



Webinar: DVB-I service discovery and programme metadata

Wednesday 4 December 2019

14:00 CET

Presenters



Peter Lanigan – Chair of the DVB CM-I Group



Paul Higgs – Chair of the DVB TM-IPI Group

A recording of the webinar will be available shortly after the event.

dvb.org/webinars



DVB-I: Introduction and Current Status

Peter Lanigan
TP Vision / Chair of CM-I

What is DVB-I?

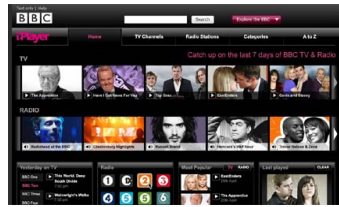
- DVB already has **DVB-T** (terrestrial), **DVB-C** (cable) and **DVB-S** (satellite)
- **DVB-I** is a new addition, where the I stands for **Internet**
- **DVB-I** delivers services over the Internet to devices with broadband access
 - ...meaning “over the top”
 - ...but also over managed networks, with operator support
- The **user experience** of DVB-I can be similar to DVB-T, C and S
- All devices with Internet access are in scope, not just TVs and STBs

Why is DVB-I needed?

- The Internet has transformed how we access TV...

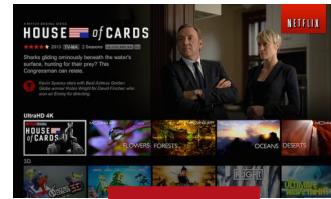


Video on
web sites



BBC iPlayer

Catch-up TV



NETFLIX

Global VoD services
as major original
content producers



sky go **NOW TV**

Super-simple OTT PayTV



UGC, channels, “stars”

Sky, Sky Go and Now TV are trademarks
owned by the Sky group of companies

Why is DVB-I needed?

- These services are deployed as **apps**
- Apps allowed **innovative services** to develop **outside the traditional processes** of the media industry, but...
- **Users:**
 - Content is segregated into independent apps, broadcast and IP content are separated
 - Not all apps are on all platforms
- **Broadcasters:**
 - Apps need to be provided and maintained for multiple platforms
 - How to get your app noticed?
- **Manufacturers:**
 - Many apps to support and certify
 - Hard to provide a consistent user experience
 - Multiple solutions to same problem

Why is DVB-I needed?

- **DVB-I** does for **IP services** what DVB-T/C/S do for broadcast
- Services are signalled and distributed in a **standardised** manner, so a **specific app is not required**
- A receiver can present an **integrated list of services and content**, including DVB-I and broadcast services
- **Users** don't have to know or care whether a service arrives via broadcast or IP
- **Broadcasters** can deploy a service once to a wide range of devices
- **Manufacturers** can make a single consistent user experience for DVB-I (and broadcast) services

DVB-I – Areas of Applicability



CM-10003

Commercial Requirements for DVB-I Services

DVB CM-I Group

Version: 0.0.31
Creation Date: 06.01.2018
Revision Date: 19.10.2018

Date	Version	Remarks
2018-01-09	0.0.0	Initial input for January 10 th face to face meeting
2018-01-16	0.0.1	Updates based on discussions in the 10 th January f2f
2018-02-22	0.0.2	Updates based on CM-I phone conference #5, 2018-01-22
2018-02-26	0.0.3	Updates based on CM-I phone conference #7, 2018-02-26
2018-03-21	0.0.4	Integrated CM-100217 as agreed
2018-03-28	0.0.5	Edits in March 26 th phone conference and actions afterwards
2018-04-05	0.0.6	Integrated Mobile Centric Use Case (CM-100225), updated Broadcaster Centric Use Case (CM-100177), requirements from IPTV Service Provider Use Case (CM-100301) and TV manufacturer use-case (CM-10039). (Description of IPTV Service Provider Use Case still TBD)
2018-06-03	0.0.7	Integrated CM-100459 as agreed in May 3 rd phone conference
2018-05-16	0.0.8	Integrated updates from Chris Boone (to 2.3, 2.4, 2.5), Thomas Stockhammer (2.6, 2.11), Paul Szucs+Davide Milanesio (2.8), Frank Herrmann (2.7, 2.1), Consolidated 2.3, 2.10 and 2.12 (action 13-6). Removed requirements from annex 4 which Chris, Thomas, Paul+Davide and Frank merged into the main body. Merged more requirements from annex 4 into the main body.
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2018-05-24	0.0.11	Live edits from May 24 th phone conference.
2018-05-29	0.0.12	Fixed heading and requirement numbering. Other purely editorials.
2018-05-30	0.0.13	Live edits from May 30 th phone conference
2018-06-04	0.0.14	Edits from June 4 th face to face meeting
2018-06-07	0.0.15	Editorial clean-ups following June 4 th meeting, edits from June 7 th phone conference
2018-06-11	0.0.16	Proposed informative text for the Summary and sections 1.1, 1.3 and 1.6.
2018-06-11	0.0.17	Live edits from June 11 th phone conference
2018-06-13	0.0.18	Updates to section 1 following comments from Davide Milanesio
2018-06-13	0.0.19	Live edits from June 13 th phone conference
2018-06-14	0.0.20	Live edits from June 14 th phone conference
2018-06-15	0.0.21	Integrated CM-100225 – mobile centric use-case – which had previously been omitted. General editorial clean-ups as agreed.

