current television services.

For mobile/nomadic IP-only receivers, i.e. DVB-I receivers only equipped with a network interface for lean-forward consumption of broadband services (e.g. smartphone, tablet, personal computer, etc.), the required features of the DVB-I client are:

- Find the URLs of relevant DVB-I service lists by querying a Service list Registry.
- Acquisition of one or more DVB-I service lists (i.e. downloading service lists published on given URLs and identifying and storing the DVB-DASH services listed within them).
- Navigation through the installed services with a user interface tailored to the device (e.g. touch interface for a smartphone/tablet, mouse and keyboard interface for a laptop/personal computer).
- Selection of a specific service within a reasonable acquisition time.
- Continuous presentation of the selected DVB-DASH stream consisting of video, audio and subtitles.
- Display of basic service information (i.e. "Info" button) including service name, logo, EPG (now/next), audio/video attributes.
- Identification of streams with content protection applied.

For hybrid receivers, i.e. DVB-I receivers also equipped with tuner(s) for DVB-S/T/C/IPTV services (e.g. connected TV or STB), in addition to the basic requirements supported by nomadic/mobile IP-only receivers, the required features of the DVB-I client are:

- Installation of a DVB-I service list announced on broadcast channels via DVB-SI metadata.
- Full LCN support, including regionalized LCN lists.
- Management of the hybrid service list by matching/disambiguating/prioritizing services signalled in the DVB-I service list with locally tuned broadcast services, including part-time services.
- Navigation through the services by means of a remote control (i.e. typing numbers, using P+/P- keys), transparently zapping between broadcast and broadband services.
- Support for service-related apps.

In addition to the above categories, IP-only lean-back receivers for consumption of broadband services (e.g. connected TV or STB not equipped with broadcast tuner) offer a user experience in line with hybrid receivers, except for accessing metadata delivered on broadcast channels and managing hybrid service lists.

8.4 Interoperability Point – IP2

For hybrid receivers, i.e. DVB-I receivers also equipped with tuner(s) for DVB-S/T/C/IPTV services (e.g. connected TV or STB), in addition to requirements listed in IP1 (clause 8.3), the required features of the DVB-I client compliant to IP2 are listed below. Most of them aim to equate access to broadband serviced to the one already in place for broadcast services, providing user a stable user-experience.

- Installation of a DVB-I service list which is country dependent, using a pre-provisioned URL. Such an URL give access to Service List Registry hosting service lists for such Country.
 - The way to activate the pre-provisioned URL is implementation dependent.
- Trusted service list management according to clause 8.5.4.5.
 - A service list shall be considered as “trusted” having `regulatorFlag="true"`
- Creation of the hybrid channel list (i.e. the list of selectable services provided to the end user) does not infringe upon the country specific channel allocation, as defined by a regulatory entity for the country, see clause 8.5.4.1.
- Correct management of parental rating, based on content guide data. See clause 8.5.4.2.
- Service instance priority and fallback management according to clause 8.5.4.3.
- Channel list management:
 - Handling updates automatically according to clause 8.5.4.4.
 - Favourite channel list.
- Generic html5 application controlling media presentation not available. See clause 8.5.4.7.
- Provisioning of separate content guide servers by different service providers. See clause 8.5.4.8.
- One or more DRM systems, CENC-compliant embedded in the client.
- Broadband-Broadcast timing gap according to clause 8.5.4.6.
- Region definition and selection at least to secondary sub-region level. See clauses 5.6.2 and 5.6.3.3.
- Temporary channel typically created for the distribution of time-limited programming covering real-world events (e.g. sports event such as the Olympics or a world cup competition), in which the service instances are constrained by availability windows as defined in clause 5.2.5.

8.5 Service Features

8.5.1 Introduction

In each table in this clause, the value "Y" in columns labelled "minimum", "hybrid", "IP-only lean-back" or "IP-only mobile" indicates that support of that requirement is mandatory to realize the expected functionality of the profile, i.e. receivers are required to understand and act on that item when present in the service list. The lack of a "Y" indication for any XML element or attribute does not indicate that the XML document should be provided without the element or attribute: these tables indicate the implementation functions, XML elements and attributes according to their definition.

NOTE 1: In the following, requirements relevant to a specific delivery system (e.g. `DVBCTDeliveryParameters`) are applicable only to hybrid receivers equipped with that specific tuner.

NOTE 2: DVB-IPTV is considered a function of a hybrid receiver, even if it is consumed via the IP interface.

NOTE 3: Support for `ContentProtection` signalling does not imply support for any content protection schemes, only the capability to identify whether content is protected and whether the receiver supports the content protection scheme used or not.

8.5.2 Service Delivery

Receivers shall support all mandatory features of the `urn:dvb:dash:profile:dvb-dash:2014` and `urn:dvb:dash:profile:dvb-dash:2017` profiles of DVB-DASH as defined in ETSI TS 103 285 [1]. Additionally, receivers shall support optional features from that specification as defined in table 78.

Table 78: Additional minimum requirements for DVB-DASH service delivery

Functionality	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
Low latency service playout (excluding requirements on video decoding speed (clause 10.20.7.3 in ETSI TS 103 285 [1]) and startup delay requirements (clause 10.20.7.4 in ETSI TS 103 285 [1]))	N	Y	Y	Y
Start-up delay requirements (clauses 10.20.7.3 and 10.20.7.4 of ETSI TS 103 285 [1])	N	Y	Y	Y
Support for content decryption based on common encryption with 'cenc' support	N	Y	Y	Y
Support for MPD Events with DVB programme metadata (clause 9.1.2 of ETSI TS 103 285 [1])	Y	Y	Y	Y
Integration of DVB-DASH and DVB Application Signalling (clause 9.1.8 of ETSI TS 103 285 [1])	N	N	N	N

Support for NGA and HDR is optional. Hybrid receivers that support one or more NGA technologies for broadcast services shall also support the same NGA technologies for DVB-DASH services (see clauses 6.3, 6.4, 6.7, 6.8 and 10.18 of ETSI TS 103 285 [1]). Hybrid receivers that support one or more HDR technologies for broadcast services should also support the same HDR technologies for DVB-DASH services (see clauses 5.2.6 and 5.2.7 of ETSI TS 103 285 [1]) to provide a consistent viewing experience irrespective of the delivery system.

8.5.3 Service Discovery

8.5.3.1 Service list discovery during installation phase

Table 79 indicates the minimum requirements for DVB-I service list discovery, during the receiver installation (or reinstallation) phase.

Table 79: Supported mechanisms for DVB-I service list discovery

Mechanism	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
URL of DVB-I service list(s) retrieved by means of a query to a Service List Registry (see clause 5.1.3.2). See note 1.		Y	Y	Y
URL of DVB-I service list(s) retrieved by looking for the specific uri_linkage_descriptor in on air NIT/BAT of broadcast services (see clause 5.1.3.3).		Y		
URL of DVB-I service list(s) retrieved by looking for the specific uri_linkage_descriptor in a CICAM NIT (see clauses 5.1.3.4 and 5.1.3.6).		Y see note 3		
URL of DVB-I service list(s) hosted by a CICAM auxiliary file system retrieved by looking for the specific uri_linkage_descriptor in a CICAM NIT (see clauses 5.1.3.5 and 5.1.3.6).				
Hard coded (or privately provisioned) URL of DVB-I service list(s)	Y	Y see note 2	Y see note 2	Y see note 2
NOTE 1: If a CSR is in place, its well-known URL shall be used.				
NOTE 2: Use of a hard-coded URL to a DVB-I service list should only be used if the service list cannot be obtained via the Service List Registry or broadcast signalling methods.				
NOTE 3: Applicable only when the receiver supports CI Plus [33].				

8.5.3.2 Support of service discovery metadata

The following tables indicate for each DVB-I service discovery function defined in clause 5, its status in terms of required support by service providers and receivers.

Table 80: Support of Service List Entry Point fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
ServiceListEntryPoints		Y	Y	Y
ServiceListRegistryEntity				
ProviderOffering		Y	Y	Y
Extension				
NOTE: Semantic definitions of the elements be found in table 9.				

Table 81: Support of Organization fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
Name				
Kind				
ContactName				
Jurisdiction				
Address				
ElectronicAddress				
@regulatorFlag		Y	Y	Y
NOTE: Semantic definitions of the elements and attributes can be found in table 10.				

Table 82: Support of Provider Offering fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
Provider		Y	Y	Y
ServiceListOffering		Y	Y	Y
NOTE: Semantic definitions of the elements can be found in table 11.				

Table 83: Support of Service List Offering fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
ServiceListName		Y	Y	Y
ServiceListURI		Y	Y	Y
Delivery		Y	Y	Y
Language		Y	Y	Y
Genre				
TargetCountry		Y	Y	Y
RelatedMaterial		Y	Y	Y
SRSSupport				
@postcode				
@regionId				
@receivedMultiplex				
@regulatorListFlag		Y	Y	Y
NOTE: Semantic definitions of the elements and attributes can be found in table 12.				

Table 83a: Support of Delivery Type fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
DASHDelivery		Y	Y	Y
@minimumBitRate				
DVBTDelivery		Y	Y	Y
DVBCDelivery		Y	Y	Y
@networkID		Y		
DVBSDelivery		Y	Y	Y
OrbitalPosition		Y		
RTSPDelivery		Y	Y	Y
@minimumBitRate				
MulticastTSDelivery		Y	Y	Y
@minimumBitRate				
ApplicationDelivery		Y	Y	Y
Application		Y	Y	Y
@contentType		Y	Y	Y
+xmlAitApplicationType		Y	Y	Y
OtherDeliveryParameters				
NOTE: Semantic definitions of the elements and attributes can be found in tables 12a to 12i.				

Table 84: Support of Service List fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
ServiceList	Y	Y	Y	Y
Name		Y	Y	Y
ProviderName				
LanguageList				
RelatedMaterial		Y	Y	Y
RegionList		Y	Y	
TargetRegion				
LCNTableList		Y	Y	
ContentGuideSourceList		Y	Y	Y
ContentGuideSource		Y	Y	Y
Service	Y	Y	Y	Y
TestService				
SubscriptionPackageList		Y	Y	Y
@version	Y	Y	Y	Y
@responseStatus				
+xml:lang	Y	Y	Y	Y
NOTE: Semantic definitions of the elements and attributes can be found in table 14.				

Table 85: Support of Service Type fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
UniqueIdentifier	Y	Y	Y	Y
ServiceInstance	Y	Y	Y	Y
TargetRegion				
ServiceName	Y	Y	Y	Y
ProviderName				
RelatedMaterial		Y note 1	Y note 1	Y note 2
ServiceGenre				
ServiceType	Y	Y	Y	Y
ServiceDescription				
RecordingInfo				
ContentGuideSource		Y	Y	Y
ContentGuideSourceRef		Y	Y	Y
ContentGuideServiceRef		Y	Y	Y
AdditionalServiceParameters		Y note 4	Y note 4	
NVOD				
ProminenceList				
ParentalRating				
@dynamic				
@version	Y	Y	Y	Y
@replayAvailable				
@xml:lang	Y	Y	Y	Y
NOTE 1: Service related applications if HbbTV supported, service logos.				
NOTE 2: Service logos.				
NOTE 3: Semantic definitions of the elements and attributes can be found in table 15				
NOTE 4: If HbbTV supported				

Table 86: Support of ServiceInstance Type fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
DisplayName	Y	Y	Y	Y
RelatedMaterial		Y note 1	Y note 1	Y note 2
ContentProtection		Y	Y	Y
ContentAttributes	Y	Y	Y	Y
Availability		Y	Y	
SubscriptionPackage				
FTAContentManagement				
SourceType				
AltServiceName	Y	Y		
DVBTDeliveryParameters	Y note 3	Y note 3		
DVBSDeliveryParameters	Y note 4	Y note 4		

DVBCTSDeliveryParameters	Y note 5	Y note 5		
RTSPDeliveryParameters		Y note 6		
MulticastTSDeliveryParameters				
DASHDeliveryParameters	Y	Y	Y	Y
SATIPDeliveryParameters				
OtherDeliveryParameters				
@priority		Y	Y	Y
@id				
@xml:lang	Y	Y	Y	Y
NOTE 1: Service related applications if HbbTV supported, service logos. NOTE 2: Service logos. NOTE 3: Only required if DVB-T/T2 is supported. NOTE 4: Only required if DVB-S/S2 is supported. NOTE 5: Only required if DVB-C/C2 is supported. NOTE 6: Only required if DVB-IPTV is supported. NOTE 7: Semantic definitions of the elements and attributes can be found in table 16.				

Table 87: Support of ContentAttributesType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
AudioAttributes				
AudioConformancePoint	Y	Y	Y	
VideoAttributes				
VideoConformancePoint	Y	Y	Y	
CaptionLanguage				
SignLanguage				
NOTE: Semantic definitions of the elements can be found in table 18.				

Table 88: Support of ContentGuideSourceListType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
ContentGuideSource				
@xml:lang				
NOTE: Semantic definitions of the elements can be found in table 19.				

Table 89: Support of ContentGuideSourceType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
Name				
ProviderName				
RelatedMaterial				
ScheduleInfoEndpoint (see note 1)		Y	Y	Y
ProgramInfoEndpoint				
GroupInfoEndpoint				
MoreEpisodesEndpoint				
@CGSID				
@minimumMetadataUpdatePeriod				
@xml:lang				
NOTE 1: At least, support for "now/next".				
NOTE 2: Semantic definitions of the elements and attributes can be found in table 20.				

Table 90: Support of DVBTripType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
@origNetId	Y	Y		
@tsId	Y	Y		
@serviceId	Y	Y		
NOTE: Semantic definitions of the attributes can be found in table 21.				

Table 91: Support of LCNTableEntryType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
@channelNumber		Y	Y	
@serviceRef		Y	Y	
@selectable		Y	Y	
@visible		Y	Y	
NOTE: Semantic definitions of the attributes can be found in table 23.				

Table 92: Support of LCNTableListType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
LCNTable		Y	Y	
NOTE: Semantic definitions of the element can be found in table 24.				

Table 93: Support of LCNTableType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
TargetRegion		Y	Y	
SubscriptionPackage		Y	Y	
LCN		Y	Y	
NOTE: Semantic definitions of the elements can be found in table 25.				

Table 94: Support of ServiceAvailabilityType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
Period		Y	Y	
@validFrom		Y	Y	
@validTo		Y	Y	
Interval		Y	Y	
@days		Y	Y	
@recurrence		Y	Y	
@startTime		Y	Y	
@endTime		Y	Y	
NOTE: Semantic definitions of the elements and attributes can be found in table 26.				

Table 95: Support of DVBTDeliveryParametersType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
DVBTriples	Y	Y		
TargetCountry	Y	Y		
NOTE: Semantic definitions of the elements can be found in table 27.				

Table 96: Support of DVBSDeliveryParametersType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
DVBTriplet	Y	Y		
OrbitalPosition	Y	Y		
Frequency	Y	Y		
Polarization	Y	Y		
SymbolRate				
RollOff				
ModulationSystem				
ModulationType				
FEC				
ModcodCode				
InputStreamIdentifier				
ChannelBonding				
Frequency				
@primary				
NOTE: Semantic definitions of the elements can be found in table 28.				

