DVBSCENE
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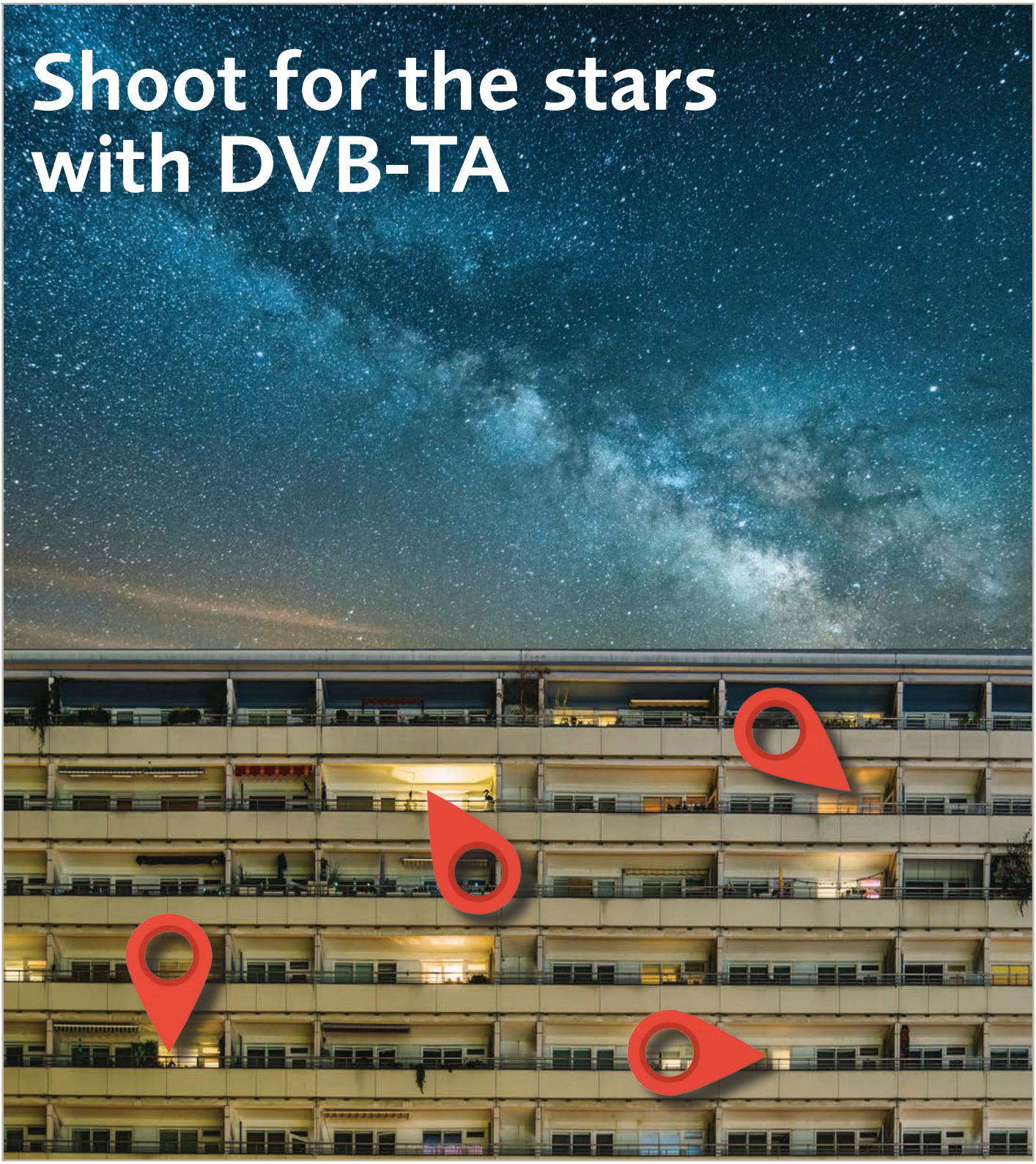
Shoot for the stars with DVB-TA



DVBSCENE

CONTENTS • MARCH 2021

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Ready for the challenge?

Emily Dubs
Head of Technology, DVB Project

A year has passed since COVID-19 began to turn our world upside down. The pandemic has been a disaster for human society and the global economy but, even amid so much hardship, one must say that this period has presented a golden opportunity for video and media.

Opportunities tend to arise when there is a challenge to be met, and our industry has seen, inter alia, a tremendous increase in viewership, along with a shift in consumption patterns. A huge amount of work has been undertaken behind the scenes to successfully handle this sudden disruption.

Some DVB Members have been instrumental in accelerating a shift, working hard to achieve in the space of a few months what would have normally taken a couple of years, while still actively contributing to DVB's work. Indeed, in this context, more than ever, the value of open standards is acknowledged. Standards are the most efficient way both to deploy new technologies at scale and monetize content. This is borne out, for instance, in article from Mediaset on page 10 related to the forthcoming market launch of standards-based targeted advertisting, implementing DVB-TA and HbbTV-TA.

SEAMLESS FRAGMENTATION

I believe that DVB retains a critical role in today's standards landscape, being at the forefront of the convergence of regular broadcast with broadband and 5G media delivery. In fact, rather than *convergence*, I would say it's more about *sharing* the strengths of the various types of network, allowing a seamless use of any of them. DVB is defining the solutions that will allow content – from prime-time fiction and live events to the long tail – to be seamlessly delivered through multiple networks, taking full advantage of the specificities of each.

In this way, one could say that DVB is now shifting its focus towards the *service* as opposed to the physical layer. In today's fragmented landscape, metadata is the 'intelligence' aspect of media and needs to be leveraged. DVB-I is a first approach, building on ETSI TS 103 770 that defines the mechanisms for internet-based service discovery. This is now being complemented by the Native IP work (see page 9) that further reflects this move towards IP-centric solutions and the service layer.

Our Members are thus now defining the tools required to get through this long transitional phase, where multiple combinations of networks, platforms and devices must coexist, delivering an ever-growing content offer. From this fragmented ecosystem, *viewers* expect a seamless and unified experience, while operators in turn, want to ensure prominence for their services! All of this adds up to a challenging and ambitious mandate for the DVB Project. Needless to say, contributions from the wider membership – including those who have not been actively involved in recent years or perhaps ever – are essential.

DVB News

NEW & UPDATED SPECIFICATIONS

Below we list DVB documents published since the last issue of DVB Scene. They include the first ETSI-published versions of DVB-I, DVB-MABR and DVB-TA, as well as the BlueBook publication of DVB-HB.

ETSI TS 103 769 V1.1.1
Adaptive media streaming over IP multicast (November 2020)

ETSI TS 103 770 V1.1.1:
Service Discovery and Programme Metadata for DVB-I (November 2020)

ETSI TS 103 752-2 V1.1.1:
Dynamic substitution of content in linear broadcast: interfacing an advert decisioning service and optimal preparation [DVB-TA, part 2] (December 2020)

ETSI TR 102 376-2 V1.2.1:
Implementation guidelines for the second generation system for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 2: S2 Extensions (DVB-S2X) (January 2021)

DVB BlueBook A001r17 (Draft TS 101 154 V2.7.1):
Specification for the use of Video and Audio Coding in Broadcast and Broadband Applications (February 2021)

DVB BlueBook A083-2r2 (Draft EN 302 307-2 V1.3.1):
Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications; Part 2: DVB-S2 Extensions (DVB-S2X) (February 2021)

DVB BlueBook A178-1r1 (Draft TS 103 752-1 V1.2.1):
Dynamic substitution of content in linear broadcast: carriage and signalling of placement opportunity information in DVB Transport Streams [DVB-TA, part 1] (February 2021)

DVB BlueBook A179:
Service discovery and delivery protocols for a DVB Home Broadcast system [DVB-HB] (February 2021)

All available from: dvb.org/specifications

NEW DVB MEMBERS

Find out how to join the DVB Project by visiting: dvb.org/join

Quadrille, based in Paris, is an independent software and service provider specializing in over-the-air content delivery. Its multicast solutions target real-world requirements in industries as diverse as media, entertainment, transportation, and public and military infrastructures. (www.quadrille.fr)

"For Quadrille, joining the DVB Project was a priority as we increasingly focus on using IP multicast technologies to deliver any kind of content over broadcast networks." Xavier Battas, CEO

Synaptics Inc, headquartered in California, develops integrated circuits for user interface solutions, with differentiated technologies in touch, display and biometrics that can be combined with a new generation of advanced connectivity and AI-enhanced video, audio, speech and security processing. (www.synaptics.com)

"The network of DVB Members and the associated access to digital media delivery insights complement the increasing focus and commitment of Synaptics to continued technological innovation at the edge." Nick Dunn, Senior Director of Marketing, Multimedia SOC

Twise SAS, based in the south of France, specializes in the development of secured solutions for the digital pay-TV market, mostly for products such as CI Plus conditional access modules (in both USB and PCMCIA form factors). Its mission is to provide flexible turnkey solutions compliant with any environment and respecting the operators' standards. (www.twise.fr)

"The ultimate goal is to contribute to the CM / TM groups for CI Plus, which is our core business, and to encourage new DVB initiatives to build our future." Xavier Teil, President

A word from the PCM chair

ELFED HOWELLS (HISILICON / HUAWEI)

In January 2021, with pride and excitement, I took up my new role as the chair of the PCM. I've been overwhelmed by the support received from our group, and the increase in participation and contributions (up to 25 members at our meetings) has been heartwarming.

The PCM is responsible for the promotion and communication of DVB's work. We work with the Project Office to help ensure that DVB's publications, events, social media presence and press releases reflect its work, while also shaping our conversation with our Members and with the outside world.

Since January we have enhanced the way the PCM functions to reflect the dynamic nature of the specifications under development at DVB. We now meet every two weeks and touch on all the aspects of our remit at each meeting. These include the news items that are in focus, our DVB events, participation in external events, publications, and our outreach to Members and non-members, in companies, organizations, industries and countries worldwide.

The recent and ongoing specification work from DVB, focusing on next generation media delivery via broadcast, mobile hybrid and OTT is keeping everyone busy. PCM participants are contributing to the creation of our new narrative that ties together existing and forward-looking technology specifications, to convey the possibilities these can offer to both enhance and expand media delivery.

