DVB-I Reference Tools
Linear Television with internet technologies

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Background

- DVB develops both industry specifications and tools to support market deployment of those specifications
- Tools are an essential component for a DVB Bluebook specification to be promoted to an ETSI standard.

- DVB-I Reference Tools support the development activities and industry operations in a maturing DVB-I based ecosystem.
- Relevant specifications
  - A177r3, Service Discovery and Programme Metadata for DVB-I
 - A168r4, DVB MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks

Find…

- Television viewers expect an experience that is easy to use and 'minimally disruptive'

- DVB-I provides a mechanism in Bluebook A177 to permit devices to find IP based television services

  - Services define editorial and delivery characteristics for broadband and broadcast service instances

  - Service lists provide channel lineups and geographic targeting of services

  - Service list registries provide the "first port of call" for devices to discover DVB-I Services
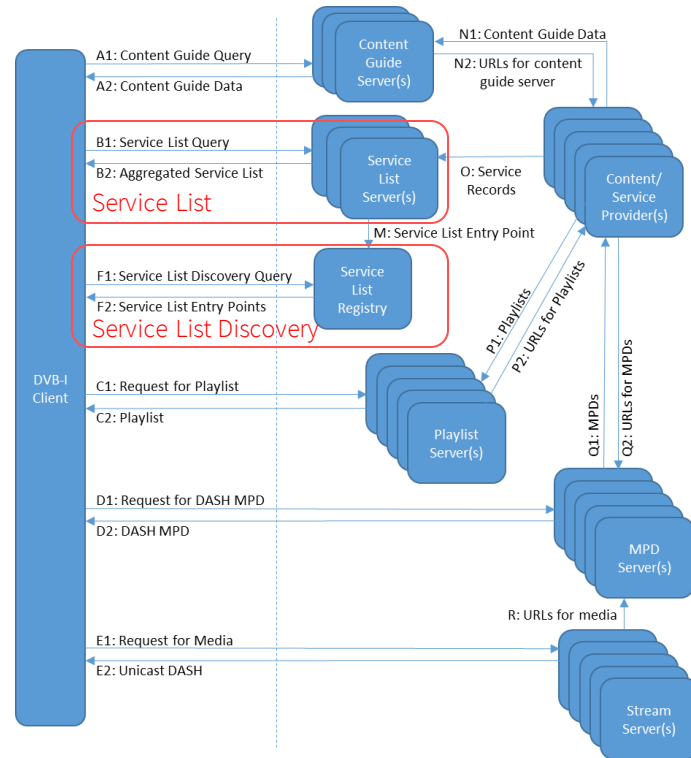
Deliver…

- Television viewers expect high quality video and have no consideration for the delivery mechanism used

- DVB-I Services primarily leverage DVB-DASH (Bluebook A168) for streaming and on-demand content

  - Profiling of MPEG-DASH to support the expectations of broadcast services

- DVB-I Services can signaled with simulcast information to align with broadcast delivery
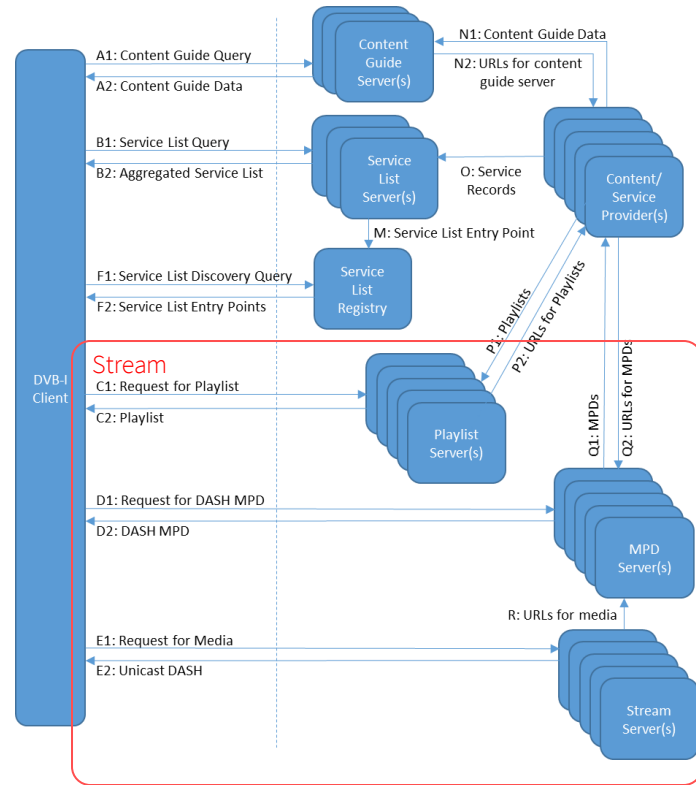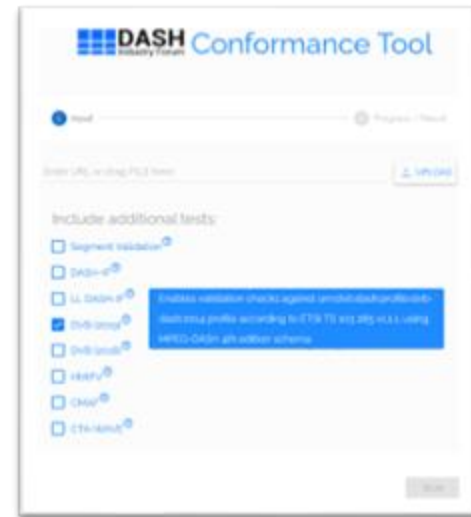
Present...

