**Digital Video Broadcasting (DVB);
Service Discovery and Programme
Metadata for DVB-I Services**

DVB Document A177

November 2019

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Contents

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Foreword

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Modal verbs terminology

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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. This specification defines the mechanisms to be used to find curated sets of linear television services that be delivered through broadband or broadcast mechanisms as well at the methods to retrieve electronic program data for those services.

1   Scope

This specification defines the following:

- signaling 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 program 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

- a method for national TV regulators or their representatives, operators and trademark licensors to offer a list of trusted / legitimate / authorized / regulated DVB-I 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]   ETSI TS 103 205 v1.4.1 (2019-05)
           Digital Video Broadcasting (DVB); Extensions to the CI Plus[TM] Specification

[3]   IETF RFC 4151
           The 'tag' URI Scheme

[4]   ETSI TS 102 034 v2.1.1 (2016-04)
           Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based
           Networks

[5]   ETSI TS 102 809 v1.3.1 (2017-06)
           Digital Video Broadcasting (DVB); Signalling and carriage of interactive applications and services
           in Hybrid broadcast/broadband environments

[6]   ETSI EN 300 468 v1.16.1 (2019-08)
           Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems

[7]   ETSI TS 102 822-3-1 v1.11.2 (2019-06)
           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-US
           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.
http://earth-info.nga.mil/GandG/publications/tr8350.2/wgs84fin.pdf

[10] DVB A168 (2019-10)
DVB MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks

[11] CENELEC - EN 50585 (2014-05)
Communications protocol to transport satellite delivered signals over IP networks

[12] DVB A126 (2019-06)
Digital Video Broadcasting (DVB); Allocation of identifiers and codes for Digital Video Broadcasting (DVB) systems

[13] IETF RFC1738
Uniform Resource Locators (URL)

[14] IETF RFC3986
Uniform Resource Identifier (URI): Generic Syntax

[15] IETF RFC2616
Hypertext Transfer Protocol -- HTTP/1.1

[16] IETF RFC7234
Hypertext Transfer Protocol (HTTP/1.1): Caching

[17] ETSI TS 102 851 v1.3.1 (2012-01)
Digital Video Broadcasting (DVB); Uniform Resource Identifiers (URI) for DVB Systems

[18] ISO 639-2
Codes for the representation of names of languages -- Part 2: Alpha-3 code

[19] ISO 639-3
Codes for the representation of names of languages -- Part 3: Alpha-3 code for comprehensive coverage of languages

[20] ISO 8601-1
Date and time -- Representations for information interchange -- Part 1: Basic rules

[21] ISO/IEC 15938-5
Information technology -- Multimedia content description interface -- Part 5: Multimedia description schemes

[22] ETSI TS 102 796 v1.5.1
Hybrid Broadcast Broadband TV

[23] ETSI TS 101 154 v2.5.1 (2019-01)
Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcast and Broadband Applications

[24] HLS Authoring Specification for Apple Devices
https://developer.apple.com/documentation/http_live_streaming/hls_authoring_specification_for_apple_devices

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]   DVB A176
          Adaptive media streaming over IP multicast – reference architecture

[i.2]   CENELEC EN 50494
          Satellite signal distribution over a single coaxial cable in single dwelling installations

[i.3]   CENELEC EN 50607
          Satellite signal distribution over a single coaxial cable - Second generation

[i.4]   List of EU Audiovisual Regulators – Audiovisual and Media Services Directive (AVMSD)
          https://ec.europa.eu/digital-single-market/en/list-eu-audiovisual-regulators

3   Definitions and abbreviations

3.1   Definitions

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

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

3.2   Abbreviations

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

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
CDN	Content Delivery Network
CRID	Content Reference Identifier
CS	Classification Scheme
CSR	Central Service Registry
DASH	Dynamic Adaptive Streaming over HTTP
DRM	Digital Rights Management
DTT	Digital Terrestrial Television
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
EIT	Event Information Table
EPG	Electronic Program Guide
HbbTV	Hybrid Broadcast Broadband TV
HD	High Definition
HDR	High Dynamic Range
HEVC	High Efficiency Video Coding
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Secure

ID	Identifier
IP	Internet Protocol
IPTV	Internet Protocol TV
JPEG	Joint Photographic Experts Group
LCN	Logical Channel Numbering
LNB	Low Noise Block
MIME	Multipurpose Internet Mail Extensions
MPD	Media Presentation Description
NID	Network Identifier
NIT	Network Information Table
ONID	Original Network Identifier
OTT	Over The Top
PNG	Portable Network Graphics
RTSP	Real Time Streaming Protocol
SD	Standard Definition
SID	Service Identifier
TOT	Time Offset Table
TSID	Transport Stream Identifier
TVA	TV-Anytime
UHD	Ultra High Definition
UI	User Interface
URI	Uniform Resource Identifier
URL	Universal Resource Locator
URN	Universal Resource Name
UTC	Coordinated Universal Time
UTF-8	Unicode Transformation Format, 8 bit
VoD	Video on Demand
XML	Extensible Markup Language

4 Overview (informative)

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.
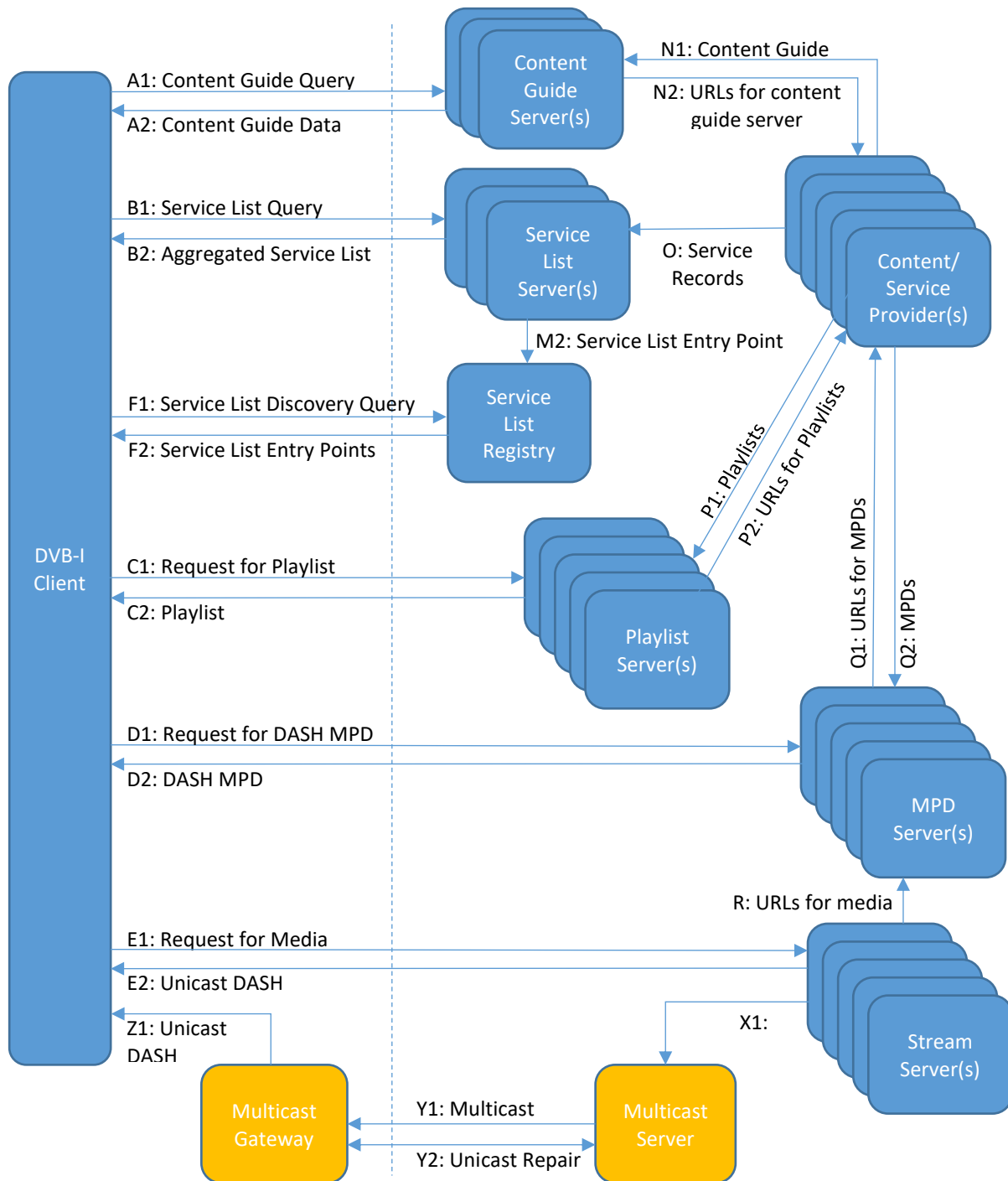
Figure 1: Simplified example DVB-I components and interfaces

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 server may aggregate service list fragments from multiple content / service providers.

NOTE: 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. Some devices may support multiple DVB-I clients.

- **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 DVB-I service are referenced in the service list entry for that service.

- **Content / Service Provider(s):** Organisations 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: The MPD that is returned may be personalised to a specific end-user. This would imply additional interfaces omitted from this simple diagram for authenticating individual users or other forms of personalisation.

- **Stream Server(s):** The server 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.

- **A2:** Content guide data: Content guide data in the format defined by the present document.

- **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:** Aggregated service list: A service list in the format defined by the present document.

- **C1:** Request for playlist: An HTTP GET request.

- **C2:** Playlist: A playlist in the format defined by the present document.

- **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.

- **F2:** A list of Service List Entry Points that match the request criteria.

- **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).

- **M2:** Registration of the Service List Entry Points for the Service List Servers.

- **O:** Service records: Data on the DVB-I 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:** 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).

- **Q2:** DASH MPDs that may be according to ETSI TS 103 285 [1].

- **R:** URLs for media: URLs for the media to be included in DASH MPDs. These may defined by an operational interface, (e.g. a naming convention) rather than a technical interface.

- **X1:** Outside the scope of DVB-I but shown here for information is a flow of DASH media data to the server that packages it in multicast. This is interface P_{in}' or O_{in} in DVB A176 [i.1].

- **Y1:** Multicast: Outside the scope of DVB-I but shown here for information is a flow of DASH media data over multicast. This is interface M in A176 [i.1].

- **Y2:** Unicast repair: Outside the scope of DVB-I but shown here for information is a flow of DASH media data over unicast to repair data lost from interface Y1. This is interface U in DVB A176 [i.1].

- **Z1:** Unicast DASH: Outside the scope of DVB-I but shown here for information is the interface from the DVB-I client to the multicast gateway which is according to ETSI TS 103 285 [1]. This is interface L in DVB A176 [i.1].

Interfaces A1, A2, B1, B2, C1 and C2 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.
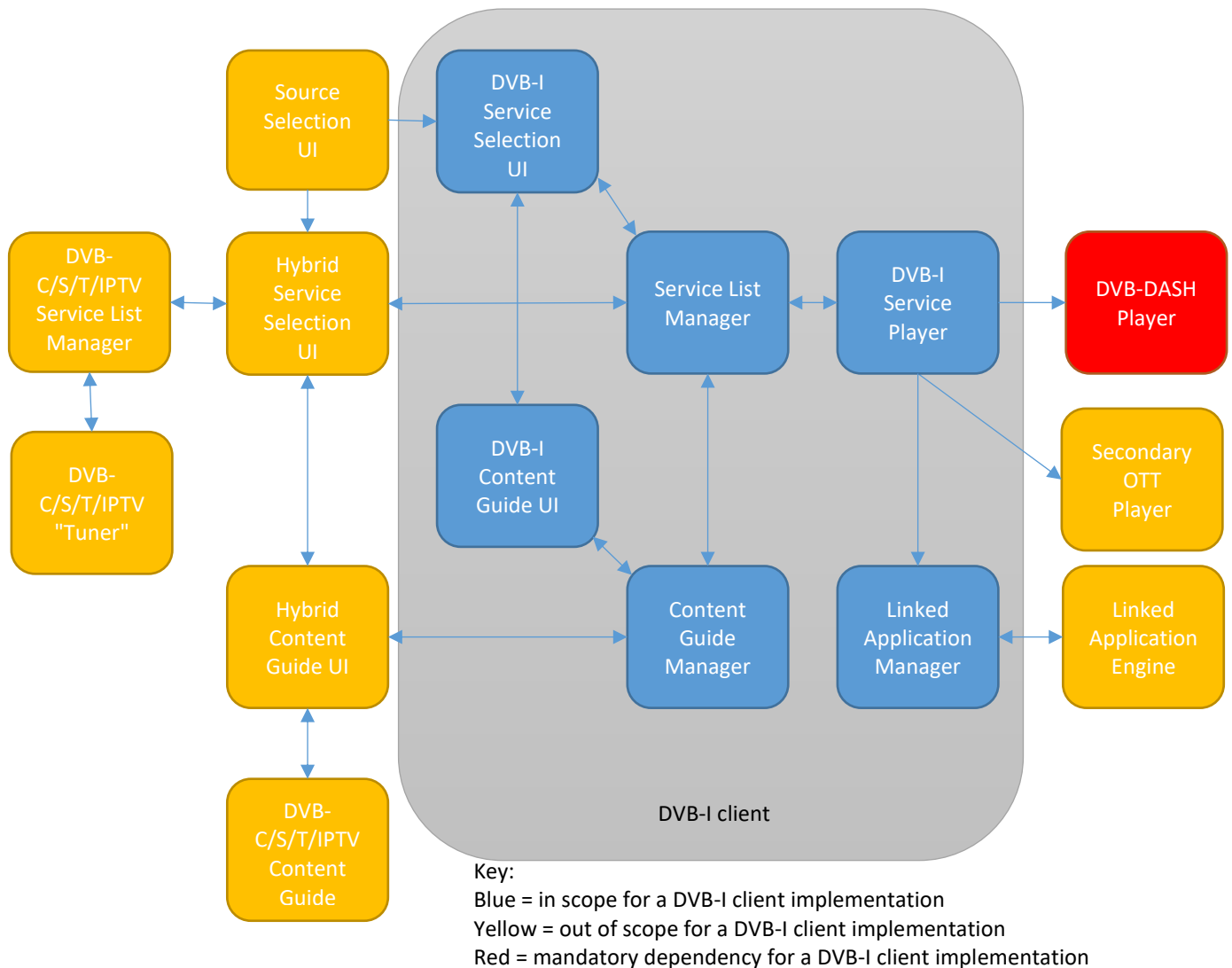
Figure 2: Conceptual model of a DVB-I client

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**: DVB-I clients may include a UI that enables users to view a list of services and choose / change between them. Note that some DVB-I clients 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 C1 and C2 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**: DVB-I clients 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 clients 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 end device 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.

- **Service player**: This is responsible for the complete lifecycle of playback of a DVB-I service. 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.

- **DVB-DASH player**: This is responsible for playing DVB-I services where the content is delivered by DVB-DASH. This is 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 player 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 DVB-I 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 DVB-I 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 DVB-I service that is being presented. For example, an HbbTV engine on a TV set or an HTML5 webview on a phone or tablet or PC.

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

5 Service Discovery

5.1 Concepts

5.1.1 Services

A DVB-I service is one which is discovered using this specification and which is available over DVB-DASH (additional delivery mechanisms may also be available). Such a DVB-I service

- may be delivered over non-managed connectivity alone, but may also be delivered by other means such as managed IP, ABR multicast, etc., or it may be replicated by DVB services delivered over existing DVB networks

- may also be received by non-TV devices as defined by DVB. Specifically, the set of receivers could include mobile devices and other devices that do not have a traditional DVB tuner.

- 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 associated applications (similar to AIT in broadcast delivery).

- may be consumed on devices that have other DVB tuners including DVB-T/S/C/IPTV as well as Sat>IP.

5.1.2   Service Lists

DVB-I clients access information about DVB-I 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.

DVB-I clients 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 is made available using HTTP at a Service List URL.

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 called Service List Discovery.

DVB-I supports two 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 a Service List Registry.

In both 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.

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 s may be operated by various kinds of organisation. Possible examples could be:

- A DVB-I client manufacturer, serving only their own clients.

- 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 registry, operated for the benefit of all DVB-I clients, providing information on a wide set of Service Lists known to that registry.

5.1.3.2 Service List Registry

A DVB-I Service List Registry is an HTTP endpoint available at a known URL that, if queried, can return a list of Service List Entry Points. The DVB-I Service List Providers who wish to enable the Service List Registry discovery mechanism for their own Service Lists may register their Service List Entry Points in the Service List Registry using the M2 interface in clause 4.1. The Service List Registry also collects contact information of the Service List Providers. How the Service List Registry collects and stores such information is out of scope of the present document.

Service List Registries may be operated by various kinds of organisations or Service List Providers. Possible examples are:

- A Central Service List Registry (CSR), potentially operated by DVB (or on behalf of DVB) for the benefit of all DVB-I clients, providing information on a wide set of Service Lists known to that registry.

- A national or regional regulator, providing information for the benefit of DVB-I clients operating within the relevant nation or region.

- A DVB-I client manufacturer, serving only their own clients

- A third-party Service List aggregator.

The Service List Registry shall be able to respond to queries issued by DVB-I clients.

Queries can be issued with or without query parameters. They may take advantage of client's knowledge of the user's geographical location or language preferences, or by offering the user a choice.

Query strings are included as part of the URL, as in the following example:

```
http://www.service-list-registry.com/query?<parameter1>=value1&<parameter2>=value2
```

The following parameters/attributes can be used in queries (see clause 5.3 for description):

- ProviderName

- Language

- Genre

- TargetCountry

- regulatorListFlag

Examples of queries to a Service List Registry (see also clause 7.2.4):

- `https://csr.dvbservices.com/query?TargetCountry=ITA&regulatorListFlag=true`
  Query to the CSR for the official DVB-I Service List published by the Italian National Authority;

- `https://dvbisr.private-service-list-registry.com/query?Language=en&TargetCountry[]=DEU&TargetCountry[]=AUT`
  Query for all DVB-I service lists targeted at Germany or Austria and in English language;

- `https://dvbisr.private-service-list-registry.com/query?ProviderName=TVfromTheWorld`
  Query for all DVB-I service lists published by a Service list Provider named "TVfromTheWorld".

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).

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

Broadcasters may signal the 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 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 DVB A126 [12]. 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
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 siganlled URI contains a query to a Service List Registry
0x03 – 0xff	reserved for future use

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 keep them as separate lists or offer a mechanism to allow the user to pick a service list.

5.1.4 Relationships

The following figure summarises the concepts of Service List Registry, Service List and Service:
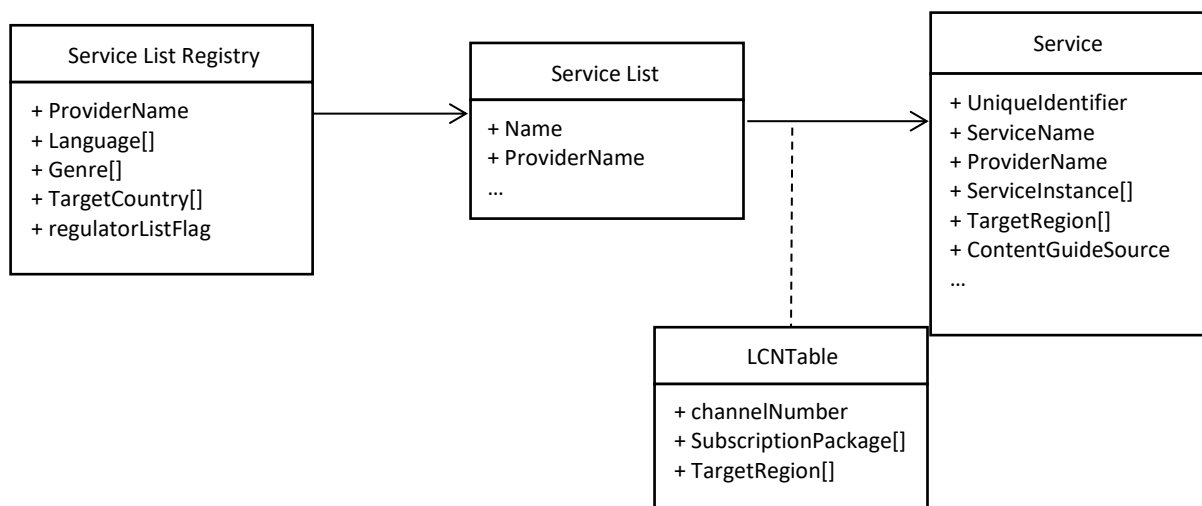
Figure 3: Relationships among Service List Entry Point, Service List, Service and LCN Table

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.