Table 97: Support of DVBCDeliveryParametersType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
DVBTriplet	Y	Y		
TargetCountry	Y	Y		
NetworkID	Y	Y		
NOTE: Semantic definitions of the elements can be found in table 29.				

Table 98: Support of RTSPDeliveryParametersType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
DVBTriplet		Y		
RTSPURL		Y		
MinimumBitRate				
NOTE: Semantic definitions of the elements can be found in table 30.				

Table 99: Support of MulticastTSDeliveryParametersType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
DVBTriplet				
IPMulticastAddress				
MinimumBitRate				
NOTE: Semantic definitions of the elements can be found in table 31.				

Table 100: Support of DASHDeliveryParametersType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
UriBasedLocation	Y	Y	Y	Y
MinimumBitRate				
Extension				
NOTE: Semantic definitions of the elements can be found in table 32.				

Table 101: Support of SATIPDeliveryParametersType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
QueryParameters				
NOTE: Semantic definitions of the element can be found in table 33.				

Table 102: Support of FTACContentManagementType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
@userDefined				
@doNotScramble				
@controlRemoteAccessOverInternet				
@doNotApplyRevocation				
NOTE: Semantic definitions of the attributes can be found in table 34.				

Table 103: Support of ContentProtectionType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
CASystemId		Y	Y	Y
@cpsIndex				
DRMSystemId		Y	Y	Y
@encryptionScheme		Y	Y	Y
@cpsIndex				
NOTE: Semantic definitions of the elements and attributes can be found in table 35.				

Table 104: Support of RegionListType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
PostcodeType		Y	Y	
WildcardPostcodeType		Y	Y	
PostcodeRangeType		Y	Y	
@from		Y	Y	
@to		Y	Y	
LatitudeType				
LongitudeType				
RadiusType				
CoordinatesType				
Latitude				
Longitude				
Radius				
CountryRegionType				
Region				
@regionID				
@countryCodes				
PrimaryRegionType		Y	Y	
RegionName		Y	Y	
Region		Y	Y	
Postcode		Y	Y	
WildcardPostcode		Y	Y	
PostcodeRange		Y	Y	
Coordinates				
@regionID		Y	Y	
@selectable		Y	Y	
+xml:lang				
SecondaryRegionType		Y	Y	
RegionName		Y	Y	
Region		Y	Y	
Postcode		Y	Y	
WildcardPostcode		Y	Y	
PostcodeRange		Y	Y	
Coordinates				
@regionID		Y	Y	
@selectable		Y	Y	
+xml:lang				

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
TertiaryRegionType		Y	Y	
RegionName		Y	Y	
Postcode		Y	Y	
WildcardPostcode		Y	Y	
PostcodeRange		Y	Y	
Coordinates				
@regionID		Y	Y	
@selectable		Y	Y	
+xml:lang				
RegionListType		Y	Y	
Region		Y	Y	
@version		Y	Y	
+xml:lang				
NOTE: Semantic definitions of the elements and attributes can be found in table 38.				

Table 105: Support of DASHPlaylistType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
Playlist				
PlaylistEntry				
NOTE: Semantic definitions of the elements can be found in table 39.				

Table 105a: Support of SubscriptionPackageListType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
SubscriptionPackage		Y	Y	Y
@allowNoPackage		Y	Y	Y
NOTE: Semantic definitions of the elements can be found in table 37b.				

Table 105b: Support of NVODType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
@mode				
@reference				
@offset				
NOTE: Semantic definitions of the elements can be found in table 37c.				

Table 105c: Support of ServiceProminenceListType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
Prominence				
NOTE: Semantic definitions of the elements can be found in table 37d.				

Table 105d: Support of ServiceProminenceEntryType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
@country				
@region				
@ranking				
NOTE: Semantic definitions of the elements can be found in table 37e.				

Table 105e: Support of ParentalRatingType fields

Element/attribute	IP0	IP1		
	Minimum	Hybrid receiver	IP-only lean-back	IP-only mobile
MinimumAge				
@countryCodes				
NOTE: Semantic definitions of the elements can be found in table 37f.				

8.5.4 Other Service Characteristics

8.5.4.1 Installation algorithm

Resulting channel list shall maintain the channel numbering ruled by the LCN allocation:

- RF conflict management procedure shall be maintained.
- A DVB service which is not present in the service list but found during the RF scan shall be added to the channel list in agreement to collected RF data, i.e. LCN.
- A DVB service which is present in the service list shall be added to the channel list as defined by the service list data. If the LCN assigned by the service list conflicts with the LCN of a DVB service not present in the service list (i.e. only found during the RF scan), the conflicting RF service should be assigned a new LCN in the dedicated range.

8.5.4.2 Parental control

Broadcaster's playout systems which are completely schedule driven guarantees that programmes start at `ActualStartTime` and finish at `ActualStartTime+ActualDuration` except in the presence of disasters, and similar events. Such broadcasters just need to provide content guide metadata and ensure that the data is correct, including parental rating information..

8.5.4.3 Instance priority and fallback management

Because the `ServiceList` could provide more than one instance for a single service, the Terminal shall correctly manage it, providing the User the available instance – at selecting time – with higher priority, in agreement to:

```
<ServiceInstance priority="x">
```

When the selected instance becomes un-playable, the Terminal shall automatically play the available instance – at that time – with the next highest priority. Implementation details are left to Manufacturers.

8.5.4.4 Automatic update

The channel list shall be maintained up to date. Selection performed by the User during the channel list creation process shall be maintained. Different implementation, by different manufacturer, of "Channel list update" for RF channel is accepted, the access to CSR should be performed once a day in order to avoid CSR overload, preferably randomizing access to CSR during the night.

8.5.4.5 Trusted service list management

The canonical channel-installation process shall select the unique trusted service list provided by the country CSR. When other un-trusted service list are available, the terminal could provide these choices but having as default choice the trusted one.

8.5.4.6 Broadband-Broadcast timing gap

In agreement to DVB-DASH specification [1], shall support `suggestedPresentationDelay` parameter in the broadband content manifest.

8.5.4.7 Generic html5 application controlling media presentation not startable

When a generic html5 application is not startable, the terminal shall automatically play the available instance – at that time – with the next highest priority.

Application “not startable” examples are:

- User has disabled the application environment
- The terminal does not support the application environment for such an application

8.5.4.8 Per Service Provider ContentGuideServer

The schedule endpoint for the content guide is determined at the service level by the `<ContentGuideSourceRef>` element. The value of this element refers to a specific `ContentGuideSource@CGSID`, in the `ContentGuideSourceList` and the corresponding `ContentGuideSource.ScheduleInfoEndpoint` defines the `ContentGuideServer_Schedule_URL`.

Annex A (normative): Schemas

A.1 DVB-I Service Discovery schema

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE schema [
  <!ENTITY PostcodeChar      "A-Za-z0-9">
  <!ENTITY PostcodeSep      "\- ">
  <!ENTITY Postcode          "[&PostcodeChar;]+([&PostcodeSep;][&PostcodeChar;])?*>
  <!ENTITY PostcodeWildFirst "\\[&PostcodeChar;]*[&PostcodeSep;]?[&PostcodeChar;]+*>
  <!ENTITY PostcodeWildMiddle
    "([&PostcodeChar;]+\[&PostcodeSep;]?[&PostcodeChar;]+)|([&PostcodeChar;]+[&PostcodeSep;]?[&PostcodeChar;]+)*">
  <!ENTITY PostcodeWildLast  "[&PostcodeChar;]+[&PostcodeSep;]?[&PostcodeChar;]*\[">
  <!ENTITY DecimalByte      "([1-9]?[0-9])|(1[0-9][0-9])|(2[0-4][0-9])|(25[0-5])">
  <!ENTITY IPv4Address      "(&DecimalByte;\.){3}&DecimalByte;">
  <!ENTITY HexDigit         "[0-9A-Fa-f]">
  <!ENTITY Hex32             "&HexDigit;{1,8}">
  <!ENTITY Hex16             "&HexDigit;{1,4}">
  <!ENTITY Hex8              "&HexDigit;{1,2}">
]>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2023"
targetNamespace="urn:dvb:metadata:servicediscovery:2023" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2023" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.xsd"/>
  <import namespace="http://www.w3.org/XML/1998/namespace" schemaLocation="xml.xsd"/>
  <element name="ServiceList" type="dvbisd:ServiceListType"/>
  <element name="Playlist" type="dvbisd:DASHPlaylistType"/>
  <complexType name="ServiceListType">
    <sequence>
      <element name="Name" type="mpeg7:TextualType" maxOccurs="unbounded"/>
      <element name="ProviderName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
      <element name="LanguageList" type="dvbisd:LanguageListType" minOccurs="0"/>
      <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0"
maxOccurs="unbounded"/>
      <element name="RegionList" type="dvbisd:RegionListType" minOccurs="0"/>
      <element name="TargetRegion" type="dvbisd:RegionIdRefType" minOccurs="0" maxOccurs="unbounded"/>
      <element name="LCNTableTable" type="dvbisd:LCNTableListType" minOccurs="0"/>
      <choice minOccurs="0">
        <element name="ContentGuideSourceList" type="dvbisd:ContentGuideSourceListType"/>
        <element name="ContentGuideSource" type="dvbisd:ContentGuideSourceType"/>
      </choice>
      <choice minOccurs="0" maxOccurs="unbounded">
        <element name="Service" type="dvbisd:ServiceType"/>
        <element name="TestService" type="dvbisd:ServiceType"/>
      </choice>
      <element name="SubscriptionPackageList" type="dvbisd:SubscriptionPackageListType" minOccurs="0"/>
      <any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
    <attribute name="version" type="positiveInteger" use="required"/>
    <attribute name="responseStatus" use="optional">
      <simpleType>
        <restriction base="string">
          <enumeration value="OK"/>

```



```

        <enumeration value="ERROR_INVALID_MUX_INFO"/>
        <enumeration value="ERROR_INVALID_REQUEST"/>
        <enumeration value="ERROR_BUSY"/>
        <enumeration value="ERROR_GENERIC_FAILURE"/>
        <enumeration value="ERROR_INVALID_POSTCODE"/>
        <enumeration value="ERROR_INVALID_REGION_ID"/>
    </restriction>
</simpleType>
</attribute>
<attribute ref="xml:lang" use="required"/>
</complexType>
<complexType name="LanguageListType">
    <sequence>
        <element name="Language" type="tva:AudioLanguageType" maxOccurs="unbounded"/>
    </sequence>
</complexType>
<complexType name="ContentGuideSourceListType">
    <sequence>
        <element name="ContentGuideSource" type="dvbisd:ContentGuideSourceType"
            minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
    <attribute ref="xml:lang"/>
</complexType>
<complexType name="ContentGuideSourceType">
    <sequence>
        <element name="Name" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="ProviderName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
        <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="ScheduleInfoEndpoint" type="dvbisd:ExtendedURIType"/>
        <element name="ProgramInfoEndpoint" type="dvbisd:ExtendedURIType" minOccurs="0"/>
        <element name="GroupInfoEndpoint" type="dvbisd:ExtendedURIType" minOccurs="0"/>
        <element name="MoreEpisodesEndpoint" type="dvbisd:ExtendedURIType" minOccurs="0"/>
    </sequence>
    <attribute name="CGSID" type="dvbisd:ContentGuideProviderIdType" use="required"/>
    <attribute name="minimumMetadataUpdatePeriod" type="duration"/>
    <attribute ref="xml:lang"/>
</complexType>
<simpleType name="ContentGuideProviderIdType">
    <restriction base="ID"/>
</simpleType>
<simpleType name="ContentGuideProviderRefIdType">
    <restriction base="IDREF"/>
</simpleType>
<complexType name="ServiceType">
    <sequence>
        <element name="UniqueIdentifier" type="dvbisd:ServiceIdentifierType"/>
        <element name="ServiceInstance" type="dvbisd:ServiceInstanceType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="TargetRegion" type="dvbisd:RegionIdRefType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="ServiceName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
        <element name="ProviderName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
        <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="ServiceGenre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="ServiceType" type="tva:ControlledTermType" minOccurs="0"/>
        <element name="ServiceDescription" type="tva:SynopsisType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="RecordingInfo" type="tva:ControlledTermType" minOccurs="0"/>
        <choice minOccurs="0">
            <element name="ContentGuideSource" type="dvbisd:ContentGuideSourceType"/>
            <element name="ContentGuideSourceRef" type="dvbisd:ContentGuideProviderRefIdType"/>
        </choice>
    </sequence>

```

```

<element name="ContentGuideServiceRef" type="string" minOccurs="0"/>
<element name="AdditionalServiceParameters" type="dvbisd:ExtensionBaseType"
  minOccurs="0" maxOccurs="unbounded"/>
<element name="NVOD" type="dvbisd:NVODType" minOccurs="0"/>
<element name="ProminenceList" type="dvbisd:ServiceProminenceListType" minOccurs="0"/>
<element name="ParentalRating" type="dvbisd:ParentalRatingType" minOccurs="0"/>
</sequence>
<attribute name="dynamic" type="boolean" default="false"/>
<attribute name="version" type="positiveInteger" use="required"/>
<attribute name="replayAvailable" type="boolean" default="false"/>
<attribute ref="xml:lang"/>
</complexType>
<complexType name="ServiceInstanceType">
  <sequence>
    <element name="DisplayName" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ContentProtection" type="dvbisd:ContentProtectionType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="ContentAttributes" type="dvbisd:ContentAttributesType" minOccurs="0"/>
    <element name="Availability" type="dvbisd:ServiceAvailabilityType" minOccurs="0"/>
    <element name="SubscriptionPackage" type="dvbisd:SubscriptionPackageType" minOccurs="0"
      maxOccurs="unbounded"/>
    <element name="FTAContentManagement" type="dvbisd:FTAContentManagementType" minOccurs="0"/>
    <element name="SourceType" type="anyURI" minOccurs="0"/>
    <element name="AltServiceName" type="string" minOccurs="0" maxOccurs="unbounded"/>
    <choice minOccurs="0">
      <sequence>
        <element name="DVBTDeliveryParameters" type="dvbisd:DVBTDeliveryParametersType"/>
        <element name="SATIPDeliveryParameters" type="dvbisd:SATIPDeliveryParametersType" minOccurs="0"/>
      </sequence>
      <sequence>
        <element name="DVBSDeliveryParameters" type="dvbisd:DVBSDeliveryParametersType"/>
        <element name="SATIPDeliveryParameters" type="dvbisd:SATIPDeliveryParametersType" minOccurs="0"/>
      </sequence>
      <element name="DVBCDeliveryParameters" type="dvbisd:DVBCDeliveryParametersType"/>
      <element name="RTSPDeliveryParameters" type="dvbisd:RTSPDeliveryParametersType"/>
      <element name="MulticastTSDeliveryParameters" type="dvbisd:MulticastTSDeliveryParametersType"/>
      <sequence>
        <element name="DASHDeliveryParameters" type="dvbisd:DASHDeliveryParametersType"/>
        <element name="MulticastTSDeliveryParameters" type="dvbisd:MulticastTSDeliveryParametersType"
          minOccurs="0"/>
      </sequence>
      <element name="OtherDeliveryParameters" type="dvbisd:ExtensionBaseType"/>
    </choice>
  </sequence>
  <attribute name="priority" type="nonNegativeInteger" default="0"/>
  <attribute name="id" type="string" default="0"/>
  <attribute ref="xml:lang"/>
</complexType>
<complexType name="ContentProtectionType">
  <sequence>
    <element name="CASystemId" type="dvbisd:CASystemType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="DRMSystemId" type="dvbisd:DRMSystemType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="ProtectionSystemType" abstract="true">
  <simpleContent>
    <extension base="string">
      <attribute name="cpsIndex" type="string"/>
    </extension>
  </simpleContent>

```