We would welcome your input and cordially invite you to join us at the PCM! Thanks for the welcome, and the ongoing support.

Did you miss this showcase of DVB's next gen specs?

A year without trade shows meant a year without those landmark events that provide a focal point for driving industry innovation forward and without an opportunity to demonstrate the latest DVB specifications in action. To fill this gap, the DVB Project Office put together the inaugural DVB DEMOS event on 26 November.

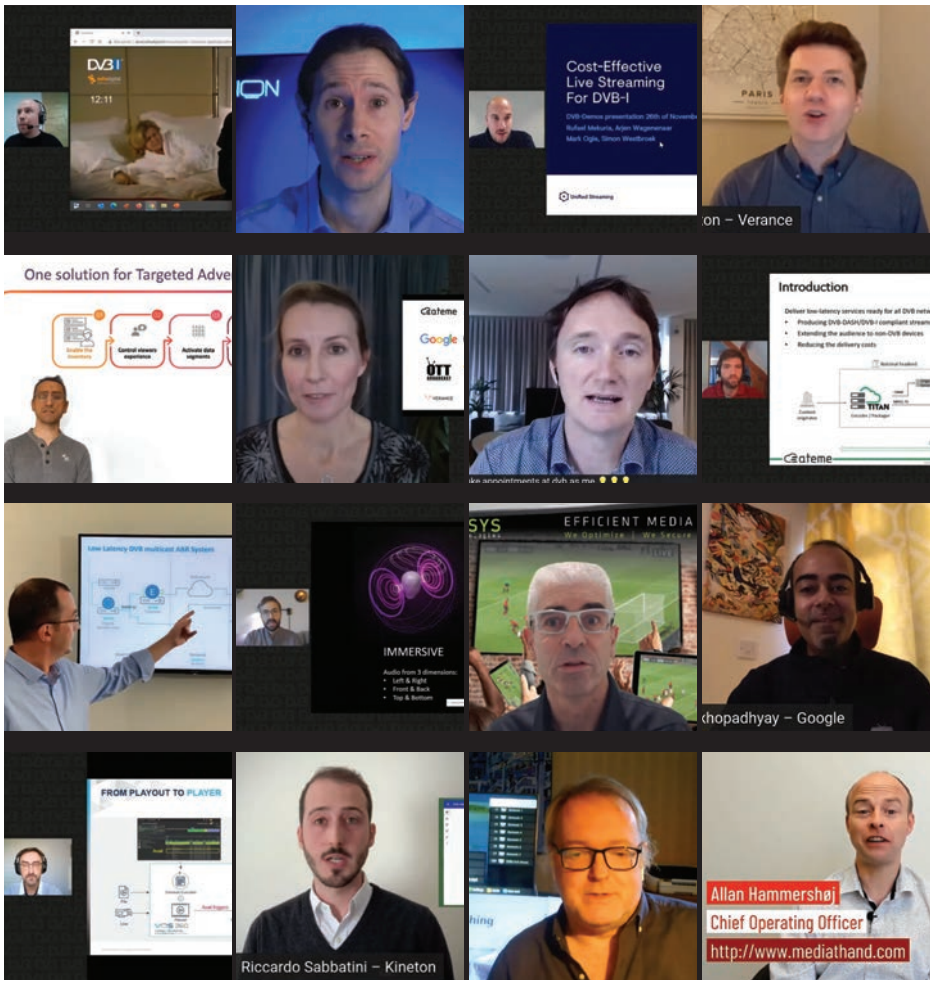
It was a little different in the way it combined two distinct blocks: the morning offered a two-hour live stream where each of the 15 "exhibitors" presented short, sharp demos of products and services that implement the newest DVB specs (DVB-I, DVB-DASH, DVB-MABR and DVB-TA). And then, in the afternoon, we switched to a different mode, with each exhibitor available for one-to-one private sessions where they could show their demos in more detail and answer questions.

Thanks to all our exhibitors: ATEME, Broadpeak, Dolby, ENENSYS Technologies, Google, Harmonic, Kineton, OnScreen Publishing, OTT Broadcast, Sofia Digital, TPV Technology, Unified Streaming, Verance, and Viaccess-Orca.

The morning session is available to watch on demand. Just visit the event page, where you'll also find direct links to each exhibitor's section: dvb.org/demos2020

The stream ends with a wrap-up from DVB Head of Technology Emily Dubs. She explains how the aforementioned new DVB specs, along with ongoing work on Native IP and 5G, will come together to create a new unified future for media delivery.

Another edition of DVB DEMOS will be held in the autumn. DVB Members should join the PCM group to follow developments: member.dvb.org/wg/PCM/dashboard



Internet-centric, broadcast-bred – a challenging mix

PETER MACAVOCK, CHAIR OF THE DVB PROJECT

"My old adage is that "turkeys never vote for Christmas": some of the changes being proposed are hard, and some are unpopular. But I believe they are necessary."

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. My old adage is that "turkeys never vote for Christmas": some of the changes being proposed are hard, and some are unpopular. But I believe they are necessary.

CROWDED FIELD

The DVB Project is uniquely placed to serve an industry that is changing faster than ever. Its heritage as the cornerstone of the analogue-to-digital and SD-to-HD transitions is useful, but in many ways constraining. In years gone by, DVB was on its own as the solutions provider in the digital broadcast space. While we believe in DVB's credentials, there are a lot of organizations vying for relevance in the broadband media delivery space, each with its own unique proposition. What makes DVB different? Is it its focus on media? Its market-led, consensus-based approach? Its unique make-up of big media companies, big vendors and lots of technology providers? We cannot be certain, but it's likely to be a combination of all of these.

We have been working on DVB's new direction for some time. Many of the elements are already in place, like DVB-I, targeted advertising, DVB-DASH, DVB-MABR. The task now is to paint a clearer picture of how these elements – and others in the pipeline – fit together and can enable the next great transition, a transition that has already begun.

What, in practice, does an internet-centric approach entail? We have tried to instil a faster time-to-market and, critically, a greater focus on aids-to-interoperability. This latter element has meant that we don't standardize our output until such time as the 'verification and validation' (V&V) phase of our work is complete. The thinking here is that if a specification is valuable, then its proponents will work to produce the tools necessary to help the market deploy interoperable solutions.

One of the challenges over the coming year will be to ensure that DVB is able to maintain its V&V effort, maximizing its usefulness and minimizing its administrative impact.

NEW BLOOD

And have we really transitioned DVB into this new – more agile – organization? Well, honestly, no; not yet at least. The intention is there among those who care most about DVB itself, but transitioning the existing membership is sometimes a struggle. Consensus is still very valuable, and we do have means of overcoming obstacles to consensus where they appear. We need to be quicker to apply them and we may even need to revisit the working methods as described in our tried and trusted Rules and Procedures.

Furthermore, many DVB-ers have been around for a long time, and attracting the new blood necessary to generate the exciting work items and to work in these new ways requires DVB to sell itself to a new audience, one that doesn't care about heritage and reputation. With our new PCM Chair, Elfed Howells, now firmly in place with an innovative and ambitious agenda, we have an opportunity to revamp DVB's public image. And, for the first time in a long time, we have the internet-centric ingredients to provide substance to the messages.

Peter MacAvock is the Chair of the DVB Project. He is also Head of Distribution Platforms and Services at the European Broadcasting Union.

Screenshot of the HbbTV version of the DVB-I reference client

Developing the DVB-I reference client: an unexpectedly adventurous journey

JUHA JOKI (SOFIA DIGITAL)

There was a lot of excitement in the air when we received the news that we had been chosen to deliver the DVB-I reference client. The contract was signed on 6 January 2020 and the work began. The project was divided into two phases: Phase 1 covered the most basic and essential use cases and Phase 2 was about packaging some more 'nice-to-have' features together.

OPEN SOURCE

The project is hosted on a public GitHub server registered by the DVB Project. The first commit to the repository was made on 20 January after the first two-week sprint. The initial delivery deadline for Phase 1 was already on 31 January, with the final Phase 1 delivery scheduled for 28 February – a particularly challenging timeline.

Because of this, we decided to recycle some of our existing codebase for the HbbTV implementation, modifying it enough so that it could be released with the open-source MIT licence to GitHub, as requested by DVB. For the Android implementation everything was coded from scratch.

The first phase was successfully delivered on 28 February, complete with the service list editor (backend), grid-based EPG, channel selection, and stream playout. It was finalized, after a few corrections, on 11 March. We had to be careful not to design a client that was too good looking: as the chair of the Technical Module, Jon Piesing, had remarked, "DVB is not paying for user interface design!"

Around this time the COVID-19 situation had worsened, and the planned DVB World conference was cancelled. It was to have been the first public demonstration of the DVB-I reference client. Instead, we settled on bringing the planned DVB Masterclass sessions online, showcasing the DVB-I reference client project in a webinar on 1 April. (See: dvb.org/webinars)

The subsequent cancellation of the IBC exhibition and various related difficulties led to the original delivery schedule for Phase 2, with its myriad of small and bigger features, slipping. After quite a bit of struggle, and with weekly calls with the DVB experts Jon Piesing, Paul Higgs and Emily Dubs, the final version was delivered at the end of the year.

IMPROVING THE SPEC

During the first phase of the project our focus was clear: the feature list consisted of the absolute essentials of a DVB-I client, namely the channel list, the EPG, the info banner and the player. In addition to this, the backend service list editor was developed to help us to understand the Service Discovery and Programme Metadata for DVB-I specification (then published as BlueBook A177) and its implications for the client. However, the second phase was more about handling many small but useful features and thus a feature tracker was applied. It was surprisingly time-consuming to complete everything and during the work we found elements of the specification that were unclear or not fully fleshed-out – which was exactly the original intention of the project. It was also a great privilege to participate in the regular calls of the DVB TM-I group during the project, to assist in getting the specification in even better shape and seeing everything come together, including the low-latency streaming effort together with FFmpeg.

The GitHub repository and our example hosted implementation will remain available for the foreseeable future. We can see that there is a lot of interest – more than ten different forks have been made by interested parties studying the code and UI. DVB-I is in a very strong position to gain worldwide implementation and we hope that the reference client developed by Sofia Digital remains helpful in fulfilling that potential.

