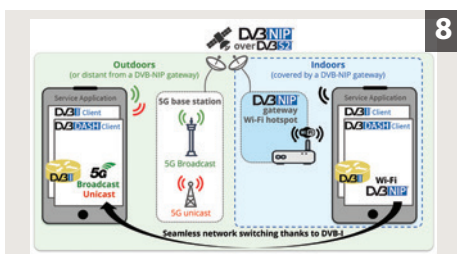




"It's time for us to think more creatively."

Remo Vogel, DVB's new Chair



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On the cover: Remo Vogel, who works for rbb in Berlin, was elected as DVB Chair in July 2024. On page 5 he sets out his initial priorities in his new role. Photograph: Julia Lexow

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Slán to Peter; willkommen to Remo!

It's 'back to school' time in Europe, which means it's also IBC time. You can expect the usual mix of dynamic demos and stimulating discussions on the DVB booth, where you'll find many familiar faces if you find the time to drop by – and I hope you do!

One thing that will be different this year is that a certain Peter MacAvock will no longer be welcoming visitors to our booth as DVB's Chair. He stepped down from that role in July, replaced by Remo Vogel, on whom I'll say more below.

When I started at DVB as Head of Technology in 2020, Peter had been chairing DVB since 2016 and involved in various capacities since almost the very beginning.

Aside from being aware of him as a leading light in the DVB community, the abiding memory I had of Peter as I joined DVB was linked to his starring role in the very funny play/sketch, "May the Steering Board be with you", which I had the pleasure of seeing at the party organized for the 20th anniversary of DVB – for me it was an unforgettable evening of laughter.

With this image in mind, the welcome dinner that the DVB Project Office held for me, a first chance to meet Peter socially, confirmed his talent for keeping a room entertained. I found myself crying with laughter once again and knew it would be a pleasure to work with him.

In the almost five years that followed, it has been a privilege to collaborate with Peter. We found a complementarity between our respective backgrounds. Beyond his long DVB history, he brought his in-depth knowledge of European broadcasters and their "platform" challenges, which has, among other things, helped guide DVB's work on DVB-I. This blended perfectly with my own background, oriented more towards product management and strategy within DVB manufacturers, with specific experience of emerging markets and the related issues around OTT availability, of particular relevance as DVB's work



Emily Dubs
Head of Technology, DVB Project

on Native IP started.

DVB will give Peter a proper send-off in Geneva later this year.

Coming to terms with this significant departure has been made a great deal easier through the election of a very able and well-qualified replacement as DVB chair. Remo Vogel was already very active in DVB and the work he has been leading in ARD regarding the German DVB-I Pilot was acknowledged through the IBC Special Innovation Award received last year. I am confident that he is the right person to ensure that DVB "further strengthens its role in the media technology landscape by addressing the right challenges", as he puts it himself on page 5.

Remo is a fierce believer in DVB's value and in its potential to have a positive impact on the key challenges our industry is facing. Together, we believe that DVB now offers an evolved, standards-based ecosystem that is a strong foundation for a transformed media delivery landscape. DVB has added well-rounded IP-centric solutions to the existing well-proven and resilient broadcast systems; as you can read in my article pages 8-9, the delivery of native IP content (including OTT services) can now use a flexible and seamless combination of broadcast, broadband and even 3GPP networks.

We must continue to tailor our solutions to the industry's needs and to promote their benefits. Please join me, Remo, and the rest of DVB's leadership team in tackling these two objectives – there's work to be done!

To subscribe to DVB Scene free of charge visit: dvb.org/dvb-scene

dvb.org • member.dvb.org • dvb-i.tv • dvbworld.org • dvbservices.com

DVB World returns to Munich in 2025

DVB World 2025 will take place in Munich, Germany on 18 and 19 March. The smartvillage Bogenhausen, used for this year's event, will be the venue once again, having proved itself to be ideally adapted to the DVB World combination of conference, unconference and exhibition.