```

    </simpleContent>
</complexType>
</complexType>
<complexType name="CASystemType">
    <complexContent>
        <extension base="dvbisd:ProtectionSystemType"/>
    </complexContent>
</complexType>
<complexType name="DRMSystemType">
    <complexContent>
        <extension base="dvbisd:ProtectionSystemType">
            <attribute name="encryptionScheme" type="dvbisd:EncryptionSchemeType" use="required"/>
        </extension>
    </complexContent>
</complexType>
<simpleType name="EncryptionSchemeType">
    <restriction base="string">
        <enumeration value="cenc"/>
        <enumeration value="cbcs"/>
        <enumeration value="cbcs-10"/>
    </restriction>
</simpleType>
<complexType name="FTACContentManagementType">
    <attribute name="userDefined" type="boolean" use="required"/>
    <attribute name="doNotScramble" type="boolean" use="required"/>
    <attribute name="controlRemoteAccessOverInternet" use="required">
        <simpleType>
            <restriction base="unsignedByte">
                <minInclusive value="0"/>
                <maxInclusive value="3"/>
            </restriction>
        </simpleType>
    </attribute>
    <attribute name="doNotApplyRevocation" type="boolean" use="required"/>
</complexType>
<complexType name="ServiceProminenceListType">
    <sequence>
        <element name="Prominence" type="dvbisd:ServiceProminenceEntryType" maxOccurs="unbounded"/>
    </sequence>
</complexType>
<complexType name="ServiceProminenceEntryType">
    <simpleContent>
        <extension base="string">
            <attribute name="country" type="tva:ISO-3166-Code"/>
            <attribute name="region" type="dvbisd:RegionIdRefType"/>
            <attribute name="ranking">
                <simpleType>
                    <restriction base="integer">
                        <minInclusive value="1"/>
                        <maxInclusive value="4095"/>
                    </restriction>
                </simpleType>
            </attribute>
        </extension>
    </simpleContent>
</complexType>
<complexType name="DVBTDeliveryParametersType">
    <sequence>
        <element name="DVBTriplet" type="dvbisd:DVBTripletType"/>

```

```

    <element name="TargetCountry" type="tva:ISO-3166-Code"/>
  </sequence>
</complexType>
<complexType name="DVBSDeliveryParametersType">
  <sequence>
    <element name="DVBTriplet" type="dvbisd:DVBTripletType"/>
    <element name="OrbitalPosition" type="dvbisd:LongitudeType" minOccurs="0"/>
    <sequence minOccurs="0">
      <element name="Frequency" type="positiveInteger" />
      <element name="Polarization">
        <simpleType>
          <restriction base="string">
            <enumeration value="horizontal"/>
            <enumeration value="vertical"/>
            <enumeration value="left circular"/>
            <enumeration value="right circular"/>
          </restriction>
        </simpleType>
      </element>
    <sequence minOccurs="0">
      <element name="SymbolRate" type="positiveInteger"/>
      <sequence minOccurs="0">
        <element name="RollOff">
          <simpleType>
            <restriction base="string">
              <enumeration value="0.35"/>
              <enumeration value="0.25"/>
              <enumeration value="0.20"/>
              <enumeration value="0.15"/>
              <enumeration value="0.10"/>
              <enumeration value="0.05"/>
            </restriction>
          </simpleType>
        </element>
        <element name="ModulationSystem">
          <simpleType>
            <restriction base="string">
              <enumeration value="DVB-S"/>
              <enumeration value="DVB-S2"/>
              <enumeration value="DVB-S2X"/>
            </restriction>
          </simpleType>
        </element>
        <element name="ModulationType">
          <simpleType>
            <restriction base="string">
              <enumeration value="QPSK"/>
              <enumeration value="8PSK"/>
              <enumeration value="8PSK-L"/>
              <enumeration value="16APSK"/>
              <enumeration value="16APSK-L"/>
              <enumeration value="32APSK"/>
              <enumeration value="32APSK-L"/>
              <enumeration value="64APSK"/>
              <enumeration value="64APSK-L"/>
            </restriction>
          </simpleType>
        </element>
        <element name="FEC">

```

```

<simpleType>
  <restriction base="string">
    <enumeration value="1/2"/>
    <enumeration value="2/3"/>
    <enumeration value="3/4"/>
    <enumeration value="5/6"/>
    <enumeration value="7/8"/>
    <enumeration value="8/9"/>
    <enumeration value="3/5"/>
    <enumeration value="4/5"/>
    <enumeration value="9/10"/>
    <enumeration value="1/4"/>
    <enumeration value="1/3"/>
    <enumeration value="2/5"/>
    <enumeration value="13/45"/>
    <enumeration value="9/20"/>
    <enumeration value="11/20"/>
    <enumeration value="23/36"/>
    <enumeration value="25/36"/>
    <enumeration value="13/18"/>
    <enumeration value="5/9"/>
    <enumeration value="26/45"/>
    <enumeration value="28/45"/>
    <enumeration value="7/9"/>
    <enumeration value="77/90"/>
    <enumeration value="8/15"/>
    <enumeration value="32/45"/>
    <enumeration value="11/15"/>
  </restriction>
</simpleType>
</element>
</sequence>
<sequence minOccurs="0">
  <annotation>
    <documentation>DVB-S2X only</documentation>
  </annotation>
  <element name="ModcodMode">
    <simpleType>
      <restriction base="string">
        <enumeration value="ccm"/>
        <enumeration value="vcm"/>
      </restriction>
    </simpleType>
  </element>
  <element name="InputStreamIdentifier" type="unsignedByte" minOccurs="0"/>
  <element name="ChannelBonding" minOccurs="0">
    <complexType>
      <sequence>
        <element name="Frequency" minOccurs="2" maxOccurs="unbounded">
          <complexType>
            <simpleContent>
              <extension base="positiveInteger">
                <attribute name="primary" type="boolean" default="false"/>
              </extension>
            </simpleContent>
          </complexType>
        </element>
      </sequence>
    </complexType>
  </element>

```

```

        </element>
    </sequence>
</sequence>
</sequence>
</complexType>
<complexType name="SATIPDeliveryParametersType">
    <sequence>
        <element name="QueryParameters" type="string"/>
    </sequence>
</complexType>
<complexType name="DVBCDeliveryParametersType">
    <sequence>
        <element name="DVBTriples" type="dvbisd:DVBTriplesType" minOccurs="0"/>
        <element name="TargetCountry" type="tva:ISO-3166-Code" />
        <element name="NetworkID" type="dvbisd:NetworkIDType" />
    </sequence>
</complexType>
<simpleType name="NetworkIDType">
    <restriction base="unsignedShort"/>
</simpleType>
<complexType name="RTSPDeliveryParametersType">
    <sequence>
        <element name="DVBTriples" type="dvbisd:DVBTriplesType"/>
        <element name="RTSPURL" type="dvbisd:RTSPURLType"/>
        <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
    </sequence>
</complexType>
<complexType name="MulticastTSDeliveryParametersType">
    <sequence>
        <element name="DVBTriples" type="dvbisd:DVBTriplesType" minOccurs="0"/>
        <element name="IPMulticastAddress" type="dvbisd:McastType"/>
        <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
    </sequence>
</complexType>
<complexType name="DASHDeliveryParametersType">
    <sequence>
        <element name="UriBasedLocation" type="dvbisd:ExtendedURIType"/>
        <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
        <element name="Extension" type="dvbisd:ExtensionBaseType" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
</complexType>
<complexType name="ServiceAvailabilityType">
    <sequence>
        <element name="Period" maxOccurs="unbounded">
            <complexType>
                <sequence>
                    <element name="Interval" minOccurs="0" maxOccurs="unbounded">
                        <complexType>
                            <attribute name="days" type="dvbisd:ServiceDaysList" default="1 2 3 4 5 6 7"/>
                            <attribute name="recurrence" type="positiveInteger" default="1"/>
                            <attribute name="startTime" type="dvbisd:ZuluTimeType" default="00:00:00Z"/>
                            <attribute name="endTime" type="dvbisd:ZuluTimeType" default="23:59:59.999Z"/>
                        </complexType>
                    </element>
                </sequence>
                <attribute name="validFrom" type="dateTime"/>
                <attribute name="validTo" type="dateTime"/>
            </complexType>
        </element>
    </sequence>

```

```

    </element>
  </sequence>
</complexType>
<simpleType name="ServiceDaysList">
  <list>
    <simpleType>
      <restriction base="integer">
        <minInclusive value="1">
          <annotation>
            <documentation xml:lang="en">Monday</documentation>
          </annotation>
        </minInclusive>
        <maxInclusive value="7">
          <annotation>
            <documentation xml:lang="en">Sunday</documentation>
          </annotation>
        </maxInclusive>
      </restriction>
    </simpleType>
  </list>
</simpleType>
<simpleType name="ZuluTimeType">
  <restriction base="time">
    <pattern value="([01]\d|2[0-3]):[0-5]\d:[0-5]\d(\.\d+)?Z"/>
  </restriction>
</simpleType>
<complexType name="RegionListType">
  <sequence>
    <element name="Region" type="dvbisd:CountryRegionType" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="version" type="positiveInteger" use="required"/>
  <attribute ref="xml:lang"/>
</complexType>
<complexType name="CountryRegionType">
  <complexContent>
    <extension base="dvbisd:RegionBaseType">
      <sequence>
        <element name="Region" type="dvbisd:PrimaryRegionType" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="countryCodes" type="tva:ISO-3166-List" use="required"/>
      <attribute name="regionID" type="dvbisd:RegionIDType" use="required"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="PrimaryRegionType">
  <complexContent>
    <extension base="dvbisd:RegionBaseType">
      <sequence>
        <element name="Region" type="dvbisd:SecondaryRegionType" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<complexType name="SecondaryRegionType">
  <complexContent>
    <extension base="dvbisd:RegionBaseType">
      <sequence>
        <element name="Region" type="dvbisd:TertiaryRegionType" minOccurs="0" maxOccurs="unbounded"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>

```

```

    </extension>
  </complexContent>
</complexType>
<complexType name="TertiaryRegionType">
  <complexContent>
    <extension base="dvbisd:RegionBaseType"></extension>
  </complexContent>
</complexType>
<complexType name="RegionBaseType" abstract="true">
  <sequence>
    <element name="RegionName" type="mpeg7:TextualType" minOccurs="0" maxOccurs="unbounded"/>
    <choice minOccurs="0" maxOccurs="unbounded">
      <element name="Postcode" type="dvbisd:PostcodeType"/>
      <element name="WildcardPostcode" type="dvbisd:WildcardPostcodeType"/>
      <element name="PostcodeRange" type="dvbisd:PostcodeRangeType"/>
      <element name="Coordinates" type="dvbisd:CoordinatesType"/>
    </choice>
  </sequence>
  <attribute name="regionID" type="dvbisd:RegionIdType" use="required"/>
  <attribute name="selectable" type="boolean" default="true"/>
  <attribute ref="xml:lang"/>
</complexType>
<simpleType name="RegionIdType">
  <restriction base="ID"/>
</simpleType>
<simpleType name="RegionIdRefType">
  <restriction base="IDREF"/>
</simpleType>
<simpleType name="PostcodeType">
  <restriction base="string">
    <pattern value="&PostcodeType;"/>
  </restriction>
</simpleType>
<simpleType name="WildcardPostcodeType">
  <restriction base="string">
    <pattern
      value="(&PostcodeWildFirst;)|(&PostcodeWildMiddle;)|(&PostcodeWildLast;)/>
  </restriction>
</simpleType>
<complexType name="PostcodeRangeType">
  <attribute name="from" type="dvbisd:PostcodeType" use="required"/>
  <attribute name="to" type="dvbisd:PostcodeType" use="required"/>
</complexType>
<complexType name="CoordinatesType">
  <sequence>
    <element name="Latitude" type="dvbisd:LatitudeType"/>
    <element name="Longitude" type="dvbisd:LongitudeType"/>
    <element name="Radius" type="dvbisd:RadiusType"/>
  </sequence>
</complexType>
<simpleType name="LatitudeType">
  <restriction base="double">
    <minInclusive value="-90.0"/>
    <maxInclusive value="90.0"/>
  </restriction>
</simpleType>
<simpleType name="LongitudeType">
  <restriction base="double">
    <minInclusive value="-180.0"/>

```



```

    <maxInclusive value="180.0"/>
  </restriction>
</simpleType>
<simpleType name="RadiusType">
  <restriction base="positiveInteger"/>
</simpleType>
<complexType name="LCNTableListType">
  <sequence>
    <element name="LCNTable" type="dvbisd:LCNTableType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="LCNTableType">
  <sequence>
    <element name="TargetRegion" type="dvbisd:RegionIdRefType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="SubscriptionPackage" type="dvbisd:SubscriptionPackageType" minOccurs="0"
      maxOccurs="unbounded"/>
    <element name="LCN" type="dvbisd:LCNTableEntryType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="LCNTableEntryType">
  <attribute name="channelNumber" type="positiveInteger" use="required"/>
  <attribute name="serviceRef" type="dvbisd:ServiceIdentifierType" use="required"/>
  <attribute name="selectable" type="boolean" default="true"/>
  <attribute name="visible" type="boolean" default="true"/>
</complexType>
<simpleType name="ServiceIdentifierType">
  <restriction base="anyURI"/>
</simpleType>
<complexType name="SubscriptionPackageType">
  <simpleContent>
    <extension base="mpeg7:TextualType"/>
  </simpleContent>
</complexType>
<complexType name="SubscriptionPackageListType">
  <sequence>
    <element name="SubscriptionPackage" type="dvbisd:SubscriptionPackageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="allowNoPackage" type="boolean" default="true"/>
</complexType>
<complexType name="DASHPlaylistType">
  <sequence>
    <element name="PlaylistEntry" type="anyURI" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="ExtensionBaseType" abstract="true">
  <attribute name="extensionName" use="required">
    <simpleType>
      <restriction base="string">
        <pattern value="[A-Za-z0-9][A-Za-z0-9:\-/\.]*[A-Za-z0-9]"/>
      </restriction>
    </simpleType>
  </attribute>
</complexType>
<complexType name="NVODType">
  <attribute name="mode" use="required">
    <simpleType>
      <restriction base="string">
        <enumeration value="reference"/>
        <enumeration value="timeshifted"/>

```