5.1.5 Subscription Packages

The optional element `<SubscriptionPackage>` describes a subscription package that applies to an LCN Table or a service instance and corresponds to the name of a package that can be subscribed to by the user. 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 on a service list or service instances on a service list. 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.

Following cases are envisaged in DVB-I deployments:

- A service list provider may wish to signal a different service order is part of a subscription package of a viewer. In that case, different `<SubscriptionPackage>` elements in the respective different LCN Tables would allow to select 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. A 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. A 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.

NOTE: The determination of the subscription packages to be matched with the entries in the DVB-I service list is out of scope the present document. For example, it could be a user choice, a DRM or common interface feature or an application environment feature.

5.1.6 Content Launching Service

A Content Launching Service is a specific instance of a `<Service>` (refer to clause 5.5.2) in a Service List that is used to start an application and does not directly have any audiovisual media. The Service elements contain the following values:

- `UniqueIdentifier` – as defined in clause 5.5.2

- `ServiceInstance` – only one service instance is permitted with the following values:

  - `DisplayName` – as defined in clause 5.5.4

  - `RelatedMaterial` – as defined in clause 5.5.4

    - At least one element signaling an application according to clause 5.2.3 with a `HowRelated@href` value of `urn:dvb:metadata:cs:LinkedApplicationCS:2019:2`.

  - `DRMSystemID` – not applicable

  - `ContentAttributes` – not applicable

  - `Availability` – as defined in clause 5.5.4

  - `SubscriptionPackage` – as defined in clause 5.5.4

- `FTAContentManagement` – not applicable

- `DVBTDeliveryParameters` – not allowed

- `DVBSDeliveryParameters` – not allowed

- `DVBCDeliveryParameters` – not allowed

- `SATIPDeliveryParameters` – not allowed

- `RTSPDeliveryParameters` – not allowed

- `MulticastTSDeliveryParameters` – not allowed

- `@priority` – not applicable

- `TargetRegion` – as defined in clause 5.5.2

- `ServiceName` – as defined in clause 5.5.2

- `ProviderName` – as defined in clause 5.5.2

- `RelatedMaterial` – as defined in clause 5.5.2

- `ServiceGenre` – as defined in clause 5.5.2

- `ServiceType` – set to `other` (see clause 7.3.4)

- `RecordingInfo` – set to `urn:dvb:metadata:cs:RecordingInfoCS:2019:5` (other, recording not allowed – see clause 7.3.3)

- `ContentGuideSource`, `ContentGuideSourceRef`, `ContentGuideServiceRef` – not applicable

- `@version` – as defined in clause 5.5.2

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-I services discovered using this specification. 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), regionalisation, language or accessibility attributes, among other qualities.

A hybrid DVB-I client may 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 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, describing the DVB-T/C/S service instances matching a given DVB-I service.

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 instance 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 and 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 mandatory for DVB service instance matching		
DVB Delivery System		
DVB-S/S2	DVB-T/T2	DVB-C/C2
	Target Country	
		Network ID
DVB Triplet (ONID, TSID, SID) (see note 1)		

Table 4: Metadata optionally present in the DVB-I service list for matching DVB service instances

Optional metadata elements		
DVB Delivery System		
DVB-S/S2	DVB-T/T2	DVB-C/C2
Orbital Position		
Frequency and Polarization (note 2)		
Service Name (see note 3)		
Target Region (see note 4)		

NOTE 1: ONID or TSID may be wildcards when no value is specified in the metadata, in which case they will match with any value of ONID or TSID.

NOTE 2: The frequency and polarization can only be used by a device when it is able to establish the correspondence between the IF frequency input from the LNB and the transmitted downlink frequency and polarization.

NOTE 3: There may be 0, 1 or more Service Name elements for each service in a DVB-I service list.

NOTE 4: 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 IF 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 IF 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". To enable robust service instance matching, DVB-I clients shall match at least one of the Service Name elements exactly with the Service Name of an installed DVB-T/C/S service. Therefore, all relevant Service Name variants should be provided for each DVB-T/C/S service instance in a DVB-I service list.

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	11054.50MHz Vertical Polarization
DVB Triplet (ONID, TSID, SID)	0x20FA, 0x5014, 0x1019
Service Name	"France 3 Reims"; "Fr3 Reims"
Target Region	*(none)*

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"; "Fr3 Reims"
Target Region	*(none)*

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 RFC4151 [3].

5.2.3 Signalling of Applications

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 7.3.2.

- A `<MediaURI>` 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: Permitted values for 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].

Application URIs with other `MediaURI@contentType` values may be signalled. The semantics of such URIs are not defined by the present document.

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

NOTE: The AIT also provides a means to signal applications of different types. See clause 5 of ETSI TS 102 809 [5].

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).

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 `RelatedContent` element with `HowRelated` set to "`urn:dvb:metadata:cs:HowRelatedCS:2019:1000.1`" (see clause 5.2.5.3) where the application type is supported.

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 is active and is selected. 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. The relationship between the initial signalling delivered in the `RelatedMaterial` element, any application signalling delivered as part of the service itself 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. 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.

NOTE: This kind of application is referred to as "broadcast independent" in ETSI TS 102 796 [22]. DVB-I services using an application to control media presentation will appear to have no content when presented by clients that do not support any of the related application types.

5.2.3.3 Dynamic Application Signalling in DVB-I 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.

DVB-I clients that support Service Instances delivered using MPEG-2 Transport Stream over DVB-C/S/T and support 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 ETSI TS 102 809 [5] clause 5.3). 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 ServiceInstances with SourceType "urn:dvb:metadata:source:dvb-t", "urn:dvb:metadata:source:dvb-s" or "urn:dvb:metadata:source:dvb-c". Such elements should not be used. DVB-I clients shall ignore any application signalling using a `RelatedMaterial` element with this `HowRelated@href` attribute when selecting such a broadcast ServiceInstance 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.

DVB-I clients that support Service Instances delivered using MPEG DASH and support an application type that can be signalled by means of a DVB AIT shall support both AITs referenced using a `<RelatedMaterial>` element and AITs referenced from a DVB DASH `EventStream` (see ETSI TS 103 285 [1] clause 9.1.8).

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) within a ServiceInstance with SourceType "urn:dvb:metadata:source:dvb-dash" shall take effect until superseded by presentation of an MPEG DASH `Period` that contains an `EventStream` with `schemeIdUri` set to "urn:dvb:dash:appsignalling:2016". Presentation of an MPEG DASH `Period` without such an `EventStream` shall have no effect on application signalling.

If a `RelatedMaterial` element with a `HowRelated@href` attribute set to "urn:dvb:metadata:cs:LinkedApplicationCS:2019:1.1" is used with a `ServiceInstance` with `SourceType` of "urn:dvb:metadata:source:dvb-dash" then care should be taken to ensure that any Period in the DASH MPD that contains an `EventStream` with `schemeIdUri` set to "urn:dvb:dash:appsignalling:2016" signals the same application (as defined by org_id and app_id) using the MPD event based signalling defined in clause 9.1.8 of ETSI TS 103 285 [1]. Applications signalled in the service list but not in any such `EventStream` present in the MPD can be expected to be killed as if they were not signalled in the service at all.

NOTE: Signalling an application in the service list enables the application to be started considerably faster than is the case for an application only signalled in the MPD.

5.2.3.4 Application Signalling Precedence

Applications can be referenced at Service or Service Instance level. A `RelatedMaterial` element within a `ServiceInstance` 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 `MediaURL@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 the `Service` element with that `HowRelated@href` value and has the same `MediaURI@contentType` value.

5.2.4 Use of XML AIT in application linking

5.2.4.1 General

Where references in the Service List or Content Guide link to an application this shall be provided by the XML AIT based mechanism (see clause 5.4 of ETSI TS 102 809 [5]) described in this clause. This clause assumes HbbTV applications only, launching other application types is outside the scope of this document.

The signalling, announcement and discovery of broadcast-independent applications is explicitly **not** defined in clause 7.2.3.2 of ETSI TS 102 796 [22] therefore this clause describes the linkage from Service List or Content Guide.

While the metadata described in clause 6 can be used to determine the availability of content, the AIT mechanism described here is used to determine whether a client device has the capability to play the content. For deep links to content (on-demand and live streams) both the availability and capability shall be determined before an item of content is indicated as available to the user. 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 a number of individual XML AIT "types" that require different processing by a DVB-I client. These are:

- Linear IP Service Deep-linked XML AIT - This may be linked to via one of the `RelatedMaterial` elements within a `Service` element (see clause 5.5.2) or within the `ServiceInstance`. This is described in further detail within clause 5.2.4.3.

- Content deep-linked XML AIT – For On Demand Programs, this is linked to via the `ProgramURL` element in an `OnDemandProgram` element of the content guide as described in clause 6.11.8. For Restart, this is linked to via the `MediaUri` element in a `HowReleated` element in a `ScheduleEvent` element as described in clause 6.11.7. Context deep-linked XML AITs are described in greater detail in clause 5.2.4.4.

- Template XML AIT – For On Demand Programs, this is linked to via the `AuxiliaryURL` element in an `OnDemandProgram` element as described in clause 6.11.8. For Restart this 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 is greater detail in clause 5.2.4.5.

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

All XML AIT files must also reference the MIME type `application/vnd.hbbtv.xhtml+xml` within the `mhp:ApplicationDescription.mhp:type.mhp:OtherApp` element as defined in clause 7.2.3.2 of ETSI TS 102 796 [22].

XML AIT files may be served over HTTP or HTTPS protocols.

Informative: The use of the Template XML AIT mechanism allows a single cacheable document to be used to indicate the application required (i.e. device capability) 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 client device 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 client device fetch and process the content deep-linked AIT. This is illustrated in figure 4.

Note the "context" addition to the AIT request URL is described in clause 5.2.4.5.6.
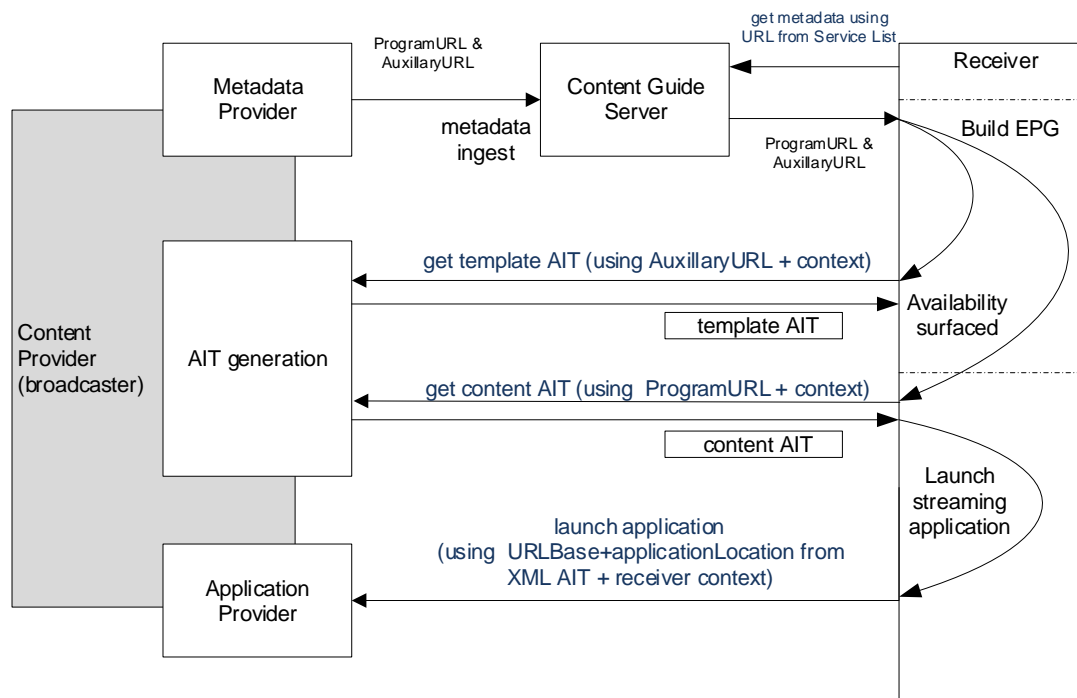
Figure 4: Template XML AIT and Content Deep-link XML AIT process

5.2.4.2 Device Criteria

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` – 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 [22]. The client shall ignore applications listed with values other than `application/vnd.hbbtv.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 [22]. 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 [22]. 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 5.2.4.5.6, 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 Linear IP Service deep-linked XML AIT

The purpose of the linear IP service deep-linked XML AIT is to provide a mechanism to launch a Content Provider player that automatically starts streaming of a linear channel. This shall be referenced via the `Service` or `ServiceInstance` see clauses 5.5.2 and 5.5.4.

Within the XML AIT the concatenation of `URLBase` and `applicationLocation` shall form a URL, which shall launch an application in an appropriate state for launching from a service.

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 5.2.4.5.6. Both `URLBase` and `applicationLocation` may contain `<![CDATA[]]>` encapsulated text, UTF-8 or HTML entity encoded characters. 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 5.2.4.5.6 for further details on these parameters.

The linear IP service deep-linked XML AIT may be referenced in the `Service.RelatedMaterial.MediaLocator.MediaURI` element of the service (see clause 5.5.2) or the `Service.ServiceInstance.RelatedMaterial.MediaLocator.MediaURI` element of the service instance (see clause 5.5.4). Specifically, these links can be identified by the `RelatedMaterial.HowRelated@href` attribute as described in clause 6.11.12.

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).

The structure of the linear IP service XML AIT will be as shown in figure 5.

```
<?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>http://www.channel7.com/</mhp:URLBase>
        </mhp:applicationTransport>
        <mhp:applicationLocation>player/service/channela</mhp:applicationLocation>
      </mhp:Application>
    </mhp:ApplicationList>
  </mhp:ApplicationDiscovery>
</mhp:ServiceDiscovery>
```
Figure 5: Example - Linear Service Deep-Linked XML AIT

5.2.4.4 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 5.2.4.5.6. Both `URLBase` and `applicationLocation` may contain `<![CDATA[]]>` encapsulated text, UTF-8 or HTML entity encoded characters. 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 5.2.4.5.6 for further details on these parameters.

For On Demand Programs, 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 term `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
<?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>http://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

5.2.4.5 Template XML AIT

5.2.4.5.1 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 Programs, 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 5.2.4.5.6 for further details on these parameters.

5.2.4.5.2 On Demand Programs

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.

5.2.4.5.3 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` term `urn:fvc:metadata:cs:HowRelatedCS:2018:restart` within a `Schedule.ScheduleEvent.InstanceDescription` element.

5.2.4.5.4 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` term `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>
```

5.2.4.5.5   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 6.2.4. 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 6.2.4.

```xml
<?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>http://www.channel7.com/</mhp:URLBase>
        </mhp:applicationTransport>
        <mhp:applicationLocation/>
      </mhp:Application>
    </mhp:ApplicationList>
  </mhp:ApplicationDiscovery>
</mhp:ServiceDiscovery>
```
Figure 7: Example - Template XML AIT

5.2.4.5.6   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 [14]. 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 [22]

Example URL:

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

5.2.5 Signalling of Part Time Services

5.2.5.1 General

A DVB-I Service, or a replacement for a DVB-I 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 though the `<Availability>` element within the service location and are referred to as the Scheduled Service Hours.

5.2.5.2 Scheduled Service Hours

DVB-I 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.

For services that are not always available, an `<Availability>` element shall be added into the Service Location to denote the hours of days, days of week and weekly cadence that the service 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, for example

A service 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>`, 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, for example

A service 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.

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 service hours, several options are available

- 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 `<RelatedMaterial>` element with the following

- A `<HowRelated>` element with an `@href` attribute carrying the value "`urn:dvb:metadata:cs:HowRelatedCS:2019:1000.1`". This classification scheme is defined in clause 7.3.1.

- Optionally a `<Format>` element containing a `<StillPictureFormat>` element depicting the horizontal resolution in pixels in the `@horizontalSize` attribute, the vertical resolution in pixels in the `@verticalSize` attribute and either "`urn:mpeg:mpeg7:cs:FileFormatCS:2001:1`" (JPEG image) or "`urn:mpeg:mpeg7:cs:FileFormatCS:2001:15`" (PNG image) in the `@href` attribute

- A `<MediaLocator>` element including a `<MediaURI>` whose value contains a URI to the image file and whose `@contentType` attribute carries either "`image/jpg`" or "`image/png`"

Multiple out of service images can be signalled. Other image formats can also be provided.

5.2.6 Logos

5.2.6.1 Service List Logos

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

- A `<HowRelated>` element with an `@href` attribute carrying the value "`urn:dvb:metadata:cs:HowRelatedCS:2019:1001.1`". This classification scheme is defined in clause 7.3.1.

- Optionally a `<Format>` element containing a `<StillPictureFormat>` element depicting the horizontal resolution in pixels in the `@horizontalSize` attribute, the vertical resolution in pixels in the `@verticalSize` attribute and either "`urn:mpeg:mpeg7:cs:FileFormatCS:2001:1`" (JPEG image) or "`urn:mpeg:mpeg7:cs:FileFormatCS:2001:15`" (PNG image) in the `@href` attribute

- A `<MediaLocator>` element including a `<MediaURI>` whose value contains a URI to the image file and whose `@contentType` attribute carries either "`image/jpg`" or "`image/png`"

Multiple service list logos can be signalled. Other image formats can also be provided. DVB-I Clients can request the image be scaled to a different resolution prior to delivery according to the method defined in clause 6.9.3.

5.2.6.2 Service Logos

Logos for the service shall be signalled in a `<RelatedMaterial>` element within the service with the following

- A `<HowRelated>` element with an `@href` attribute carrying the value "`urn:dvb:metadata:cs:HowRelatedCS:2019:1001.2`". This classification scheme is defined in clause 7.3.1.

- Optionally a `<Format>` element containing a `<StillPictureFormat>` element depicting the horizontal resolution in pixels in the `@horizontalSize` attribute, the vertical resolution in pixels in the

@verticalSize attribute and either "urn:mpeg:mpeg7:cs:FileFormatCS:2001:1" (JPEG image) or "urn:mpeg:mpeg7:cs:FileFormatCS:2001:15" (PNG image) in the @href attribute

- A <MediaLocator> element including a <MediaURI> whose value contains a URI to the image file and whose @contentType attribute carries either "image/jpg" or "image/png"

Multiple service logos can be signalled. Other image formats can also be provided. DVB-I Clients can request the image be scaled to a different resolution prior to delivery according to the method defined in clause 6.9.3.

5.2.6.3 Content Guide Source Logos

Logos for the content guide source shall be signalled in a <RelatedMaterial> element within the service list with the following

- A <HowRelated> element with an @href attribute carrying the value "urn:dvb:metadata:cs:HowRelatedCS:2019:1002.1". This classification scheme is defined in clause 7.3.1.

- Optionally a <Format> element containing a <StillPictureFormat> element depicting the horizontal resolution in pixels in the @horizontalSize attribute, the vertical resolution in pixels in the @verticalSize attribute and either "urn:mpeg:mpeg7:cs:FileFormatCS:2001:1" (JPEG image) or "urn:mpeg:mpeg7:cs:FileFormatCS:2001:15" (PNG image) in the @href attribute

- A <MediaLocator> element including a <MediaURI> whose value contains a URI to the image file and whose @contentType attribute carries either "image/jpg" or "image/png"

Multiple content guide source logos can be signalled. Other image formats can also be provided. DVB-I Clients can request the image be scaled to a different resolution prior to delivery according to the method defined in clause 6.9.3.

5.2.7 Description of DVB-I linear services and playlists

5.2.7.1 General

A DVB-I Service 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/personalised, i.e., the sequence of audio/video assets is dynamically created by the playlist server (see Figure 1) when requested. The playlist signalled to the DVB-I client as a DASH service with a content type that differentiates it from a regular DVB DASH manifest file.

Personalisation 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

DVB-I clients 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.
- If @contentType attribute carries "application/xml", the URL refers to an XML file provided by a playlist server, which in turn describes a dynamic/personalised playlist (see example below).

5.2.7.3 Examples

a) Description of a DVB-I linear service