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Commercial Requirements – areas of applicability:

- Any device with an internet connection and a media player
- May or may not have a DVB tuner
- Works over broadband, wifi, mobile networks, ...
- OTT or with network operator support
- Can be received with a standard receiver or a downloaded application

DVB-I – Service Types



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Commercial Requirements – service types:

- **Broadcast-like:**
 - Linear TV
 - Free and pay TV
 - Parental control
 - A/V, subtitles, associated applications, ...
- **Specific to IP:**
 - Video on Demand
 - “Scheduled VoD”
 - Personalized services
- DVB-I service offerings can be stand alone or integrated with broadcast

DVB-I – User Experience



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Commercial Requirements – user experience:

- Can be similar user experience to DVB-T/C/S
- Navigation possible with channel list and programme guide (which may include broadcast and IP services)
- Zapping times between linear channels similar to broadcast

DVB-I – Service Discovery and Trust



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Commercial Requirements – service discovery and trust:

- Who provides service lists?
- Many thousands of channels may be technically available to a user
- How can a receiver find relevant services?
- How are legal and trusted services identified?
- Not only technical, but also commercial and legal problem
- DVB-I provides the technical means for these problems to be solved

DVB-I Specifications

- **DVB-I Service Discovery and Programme Metadata** – published November 2019
 - https://www.dvb.org/resources/public/standards/a177_dvb-i_specification.pdf
- And **DVB-I** builds on:
- **DVB-DASH** – update with low latency support published June 2019
 - https://www.dvb.org/resources/public/standards/a168_dvb_mpeg-dash_oct_2019.pdf
- **DVB ABR Multicast** - publication expected in Q1 2020
- Supported by other DVB specifications including:

Testing, Validation and Verification

- DVB has decided to help the industry adopt its technology more easily
- DVB-I will be the first major specification to benefit
- Aims for DVB-I include:
 - Accelerating and assisting deployments
 - Help service providers create interoperable services
 - Help manufacturers create interoperable clients
 - Verify that specification is correct
 - Create framework for experimentation and further development

Testing, Validation and Verification – Current Status

- RfP issued for project to cover:
 - Example services lists and content guide metadata
 - Example LL-DASH streams
 - Example DVB-I client implementation (in HTML5 and Javascript)
 - Service discovery, service selection, content guide, content playback
- Supplier selection **IN PROGRESS**
- Extend *ffmpeg* to support LL-DASH (in co-operation with DASH-IF) **IN PROGRESS**

DVB-I Demonstration at IBC 2019

IBC demonstration included:

- DVB-I Hybrid Service List
- DVB-DASH Low Latency streaming
- Multicast ABR

Collaboration between 12 companies:

ATEME, Broadpeak, ENENSYS Technologies, Harmonic, ITV, Kineton, Newtec, RAI, Rohde & Schwarz, SES, TP Vision and Viaccess-Orca



Future Activities

- **DVB broadcast standards** have evolved for more than two decades
- **DVB-I will also not stand still** – we will maintain and extend DVB-I with new features
- **DVB-I** will also be relevant beyond DVB's traditional membership
- For example: it will be possible to deploy **DVB-I over 5G networks**

The future will be shaped by DVB's membership

Conclusions



DVB-I enables the delivery of DVB services over the Internet

Services:

- will reach more users...
- on more devices...
- and users without access to traditional broadcast reception

Users:

- will be able to access more services
- won't need to know or care whether a service reaches them via DVB-T/C/S or DVB-I

DVB:

- will support its members with new deployment options
- brings opportunities support new parts of the industry
- extends DVB's relevance outside the traditional broadcast domain



DVB-I Technical Aspects

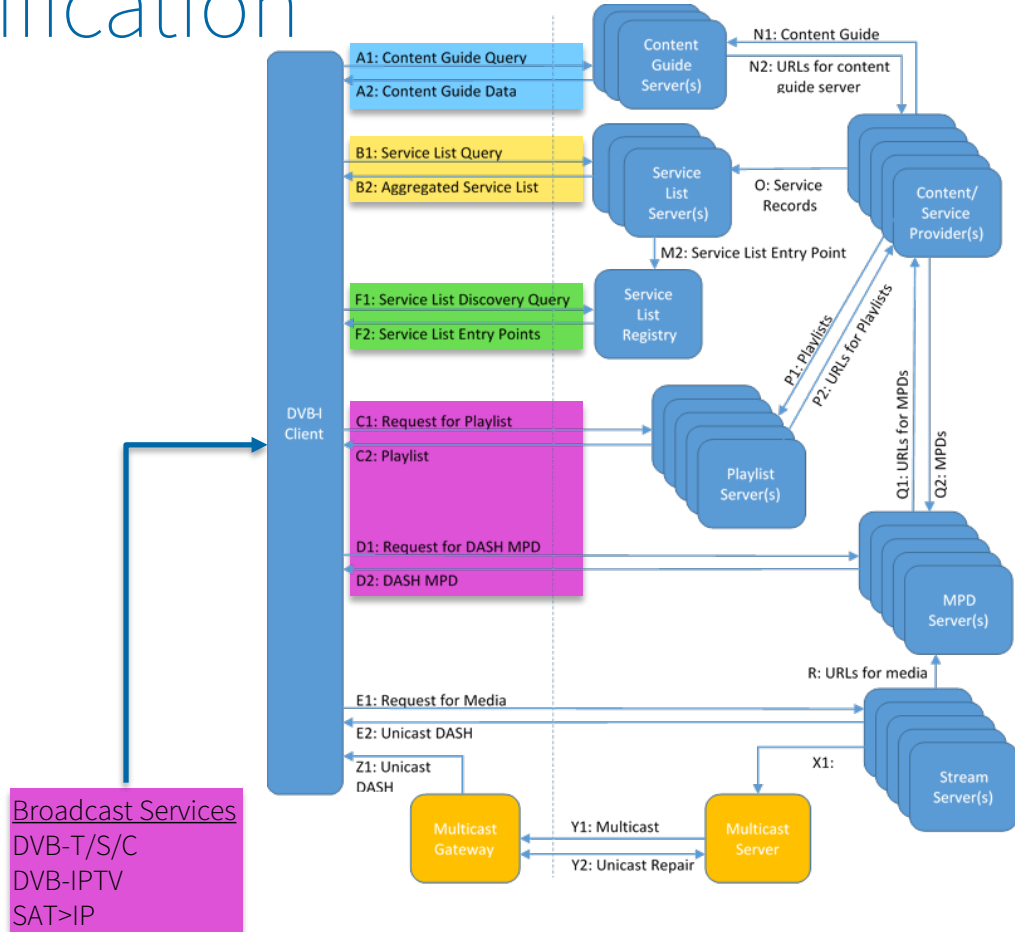
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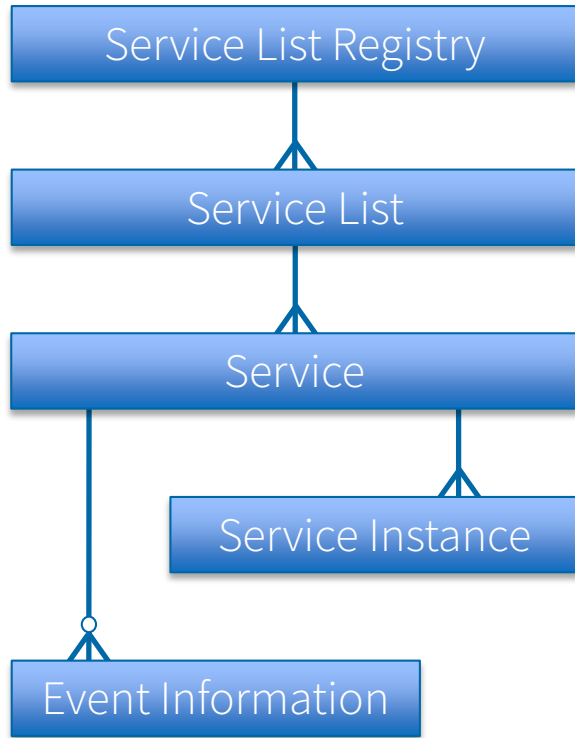
DVB-I Service Discovery and Content Metadata Specification