- DVB-I Services can be provisioned with a wide variety of supplementary and supportive information
  - Program Guide metadata
  - Logos and banners
  - Availability intervals
    - Can also support "hybrid transitions"
  - Content protection
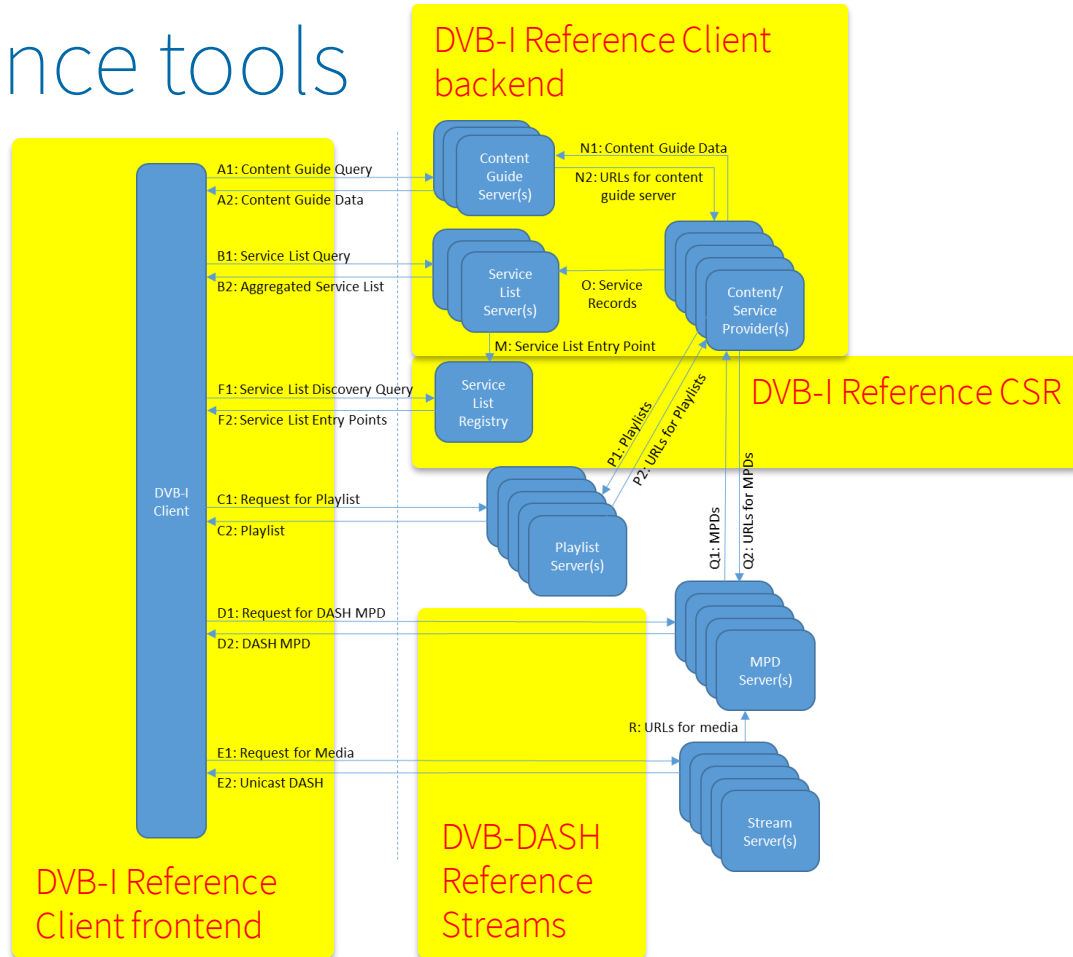 - Audio/Video characteristics for device targeting
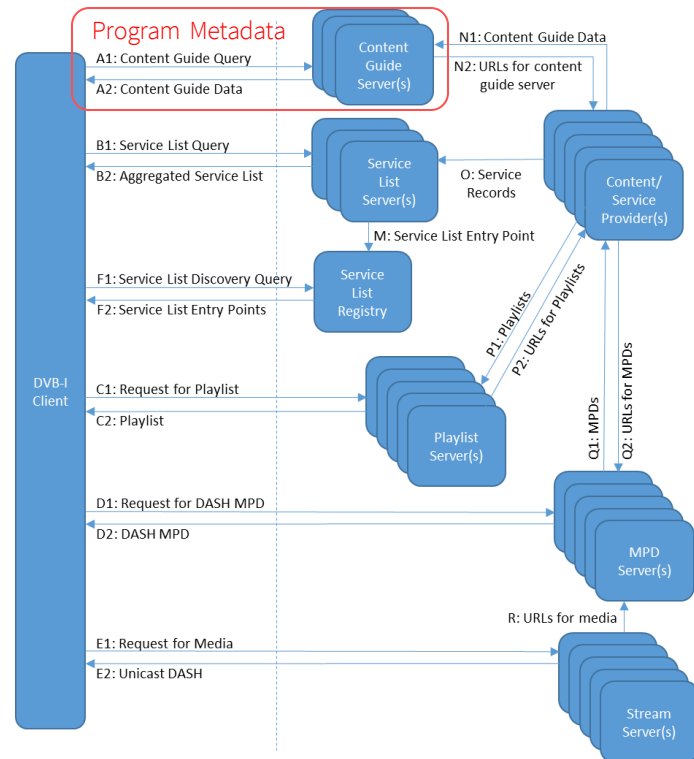
The Ecosystem...