```
<ServiceInstance>
  <DisplayName>Linear Service 24/7</DisplayName>
  <SourceType>urn:dvb:metadata:source:dvb-dash</SourceType>
  <DASHDeliveryParameters>
    <UriBasedLocation contentType="application/dash+xml">
      <URI>
        http://www.broadcaster.com/mpd/linear_service_24x7.mpd
```

```
      </URI>
    </UriBasedLocation>
  </DASHDeliveryParameters>
</ServiceInstance>
```

b)   Description of a dynamic/personalised playlist

```
<ServiceInstance>
  <DisplayName>Static Playlist</DisplayName>
  <SourceType>urn:dvb:metadata:source:dvb-dash</SourceType>
  <DASHDeliveryParameters>
    <UriBasedLocation contentType="application/xml">
      <URI>
        http://www.playlist_provider.com/playlists/MyPlaylist.xml
      </URI>
    </UriBasedLocation>
  </DASHDeliveryParameters>
</ServiceInstance>
```

where file MyPlaylist.xml is generated as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<Playlist xmlns="urn:dvb:metadata:servicediscovery:2019"
xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2019 ../dvbi _v1.0.xsd" >
  <PlaylistEntry>http://www.broadcaster.com/mpd/my_first_clip.mpd</PlaylistEntry>
  <PlaylistEntry>http://www.broadcaster.com/mpd/my_second_clip.mpd</PlaylistEntry>
  <PlaylistEntry>http://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>
  <SourceType>urn:dvb:metadata:source:dvb-dash</SourceType>
  <DASHDeliveryParameters>
    <UriBasedLocation contentType="application/dash+xml">
      <URI>
        http://www.broadcaster.com/mpd/first+second+third_clip.mpd
      </URI>
    </UriBasedLocation>
  </DASHDeliveryParameters>
</ServiceInstance>
```

5.3   Service List Entry Points

5.3.1   Service List Entry Point schema

```
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:dvbisId="urn:dvb:metadata:servicelistdiscovery:2019"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2019" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019"
targetNamespace="urn:dvb:metadata:servicelistdiscovery:2019" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2019" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.xsd"/>
  <import namespace="urn:dvb:metadata:servicediscovery:2019" schemaLocation="dvbi_v1.0.xsd"/>
  <element name="ServiceListEntryPoints" type="dvbisId: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="dvbisld:ServiceListEntryPointsType"/>
<complexType name="ServiceListEntryPointsType">
  <sequence>
    <element name="ServiceListRegistryEntity" type="dvbisld:OrganizationType"/>
    <element name="ProviderOffering" type="dvbisld:ProviderOfferingType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

Table 8: Service List Entry Point Fields

Name	Semantic Definition	Constraints
ServiceListEntryPoints	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
ServiceListRegistryEntity	The name and contact info of the organization managing the queried Service List Registry.	Mandatory
ProviderOffering	A list of Service List Providers with the associated Service Lists. Note: If ProviderOffering element is not present, it means that the query does not match any entry in the Service List Registry.	Optional 0 .. ∞

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"/>
        <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 9: 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="dvbisld:OrganizationType"/>
    <element name="ServiceListOffering" type="dvbisld:ServiceListOfferingType" maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

Table 10: Provider Offering Fields

`	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 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="Language" type="tva:AudioLanguageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="Genre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="TargetCountry" type="dvbisd:ISO-3166-List" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="regulatorListFlag" type="boolean" default="false"/>
</complexType>
```

Table 11: 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. 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 .. ∞
Language	The audio language of the Service List's services. Multiple Language elements can be specified in case of multilingual contents.	Optional 0 .. ∞
Genre	The Genre of the contents available for the service list according to the TV Anytime standard**.** A finer grain approach is possible by specifying the Genre at the Service level (ServiceList.Service.ServiceGenre). Simiar 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 7.3.5	Optional 0 .. ∞
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. Note: Particular attention shall be paid when using @regulatorList in conjuncton with multiple target countries.	Optional 0 .. ∞
@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 "False". Multiple values are not allowed.	Optional

5.4 Schema

```
<schema xmlns="http://www.w3.org/2001/XMLSchema" targetNamespace="urn:dvb:metadata:servicediscovery:2019"
xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019" xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2019"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2019" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.xsd"/>
  <element name="ServiceList" type="dvbisd:ServiceListType"/>
</schema>
```

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="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>
<element name="Service" type="dvbisd:ServiceType" minOccurs="0" maxOccurs="unbounded"/>
<any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
    <attribute name="version" type="positiveInteger" use="required"/>
</complexType>
```

Table 12: 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.	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.	Mandatory 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 in this service list.	Optional 0 .. 1
ContentGuideSource	The details of a content guide source providing schedule and programme metadata for services in this service list.	Optional 0 .. 1
Service	The services that are part of this service list.	Optional 0 .. ∞
@version	The version number of the service list. Must be incremented for every published change.	Mandatory

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"/>
    <element name="ServiceType" type="tva:ControlledTermType" minOccurs="0"/>
    <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="dvbisd:ServiceIdentifierType" minOccurs="0"/>
  </sequence>
  <attribute name="version" type="positiveInteger" use="required"/>
</complexType>
```

Table 13: 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 ServiceInstances for a given Service carry the same editorial content.	Optional 0 .. ∞
TargetRegion	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.	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.	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	Optional 0 .. ∞
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 7.3.5	Optional 0 .. ∞
ServiceType	Identifies the representation of the service, selected from the values available in the ServiceTypeCS classification scheme (see clause 7.3.4)	Optional 0 .. 1
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 cause 7.3.3.	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 service id to be used in queries to the Content Guide Server to obtain program metadata for this service.	Optional 0 .. 1
@version	The version number of the service. Must be incremented for every published change.	Mandatory

5.5.3   ServiceIdentifierType

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

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="string" minOccurs="0" maxOccurs="unbounded"/>
        <element name="FTAContentManagement" type="dvbisd:FTAContentManagementType" minOccurs="0"/>
        <element name="SourceType" type="anyURI"/>
        <choice minOccurs="0" maxOccurs="unbounded">
            <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>
            <any namespace="##other" processContents="lax"/>
        </choice>
    </sequence>
    <attribute name="priority" type="integer"/>
</complexType>
```

Table 14: ServiceInstanceType Fields

Name	Semantic Definition	Constraints
DisplayName	Human-readable name of the service associated to this specific Service Location. Multiple service names may be provided as long as they all have different `xml:lang` attributes. When not present, ServiceName is used.	Optional 0 .. ∞
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 Any related material with a particular value of `HowRelated` that is provided within a ServiceInstance element supersedes any corresponding related material with that value of `HowRelated` that is provided within a Service element.	Optional 0 .. ∞
ContentProtection	Denotes the content protection schemes being used for this service instance, together with their corresponding identifiers.	Optional 0 .. ∞
ContentAttributes	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Optional 0 .. 1
Availability	Indicates the period(s) in time when this service location is expected to be active.	Optional 0 .. 1
SubscriptionPackage	Identifies the subscription packages in which this service is included.	Optional 0 .. ∞
FTAContentManagement	DVB-I service instances not using DRM may carry a FTAContentManagement element to define the content management policy for the ServiceInstance. 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].	Optional 0 .. 1
SourceType	Identifies the primary delivery source for this service instance and thus determines the required delivery parameters according to table 15.	Optional 0 .. 1
DVBTDeliveryParameters	Delivery parameters for DVB-T services.	To be specified in accordance with `SourceType` as described in table 15.
DVBSDeliveryParameters	Delivery parameters for DVB-S services.	
DVBCDeliveryParameters	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 DVB A168 [10] delivery.	

Name	Semantic Definition	Constraints
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.	
@priority	The priority of this service instance relative to the other service instances of the service. Selection between service instances which have the same priority is implementation dependant.	Optional

Table 15: 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	DVBCDeliveryParameters
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"/>
    <element name="VideoAttributes" type="tva:VideoAttributesType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="VideoConformancePoint" type="tva:ControlledTermType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="CaptionLanguage" type="tva:CaptionLanguageType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="SignLanguage" type="tva:SignLanguageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

Table 16: ContentAttributesType Fields

Name	Semantic Definition	Constraints
AudioAttributes	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Optional 0 .. ∞
AudioConformancePoint	The conformance point, according to `urn:dvb:metadata:cs:AudioConformancePointsCS:2017`[1] as defined in ETSI TS 101 154 [23], denoting audio formats that may be used in the service.	Optional 0 .. ∞
VideoAttributes	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Optional 0 .. ∞
VideoConformancePoint	The conformance point, according to `urn:dvb:metadata:cs:VideoConformancePointsCS:2017`[2] as defined in ETSI TS 101 154 [23], denoting video formats that may be used in the service.	Optional 0 .. ∞
CaptionLanguage	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Optional 0 .. ∞
SignLanguage	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Optional 0 .. ∞

---

[1] https://www.dvb.org/metadata/cs/2017/AudioConformancePointsCS.xml

[2] https://www.dvb.org/metadata/cs/2017/VideoConformancePointsCS.xml

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

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

Table 17: 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 .. ∞

5.5.7   ContentGuideSourceType

```xml
<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>

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

Table 18: 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.	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.	Mandatory 1 .. ∞
RelatedMaterial	Additional material related to the content guide as a whole. Use to signal the following: Content Guide Source logos, see clause 5.2.6.3	Optional 0 .. ∞
ScheduleInfoEndpoint	The URL for the endpoint of the API providing schedule metadata from this content guide source.	Mandatory
ProgramInfoEndpoint	The 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.	Optional 0 .. 1
GroupInfoEndpoint	The URL for the endpoint of the API providing programme grouping data (e.g. series) from this content guide source.	Optional 0 .. 1
MoreEpisodesEndpoint	The 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.	Optional 0 .. 1

Name	Semantic Definition	Constraints
@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

5.5.8   DVBTripletType

This definition of DVBTripletType is adapted from the DVBTriplet defined in ETSI TS 102 034 [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>
```

Table 19: DVBTripletType 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. This specification 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. This specification 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

For semantic and syntax definitions, refer to Annex D.1.3.2 of ETSI TS 103 205 [2].

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 20: LCNTableEntryType Fields

Name	Semantic Definition	Constraints
@channelNumber	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition of the LCN attribute.	Mandatory
@serviceRef	Reference to the service identified by `UniqueIdentifier` defined in this service list for the logical channel number.	Mandatory
@selectable	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Optional
@visible	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Optional

5.5.11   LCNTableListType

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

Table 21: 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 22: LCNTableType Fields

Name	Semantic Definition	Constraints
TargetRegion	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. 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 .. ∞

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="unsignedInt" default="1"/>
              <attribute name="startTime" type="dvbisd:ZuluTimeType" use="required"/>
              <attribute name="endTime" type="dvbisd:ZuluTimeType" use="required"/>
            </complexType>
          </element>
        </sequence>
        <attribute name="validFrom" type="dateTime"/>
        <attribute name="validTo" type="dateTime"/>
      </complexType>
    </element>
  </sequence>
</complexType>
```

Table 23: ServiceAvailabilityType Fields

Name	Semantic Definition	Constraints
Period		Mandatory

Name	Semantic Definition	Constraints
		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
Interval		Optional 0 .. ∞
@days	Defines which days of the week the service is available. If not specified then the service is available on all days (e.g. `@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.	Mandatory
@endTime	The time of day that the service ceases to be available. If this value is less than the value of `@startTime` the end service ends on the following day.	Mandatory

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 expects the same format as an `xml:time` type, but permits only Zulu time to be specified.

```
<simpleType name="ZuluTimeType">
  <restriction base="time">
    <pattern value="(([01]\d|2[0-3]):[0-5]\d:[0-5]\d(\.\d+)?|(24:00:00(\.0+)?))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="dvbisd:ISO-3166-Code" />
  </sequence>
</complexType>
```

Table 24: DVBTDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service.	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>
  </sequence>
</complexType>
```

Table 25: DVBSDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service.	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 10kHz. 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.	

5.5.18.3 DVBCDeliveryParametersType

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

<simpleType name="NetworkIdType">
  <restriction base="unsignedShort"/>
</simpleType>
<simpleType name="ISO-3166-Code">
  <annotation>
    <documentation xml:lang="en">A country code, as defined by ISO-3166.</documentation>
  </annotation>
  <restriction base="string">
    <pattern value="\c\c\c"/>
  </restriction>
</simpleType>
```

Table 26: DVBCDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service.	Mandatory
TargetCountry	The country 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 27: RTSPDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service.	Mandatory
RTSPURL	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	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 28: MulticastTSDeliveryParametersType Fields

Name	Semantic Definition	Constraints
DVBTriplet	The DVB triplet that can be used to refer to this service.	Optional
IPMulticastAddress	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	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"/>
  </sequence>
</complexType>
```

Table 29: DASHDeliveryParametersType Fields

Name	Semantic Definition	Constraints
UriBasedLocation	Refer to Annex D.1.3.2 of ETSI TS 103 205 [2] for semantic definition.	Mandatory
MinimumBitRate	Threshold bit-rate under which an alternative source for the same service should be preferred, if available.	Optional

5.5.18.7 SATIPDeliveryParametersType

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

Table 30: SATIPDeliveryParametersType Fields

Name	Semantic Definition	Constraints

QueryParameters	Contains a list of query parameters formatted according to 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 CENELEC EN 50585 [11] 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 ServiceInstance in preference to other available serviceInstances 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   FTAContentManagementType

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

Table 31: FTAContentManagementType Fields

Name	Semantic Definition	Constraints
@userDefined	The semantics of each attribute are those defined for	Mandatory
@doNotScramble	the correspondingly named fields of the	Mandatory
@controlRemoteAccessOverInternet	`FTA_content_management_descriptor` defined in	Mandatory
@doNotApplyRevocation	clause 6.2.18.0 of ETSI EN 300 468 [6].	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">
  <attribute name="cpsIndex" type="string"/>
</complexType>
<complexType name="CASystemType">
  <complexContent>
    <extension base="dvbisd:ProtectionSystemType">
      <sequence>
        <element name="CASystemId" type="string"/>
      </sequence>
```

```
        </extension>
      </complexContent>
    </complexType>
    <complexType name="DRMSystemType">
      <complexContent>
        <extension base="dvbisd:ProtectionSystemType">
          <sequence>
            <element name="DRMSystemId" type="string"/>
          </sequence>
          <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 32: ContentProtection 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 DVB A126 [12].	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 DVB A168 [10]	Optional 0 .. ∞
@encryptionScheme	Indicates the encryption scheme, as defined for @value in clause 8.4 of DVB A168 [10]. For interoperability with client devices that only support a specific pattern of encrypted/unencrypted bytes, the additional 'cbcs-10' value can be used to identify AES-128 CBC with a 1:9 encrypt:skip pattern (10% partial encryption) as referenced in clause 13.7 of HLS Authoring Specification for Apple Devices [24].	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/		

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, or content licensing restrictions.

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.

Table 33 provides the semantic definition of RegionListType fields.

Table 33: RegionListType Fields

Name	Semantic Definition	Constraints
PostcodeType	A string containing one postcode, defined by the following pattern expressed in ABNF: Postcode = (ALPHA / DIGIT) *(ALPHA / DIGIT / SP / "-") A postcode may be composed of alphanumeric characters (upper- and lower-case ASCII letters and decimal digits [8]), whitespaces (7-bit ASCII [8] code point 0x20) and hyphens (7-bit ASCII [8] code point 0x2D).	
WildcardPostcodeType	A string containing part(s) of a postcode combined with one wildcard character, defined by the following pattern expressed in ABNF: WcPostcode = "*" (ALPHA / DIGIT) *(ALPHA / DIGIT / SP / "-") WcPostcode /= (ALPHA / DIGIT) *(ALPHA / DIGIT / SP / "-") "*" 1*(ALPHA / DIGIT / SP / "-") WcPostcode /= (ALPHA / DIGIT) *(ALPHA / DIGIT / SP / "-") "*" An asterisk character "*" (7-bit ASCII [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.	
PostcodeRangeType	A type used to define a range of postcodes. Postcode order shall follow ASCII-code [8] order.	
@from	The postcode defining the start of the range.	Mandatory
@to	The postcode defining the end of the range.	Mandatory
LatitudeType	A type used to define the latitude of a set of coordinates, expressed in decimal degrees and defined as follows in ABNF: Latitude = 0*1(- / +) lat-value lat-value = 0*1(1-8) DIGIT ["." 1*DIGIT] lat-value =/ 90 ["." 1*(0)]	
LongitudeType	A type used to define the longitude of a set of coordinates, expressed in decimal degrees and defined as follows in ABNF: Longitude = 0*1(- / +) lng-value lng-value = 180 ["." 1*(0)] lng-value =/ ((1 (0-7) DIGIT) / ([1-9] DIGIT)) ["." 1*DIGIT]	
RadiusType	A type used to define the radius of a circular region, expressed in meters and defined as follows in ABNF: Radius = 1*DIGIT	
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
RegionType	A type used to provide the name and location of a region.	
RegionName	The human-readable name of the region. Mandatory for regions used as target regions by services, to enable selection of the region by the DVB-I client. Mandatory if no sub-regions are provided. Multiple elements of this type shall only be provided if they have different languages, indicated using the xml:lang attribute.	Optional 0 .. ∞
Region	The details of a sub-region within the region. The use of sub-regions shall be limited to at most three levels (e.g. country-level regions containing primary regions, containing secondary regions, which in turn contain tertiary regions). This is equivalent to the target region descriptor hierarchy.	Optional 0 .. ∞
Postcode	A postcode defining the geographical location of the 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 .. ∞

Name	Semantic Definition	Constraints
WildcardPostcode	A postcodes defining the geographical location of the 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 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 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
@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
RegionListType	A type used to define one or more regions. Each region may consist of one or more countries, with one or more primary regions, each with one or more sub-regions. The use of sub-regions shall be limited to two levels (i.e. primary regions containing secondary regions which contain tertiary regions). The regions and/or sub-regions shall be associated with one or more services in the service list.	
Region	The details of a region within the region list, which may contain up to 3 levels of sub-regions.	Mandatory 1 .. ∞

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="[A-Za-z0-9][A-Za-z0-9\- ]*"/>
  </restriction>
</simpleType>

<simpleType name="WildcardPostcodeType">
  <restriction base="string">
    <pattern value="(\*[A-Za-z0-9][A-Za-z0-9\- ]*)|([A-Za-z0-9][A-Za-z0-9\- ]*\*[A-Za-z0-9\- ]+)|([A-Za-z0-9][A-Za-z0-9\- ]*\*)"/>
  </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>

<complexType name="RegionType">
  <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>
    <element name="Region" type="dvbisd:RegionType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence >
  <attribute name="regionID" type="RegionIdType" use="required"/>
  <attribute name="countryCodes" type="dvbisd:ISO-3166-List" use="optional"/>
</complexType>

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

<complexType name="RegionListType">
  <sequence>
    <element name="Region" type="dvbisd:RegionType" maxOccurs="unbounded"/>
  </sequence>
</complexType>
```