```

    </restriction>
  </simpleType>
</attribute>
<attribute name="reference" type="dvbisd:ServiceIdentifierType"/>
<attribute name="offset" default="PT0S">
  <simpleType>
    <restriction base="duration">
      <minInclusive value="PT0S"/>
    </restriction>
  </simpleType>
</attribute>
</complexType>
<!-- -->
<!-- TV-Anytime extended data types -->
<!-- -->
<complexType name="VideoAttributesType">
  <complexContent>
    <extension base="tva:VideoAttributesType">
      <sequence>
        <element name="Colorimetry" type="tva:ControlledTermType" minOccurs="0"/>
      </sequence>
    </extension>
  </complexContent>
</complexType>
<!-- -->
<!-- data types adapted from SDnS v1.4 -->
<!-- -->
<complexType name="DVBTripletType">
  <attribute name="origNetId" type="dvbisd:OrigNetId" use="optional"/>
  <attribute name="tsId" type="dvbisd:TSId" use="optional"/>
  <attribute name="serviceId" type="dvbisd:ServiceId" use="required"/>
</complexType>
<!-- -->
<!-- items adapted from OSDT v1.2.1 -->
<!-- -->
<complexType name="ContentAttributesType">
  <sequence>
    <element name="AudioAttributes" type="tva:AudioAttributesType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="AudioConformancePoint" type="tva:ControlledTermType" minOccurs="0" maxOccurs="unbounded">
      <annotation><documentation>The use of this element is deprecated</documentation></annotation>
    </element>
    <element name="VideoAttributes" type="dvbisd:VideoAttributesType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="VideoConformancePoint" type="tva:ControlledTermType" minOccurs="0"/>
    <element name="CaptionLanguage" type="tva:CaptionLanguageType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="SignLanguage" type="tva:SignLanguageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<!-- -->
<!-- items copied from SDnS v1.4 -->
<!-- -->
<simpleType name="DomainType">
  <restriction base="string">
    <pattern value="((.|\n|\r)*)?(\\.\\.|\n|\r)*"/>
  </restriction>
</simpleType>
<complexType name="McastType">
  <sequence minOccurs="0">
    <element name="FECBaseLayer" type="dvbisd:FECBaseLayerAddressType" minOccurs="0"/>

```

```

    <element name="FECEnhancementLayer" type="dvbisd:FECLayerAddressType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="CNAME" type="string" minOccurs="0"/>
    <element name="ssrc" type="unsignedInt" minOccurs="0"/>
    <element name="RTPRetransmission" type="dvbisd:RETInfoType" minOccurs="0"/>
  </sequence>
  <attributeGroup ref="dvbisd:MulticastAddressAttributes"/>
</complexType>
<complexType name="FECLayerAddressType">
  <attribute name="Address" type="dvbisd:IOrDomainType" use="optional"/>
  <attribute name="Source" type="dvbisd:IOrDomainType" use="optional"/>
  <attribute name="Port" type="unsignedShort" use="optional"/>
  <attribute name="MaxBitrate" type="positiveInteger" use="optional"/>
  <attribute name="RTSPControlURL" type="anyURI" use="optional"/>
  <attribute name="PayloadTypeNumber" type="unsignedInt" use="optional"/>
  <attribute name="TransportProtocol" type="dvbisd:TransportProtocolType" use="optional"/>
</complexType>
<complexType name="RETInfoType">
  <sequence>
    <element name="RTCPReporting" type="dvbisd:RTCPReportingType"/>
    <element name="UnicastRET" type="dvbisd:UnicastRETType" minOccurs="0"/>
    <element name="MulticastRET" type="dvbisd:MulticastRETType" minOccurs="0"/>
  </sequence>
</complexType>
<attributeGroup name="FECAAttributeGroupType">
  <attribute name="FECMaxBlockSize" type="unsignedShort" use="optional"/>
  <attribute name="FECMaxBlockTime" type="unsignedShort" use="optional"/>
  <attribute name="FECOTI" type="base64Binary" use="optional"/>
</attributeGroup>
<attributeGroup name="BasicMulticastAddressAttributesType">
  <attribute name="Source" type="dvbisd:IOrDomainType" use="optional"/>
  <attribute name="Address" type="dvbisd:IOrDomainType" use="required"/>
  <attribute name="Port" type="unsignedShort" use="required"/>
</attributeGroup>
<attributeGroup name="MulticastAddressAttributes">
  <attributeGroup ref="dvbisd:BasicMulticastAddressAttributesType"/>
  <attribute name="Streaming" type="dvbisd:StreamingType" use="optional"/>
  <attributeGroup ref="dvbisd:FECAAttributeGroupType"/>
</attributeGroup>
<simpleType name="IOrDomainType">
  <annotation>
    <documentation xml:lang="en">union of DomainType and IPType</documentation>
  </annotation>
  <union memberTypes="dvbisd:IPType dvbisd:DomainType"/>
</simpleType>
<simpleType name="StreamingType">
  <restriction base="string">
    <enumeration value="rtp"/>
    <enumeration value="udp"/>
  </restriction>
</simpleType>
<simpleType name="TransportProtocolType">
  <restriction base="string">
    <enumeration value="RTP-AVP"/>
    <enumeration value="UDP-FEC"/>
  </restriction>
</simpleType>
<complexType name="RTCPReportingType">
  <attribute name="DestinationAddress" type="string" use="required"/>

```

```

<attribute name="DestinationPort" type="unsignedShort" use="optional"/>
<attribute name="dvb-t-ret" type="positiveInteger" use="optional"/>
<attribute name="rtcp-bandwidth" type="positiveInteger" use="optional"/>
<attribute name="rtcp-rsize" type="positiveInteger" use="optional"/>
<attribute name="trr-int" type="positiveInteger" use="optional"/>
<attribute name="dvb-disable-rtcp-rr" type="boolean" use="optional" default="false"/>
<attribute name="dvb-enable-byte" type="boolean" use="optional" default="false"/>
<attribute name="dvb-t-wait-min" type="unsignedInt" use="optional" default="0"/>
<attribute name="dvb-t-wait-max" type="unsignedInt" use="optional" default="0"/>
<attribute name="dvb-ssrc-bitmask" type="dvbisd:Hexadecimal32bit" use="optional" default="ffffffff"/>
<attribute name="dvb-rsi-mc-ret" type="boolean" use="optional"/>
<attribute name="dvb-ssrc-upstream-client" type="positiveInteger" use="optional"/>
</complexType>
<simpleType name="Hexadecimal32bit">
  <restriction base="string">
    <pattern value="&Hex32;"/>
  </restriction>
</simpleType>
<simpleType name="Hexadecimal16bit">
  <restriction base="string">
    <pattern value="&Hex16;"/>
  </restriction>
</simpleType>
<simpleType name="Hexadecimal8bit">
  <restriction base="string">
    <pattern value="&Hex8;"/>
  </restriction>
</simpleType>
<complexType name="UnicastRETType">
  <attribute name="trr-int" type="unsignedInt" use="optional"/>
  <attribute name="DestinationPort-ForRTCPReporting" type="unsignedInt" use="optional"/>
  <attribute name="SourcePort" type="unsignedInt" use="optional"/>
  <attribute name="RTSPControlURL" type="anyURI" use="optional"/>
  <attributeGroup ref="dvbisd:CommonCastRETType"/>
</complexType>
<complexType name="MulticastRETType">
  <attribute name="SourceAddress" type="string" use="optional"/>
  <attribute name="GroupAddress" type="string" use="required"/>
  <attributeGroup ref="dvbisd:CommonCastRETType"/>
</complexType>
<attributeGroup name="CommonCastRETType">
  <attribute name="ssrc" type="unsignedInt" use="optional"/>
  <attribute name="RTPPayloadTypeNumber" type="unsignedInt" use="optional"/>
  <attribute name="dvb-original-copy-ret" type="boolean" use="optional"/>
  <attribute name="rtcp-mux" type="boolean" use="optional" default="false"/>
  <attribute name="DestinationPort" type="unsignedInt" use="optional"/>
  <attribute name="rtx-time" type="unsignedInt" use="required"/>
</attributeGroup>
<complexType name="RTSPURLType">
  <simpleContent>
    <extension base="dvbisd:RTSP">
      <attribute name="RTSPControlURL" type="anyURI" use="optional"/>
    </extension>
  </simpleContent>
</complexType>
<simpleType name="RTSP">
  <restriction base="anyURI">
    <pattern value="rtsp://.*"/>
  </restriction>

```

```

</simpleType>
<simpleType name="OrigNetId">
  <annotation>
    <documentation xml:lang="en">
      A unique identifier of a network. This is managed by DVB through ETSI
    </documentation>
  </annotation>
  <restriction base="unsignedShort"/>
</simpleType>
<simpleType name="TSId">
  <annotation>
    <documentation xml:lang="en">
      A number used to identify Transport Stream within an original_network.
    </documentation>
  </annotation>
  <restriction base="unsignedShort"/>
</simpleType>
<simpleType name="ServiceId">
  <annotation>
    <documentation xml:lang="en">
      A number used to identify a service within a Transport Stream.
    </documentation>
  </annotation>
  <restriction base="unsignedShort"/>
</simpleType>
<!-- -->
<!-- items copied from SDNS v2.1 -->
<!-- -->
<simpleType name="IPType">
  <annotation>
    <documentation xml:lang="en">union of IPv4Type and IPv6Type</documentation>
  </annotation>
  <union memberTypes="dvbisd:IPv4Type dvbisd:IPv6Type"/>
</simpleType>
<simpleType name="IPv4Type">
  <annotation>
    <documentation xml:lang="en">
      Regular expressions in pattern values for type define compatible address
      structures for IPv4 syntax
    </documentation>
  </annotation>
  <restriction base="string">
    <pattern value="&IPv4address;"/>
  </restriction>
</simpleType>
<simpleType name="IPv6Type">
  <annotation>
    <documentation xml:lang="en">
      Regular expressions in pattern values for type define compatible address
      structures IPv6 syntax
    </documentation>
  </annotation>
  <restriction base="string">
    <pattern value="/^\\s*((&Hex16;){7}(&Hex16;|:))|
      ((&Hex16;){6}(:&Hex16;|&IPv4Address;|:))|
      ((&Hex16;){5}(((&Hex16;){1,2})|:&IPv4Address;|:))|
      ((&Hex16;){4}(((&Hex16;){1,3})|((:&Hex16;)?&IPv4Address;|:))|
      ((&Hex16;){3}(((&Hex16;){1,4})|((:&Hex16;){0,2}&IPv4Address;|:))|
      ((&Hex16;){2}(((&Hex16;){1,5})|((:&Hex16;){0,3}&IPv4Address;|:))|

```

```

((&Hex16;:){1}(((&Hex16;){1,6})|((&Hex16;){0,4}&IPv4Address;)|:))|
(:(((&Hex16;){1,7})|((&Hex16;){0,5}&IPv4Address;)|:)))((%.+)?\s*$"/>
</restriction>
</simpleType>
<!-- -->
<!-- items copied from OSDT v1.2.1 -->
<!-- -->
<complexType name="ExtendedURIType">
  <sequence>
    <element name="URI" type="anyURI"/>
  </sequence>
  <attribute name="contentType" type="mpeg7:mimeType" use="required"/>
</complexType>
</schema>

```

A.2 DVB-I Service List Discovery schema

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:dvbisd="urn:dvb:metadata:servicelistdiscovery:2023"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2023" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
targetNamespace="urn:dvb:metadata:servicelistdiscovery:2023" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2023" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.xsd"/>
  <import namespace="urn:dvb:metadata:servicediscovery:2023" schemaLocation="dvbi_v5.0.xsd"/>
  <import namespace="http://www.w3.org/XML/1998/namespace" schemaLocation="xml.xsd"/>
  <element name="ServiceListEntryPoints" type="dvbisd:ServiceListEntryPointsType"/>
  <complexType name="ServiceListEntryPointsType">
    <sequence>
      <element name="ServiceListRegistryEntity" type="dvbisd:OrganizationType"/>
      <element name="ProviderOffering" type="dvbisd:ProviderOfferingType" minOccurs="0" maxOccurs="unbounded"/>
      <element name="Extension" type="dvbisd:ExtensionBaseType" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
    <attribute ref="xml:lang" use="required"/>
  </complexType>
  <complexType name="OrganizationType">
    <complexContent>
      <extension base="mpeg7:AgentType">
        <sequence>
          <element name="Name" maxOccurs="unbounded">
            <complexType>
              <complexContent>
                <extension base="mpeg7:TextualType">
                  <attribute name="type" use="optional">
                    <simpleType>
                      <restriction base="NMTOKEN">
                        <enumeration value="former"/>
                        <enumeration value="variant"/>
                        <enumeration value="main"/>
                      </restriction>
                    </simpleType>
                  </attribute>
                </extension>
              </complexContent>
            </complexType>
          </element>
          <element name="Kind" type="mpeg7:TermUseType" minOccurs="0"/>

```

```

        <element name="ContactName" type="mpeg7:PersonNameType" minOccurs="0"/>
        <element name="Jurisdiction" type="mpeg7:PlaceType" minOccurs="0"/>
        <element name="Address" type="mpeg7:PlaceType" minOccurs="0"/>
        <element name="ElectronicAddress" type="mpeg7:ElectronicAddressType" minOccurs="0"/>
    </sequence>
    <attribute name="regulatorFlag" type="boolean" default="false"/>
</extension>
</complexContent>
</complexType>
<complexType name="ProviderOfferingType">
    <sequence>
        <element name="Provider" type="dvbisd:OrganizationType"/>
        <element name="ServiceListOffering" type="dvbisd:ServiceListOfferingType" maxOccurs="unbounded"/>
    </sequence>
    <attribute ref="xml:lang"/>
</complexType>
<complexType name="ServiceListOfferingType">
    <sequence>
        <element name="ServiceListName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
        <element name="ServiceListURI" type="dvbisd:ExtendedURIType" maxOccurs="unbounded"/>
        <element name="Delivery" type="dvbisd:DeliveryType"/>
        <element name="Language" type="tva:AudioLanguageType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="Genre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="TargetCountry" type="tva:ISO-3166-List" minOccurs="0" maxOccurs="unbounded"/>
        <element name="RelatedMaterial" type="tva:RelatedMaterialType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="SRSSupport" minOccurs="0">
            <complexType>
                <attribute name="postcode" type="boolean" default="false"/>
                <attribute name="regionId" type="boolean" default="false"/>
                <attribute name="receivedMultiplex" type="boolean" default="false"/>
            </complexType>
        </element>
    </sequence>
    <attribute name="regulatorListFlag" type="boolean" default="false"/>
    <attribute ref="xml:lang"/>
</complexType>
<complexType name="DeliveryType">
    <sequence>
        <element name="DASHDelivery" type="dvbisd:NoAdditionalIPParametersType" minOccurs="0"/>
        <element name="DVBTDelivery" type="dvbisd:DVBTDeliveryType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="DVBCDelivery" type="dvbisd:DVBCDeliveryType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="DVBSDelivery" type="dvbisd:DVBSDeliveryType" minOccurs="0" maxOccurs="unbounded"/>
        <element name="RTSPDelivery" type="dvbisd:NoAdditionalIPParametersType" minOccurs="0"/>
        <element name="MulticastTSDelivery" type="dvbisd:NoAdditionalIPParametersType" minOccurs="0"/>
        <element name="ApplicationDelivery" type="dvbisd:ApplicationTypeListType" minOccurs="0"/>
        <element name="OtherDeliveryParameters" type="dvbisd:ExtensionBaseType" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
</complexType>
<complexType name="AbstractDeliveryType" abstract="true">
    <attribute name="required" type="boolean" default="false"/>
</complexType>
<complexType name="AbstractIPDeliveryType" abstract="true">
    <complexContent>
        <extension base="dvbisd:AbstractDeliveryType">
            <attribute name="minimumBitRate" type="unsignedInt"/>
        </extension>
    </complexContent>
</complexType>
<complexType name="NoAdditionalIPParametersType">

