

## ABU Technical Bureau & Committee Meetings 2021

### Engineering Awards Winners



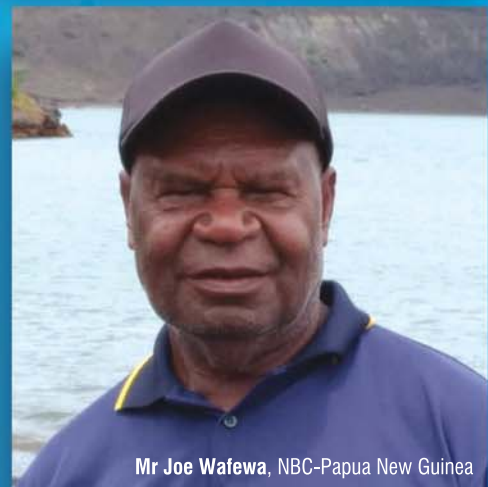
Mr Fu Haibo, RTPRC-China  
ABU Engineering Industry Excellence Award Winner



Dr Reza Alidadi, IRIB-Iran  
ABU Broadcast Engineering Excellence Award Winner



Golden Eagle Broadcasting System, RTPRC-China  
ABU Green Broadcast Engineering Award Winner



Mr Joe Wafewa, NBC-Papua New Guinea  
ABU Developing Broadcasters' Excellence Award Winner

**ALSO INSIDE**

Full IP UHD Remote Production – A Full-Scenario Solution

# How can DVB-I help broadcasters to get prepared for future?

## INTRODUCTION

Growth of penetration of internet and connected devices, OTT content production and the viewing of Media over the Internet (OTT) are realities of the new age of media. On other hand, the COVID-19 pandemic has brought an unforgiving illness to the world and has changed the way people live. We see that OTT audience-time increased in lockdowns. The media age is changing and these changes are not hidden from broadcasters. Let's imagine days when people watch more and more content through their connected devices (TV, mobile phone etc.) and through internet, not broadcast signals. Of course this future is not far away in some countries, it has happened, and it will happen in other countries, too. Where will broadcasters stand in this future? How can broadcasters access their viewers? How can their services be discovered among the many other services on the internet?

DVB is preparing well for this future, Its standardisation activities like DVB-MABR, DVB-DASH, DVB-TA and DVB-I show that it understands this future and the necessity for evolution. Mr. Peter MacAvock made mention of this in DVB Scene 57, via his article 'Internet-centric, broadcast-bred – a challenging mix'. Over the last two years or so, DVB has shifted to promoting itself as internet centric. But what does this mean? It's about changing mindsets, shifting focus, revamping old working methods, and accompanying (encouraging? dragging?) industry stakeholders into the future, all while retaining their support.

DVB-I has been created to provide partial solutions to some of the needs in this future, when broadcasters want their services to be accessible on the internet as easily as via broadcast.

The commercial requirements of DVB-I were developed in 2016. The target devices were all connected devices including mobile phones, PCs, tablets and connected TVs. There were several questions in these first steps: There are many services over the internet, how should receivers discover Broadcaster's services over the internet? How should viewers trust these services? How can viewers access to the services over internet as easily as broadcast? How can viewers have an experience similar to broadcast, for service list, EPG, zapping between services, on broadband?

The DVB-I technical group's answers to these questions can be found in "Service Discovery and Programme Metadata for DVB-I". The specification has been published as DVB BlueBook A177 in 2019 and was standardised as TS 103 770 in 2020.

## SERVICE DISCOVERY AND PROGRAMME METADATA FOR DVB-I

The DVB-I specification has been designed to bring the standard of linear TV delivered over the internet up to the level of the traditional broadcast experience both in video quality and user friendliness. A major focus lay in making the processes of search, discovery and navigation as straightforward as they are with leading broadcast services. This has led to development of components allowing linear TV services to be discoverable over the internet, involving delivery of suitable metadata.

The term "I" in DVB-I refers to 'internet' and DVB-I is going to be as same as DVB-T, DVB-C and DVB-S. DVB has standardised the interoperability between the client and the service provider for accessing services over internet.

The DVB-I Service Layer provides the mechanism for a client, which could be an application running in a smart TV set or any other connected devices, to discover service lists. DVB-I services can be a service that is delivered over broadcast or internet as DVB-DASH or both of these methods.

The service list provider prepares a service list of DVB-I services from all content providers. It may target a Service List of a particular platform brand, geographical region, language or other market segment, or none of these [see "DVB BlueBook A177r2:Service Discovery and Programme Metadata for DVB-I", 2021]

The service list provider registers the service list in Service List Registry. A Service List Registry is an HTTP endpoint made available at a known Service List Registry URL that can return a list of Service Lists and their Service List URLs. Service list registries can be operated by device manufacturers (for their specific service lists), by national or regional regulators, by operators for their specific clients, or by Central Service List Registry for all devices that implement DVB-I client and a third-party service list aggregator.

The DVB-I client may offer a specific service list just for a platform or several service lists to the users, who can select among them, or it can combine several service lists and create one list from them.