The 2024 edition attracted 200 registrations, making it the second-best attended DVB World ever. We're hoping to achieve at least the same level of attendance – ideally more! Registration will open in Q4 2024. To ensure you are among the first to hear about it, you can join the event's mailing list via: dvbworld.org

SPONSORSHIP

Last March saw the return of a formal exhibition area for DVB World, which added great value to the attendee experience while giving DVB Members and non-members alike the opportunity to demonstrate their products and services. Sponsorship packages for DVB World 2025 will be announced shortly.

We would like to offer a final thank you to this year's Exhibitors and Supporters, whose logos are shown below. Their collaboration helps us to keep the registration fees for the event low. **See you in Munich!**



NEW AND UPDATED DOCUMENTS

Find the latest published version of every DVB specification in our library: dvb.org/specifications

DVB-TVA metadata schemas (Broadcast and online services: search, select, and rightful use of content ("TV-Anytime"); Part 3: Metadata; Sub-part 1: Phase 1 – Metadata schemas)

May 2024 • TS 102 822-1 V1.13.1

Service discovery and delivery protocols for a DVB Home Broadcast system (DVB-HB)

July 2024 • TS 104 025 V1.1.1

Dynamic substitution of content in linear broadcast – Part 3: carriage and signalling of placement opportunity information in DVB-DASH (DVB-TA Part 3)

July 2024 • DVB BlueBook A178-3r2

Commercial Requirements for the use of Common Media Client Data (CMCD) in DVB-I

July 2024 • TS 103 876 V1.1.1

Adaptive media streaming over IP multicast (DVB-MABR)

August 2024 • DVB BlueBook A176r6 (Draft TS 103 769 V1.2.1)

DVB MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks (DVB-DASH)

September 2024 – DVB BlueBook A168r7

Second Generation DVB Interactive Satellite System (DVB-RCS2); Part 1: Overview and System Level specification

September 2024 – DVB BlueBook A155-1r3

Second Generation DVB Interactive Satellite System (DVB-RCS2); Part 2: Lower Layers for Satellite standard

September 2024 – DVB BlueBook A155-2r4

Generic Stream Encapsulation (GSE); Part 2: Logical Link Control (LLC) (DVB-GSE)

September 2024 – DVB BlueBook A116-2r3 (Draft TS 102 606-2 v1.3.1)

Specification for Service Information (SI) in DVB systems (DVB-SI)

September 2024 – A038r17 (Draft EN 300 468 v1.19.1)

Specification for data broadcasting (DVB-DATA)

September 2024 – A027r5 (Draft EN 301 192 v1.8.1)

Service Discovery and Programme Metadata for DVB-I

September 2024 – TS 103 770 v1.2.1

Native IP Broadcasting (DVB-NIP)

September 2024 • TS 103 876 V1.1.1

DVB SCENE | SEPTEMBER 2024

NEW DVB MEMBER



SEI Robotics, established in 2009 in Shenzhen, China, is a smart hardware company developing and manufacturing Android TV, audiovisual and IoT devices. The company is a certified Tier 1 Android TV ODM (Original Design Manufacturer) partner and focuses on products such as soundbars, speakers, dongles, home gateways, and OTT and hybrid set-top boxes.
See: seirobotics.net

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



A word from the PCM chair

Elfed Howells (Huawei), Chair of the DVB Promotion & Communications Module



It has been a period of positive evolution for the DVB Project and the PCM this year, with global adoption and maturation of our latest technologies and specifications along with record interest in our work and in engaging with us, both at DVB World and from other forums and standards bodies.

As he steps down from being DVB's Chair, we celebrate the manifold achievements, guidance and effervescent leadership of Peter MacAvock. He has, through his many roles at DVB since the early days, been a key contributor, champion, and guiding light for us all. Peter worked harder than most to ensure the success and global recognition of DVB.

Since the last DVB Scene, we also, at DVB World in Munich, honoured the great work of Martyn Lee, making him the latest DVB Honorary Fellow. The deep respect and admiration for Martyn's work in leading the DVB Commercial Module for so many years was apparent – much warmth and strength of feeling was in evidence from his peers.

NEW CHAIRS

These departures have seen new leaders, in turn, take up their positions and start a new chapter for DVB. Replacing Martyn, David Peilow (European Space Agency) has already chaired his first CM meeting and is active in the PCM, bringing new ideas and a new perspective to our work.