```

```

<complexContent>
  <extension base="dvbisd:AbstractIPDeliveryType">
    <!-- no additional elements or attributes -->
  </extension>
</complexContent>
</complexType>
<complexType name="DVBTDeliveryType">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <attribute name="originalNetworkID" type="dvbisd:NetworkIDType" use="optional"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="DVBCDeliveryType">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <attribute name="networkID" type="dvbisd:NetworkIDType" use="required"/>
    </extension>
  </complexContent>
</complexType>
<complexType name="DVBSDeliveryType">
  <complexContent>
    <extension base="dvbisd:AbstractDeliveryType">
      <sequence>
        <element name="OrbitalPosition" type="dvbisd:LongitudeType" maxOccurs="unbounded"/>
      </sequence>
      <attribute name="originalNetworkID" type="dvbisd:NetworkIDType" use="optional">
        <annotation>
          <documentation>The use of this attribute is deprecated.</documentation>
        </annotation>
      </attribute>
    </extension>
  </complexContent>
</complexType>
<complexType name="ApplicationTypeListType">
  <sequence>
    <element name="ApplicationType" type="dvbisd:ApplicationType" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<complexType name="ApplicationType">
  <attribute name="contentType" type="mpeg7:mimeType" use="required"/>
  <attribute name="xmlAitApplicationType" type="mpeg7:mimeType"/>
</complexType>
</schema>

```


Annex B (normative): Electronic Attachments

The present document includes the following electronic attachments contained in archive A177r3-electronic-attachments.zip which accompanies the present document:

- dvbi_service_list_discovery_v1.5.xsd - The service list discovery schema (see clause 5.1.3) as shown in clause A.2
- dvbi_v5.0.xsd - The service list schema (see clauses 5.4 and 5.5) as shown in clause A.1
- DVBColorimetryCS-2020.xml - Defines terms representing the colorimetry used in a service or program (see clause D.6)
- DVBContentSubjectCS-2019.xml - Additional service or programme genres (see clause D.5)
- DVBHowRelatedCS-2021.xml - Defines terms used in HowRelated elements (see clause D.1)
- DVBLinkedApplicationCS-2019.xml - Defines the application launching methods (see clause D.2)
- DVBRecordingInfoCS-2019.xml - Defines the time-shift or recording options available (see clause D.3)
- DVBServiceTypeCS-2019.xml - Defines the identifiers for the representation of a service (see clause D.4)
- tva_metadata_3-1.xsd - TV-Anytime schema
- tva_mpeg7.xsd - TV-Anytime profile of MPEG-7 schema
- examples/Box Set Categories Response.xml - Example of a response from the Content Guide Server to a Box Set Categories request (see clauses 6.8.2.2 and 6.8.2.3)
- examples/Box Set Contents Response.xml - Example of a response from the Content Guide Server to a Box Set Contents request (see clauses 6.8.4.2 and 6.8.4.3)
- examples/Box Set Lists Response.xml - Example of a response from the Content Guide Server to a Box Set Lists request (see clauses 6.8.3.2 and 6.8.3.3)
- examples/Content Guide Source.xml - Example of Content Guide Server endpoints in a minimal service list (see clause 6.4)
- examples/Detailed Program Information Response.xml - Example of a response from the Content Guide Server to a Programme Information request (see clause 6.6)
- examples/Italy Regional Inserts.xml - Example service list with broadcast content supplemented with regional broadband delivery at certain times
- examples/More Episodes Response.xml - Example of a response from the Content Guide Server to a More Episodes request (see clause 6.7)
- examples/Playlist.xml - Example MPD playlist when the DASH Delivery Type is signalled as application/xml
- examples/Regions (Range and Postcode).xml - Example region definitions using individual postcodes and ranges of postcodes
- examples/Regions (Range and Wildcard).xml - Example region definitions using ranges of postcodes and wildcarded postcodes (see clause 5.6)
- examples/SAT-IP.xml - Example service list contain SAT>IP delivery parameters (see clause 5.5.18.7)

- `examples/Schedule NowNext Response.xml` - Example of a response from the Content Guide Server to a Now/Next Filtered Schedule request (see clause 6.5.3)
- `examples/Schedule NowNext Window Response.xml` - Example of a response from the Content Guide Server to a Now/Next Window Filtered Schedule request (see clause 6.5.3)
- `examples/Schedule Response.xml` - Example of a response from the Content Guide Server to a Timestamp Filtered Schedule request (see clause 6.5.2)
- `examples/Service List Registry Response (DE or AT and English).xml` - Example service list registry response for German and Austrian service lists with English language services (see clause 5.1.3)
- `examples/Service List Registry Response (error).xml` - Example service list registry response where no service lists match the query (see clause 5.1.3)
- `examples/Service List Registry Response (IT and Regulated).xml` - Example service list registry response for the Italian regulated service list (see clause 5.1.3)
- `examples/Service List Registry Response (IT, Regulated, DVB-T).xml` - Example service list registry response for the Italian terrestrial regulated service list (see clause 5.1.3)

Annex C (informative): Examples

C.1 Regional Inserts

Use case: a broadcast service (e.g. DVB-S) carries national content for most of the day, and regional content during regular daily time windows. Instead of broadcasting all regional variants, the regional contents are delivered as DVB-DASH services, allowing the DVB-I client to replace the national broadcast content during those time windows.

```
<?xml version="1.0" encoding="UTF-8"?>
<ServiceList version="1" xml:lang="en" xmlns="urn:dvb:metadata:servicediscovery:2023"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2023 ../dvbi_v5.0.xsd">
  <Name>Italian public broadcasting company 3 example</Name>
  <ProviderName>Italian public broadcasting company</ProviderName>
  <RegionList Version="1">
    <Region countryCodes="ITA" regionID="Italy">
      <Region regionID="Piemonte">
        <RegionName>Piemonte</RegionName>
        <PostcodeRange from="15010" to="15122"/>
        <PostcodeRange from="14010" to="14100"/>
        <PostcodeRange from="13811" to="13900"/>
        <PostcodeRange from="12010" to="12025"/>
        <PostcodeRange from="28010" to="28100"/>
        <PostcodeRange from="10100" to="10156"/>
        <PostcodeRange from="28801" to="28925"/>
        <PostcodeRange from="13010" to="13100"/>
      </Region>
      <Region regionID="Lombardia">
        <RegionName>Lombardia</RegionName>
        <PostcodeRange from="24010" to="24129"/>
        <PostcodeRange from="25010" to="25136"/>
        <PostcodeRange from="22010" to="22100"/>
        <PostcodeRange from="26010" to="26100"/>
        <PostcodeRange from="23801" to="23900"/>
        <PostcodeRange from="26811" to="26900"/>
        <PostcodeRange from="46010" to="46100"/>
        <PostcodeRange from="20010" to="20162"/>
        <PostcodeRange from="20811" to="20900"/>
        <PostcodeRange from="27010" to="27100"/>
        <PostcodeRange from="23010" to="23100"/>
      </Region>
    </Region>
  </RegionList>
  <LCNTableList>
    <LCNTable>
      <TargetRegion>Piemonte</TargetRegion>
      <LCN channelNumber="3" serviceRef="tag:rai.it,2019:rai-3-piemonte"/>
    </LCNTable>
    <LCNTable>
      <TargetRegion>Lombardia</TargetRegion>
      <LCN channelNumber="3" serviceRef="tag:rai.it,2019:rai-3-lombardia"/>
    </LCNTable>
  </LCNTableList>
</ServiceList>
```

```

<Service version="1">
  <UniqueIdentifier>tag:rai.it,2019:rai-3-piemonte</UniqueIdentifier>
  <ServiceInstance priority="2">
    <DVBSDeliveryParameters>
      <DVBTripIet origNetId="318" tsId="5200" serviceId="3403"/>
      <OrbitalPosition>-5</OrbitalPosition>
      <Frequency>11179</Frequency>
      <Polarization>vertical</Polarization>
    </DVBSDeliveryParameters>
  </ServiceInstance>
  <ServiceInstance priority="1">
    <DisplayName>Rai 3 Regional Piemonte</DisplayName>
    <Availability>
      <Period>
        <Interval startTime="17:30:00Z" endTime="18:00:00Z" days="1 2 3 4 5 6 7"/>
      </Period>
    </Availability>
    <DASHDeliveryParameters>
      <UriBasedLocation contentType="application/dash+xml">
        <URI>https://www.raipIay.it/dvbi/mpd/rai3_tgr_piemonte.mpd</URI>
      </UriBasedLocation>
    </DASHDeliveryParameters>
  </ServiceInstance>
  <ServiceName>Rai 3</ServiceName>
  <ProviderName>Italian public broadcasting company</ProviderName>
</Service>
<Service version="1">
  <UniqueIdentifier>tag:rai.it,2019:rai-3-lombardia</UniqueIdentifier>
  <ServiceInstance priority="2">
    <DVBSDeliveryParameters>
      <DVBTripIet origNetId="318" tsId="5200" serviceId="3403"/>
    </DVBSDeliveryParameters>
  </ServiceInstance>
  <ServiceInstance priority="1">
    <DisplayName>Rai 3 Regional Lombardia</DisplayName>
    <Availability>
      <Period>
        <Interval startTime="17:30:00Z" endTime="18:00:00Z" days="1 2 3 4 5 6 7"/>
      </Period>
    </Availability>
    <DASHDeliveryParameters>
      <UriBasedLocation contentType="application/dash+xml">
        <URI>https://www.raipIay.it/dvbi/mpd/rai3_tgr_lombardia.mpd</URI>
      </UriBasedLocation>
    </DASHDeliveryParameters>
  </ServiceInstance>
  <ServiceName>Rai 3</ServiceName>
  <ProviderName>Italian public broadcasting company</ProviderName>
</Service>
</ServiceList>

```

C.2 SAT>IP

The following example shows a service list with one region definition "Saarland" in Germany. The Region is defined via a list of postcodes and postcode ranges. The LCN entry for one service and the region Saarland is 1.

There is one service entry, whose service name is "Das Erste" with 3 service instances:

- Instance 1
 - DVB-S/S2 in HD (highest priority)
 - This instance carries the attributes AC3 for audio and H264 for Video
 - The Displayed Name is "Das Erste HD"
 - SATIPDeliveryParameters are included
- Instance 2
 - DVB-S in SD
 - This instance has the attributes MPEG-1 Layer II for audio and MPEG-2 for Video
 - The Displayed Name is "Das Erste"
 - SATIPDeliveryParameters are included
- Instance 3
 - DASH Delivery in SD (DVB-I DASH)
 - The Displayed Name is "Das Erste"

```
<?xml version="1.0" encoding="UTF-8"?>
<ServiceList version="1" xml:lang="en" xmlns="urn:dvb:metadata:servicediscovery:2023"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2023 ../dvbi_v5.0.xsd"
xmlns:tva="urn:tva:metadata:2023">
  <Name>Germany FTA Example</Name>
  <ProviderName>SES</ProviderName>
  <RegionList version="1">
    <Region countryCodes="DEU" regionID="Deutschland">
      <Region regionID="Saarland">
        <PostcodeRange from="66111" to="66133"/>
        <Postcode>66265</Postcode>
        <Postcode>66271</Postcode>
        <Postcode>66280</Postcode>
        <Postcode>66287</Postcode>
        <Postcode>66292</Postcode>
        <Postcode>66299</Postcode>
        <Postcode>66333</Postcode>
        <Postcode>66346</Postcode>
        <Postcode>66352</Postcode>
        <Postcode>66359</Postcode>
        <Postcode>66386</Postcode>
        <Postcode>66399</Postcode>
        <Postcode>66424</Postcode>
        <Postcode>66440</Postcode>
        <Postcode>66450</Postcode>
        <Postcode>66453</Postcode>
```

```

    <Postcode>66459</Postcode>
    <PostcodeRange from="66538" to="66540"/>
    <Postcode>66557</Postcode>
    <Postcode>66564</Postcode>
    <Postcode>66571</Postcode>
    <Postcode>66578</Postcode>
    <Postcode>66583</Postcode>
    <Postcode>66589</Postcode>
    <Postcode>66606</Postcode>
    <Postcode>66620</Postcode>
    <Postcode>66625</Postcode>
    <Postcode>66629</Postcode>
    <Postcode>66636</Postcode>
    <Postcode>66640</Postcode>
    <Postcode>66646</Postcode>
    <Postcode>66649</Postcode>
    <Postcode>66663</Postcode>
    <Postcode>66679</Postcode>
    <Postcode>66687</Postcode>
    <Postcode>66693</Postcode>
    <Postcode>66701</Postcode>
    <Postcode>66706</Postcode>
    <Postcode>66709</Postcode>
    <Postcode>66740</Postcode>
    <Postcode>66763</Postcode>
    <Postcode>66773</Postcode>
    <Postcode>66780</Postcode>
    <Postcode>66787</Postcode>
    <Postcode>66793</Postcode>
    <Postcode>66798</Postcode>
    <Postcode>66802</Postcode>
    <Postcode>66806</Postcode>
    <Postcode>66809</Postcode>
    <Postcode>66822</Postcode>
    <Postcode>66839</Postcode>
  </Region>
</Region>
</RegionList>
<LCNTableList>
  <LCNTable>
    <TargetRegion>Deutschland</TargetRegion>
    <LCN channelNumber="1" serviceRef="tag:daserste.de,2019:DasErste"/>
  </LCNTable>
  <LCNTable>
    <TargetRegion>Saarland</TargetRegion>
    <LCN channelNumber="1" serviceRef="tag:daserste.de,2019:DasErste"/>
  </LCNTable>
</LCNTableList>
<Service version="1">
  <UniqueIdentifier>tag:daserste.de,2019:DasErste</UniqueIdentifier>
  <ServiceInstance priority="1">
    <DisplayName>Das Erste HD</DisplayName>
    <ContentAttributes>
      <AudioAttributes>
        <tva:Coding href="urn:dvb:metadata:cs:AudioCodecCS:2007:3.1">
          <tva:Name>AC3</tva:Name>