Note that for the purpose of accessing to the service list(s), DVB has defined a service list discovery method for the client.

## SERVICE LIST DISCOVERY:

The client will send a query to a known service list registry for access to the address of service list(s). The user will

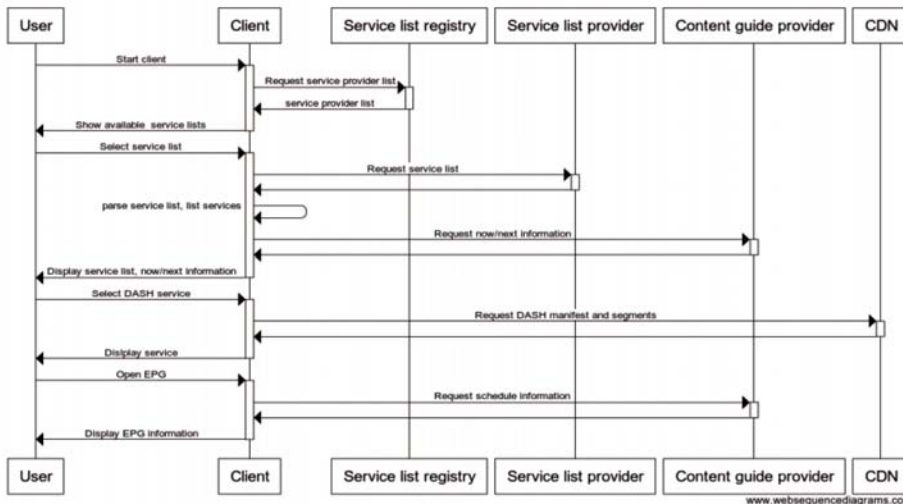


Figure 1: Sequence example

[https://dvb.org/wp-content/uploads/2020/03/20200406\\_webinar\\_DVB-I\\_slides\\_FINAL.pdf](https://dvb.org/wp-content/uploads/2020/03/20200406_webinar_DVB-I_slides_FINAL.pdf)

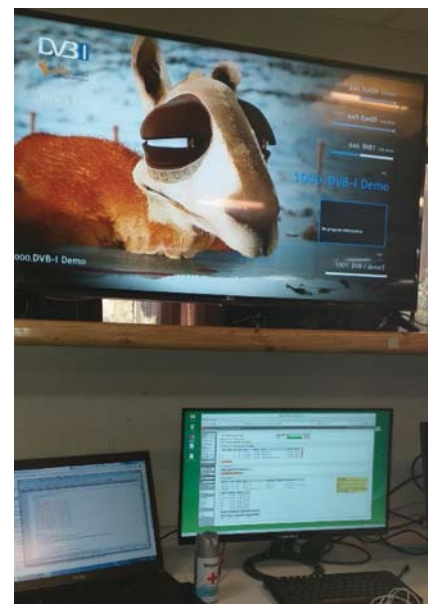


Figure 2: Laboratory setup for DVB-I and trial service list

select a service list and the client will display the service list on their device. **Figure 1** shows the sequence.

DVB-I can offer a common list of Broadcast and Broadband services and viewers can switch between services easily, no matter whether they are receiving through broadcast or broadband. In this way the broadcaster can offer a common list for its internet and broadcast services.

The DVB-I standard makes it possible to have a programme guide, related material, and linked applications for every service.

One of the main benefits of DVB-I is the possibility of offering UHD content over DVB-I. Lower quality content can be offered over broadcast and higher quality like UHD can be offered over internet. Services can be provided by both internet and broadcast delivery.

### DVB-I REFERENCE CLIENT

DVB has provided DVB-I reference Client to assist DVB-I implementers. The project consists of backend and frontend parts. The frontend is an HbbTV OpApp implementation of a DVB-I compatible Client. It offers Service list navigation, selection/tuning of services, info

banner and a simple EPG. A separate client is offered for Android devices. The Android client is a PWA application, offering roughly the same functionality. The application is available in GitHub: <https://github.com/DVBproject/DVB-I-Reference-Client>

### DVB-I IN IRAN

IRIB started laboratory test of DVB-I after a study phase in March 2020. As a first step, a service list, including services with DVB-T/DVB-DASH instances, was created. The service list was registered in IRIB's Service List Registry and the address of SLR was hard coded in the Client. All standards have many features and details and a laboratory trial can help to evaluate those features and potential benefits. The laboratory test helped IRIB to carry out its evaluation of different features of DVB-I and to assess how it could be applied to current and future IRIB services.