Juha Joki has many years' experience in DVB and HbbTV technologies. Currently he is in charge of DVB broadcast products and testing and certification services for DVB and HbbTV at Sofia Digital.

Enabling enhanced linear TV experiences with DVB-I

JAN MÜLLER (DOLBY)

TVs and mobile devices are increasingly capable of reproducing enhanced viewing experiences that bring us closer to reality – with UHD high dynamic range video, for example, and immersive 3D audio. But while some bigger streaming and pay-TV services have been able to take advantage of these new capabilities already, it can be more challenging for broadcasters to find the spectrum to innovate, especially over congested terrestrial networks.

DVB-I offers a solution for broadcasters to innovate and launch new enhanced television services, making use of flexible broadband delivery while achieving scale with an open, cross-platform approach. Through enhanced audio capabilities, DVB-I enables new possibilities to improve service accessibility and to meet the preferences of individual viewers.

IMMERSIVE AUDIO

Immersive audio wraps the viewer in detailed 3D sound from all around, including overhead. It has been used for several years now to make movies and episodic dramas much more exciting and is increasingly used for live broadcasts to recreate a realistic atmosphere for sports, concerts and other events. By enabling use of the latest next generation audio (NGA) codecs, DVB-I enables immersive audio to be included in linear broadband services in a single data-rate-efficient bitstream.

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 utilized an AC-4 audio stream, enabling fully immersive 360-degree audio reproduction with its built-in loudspeaker system, without requiring any additional speakers.

ACCESSIBLE CONTENT FOR ALL

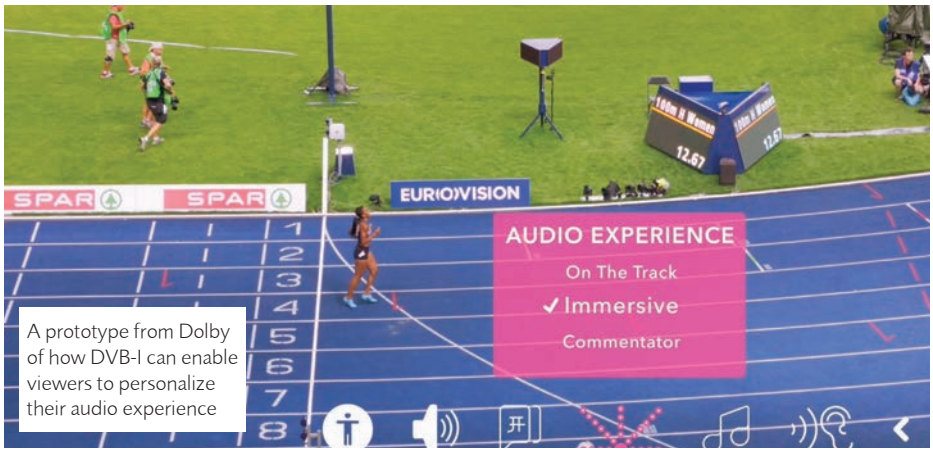
DVB-I also provides new opportunities to increase content accessibility. Again through support of the latest NGA codecs, DVB-I offers extensive features including dialogue enhancement and audio description. Dialogue enhancement enables the user to adjust the level of dialogue within a programme compared to the background audio to maximize intelligibility. And extended support for audio description can provide audio commentaries in a more extensive and scalable way – for example, making it possible to offer description for different language versions and across stereo, surround and immersive listening scenarios, or to change the level of the descriptive commentary versus the main programme.

PERSONALIZED EXPERIENCES

In enabling viewers to choose their preferred audio experience, DVB-I can bring the level of personalization interactivity usually associated with watching internet content to the world of linear TV. At its simplest, this can be a choice of languages, the option to add director commentary, or to choose a dialogue version more appropriate for children. Personalized audio can also go beyond dialogue preferences to make the whole audio scene more individual, for example with adjustable or even team-biased crowd noise in sports content. The 'preselection' concept within DVB-I and DVB-DASH provides a standardized framework for the selection of different audio versions via the DVB-I client, all derived from a single audio bitstream.

DVB-I doesn't come with a complete new set of requirements for codec support and media delivery – it builds on top of existing DVB standards for receiver interoperability. As proven with the prototype, compliant DVB devices on market today can be used to implement a DVB-I client application and reproduce an immersive experience for consumers using built-in technology.

The opportunities with DVB-I in terms of enhancing the user experience even further are huge and user interaction for accessible and personalized content adds great value for consumers. To give the viewers access to those features the DVB-I client needs to implement a corresponding user interface; we are looking forward to seeing the first prototypes soon. We're excited to see how broadcasters choose to leverage DVB-I to innovate with new immersive, accessible and personalized services.

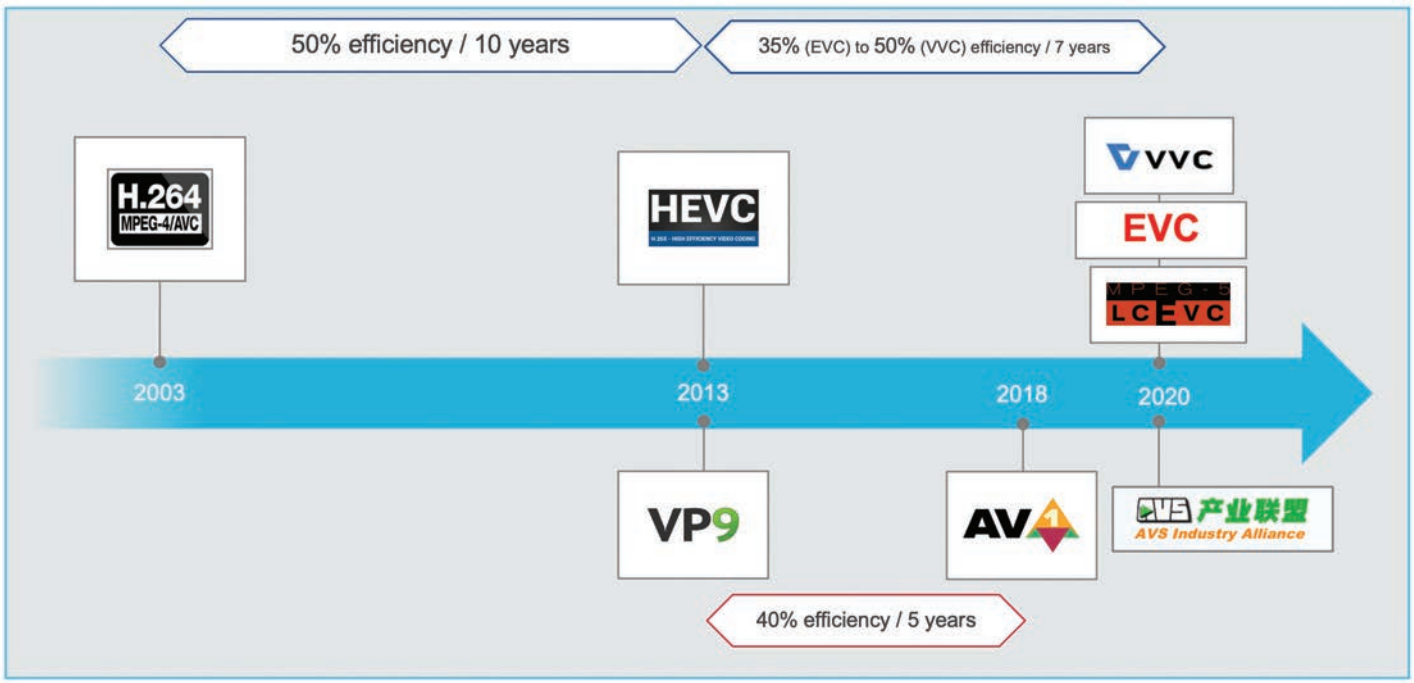


A prototype from Dolby of how DVB-I can enable viewers to personalize their audio experience

Jan Müller – Commercial Partnerships and Standards Manager at Dolby. He works with the industry on enhanced media experiences in horizontal ecosystems and is involved in standardization activities within DVB and HbbTV.

Why specify new video codecs in DVB?

JAN OUTTERS (SES) & JASON POWER (DOLBY)



Video codecs timeline, courtesy of Harmonic Inc.

At the time of writing, the participants in DVB's CM-AVC sub-group are particularly active. The goal is to agree on a set of commercial requirements that will ultimately lead to the addition of one or more new video codecs to DVB's toolbox.

This current phase of work was kickstarted with an online workshop that took place last September. For DVB Members only but featuring several guest speakers, the workshop attracted more than 140 participants, which provides an indication of just how important this topic remains for the industry.

MAIN DRIVERS

There was a strong mandate from DVB's membership for further work in this area. In a survey that had been undertaken prior to the workshop, 94% of respondents indicated that they would like to see one or more new video codecs added. While the phenomenal growth in OTT video traffic is perhaps the biggest driver for the emergence of new video codec solutions, these codecs could also be important enablers of new enhanced video experiences for broadcast and broadband like 8K, and also accelerate adoption of 4K UHD on terrestrial networks.

"Clarity around licensing terms will be an essential factor in the successful growth and adoption of any technology in the marketplace."

It has been suggested that the success of codecs is heavily influenced by the "three Cs": compression, complexity of implementation, and commercial characteristics. And while current technology is sufficient to meet some near-term opportunities like 8K, there is general agreement that new codecs will be needed for the longer term, from 2023 onwards. Clarity around licensing terms will be an essential factor in the successful growth and adoption of any technology in the marketplace.

THE YEAR OF CODECS

2020 was a landmark year for video codecs, with several – AV1, AVS3, MPEG-5 EVC, MPEG-I VVC and MPEG LCEVC – all reaching key milestones. The standards work is generally done for all of these codecs and volume shipment of devices can be expected in 2021–23 depending on the technology and demand for it.

All five of these codecs were presented by their proponents during the September workshop. DVB Members can access the individual presentations via the CM-AVC workspace. They provide a wealth of information about the technology used, performance, commercial factors and the status of licensing.