Remo Vogel (rbb/ARD), our new DVB Chair, has long been an active PCM member and has represented us at many international events, presented webinars and presented at DVB World. His experience in the actual deployment of DVB-I, DVB-DASH and our other IP-centric specifications gives him a highly valuable perspective on our work, and on how it should be promoted.

We at the PCM look forward to his leadership and to his new ideas for our promotion, communication and outreach work.

With DVB-I flying high in multiple European trials, now slowly evolving into established services, there has been strengthened interest in our work from the worldwide community. A submission on DVB-I was made to the ITU and the specification is also about to be published in the Chinese language, through our liaison with, and the hard work of, the AVS organization.

We have presented at BroadcastAsia, NAB, ABU DBS, Connected TV World, the Media Web Symposium, and at the recent seminars on DVB-I in China, where it was announced that verification testing of DVB-I with AVS UHD technologies for live broadcasting and live streaming is under way.

Change is good, and this is certainly true for us at the PCM, as we celebrate our current achievements and those yet to come. See you all at IBC, where we will have further new initiatives to show.

German DVB-I use-case report now available in English

The Deutsche TV-Plattform has published a report describing relevant DVB-I use cases for the German market. Developed by the association's DVB-I Taskforce, the report is aimed at decision-makers along the television value chain, highlighting the potential of the DVB-I specification and its advantages for the market participants identified, including end users.



While intended for stakeholders in Germany, the report will also be of great interest to their counterparts across Europe and further afield, since many of the challenges and opportunities are replicated in other markets.

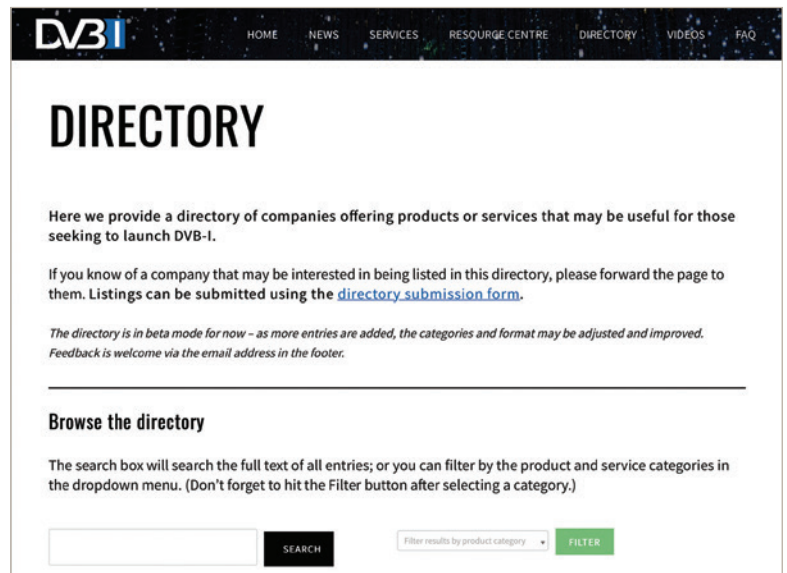
The full report has now been translated into English and can be downloaded from the association's website (<https://tv-plattform.de>). Some copies will be available from the DVB booth at IBC2024 (1.B71).

Doing DVB-I? Check out our Directory!

Launched earlier this year, the DVB-I Directory is an online listing of companies offering products and services targeting those launching or testing DVB-I signalled services.

Any company with a relevant offering is free to submit a listing for the Directory – simply complete the form and your entry will be added once it has been reviewed by the DVB Project Office. At the time of writing, 11 entries have been submitted. We're inviting DVB Members and non-members alike to submit listings ahead of IBC2024.

See: <https://dvb-i.tv/directory>



DVB @ IBC2024

Find our booth in Hall 1 at 1.B71.



Join us for demos of DVB-I and DVB-NIP and much more. See you in Amsterdam!

Strong today, stronger tomorrow? DVB's role in a transformed media world

Remo Vogel, Chair of the DVB Project

I had the honour of being elected to the role of DVB Chair in July. I hold great respect for this position, as it involves stepping into the shoes of not only Peter MacAvock but also many other brilliant technicians and visionaries who shaped the technology into what it is today.