5.6.2.3   Region List Examples

Combination of individual postcodes with wildcards and ranges

```
<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>
 <Region countryCodes="ITA" regionID="Italy">
  <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 intended to help DVB-I clients 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(s) 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.

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 one or more regions. 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(s) 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 DVB-I services, typically following country selection.

DVB-I clients may use a variety of methods to select a region including manual selection, matching against a known post code 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 3 levels (e.g. country-level regions containing primary regions, containing secondary regions, which in turn contain tertiary regions). Selectable regions 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 it's 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. Regions that match with the user's postcode shall automatically be selected by the DVB-I client. The DVB-I client may additionally offer manual selection. If so, the regions automatically selected should be preselected in the list offered to the user.

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. Where a client determines that there are multiple regions appropriate for the viewer's location, clients may offer the viewer a choice or may choose the first listed region. Clients should provide a means for alternative regions to be selected. Regions automatically selected should be preselected in the list offered to the user.

The following is an example of an installation sequence:

1. User selects their country.
2. User chooses to install DVB-I services and selects the service (list) provider.
3. Client retrieves the service list.
4. Client determines the region using the region list by:
   a. showing the user a list of regions, enabling the user to select one,

b. or asking the user to enter their postcode and matching that with a postcode (or postcode range) in the region list,

c. or 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.

5.7 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 34: 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 UK DTT Freeview Play specifications.

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

Client devices 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` object (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 RFC3986 [14] in the query string (within key/value pairs) shall be percent-encoded as defined in clause 2.1 of IETF RFC3986 [14] 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 2048 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 program 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 RFC1738 [13] and clause 2.1 of IETF RFC3986 [14].

6.2.3   HTTP Request Headers

6.2.3.1   Cache-Control Headers

For all responses from a Content Guide Server or Content Provider XML AIT services, the lifetime of responses may be defined by a `Cache-Control: max-age` header (as defined in IETF RFC7234 [16]). Client devices 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 Content Guide Server, so the header shall be checked on the response to each request.

If the `max-age` header is present, client devices shall only request updates after the duration signalled in the header has passed. In this respect, the client device 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 client device shall honour the `max-age` header, where present, while the client device 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 Content Guide Server, depending on the content. These shall be honoured individually.

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

Example header:

        `Cache-Control: max-age=3600`

6.2.3.2   If-Modified-Since Headers

All HTTP requests to a Content Guide Server and Content Provider XML AIT Services shall include an `If-Modified-Since` header as defined in clause 14.25 of IETF RFC2616 [15], 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 client device 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 Content Guide Server shall respond as per a standard `GET` request.

Example header:

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

6.2.4   HTTP Responses

6.2.4.1   Introduction

The Content Guide is 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 responses.

6.2.4.2   400 (Bad Request), 406 (Not Acceptable)

When received on a request to any content guide API endpoint, XML AIT service or image endpont the client device shall not retry the same request and deem it to have failed.

6.2.4.3   401 (Authentication Required), 403 (Forbidden)

This response shall only be used where the Content Guide server requires client authentication. The manner of authentication is outside the scope of this document.

When received on a request to any content guide API endpoint, the client device 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 client device should attempt to re-authenticate immediately.

6.2.4.4   404 (Not Found)

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 6.2.4.7. If the client fails to acquire the Service List then the device 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 or an XML AIT service the client device shall not retry the request and deem it to have failed.

6.2.4.5   500 (System Error), 502 (Bad Gateway), 504 (Gateway Timeout), Connection Failure

When occurring on any request to any content guide API endpoint the client device 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 6.2.4.7. The client device MAY continue to retry until powered off and shall attempt to re-authenticate (if authentication is provided) before each retry.

6.2.4.6   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 content guide API endpoint, XML AIT service or image endpoint the client device shall deem the request to have failed.

6.2.4.7   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 client device shall wait for a random period before retrying the request, where the random period in milliseconds is between `minwait` and `maxwait` values given by:

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

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

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 1600ms 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 104857600ms shall continue to be used for subsequent retries.

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

6.3 Regionalisation

In order to ensure that a DVB-I server endpoint can perform server-side region tailoring of service and content guide information and only relevant data is delivered to a client device, it is optional to provide a means of regionalisation on some of the API calls, notably those calls related to obtaining group information.

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 shared by multiple services.

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 regionalisation 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 client device can make in order to populate its UI. The data returned from the API endpoints is based on the TV-Anytime (TVA) specification, please see clause 6.11 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>
      <HowRelated href="urn:dvb:metadata:cs:HowRelatedCS:2019:1002.1"/>
      <MediaLocator>
        <MediaUri contentType="image/png">
          http://cgs.az.metadata/static/logo.png
        </MediaUri>
      </MediaLocator>
    </RelatedMaterial>
    <ScheduleInfoEndpoint contentType="application/xml">
      <URI>http://cgs.az.metadata/schedule</URI>
    </ScheduleInfoEndpoint>
    <ProgramInfoEndpoint contentType="application/xml">
      <URI>http://cgs.az.metadata/program</URI>
```

```
    </ProgramInfoEndpoint>
    <GroupInfoEndpoint contentType="application/xml">
      <URI>http://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 TVA 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 exists within `ProgramInformation.BasicDescription` each with `type="main"` but with different `xml:lang` values.

6.5   Schedule Information Requests

6.5.1   Introduction

The `<ScheduleInfoEndpoint>` API 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 6.2.3.1, the expiry time contained in the `Cache-Control: max-age` header in returned schedule results shall be respected, however, client devices 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 10800 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 client device 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 10800

    - 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 10800

    - shall be greater than `start_unixtime,` by a value of either 21600 seconds (6 hours) or 43200 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 client device 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.

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 client device. Client devices shall only request information for services that are listed in a DVB-I provided ServiceList.

URL format:

```
<ScheduleInfoEndpoint>?start=<start_unixtime>&end=<end_unixtime>
&sids[]=<service_id>&image_variant=<variant>
```

where:
- `service_id`: shall be a single decimal Service ID as determined by the client device

- only a single occurrence of the `sids[]` parameter shall be passed

- `variant`: (Optional) shall specify an image variant (see clause 6.9.2)

Example URL:

```
<ScheduleInfoEndpoint>?start=1433246400&end=1433268000&sids[]=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 6.11.

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

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 client devices to retrieve schedule information only for the current event and events adjacent to it.

Client devices 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`.

Client devices 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`.

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 client devices 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.

6.5.4   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:

- `ProgramLocationTable` (see clause 6.11.1)

- `ProgramInformationTable` (see clause 6.11.1)

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).

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 recognised 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`.

6.5.4.2   Metadata Merging for Hybrid platforms

The `Schedule@serviceIDRef` attribute shall be used to associate the `Schedule` element with a specific DVB-I service. It shall match `UniqueIdentifier` in the `Service` element (see clause 5.5.2). `ServiceInstance` of `Service` element may be used to provide DVB-I Content guide for a linear broadcast channel.

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 [17], a hybrid client has already associated the DVB-I service ID 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. Client devices 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 shall continue to use the broadcast EIT metadata for these events.
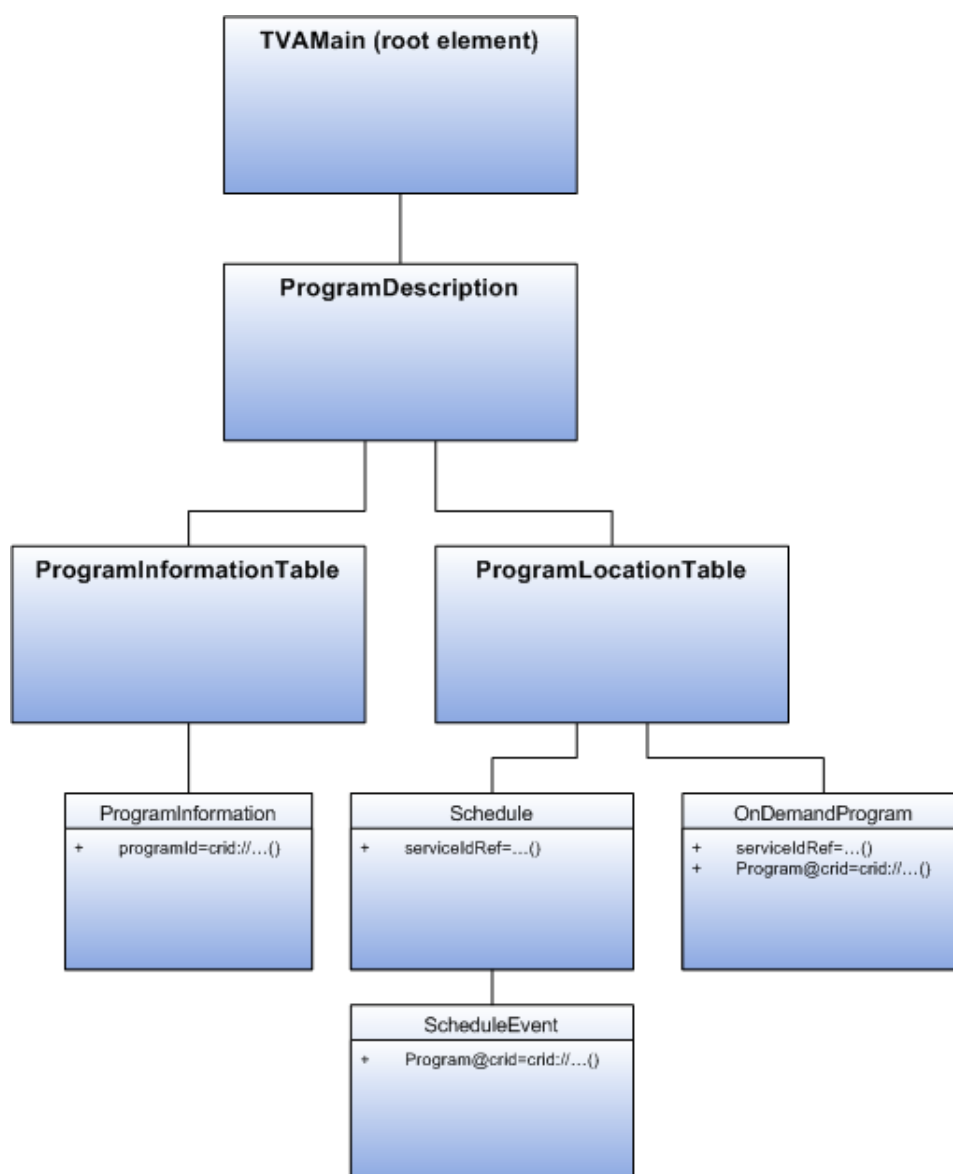
Figure 8: Schedule Information response data structure

6.5.4.3 Example Schedule response

```xml
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2019"
    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="eng">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="eng">
      <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: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">
                    http://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">BBC News at One</Title>
              <Synopsis length="medium"> The latest national and international
                news stories from the BBC News team, followed by weather</Synopsis>
              <Genre href="urn:dvb:metadata:cs:ContentSubject:2019:2" type="main"/>
              <ParentalGuidance>
                <mpeg7:ParentalRating
                   href="urn:fvc:metadata:cs:ContentRatingCS:2014-07:no_parental_controls"/>
                <ExplanatoryText length="long">
                    Contains scenes of violence and strong language.</ExplanatoryText>
              </ParentalGuidance>
              <RelatedMaterial>
                <HowRelated href="urn:tva:metadata:cs:HowRelatedCS:2012:19"/>
                <MediaLocator>
                  <MediaUri contentType="image/png">
                     http://img-ctv.mdata.co.uk/channel7/mybroadcaster_news.png</MediaUri>
                </MediaLocator>
              </RelatedMaterial>
            </BasicDescription>
          </ProgramInformation>
        </ProgramInformationTable>
        <ProgramLocationTable xml:lang="eng">
          <Schedule serviceIDRef="3039" start="2013-09-25T11:15:00Z" end="2013-09-25T12:30:00.000Z">
            <ScheduleEvent>
              <Program crid="crid://channel7.co.uk/b01myjsy"/>
              <ProgramURL>dvb://233a..3039;b2e3</ProgramURL>
              <InstanceDescription>
                <CaptionLanguage closed="true">eng</CaptionLanguage>
                <SignLanguage closed="false">sgn</SignLanguage>
                <AVAttributes>
                  <AudioAttributes>
                    <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:1">
                      eng</AudioLanguage>
                  </AudioAttributes>
                  <AudioAttributes>
                    <MixType href="urn:mpeg:mpeg7:cs:AudioPresentationCS:2001:3"/>
                    <AudioLanguage purpose="urn:tva:metadata:cs:AudioPurposeCS:2007:6">
                      eng</AudioLanguage>
                  </AudioAttributes>
                  <VideoAttributes>
                    <HorizontalSize>1920</HorizontalSize>
                    <VerticalSize>1080</VerticalSize>
                    <AspectRatio>16:9</AspectRatio>
                  </VideoAttributes>
                  <CaptioningAttributes>
                    <Coding href="urn:tva:metadata:cs:CaptionCodingFormatCS:2010:2.1"/>
```

```
            </CaptioningAttributes>
          </AVAttributes>
          <OtherIdentifier type="eit-programme-crid">
            crid://channel7.co.uk/23VD4Q</OtherIdentifier>
          <OtherIdentifier type="eit-series-crid">
            crid://channel7.co.uk/KM9T8E</OtherIdentifier>
        </InstanceDescription>
        <PublishedStartTime>2013-09-25T11:15:00Z</PublishedStartTime>
        <PublishedDuration>PT45M</PublishedDuration>
      </ScheduleEvent>
      <ScheduleEvent>
        <Program crid="crid://channel7.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://channel7.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>
      <Program crid="crid://channel7.co.uk/b01myjsy"/>
      <ProgramURL contentType="application/vnd.dvb.ait+xml">
        http://channel7.co.uk/ait.aitx?pid=b01myjsy</ProgramURL>
      <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
        http://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">eng</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 9: Example - 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 6.11.4 and 6.11.16.2.

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

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 `InstanceDesciption` 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 10:

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

Figure 10: Example - Restart Output – InstanceDescription of ScheduleEvent (part)

The `RelatedMaterial` element has a term of `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 devices shall use to determine device compatibility with the Restart stream. The Template XML AIT rules of clause 5.2.4.5 apply.

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

- **restart_available**

  `urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_available`
  Subject to Template AIT rules of clause 5.2.4.5, the device 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. Devices shall be robust to the possibility that a request for the Restart AIT fails – for example, an error message shoul;d be displayed to the user.

- **restart_check**

  `urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_check`
  Restart may be available, but the device needs to check with the Content Provider. Assuming the Template AIT rules of clause 5.2.4.5 have been satisfied, the device 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 device shall display the option to restart to the user but if an invalid Restart AIT is returned then the device 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 isn't currently. Devices 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.

Devices 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   Program Information Request

6.6.1   Request

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

The following API endpoint allows a client device to retrieve detailed information on a specific program, 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 6.11.4). 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 6.9.2)

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 6.11.1).

- 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 program, 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 6.2.3.1, the expiry time contained in the Cache-Control: max-age header in returned programme results shall be respected.

6.6.2   Response

A Content Guide Server shall return a well-formed XML document consisting of the following tables:

1. ProgramInformationTable (see clause 6.11.1)

2. ProgramLocationTable (see clause 6.11.1)

The following attributes may be used to associate ProgramInformation and OnDemandProgram elements provided from the Detailed Program Information API 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).

The Detailed Programme Information API 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 client device from a Schedules response if necessary.
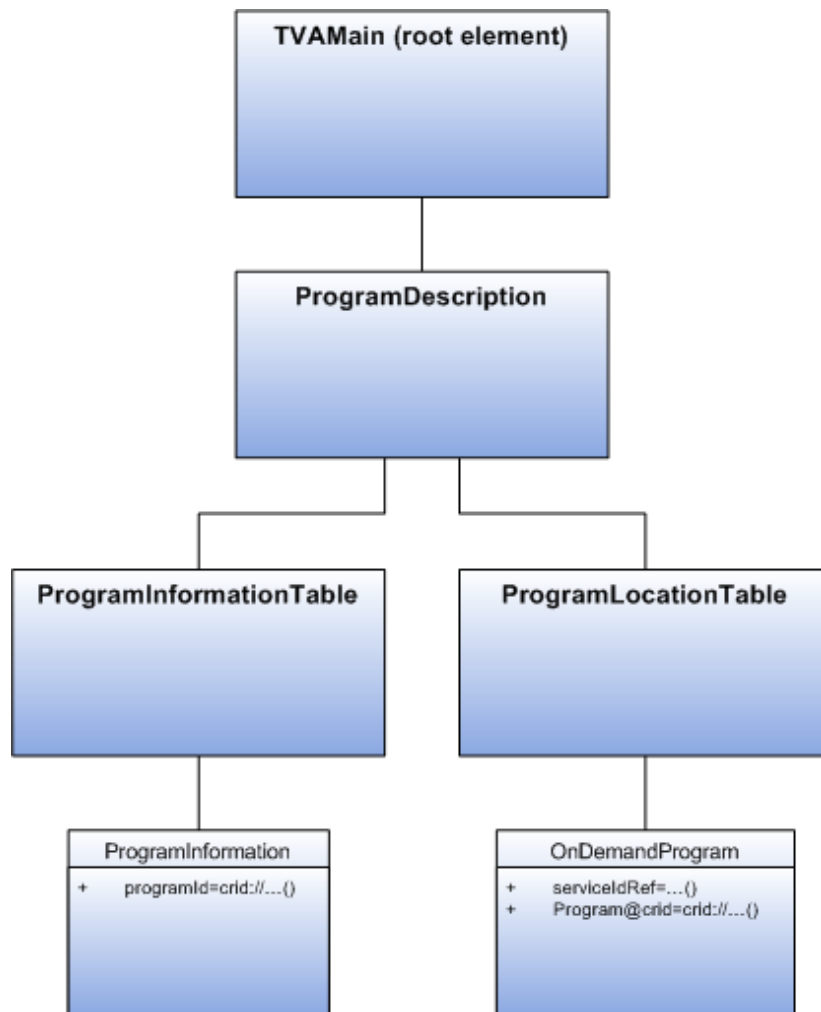
Figure 11: Detailed Programme Information response data structure

Example URL:

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

```xml
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2019"
  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="eng">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="eng">
      <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: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:2010:V20">
          <OrganizationName>ITV Studios Limited</OrganizationName>
        </CreditsItem>
        <CreditsItem role="urn:tva:metadata:cs:TVARoleCS:2010: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">
            http://img-ctv.mdata.co.uk/channel7/bargain_hunt.png
          </MediaUri>
        </MediaLocator>
      </RelatedMaterial>
    </BasicDescription>
  </ProgramInformation>
 </ProgramInformationTable>
<ProgramLocationTable xml:lang="eng">
  <OnDemandProgram serviceIDRef="http://channel7.co.uk/service_a_content_owning">
    <Program crid="crid://channel7.co.uk/b01myjsy"/>
    <ProgramURL contentType="application/vnd.dvb.ait+xml">
      http://channel7.co.uk/ait.aitx?pid=b01myjsy</ProgramURL>
    <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
      http://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">eng</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 12: Example – Detailed Programme Information Response

6.7 More Episodes (Siblings Group Information) 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.

6.7.2 Request

The More Episodes endpoint allows a client device to retrieve a list of more episodes related to a specific program. The program 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 6.11.4).