Aspects of the Specification

- Service List Discovery
- Service Lists
- Content Metadata
- Media Representations



Information Model



Queryable network function to discovery providers of service lists

Curated collection of services including ordering and target regions

Editorial representation of a linear television service

Network specific delivery parameters, including availability windows

Program information for channel change banner and electronic program guide

High Level Principles

- Service List Discovery
 - HTTP Queries (and the XML response) issued to Service List Registries for service lists based on country, regulator, genre, language, provider
- Service List
 - A curated collection of services with their ordering, availability (periodic and location) and delivery methods
 - Delivery methods indicate broadcast and broadband access methods which can be reconciled with local channel scan data or other manifest (SAT>IP or IPTV).
 - Support for signaling of applications, deep links and playlists
- Content Metadata
 - HTTP Queries and TV Anytime XML responses for
 - Now/next summary program information
 - Summary information for programs within a service in a specified duration (\pm 28 days)
 - Detailed program information
 - Groups of programs (siblings or box sets)

Service List Discovery

- Service List queries to known registries

`http://registry/query?<param>&<param>...`

- Query parameters
 - TargetCountry – service lists intended for specific countries
 - Language – service lists containing specific languages
 - Genre – service lists containing specific genre*
 - Provider Name – service lists provided by a specific organization
 - regulatorListFlag – identified “official” lists of services
- Query parameters can be plural (OR) and combined (AND)

* TV Anytime ContentCS, FormatCS or DVB-I ContentSubject

Service List Discovery example

```
<ServiceListEntryPoints xmlns="urn:dvb:metadata:servicelistdiscovery:2019" xmlns:dvbisd="urn:dvb:metadata:servicediscovery:2019"
xmlns:mpeg7="urn:tva:mpeg7:2008" 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="false">
    <!-- contact information for the service list registry – based on TVA:OrganizationType -->
    <ProviderOffering>
      <!-- contact information for the service list provider – based on TVA:OrganizationType -->
      <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>
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xsi:schemaLocation="urn:dvb:metadata:servicelistdiscovery:2019 dvbi_service_list_discovery_v1.0.xsd">
  <ServiceListRegistryEntity regulatorFlag="false">
    <!-- contact information for the service list registry – based on TVA:OrganizationType -->
  <ProviderOffering>
    <!-- contact information for the service list provider – based on TVA:OrganizationType -->
    <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>
  ...
</ServiceListEntryPoints>
```

Service List

- Defines geographic regions based on coordinates or postal codes
- LCN Tables optionally mapped to regions
- Parameters for DVB-T/S/C/IPTV/DASH delivery and media format
- Signaling of supplemental items, i.e. out-of-service banners, interactive applications
- Time based availability periods for event based services or service interworking
- Individual or aggregate source for program metadata

Service List example

```
<ServiceList xmlns="urn:dvb:metadata:servicediscovery:2019" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:tva="urn:tva:metadata:2019" version="191126165755"
xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2019 dvbi_v1.0.xsd">
  <Name>Germany FTA</Name>
  <ProviderName>SES</ProviderName>
  <RegionList version="1">
    <Region countryCodes="DEU" regionID="Deutschland"/>
    <Region countryCodes="DEU" regionID="Baden_Württemberg"/>
    <Region countryCodes="DEU" regionID="Bayern_Nord"/>
    <Region countryCodes="DEU" regionID="Bayern_Süd"/>
    <Region countryCodes="DEU" regionID="Berlin">
      <WildcardPostcode>10*</WildcardPostcode>
      <WildcardPostcode>11*</WildcardPostcode>
      <WildcardPostcode>12*</WildcardPostcode>
      <WildcardPostcode>13*</WildcardPostcode>
    </Region>
    <Region countryCodes="DEU" regionID="Saarland">
      <PostcodeRange from="66111" to="66133"/>
    </Region>
  </RegionList>
</ServiceList>
```