With its specifications, DVB occupies a unique position at the interface between key media stakeholders, granting it the ability to make substantial contributions.

I wonder what it would be like if the DVB logo symbolized not just broadcast and broadband standards, but a comprehensive, unified solution. What do you think? What core values and objectives should DVB adopt to reflect a future vision?

When we, as DVB, communicate today, it is often in the context of a given distribution-technology silo. Meanwhile, media managers are overwhelmed by market developments, with many having already surrendered to Big Tech players. They have lost sight of the power we, as broadcasters and content providers, hold in our own hands. Open DVB technologies, developed by our Members, not only power up to 95% of live video delivery – the relevant figure for my employer ARD's television services in Germany – but also offer a wide range of solutions for managing the digital transition.

BROADCAST & BROADBAND

DVB has, over the years, successfully expanded its broadcast technologies to also cover broadband. Today, we offer solutions for internet-based delivery (DVB-DASH), seamless hybrid service discovery (DVB-I), and dynamic hybrid

“It is time for us to think more creatively about new possibilities.”

delivery (DVB Native IP). With HbbTV, we have a reliable partnership to enable the flexibility needed today with highly integrated client applications. At IBC this year, we showcase, among other things, how the world's most promising direct-to-mobile technology, 5G Broadcast, can be fully integrated into a DVB-I service portfolio.

We maintain a robust and advanced ecosystem that encompasses technology providers, affordable clients, and a comprehensive testing infrastructure.

DVB is the technology stack for publishing digital video. I believe we need to enhance how DVB is perceived, emphasizing that the “B” in the acronym represents more than just “Broadcasting”. How do you think we should adapt DVB's image to reflect what we already are?

BUSINESS MODELS KEY

The entire media industry faces substantial challenges. Budgets for public service media and private broadcasters are shrinking, manufacturers must redefine their roles in a software-driven smart TV world, and Big Tech is disrupting established revenue models. This phase comes surprisingly late, given that the digital transformation has already overhauled entire industries, from music to banking. Perhaps this delay is a testament to the fundamentally healthy business model of the broadcast industry.

DVB supports a horizontal business model, operating within distributed markets that offer various roles and associated business opportunities. It is time for us to think more creatively about new possibilities. For instance, HbbTV's Targeted Advertising solution (which closely complements the DVB-TA specifications) allows innovative revenue-sharing. Can we explore applying these approaches to other areas as well?

BROADER CHALLENGES

Beyond our core business, there are several pressing issues, such as accessibility, sustainability, privacy and many more. Our work has significant potential to have a meaningful impact in these areas.

Consider accessibility, for example, where effort has been invested in recent years, including the introduction of accessibility signalling and forthcoming implementation guidelines. But is this enough? Where do we want to be with accessibility by 2035? Are our current approaches sustainable in the long term? And ultimately, what role should DVB play in advancing this goal?

Please don't hesitate to bring your ideas! Events like IBC and especially DVB World are excellent for tackling complex problems. They also provide a great opportunity to find supporters for your ideas.

I will work – with you – to ensure that DVB continues on its successful path and further strengthens its role in the media technology landscape by addressing the right challenges.