More Episodes results shall be provided in TVA compliant data structures, similar to the other API endpoints described within this specification. This format is defined in clause 6.7.3 while details on the pagination of these results can be found in clause 6.10.

More Episodes results shall be filtered by a Content Guide Server to be regionally relevant based on regionality information (`regionID` from the provided `RegionList`, see clause 5.6.2) provided by the client device 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=<image_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 MUST be percent-encoded as defined above.

- `region_id_x`: may be a single `regionID` as determined by the client device (see clause 5.6.2)

    - At least one `regionID[]` parameter shall be passed. More than one `regionID[]` parameter may be passed.

- `image_variant`: (Optional) shall specify an image variant (see clause 6.9.2)

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 6.2.3.1) and If-Modified-Since conditional requests (clause 6.2.3.2) shall be supported for More Episode requests as described in the relevant clauses of this specification.

6.7.3 Response

A Content Guide Server shall return a well-formed TV-Anytime XML document consisting of the following tables:

- `ProgramInformationTable` (see clause 6.11.1)

- `GroupInformationTable` (see clause 6.11.1)

- `ProgramLocationTable` (see clause 6.11.1)

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).

All OnDemand programs 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:

- minimal `ProgramInformation` (see clause 6.11.4)

- minimal `OnDemandProgram` (see clause 6.11.8)

The details of the "minimal" data provided in More Episodes results may be found in the relevant portions of the profile tables in clause 6.11 and complete examples are provided below.

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 6.10. 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. Client devices 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 `ServiceInformation@serviceId` of a Service. This association may be used by client devices, 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 client device shall process the Template XML AIT for each `OnDemandProgram` as specified in clause 5.2.4.5 to ensure that the content is supported by the client device. In the event that this process indicates incompatibility between the content and the client device 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 6.10 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 6.10) of results.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2019" 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="eng">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="eng">
      <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">
                http://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">
                http://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/search/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>
              http://api-ctv.mdata.co.uk/programs/more-
episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2n19alr19&amp;type=ondemand&amp;regionID%5B%5D=1234&amp;
regionID%5B%5D=5678
            </MediaUri></MediaLocator>
          </RelatedMaterial>
          <RelatedMaterial>
            <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:prev"/>
            <MediaLocator><MediaUri>
              http://api-ctv.mdata.co.uk/programs/more-
episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2Fn19alr19&amp;type=ondemand&amp;regionID%5B%5D=1234&amp
;regionID%5B%5D=5678&amp;page=2
            </MediaUri></MediaLocator>
          </RelatedMaterial>
          <RelatedMaterial>
            <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:next"/>
            <MediaLocator><MediaUri>
```

```
              http://api-ctv.mdata.co.uk/programs/more-
episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2Fn19alr19&amp;type=ondemand&amp;regionID%5B%5D=1234&amp
;regionID%5B%5D=5678&amp;page=4
            </MediaUri></MediaLocator>
         </RelatedMaterial>
         <RelatedMaterial>
           <HowRelated href="urn:fvc:metadata:cs:HowRelatedCS:2015-12:pagination:last"/>
           <MediaLocator><MediaUri>
             http://api-ctv.mdata.co.uk/programs/more-
episodes?pid=crid%3A%2F%2Fchannel7.co.uk%2Fn19alr19&amp;type=ondemand&amp;regionID%5B%5D=1234&amp
;regionID%5B%5D=5678&amp;page=4
            </MediaUri></MediaLocator>
         </RelatedMaterial>
       </BasicDescription>
     </GroupInformation>
   </GroupInformationTable>
   <ProgramLocationTable xml:lang="eng">
     <OnDemandProgram serviceIDRef="http://channel7.co.uk/service_a_content_owning">
       <Program crid="crid://channel7.co.uk/n19alrr1"/>
       <ProgramURL contentType="application/vnd.dvb.ait+xml">
         http://channel7.co.uk/ait.aitx?pid=crid://channel7.co.uk/n19alrr1</ProgramURL>
       <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
         http://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_content_owning">
       <Program crid="crid://channel7.co.uk/n19alrr2"/>
       <ProgramURL contentType="application/vnd.dvb.ait+xml">
         http://channel7.co.uk/ait.aitx?pid=crid://channel7.co.uk/n19alrr2</ProgramURL>
       <AuxiliaryURL contentType="application/vnd.dvb.ait+xml">
         http://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 13: 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 client devices, 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 the lists 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 client devices 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).

URL Format:

    <GroupInfoEndpoint>/categories?regionID[]=<region_id_1>&regionID[]=<region_
    id_2>…

where:

- region_id_*x*: (Optional)

    - **Devices using a channel line-up provided by broadcast:** region_id shall be a regionID as determined by the client device (see clause 5.6.2). At least one regionID[] parameter shall be passed. More than one regionID[] parameter may be passed.

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.

For response codes during error conditions and expected client device behaviour, see clause 6.2.3.2 with reference to any content guide API endpoint.

Behaviour regarding Cache-Control support (clause 6.2.3.1) and If-Modified-Since conditional requests (clause 6.2.3.2) 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 TV-Anytime table:

- GroupInformationTable (see clause 6.11.1)

The GroupInformationTable shall consist of a set of GroupInformation fragments which comply with the schema definition detailed in clause 6.11.16.1. 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 client device 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
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2019" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:mpeg7="urn:tva:mpeg7:2008" xml:lang="eng">
  <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">
                  http://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">
                  http://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 14: 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.

6.8.3.2   Request

The Box Set Lists endpoint is provided in order to allow client devices 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 regionIDs provided by the client device 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>&
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 MUST be percent-encoded as defined in clause 6.2.2.

- region_id_*x*: (Optional)

   - **Devices using a channel line-up provided by broadcast:** region_id shall be a regionID as determined by the client device (see clause 5.6.2). At least one regionID[] parameter shall be passed. More than one regionID[] parameter may be passed.

- variant: (Optional) shall specify an image variant (see clause 6.9.2).

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

For response codes in error conditions and expected client device behaviour, see clause 6.2.4 with reference to any content guide API endpoint.

Behaviour regarding Cache-Control (clause 6.2.3.1) and If-Modified-Since conditional requests (clause 6.2.3.2) 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 TV-Anytime table:

- GroupInformationTable (see clause 6.11.1)

The GroupInformationTable shall consist of a set of GroupInformation fragments which comply with the schema definition detailed in clause 6.11.16.1.

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 client device. 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 6.10. 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 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.

Information (title, synopsis and image) about each Box Set shall be contained in a GroupInformation.BasicDescription fragment (see clause 6.11.16.1). The identifier of the Content Launching Service 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
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2019" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:mpeg7="urn:tva:mpeg7:2008" xml:lang="eng">
  <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/content_owning/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>
        <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">
          http://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/content_owning/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">
          http://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 15: 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 paginated.

6.8.4.2 Request

The Box Set Contents endpoint is provided in order to allow client devices 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 client device in the query. The DVB-I client shall not filter the results, whether by region ID or other means.

URL format:

```
<GroupInfoEndpoint>/contents?groupId=<Group_ID>&type=ondemand
&regionID[]=<region_id_1>&regionID[]=<region_id_2>…&image_variant=<variant>
```

where:

- `type:` (Optional) shall carry a value of 'ondemand' or 'linear' to filter the results to `OnDemand` or `ScheduleEvent` respectively.

- `groupId:` (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 MUST be percent-encoded as defined in clause 6.2.2.

- `region_id_x`: (Optional)

    - **Devices using a channel line-up provided by broadcast:** `region_id` shall be a `regionID` as determined by the client device (see clause 5.6.2). At least one `regionID[]` parameter shall be passed. More than one `regionID[]` parameter may be passed.

- `variant:` (Optional) shall specify an image variant (see clause 6.9.2).

Example URL:

```
<GroupInfoEndpoint>/contents?groupId=crid://mdata.co.uk/comedy
&type=ondemand&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.

For response codes in error conditions and expected client device behaviour, see clause 6.2.4 with reference to any content guide API endpoint.

Behaviour regarding Cache-Control (clause 6.2.3.1) and If-Modified-Since conditional requests (clause 6.2.3.2) shall be supported for Box Set Contents requests.

6.8.4.3 Response

The Content Guide Server shall return a well-formed TV-Anytime XML document consisting of the following tables:

- `ProgramInformationTable` (see clause 6.11.1)

- `GroupInformationTable` (see clause 6.11.1)

- ProgramLocationTable (see clause 6.11.1)

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).

All On Demand programs 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:

- minimal ProgramInformation (see clause 6.11.4 and 6.11.5.4)

- minimal OnDemandProgram (see clause 6.11.8)

The details of the "minimal" data provided in Box Set results may be found in the relevant portions of the profile tables in clause 6.11 and complete examples are provided below.

Each response shall contain a single Results Group GroupInformation fragment. The Results Group shall be identified by a structural groupId attribute.

The response may be paginated as defined in clause 6.10. 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 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 this Results Group through the ProgramInformation.MemberOf element. Client devices 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 ServiceInformation@serviceId of a Service. This association may be used by client devices, 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 6.10 for further detail).

```xml
<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xmlns="urn:tva:metadata:2019" xmlns:mpeg7="urn:tva:mpeg7:2008" xml:lang="eng"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <ProgramDescription>
    <ProgramInformationTable xml:lang="eng">
      <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: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">
     http://img-ctv.mdata.co.uk/images/c5/7e/c57eebdd2bc0406781e077ae319ae28c.jpeg
            </MediaUri>
          </MediaLocator>
        </RelatedMaterial>
      </BasicDescription>
      <MemberOf xsi:type="MemberOfType" index="1"
        crid="crid://mdata.co.uk/collections/boxsets/stewart_lee"/>
    </ProgramInformation>
    <ProgramInformation programId="crid://mybroadcaster.co.uk/mdata/episode/b00jhpy6">
      <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">
      http://img-ctv.mdata.co.uk/images/3b/32/3b320ea9fed743979dba14959a32ce09.jpeg
            </MediaUri>
          </MediaLocator>
        </RelatedMaterial>
      </BasicDescription>
      <MemberOf xsi:type="MemberOfType" index="2"
        crid="crid://mdata.co.uk/collections/boxsets/stewart_lee"/>
      <BasicDescription/>
    </ProgramInformation>
  </ProgramInformationTable>
  <GroupInformationTable>
    <GroupInformation groupId="crid://mdata.co.uk/collections/boxsets/stewart_lee"
      ordered="true" numOfItems="2"
      serviceIDRef="http://www.mybroadcaster.co.uk/mdata/service/content_owning/broadcast_two">
      <GroupType xsi:type="ProgramGroupTypeType" value="otherCollection"/>
    </GroupInformation>
  </GroupInformationTable>
  <ProgramLocationTable xml:lang="eng">
    <OnDemandProgram
      serviceIDRef="http://www.bbc.co.uk/nitro/service/content_owning/bbc_two">
      <Program crid="crid://bbc.co.uk/nitro/episode/b00jd8gp"/>
      <ProgramURL contentType="application/vnd.dvb.ait+xml">
https://www.live.bbctvapps.co.uk/ait/launch/iplayer.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/content_owning/broadcast_two">
      <Program crid="crid://mybroadcaster.co.uk/mdata/episode/b00jhpy6"/>
      <ProgramURL contentType="application/vnd.dvb.ait+xml">
https://www.live.mybroadcastertvapps.co.uk/ait/launch/iplayer.aitx?deeplink=tv/playback/b00jhpy6
      </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:FEPGAvailabilityCS: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">
              eng
            </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 16: Example – Box Set Contents Response

6.9   Images

6.9.1   Introduction

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

Services, application, programmes and may have an associated image, referenced in the `ServiceInformation` fragment, `GroupInformation` fragment or `ProgramInformation` fragment within a `RelatedMaterial` element.

> NOTE: Client UI designs vary, for example some client 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 a controlled at source as part of the editorial process. With regard to size it 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 appropriate 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.

6.9.2   Image Variants

A range of variants may be available for certain image categories as defined below. If the default variant isn't required, devices 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 Content Guide Server. If the requested variant is unavailable for an item, then the response shall not contain any image for that item.

Table 35 shows permissible `image_variant` query parameters and corresponding TVA terms used within `RelatedMaterial.HowRelated@href` in the response from a Content Guide Server. The TVA terms are defined in clause 6.12.9.

Table 35: Image variants

Image variant	Query parameter `image_variant=`	Term used `HowRelated@href=`
16:9 colour	`16x9_colour`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_colour`
1:1 colour	`square_colour`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02:square_colour`
16:9 white on transparent	`16x9_white`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_white`
1:1 white on transparent	`square_white`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02:square_white`
16:9 colour light on transparent	`16x9_colour_light`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_colour_light`
1:1 colour light on transparent	`square_colour_light`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02:square_colour_light`
16:9 colour dark on transparent	`16x9_colour_dark`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_colour_dark`
1:1 colour dark on transparent	`square_colour_dark`	`urn:fvc:metadata:cs:ImageVariantCS:2017-02: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 35 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.

Client devices 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 client devices shall ignore any `RelatedMaterial` elements with an unexpected or unrecognised `HowRelated` term.

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`

6.9.3   Image Request

The value of `RelatedMaterial.MediaLocator.MediaUri` shall represent the `image_url` for the image request.
The client may request that the server preform 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.

6.9.4   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 TS 102 796 [22], 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 client device 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 6.9.3:

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

Figure 17: Example - Image Response

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

    `http://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.

6.10   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 of More Episodes 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. Client devices 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 client devices 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.

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 36: Pagination links

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

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

Client devices 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 36 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, devices shall not display the value of `GroupInformation@numOfItems` to the user.

Devices 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 (>1000 programmes) so devices 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 device's UI, and a Content Guide Server indicates a 'next' pagination link, the device shall retrieve and display the next page of results from a Content Guide Server. Devices may pre-emptively request the next page to allow seamless display of results to the user.

When dealing with result pages, client devices shall obey retrieval rules as for other resources by observing the Cache-Control mechanisms defined in clause 6.2.3.1 and providing conditional request headers as defined in clause 6.2.3.2.

Note - It is possible that there may be duplicate results provided, including but not limited to around paging boundaries. Client devices 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.

6.11 Metadata Profile

6.11.1 Schema Overview

6.11.1.1 Introduction

The DVB-I Metadata profile is based on TV-Anytime and the UK Freeview Play Metadata profile.

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

Client devices may ignore any classification schemes, classification scheme terms, elements and attributes not specified within this specification in order to be robust to backwards-compatible changes to the API.

The ordering of elements used in the examples provided within this specification shall not be taken to be explicit unless specified within the corresponding schemas. Client device implementations shall be robust to alternate ordering of elements or inclusion of additional elements where allowed within the bounds of the schemas.
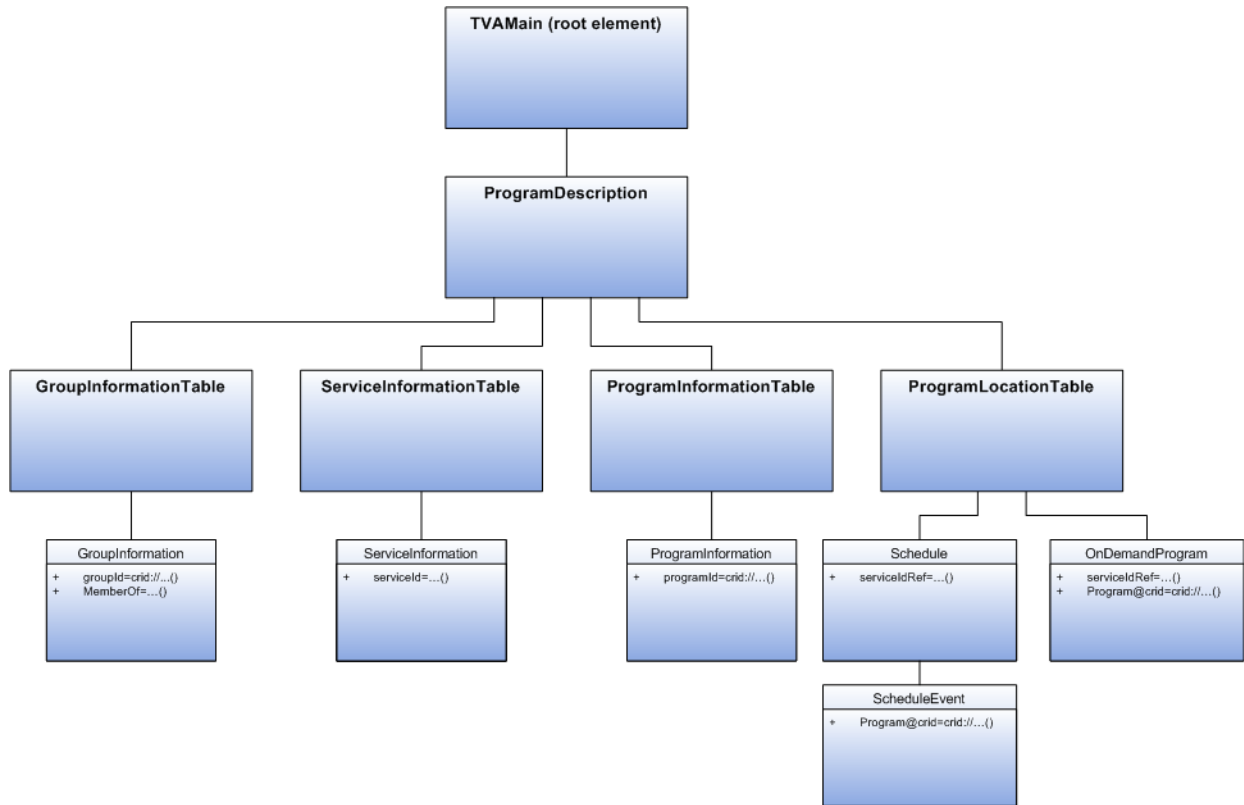
Figure 18: DVB-I TVA data structure overview

1. `GroupInformationTable`
   - `GroupInformation` fragment (schema type: `GroupInformationType`)
2. `ServiceInformationTable`
   - `ServiceInformation` fragment (schema type: `ServiceInformationType`)
3. `ProgramInformationTable`
   - `ProgramInformation` fragment (schema type: `ProgramInformationType`)
4. `ProgramLocationTable`
   - `Schedule` fragment (schema type: `ScheduleType`)
     - `Schedule` fragment (schema type: `ScheduleType`)
   - `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.

6.11.1.2   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 TVA document 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 exists within `ProgramInformation.BasicDescription` each with `type="main"` but with different `xml:lang` values.

6.11.2 Access Services

6.11.2.1 Introduction

This clause describes the indication of Access Services in the metadata provided by a Content Guide Server.

6.11.2.2 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 [18] or a sign language listed in ISO 639-3 [19].

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.

6.11.2.3 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 6.12.3. 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.

6.11.2.4 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 6.12.2.

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 `ScheduleEvents` and `OnDemandPrograms`. It is not indicated in the `ProgramInformation` element.

6.11.3 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. [ServiceInformation].