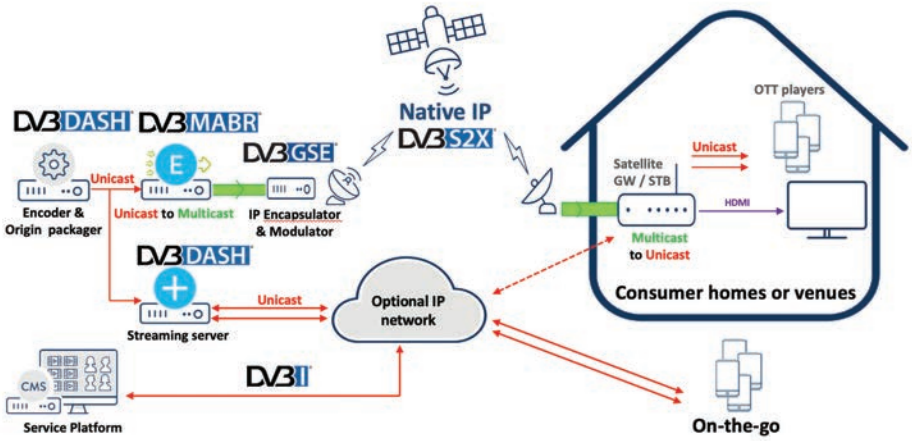
The CM-AVC group has a target to deliver first commercial requirements around the start of Q2 2021. The TM-AVC group has already begun preliminary work in anticipation of the Steering Board approving the next step.

Jan Outters is Senior Engineer – Product Management with SES; **Jason Power** is Senior Director of Commercial Partnerships and Standards with Dolby. They are, respectively, vice-chair and chair of the DVB Commercial Module sub-group on audio and video coding, CM-AVC.

DVB Native IP: fast track to DTH 2.0?

JEAN-CLAUDE SACHOT (BROADPEAK)

The DTH 2.0 platform



Aside from the introduction of new codecs and formats, direct-to-home (DTH) digital satellite television has not improved much since the mid-1990s: it remains limited to the TV screen, in most cases connected to a bespoke satellite receiver decoder. However, we have now reached the point where the broadcast of live video channels using video packaging formats such as DVB-DASH or HLS can revolutionize video content distribution by *natively* addressing *all* types of screens.

At the start of 2020, amid growing momentum, several industry players joined forces within the DVB Project to initiate work on producing commercial requirements for a Native IP specification allowing the delivery, via broadcast means, of media content natively tailored for distribution over any IP-capable network, using the same media packaging formats that have enabled OTT streaming. From unifying systems on the headend side to enabling new business models, and beyond, the benefits offered are wide-ranging, and not only in the context of satellite.

A first important milestone was achieved last summer when the DVB Steering Board approved the commercial requirements for Native IP. This subsequently triggered the creation of the new Technical Module Native IP sub-group (TM-NIP) at the beginning of November, to deliver a specification and implementation guidelines.

LOOKING AHEAD

Moving from a specification to broad market adoption, however, will not be straightforward. There are understandable fears that the demand for solutions targeting the B2C segment, such as next-generation DTH, may still be many years away. The most common concern is that, for broadcasters, deploying Native IP would require additional transmission capacity for quite a long time on top of the conventional MPEG Transport Stream-based transmissions, until the latter could be switched off.

However, when a new technology proves to be mature, brings benefits to consumers as well as content distributors, and offers good prospects for profitability, the next step for the industry is to identify a viable migration path that permits its early market introduction and the progressive withdrawal of the previous generation.

For technologies that rely on legacy consumer-premises equipment, migration obviously cannot happen overnight. The migration path is usually long, but as with the shutdown of analogue television or video codec and format transitions, the recipe for success is good planning and a willingness to move forward. Given the long legacy the satellite industry has to live with when new generations of TV sets or set-top boxes hit the market, I believe that now is the right time to engage in serious planning activities for introducing Native IP delivery to satellite broadcast.

MIGRATION PLANNING

Most content providers already have OTT streaming playout capabilities that can be leveraged for Native IP distribution via broadcast. When it comes to transmission bandwidth, a viable migration path could be to reduce the number of live TV channels distributed by satellite (offloading the low audience channels to OTT distribution only) and reuse the released satellite spectrum to simulcast high-audience channels or live events in Native IP, addressing all consumer devices.

Legacy set-top boxes pose perhaps the biggest challenge. Nevertheless, we have demonstrated that the software of eligible set-top boxes can be upgraded to support Native IP redistribution across consumer homes. Native IP satellite gateways could present another solution here.

The vision that drives us is enabling providers to operate all of their broadcasting and OTT streaming with one single distribution platform, rather than operating two siloed ecosystems forever. Native IP is a clear opportunity for significant short-term cost savings and greater consumer satisfaction, and paves the way for a successful DTH 2.0!

Jean-Claude Sachot is the Business Development Director for Broadpeak. He has more than 30 years of experience in digital video processing and delivery, and was previously vice president of pre-sales – video CPEs at Technicolor.

Targeted Advertising: from specification to implementation

STEFANO BRAGHIERI (MEDIASET)

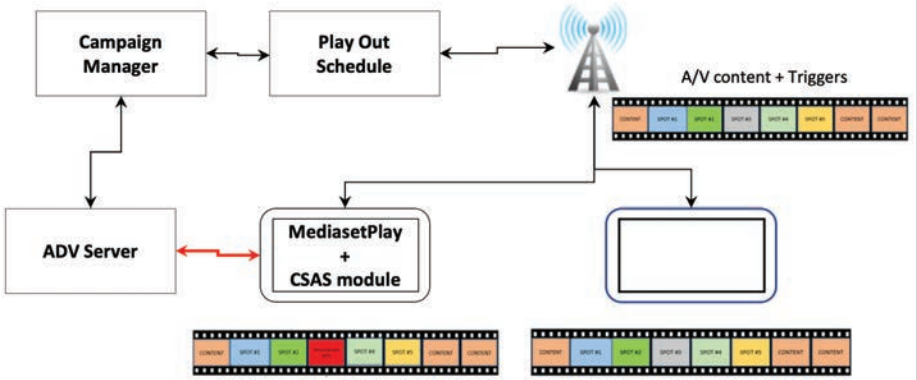


Figure 1. HbbTV 2.0 implemented solution

Mediaset, the major Italian commercial broadcaster, has been involved as a DVB Member for many years, taking advantage of the opportunity to contribute to the definition and standardization of new technologies.

Since the days of MHP, we have understood that a deep involvement in DVB and other standardization bodies is key to maintaining a leading position in the competitive environment where new technologies come along more and more frequently.

This article describes how Mediaset has developed a proof of concept based on the newly released Targeted Advertising (TA) specifications, aiming at real product deployment to offer personalized advertising slots to our advertising agency and its clients (see page 12).

WHY TARGETED ADVERTISING?

For the Mediaset Group, TA is strategic mainly because it offers the best of the two worlds of television and digital: brand safety in a curated editorial environment, viewability, regulation, and addressability. It is therefore essential for our company to invest in the development of such formats, in order to satisfy the evolving needs of our advertisers.

TA can be used in an upselling strategy towards brands that already use television advertising, by extending their linear campaigns on connected TVs in order to ensure either incremental reach or additional frequency. It also makes television accessible for first-time advertisers, such as SMEs and local businesses, since it requires lower budgets, avoids ad waste and allows geographic segmentation.

Not least, TA allows broadcasters to prevent video ad budgets shifting away from television towards ad-funded online platforms from the likes of Google, Amazon and other digital players.

From a technical point of view, in 2017 we understood the potentialities offered by the HbbTV 2.0 core specification thanks to early terminals deployed in the Italian market at that time. Italian broadcasters agreed on a "Statement of Direction Towards HbbTV 2.0" in 2014, moving away from MHP in a green-field HbbTV context that avoided an HbbTV 1.5 legacy. Such a choice allowed us to count on terminal implementation compliant with the HbbTV 2.0 core specification, which introduced HTML5 functionalities and in particular, within the scope of TA, the HTML5-video-element and the DSMCC do-it-now stream event.

Based on those HbbTV 2.0 core functionalities, a client-side-ad-substitution (CSAS) module was developed and integrated in Mediaset Play, the Mediaset broadcast-related catch-up and VOD HbbTV application signaled on all Mediaset channel line-ups, enabling personalized ad substitution in live broadcast.

CLIENT-SIDE SUBSTITUTION

Figure 1 shows a high-level diagram of the implemented solution where the Mediaset Play HbbTV application, with a CSAS module running, is compared to a terminal not providing the application.

The solution uses synchronous triggers instructing the HbbTV application to:

- Start dialogue with the advertising server and pre-load into the device memory the advert that will be inserted;
- Perform the switch from broadcast content and play pre-loaded content; and
- Switch back to broadcast content.

The proprietary solution used to trigger the application, and integrated into our legacy playout system chain, provides a working mechanism to achieve a satisfying level of performance on deployed HbbTV 2.0 terminals.

The solution was deployed in 2019 and since then is up and running as a commercial product; nevertheless, we faced some relevant issues:

- Some terminals did not successfully implement the HTML5 video element functionality
- Switching time and accuracy performance on the broadcast to broadband transition, and vice-versa, were not defined, leaving terminal performance dependent on terminal implementation
- No requirements for buffer size
- No requirements about the supported codec

As a consequence, we were not able to count on a well-functioning and predictable set of reachable terminals without putting in place a managed terminal "whitelist" to address only the subset of well tested and verified HbbTV 2.0 terminals.

In June 2018 a set of commercial requirements for TA were approved by the DVB Project; the technical groups delivered their work around the end of 2019, offering a TA framework that includes the specification for the "Carriage and signalling of placement opportunity information in DVB Transport Streams" (DVB-TA Part 1) and the guidelines for "Interfacing to an advert decisioning service and optimal preparation of

Stefano Braghieri has more than 25 years of experience in broadcast technologies in various capacities, from code writing to standard definition. He has been working for Mediaset since 2011, involved in technical and commercial support for new technologies and product innovation.