```

```

        </tva:Coding>
    </AudioAttributes>
    <VideoAttributes>
        <tva:Coding href="urn:dvb:metadata:cs:VideoCodecCS:2007:1.4.12">
            <tva:Name>H264 High Profile @ Level 4.0</tva:Name>
        </tva:Coding>
    </VideoAttributes>
</ContentAttributes>
<DVBSDeliveryParameters>
    <DVBTripLet origNetId="1" tsId="1019" serviceId="10301"/>
    <OrbitalPosition>19.2</OrbitalPosition>
    <Frequency>11494</Frequency>
    <Polarization>horizontal</Polarization>
</DVBSDeliveryParameters>
<SATIPDeliveryParameters>
    <QueryParameters>
        freq=11494&pol=h&ro=0.35&msys=dvbs2&mtype=8psk&plts=on&
        sr=22000&fec=23&pids=0,17,18,5100,5101,5102,5104
    </QueryParameters>
</SATIPDeliveryParameters>
</ServiceInstance>
<ServiceInstance priority="2">
    <DisplayName>Das Erste</DisplayName>
    <ContentAttributes>
        <AudioAttributes>
            <tva:Coding href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2">
                <tva:Name>MPEG-1 Audio Layer II</tva:Name>
            </tva:Coding>
        </AudioAttributes>
        <AudioAttributes>
            <tva:Coding href="urn:dvb:metadata:cs:AudioCodecCS:2007:3.1">
                <tva:Name>AC3</tva:Name>
            </tva:Coding>
        </AudioAttributes>
        <VideoAttributes>
            <tva:Coding href="urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:2.2.2">
                <tva:Name>MPEG-2 Video Main Profile @ Main Level</tva:Name>
            </tva:Coding>
        </VideoAttributes>
    </ContentAttributes>
    <DVBSDeliveryParameters>
        <DVBTripLet origNetId="1" tsId="1101" serviceId="28106"/>
        <OrbitalPosition>19.2</OrbitalPosition>
        <Frequency>1183600</Frequency>
        <Polarization>horizontal</Polarization>
    </DVBSDeliveryParameters>
    <SATIPDeliveryParameters>
        <QueryParameters>
            freq=11836&pol=h&ro=0.35&msys=dvbs&mtype=8psk&plts=off
            &sr=27500&fec=34&pids=0,17,18,100,101,102,104
        </QueryParameters>
    </SATIPDeliveryParameters>
</ServiceInstance>
<ServiceInstance priority="3">
    <DisplayName>Das Erste</DisplayName>
    <DASHDeliveryParameters>

```

```

        <UriBasedLocation contentType="application/dash+xml">
            <URI>https://live.daserste.de/0001-Das%20Erste.mpd</URI>
        </UriBasedLocation>
    </DASHDeliveryParameters>
</ServiceInstance>
<ServiceName>Das Erste</ServiceName>
<ProviderName>ARD</ProviderName>
<ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
</Service>
</ServiceList>

```

C.3 Content Guide Source

```

<?xml version="1.0" encoding="UTF-8"?>
<ServiceList xmlns="urn:dvb:metadata:servicediscovery:2023" version="1" xml:lang="en"
  xmlns:tva="urn:tva:metadata:2023" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2023 ../dvbi_v5.0.xsd
    urn:tva:metadata:2023 ../tva_metadata_3-1.xsd">
  <Name xml:lang="en">Content Guide Source example</Name>
  <ProviderName xml:lang="en">Content Guide Source</ProviderName>
  <ContentGuideSourceList>
    <ContentGuideSource CGSID="cgs-dvbi-01">
      <Name xml:lang="en">A-Z Content Guide</Name>
      <ProviderName xml:lang="en">A-Z Metadata</ProviderName>
      <RelatedMaterial>
        <tva:HowRelated href="urn:dvb:metadata:cs:HowRelatedCS:2021:1002.1"/>
        <tva:MediaLocator>
          <tva:MediaUri contentType="image/png">
            https://cgs.az.metadata/static/logo.png
          </tva:MediaUri>
        </tva:MediaLocator>
      </RelatedMaterial>
      <ScheduleInfoEndpoint contentType="application/xml">
        <URI>https://cgs.az.metadata/schedule</URI>
      </ScheduleInfoEndpoint>
      <ProgramInfoEndpoint contentType="application/xml">
        <URI>https://cgs.az.metadata/program</URI>
      </ProgramInfoEndpoint>
      <GroupInfoEndpoint contentType="application/xml">
        <URI>https://cgs.az.metadata/group</URI>
      </GroupInfoEndpoint>
    </ContentGuideSource>
  </ContentGuideSourceList>
</ServiceList>

```

C.4 Responses to queries to a Service List Registry for service list discovery

Example of response to query:

<https://csr.dvbservices.com/query?TargetCountry=ITA®ulatorListFlag=true>


```

<?xml version="1.0" encoding="UTF-8"?>
<!-- Example of response to query:
https://csr.dvbservices.com/query?TargetCountry=ITA&regulatorListFlag=true -->
<ServiceListEntryPoints xml:lang="en" xmlns="urn:dvb:metadata:servicelistdiscovery:2023"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2023
../dvbi_service_list_discovery_v1.5.xsd">
  <ServiceListRegistryEntity regulatorFlag="true">
    <Name>DVB Services Sàrl</Name>
    <Address>
      <mpeg7:Name>John Doe</mpeg7:Name>
      <mpeg7:PostalAddress>
        <mpeg7:AddressLine>Geneva, Switzerland</mpeg7:AddressLine>
      </mpeg7:PostalAddress>
    </Address>
    <ElectronicAddress>
      <mpeg7:Telephone>+41 22 0000000</mpeg7:Telephone>
      <mpeg7:Email>dvbi_csr@dvbservices.com</mpeg7:Email>
      <mpeg7:Url>csr.dvbservices.com</mpeg7:Url>
    </ElectronicAddress>
  </ServiceListRegistryEntity>
  <ProviderOffering>
    <Provider>
      <Name>AGCOM</Name>
      <Address>
        <mpeg7:Name>John Doe</mpeg7:Name>
        <mpeg7:PostalAddress>
          <mpeg7:AddressLine>Roma, Italy</mpeg7:AddressLine>
        </mpeg7:PostalAddress>
      </Address>
      <ElectronicAddress>
        <mpeg7:Telephone>+39 06 0000000</mpeg7:Telephone>
        <mpeg7:Email>dvbi@agcom.it</mpeg7:Email>
      </ElectronicAddress>
    </Provider>
    <ServiceListOffering regulatorListFlag="true">
      <ServiceListName>Italian Trusted Services</ServiceListName>
      <ServiceListURI contentType="application/vnd.dvb.dvbisl+xml">
        <dvbisd:URI>https://dvbi.italian-authority.it/trusted-services-dtt.xml</dvbisd:URI>
      </ServiceListURI>
      <Delivery>
        <DASHDelivery/>
        <DVBTDelivery required="true"/>
      </Delivery>
      <Language>it</Language>
      <TargetCountry>ITA</TargetCountry>
    </ServiceListOffering>
    <ServiceListOffering regulatorListFlag="true">
      <ServiceListName>Italian Trusted Services</ServiceListName>
      <ServiceListURI contentType="application/vnd.dvb.dvbisl+xml">
        <dvbisd:URI>https://dvbi.italian-authority.it/trusted-services-dth.xml</dvbisd:URI>
      </ServiceListURI>
      <Delivery>
        <DASHDelivery/>
        <DVBSDelivery required="true">
          <OrbitalPosition>13.7</OrbitalPosition>
        </DVBSDelivery>
      </Delivery>
    </ServiceListOffering>
  </ProviderOffering>
</ServiceListEntryPoints>

```

```

        </DVBSDelivery>
    </Delivery>
    <Language>it</Language>
    <TargetCountry>ITA</TargetCountry>
</ServiceListOffering>
</ProviderOffering>
</ServiceListEntryPoints>

```

Example of response to query:

[https://private-slr.com/query?TargetCountry\[\]=DEU&TargetCountry\[\]=AUT&Language=en](https://private-slr.com/query?TargetCountry[]=DEU&TargetCountry[]=AUT&Language=en)

```

<?xml version="1.0" encoding="UTF-8"?>
<!-- Example of response to query: https://dvb.isr.private-service-list-
registry.com/query?TargetCountry%20in%20(DE%2CAT)&Language=en -->
<ServiceListEntryPoints xml:lang="en" xmlns="urn:dvb:metadata:servicelistdiscovery:2023"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2023
../dvbi_service_list_discovery_v1.5.xsd">
    <ServiceListRegistryEntity>
        <Name>A Private Service List Registry</Name>
        <ElectronicAddress>
            <mpeg7:Email>info@private-service-list-registry.com</mpeg7:Email>
            <mpeg7:Url>dvb.isr.private-service-list-registry.com</mpeg7:Url>
        </ElectronicAddress>
    </ServiceListRegistryEntity>
    <ProviderOffering>
        <Provider>
            <Name>TVfromTheWorld</Name>
            <Address>
                <mpeg7:Name>John Doe</mpeg7:Name>
                <mpeg7:PostalAddress>
                    <mpeg7:AddressLine>U.S.</mpeg7:AddressLine>
                </mpeg7:PostalAddress>
            </Address>
            <ElectronicAddress>
                <mpeg7:Telephone>+1 555 0000000</mpeg7:Telephone>
                <mpeg7:Email>dvbi_lists@TVfromTheWorld.com</mpeg7:Email>
            </ElectronicAddress>
        </Provider>
        <ServiceListOffering>
            <ServiceListName xml:lang="en">TV services from the world in English</ServiceListName>
            <ServiceListName xml:lang="de">Fernsehen aus der Welt in Englisch</ServiceListName>
            <ServiceListName xml:lang="fr">Télévision du monde en anglais</ServiceListName>
            <ServiceListName xml:lang="it">TV del mondo in inglese</ServiceListName>
            <ServiceListURI contentType="application/vnd.dvb.dvbi+xml">
                <dvbisd:URI>https://dvbi.TVfromTheWorld.com/engTVservices.xml</dvbisd:URI>
            </ServiceListURI>
            <Delivery>
                <DASHDelivery required="true"/>
            </Delivery>
            <Language>en</Language>
            <!-- Assumption: if TargetCountry is not specified, the service list is assumed to be
                targeted to any country -->
        </ServiceListOffering>
    </ServiceListOffering>

```

```

<ServiceListName xml:lang="de">TV aus Deutschland</ServiceListName>
<ServiceListName xml:lang="en">TV from Germany</ServiceListName>
<ServiceListURI contentType="application/vnd.dvb.dvbisl+xml">
  <dvbisd:URI>https://dvbi.TVfromTheWorld.com/TVservices_Germany.xml</dvbisd:URI>
</ServiceListURI>
<Delivery>
  <DASHDelivery required="true"/>
</Delivery>
<Language>de</Language>
<Language>en</Language>
<TargetCountry>DEU</TargetCountry>
</ServiceListOffering>
</ProviderOffering>
<ProviderOffering>
  <Provider>
    <Name>British DVB-I</Name>
    <Address>
      <mpeg7:Name>John Doe</mpeg7:Name>
      <mpeg7:PostalAddress>
        <mpeg7:AddressLine>London, UK</mpeg7:AddressLine>
      </mpeg7:PostalAddress>
    </Address>
    <ElectronicAddress>
      <mpeg7:Telephone>+44 020 00000000</mpeg7:Telephone>
      <mpeg7:Email>dvbi@british-service-list-provider.co.uk</mpeg7:Email>
    </ElectronicAddress>
  </Provider>
  <ServiceListOffering>
    <ServiceListName>Documentaries</ServiceListName>
    <ServiceListURI contentType="application/vnd.dvb.dvbisl+xml">
      <dvbisd:URI>
        https://www.british-service-list-provider.co.uk/documentaries.xml
      </dvbisd:URI>
    </ServiceListURI>
    <ServiceListURI contentType="application/vnd.dvb.dvbisl+xml">
      <dvbisd:URI>
        https://alt.british-service-list-provider.co.uk/documentaries.xml
      </dvbisd:URI>
    </ServiceListURI>
    <Delivery>
      <DASHDelivery required="true" minimumBitRate="1572842"/>
      <ApplicationDelivery required="true">
        <ApplicationType contentType="application/vnd.dvb.ait+xml"
          xmlAitApplicationType="application/vnd.hbbtv.xhtml+xml"/>
      </ApplicationDelivery>
    </Delivery>
    <Language>en</Language>
    <TargetCountry>GBR</TargetCountry>
    <TargetCountry>FRA</TargetCountry>
    <TargetCountry>ITA</TargetCountry>
    <TargetCountry>DEU</TargetCountry>
    <TargetCountry>AUT</TargetCountry>
  </ServiceListOffering>
</ProviderOffering>
</ServiceListEntryPoints>

```

Example of response to query including a delivery medium:

`https://csr.dvbservices.com/query?TargetCountry=ITA®ulatorListFlag=true&Delivery%5B%5D=dvb-dash&Delivery%5B%5D=dvb-t`

or

`https://csr.dvbservices.com/query?TargetCountry=ITA®ulatorListFlag=true&Delivery=dvb-t`

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Example of response to query:
https://csr.dvbservices.com/query?TargetCountry=ITA&regulatorListFlag=true&Delivery=dvb-t -->
<ServiceListEntryPoints xml:lang="en" xmlns="urn:dvb:metadata:servicelistdiscovery:2023"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2023
../dvbi_service_list_discovery_v1.5.xsd">
  <ServiceListRegistryEntity regulatorFlag="true">
    <Name>DVB Services Sàrl</Name>
    <Address>
      <mpeg7:Name>John Doe</mpeg7:Name>
      <mpeg7:PostalAddress>
        <mpeg7:AddressLine>Geneva, Switzerland</mpeg7:AddressLine>
      </mpeg7:PostalAddress>
    </Address>
    <ElectronicAddress>
      <mpeg7:Telephone>+41 22 0000000</mpeg7:Telephone>
      <mpeg7:Email>dvbi_csr@dvbservices.com</mpeg7:Email>
      <mpeg7:Url>csr.dvbservices.com</mpeg7:Url>
    </ElectronicAddress>
  </ServiceListRegistryEntity>
  <ProviderOffering>
    <Provider>
      <Name>AGCOM</Name>
      <Address>
        <mpeg7:Name>John Doe</mpeg7:Name>
        <mpeg7:PostalAddress>
          <mpeg7:AddressLine>Roma, Italy</mpeg7:AddressLine>
        </mpeg7:PostalAddress>
      </Address>
      <ElectronicAddress>
        <mpeg7:Telephone>+39 06 0000000</mpeg7:Telephone>
        <mpeg7:Email>dvbi@agcom.it</mpeg7:Email>
      </ElectronicAddress>
    </Provider>
    <ServiceListOffering regulatorListFlag="true">
      <ServiceListName>Italian Trusted Services</ServiceListName>
      <ServiceListURI contentType="application/vnd.dvb.dvbisl+xml">
        <dvbisd:URI>https://dvbi.italian-authority.it/trusted-services-dtt.xml</dvbisd:URI>
      </ServiceListURI>
      <Delivery>
        <DASHDelivery/>
        <DVBDelivery required="true"/>
      </Delivery>
      <Language>it</Language>
      <TargetCountry>ITA</TargetCountry>
    </ServiceListOffering>
  </ProviderOffering>
```