6.11.4 ProgramInformation Element

Table 37: ProgramInformation Element

Element Name / Required	Description	Example
`@programId` Mandatory {1}	The CRID of the programme. 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.	`<ProgramInformation programId="crid://channe l7.co.uk/b01myjsy">`
`BasicDescription` Mandatory {1}	Complex type describing the ProgramInformation. See clause 6.11.5 for further information.	See clause 6.11.5 for further information
`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.	
`MemberOf` Optional {0..n}	In Schedules response this may indicate group association. For Now/Next Filtered Schedules, 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. 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`.	`<MemberOf xsi:type="MemberOfType" index="5" crid="crid://dvbi.org/se arch/results"/>`
`EpisodeOf` Optional {0..n}	Indicates a series from which the current programme is an episode.	

6.11.5 BasicDescription Elements

6.11.5.1 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.

6.11.5.2 ProgramInformation.BasicDescription Element [Schedules]

Table 38: 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.
	Note – this field may contain UTF-8 encoded characters and/or HTML character entity references
		`<Title type="main">Bargain Hunt</Title>`
		`<Title type="main" xml:lang="deu">Schnäp pchenjagd</Title>`
		
		`<Title type="secondary">01/0 1/2014</Title>`

`Synopsis`
 	
Mandatory {0..2}
	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.
		`<Synopsis length="short">Amanda helps three homeowners in Wokingham. </Synopsis>`
		
		`<Synopsis length="medium">Amand a helps three homeowners in`

	A minimum of one synopsis shall be provided and this shall have the `length` attribute "`medium`". Additionally, a synopsis of length "`short`" may optionally be provided. Note - a long synopsis is only provided via the Detailed Programme Information endpoint. There shall not be more than one synopsis element with the same `length` attribute for a specified language. Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.	Wokingham. Can Raj and Maria fix their decking? Margaret's red and white interior could do with some TLC. 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 TLC. And can Bob and Geraldine update their home?</Synopsis>
`Genre` Optional {0..1}	An element for specifying a 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 7.3.5 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`". Client devices 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:C ontentSubject:2019:4" type="main"/>
`ParentalGuidance` Optional {0..2}	A complex type that contains 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 6.11.14
`RelatedMaterial` Optional {0..2}	A complex type that specifies a related image to the content. A maximum of one `RelatedMaterial` element identifying an image shall be specified – see clauses 6.9.2 and 6.11.12 for further information. Elements with `HowRelated` values that don't 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 6.11.12

6.11.5.3   ProgramInformation.BasicDescription Element [Detailed Programme Information]

Table 39: ProgramInformation.BasicDescription Element [Detailed Programme Information]

Element Name / Required	Description	Example
`Title` Mandatory {1..2}	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.	<Title type="main">Bargain Hunt</Title> <Title type="main" xml:lang="deu">Schnäp pchenjagd</Title>

	Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.	`<Title type="secondary">01/01/2014</Title>`

`Synopsis`
 	
Mandatory {1..3}
	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 1200 characters.
	A minimum of one synopsis shall be provided and this shall have the `length` attribute "`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.
	Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.
		`<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 TLC. 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 TLC. And can Bob and Geraldine update their home?</Synopsis>`

`Keyword`
 	
Optional {0..20}
	An element for specifying 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 `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>`

`Genre` Optional {0..1}	An element for specifying a genre or classification for the programme. 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 7.3.5 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`". Client devices shall be robust to handling the addition of `Genre` elements in future by checking the term given in the `href` 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}	A complex type that contains teh 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 6.11.14

`CreditsList` Optional {0..1}	A complex type that defines a list of credits for the specified programme. A maximum of 40 individual `CreditsItem` elements shall be provided within this `CreditsList` element.	See clause 6.11.13
`RelatedMaterial` Optional {0..1}	A complex type that specifies a related image to the content. A maximum of one `RelatedMaterial` element identifying an image shall be specified – see clauses 6.9.2 and 6.11.12 for further information. Elements with `HowRelated` values that don't refer to an image shall be ignored. Client devices 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 6.11.12

6.11.5.4 ProgramInformation.BasicDescription Element [Box Set Contents]

Table 40: ProgramInformation.BasicDescription Element [Box Set Contents]

Element Name / Required	Description	Example

`Title`
 	
Mandatory {1..2}
	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.
	This field may contain UTF-8 encoded characters and/or HTML character entity references.
		`<Title type="main">Bargain Hunt</Title>`
		`<Title type="main" xml:lang="deu">Schnäppchenjagd</Title>`
		
		`<Title type="secondary">01/01/2014</Title>`

`Synopsis` Mandatory {1}	Descriptive text about the entity. 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. This field may contain UTF-8 encoded characters and/or HTML character entity references.	`<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 TLC. And can Bob and Geraldine update their home?</Synopsis>`
`ParentalGuidance` Optional {0..2}	A complex type that contains 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 6.11.14
`RelatedMaterial` Optional {0..1}	A complex type that specifies a related image to the content. A maximum of one `RelatedMaterial` element identifying an image shall be specified – see clauses 6.9.2 and 6.11.12 for further information. Elements with `HowRelated` values that don't refer to an image shall be ignored. Client devices 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 6.11.12

6.11.6 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 41: Schedule Element

Element Name / Required	Description	Example

@serviceIDRef
 	
Mandatory {1}
	It shall match `UniqueIdentifier` of `ContentGuideServiceRef` in the `Service` element (see clause 5.5.2). `ContentGuideServiceRef`, when specified, takes precedence takes precedence over `UniqueIdentifier`. `ServiceInstance` of `Service` element may be used to provide DVB-I Content guide for a linear broadcast channel.	`<Schedule serviceIDRef="`
		`tag:rai.it,2019: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 `ScheduleEvent` within the provided schedule.
	Note - this 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 ISO 8601-1 [20] clause 5.3.3.
		`<Schedule serviceIDRef="`
		`tag:rai.it,2019:rai-"`
		`start="2013-09-25T11:15:00Z"`
		`end="2013-09-25T12:30:00.000Z">`

@end
 	
Mandatory {1}
	Specifies the end time of the latest `ScheduleEvent` within the provided schedule.
	Note - this 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 ISO 8601-1 [20] clause 5.3.3.
		`<Schedule serviceIDRef="`
		`tag:rai.it,2019:rai-"`
		`start="2013-09-25T11:15:00Z"`
		`end="2013-09-25T12:30:00.000Z">`

ScheduleEvent Optional {0..n}	Individual `ScheduleEvent` elements are contained within the schedule wrapper. See clause 6.11.7 for details of the `ScheduleEvent` element.	See clause 6.11.7.

6.11.7 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 42: 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 [17] 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}	Used as a grouping to indicate caption language, sign language and audio/video attributes. See clauses 6.11.9 and 6.11.15 for more information.	See clauses 6.11.9 and 6.11.15.

`PublishedStartTime` Mandatory {1}	The time at which the programme is advertised as starting. Note - this will typically be different from the actual exact start time. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to ISO 8601-1 [20] clause 5.3.3. 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 including BST.	`<PublishedStartTime>2014-07-15T20:42:40Z </PublishedStartTime>`
`PublishedDuration` Mandatory {1}	The duration of the programme as displayed to viewers. Note - this will typically be different from the actual exact duration. The format must adhere to ISO 8601-1 [20] clause 5.3.3.2. Partial representations are also permitted.	`<PublishedDuration>PT1H00M00 S</PublishedDuration>`
`ActualStartTime` Optional {0..1}	The actual start time of scheduled event. Expressed in Coordinated Universal Time (UTC) with the Zulu designator and formatted according to ISO 8601-1 [20] clause 5.3.3.	
`FirstShowing` Optional {0..1}	A boolean flag that specifies this `ScheduleEvent` 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 `true` if this `ScheduleEvent` is the first showing. If the element is omitted or provided with the value `false` then this is not the first showing.	`<FirstShowing value="false" />`
`Free` Optional {0..1}	If not preset, assume "true"	`<Free value="true" />`

6.11.8   OnDemandProgram Element

`OnDemandProgram` elements are surfaced through the Schedules, Detailed Programme Information endpoints.

Table 43: OnDemandProgram Element [Schedules & Detailed Programme Information]

Element Name / Required	Description	Example
`@serviceIDRef` Optional {0..1}	It shall match `UniqueIdentifier` in the `Service` element (see clause 5.5.2). `ServiceInstance` of `Service` element may be used to provide DVB-I Content guide for a linear broadcast channel.	`<OnDemandProgram serviceIDRef="http://www.channel7.com/services/dtt/ChannelA/London">`
`Program` Mandatory {1}	Specifies the CRID of the matching `ProgramInformation@ProgramId` attribute.	`<Program crid="crid://www.channel7.com/version/57984/005/V"/>`
`ProgramURL` Mandatory {1}	An element specifying 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 client devices 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"> http://broadcaster.co.uk:8085/ait?pid=tb0101p3j</ProgramURL>`
`AuxiliaryURL` Optional {0..1}	An element specifying a URL location of a Template XML AIT that can be used to determine whether the content instance specified by `ProgramURL` is compatible with a client 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"> http://broadcaster.co.uk:8085/ait?template</AuxiliaryURL>`

InstanceDescription Mandatory {1}	Used for indicating media asset availability and audio/video attributes - see clause 6.11.15.	See clause 6.11.15
PublishedDuration Mandatory {1}	The advertised duration of the On Demand programme. Note - this will typically be different from the actual exact duration. The format must adhere to ISO 8601-1 [20] clause 5.3.3.2. 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 ISO 8601-1 [20] clause 5.3.3. 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 including BST.	`<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 ISO 8601-1 [20] clause 5.3.3. 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 including BST.	`<EndOfAvailability>2014-04-17T21:00:00Z</EndOfAvailability>`
DeliveryMode Mandatory {1}	The element shall contain the value `streaming`. This element may be used for other use cases not yet defined.	`<DeliveryMode>streaming</DeliveryMode>`
Free Mandatory {1}	A flag to indicate if access to this instance of the programme is free. Value attribute is mandatory and shall be `true` or `false`.	`<Free value="true" />`

6.11.9   AVAttributes Element

Table 44: AVAttributes Element

Element Name / Required	Description	Example
AudioAttributes Optional {0..2} (per language)	Describes the audio characteristics. See clause 6.11.10. A separate `AudioAttributes` element may be provided for each `AudioLanguage@purpose` (Main and Audio Described). Multiple languages may be provided.	See clause 6.11.10
VideoAttributes Optional {0..n}	Describes the video characteristics. See clause 6.11.11. If one or more `VideoAttributes` elements are present then client devices shall assume the content is only available at the resolution(s) specified (i.e. SD, HD, 4K, 8K).	See clause 6.11.11
CaptioningAttributes Optional {0..1} per language	An element providing additional information on the format of subtitles. See clause 6.11.2.3 for further details.	`<CaptioningAttributes><Coding href="urn:tva:metadata:cs:CaptionCodingFormatCS:2010:2.1"/></CaptioningAttributes>`

6.11.10   AudioAttributes Element

Table 45: 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 6.12.1.	`<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 6.12.2 for allowable CS terms.
This element may indicate the presence of audio description. See clause 6.11.2.4 for further details. | `<AudioLanguage purpose="urn:tva:met adata:cs:AudioPurpos eCS:2007:6">eng</Aud ioLanguage>` |

6.11.11 VideoAttributes Element

Table 46: 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).
	Client devices shall only use the VerticalSize to determine if a piece of content is SD, HD, 4K etc.
		`<!--SD -->`
		`<HorizontalSize>576</Ho rizontalSize>`
		
		`<!--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 `HorizontalSize` and `VerticalSize` elements shall be set to the appropriate values (e.g. 1920 and 1080 respectively for HD).
	Client devices shall only use the VerticalSize 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
		`<!--SD -->`
		`<VerticalSize>512</Vert icalSize>`
		
		`<!--HD -->`
		`<VerticalSize>1080</Ver ticalSize>`

AspectRatio Optional {0..1}	The aspect ratio of the video. Permitted values are "16:9" and "4:3".	`<AspectRatio>16:9</Aspe ctRatio>`

6.11.12 RelatedMaterial Element

Table 47: RelatedMaterial Element

Element Name / Required	Description	Example

HowRelated
 	
Mandatory {1}
	Describes the type of related material to the content. An item from the `HowRelatedCS` vocabulary shall be assigned to the `href` attribute of the element.
	The `href` attribute shall carry a value specified in clause 7.3.1 where the `RelatedMaterial` fragment contains a link to an application, an application logo, service logo or programme image in the `MediaLocator.MediaUri` element.
	The `href` attribute shall carry a value of `urn:tva:metadata:cs:HowRelatedCS:2012:10.5` where the `RelatedMaterial` fragment contains an OnDemand Player URL in the `MediaLocator.MediaUri` element.
		`<!-- Service Logo (Promotional Still image) -->`
		`<HowRelated href="urn:tva:metada ta:cs:HowRelatedCS:2 012:19" />`
		`<!-- Programme Image (Promotional Still image) -->`
		`<HowRelated href="urn:tva:metada ta:cs:HowRelatedCS:2 012:19" />`
		`<!-- OnDemand Player Link --->`
		`<HowRelated`

	The `href` attribute shall carry one of the values defined in clause 6.10 where links to other pages in a results set are returned.	`href="urn:tva:metada ta:cs:HowRelatedCS:2 012:10.5" />`
`Format` Optional {0..1}	Only the `StillPictureFormat` sub-element is permitted.	

`MediaLocator`
 	
Mandatory {1}
	Specifies the location of the media asset or content. Defined as an MPEG-7 datatype, MediaLocatorType (see clause 6.5.2 of ISO/IEC 15938-5 [21] for a detailed description).	`<MediaLocator>`
		`<MediaUri`
		`contentType="image/p ng"`
		`>http://www.channel7 .com/channela/image. jpg</MediaUri>`
		`</MediaLocator>`

`PromotionalText [ServiceInformation]`
 	
Optional {0..1}
	Provides alt-text for images, specifically only for Service logos.
	The length of the text shall not exceed 250 characters.
	Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.
		`<PromotionalText>`
		`Service A logo`
		`</PromotionalText>`

6.11.13 CreditsItem Element

A maximum of 40 `CreditsItem` elements shall be present within a `CreditsList` element.

`CreditsItem` elements shall be specified in one of the following ways:

- `PersonName`

- `PersonName` and `Character`

- `OrganizationName`

Table 48: CreditsItem Element

Element Name / Required	Description	Example
`@role` Mandatory {1}	Identifies the type of credit that this `CreditsItem` relates to. The value shall be an item from either the RoleCS or TVARoleCS classification schemes. See clause 6.12.5 for allowed terms and the display text to use for each.	`<CreditsItem role="urn:mpeg:mpeg7:cs:Role CS:2001:INTERVIEWER">`
`PersonName` Optional {0..1}	An element giving the Name of the person. This element shall only be supplied if `OrganizationName` is not present.	

`PersonName.mpeg7: GivenName`
 	
Mandatory if PersonName present {1}
	An element giving the Name used to address the person or character – typically first name.
	The length of the text shall not exceed 32 characters.
	Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.
		`<PersonName>`
		`<mpeg7:GivenName>Jeremy</mpe g7:GivenName>`
		`</PersonName>`

`PersonName.mpeg7: FamilyName`
 	
Optional {0..1}
	An element giving the Surname of the person.
	The length of the text shall not exceed 32 characters.
	Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.
		`<PersonName>`
		`<mpeg7:GivenName>Jeremy </mpeg7:GivenName>`
		`<mpeg7:FamilyName>Brown</mpe g7:FamilyName>`
		`</PersonName>`

`Character` Optional {0..1}	An element giving the Name of the character. This element shall only be supplied if `PersonName` is also present.	

`Character.mpeg7: GivenName`	An element giving the Name used to address the character – typically first name.
	The length of the text shall not exceed 32 characters.
		`<Character>`
		`<mpeg7:GivenName>Billy </mpeg7:GivenName>`
		`</Character>`

	Note – this field may contain UTF-8 encoded	
Mandatory if Character present {1}	characters and/or HTML character entity references.	

`Character.mpeg7: FamilyName`
 	
Optional {1}
	An element giving the Surname of the character. The length of the text shall not exceed 32 characters.
	Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.
		`<Character>`
		`<mpeg7:GivenName>Billy`
		`</mpeg7:GivenName>`
		`<mpeg7:FamilyName>Johns`
		`</mpeg7:FamilyName>`
		`</Character>`

`OrganizationName` Optional {1}	An element giving 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. Note – this field may contain UTF-8 encoded characters and/or HTML character entity references.	`<OrganizationName>ITV Studios Limited</OrganizationName>`

6.11.14 ParentalGuidance Element

Table 49: 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>`

`mpeg7:ParentalRating`
 	
Mandatory for the second `ParentalGuidance` element defined, in addition to the `ParentalGuidance` element containing `mpeg7:MinimumAge`
	Additional ParentalGuidane 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:ParentalGuidan ceCS:2007`, or a scheme defined by local profile, e.g. `urn:dtg:metadata:cs:DTGContentWarn ingCS` shall be used.
	
	A mix of classification schemes may be used for programmes on a service.
		`<!-- ContentRatingCS -->`
		`<mpeg7:ParentalRating href="urn:fvc:metadata:cs:Con tentRatingCS:2014-07:no_parental_controls" />`
		
		`<!-- DTGContentWarningCS -->`
		`<mpeg7:ParentalRating href="urn:dtg:metadata:cs:DTG ContentWarningCS:2011:W"/>`

`ExplanatoryText` Mandatory if `DTGContentWarningCS` specified, otherwise optional {0..1}	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. Note – this field may contain UTF-8 encoded characters and/or HTML character entity references	`<ExplanatoryText length="long">Contains strong language and flash photography</ExplanatoryText>`

6.11.15 InstanceDescription Element

Table 50: InstanceDescription Element

Element Name / Required	Description	Example
Genre [OnDemandProgram] Mandatory {2}	The href attribute of the Genre element shall indicate one or more of the following: Whether an OdDemand asset may be shown as available in a device content guide. It indicates - availability of the media asset - availability of on-demand programme in a device's forwards EPG The possible values shall be taken from the `MediaAvailabilityCS` and `FEPGAvailabilityCS`. The default values shall be `media_unavailable` and `fepg_unavailable`. See clause 6.12.6 for information on how these indicators shall be used. The type attribute shall carry the value "`other`" or may be omitted.	`<!-- media availability -->` `<Genre href="urn:fvc:metadata:cs:MediaAvailabilityCS:2014-07:media_available" type="other"/>` `<!-- FEPG availability -->` `<Genre href="urn:fvc:metadata:cs:FEPGAvailabilityCS:2014-10:fepg_unavailable" type="other"/>`
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 6.11.2 for further details.	`<CaptionLanguage closed="true">eng</CaptionLanguage>`
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`" or the language of the sign language as defined in ISO 639-3 [19]. See clause 6.11.2.2 for further details.	`<SignLanguage closed="false">sgn</SignLanguage>`
AVAttributes Optional {0..1}	A grouping to contain Audio, Video and Captioning attributes.	See clause 6.11.9
OtherIdentifier [ScheduleEvent] Optional {0..n}	The identifiers of schedule events including the programme CRID (PCRID) and series CRID (SCRID) 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).	`<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>`
OtherIdentifier [OnDemandProgram] Optional {0..n}	The identifier(s) of the content protection scheme(s) used for this On Demand program (`@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>`
Genre [ScheduleEvent] Optional {0..1}	If resent, the href attribute of the Genre element shall indicate the availability of Restart. See clause 6.12.11 for further information.	

HowRelated [ScheduleEvent] Optional {0..1}	A maximum of one `RelatedMaterial` element identifying Restart URLs shall be specified – see clauses 6.12.11 and 6.11.12 for further information.	