Manual or assisted
region selection

Service List example

Support for Radio
and Television
services

```
<LCNTableList>
  <LCNTable>
    <TargetRegion>Berlin</TargetRegion>
    <LCN channelNumber="1001" serviceRef="tag:ses.com,2019:RNE%20RADIO%201"/>
    <LCN channelNumber="1002" serviceRef="tag:ses.com,2019:RNE%20RADIO%203"/>
    <LCN channelNumber="101" serviceRef="tag:ses.com,2019:DasErste"/>
    <LCN channelNumber="526" serviceRef="tag:ses.com,2019:Sky%20Select"/>
    <LCN channelNumber="551" serviceRef="tag:ses.com,2019:Comedy%20Central%20Austria"/>
  <LCNTable>
    <TargetRegion>Aachen</TargetRegion>
    <LCN channelNumber="167" serviceRef="tag:ses.com,2019:WDR%20HD%20Aachen"/>
  <LCNTable>
    <TargetRegion>Bonn</TargetRegion>
    <LCN channelNumber="167" serviceRef="tag:ses.com,2019:WDR%20HD%20Bonn"/>
```

Service List example

Local channels at
“known” locations

```
<LCNTableList>
  <LCNTable>
    <TargetRegion>Berlin</TargetRegion>
    <LCN channelNumber="1001" serviceRef="tag:ses.com,2019:RNE%20RADIO%201"/>
    <LCN channelNumber="1002" serviceRef="tag:ses.com,2019:RNE%20RADIO%203"/>
    <LCN channelNumber="101" serviceRef="tag:ses.com,2019:DasErste"/>
    <LCN channelNumber="526" serviceRef="tag:ses.com,2019:Sky%20Select"/>
    <LCN channelNumber="551" serviceRef="tag:ses.com,2019:Comedy%20Central%20Austria"/>
  <LCNTable>
    <TargetRegion>Aachen</TargetRegion>
    <LCN channelNumber="167" serviceRef="tag:ses.com,2019:WDR%20HD%20Aachen"/>
  <LCNTable>
    <TargetRegion>Bonn</TargetRegion>
    <LCN channelNumber="167" serviceRef="tag:ses.com,2019:WDR%20HD%20Bonn"/>
```

Service List example

Radio services have
no video component

```
<Service version="1">
  <UniqueIdentifier>tag:ses.com,2019:RNE%20RADIO%201</UniqueIdentifier>
  <ServiceInstance priority="1">
    <DisplayName>RNE RADIO 1</DisplayName>
    <ContentAttributes>
      <AudioAttributes>
        <tva:Coding href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2"/>
      </AudioAttributes>
    </ContentAttributes>
    <SourceType>urn:dvb:source:dvb-s</SourceType>
    <DVBSDeliveryParameters>
      <DVBTriplet origNetId="1" tsId="1028" serviceId="4411"/>
      <OrbitalPosition>19.2</OrbitalPosition><Frequency>1162650</Frequency><Polarization>vertical</Polarization>
    </DVBSDeliveryParameters>
    <SATIPDeliveryParameters>
      <QueryParameters>
        freq=11626&pol=V&ro=35&msys=DVBS&mtype=QPSK&plts=off
        &sr=22000&fec=56&pids=0,17,18,3523</QueryParameters>
      </SATIPDeliveryParameters>
    </ServiceInstance>
  <ServiceName>RNE RADIO 1</ServiceName>
  <ProviderName>unknown</ProviderName>
  <ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
</Service>
```