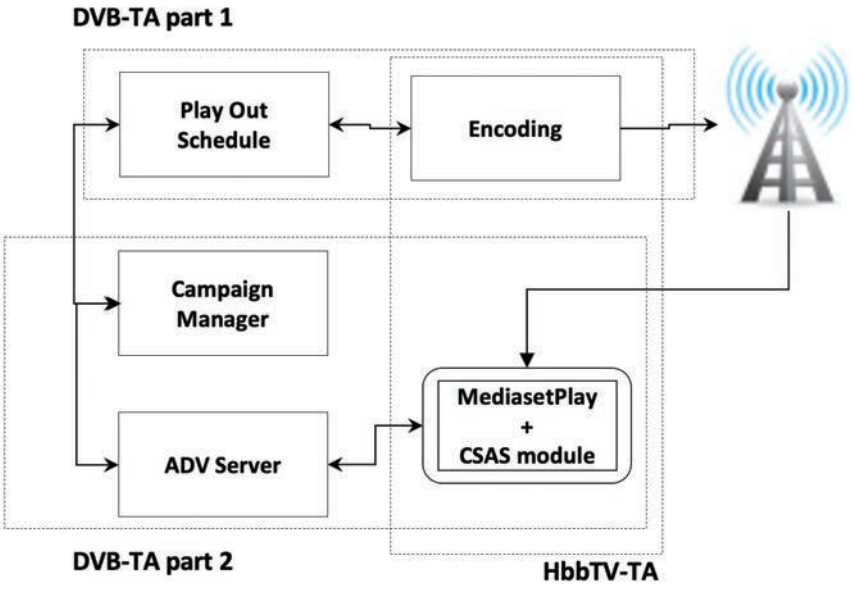


Figure 2. TA specification area of applicability

media" (DVB-TA Part 2). The HbbTV Association, on the other side, provided the terminal specification to be applied on top of an HbbTV 2.0 compliant terminal, providing new functionalities to an application in order to perform the ad substitution in a predictable and invariable way (HbbTV-TA).

STANDARDS-BASED APPROACH

The arrival of the new set of TA specifications and guidelines allowed us to remove the proprietary solution and resolved the aforementioned issues. The new solution is still based on a CSAS module which is integrated in the HbbTV Mediaset Play application. Figure 2, related to an HbbTV terminal running Mediaset Play, illustrates where the new TA specifications apply.

Because the whole set of TA specifications were brand new, when we started to study how to best implement them, there were neither products nor prototypes for any of the blocks in the end-to-end chain; once again we faced the well-known chicken-and-egg scenario, which led us to develop a proof of concept in collaboration with technical partners involved in the whole production chain.

Three main areas of work, depicted in Figure 3, were identified:

(1) The HbbTV-TA specification provides a means of decoupling the terminal implementation from the signal carrying placement opportunities, as per DVB-TA Part 1. While we were cooperating closely with technology providers to develop headend apparatus implementing DVB-TA Part 1 signalling, we were able to generate signals correctly simulating the payload of the placement opportunities. Once the real headend product became available, no changes were required in the terminal block – just minor changes in the application and a no-regression test phase were necessary.

(2) In the second area, strong collaboration with terminal manufacturers was established, achieving fully open contributions generating a positive win-win process where terminal firmware and applications were developed step by step, sharing and discussing topics and issues, including those arising from different interpretations of the specifications, finally reaching the goal of having an implementation compliant with the HbbTV-TA specifications.

(3) In the third area of work, a dialogue with backend services was defined to test (a) the correct ad substitution provisioning and (b) the ad substitution process reporting. The existing Mediaset infrastructure was already compliant with DVB-TA Part 2; we had just to generate different configurations of the backend services, setting up a validation environment providing support for this activity.

To test the whole chain, a great deal of effort went into defining and building a validation package to test the three areas just described. The validation package includes:

- Recorded transport streams: a set of streams, carrying signalling for the HbbTV application, provide timelines and placement opportunities for all the use cases to be tested. The streams also cover the set of broadcast audio and video formats in use at Mediaset in compliance with the TA specifications.
- Substituted advert content: a range of advertising content in various audiovisual formats and durations was prepared.
- A test protocol: the validation package came with detailed instructions to run tests to avoid misunderstanding of the expected results.

READY TO LAUNCH

The proof of concept and the test activities have been successfully completed. The implementation of various use cases required by Mediaset confirmed what was foreseen by the specifications.

The terminal executes the ad substitution within the time constraints imposed by the HbbTV-TA profile #2 for all audiovisual content formats considered relevant.

The whole project has been performed 100% in agreement with the TA standards, providing solutions for issues we found in early implementations based on the HbbTV 2.0 core specification and allowing a forthcoming launch on the market of TA based on DVB-TA and HbbTV-TA specification.

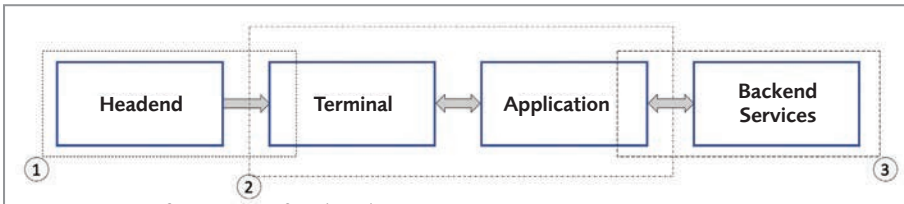


Figure 3. TA specification area of applicability

A leap forward in TV advertising efficiency

PAOLA COLOMBO (PUBLITALIA '80)

A recent Pubitalia '80 campaign leveraging targeted advertising

Recent developments in television technology have had a direct impact on TV advertising campaigns, with significant benefits for advertisers, agencies, broadcasters and end users.

For Publitalia '80, the advertising agency owned by Mediaset Group, using the DVB and HbbTV Targeted Advertising standards in connected TVs marks a crucial step forward. This integration of broadcast and broadband on TV sets means they join other digital touchpoints in our portfolio, such as mobile and portable devices. If we add also the possibility of interaction between the main TV set and portable devices – also known as companion devices – we see this whole ecosystem as a gamechanger that offers the best of the two worlds of television and digital.

Combining the advent of platforms like Mediaset Play – the broadcast-related catch-up and VOD HbbTV app signalled on all Mediaset channels – with the collection of user data via digital properties, the analysis of this data and its enrichment with data from other sources, we can now offer our clients an even more efficient ad service. New innovations that are made possible include:

- The definition of ad targets based on geographical, socio-demographic, behavioural and attitudinal characteristics, according to the objectives of our clients.
- Real-time replacement of broadcast commercials based on the characteristics of the chosen target, known as Dynamic Advert Substitution.
- Re-targeting, which means optimization of reach and frequency objectives based on the accurate daily analysis of campaign performance across multiple media at the same time.
- Analysis of ad campaign performance with timely attribution of the contribution of connected TVs.

MERCEDEZ-BENZ CAMPAIGN

The Mercedes-Benz Italia campaign to promote their new "smart EQ fortwo" hybrid electric car is a good illustration of these technologies in action. Together we planned an addressable campaign on mobile and connected TVs.

The audience targeted in this project was a premium custom target, based on the intersection of some variables identified with Mercedes-Benz on connected TVs. It was enriched by the "driving" interest of users who usually browse the automotive sections of the Mediaset digital property network and other partner sites, including DriveK, a European web platform for configuring new cars. The profile was further enriched with geo-behavioural data relating to users who had visited car dealers and who attended points of interest perfectly aligned with the target indicated by Mercedes-Benz.

In particular, the targeted advertising campaign on connected TVs was combined with a mobile rich-media campaign with a "drive to dealer" call-to-action to point out the closest Mercedes-Benz dealer.

IMPRESSIVE RESULTS

Measuring the effectiveness of targeted advertising campaigns on connected TVs in terms of store visits was the goal of the "attribution model" developed by the AdTech team of Publitalia '80 with Beintoo, another Mediaset company, specializing in geo-marketing solutions that track users on the move.

The Beintoo attribution model, which verifies the progress of a mobile advertising campaign in relation to the accesses generated in the store, is now applied to the connected TV campaigns managed by Publitalia '80; analysis allows the evaluation these new advertising formats by comparing visits to dealers by customers who have been exposed to the targeted advertising compared to a non-exposed control group with the same demographic.

Applying this to the Mercedes-Benz "smart EQ fortwo" advertising campaign told us that targeted advertising on connected TVs led to an uplift of 43% compared to the control group; it is a valid tool for our clients for measuring the efficiency of targeted ads and the real impact of Mediaset Play's addressable campaigns on sales.

Paola Colombo is General Manager of the Adtech and Business Development unit at Publitalia '80, where she focuses on new business strategies, partnerships, and technology-driven innovation.

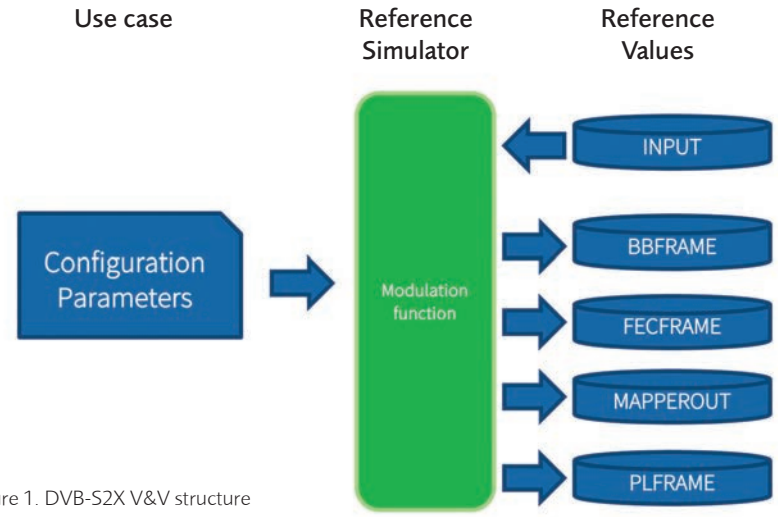


Figure 1. DVB-S2X V&V structure

New V&V test package for DVB-S2X beam hopping

AVI FREEDMAN (SATIXFY)

In July 2019, the DVB Steering Broad approved a revised version of the DVB-S2X (EN 302 307-2) specification, adding support for beam-hopping systems. By that, and with the completion of the signalling specification for beam hopping and advanced satellite systems, expected this quarter, DVB offers a suite of solutions for the new era of satellite systems, be they high throughput GEO satellites or even LEO constellations. These standards are key to an open market, leading to real market growth.