6.11.16 GroupInformation Element

6.11.16.1   GroupInformation Element [More Episodes, Box Set Contents]

Table 51: GroupInformation Element [More Episodes, Box Set Contents]

Element Name / Required	Description	Example
@groupId Mandatory {1}	The CRID of the group. For More Episodes this provides the top-level grouping including relative page links (see clause 6.10 for further details).	`<GroupInformation groupId="crid://duk.co.uk/search/results" ordered="true" numOfItems="47">`
@ordered Optional {0..1}	An attribute that defines whether the members of the group are ordered. This shall always be set to `true`.	`<GroupInformation groupId="crid://duk.co.uk/search/results" ordered="true" numOfItems="47">`
@numOfItems Optional {0..1}	An attribute that 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.	`<GroupInformation groupId="crid://duk.co.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, the Service ID used to identify the Content Launching Service to which the Box Set relates. This shall not be present in responses other than Box Set Lists and Box Set Contents.	`<OnDemandProgram serviceIDRef="http://www.channel7.com/services/dtt/ChannelA/London">`
GroupType Mandatory {1}	The `xsi:type` attribute shall always be `ProgramGroupTypeType`. The `value` attribute shall always have the value `otherCollection`.	`<GroupType xsi:type="ProgramGroupTypeType" value="otherCollection" />`

BasicDescription
 	
Optional {0..1}
	Complex type describing the group.
	For search results and More Episodes endpoint, the value shall only contain a number of `RelatedMaterial` elements for page links, see clause 6.11.5.
	This element shall only be present where there is more than one page of search results.
	For Linear Service Filtered Recommendations this element shall contain metadata related to the selected linear service.
		`<BasicDescription>`
		`<RelatedMaterial>`
		`<HowRelated href=`
		…
		`</BasicDescription>`

6.11.16.2   GroupInformation Element [Now/Next Filtered Schedules]

Table 52: 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`	
@ordered	An attribute that defines whether the members of the group are ordered. This shall always be set to `true`.	`<GroupInformation groupId="crid://dvb.org/meta`

Mandatory {1}		data/schedules/now-next/now" ordered="true" numOfItems="1">
@numOfItems Mandatory {1}	An attribute that defines the number of members within a group.	<GroupInformation groupId="crid://dvb.org/meta data/schedules/now-next/now" ordered="true" numOfItems="1">
GroupType Mandatory {1}	The xsi:type attribute shall always be ProgramGroupTypeType. The value attribute shall always have the value otherCollection.	<GroupType xsi:type="ProgramGroupTypeTy pe" value="otherCollection"/>
BasicDescription Mandatory {1}		

6.12 Classification Terms

This clause details the Classification Scheme (CS) terms used for the DVB-I content guide. The CS terms are profiled from MPEG7 [21] and TV-Anytime [7] as well as from the Digital UK Freeview Play specification.

6.12.1 Audio Mix Types

Source Reference: ISO/IEC 15938-5 [21]

Table 53: 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

6.12.2 Audio Purpose

Source Reference: ETSI TS 102 822-3-1 [7]

Table 54: 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:2007:6	Main programme audio

6.12.3 Caption Coding Format

Source Reference: ETSI TS 102 822-3-1 [7]

Table 55: Caption Coding Format

XPath(s)
.../InstanceDescription/AVAttributes/CaptioningAttributes/Coding[@href]

Fully Qualified Classification Scheme Term	Term Name
urn:tva:metadata:cs:CaptionCodingFormatCS:2010:2.1	DVB Subtitles (bitmaps)
urn:tva:metadata:cs:CaptionCodingFormatCS:2010:2.2	DVB Subtitles (characters)

6.12.4 Content Genre

Source Reference: ContentCS or FormatCS defined in ETSI TS 102 822-3-1 [7] or DVB ContentSubject defined in clause 7.3.5.

6.12.5 Credit Role

Source Reference: ISO/IEC 15938-5 [21], ETSI TS 102 822-3-1 [7]

Table 56: 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
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
urn:tva:metadata:cs:TVARoleCS:2010:AD1	Advertising Agency
urn:tva:metadata:cs:TVARoleCS:2010:AD2	Advertising Production Company
urn:tva:metadata:cs:TVARoleCS:2010:AD3	Advertiser
urn:tva:metadata:cs:TVARoleCS:2010:AD4	Commissioning Channel
urn:tva:metadata:cs:TVARoleCS:2010:AD5	Commissioning Brand
urn:tva:metadata:cs:TVARoleCS:2010:AD6	Presenter
urn:tva:metadata:cs:TVARoleCS:2010:AD7	Studio Manager
urn:tva:metadata:cs:TVARoleCS:2010:AD8	Assistant Studio Manager
urn:tva:metadata:cs:TVARoleCS:2010:AD9	Caption Author
urn:tva:metadata:cs:TVARoleCS:2010:AD10	Electrician
urn:tva:metadata:cs:TVARoleCS:2010:AD11	Judge
urn:tva:metadata:cs:TVARoleCS:2010:AD12	Series Editor

urn:tva:metadata:cs:TVARoleCS:2010:AD13	Series Producer
urn:tva:metadata:cs:TVARoleCS:2010:V2	Scenario
urn:tva:metadata:cs:TVARoleCS:2010:V19	Commissioning Broadcaster
urn:tva:metadata:cs:TVARoleCS:2010:V20	Production Company
urn:tva:metadata:cs:TVARoleCS:2010:V22	Production Department
urn:tva:metadata:cs:TVARoleCS:2010:V30	Editor-in-chief
urn:tva:metadata:cs:TVARoleCS:2010:V31	Editor-of-the-Day
urn:tva:metadata:cs:TVARoleCS:2010:V32	Commentary or Commentator
urn:tva:metadata:cs:TVARoleCS:2010:V42	Conductor
urn:tva:metadata:cs:TVARoleCS:2010:V43	Participant
urn:tva:metadata:cs:TVARoleCS:2010:V44	Illustrator
urn:tva:metadata:cs:TVARoleCS:2010:V45	Photographer
urn:tva:metadata:cs:TVARoleCS:2010:V49	Sound Recordist
urn:tva:metadata:cs:TVARoleCS:2010:V55	Manufacturer
urn:tva:metadata:cs:TVARoleCS:2010:V76	Adaptor
urn:tva:metadata:cs:TVARoleCS:2010:V77	Set Dresser
urn:tva:metadata:cs:TVARoleCS:2010:V79	Consultant
urn:tva:metadata:cs:TVARoleCS:2010:V80	Choreographer
urn:tva:metadata:cs:TVARoleCS:2010:V82	Visual Editor
urn:tva:metadata:cs:TVARoleCS:2010:V83	Director of photography
urn:tva:metadata:cs:TVARoleCS:2010:V88	Orchestra
urn:tva:metadata:cs:TVARoleCS:2010:V94	Treatment/Programme Proposal
urn:tva:metadata:cs:TVARoleCS:2010:V95	Translation
urn:tva:metadata:cs:TVARoleCS:2010:V96	Expert
urn:tva:metadata:cs:TVARoleCS:2010:V97	Interviewed Guest
urn:tva:metadata:cs:TVARoleCS:2010:V103	Announcer
urn:tva:metadata:cs:TVARoleCS:2010:V105	Special Effects
urn:tva:metadata:cs:TVARoleCS:2010:V106	Key talent

urn:tva:metadata:cs:TVARoleCS:2010:V110	Casting
urn:tva:metadata:cs:TVARoleCS:2010:V117	Witness
urn:tva:metadata:cs:TVARoleCS:2010:V483	Correspondent
urn:tva:metadata:cs:TVARoleCS:2010:V484	Costume designer
urn:tva:metadata:cs:TVARoleCS:2010:V485	Dresser
urn:tva:metadata:cs:TVARoleCS:2010:V486	Editor/Producer (News)
urn:tva:metadata:cs:TVARoleCS:2010:V487	Floor Manager
urn:tva:metadata:cs:TVARoleCS:2010:V488	Graphic Assistant
urn:tva:metadata:cs:TVARoleCS:2010:V489	Graphic Designer
urn:tva:metadata:cs:TVARoleCS:2010:V490	Post-Production editor
urn:tva:metadata:cs:TVARoleCS:2010:V491	Production Manager
urn:tva:metadata:cs:TVARoleCS:2010:V492	Production Secretary
urn:tva:metadata:cs:TVARoleCS:2010:V493	Programme Production Researcher
urn:tva:metadata:cs:TVARoleCS:2010:V494	Rigger
urn:tva:metadata:cs:TVARoleCS:2010:V495	Runner
urn:tva:metadata:cs:TVARoleCS:2010:V496	Scenic Operative
urn:tva:metadata:cs:TVARoleCS:2010:V497	Assistant Producer
urn:tva:metadata:cs:TVARoleCS:2010:V498	Broadcast Assistant
urn:tva:metadata:cs:TVARoleCS:2010:V708	Dubber
urn:tva:metadata:cs:TVARoleCS:2010:V709	Key character
urn:tva:metadata:cs:TVARoleCS:2010:V710	Stunts
urn:tva:metadata:cs:TVARoleCS:2010:V714	Fight Director
urn:tva:metadata:cs:TVARoleCS:2010:V715	Script Supervisor
urn:tva:metadata:cs:TVARoleCS:2010:V716	Second Assistant Director
urn:tva:metadata:cs:TVARoleCS:2010:V717	Second Unit Director
urn:tva:metadata:cs:TVARoleCS:2010:V718	Sound Designer
urn:tva:metadata:cs:TVARoleCS:2010:V719	Music Arranger
urn:tva:metadata:cs:TVARoleCS:2010:V720	Causeur
urn:tva:metadata:cs:TVARoleCS:2010:V721	News Reader
urn:tva:metadata:cs:TVARoleCS:2010:V724	Assistant Chief Lighting Technician

urn:tva:metadata:cs:TVARoleCS:2010:V725	Carpenter
urn:tva:metadata:cs:TVARoleCS:2010:V727	Dialogue Coach
urn:tva:metadata:cs:TVARoleCS:2010:V728	Draughtsman
urn:tva:metadata:cs:TVARoleCS:2010:V729	Hairdresser
urn:tva:metadata:cs:TVARoleCS:2010:V730	Leadman
urn:tva:metadata:cs:TVARoleCS:2010:V734	Assistant Visual Editor
urn:tva:metadata:cs:TVARoleCS:2010:V735	Clapper Loader
urn:tva:metadata:cs:TVARoleCS:2010:V736	Focus Puller
urn:tva:metadata:cs:TVARoleCS:2010:V737	Foley Artist
urn:tva:metadata:cs:TVARoleCS:2010:V738	Foley Editor
urn:tva:metadata:cs:TVARoleCS:2010:V739	Foley Mixer
urn:tva:metadata:cs:TVARoleCS:2010:V740	Grip
urn:tva:metadata:cs:TVARoleCS:2010:V741	Key Grip
urn:tva:metadata:cs:TVARoleCS:2010:V742	Matte Artist
urn:tva:metadata:cs:TVARoleCS:2010:V743	Pyrotechnician
urn:tva:metadata:cs:TVARoleCS:2010:V744	Second Assistant Camera
urn:tva:metadata:cs:TVARoleCS:2010:V745	Sound Mixer
urn:tva:metadata:cs:TVARoleCS:2010:V746	Vision mixer
urn:tva:metadata:cs:TVARoleCS:2010:V748	Animal Trainer
urn:tva:metadata:cs:TVARoleCS:2010:V749	Armourer
urn:tva:metadata:cs:TVARoleCS:2010:V750	Greensman
urn:tva:metadata:cs:TVARoleCS:2010:V751	Location Manager
urn:tva:metadata:cs:TVARoleCS:2010:V753	Sign Language
urn:tva:metadata:cs:TVARoleCS:2010:V754	Subtitles
urn:tva:metadata:cs:TVARoleCS:2010:V755	Transportation Manager
urn:tva:metadata:cs:TVARoleCS:2010:V807	Choir
urn:tva:metadata:cs:TVARoleCS:2010:V808	Ensemble
urn:tva:metadata:cs:TVARoleCS:2010:V809	Music Group
urn:tva:metadata:cs:TVARoleCS:2010:V810	Librettist
urn:tva:metadata:cs:TVARoleCS:2010:V811	Lyricist
urn:tva:metadata:cs:TVARoleCS:2010:V812	Computer programmer
urn:tva:metadata:cs:TVARoleCS:2010:V813	Puppeteer

6.12.6   Media Availability

Source Reference: Digital UK

Table 57: 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

6.12.7   Forward EPG Availability

Source Reference: Digital UK

Table 58: 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

6.12.8   Relationship

Source Reference: ETSI TS 102 822-3-1 [7]

Table 59: Relationship

XPath(s)
.../BasicDescription/RelatedMaterial/HowRelated[@href] .../ServiceInformation/RelatedMaterial[@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

6.12.9   Image Variants

Source Reference: Digital UK

Table 60: Image Variants

XPath(s)	
.../BasicDescription/RelatedMaterial/HowRelated[@href] .../ServiceInformation/RelatedMaterial[@href]	
Fully Qualified Classification Term	**Term Name**
urn:tva:metadata:cs:HowRelatedCS:2012:19	Default Image
urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_colour	16:9 colour
urn:fvc:metadata:cs:ImageVariantCS:2017-02:square_colour	Square colour
urn:fvc:metadata:cs:ImageVariantCS:2017-02:4x3_colour	4:3 colour
urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_white	16:9 white on transparent
urn:fvc:metadata:cs:ImageVariantCS:2017-02:square_white	Square white on transparent
urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_colour_light	16:9 colour light on transparent
urn:fvc:metadata:cs:ImageVariantCS:2017-02:square_colour_light	Square colour light on transparent
urn:fvc:metadata:cs:ImageVariantCS:2017-02:16x9_colour_dark	16:9 colour dark on transparent
urn:fvc:metadata:cs:ImageVariantCS:2017-02:square_colour_dark	Square colour dark on transparent
urn:fvc:metadata:cs:ImageVariantCS:2017-02:enhanced	Enhanced Image endpoint

6.12.10 Restart Links

Source Reference: Digital UK

Table 61: Restart Links

XPath(s)	
.../ScheduleEvent/RelatedMaterial/HowRelated[@href]	
Fully Qualified Classification Scheme Term	**Term Name**
urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart	Restart links

6.12.11 Restart Availability

Source Reference: Digital UK

Table 62: 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	Device should check restart availability with Content Provider
urn:fvc:metadata:cs:RestartAvailabilityCS:2018:restart_pending	Restart isn't currently available but is expected to be

6.12.12 Box Sets

Source Reference: Digital UK

Table 63: Content Subject

XPath(s)
.../GroupInformation/RelatedMaterial/HowRelated[@href]

Fully Qualified Classification Scheme Term	Term Name
urn:fvc:metadata:cs:RestartAvailabilityCS:2018:templateAIT	Box Set Template AIT

6.12.13 More Episodes Available Genre

Source Reference: Digital UK

Table 64: More Episodes Available

XPath(s)
.../GroupInformation/BasicDescription/Genre[@href] .../ServiceInformation/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