Service List example

SAT>IP parameters
for local distribution

```
<Service version="1">
  <UniquelIdentifier>tag:ses.com,2019:RNE%20RADIO%201</UniquelIdentifier>
  <ServiceInstance priority="1">
    <DisplayName>RNE RADIO 1</DisplayName>
    <ContentAttributes>
      <AudioAttributes>
        <tva:Coding href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2"/>
      </AudioAttributes>
    </ContentAttributes>
    <SourceType>urn:dvb:source:dvb-s</SourceType>
    <DVBSDeliveryParameters>
      <DVBTripel origNetId="1" tsId="1028" serviceId="4411"/>
      <OrbitalPosition>19.2</OrbitalPosition><Frequency>1162650</Frequency><Polarization>vertical</Polarization>
    </DVBSDeliveryParameters>
    <SATIPDeliveryParameters>
      <QueryParameters>
        freq=11626&pol=V&ro=35&mss=DVBS&mtype=QPSK&plts=off
        &sr=22000&fec=56&pids=0,17,18,3523</QueryParameters>
      </SATIPDeliveryParameters>
    </ServiceInstance>
  <ServiceName>RNE RADIO 1</ServiceName>
  <ProviderName>unknown</ProviderName>
  <ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
</Service>
```

Service List example

“Pop-up” services

```
<Service version="1">
  <UniqueIdentifier>tag:ses.com,2019:RNE%20RADIO%201</UniqueIdentifier>
  <ServiceInstance priority="1">
    <DisplayName>RNE RADIO 1</DisplayName>
    <ContentAttributes>
      <AudioAttributes>
        <tva:Coding href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2"/>
      </AudioAttributes>
    </ContentAttributes>
    <SourceType>urn:dvb:source:dvb-s</SourceType>
    <DVBSDeliveryParameters>
      <DVBTriplet origNetId="1" tsId="1028" serviceId="4411"/>
      <OrbitalPosition>19.2</OrbitalPosition><Frequency>1162650</Frequency><Polarization>vertical</Polarization>
    </DVBSDeliveryParameters>
    <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>
  </ServiceInstance>
  <ServiceName>RNE RADIO 1</ServiceName>
  <ProviderName>unknown</ProviderName>
  <ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
</Service>
```

Service List example

```
<Service version="1">
  <UniqueIdentifier>tag:ses.com,2019:DasErste.DasErste</UniqueIdentifier>
  <ServiceName>Das Erste</ServiceName> <ProviderName>unknown</ProviderName>
  <ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
</Service>
```

```
<ServiceInstance priority="1">
  <DisplayName>Das Erste HD</DisplayName>
  <ContentAttributes>
  <AudioAttributes>
    <tva:Coding href="urn:dvb:metadata:cs:AudioCodecCS:2007:3.1"/>
  <VideoAttributes>
    <tva:Coding href="urn:dvb:metadata:cs:VideoCodecCS:2007:1.4.12"/>
  <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
  <DVBSDeliveryParameters>
    <DVBTriples origNetId="1" tsId="1019" serviceId="10301"/>
    <OrbitalPosition>19.2</OrbitalPosition>
    <Frequency>11494</Frequency>
    <Polarization>horizontal</Polarization>
  </DVBSDeliveryParameters>
</ServiceInstance>
```

```
<ServiceInstance priority="2">
  <DisplayName>Das Erste</DisplayName>
  <ContentAttributes>
  <AudioAttributes>
    <tva:Coding href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2">
  <AudioAttributes>
    <tva:Coding href="urn:dvb:metadata:cs:AudioCodecCS:2007:3.1">
  <VideoAttributes>
    <tva:Coding href="urn:mpeg:mpeg7:cs:VideoCodingFormatCS:2001:2.2.2">
  <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
  <DVBSDeliveryParameters>
    <DVBTriples origNetId="1" tsId="1101" serviceId="28106"/>
    <OrbitalPosition>19.2</OrbitalPosition>
    <Frequency>1183600</Frequency>
    <Polarization>horizontal</Polarization>
  </DVBSDeliveryParameters>
</ServiceInstance>
```