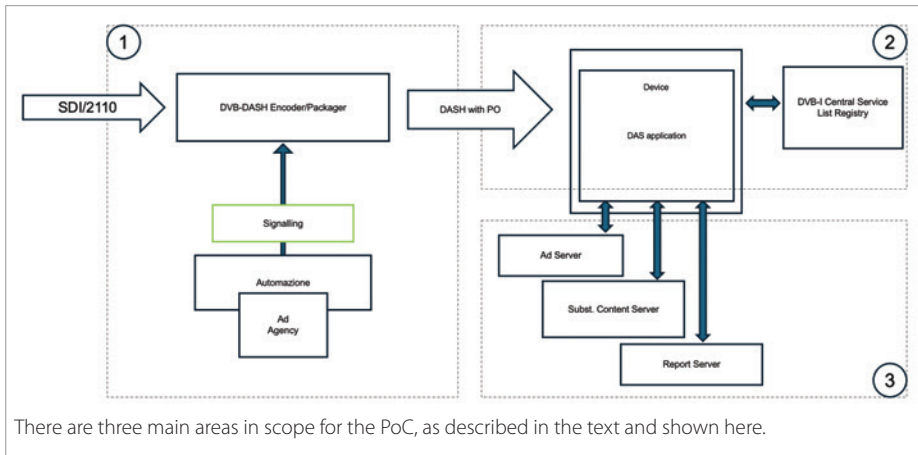
JULIA LEXOW



Remo Vogel is responsible for the strategic development of distribution technology for Rundfunk Berlin Brandenburg, part of the ARD network in Germany. His focus is on hybrid systems for programme publication. In addition to chairing the DVB Project, he leads DVB-I-related activities for both the EBU and the Deutsche TV-Plattform.

New phase in Italian Targeted Advertising PoC tests fully hybrid environment

Stefano Braghieri (Mediaset)



As far back as 2017, Mediaset started offering personalized advertising slots to our advertising agency and its clients. In line with our commitment to the use of well-established open standards, essential for the success of horizontal markets, our first implementation of Targeted Advertising (TA) was based on the core HbbTV 2.0 specification. This allowed us to perform client-side ad replacement on compliant TV sets, by means of a DAS (dynamic ad substitution) application, in this case an HbbTV app running in the client, managing the substitution of a personalized ad at a signalled placement opportunity (PO). The solution, which pre-dated the creation of dedicated TA specifications and required some proprietary elements, is still running on several TV models, providing acceptable performance.

FIRST DVB-TA DEPLOYMENTS

The introduction of the DVB-TA and HbbTV-TA specifications marked a big step forward. We first implemented this approach as of 2021, following a proof-of-concept (PoC). It uses DVB-TA Part 1 (to signal the POs in the broadcast transport stream), Part 2 (to interface

with the advertising server), and HbbTV-TA (ensuring the terminal performs the substitution reliably and accurately). You can read more about this implementation in Issue 57 of DVB Scene.

2019 saw the start of our activities on trialling DVB-I service discovery, with a PoC eventually leading to the on-going commercial trial. (See: <https://dvb-i.tv/services>.)

With DVB-I integrating broadcast- and broadband-delivered signals in a unified user experience, the natural next step for Mediaset is to move towards implementation of DVB-TA Part 3, which focuses on the signalling of ad placement opportunities in DASH streams.

DVB-TA PART 3

Phase 2 of our TA PoC has thus begun, initially focused on client-side ad substitution in DVB-DASH streams, where a DAS application takes care of content substitution and reporting. DVB-TA Part 3, like Part 1, is agnostic with respect to the type of device the DAS application runs in. It specifies how the DASH content shall be formed and how the DAS application shall behave to correctly perform substitution and

reporting, as well as how the DASH content should be packaged.

The aims are: 1) within HbbTV environments, to extend all the functionalities we have in a broadcast environment to the hybrid one, in parallel with our work towards implementing the HbbTV 2.0.4 core specification; and 2) to extend this mechanism to other devices, e.g. smartphones, demonstrating the applicability of DVB specifications.

There are three areas in scope for the Phase 2 PoC, as shown in the diagram.

Firstly, Mediaset's existing tool for interfacing with the ad agency – called Automazione – is extended to provide the SCTE-35 signals that need to be encapsulated in the DVB-DASH streams by means of a DVB-TA Part 3-compliant encoder/packager, requiring strong collaboration with the equipment provider. One key element of the PoC is ensuring correct functioning low-latency DASH streams.

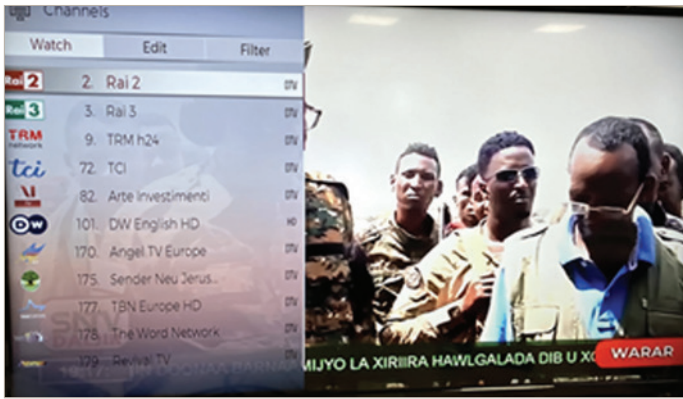
Secondly, the DAS application needs to correctly receive the PO information and perform the substitution in line with expectations. The relevant specifications for this are already deployed, both for the HbbTV ecosystem, as the required functionalities exist in HbbTV 2.0.3, and for generic devices based on DVB-DASH compliant players. An important focus is how terminals perform when required to manage different player instances to display different content.