The interoperability made possible by standards brings many benefits: end users can freely choose between service providers and equipment types, and have open access to different systems; service providers can offer a wider variety of services to their customers; content providers can extend their audience reach; and satellite operators are freed from the burden of micro-managing customers, and even gateway operation.

VERIFICATION & VALIDATION

However, specifications alone do not assure interoperability! In 2018 the Steering Board mandated a policy wherein every specification going to ETSI will be accompanied by a V&V – verification and validation – package. Typically, this comprises reference streams and signals, verified and validated by several entities as complying with the specifications. Although this policy came into effect only after the beam-hopping revision was approved, the TM-S group, with the endorsement of the CM-S group, elected to produce a V&V package for this revision.

The purpose of the V&V programme is to verify equipment compliance to the standard and interoperability in a defined set of configurations that are considered most significant to reach the scope. The complete V&V package has been available to the public via the DVB website since February 2021.

The specific objectives of the V&V package are:

- Ensure the unambiguous description of use cases, protocols and formats.
- Facilitate the standard implementation process.
- Ease interoperability between implementations from different manufacturers.

For now, the package includes only computer files. Further activities, including actual equipment tests against a satellite emulator and plug fests between different manufacturers, are envisaged for the future.

The V&V package includes a set of reference streams and waveforms that allow validating different implementations of the DVB-S2X extensions for beam hopping. Several test cases are provided, to allow for a thorough verification of the beam-hopping formats. Other features of the DVB-S2X standard can also be tested.

The V&V structure is shown in Figure 1. Each test case is defined as a set of files that contain configuration parameters as well as a description of the test; the input data file to the modulation function; and the output files, starting from the baseband frame, and ending with the physical layer frame (PLFRAME), which is the set of symbols to be transmitted, including preambles, pilots and postambles, scrambled according to the standard specification. Thus, an implementor can make use of the package for development and debugging, beyond its function as a verification tool.

Verification can be performed either by an independent modulation function, generating output files according to the input and configuration parameters, and comparing them to the output files in the package; or by a receive simulation function, which would take an output file at its input and compare the decoded stream to the input file. The test cases cover a large variety of possible waveform streams and superframe formats.

Interoperability cannot be achieved without cooperation. Production of the package would not have been possible without the cooperation of all of the DVB Members that participate in TM-S, contributing to the effort in so many ways for the benefit of the whole industry.

Avi Freedman is a director of system engineering at Satixfy, involved in R&D for modems and smart antennas for satellite communications. He has been active in DVB standards development efforts for eight years.

An oral history of the birth of DVB SimulCrypt

In January 2021, we learned that DVB's work on common encryption was to be recognized with a Technology & Engineering Emmy® Award. To mark this honour, we invited some of those who were involved in the commercial and technical work that led to Simulcrypt to share their memories of that time.

CONTRIBUTORS

Robin Crossley worked for SES Astra between 1986 and 1989 and again between 1991 and 1995. From 1995 he worked for Sky until his retirement in December 2020.

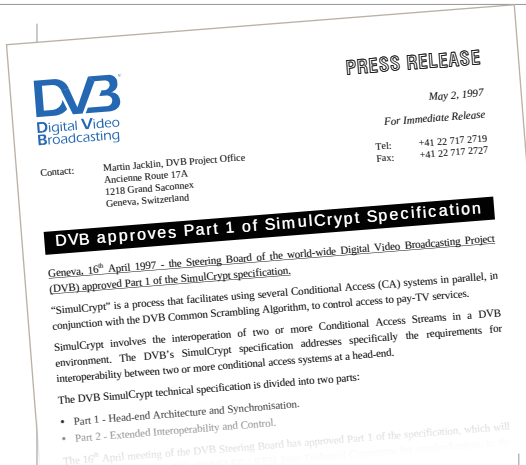
David Cutts, now retired, worked with several companies in the pay-TV sector, including BSB in the UK and France Télécom, before forming S&T (with Nick Birch).

Andrew Glasspool began his career in the television industry with BSB, after which he founded Farncombe Technology. He still works as a consultant on a wide variety of digital television and telecoms projects, when not sailing around the world.

Erik Lambert joined the Canal+ group in 1986 and partook in the DVB Project's work as a representative of Canal+ until 2002. Lately he has helped launch two SVOD platforms, HBO Nordic and StarzPlay Arabia.

Andrew Glasspool: SimulCrypt, just a word, with a simple definition, meant so many different things to the different players in the industry. And ironically it delivered something that went far beyond its original scope. The technical working groups brought together experts from each of the conditional access (CA) system vendors in a way that had never happened before. At times these experts, having worked in isolation for much of their careers, were surprised to find that *their* solution for messaging and interfacing was not the only way and perhaps not even the best way. This created interesting dialogue and challenges for the specification, given than none of the systems had been designed to interoperate at a DVB headend.

Erik Lambert: The idea of SimulCrypt was born in the analogue era. At the end of the 1980s, Canal+ was in discussions with France Télécom about using D2-MAC transmissions (an analogue standard with some limited data capacity) to feed both the DTH and cable markets. A standardized CA system was being developed – Eurocrypt – but Canal+ quickly identified two major issues. The first was linked to the change of CA in case of a major system breach (this was quite a frequent occurrence) with the necessity to temporarily associate two systems to the same scrambled signal; the second to the necessity to isolate the DTH network from the cable one, due to differences in the commercial policies. Thus was born the idea of a common scrambled signal and a common signal architecture, associated with several CA systems, that is, SimulCrypt!



PRESS RELEASE

May 2, 1997

For Immediate Release

DVB Digital Video Broadcasting

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DVB approves Part 1 of SimulCrypt Specification

Geneva, 16th April 1997 - the Steering Board of the world-wide Digital Video Broadcasting Project (DVB) approved Part 1 of the SimulCrypt specification.

"SimulCrypt" is a process that facilitates using several Conditional Access (CA) systems in parallel, in conjunction with the DVB Common Scrambling Algorithm, to control access to pay-TV services.

SimulCrypt involves the interoperation of two or more Conditional Access Streams in a DVB environment. The DVB's SimulCrypt specification addresses specifically the requirements for interoperability between two or more conditional access systems at a head-end.

The DVB SimulCrypt technical specification is divided into two parts:

- Part 1 - Head-end Architecture and Synchronisation.
- Part 2 - Extended Interoperability and Control.

The 16th April meeting of the DVB Steering Board has approved Part 1 of the specification, which will

During the first years of the 90s it became clear (at least to the technically savvy) that the future of broadcasting would be digital. The European Launching Group (precursor to the DVB Project) was created, and the European pay-TV operators, who had toyed with the idea of each controlling their own digital transmission system, joined the common standardization effort in 1993.

David Cutts: Critical to making the DVB system as close to standardized as possible was the requirement for a means, analogous with the 'cut and rotate' scrambler of MAC, that would scramble the video and audio transmission in the broadcast so that individual users can descramble at the receiver. This requirement was met by the common scrambling system, a core part of the problem.

Another key part of the DVB activity was in defining the architecture, its standardization and regulation such that it could support at the same time both a high-volume implementation of the underlying silicon hardware and customized and secure implementations of the security mechanisms required to deliver descrambling keys to individual customers.

DVB set up a specialized policy/commercial group, reporting to the Steering Board and chaired by Eamon Lalor, from the European Commission, that set out to give structure and resolution to these issues. At the heart of the whole solution is the common scrambling algorithm (CSA). The DVB Members involved put together a specialist team of cryptographers of global stature to work out how to provide this function.

Erik: Scrambling and CA became a contentious topic, and immediately positions (and camps) mimicked the earlier French debate of a single system vs. multiple coexisting systems. Under the constant push of Eamon "how to eat an elephant, one spoonful at a time" Lalor, the concept of SimulCrypt was, after a while, accepted by all parties.

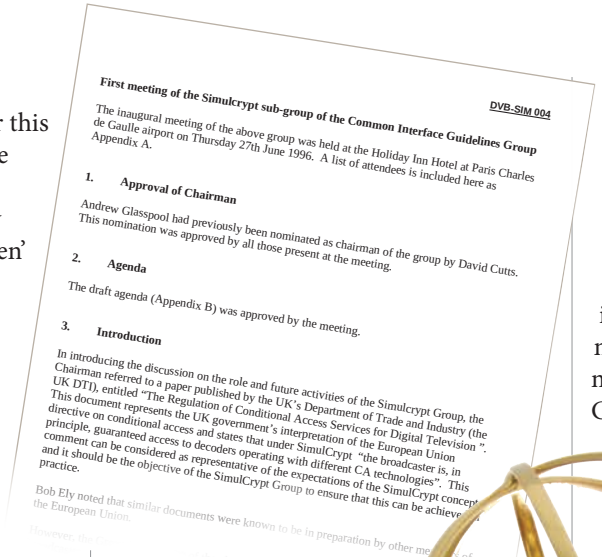
Robin Crossley: The challenge for this work, of course, was that there were very strongly held views about the need to use proprietary technology (secret, with lots of IPR) versus 'open' technology (not secret and not so much IPR). One testing question someone once asked was "ask yourself who's going to pay to fix it when it gets hacked?"

Most of my memories relate to the workings of the sub-sub-group that was tasked with inventing a common scrambling algorithm, needed if SimulCrypt was going to work. Because of the nature of this work, it was a restricted group; in fact, Frits Schreuder (SES) and I were the only two who weren't 'super mathematicians'! Each of the main protagonists of encryption nominated their own expert: Dr Amos Fiat for Canal+, Professor Adi Shamir for NDS (now Synamedia), Louis Guillou for CCETT/France Télécom, and Donald Davies for Irdeto.

Erik: Difficult discussions with the European security administrations introduced extra constraints on the system: it was to be highly asymmetric – the encryption equipment difficult to implement and under severe export control, so as to allow for the free circulation of the decryption chips. Furthermore, the administrations were not happy with the real entropy of the system (the resistance to brute force attacks) so there was to be a CSA1 and a CSA2, with an over-the-air upgrade, to allow for the base requirement of life-length for the system: the upgrade was done very soon after the commercial launch of digital pay-TV in 1995–96.