- Beyond specifications, DVB supports the adoption and implementation of its work
- DVB-I Reference Client
  - Android and HbbTV application along with service lists, registries and content guide metadata backends
- DVB-I Reference CSR
  - A lightweight service list registry to allow bootstrapping of horizontal market clients in the service discovery process
- DVB-DASH Reference Streams
  - DASH manifests and media compliant with Bluebook A168
- DVB-DASH Validator
  - Developed in conjunction with HbbTV. Verifies manifests and media segments against Bluebook A168
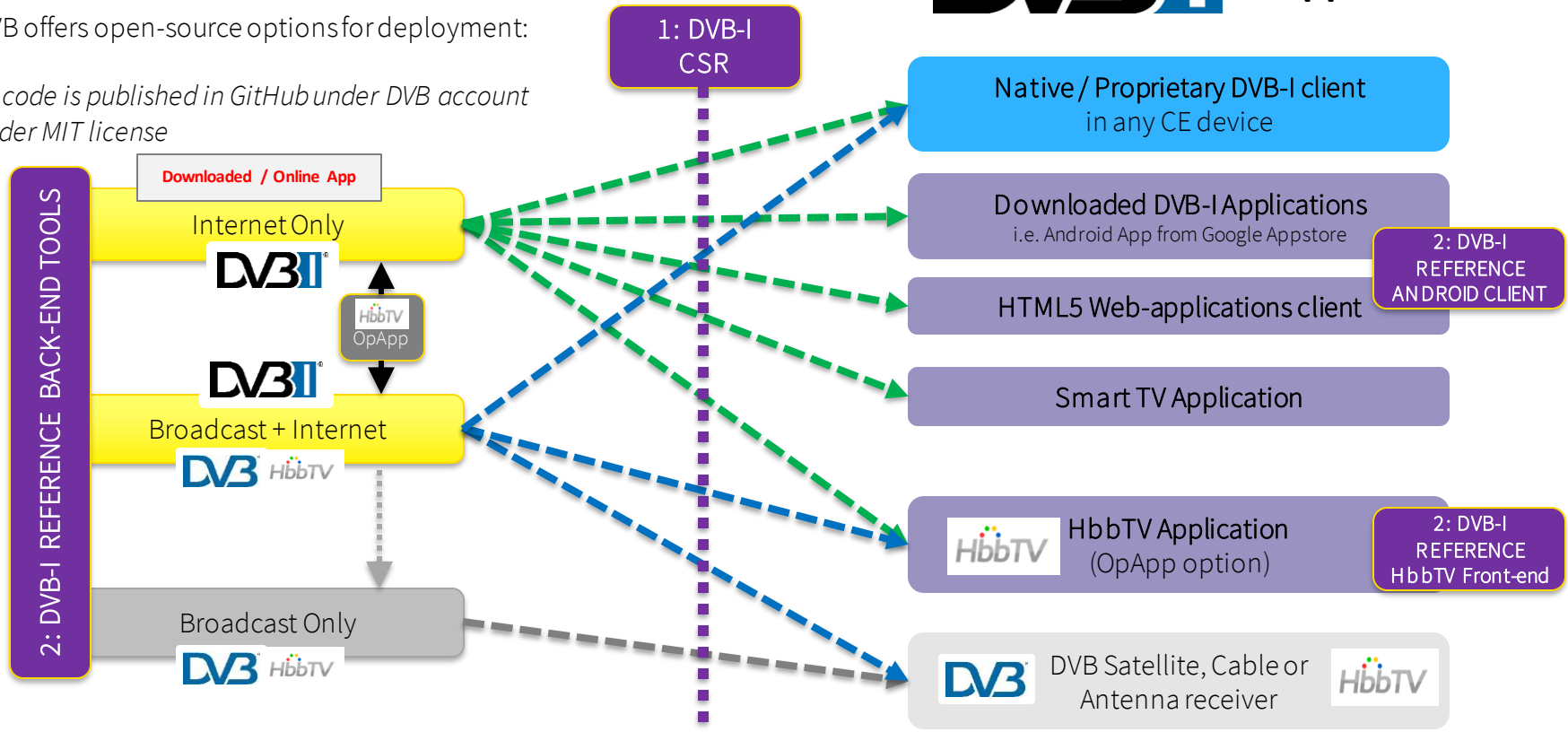
The reference tools