After the trialing of DVB-I in the laboratory, a new service list for the pilot phase was created, this new service list included 63 services :30 national and 33 regional IRIB services. The national services had DVB-T instances and regional services had DVB-T and DVB-DASH instances. LCN, created based on IRIB network LCN, are shown in the following code:

```

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

<ServiceList xmlns="urn:dvb:metadata:servicediscovery:2019" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:tva="urn:tva:metadata:2019" version="1" xsi:schemaLocation="urn:dvb:metadata:servicediscovery:2019 .. /dvbi_v1.0.xsd">
  <Name>IRIB DVB-I example service list</Name>
  <ProviderName>IRIB RD</ProviderName>
  <LCNTableList>
    <LCNTable>
      <LCN channelNumber="1" serviceRef="sid101"/>
      <LCN channelNumber="2" serviceRef="sid102"/>
      <LCN channelNumber="3" serviceRef="sid102"/>
      <LCN channelNumber="4" serviceRef="sid104"/>
      <LCN channelNumber="5" serviceRef="sid105"/>
      <LCN channelNumber="6" serviceRef="sid106"/>
      <LCN channelNumber="7" serviceRef="sid107"/>
      <LCN channelNumber="8" serviceRef="sid108"/>
    
```

Every service in IRIB service list has a unique identifier as below:

```
<UniquelIdentifier>sid109</UniquelIdentifier>
```

The service has two service instances, DVB-T and DVB-DASH. The DVB-T instance has higher priority in the service list so, as the first step, TV runs the service from DVB-T if a DVB-T signal is available. The DVB delivery parameter includes DVB Triplet of service as below:

```
<ServiceInstance priority="1">
  <SourceType>urn:dvb:metadata:source:dvb-t</SourceType>
  <DVBTDeliveryParameters>
    <DVBTripelt origNetId="3622" tsId="102" serviceId="109"/>
    <TargetCountry>IRN</TargetCountry>
  </DVBTDeliveryParameters>
</ServiceInstance>
```

DVB delivery parameter includes DASH URI as following code:

```
<ServiceInstance priority="2">
  <SourceType>urn:dvb:metadata:source:dvb-dash</SourceType>
  <DASHDeliveryParameters>
    <UriBasedLocation contentType="application/dash+xml">
      <URI>http://live.irib.ir/mdash/abadan/manifest.mpd </URI>
    </UriBasedLocation>
  </DASHDeliveryParameters>
</ServiceInstance>
```

The service list was based on serving a need within the local audience for the reception of provincial services from elsewhere in the country. In this way, people could receive national TV and their own provincial TV channels through broadcast and other provincial TV channels through internet.

The service list was registered in IRIB SLR and the SLR address was hard coded in the client.

```
var PROVIDER_LIST = http://rd.irib.ir/servicelist\_registry.php
```

The client was customized for Android phone/TVs and also HbbTV receivers. **Figures 3** and **4** show the launch of service list on mobile and TV. Users can switch between TV channels easily no matter whether from broadband or broadcast.



Figure 3: Displaying DVB-I Service list on android phone



Figure 4: displaying DVB-I service list on HbbTV Receiver

## DVB-I IN OTHER COUNTRIES

DVB DEMOS 2021 showed there is growing momentum around DVB-I. Several companies demonstrated early implementations of products based on the specification. In 2021, the new Italian receiver spec, UHD Book 2.0, foresees mandatory DVB-I support, post 2022. It considers some preconditions for the mandatory status of DVB-I in Italy: firstly, DVB-I should be ratified as an ETSI standard and the secondly, major Italian broadcasters should have successfully completed proofs-of-concept and trials showing end-to-end interoperability of all components. [see "UHD Book 2.0", HD forum Italy, 2020]

Dolby and TP Vision recently collaborated to show how DVB-I can deliver a UHD service complete with immersive audio to an off-the-shelf Philips connected TV running a prototype DVB-I client. This utilised an AC-4 audio stream, enabling fully immersive 360-degree audio reproduction with its built-in loudspeaker system, without requiring any additional speakers [see "Enabling enhanced linear TV experiences with DVB-I", DVB Scene 57, 2021]

## DVB-I OVER 5G

In July 2021, the DVB Project approved commercial requirements for DVB-I service support over 5G networks and systems as DVB Blue Book C100. Work has already been assigned to DVB's Technical Module to provide extensions to the relevant existing specifications – including DVB-I service discovery and DVB-DASH – to address the use cases and requirements collected and agreed by the Commercial Module. [see "DVB Bluebook C100: Commercial Requirements for DVB-I over 5G", 2021]

The commercial requirements demand specifications to support different Rel-16-based 5G operation modes, 5G Broadcast, unicast-based 5G Media Streaming, concurrent delivery of the same service over both modes, and hybrid DVB-I services. In all cases it is expected that the specifications reuse existing DVB technologies to the full extent possible and provide commonalities with other IP-based DVB delivery means. AS DVB-I was designed to provide a TV service platform independent of access layer, many issues of technically-oriented requirements in different service operation phases and client related aspects are already covered by the existing DVB-I specification.

## CONCLUSION

DVB-I offers a solution for broadcasters to launch new enhanced services, offer all their services (broadcast and broadband) in one service list and get them prepared for future. The opportunities with DVB-I, in terms of enhancing the user experience even further, are huge and user interaction for accessible and personalised content adds great value for consumers.

## ABOUT AUTHOR



### Fatemeh Fallahi

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Fatemeh Fallahi works as Researcher at IRIB. She received her MSc. degree in electrical engineering from Tarbiat Modarres university in 2009. In 2009, She joined IRIB R&D and established her career as a researcher on mobile TV, digital switch over and analogue switch off. She has many years' experience in DVB and HbbTV technologies. ■