7 Appendices

7.1 Schemas

7.1.1 DVB-I Service Discovery schema

```xml
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2019"
targetNamespace="urn:dvb:metadata:servicediscovery:2019" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2019" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.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="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>
      <element name="Service" type="dvbisd:ServiceType" minOccurs="0" maxOccurs="unbounded"/>
      <any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
    <attribute name="version" type="positiveInteger" use="required"/>
  </complexType>
  <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"/>
      <element name="ServiceType" type="tva:ControlledTermType" minOccurs="0"/>
      <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="dvbisd:ServiceIdentifierType" minOccurs="0"/>
    </sequence>
    <attribute name="version" type="positiveInteger" use="required"/>
  </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="string" minOccurs="0" maxOccurs="unbounded"/>
      <element name="FTAContentManagement" type="dvbisd:FTAContentManagementType" minOccurs="0"/>
      <element name="SourceType" type="anyURI"/>
      <choice minOccurs="0">
        <sequence>
```

```xml
          <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>
        <any namespace="##other" processContents="lax"/>
      </choice>
    </sequence>
    <attribute name="priority" type="integer" default="0"/>
  </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">
    <attribute name="cpsIndex" type="string"/>
  </complexType>
  <complexType name="CASystemType">
    <complexContent>
      <extension base="dvbisd:ProtectionSystemType">
        <sequence>
          <element name="CASystemId" type="string"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
  <complexType name="DRMSystemType">
    <complexContent>
      <extension base="dvbisd:ProtectionSystemType">
        <sequence>
          <element name="DRMSystemId" type="string"/>
        </sequence>
        <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="FTAContentManagementType">
    <attribute name="userDefined" type="boolean" use="required"/>
    <attribute name="doNotScramble" type="boolean" use="required"/>
    <attribute name="controlRemoteAccessOverInternet">
      <simpleType>
        <restriction base="unsignedByte">
          <minInclusive value="0"/>
          <maxInclusive value="3"/>
        </restriction>
      </simpleType>
```

```xml
        </attribute>
        <attribute name="doNotApplyRevocation" type="boolean" use="required"/>
    </complexType>
    <complexType name="DVBTDeliveryParametersType">
        <sequence>
            <element name="DVBTriplet" type="dvbisd:DVBTripletType"/>
            <element name="TargetCountry" type="dvbisd: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>
        </sequence>
    </complexType>
    <complexType name="SATIPDeliveryParametersType">
        <sequence>
            <element name="QueryParameters" type="string"/>
        </sequence>
    </complexType>
    <complexType name="DVBCDeliveryParametersType">
        <sequence>
            <element name="DVBTriplet" type="dvbisd:DVBTripletType" minOccurs="0"/>
            <element name="TargetCountry" type="dvbisd:ISO-3166-Code" />
            <element name="NetworkID" type="dvbisd:NetworkIdType" />
        </sequence>
    </complexType>
    <simpleType name="NetworkIdType">
        <restriction base="unsignedShort"/>
    </simpleType>
    <simpleType name="ISO-3166-Code">
        <annotation>
            <documentation xml:lang="en">A country code, as defined by ISO-3166.</documentation>
        </annotation>
        <restriction base="string">
            <pattern value="\c\c\c"/>
        </restriction>
    </simpleType>
    <complexType name="RTSPDeliveryParametersType">
        <sequence>
            <element name="DVBTriplet" type="dvbisd:DVBTripletType" minOccurs="0"/>
            <element name="RTSPURL" type="dvbisd:RTSPURLType"/>
            <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
        </sequence>
    </complexType>
    <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>
```

```xml
<complexType name="DASHDeliveryParametersType">
  <sequence>
    <element name="UriBasedLocation" type="dvbisd:ExtendedURIType"/>
    <element name="MinimumBitRate" type="unsignedInt" minOccurs="0"/>
  </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="unsignedInt" default="1"/>
              <attribute name="startTime" type="dvbisd:ZuluTimeType" use="required"/>
              <attribute name="endTime" type="dvbisd:ZuluTimeType" use="required"/>
            </complexType>
          </element>
        </sequence>
        <attribute name="validFrom" type="dateTime"/>
        <attribute name="validTo" type="dateTime"/>
      </complexType>
    </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+)?|(24:00:00(\.0+)?))Z"/>
  </restriction>
</simpleType>
<complexType name="RegionListType">
  <sequence>
    <element name="Region" type="dvbisd:RegionType" maxOccurs="unbounded"/>
  </sequence>
  <attribute name="version" type="positiveInteger" use="required"/>
</complexType>
<complexType name="RegionType">
  <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="dvbsid:WildcardPostcodeType"/>
      <element name="PostcodeRange" type="dvbsid:PostcodeRangeType"/>
      <element name="Coordinates" type="dvbisd:CoordinatesType"/>
    </choice>
    <element name="Region" type="dvbisd:RegionType" minOccurs="0" maxOccurs="unbounded"/>
```

```xml
    </sequence>
    <attribute name="regionID" type="dvbisd:RegionIdType" use="required"/>
    <attribute name="countryCodes" type="dvbisd:ISO-3166-List" use="optional"/>
</complexType>
<simpleType name="RegionIdType">
    <restriction base="ID"/>
</simpleType>
<simpleType name="RegionIdRefType">
    <restriction base="IDREF"/>
</simpleType>
<simpleType name="PostcodeType">
    <restriction base="string">
        <pattern value="[A-Za-z0-9][A-Za-z0-9\- ]*"/>
    </restriction>
</simpleType>
<simpleType name="WildcardPostcodeType">
    <restriction base="string">
        <pattern
            value="(\*[A-Za-z0-9][A-Za-z0-9\- ]*)|([A-Za-z0-9][A-Za-z0-9\- ]*\*[A-Za-z0-9\- ]+)|([A-Za-z0-9][A-Za-z0-9\- ]*\*)"/>
    </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"/>
```

```xml
</complexType>
<simpleType name="ServiceIdentifierType">
  <restriction base="anyURI"/>
</simpleType>
<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>
<simpleType name="ContentGuideProviderIdType">
  <restriction base="ID"/>
</simpleType>
<simpleType name="ContentGuideProviderRefIdType">
  <restriction base="IDREF"/>
</simpleType>
<complexType name="DASHPlaylistType">
  <sequence>
    <element name="PlaylistEntry" type="anyURI" maxOccurs="unbounded"/>
  </sequence>
</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"/>
    <element name="VideoAttributes" type="tva:VideoAttributesType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="VideoConformancePoint" type="tva:ControlledTermType" minOccurs="0" maxOccurs="unbounded"/>
    <element name="CaptionLanguage" type="tva:CaptionLanguageType"
      minOccurs="0" maxOccurs="unbounded"/>
    <element name="SignLanguage" type="tva:SignLanguageType" minOccurs="0" maxOccurs="unbounded"/>
  </sequence>
</complexType>
<!-- -->
<!-- items copied from SDnSv1.4 -->
<!-- -->
<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:FECLayerAddressType" 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"/>
```

```xml
      </sequence>
      <attributeGroup ref="dvbisd:MulticastAddressAttributes"/>
  </complexType>
  <complexType name="FECLayerAddressType">
      <attribute name="Address" type="dvbisd:IPOrDomainType" use="optional"/>
      <attribute name="Source" type="dvbisd:IPOrDomainType" 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="FECAttributeGroupType">
      <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:IPOrDomainType" use="optional"/>
      <attribute name="Address" type="dvbisd:IPOrDomainType" 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:FECAttributeGroupType"/>
  </attributeGroup>
  <simpleType name="IPOrDomainType">
      <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"/>
```

```xml
      <attribute name="dvb-ssrc-upstream-client" type="positiveInteger" use="optional"/>
</complexType>
<simpleType name="Hexadecimal32bit">
   <restriction base="string">
      <pattern value="[0-9a-fA-F]{8}"/>
   </restriction>
</simpleType>
<simpleType name="Hexadecimal16bit">
   <restriction base="string">
      <pattern value="[0-9a-fA-F]{1,4}"/>
   </restriction>
</simpleType>
<simpleType name="Hexadecimal8bit">
   <restriction base="string">
      <pattern value="[0-9a-fA-F]{1,2}"/>
   </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>
<simpleType name="ISO-3166-List">
   <annotation>
      <documentation xml:lang="en">
         A comma separated list of one or more country codes, where the codes are defined by
         ISO-3166.
      </documentation>
   </annotation>
   <restriction base="string">
      <pattern value="\c\c\c(,\c\c\c)*"/>
   </restriction>
</simpleType>
<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, and listed in
         ETSI TR 101 162
```

```
        </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.
        See ETSI EN 300 468
      </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.
        See ETSI EN 300 468
      </documentation>
    </annotation>
    <restriction base="unsignedShort"/>
  </simpleType>
  <!-- -->
  <!-- items copied from SDnSv2.1 -->
  <!-- -->
  <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="((([1-9]?[0-9])|(1[0-9][0-9])|(2[0-4][0-9])|(25[0-5]))\.){3}(([1-9]?[0-9])|(1[0-9][0-9])|(2[0-4][0-9])|(25[0-5]))"/>
    </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*((([0-9A-Fa-f]{1,4}:){7}([0-9A-Fa-f]{1,4}|:))|(([0-9A-Fa-f]{1,4}:){6}(:[0-9A-Fa-f]{1,4}|((25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)
(\.(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)){3})|:))|(([0-9A-Fa-f]{1,4}:){5}(((:[0-9A-Fa-f]{1,4}){1,2})|:(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)
(\.(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)){3})|:))|(([0-9A-Fa-f]{1,4}:){4}(((:[0-9A-Fa-f]{1,4}){1,3})|((:[0-9A-Fa-f]{1,4})?:(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)
(\.(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)){3}))|:))|(([0-9A-Fa-f]{1,4}:){3}(((:[0-9A-Fa-f]{1,4}){1,4})|((:[0-9A-Fa-f]{1,4}){0,2}:(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)
(\.(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)){3}))|:))|(([0-9A-Fa-f]{1,4}:){2}(((:[0-9A-Fa-f]{1,4}){1,5})|((:[0-9A-Fa-f]{1,4}){0,3}:(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)
(\.(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)){3}))|:))|(([0-9A-Fa-f]{1,4}:){1}(((:[0-9A-Fa-f]{1,4}){1,6})|((:[0-9A-Fa-f]{1,4}){0,4}:(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)
(\.(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)){3}))|:))|(:(((:[0-9A-Fa-f]{1,4}){1,7})|((:[0-9A-Fa-f]{1,4}){0,5}:(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)
(\.(25[0-5]|2[0-4]\d|1\d\d|[1-9]?\d)){3}))|:)))(%.+)?\s*$/"/>
    </restriction>
```

```xml
    </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>
```

7.1.2   DVB-I Service List Discovery schema

```xml
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:dvbisld="urn:dvb:metadata:servicelistdiscovery:2019"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:tva="urn:tva:metadata:2019" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019"
targetNamespace="urn:dvb:metadata:servicelistdiscovery:2019" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <import namespace="urn:tva:metadata:2019" schemaLocation="tva_metadata_3-1.xsd"/>
  <import namespace="urn:tva:mpeg7:2008" schemaLocation="tva_mpeg7.xsd"/>
  <import namespace="urn:dvb:metadata:servicediscovery:2019" schemaLocation="dvbi_v1.0.xsd"/>
  <element name="ServiceListEntryPoints" type="dvbisld:ServiceListEntryPointsType"/>
  <complexType name="ServiceListEntryPointsType">
    <sequence>
      <element name="ServiceListRegistryEntity" type="dvbisld:OrganizationType"/>
      <element name="ProviderOffering" type="dvbisld:ProviderOfferingType" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
  </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"/>
          <element name="Address" type="mpeg7:PlaceType"/>
          <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="dvbisld:OrganizationType"/>
```

```xml
        <element name="ServiceListOffering" type="dvbisld:ServiceListOfferingType" maxOccurs="unbounded"/>
      </sequence>
  </complexType>
  <complexType name="ServiceListOfferingType">
    <sequence>
      <element name="ServiceListName" type="mpeg7:TextualType" maxOccurs="unbounded"/>
      <element name="ServiceListURI" type="dvbisd:ExtendedURIType" maxOccurs="unbounded"/>
      <element name="Language" type="tva:AudioLanguageType" minOccurs="0" maxOccurs="unbounded"/>
      <element name="Genre" type="tva:GenreType" minOccurs="0" maxOccurs="unbounded"/>
      <element name="TargetCountry" type="dvbisd:ISO-3166-List" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
    <attribute name="regulatorListFlag" type="boolean" default="false"/>
  </complexType>
</schema>
```

7.2 Examples

7.2.1 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-I services, allowing DVB-I clients to replace the national broadcast content during those time windows.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ServiceList version="1" xmlns="urn:dvb:metadata:servicediscovery:2019"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2019 ../dvbi_v1.0.xsd">
  <Name>RAI 3 example</Name>
  <ProviderName>RAI</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>
```

```xml
      <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>
  <Service version="1">
    <UniqueIdentifier>tag:rai.it,2019:rai-3-piemonte</UniqueIdentifier>
    <ServiceInstance priority="2">
      <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
      <DVBSDeliveryParameters>
        <DVBTriplet origNetId="318" tsId="5200" serviceId="3403"/>
        <OrbitalPosition>-5</OrbitalPosition>
        <Frequency>11179</Frequency>
        <Polarization>vertical</Polarization>
      </DVBSDeliveryParameters>
    </ServiceInstance>
    <ServiceInstance priority="1">
      <DisplayName>Rai 3 TGR Piemonte</DisplayName>
      <Availability>
        <Period>
          <Interval startTime="17:30:00Z" endTime="18:00:00Z" days="1 2 3 4 5 6 7"/>
        </Period>
      </Availability>
      <SourceType>urn:dvb:metadata:source:dvb-dash</SourceType>
      <DASHDeliveryParameters>
        <UriBasedLocation contentType="application/dash+xml">
          <URI>http://www.raiplay.it/dvbi/mpd/rai3_tgr_piemonte.mpd</URI>
        </UriBasedLocation>
      </DASHDeliveryParameters>
    </ServiceInstance>
    <ServiceName>Rai 3</ServiceName>
    <ProviderName>RAI</ProviderName>
  </Service>
  <Service version="1">
    <UniqueIdentifier>tag:rai.it,2019:rai-3-lombardia</UniqueIdentifier>
    <ServiceInstance priority="2">
      <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
      <DVBSDeliveryParameters>
        <DVBTriplet origNetId="318" tsId="5200" serviceId="3403"/>
      </DVBSDeliveryParameters>
    </ServiceInstance>
    <ServiceInstance priority="1">
      <DisplayName>Rai 3 TGR Lombardia</DisplayName>
      <Availability>
        <Period>
          <Interval startTime="17:30:00Z" endTime="18:00:00Z" days="1 2 3 4 5 6 7"/>
        </Period>
      </Availability>
      <SourceType>urn:dvb:metadata:source:dvb-dash</SourceType>
      <DASHDeliveryParameters>
        <UriBasedLocation contentType="application/dash+xml">
          <URI>http://www.raiplay.it/dvbi/mpd/rai3_tgr_lombardia.mpd</URI>
        </UriBasedLocation>
      </DASHDeliveryParameters>
    </ServiceInstance>
    <ServiceName>Rai 3</ServiceName>
    <ProviderName>RAI</ProviderName>
  </Service>
</ServiceList>
```

7.2.2   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
<?xml version="1.0" encoding="UTF-8"?>
<ServiceList version="1" xmlns="urn:dvb:metadata:servicediscovery:2019"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2019 ../dvbi_v1.0.xsd"
xmlns:tva="urn:tva:metadata:2019">
 <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>
```

```xml
      <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:das.erste.de,2019:Das Erste"/>
  </LCNTable>
  <LCNTable>
    <TargetRegion>Saarland</TargetRegion>
    <LCN channelNumber="1" serviceRef="tag:das.erste.de,2019:Das Erste"/>
  </LCNTable>
</LCNTableList>
<Service version="1">
  <UniqueIdentifier>tag:daserste.de,2019:Das Erste</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>
    <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
    <DVBSDeliveryParameters>
      <DVBTriplet origNetId="1" tsId="1019" serviceId="10301"/>
```

```
        <OrbitalPosition>19.2</OrbitalPosition>
        <Frequency>11494</Frequency>
        <Polarization>horizontal</Polarization>
      </DVBSDeliveryParameters>
      <SATIPDeliveryParameters>
        <QueryParameters>
          freq=11494&amp;pol=h&amp;ro=0.35&amp;msys=dvbs2&amp;mtype=8psk&amp;plts=on&amp;
          sr=22000&amp;fec=23&amp;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:VideoCodingFormatCS:2001:2.2.2">
            <tva:Name>MPEG-2 Video Main Profile @ Main Level</tva:Name>
          </tva:Coding>
        </VideoAttributes>
      </ContentAttributes>
      <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
      <DVBSDeliveryParameters>
        <DVBTriplet origNetId="1" tsId="1101" serviceId="28106"/>
        <OrbitalPosition>19.2</OrbitalPosition>
        <Frequency>1183600</Frequency>
        <Polarization>horizontal</Polarization>
      </DVBSDeliveryParameters>
      <SATIPDeliveryParameters>
        <QueryParameters>
          freq=11836&amp;pol=h&amp;ro=0.35&amp;msys=dvbs&amp;mtype=8psk&amp;plts=off
          &amp;sr=27500&amp;fec=34&amp;pids=0,17,18,100,101,102,104
        </QueryParameters>
      </SATIPDeliveryParameters>
    </ServiceInstance>
    <ServiceInstance priority="3">
      <DisplayName>Das Erste</DisplayName>
      <SourceType>urn:dvb:metadata:source:dvb-dash</SourceType>
      <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>
```

7.2.3   Content Guide Source

```
<?xml version="1.0" encoding="UTF-8"?>
```

```xml
<ServiceList xmlns="urn:dvb:metadata:servicediscovery:2019" version="1"
 xmlns:tva="urn:tva:metadata:2019" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2019 ../dvbi_v1.0.xsd
urn:tva:metadata:2019 ../tva_metadata_3-1. ">
 <Name xml:lang="en">Content Guide Source exmaple</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 xsi:type="tva:RelatedMaterialType">
       <tva:HowRelated href="urn:dvb:metadata:cs:HowRelatedCS:2019:1002.1"/>
       <tva:MediaLocator>
         <tva:MediaUri contentType="image/png">
           http://cgs.az.metadata/static/logo.png
         </tva:MediaUri>
       </tva:MediaLocator>
     </RelatedMaterial>
     <ScheduleInfoEndpoint contentType="application/xml">
       <URI>http://cgs.az.metadata/schedule</URI>
     </ScheduleInfoEndpoint>
     <ProgramInfoEndpoint contentType="application/xml">
       <URI>http://cgs.az.metadata/program</URI>
     </ProgramInfoEndpoint>
     <GroupInfoEndpoint contentType="application/xml">
       <URI>http://cgs.az.metadata/group</URI>
     </GroupInfoEndpoint>
   </ContentGuideSource>
 </ContentGuideSourceList>
</ServiceList>
```

7.2.4 Responses to queries to a Service List Registry for service list discovery

Example of response to query:
https://csr.dvbservices.com/query?TargetCountry=IT&regulatorListFlag=true

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- Example of response to query:
https://csr.dvbservices.com/query?TargetCountry=IT&regulatorListFlag=true -->
<ServiceListEntryPoints xmlns="urn:dvb:metadata:servicelistdiscovery:2019"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2019
../dvbi_service_list_discovery_v1.0.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>
```

```xml
    <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/xml">
      <dvbisd:URI>http://dvbi.italian-authority.it/trusted-services.xml</dvbisd:URI>
    </ServiceListURI>
    <Language>it</Language>
    <TargetCountry>ITA</TargetCountry>
  </ServiceListOffering>
 </ProviderOffering>
</ServiceListEntryPoints>
```

Example of response to query:
```
https://dvbisr.private-service-list-
registry.com/query?TargetCountry[]=DEU&TargetCountry[]=AUT&Language=en
```

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- Example of response to query: https://dvbisr.private-service-list-
registry.com/query?TargetCountry%20in%20(DE%2CAT)&Language=en -->
<ServiceListEntryPoints xmlns="urn:dvb:metadata:servicelistdiscovery:2019"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2019
../dvbi_service_list_discovery_v1.0.xsd">
  <ServiceListRegistryEntity>
    <Name>A Private Service List Registry</Name>
    <ElectronicAddress>
      <mpeg7:Email>info@private-service-list-registry.com</mpeg7:Email>
      <mpeg7:Url>dvbisr.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 ter 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/xml">
       <dvbisd:URI>http://dvbi.TVfromTheWorld.com/engTVservices.xml</dvbisd:URI>
```

```xml
      </ServiceListURI>
      <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/xml">
        <dvbisd:URI>http://dvbi.TVfromTheWorld.com/TVservices_Germany.xml</dvbisd:URI>
      </ServiceListURI>
      <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/xml">
        <dvbisd:URI>
          http://www.british-service-list-provider.co.uk/documentaries.xml
        </dvbisd:URI>
      </ServiceListURI>
      <ServiceListURI contentType="application/xml">
        <dvbisd:URI>
          http://alt.british-service-list-provider.co.uk/documentaries.xml
        </dvbisd:URI>
      </ServiceListURI>
      <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 a query not matching any entry:
`https://dvbisr.private-service-list-registry.com/query?ProvideName=NotExistingProvider`

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- Example of response to a query not matching any entry: https://dvbisr.private-service-list-
registry.com/query?ProvideName=NotExistingProvider -->
<ServiceListEntryPoints xmlns="urn:dvb:metadata:servicelistdiscovery:2019"
xmlns:mpeg7="urn:tva:mpeg7:2008" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2019
```

```
../dvbi_service_list_discovery_v1.0.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>dvbisr.private-service-list-registry.com</mpeg7:Url>
    </ElectronicAddress>
  </ServiceListRegistryEntity>
</ServiceListEntryPoints>
```

7.3 Classification Schemes

7.3.1 HowRelatedCS

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:dvb:metadata:cs:HowRelatedCS: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">
  <!-- ################################################################### -->
  <!-- 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>
  <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>
  <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>

7.3.2   LinkedApplicationCS

```xml
<?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>
```

7.3.3   RecordingInfoCS

```xml
<?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>
```

7.3.4   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 programming</Name>
    </Term>
    <Term termID="ondemand">
      <Name xml:lang="en">The service contains on demand programming</Name>
    </Term>
    <Term termID="data">
      <Name xml:lang="en">The service contains only data signalling</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 65 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 65: Mapping of ETSI EN 300 468 service_type to DVB-I

ETSI EN 300 468		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.ContentAttributres.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" Service.ServiceInstance.ContentAttributes.AudioAttributes.Coding="urn:mpeg:mpeg7:cs:Audio CodingFormatCS: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:ondemand" Service.ServiceInstance.ContentAttributres.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.ServiceInstance.ContentAttributres.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 -->
0x06	mosaic service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributres.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" 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" 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.ContentAttributres.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.ContentAttributres.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:timeshift" Service.ServiceInstance.ContentAttributres.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:ondemand" Service.ServiceInstance.ContentAttributres.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 -->

0x19	H.264/AVC HD digital television service	Service.ServiceType="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear" Service.ServiceInstance.ContentAttributres.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:timeshift" Service.ServiceInstance.ContentAttributres.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:ondemand" Service.ServiceInstance.ContentAttributres.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.ContentAttributres.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.ServiceInstance.ContentAttributres.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:ondemand" Service.ServiceInstance.ContentAttributres.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.ContentAttributres.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.ContentAttributres.VideoAttributes.Coding contains any HEVC related term from urn:dvb:metadata:cs:VideoConformancePointsCS:2017
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.ContentAttributres.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 urn:dvb:metadata:cs:VideoConformancePointsCS:2017

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 and ETSI TS 101 547 2 (3D Guidelines of Frame Compatible 3D-TV).

NOTE 4: For rules on the use of this value, see clause I.2.5 of ETSI EN 300 468 and ETSI TS 101 547-4. 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, see clause I.2.5.2 of ETSI EN 300 468.

NOTE 5: For rules on the use of these values, see clause I.2.6 of ETSI EN 300 468.

7.3.5 ContentSubject

```xml
<?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 EN 300 468 for the content descriptor.
  Version 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">
```

```xml
  <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 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 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>
```

```xml
<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 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>
```

```xml
<Term termID="7.7">
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Annex (informative):
Change History

Date	Version	Information about changes
November 2019	1	Initial DVB-I Service Discovery and Content Metadata specification