DVB-I Reference Client backend

A1: Content Guide Query
A2: Content Guide Data

Content Guide Server(s)

N1: Content Guide Data
N2: URLs for content guide server

B1: Service List Query
B2: Aggregated Service List

Service List Server(s)

O: Service Records

Content/ Service Provider(s)

M: Service List Entry Point

DVB-I Reference CSR

F1: Service List Discovery Query
F2: Service List Entry Points

Service List Registry

P1: Playlists
P2: URLs for Playlists

DVB-I Client

C1: Request for Playlist
C2: Playlist

Playlist Server(s)

Q1: MPDs
Q2: URLs for MPDs

D1: Request for DASH MPD
D2: DASH MPD

MPD Server(s)

R: URLs for media

E1: Request for Media
E2: Unicast DASH

Stream Server(s)

DVB-I Reference Client frontend

DVB-DASH Reference Streams

DVB

Deployment options of DVB-I

DVB offers open-source options for deployment:

All code is published in GitHub under DVB account under MIT license

Client Apps

1: DVB-I CSR

Downloaded / Online App

Internet Only

HbbTV OpApp

Broadcast + Internet

Broadcast Only

2: DVB-I REFERENCE BACK-END TOOLS

Native / Proprietary DVB-I client in any CE device

Downloaded DVB-I Applications
i.e. Android App from Google Appstore

HTML5 Web-applications client

Smart TV Application

HbbTV Application (OpApp option)