Robin: These people were all top 'algorithimists' and spent much of their time trying to outscore their peers on intellectual prowess! There were more than a few tense moments and tantrums and even walking-out-of-the-room episodes. A particular memory I recall is Adi Shamir saying to Amos Fiat "did you not listen when I taught you this stuff in university?" These two are famous for the Fiat Shamir 'zero knowledge' authentication algorithm.

There were some interesting 'cold war' stories discussed over dinner, as most of these guys had connections with or were directly employed by government intelligence agencies. I particularly remember Donald Davies telling us of attempts by the US secret service to activate a passive microphone in a Russian embassy building across the river. They apparently beamed so much microwave energy at it that the window glass got hot!



First meeting of the Simulcrypt sub-group of the Common Interface Guidelines Group

DVB-SIM 004

The inaugural meeting of the above group was held at the Holiday Inn Hotel at Paris Charles de Gaulle airport on Thursday 27th June 1996. A list of attendees is included here as Appendix A.

1. Approval of Chairman

Andrew Glasspool had previously been nominated as chairman of the group by David Cutts. This nomination was approved by all those present at the meeting.

2. Agenda

The draft agenda (Appendix B) was approved by the meeting.

3. Introduction

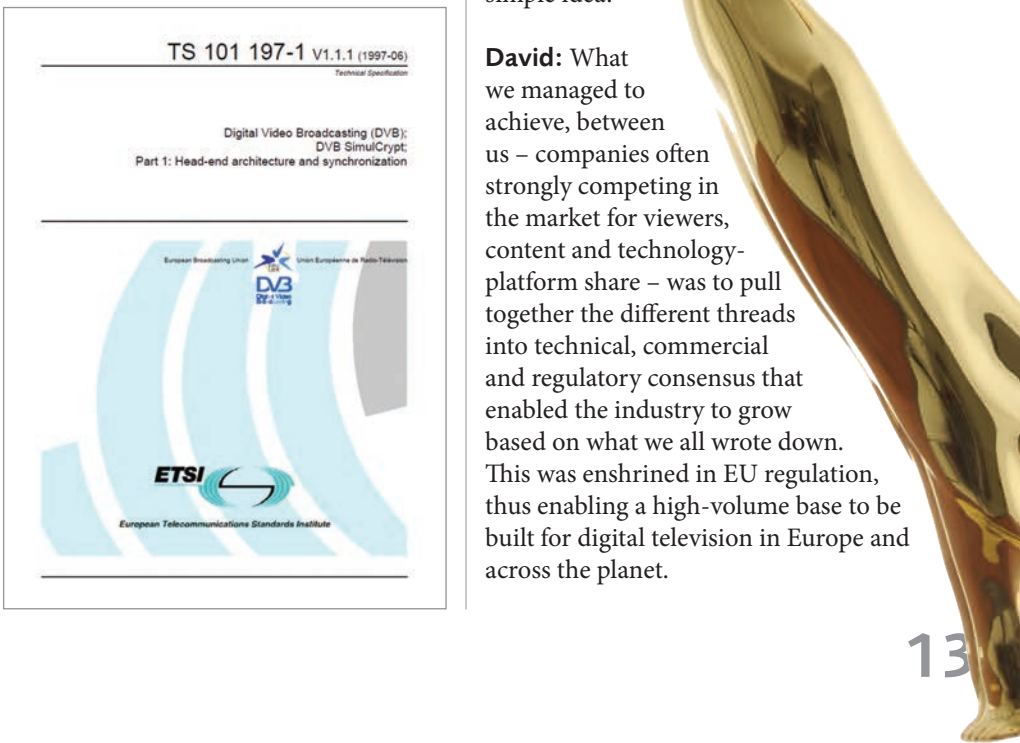
In introducing the discussion on the role and future activities of the Simulcrypt Group, the Chairman referred to a paper published by the UK's Department of Trade and Industry (the UK DTI), entitled "The Regulation of Conditional Access Services for Digital Television ". This document represents the UK government's interpretation of the European Union directive on conditional access and states that under SimulCrypt "the broadcaster is, in principle, guaranteed access to decoders operating with different CA technologies". This comment can be considered as representative of the expectations of the SimulCrypt concept and it should be the objective of the SimulCrypt Group to ensure that this can be achieved in practice.

Bob Ely noted that similar documents were known to be in preparation by other me... of the European Union.

David: SimulCrypt, strictly defined as allowing different CA systems to control a single TV transmission, has been rarely used, in each case in the process of switching from one CA smart card system to another. But the work done to define how a headend supports SimulCrypt and common scrambling has been used throughout the industry.

Andrew: That a solution was found that accommodated every "security" quirk of every system, yet could be implemented by any multiplexer manufacturer, is a great tribute to the skills of the people that came together in the SimulCrypt group. Today the output of this group goes far beyond just enabling two CA systems to work together. The standard that was created is implemented in every DVB headend, allowing manufacturers since the mid-1990s to make equipment without concern for the CA system or systems that might be used.

SimulCrypt has therefore become one of the longest lasting, important but little-known standards created by the DVB Project.



Erik: Today, the basic concept of SimulCrypt with a common scrambling applied to the audiovisual content signal and several access management systems associated with this scrambled signal, is also the standard mode of operation for OTT services.

From analogue broadcast to the internet, the long life of a simple idea!

David: What we managed to achieve, between us – companies often strongly competing in the market for viewers, content and technology-platform share – was to pull together the different threads into technical, commercial and regulatory consensus that enabled the industry to grow based on what we all wrote down. This was enshrined in EU regulation, thus enabling a high-volume base to be built for digital television in Europe and across the planet.

TS 101 197-1 V1.1.1 (1997-06)

Technical Specification

Digital Video Broadcasting (DVB);
DVB SimulCrypt;
Part 1: Head-end architecture and synchronization

ETSI

European Telecommunications Standards Institute

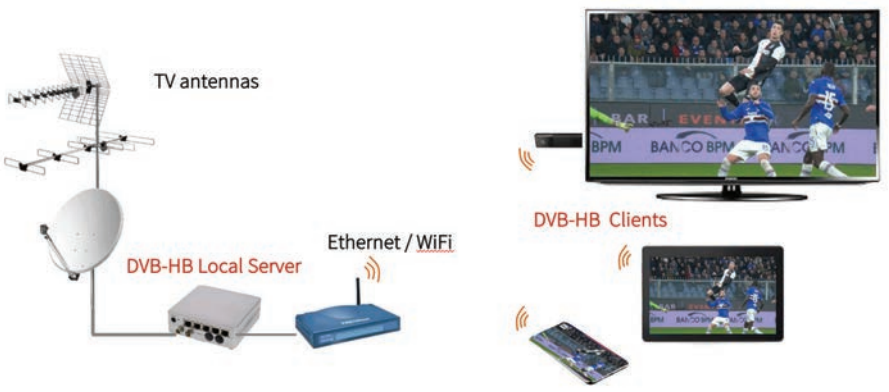


Figure 1 – DVB-HB concept

DVB-HB: an in-home bridge from broadcast to IP

DAVIDE MILANESIO (RAI)

User habits are rapidly changing as the widespread diffusion of IP networks allows audio and video services to be consumed on any networked device, from widescreen connected TVs to personal devices like tablets or smartphones.

Broadband networks enable consumption of audiovisual services both live and on demand. However, it is recognized that it is still popular live events that attract massive audiences, causing traffic peaks that potentially stress the delivery capabilities of IP networks. In such cases, users may experience video freezing or a reduction of picture quality, while from a broadcaster's perspective broadband delivery is clearly not as cost effective as traditional broadcast networks when it comes to simultaneously serving a multitude of users.

But why should I need to connect to the internet to receive a linear television service on my IP-connected device when I am at home, if the same service is already available in full quality at my TV antenna plug?

THE DVB-HB SPECIFICATION

Published in February 2021 as DVB BlueBook A179, the DVB-HB specification enables consumption of traditional DVB broadcast services (that is, delivered via satellite, terrestrial or cable networks) on in-home networked devices like smartphones, tablets, PCs, IP-enabled TV sets and set-top boxes (Figure 1). It defines the interfaces through which a DVB-HB local server, i.e., a device connected to an antenna plug acting as a remote tuner, can redistribute broadcast signals and associated metadata to DVB-HB clients connected to the same LAN (e.g. in an apartment, hotel/campus, hotspot, etc.).

The DVB-HB reference architecture includes various functional blocks, covering the installation and set-up phase (e.g. local server announcement and discovery, generation of the service list, etc.) and operational phase (e.g. optimization and exposure of available resources, selection of a specific service by the client, content publication by the local server, etc.).

In order to address all significant deployment scenarios and allow backwards compatibility with already deployed standards, two profiles are defined:

- Profile A is based on the SAT>IP specification, further extending it with additional optional features. The selected television services are redistributed on the LAN as Transport Stream over IP;
- Profile B allows compatibility with DVB-I clients, including browser-based client applications. The selected television services are redistributed on the LAN in DVB-DASH format (this implies audio/video transcoding or at least repackaging), together with service discovery metadata according to the DVB-I specification.

END-TO-END BENEFITS

DVB-HB allows users to transform any of their IP devices into a TV receiver, for consumption of live/linear television services at 'broadcast quality', also in areas with no or poor broadband coverage (sometimes referred to as Digital Divide areas).

Broadcasters can offer live/linear television services with improved QoS (quality of service) also to their users consuming them on an IP device, and benefit from a reduction of costs associated with CDN transport. (It is somewhat like transparently moving their streaming servers into users' homes.)

Finally, designers of in-building network infrastructures (e.g. for hospitality, campus, etc.) can more easily integrate TV distribution with other IT services, while consumer electronics manufacturers may consider adding new features to their products covering the entire home entertainment ecosystem.

DVB has recently initiated work on Native IP delivery on broadcast networks, targeting both TV screens and personal IP devices (see page 9). Many DVB-HB functional blocks are likely to be leveraged when designing the Native IP receiving side.

Davide Milanesio is a senior research engineer at Rai CRITS (Centro Ricerche, Innovazione Tecnologica e Sperimentazione). He is involved in the latest technologies for television distribution over fixed and mobile networks and is chair of the DVB TM-HB group.

Mission accomplished: Russia's massive analogue switch-off project

ANDREY CHERNIKOV (RTRN)

Russia's digital terrestrial television (DTT) network is the largest operating broadcast network in the world. It includes 5,040 transmission sites and 10,080 transmitters. It took just 10 years to transition from analogue to digital broadcasting, with the digital switchover (DSO) completed in late 2019.