```
</ServiceListEntryPoints>
```

Example of response to a query not matching any entry:

<https://dvbistr.private-service-list-registry.com/query?ProviderName=NotExistingProvider>

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Example of response to a query not matching any entry: https://dvbistr.private-service-list-
registry.com/query?ProviderName=NotExistingProvider -->
<ServiceListEntryPoints xml:lang="en" xmlns="urn:dvb:metadata:servicelistdiscovery:2023"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2023
../dvbi_service_list_discovery_v1.5.xsd" xmlns:dvbisd-
playlist="urn:dvb:metadata:servicediscovery-playlist:2019">
  <ServiceListRegistryEntity>
    <Name>A Private Service List Registry</Name>
    <ElectronicAddress>
      <mpeg7:Email>info@private-service-list-registry.com</mpeg7:Email>
      <mpeg7:Url>dvbistr.private-service-list-registry.com</mpeg7:Url>
    </ElectronicAddress>
  </ServiceListRegistryEntity>
</ServiceListEntryPoints>
```

Annex D (normative): Classification Schemes

D.1 HowRelatedCS

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:dvb:metadata:cs:HowRelatedCS:2021" xmlns="urn:tva:mpeg7:2008"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:tva:mpeg7:2008
tva_mpeg7.xsd" xsi:type="ClassificationSchemeType">
  <!-- ##### -->
  <!-- HOWRELATED -->
  <!-- Definition: A series of definitions for possible relations between -->
  <!-- services or programmes -->
  <!-- ##### -->
  <Term termID="1000">
    <Name xml:lang="en">Service Related Material</Name>
    <Definition xml:lang="en">
      The reference points an item that can be used in the onscreen appearance of a
      service.
    </Definition>
    <Term termID="1000.1">
      <Name xml:lang="en">Out Of Service Banner</Name>
      <Definition xml:lang="en">
        A banner that can be shown when the service is selected outside of normal
        operating hours.
      </Definition>
    </Term>
    <Term termID="1000.2">
      <Name xml:lang="en">Content Finished Banner</Name>
      <Definition xml:lang="en">
        A banner that can be shown when all content in a finite duration content
        item has been played.
      </Definition>
    </Term>
  </Term>
  <Term termID="1001">
    <Name xml:lang="en">Service Related Material</Name>
    <Definition xml:lang="en">
      The reference points an item that can be used in the onscreen appearance of a
      service.
    </Definition>
    <Term termID="1001.1">
      <Name xml:lang="en">Service List Logo</Name>
      <Definition xml:lang="en">
        A graphical icon that can be used to visually identify a service list.
      </Definition>
    </Term>
    <Term termID="1001.2">
      <Name xml:lang="en">Service Logo</Name>
      <Definition xml:lang="en">
        A graphical icon that can be used to visually identify a service.
      </Definition>
    </Term>
    <Term termID="1001.3">
```

```

    <Name xml:lang="en">Service Banner</Name>
    <Definition xml:lang="en">
        A large format graphical element that depicts a scene or theme for the service.
    </Definition>
</Term>
</Term>
<Term termID="1002">
    <Name xml:lang="en">Content Guide Material</Name>
    <Definition xml:lang="en">
        The reference points an item that can be used in the onscreen appearance of a
        content guide.
    </Definition>
    <Term termID="1002.1">
        <Name xml:lang="en">Content Guide Service Logo</Name>
        <Definition xml:lang="en">
            A graphical icon that can be used to visually identify a content guide service.
        </Definition>
    </Term>
</Term>
</ClassificationScheme>

```

D.2 LinkedApplicationCS

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:dvb:metadata:cs:LinkedApplicationCS:2019"
xmlns="urn:tva:mpeg7:2008" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:tva:mpeg7:2008 tva_mpeg7.xsd" xsi:type="ClassificationSchemeType">
    <!-- ##### -->
    <!-- LINKEDAPPLICATION -->
    <!-- Definition: Application links and associated relationships with media -->
    <!-- ##### -->
    <Term termID="1">
        <Name xml:lang="en">App for service when available</Name>
        <Definition xml:lang="en">An associated application that is intended to be started
            during the availability period of a service instance</Definition>
        <Term termID="1.1">
            <Name xml:lang="en">App with media in parallel</Name>
            <Definition xml:lang="en">An associated application to be started in parallel with
                commencing presentation of any A/V media</Definition>
        </Term>
        <Term termID="1.2">
            <Name xml:lang="en">App controlling media presentation</Name>
            <Definition xml:lang="en">An associated application that controls media presentation
                or has no media</Definition>
        </Term>
    </Term>
    <Term termID="2">
        <Name xml:lang="en">App for outside availability period</Name>
        <Definition xml:lang="en">An associated application to be started outside the availability
            period of a service instance</Definition>
    </Term>
</ClassificationScheme>

```

D.3 RecordingInfoCS

```

<?xml version="1.0" encoding="UTF-8"?>

```

```

<ClassificationScheme uri="urn:dvb:metadata:cs:RecordingInfoCS:2019" xmlns="urn:tva:mpeg7:2008"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:tva:mpeg7:2008
tva_mpeg7.xsd" xsi:type="ClassificationSchemeType">
  <!-- ##### -->
  <!-- RECORDINGINFO -->
  <!-- Definition: A series of definitions providing information about -->
  <!-- recording permission -->
  <!-- ##### -->
  <Term termID="1">
    <Name xml:lang="en">Broadcast simulcast</Name>
    <Definition xml:lang="en">
      A simulcast of a service or event delivered using DVB-C/S/T
    </Definition>
  </Term>
  <Term termID="2">
    <Name xml:lang="en">Provider-scheduled service</Name>
    <Definition xml:lang="en">A scheduled service other than a broadcast simulcast with
      scheduled times determined by the service provider</Definition>
  </Term>
  <Term termID="3">
    <Name xml:lang="en">Concurrent live</Name>
    <Definition xml:lang="en">A service other than a broadcast simulcast or provider-scheduled
      service carrying a concurrent transmission of a live event</Definition>
  </Term>
  <Term termID="4">
    <Name xml:lang="en">Other, recording permitted</Name>
    <Definition xml:lang="en">A service other than a broadcast simulcast, provider-scheduled
      service or concurrent live transmission for which the provider wishes to allow
      recording</Definition>
  </Term>
  <Term termID="5">
    <Name xml:lang="en">Other, recording not permitted</Name>
    <Definition xml:lang="en">A service other than a broadcast simulcast, provider-scheduled
      service or concurrent live transmission for which the provider does not grant
      permission for recording</Definition>
  </Term>
</ClassificationScheme>

```

D.4 ServiceTypeCS

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:dvb:metadata:cs:ServiceTypeCS:2019" xmlns="urn:tva:mpeg7:2008"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:tva:mpeg7:2008
tva_mpeg7.xsd" xsi:type="ClassificationSchemeType">
  <!-- ##### -->
  <!-- ServiceType -->
  <!-- Definition: Definitions for the different types of service -->
  <!-- ##### -->
  <Term termID="linear">
    <Name xml:lang="en">The service contains linear television programming</Name>
  </Term>
  <Term termID="linear-radio">
    <Name xml:lang="en">The service contains linear radio programming</Name>
  </Term>
  <Term termID="ondemand">
    <Name xml:lang="en">The service contains on demand television programming</Name>
  </Term>

```



```

</Term>
<Term termID="ondemand-radio">
  <Name xml:lang="en">The service contains on demand radio programming</Name>
</Term>
<Term termID="data">
  <Name xml:lang="en">The service contains only data signalling (no audio or video
    service component)</Name>
</Term>
<Term termID="mosaic">
  <Name xml:lang="en">The service contains a visually structured composition
    derived from other services</Name>
</Term>
<Term termID="other">
  <Name xml:lang="en">The service cannot be described by one of the categories
    in this scheme</Name>
</Term>
</ClassificationScheme>

```

Table provides an informational mapping on how the `service_type` defined in ETSI EN 300 468 [6] is mapped to service list elements. Service types not listed have no mapping to DVB-I.

Table D.1: Mapping of ETSI EN 300 468 [6] `service_type` to DVB-I

ETSI EN 300 468 [6]		DVB-I Service List
service_type	Description	
0x01	digital television service (see note 1)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.1" <!--SD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:2 <!--MPEG-2 -->
0x02	digital radio sound service (see note 2)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear-radio" Service.ServiceInstance.ContentAttributes.AudioAttributes.Coding="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2" <!-- MPEG-1 Audio Layer II --> Service.ServiceInstance.ContentAttributes.AudioAttributes.NumOfChannels = 1 or 2 Service.ServiceInstance.ContentAttributes.VideoAttributes does not exist
0x04	NVOD reference service (see note 1)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="reference" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.1" <!--SD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:2 <!--MPEG-2 -->
0x05	NVOD time-shifted service (see note 1)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="timeshifted" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.1" <!--SD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:2 <!--MPEG-2 -->

ETSI EN 300 468 [6]		DVB-I Service List
service_type	Description	
0x06	mosaic service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:mosaic" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:3" <!-- Multiview Autoscopic Video --> Relevant descriptive AudioAttributes and VideoAttributes
0x07	FM radio service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear-radio" Service.ServiceInstance.ContentAttributes.AudioAttributes.Coding="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2" <!-- MPEG-1 Audio Layer II --> Service.ServiceInstance.ContentAttributes.AudioAttributes.NumChannels >= 2 Service.ServiceInstance.ContentAttributes.VideoAttributes does not exist
0x0A	advanced codec digital radio sound service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear-radio" Service.ServiceInstance.ContentAttributes.AudioAttributes.Coding does not contain "urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2"
0x0B	H.264/AVC mosaic service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:mosaic" Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x0C	data broadcast service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:data"
0x11	MPEG-2 HD digital television service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.2" <!--HD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:2 <!--MPEG-2 -->
0x16	H.264/AVC SD digital television service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.1" <!--SD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x17	H.264/AVC SD NVOD time-shifted service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="timeshifted" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.1" <!--SD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x18	H.264/AVC SD NVOD reference service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="reference" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.1" <!--SD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->

ETSI EN 300 468 [6]		DVB-I Service List
service_type	Description	
0x19	H.264/AVC HD digital television service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.2" <!--HD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x1A	H.264/AVC HD NVOD time-shifted service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="timeshifted" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.2" <!--HD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x1B	H.264/AVC HD NVOD reference service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="reference" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.2" <!--HD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x1C	H.264/AVC frame compatible plano-stereoscopic HD digital television service (see note 3)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.2" <!--HD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x1D	H.264/AVC frame compatible plano-stereoscopic HD NVOD time-shifted service (see note 3)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="timeshifted" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat contains any term from urn:tva:metadata:cs:PictureFormatCS:2015:2 <!--Plano-Stereoscopic Video --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x1E	H.264/AVC frame compatible plano-stereoscopic HD NVOD reference service (see note 3)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.NVOD@mode="reference" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat contains any term from urn:tva:metadata:cs:PictureFormatCS:2015:2 <!--Plano-Stereoscopic Video --> Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any term from urn:mpeg:mpeg7:cs:VisualCodingFormatCS:2001:3 <!--H.264/AVC -->
0x1F	HEVC digital television service (see note 4)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.2" <!--HD --> or "urn:tva:metadata:cs:PictureFormatCS:2015:1.3" <!--UHD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.FrameRate <= "120" Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any HEVC related term from the video codec classification scheme (see note 6)

ETSI EN 300 468 [6]		DVB-I Service List
service_type	Description	
0x20	HEVC UHD digital television service with HDR and/or a frame rate of 100 Hz, 120 000/1 001 Hz, or 120 Hz, or any combination of HDR and these frame rates (see note 5)	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributes.VideoAttributes.PictureFormat="urn:tva:metadata:cs:PictureFormatCS:2015:1.3" <!--UHD --> Service.ServiceInstance.ContentAttributes.VideoAttributes.FrameRate <= "120" Service.ServiceInstance.ContentAttributes.VideoAttributes.Coding contains any HEVC related term from the video codec classification scheme (see note 6)
NOTE 1: MPEG-2 SD material should use this type. NOTE 2: MPEG-1 Layer 2 audio material should use this type. NOTE 3: For information on the use of these values, see clause I.2.3 of ETSI EN 300 468 [6] and ETSI TS 101 547-2 [i.9]. NOTE 4: For rules on the use of this value, see clause I.2.5 of ETSI EN 300 468 [6] and ETSI TS 101 547-4 [i.10]. This value should be used for backward compatible HLG10 HDR services, and/or backward compatible high frame rate (HFR) services which are decodable by HEVC_UHDTV_IRD as defined in ETSI TS 101 154 [22], see clause I.2.5.2 of ETSI EN 300 468 [6]. NOTE 5: For rules on the use of these values, see clause I.2.6 of ETSI EN 300 468 [6]. NOTE 6: HEVC related terms are defined in urn:dvb:metadata:cs:VideoCodecCS:2020, urn:dvb:metadata:cs:VideoCodecCS:2021 or urn:dvb:metadata:cs:VideoCodecCS:2022.		

D.5 ContentSubject

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme xsi:type="ClassificationSchemeType"
uri="urn:dvb:metadata:cs:ContentSubject:2019" xmlns="urn:tva:mpeg7:2008"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:tva:mpeg7:2008
tva_mpeg7.xsd">
<!-- *****
DVB Content Subject Classification Scheme.
Defined in ETSI EN 300 468 for the content descriptor.
Version ETSI EN 300 468 V1.16.1.
***** -->
<Term termID="0">
  <Name xml:lang="en">Undefined content</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="1">
  <Name xml:lang="en">Movie/Drama</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="1.0">
    <Name xml:lang="en">Movie/Drama (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="1.1">
    <Name xml:lang="en">Detective/Thriller</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="1.2">
    <Name xml:lang="en">Adventure/Western/War</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="1.3">
    <Name xml:lang="en">Science fiction/Fantasy/Horror</Name>
    <Definition xml:lang="en"></Definition>

```

```

</Term>
<Term termID="1.4">
  <Name xml:lang="en">Comedy</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="1.5">
  <Name xml:lang="en">Soap/Melodrama/Folkloric</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="1.6">
  <Name xml:lang="en">Romance</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="1.7">
  <Name xml:lang="en">Serious/Classical/Religious/Historical movie/Drama</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="1.8">
  <Name xml:lang="en">Adult movie/Drama</Name>
  <Definition xml:lang="en"></Definition>
</Term>
</Term>
<Term termID="2">
  <Name xml:lang="en">News/Current affairs</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="2.0">
    <Name xml:lang="en">News/Current affairs (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="2.1">
    <Name xml:lang="en">News/Weather report</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="2.2">
    <Name xml:lang="en">News magazine</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="2.3">
    <Name xml:lang="en">Documentary</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="2.4">
    <Name xml:lang="en">Discussion/Interview/Debate</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
</Term>
<Term termID="3">
  <Name xml:lang="en">Show/Game show</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="3.0">
    <Name xml:lang="en">Show/Game show (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="3.1">
    <Name xml:lang="en">Game show/Quiz/Contest</Name>
    <Definition xml:lang="en"></Definition>
  </Term>

```

```

</Term>
<Term termID="3.2">
  <Name xml:lang="en">Variety show</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="3.3">
  <Name xml:lang="en">Talk show</Name>
  <Definition xml:lang="en"></Definition>
</Term>
</Term>
<Term termID="4">
  <Name xml:lang="en">Sports</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="4.0">
    <Name xml:lang="en">Sports (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.1">
    <Name xml:lang="en">Special events (Olympic Games, World Cup, etc.)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.2">
    <Name xml:lang="en">Sports magazines</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.3">
    <Name xml:lang="en">Football/Soccer</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.4">
    <Name xml:lang="en">Tennis/Squash</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.5">
    <Name xml:lang="en">Team sports (excluding football)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.6">
    <Name xml:lang="en">Athletics</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.7">
    <Name xml:lang="en">Motor sport</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.8">
    <Name xml:lang="en">Water sport</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.9">
    <Name xml:lang="en">Winter sports</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="4.10">
    <Name xml:lang="en">Equestrian</Name>
    <Definition xml:lang="en"></Definition>
  </Term>