Prioritized service instances for different representations

Service List example

Multiple audio codings

```
<Service version="1">
  <UniqueIdentifier>tag:ses.com,2019:DasErste.DasErste</UniqueIdentifier>
  <ServiceName>Das Erste</ServiceName> <ProviderName>unknown</ProviderName>
  <ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
</Service>
```

```
<ServiceInstance priority="1">
  <DisplayName>Das Erste HD</DisplayName>
  <ContentAttributes>
    <AudioAttributes>
      <tva:Coding href="urn:dvb:metadata:cs:AudioCodecCS:2007:3.1"/>
    <VideoAttributes>
      <tva:Coding href="urn:dvb:metadata:cs:VideoCodecCS:2007:1.4.12"/>
  <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
  <DVBSDeliveryParameters>
    <DVBTriples origNetId="1" tsId="1019" serviceId="10301"/>
    <OrbitalPosition>19.2</OrbitalPosition>
    <Frequency>11494</Frequency>
    <Polarization>horizontal</Polarization>
  </DVBSDeliveryParameters>
</ServiceInstance>
```

```
<ServiceInstance priority="2">
  <DisplayName>Das Erste</DisplayName>
  <ContentAttributes>
    <AudioAttributes>
      <tva:Coding href="urn:mpeg:mpeg7:cs:AudioCodingFormatCS:2001:3.2">
    <AudioAttributes>
      <tva:Coding href="urn:dvb:metadata:cs:AudioCodecCS:2007:3.1">
    <VideoAttributes>
      <tva:Coding href="urn:mpeg:mpeg7:cs:VideoCodingFormatCS:2001:2.2.2">
  <SourceType>urn:dvb:metadata:source:dvb-s</SourceType>
  <DVBSDeliveryParameters>
    <DVBTriples origNetId="1" tsId="1101" serviceId="28106"/>
    <OrbitalPosition>19.2</OrbitalPosition>
    <Frequency>1183600</Frequency>
    <Polarization>horizontal</Polarization>
  </DVBSDeliveryParameters>
</ServiceInstance>
```


Service List example

Service Instances for
DVB-DASH

```
<Service version="1">
  <UniqueIdentifier>tag:ses.com,2019:DasErste.DasErste</UniqueIdentifier>
  <ServiceName>Das Erste</ServiceName> <ProviderName>unknown</ProviderName>
  <ServiceType href="urn:dvb:metadata:cs:ServiceTypeCS:2019:linear"/>
</Service>
<ServiceInstance priority="3">
  <DisplayName>Das Erste</DisplayName>
  <ContentAddress>
    <AudioAttributes>
      <tva:Codec>001:3.2">
    <VideoAttributes>
      <tva:Codec>
    <SourceType>
      <DASHDeliveryParameters>
        <UriBasedLocation contentType="application/dash+xml">
          <URI>https://live.daserste.de/0001-Das%20Erste.mpd</URI>
        </UriBasedLocation>
      </DASHDeliveryParameters>
    </SourceType>
    <DVBSDeliveryParameters>
      <DVBTriples>
        <OrbitalPosition>
        <Frequency>1183600</Frequency>
        <Polarization>horizontal</Polarization>
      </DVBSDeliveryParameters>
    </ServiceInstance>
  </ServiceInstance>
  </DVBSDeliveryParameters>
</ServiceInstance>
```

Content Metadata

- REST APIs to obtain program and series information
- Summary and detailed information requests. Responses are profiled from TV Anytime
- Linear schedule up to 28 days in advance
- Catch-up schedule for the last 28 days
- Category and series searches
- Per-service or per-provider provisioning options
- Server side construction of graphic elements to align with UI

Content Metadata example

Logo for Content
Guide provider

```
<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>
```

Content Metadata example

Schedule information
with brief metadata

```
<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>
```

Content Metadata 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>
```

Query point for
detailed program
information

Content Metadata 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>
```

Query point for
related programs
within defined
categories (BoxSets)

Content Metadata query examples

- `<ScheduleInfoEndpoint>?start=1433246400&end=1433268000
&sids[]=tag:ses.com,2019:DasErste&image_variant=
16x9_colour`

Request the summary information for programs on Das Erste between 12:00 and 18:00 on 6 June 2015 with any image links referring to the colour 16x9 quality

Content Metadata query examples

- `<ScheduleInfoEndpoint>?sid= tag:ses.com,2019:DasErste &now_next=true`

Request the summary information for the current and next scheduled programs on Das Erste (material suitable for channel change banner etc)

Content Metadata query examples

- `<ProgramInfoEndpoint>?pid=crid://daserste.de/b01myjsy`

Request the full program information for program with the specific CRID (Content Reference Identifier)

Other notes

- DVB-I service list registry queries and service lists can be signaled in the NIT or BAT
- DVB-DASH with low latency extensions (DVB Bluebook A168) can be used
- DVB-MABR being finalized to offer interoperable multicast delivery of segmented content

DVB[®]