On 3 December 2009, the Russian government approved a federal programme titled "Development of TV and Radio broadcasting in the Russian Federation in 2009–2018".

The main objective of the programme was to provide the people of the Russian Federation with free-to-air digital television and radio.

The Federal State Unitary Enterprise "Russian Television and Radio Broadcasting Network" (RTRN) was appointed to execute the deployment of the DTT network using the DVB-T2 standard. Almost 75% of the 5,040 transmission sites were built from scratch.

FIRST AMONG THE BRICS

Over a period of 10 years, about 100 million TV sets and about 20 million digital set-top boxes were sold. This had set the stage for the analogue switch-off (ASO) and on 29 November 2018, the Russian government approved the roadmap.

In December 2018, the pilot region, the Tver Region, phased out analogue broadcasting of 20 federal television channels. Then, during 2019, Russia switched off analogue television broadcasting in four stages: eight regions in February, 20 in April, 36 in June, and 21 in October. Russia thus became was the first BRICS[1] country to complete the ASO.

Preparation for each stage of the ASO included several activities:

1. Informing the population, both through federal and regional media.
2. Placing information materials in post offices, social services centres and retailers of electronic appliances.
3. Door-to-door activities in all localities of the Russian Federation.
4. Attracting volunteers to assist the population in setting up equipment for receiving DTT.
5. Creating the Digital Switchover Task Force with representatives of the Russian government, regional authorities and all organizations involved.
6. Monitoring the cost of the television reception equipment in retail stores.
7. Carrying out inspections of community antenna TV systems for DTT broadcasting in apartment buildings and, if necessary, repairing and upgrading them.
8. Developing mechanisms and conditions for providing the population living outside the DTT coverage area with satellite equipment at a reduced price.
9. Providing targeted assistance for vulnerable and/or low-income citizens.

PR CAMPAIGN

During 2010–2018, RTRN held 500 PR events. During its 2019 awareness-raising campaign, the international information agency (MIA) "Russia Today" organized 11 public events and PR actions (flash mobs) and six press conferences. There were more than 200,000 reports in the printed and online media and more than 20,000 TV advertisements about the DSO and the ASO.

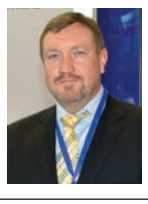
Over 10 million people visited the DSO website and over 3.6 million people called the federal call centre for consultation and help. In June 2018, RTRN added a letter "A" icon next to the logo on analogue federal TV channels. Marking the analogue video signal in this way helped viewers identify their type of TV reception.

100% of the Russian population now has guaranteed public access to 20 must-carry public television channels and three radio stations, 98.4% of them through DTT. ASO saw 15,973 analogue transmitters put out of operation.

The DTT transition helped to bridge the digital divide and has laid the foundations for the development of new services (HD, UHD, HbbTV and so on).

1 Brazil, Russia, India, China, and South Africa

Andrey Chernikov is Director of Business Strategy and Technical Polices at RTRN in Russia. He is a member of the DVB Steering Board.



New DVB solutions for a post-pandemic world?

DAVID WOOD (EBU)

The COVID-19 pandemic has as brought an unforgiving illness to the world and has changed the way we live. The media have played an indispensable part in providing information and advice; there are also consequential secondary effects on the media in our lives.

Television and OTT audience-time surged in lockdowns, advertising fell, loneliness increased and there were effects on mental health. We cannot foresee what the pandemic's legacy will be, yet we should ask if there is a role for DVB to play in the 'new normal'. Are there additional standards that need to be developed? Are there new alliances that need to be formed? Is there work to be done by DVB to remain purposeful and relevant?

COLLECTIVE EXPERIENCES

The pandemic demanded reduced social contact, and this meant staying at home. There could be no cinema, theatre, or sports stadium visits. If the content these venues offer was to be seen, it meant streaming or broadcasts to the home, with obvious differences in the atmosphere for experiences typically shared with many others. Sad, but if – out of necessity or habit – we must continue to reduce collective experiences, will there be a need to augment the home media experience, to make it more like in-person collective experiences?

It may make sense to merge the formats and technologies of cinema, broadcast, and broadband media, whether experienced in or outside the home. The 'parameter values' would need to meet the needs of the different content types. There may be two 'experience modes' to be catered for. The first is the viewer as virtual *participant* in the content. This would be the case for sports events. Here the viewer would be given maximum image and sound fidelity, and a range of options for sound channels to suit their personal choices. The second experience model is the viewer as *observer* of events. This is the case for fiction. The viewer here needs to enjoy the content (the 'suspension of disbelief') as a work of art, but not feel they are participating in it. Movie makers achieve this 'look' (inter alia) using 24 Hz frame rates.

Today the compression and parameter values used for digital cinema delivery – the DCI specifications – are not the same as for broadcast or broadband delivery. Is there a case for bringing the movie and broadcast/broadband industries together, instigated by DVB, to create a phased move to a universal delivery system for in or out of home?

"It may make sense to merge the formats and technologies of cinema, broadcast, and broadband media, whether experienced in or outside the home."

TECHNOLOGY AS COMPANION

The pandemic has also brought more loneliness into the world. Maybe we can help alleviate this using media technology. Can we evolve the television, tablet, or smartphone, to become a friend and companion? Are there user interfaces that would make the user feel less alone and offer companionship? Could voice activation systems be developed to use photo-realistic on-screen avatars having a personality compatible with ours? Could they share and discuss the content we are watching, and learn to recognize us? Should DVB work with others on non-intrusive media-delivered AI that would allow this?

We also know that COVID-19 has complicated the lives of those with sensory or intellectual differences. Is there a role for DVB? Furthermore, in a world with increased media consumption, is it also the moment to consider technologies that reduce energy consumption?

DVB members must always be realistic about the cost, commercial value, and difficulty of introducing new technology. But in the past, DVB has made a difference with innovative standards for disruptive technologies. Is this the moment to reflect on whether DVB can do yet more, and help the post-pandemic world adapt?

David Wood is a consultant to the EBU Technology & Innovation Department. He has chaired several standardization groups at the ITU and the DVB Project, covering areas such as digital television, HDTV, UHDTV, next generation audio and media accessibility.

Ofcom shines a light on technology futures for media

SIMON PARNALL (OFCOM)

Ofcom is the UK's independent telecommunications and broadcast regulator, with a remit to encourage innovation and to ensure that we are across emerging technologies in all our sectors. In spring 2020 we decided to produce the first of what we expect to be a series of reports on game-changing technologies, shining a light on the innovative technologies that could shape the communications industry in the future. We issued an invitation to anyone with insight and evidence to contribute to our research and we carried out dozens of interviews with many leading technologists.

The Technology Futures report, which was published in January this year, is available to download. (Find it via dvb.org/ofcom-report.)

DRAMATIC CHANGES

The report covers several key areas of interest to Ofcom – fixed, mobile and wireless technologies; satellite; broadcast and media; and the document's first chapter takes an aspirational overview of the direction of travel towards truly immersive communications and applications.

The chapter on broadcast and media looks at the changing landscape of television and radio, in production, consumption, navigation and – of course – distribution. Cloud-based content production, 5G contribution, the use of artificial intelligence and object-based media (including next generation audio – NGA) will all dramatically change the nature of what we can see and hear; and voice assistants, immersive screen technologies, virtual reality and an ever-expanding range of consumption devices will provide new constraints, challenges and opportunities.

The first object-based media might well have been the invention of closed captioning in the late 1970s. Today, it offers the promise for viewers to be able to customize the experience to suit their viewing conditions, screen angle, listening preferences, their interest in the performance statistics of football players – even their preference for the two teams playing in the game and the time available to watch the match. Television becomes no longer a one-size-fits-all medium, but adaptable and malleable to meet the needs of individual viewers.

"Television becomes no longer a one-size-fits-all medium, but adaptable and malleable to meet the needs of individual viewers."

ROLE FOR DVB-I?

Just as a mobile phone user will be largely unaware of whether a call or email has come via 5G, 4G, 3G or Wi-Fi, so viewers in the future might reasonably expect their devices to access content via the communication channels that are available and preferable. The report looks at content distribution both today and in the light of all the opportunities above – and the role that DVB's standards might play in supporting a world in which the user is 'abstracted' from needing to know exactly how content has been delivered, and a world in which content might be composed of multiple object elements, assembled according to our preferences and needs by our devices. DVB-I is mentioned as one technology that could potentially play a role here.

Our cars too are changing dramatically – connectivity is now the norm for navigation, safety and maintenance, and integrated systems with voice assistants offer new paradigms for in-vehicle entertainment. The medium of radio will evolve to meet these opportunities and challenges, and continue to explore the hinterland of multimedia, with supporting text, graphics, pictures and video.

Both radio and television are on a path of inevitable change, driven by evolution in production capabilities and consumer experiences. New distribution technologies will be key in facilitating this change.

DVB has a pivotal part to play.

Simon Parnall has been Principal Advisor Broadcast Technology for Ofcom since 2016. Previously he worked in broadcast research and development, for NDS, Cisco and BBC R&D. His work has primarily been in the creation and standardization of new television and radio technologies, and he has led a number of European and global initiatives

Our growing V&V collection

DVB has fostered the creation of a growing collection of resources for the verification and validation of its specifications.

DVB-I

Reference application with implementations for HbbTV OpApp and Android, along with various other tools for testing DVB-I Service Lists.

DVB-DASH

We collaborated with the HbbTV Association to extend the DASH-IF Conformance Tool to handle DASH-related specs from DVB and HbbTV.

DVB-S2X

A set of test cases to allow for a thorough verification of the newly added beam-hopping formats in DVB-S2X along with other features of the spec.

DVB-T2

A set of 80 test streams covering single PLP (including with ACE enabled), multiple PLP and T2-lite formats.

DVB-TTML

Created and originally published by IRT, these streams allow the testing of DVB-TTML subtitles, including with downloadable fonts.

DVB-AVC

Streams to test the interoperability and functionality of DVB HDR dynamic mapping implementations both in Transport Streams and DVB-DASH streams.

More information and links: dvb.org/vv