DVB Satellite, Cable or Antenna receiver

2: DVB-I REFERENCE ANDROID CLIENT

2: DVB-I REFERENCE HbbTV Front-end
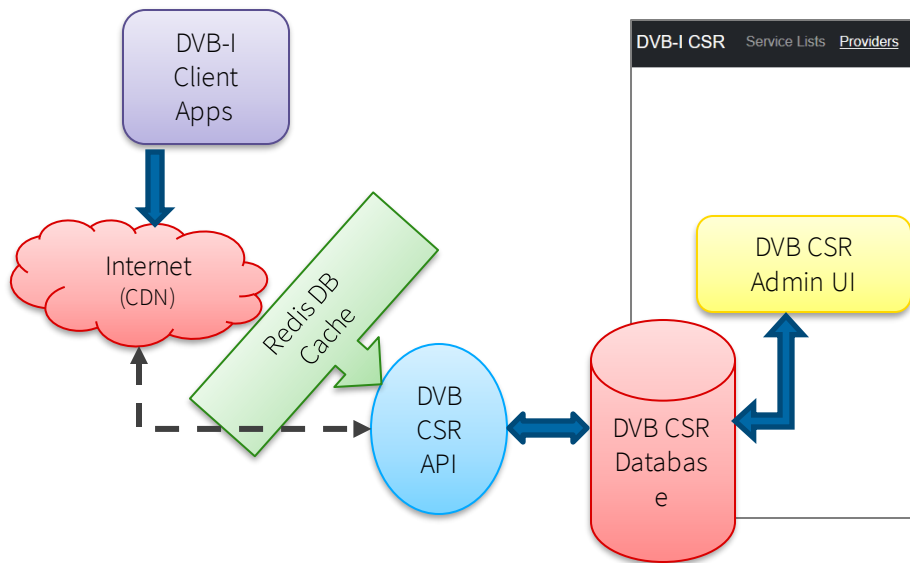
DVB-I Open-Source Projects: DVB-I CSR

Aims to test the feasibility and features of a Central Service Registry, providing access to service lists globally, and with an efficient and reliable Query API

- a small project group from Sofia Digital and DVB members manage the project

- MIT license is used

- First release was made 3rd November, "Phase 1 complete" since 18th March (skeleton size with complete DVB-I CSR related functionalities)

- Current status: bug fixing in the current release, preparing for new metadata spec releases, supporting test users

More info at https://github.com/DVBProject/DVB-I-Reference-CSR
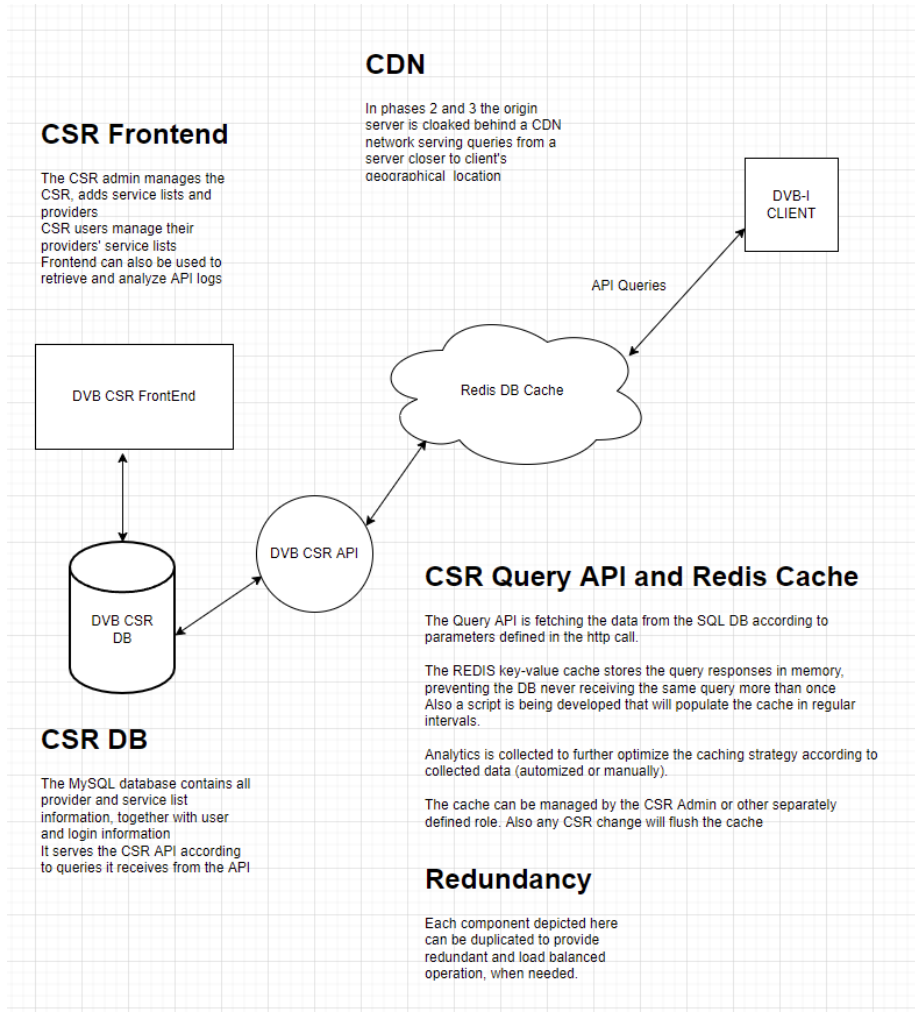
DVB-I CSR Tool – demo URL and screenshots