```

```

</Term>
<Term termID="4.11">
  <Name xml:lang="en">Martial sports</Name>
  <Definition xml:lang="en"></Definition>
</Term>
</Term>
<Term termID="5">
  <Name xml:lang="en">Children's/Youth programmes</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="5.0">
    <Name xml:lang="en">Children's/Youth programmes (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="5.1">
    <Name xml:lang="en">Pre-school children's programmes</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="5.2">
    <Name xml:lang="en">Entertainment programmes for 6 to 14</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="5.3">
    <Name xml:lang="en">Entertainment programmes for 10 to 16</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="5.4">
    <Name xml:lang="en">Informational/Educational/School programmes</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="5.5">
    <Name xml:lang="en">Cartoons/Puppets</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
</Term>
<Term termID="6">
  <Name xml:lang="en">Music/Ballet/Dance</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="6.0">
    <Name xml:lang="en">Music/Ballet/Dance (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="6.1">
    <Name xml:lang="en">Rock/Pop</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="6.2">
    <Name xml:lang="en">Serious music/Classical music</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="6.3">
    <Name xml:lang="en">Folk/Traditional music</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="6.4">
    <Name xml:lang="en">Jazz</Name>
    <Definition xml:lang="en"></Definition>
  </Term>

```

```

</Term>
<Term termID="6.5">
  <Name xml:lang="en">Musical/Opera</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="6.6">
  <Name xml:lang="en">Ballet</Name>
  <Definition xml:lang="en"></Definition>
</Term>
</Term>
<Term termID="7">
  <Name xml:lang="en">Arts/Culture (without music)</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="7.0">
    <Name xml:lang="en">Arts/Culture (without music, general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.1">
    <Name xml:lang="en">Performing arts</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.2">
    <Name xml:lang="en">Fine arts</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.3">
    <Name xml:lang="en">Religion</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.4">
    <Name xml:lang="en">Popular culture/Traditional arts</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.5">
    <Name xml:lang="en">Literature</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.6">
    <Name xml:lang="en">Film/Cinema</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.7">
    <Name xml:lang="en">Experimental film/Video</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.8">
    <Name xml:lang="en">Broadcasting/Press</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.9">
    <Name xml:lang="en">New media</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="7.10">
    <Name xml:lang="en">Arts/Culture magazines</Name>
    <Definition xml:lang="en"></Definition>
  </Term>

```



```

</Term>
<Term termID="7.11">
  <Name xml:lang="en">Fashion</Name>
  <Definition xml:lang="en"></Definition>
</Term>
</Term>
<Term termID="8">
  <Name xml:lang="en">Social/Political issues/Economics</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="8.0">
    <Name xml:lang="en">Social/Political issues/Economics (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="8.1">
    <Name xml:lang="en">Magazines/Reports/Documentary</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="8.2">
    <Name xml:lang="en">Economics/Social advisory</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="8.3">
    <Name xml:lang="en">Remarkable people</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
</Term>
<Term termID="9">
  <Name xml:lang="en">Education/Science/Factual topics</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="9.0">
    <Name xml:lang="en">Education/Science/Factual topics (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="9.1">
    <Name xml:lang="en">Nature/Animals/Environment</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="9.2">
    <Name xml:lang="en">Technology/Natural sciences</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="9.3">
    <Name xml:lang="en">Medicine/Physiology/Psychology</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="9.4">
    <Name xml:lang="en">Foreign countries/Expeditions</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="9.5">
    <Name xml:lang="en">Social/Spiritual sciences</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="9.6">
    <Name xml:lang="en">Further education</Name>
    <Definition xml:lang="en"></Definition>
  </Term>

```

```

</Term>
<Term termID="9.7">
  <Name xml:lang="en">Languages</Name>
  <Definition xml:lang="en"></Definition>
</Term>
</Term>
<Term termID="10">
  <Name xml:lang="en">Leisure hobbies</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="10.0">
    <Name xml:lang="en">Leisure hobbies (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="10.1">
    <Name xml:lang="en">Tourism/Travel</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="10.2">
    <Name xml:lang="en">Handicraft</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="10.3">
    <Name xml:lang="en">Motoring</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="10.4">
    <Name xml:lang="en">Fitness and health</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="10.5">
    <Name xml:lang="en">Cooking</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="10.6">
    <Name xml:lang="en">Advertisement/Shopping</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="10.7">
    <Name xml:lang="en">Gardening</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
</Term>
<Term termID="11">
  <Name xml:lang="en">Special characteristics</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="11.0">
    <Name xml:lang="en">Original language</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="11.1">
    <Name xml:lang="en">Black and white</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
  <Term termID="11.2">
    <Name xml:lang="en">Unpublished</Name>
    <Definition xml:lang="en"></Definition>
  </Term>

```

```

</Term>
<Term termID="11.3">
  <Name xml:lang="en">Live broadcast</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="11.4">
  <Name xml:lang="en">Plano-stereoscopic</Name>
  <Definition xml:lang="en"></Definition>
</Term>
<Term termID="11.5">
  <Name xml:lang="en">Local or regional</Name>
  <Definition xml:lang="en"></Definition>
</Term>
</Term>
<Term termID="12">
  <Name xml:lang="en">Adult</Name>
  <Definition xml:lang="en"></Definition>
  <Term termID="12.0">
    <Name xml:lang="en">Adult (general)</Name>
    <Definition xml:lang="en"></Definition>
  </Term>
</Term>
</ClassificationScheme>

```

D.6 ColorimetryCS

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:dvb:metadata:cs:ColorimetryCS:2020" xmlns="urn:tva:mpeg7:2008"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:tva:mpeg7:2008
tva_mpeg7.xsd" xsi:type="ClassificationSchemeType">
  <!-- ##### -->
  <!-- Colorimetry -->
  <!-- Definition: Different picture colorimetry standards -->
  <!-- ##### -->
  <Term termID="1">
    <Name xml:lang="en">ITU BT.709</Name>
    <Definition xml:lang="en">ITU BT.709 colorimetry</Definition>
  </Term>
  <Term termID="2">
    <Name xml:lang="en">BT.2020</Name>
    <Definition xml:lang="en">ITU BT.2020 colorimetry</Definition>
    <Term termID="2.1">
      <Name xml:lang="en">BT.2020 NCL</Name>
      <Definition xml:lang="en">ITU BT.2020 non-constant luminance colorimetry</Definition>
    </Term>
  </Term>
  <Term termID="3">
    <Name xml:lang="en">BT.2100</Name>
    <Definition xml:lang="en">ITU BT.2100 colorimetry</Definition>
    <Term termID="3.1">
      <Name xml:lang="en">BT.2100 NCL</Name>
      <Definition xml:lang="en">ITU BT.2100 non-constant luminance colorimetry</Definition>
    </Term>
  </Term>
</ClassificationScheme>

```

Annex E (normative): Implementation Considerations

E.1 Interface between DVB-I client and DVB-DASH player

Refer to clause 4.1 of DVB A184 [34].

E.2 Handling multiple service lists

Refer to clause 4.2 of DVB A184 [34].

Annex F (informative): A typical service installation

Refer to clause 4.3 of DVB A184 [34].

Annex G (informative): Signalling of services delivered with HLS

G.1 Introduction

A service list as defined in this document includes several options for signalling additional formats for the delivery of media. Several approaches are possible to signal services which use HTTP Live Streaming (HLS) according to IETF RFC 8216 [i.13]. The service instance for the HLS service can

- be signalled as an application controlling media presentation according to clause 5.2.3.2 (see clause G.2), or
- include an `OtherDeliveryParameters` element with values indicating and referencing the HLS playlist for use by a native player function (see clause G.3).

In addition, a replay of the scheduled program may be available on demand or as part of a box set.

Alternatively DASH and HLS delivered media can co-exist to some extent as described in clause G.4.

G.2 Service Instance

G.2.1 Use of Linked Applications

To support DVB-I clients where a built-in HLS player is not available, a player application for controlling media presentation can be signalled according to clause 5.2.3.2. The player application can be specific to the service, or can be a generic application.

G.2.2 Use of OtherDeliveryParameters

The extension name of “vnd.apple.mpegurl” indicates that the delivery parameters identify an HLS playlist which is further confirmed by the MIME type of “application/vnd.apple.mpegurl” as specified in IETF RFC 8216 [i.13]. The specified URI can be passed to a suitable player, if supported. Any related application to be used in parallel to the playback can also be signalled to provide additional interactivity.

An example definition of the extension conveying the URL of the HLS playlist, as seen in the example in clause G.5, would be:

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
  targetNamespace="vnd:apple:mpegurl"
  xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2023"
  elementFormDefault="qualified" attributeFormDefault="unqualified">
  <import namespace="urn:dvb:metadata:servicediscovery:2023"
    schemaLocation="dvbi_v5.0.xsd"/>
  <complexType name="m3u8RefType">
    <complexContent>
      <extension base="dvbisd:ExtensionBaseType">
        <sequence>
          <element name="UriBasedLocation" type="dvbisd:ExtendedURIType"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

G.3 On Demand Programmes

When HLS is used to replay a scheduled program, either through on demand or box set selection, a deep-linked XML AIT is used to invoke the application for playback. That application would determine whether a suitable player is available or whether the application itself will function in a similar manner to an application controlling media playback according to clause 5.2.3.2.

G.4 Common Media Segments

If neither built-in support for HLS nor linked applications supporting MSE are available then an alternative for service and content providers is to encode the media segments once for both DASH and HLS but to provide separate DASH and HLS manifests. Section 4 of CTA-5005 [i.14] describes, for various use-cases, constraints on authoring DASH content for HLS compatibility and vice-versa, constraints on authoring HLS content for DASH compatibility. If the content was originally authored for DASH then an HLS m3u8 playlist would also need to be produced referencing that content. If the content was originally authored for HLS then a DASH MPD would also need to be produced.

G.5 Examples

The following example illustrates a service instance signalling a player application.

```
<ServiceInstance>
  <DisplayName xml:lang="en">XBC-1 HLS player app</DisplayName>
  <RelatedMaterial>
    <!-- service instance logo -->
    <HowRelated href="urn:dvb:metadata:cs:HowRelatedCS:2020:1001.2"/>
  <MediaLocator>
```

```

    <tva:MediaUri contentType="image/png">
      http://xbc.tv/dvb-i-apps/xbc-1.png
    </tva:MediaUri>
  </MediaLocator>
</RelatedMaterial>
<RelatedMaterial>
  <!-- player app -->
  <HowRelated href="urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.2"/>
  <MediaLocator>
    <tva:MediaUri contentType="text/html">
      http://open.tv/hls-player.html?chan=http%3a%2f%2fxbc.tv%2fhls_content%2fch1%2fxbc-1.m3u8
    </tva:MediaUri>
  </MediaLocator>
</RelatedMaterial>
</ServiceInstance>

```

The following example illustrates a service instance signalling an HLS playlist.

```

<ServiceList ... xmlns="urn:dvb:metadata:servicediscovery:2023" xmlns:hls=""vnd:apple:mpegurl"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="vnd:apple:mpegurl hls-url.xsd" >

<ServiceInstance>
  <DisplayName xml:lang="en">XBC-1 in HLS</DisplayName>
  <RelatedMaterial>
    <!-- service instance logo -->
    <HowRelated href="urn:dvb:metadata:cs:HowRelatedCS:2020:1001.2"/>
    <MediaLocator>
      <tva:MediaUri contentType="image/png">
        http://xbc.tv/dvb-i/xbc-1-hls.png
      </tva:MediaUri>
    </MediaLocator>
  </RelatedMaterial>
  <OtherDeliveryParameters extensionName="vnd.apple:mpegurl"
    xsi:type="hls:m3u8RefType">
    <hls:UriBasedLocation contentType="application/vnd.apple.mpegurl">
      <URI>http://xbc.tv/hls_content/ch1/xbc-1.m3u8</URI>
    </hls:UriBasedLocation>
  </OtherDeliveryParameters>
</ServiceInstance>

```

Other service and service instance related elements, such as `ContentProtection`, `ContentAttributes` and `SubscriptionPackage` are equally applicable for the selection and use of the service instance.

History

Document history		
A177r1	July 2020	Initial Version
A177r2	July 2021	Added extensibility signalling to the service instance delivery type allowing different delivery systems to be specified Permit signalling of HTML5 webpages as service related applications Clarifications relating to (i) captioning types signalled in the service list; (ii) use of ‘branch’ and ‘leaf’ values in classification schemes for video and audio codecs; (iii) signalling of intervals for availability periods; (iv) use of equivalent values in different versions of video and audio codec classification schemes The data types used for the <ContentProtection> element have been flattened to provide a more concise representation of content protection schemes that may be present in a service Service list registry responses indicates which delivery systems are required to represent the service lists. A DVB-I client can query service list registries for service list offerings using specific delivery systems. New elements • <Colorimetry> in tva:VideoAttributes type to convey the colour space for a service or event • <ServiceDescription> to provide a human readable description of the service • <AdditionalServiceParameters> in <Service> to convey element and attributes defined by third parties
A177r3	January 2022	Multilingual elements can inherit the natural language identifier from an ancestor element. Instance document language is required on root element. The time 24:00:00Z is disallowed as it does not comply with ISO 8601-1:2019. The &image_variant query parameter can be applied to service list requests and also images and banners within service lists. Responses to Box Set Categories and Box Set Contents requests can include pagination of the results set. Clarification that use of <TargetRegion> and <SubscriptionPackage> resolve to a single <LCNtable>. New elements and functions • <AltServiceName> to be used for service instance matching. • A banner can be signalled to depict a large format graphic representation of a service. Logos and Banners can optionally use WebP image format. • <SubscriptionPackageList> conveys all valid subscription packages used in the service list.

A177r4	September 2022	The service list logo can be signalled either ‘inband’ or by reference in the service list registry response to aid UI design. Support for announcement and processing of client specific aspects for server based creation of service lists. Enhancements to Box Set API to permit season/series grouping alongside primary boxset and service specific box set categories and lists with shared content guide servers. NVOD services for signalled as associated with the reference service. Use of VideoCodecCS:2022 and VideoConformancePointsCS:2022 to signal AVS3 and VVC next generation video codecs. Additional terms added to the ServiceTypeCS to differentiate television and radio services.
A177r5	July 2023	Information related to implementation aspects is moved to DVB Bluebook A184. Use of <AudioConformancePointCS> is deprecated in favour of <AudioAttributes> Prominence of a service can be signalled according to AVMSD Article 7a. List of service languages is included in the service list. Parental Rating specified on the service level in addition to the event level. Broadcast signalling extension to include the service list name and optionally provider name of the service list at the signalled URL. Additional signalling to allow instant setup and direct tuning of satellite delivered services.