- Service list management UI is available at https://csr.dtv.fi/
- Service list discovery API is available at https://csr.dtv.fi/api/query
- User accounts are created on request (refer to github repo)

Technical diagram

CDN

In phases 2 and 3 the origin
server is cloaked behind a CDN
network serving queries from a
server closer to client's
geographical location

CSR Frontend

The CSR admin manages the
CSR, adds service lists and
providers
CSR users manage their
providers' service lists
Frontend can also be used to
retrieve and analyze API logs

DVB-I
CLIENT

API Queries

DVB CSR FrontEnd

Redis DB Cache

DVB CSR API

DVB CSR
DB

CSR Query API and Redis Cache

The Query API is fetching the data from the SQL DB according to
parameters defined in the http call.

The REDIS key-value cache stores the query responses in memory,
preventing the DB never receiving the same query more than once
Also a script is being developed that will populate the cache in regular
intervals.

Analytics is collected to further optimize the caching strategy according to
collected data (automized or manually).

The cache can be managed by the CSR Admin or other separately
defined role. Also any CSR change will flush the cache

CSR DB

The MySQL database contains all
provider and service list
information, together with user
and login information
It serves the CSR API according
to queries it receives from the API

Redundancy

Each component depicted here
can be duplicated to provide
redundant and load balanced
operation, when needed.

DVB-I Open-Source Projects: DVB-I Reference Client

Project consists of a backend and of a frontend:

- Backend allows generation and editing of DVB-I service lists
  - TV-guide (TV-A EPG data) management is not included into the reference app backend.
  - TV-guide data generator populates the EPG with sample mock-up schedule.
- The DVB-I app frontend has 2 versions
  - HbbTV OpApp implementation of a DVB-I compatible Client. It offers Service list navigation, selection/tuning of services, info banner and a simple EPG. Native or dash.js player can be used for service playback
  - HTML5 client for PC and Android devices. Android client is a PWA application, offering roughly the same functionality.
- General information
  - Project was managed by Sofia Digital and DVB project, with bi-weekly calls and feature tracking sheet
  - First release under the MIT license was made 31st January 2020, just making the first deadline (and beating COVID-19)
  - Project is now under maintenance accepting contributions from anyone interested
  - Main goal is to update the client and backend to produce metadata according to the latest A177r3/r4 release
- More info and demos at https://github.com/DVBproject/DVB-I-Reference-Client

Examples based on DVB-I Reference Client Design:

DVB-I DOLBY AC4 with NGA Dialog Enhancement

Key points

- UI based on DVB-I ref-app client
- Application converted as Native Android App
  - Using common modules in Android SDK
  - WebView HTML5 chrome engine
  - ExoPlayer to use native playback engine
- Works in Android devices with Dolby AC4 codecs
- Android SDK standard ExoPlayer with extensions by Dolby Laboratories

DVB-I adaptations
Based on Reference Client Design

In Germany

- rbb service list validated with the DVB-I Reference application
- Channel logos and XML AIT service
    - Including app only service!
- Complete TVA-EPG data with preview pictures

POC with MyTV Broadcasting Malaysia 2019-2020

- UI based on DVB-I ref-app client
- Application converted as Native Android App
    - Using Android Webview
- Use available / existing MPEG-DASH OTT streams
- Utilize existing EPG data from Sofia Backstage

DVB-I Reference Client also tested in Cambodia, Iran, and more…

Onwards

- The current DVB-I reference tools have been used as a base for several industry trials

- DVB members have contributed to updating and improving some aspects of these tools

  - Contributions and considerations are always welcomed.

- DVB-I Reference Client will be updated to align with the latest A177 version later in 2022

THANK YOU!