The **third area** for Phase 2 is ensuring the DAS application correctly manages the dialogue with ad system backends. As with the first point above, the application already performs these activities in relation to TA in broadcast, so it is a matter of extending the existing data-exchange workflow.

Within the HbbTV ecosystem, the ultimate aim is to achieve complete coverage of hybrid scenarios, where all functionalities are provided independently of the medium in use, whether it be DVB-T, DVB-S or DVB-DASH, and all with a common user interface and experience thanks to DVB-I. Reaching this goal will require the introduction of HbbTV 2.0.4, allowing the merging of DVB-T/S with DVB-I, up to now running independently.



Stefano Braghieri has almost 30 years of experience in broadcast technologies in various capacities, from writing code to standards development and testing. He has been with Mediaset since 2011, working on support for new technologies and product innovation.



Sat.tv Connect on DVB-I client



Sat.tv Connect on HbbTV client

Enhanced access to free-to-air satellite television thanks to DVB-I

Ralph Edeine (Eutelsat Group)

Sat.tv is an exclusive channel listing and programme guide service from Eutelsat Group. It is designed to enhance the viewing experience and increase the visibility of hundreds of free-to-air channels broadcast from Eutelsat's 7°/8° West, 16° East and HOTBIRD 13° East satellite positions.

Sat.tv is already available on low-cost satellite set-top boxes, which use a proprietary technical specification to install lists of services by country, region or language, and receive a seven-day "enriched EPG" over the air. Now, thanks to a new interactive service called Sat.tv Connect, the aim is to extend our reach to new generations of connected TV sets with integrated satellite tuners.

The combination of two interactive television technology standards, DVB-I and HbbTV, was chosen as the basis for the Sat.tv Connect service.

HUNDREDS OF CHANNELS

DVB-I, in its latest release, is used as the standard solution for the 'organization' of the free-to-air broadcasting environment on the different satellite positions of Eutelsat to:

- Manage multiple service lists per satellite position, with sub-filtering by region, country or language (up to 33 different Sat.tv lists so far).
- Optimize and simplify the installation of satellite channels by using the "instant tuning" and "LCN range" functions that are integrated into the DVB-I service list. These guarantee direct zapping to the chosen television or radio channel, without the need for time-consuming pre-scanning of the entire satellite position, and facilitate channel classification.
- Enhance the user experience by enriching the native TV interface with channel logos, thumbnails and programme information that can be integrated directly into the channel's zapping banner and television guide (with programme information for more than 500 channels to date), thanks to the prioritization, when available, of DVB-I metadata over the broadcast EIT (Event Information Table) that is traditionally used for such information.

- Enable flexible service-list discovery, for both connected and unconnected scenarios, with service-list installation via a broadcast signal that declares either DVB-I entry point parameters or directly the DVB-I services lists.
- Initiate service hybridization, offering the widest free choice of free-to-air broadcast and FAST streaming channels.

HbbTV is the core standard for Sat.tv Connect's interactive application. It provides a first level of service even on TV sets that do not support DVB-I.

This complementary application is a multilingual portal (English, French, Arabic, Italian, Farsi and Russian) that also gives access to an enriched EPG based on the user's list of favourite Sat.tv services and zaps directly to the channel of their choice.

The Sat.tv Connect portal is launched via the Sat.tv promotion channel on each satellite or via partner channels.

METADATA MANAGEMENT

Sat.tv Connect's architecture is fully cloud-based to ensure scalability according to the number of concurrent users. At the heart of the solution is the EVMM (Eutelsat Video & Metadata Manager) server, which allows semi-automatic editing and management of channel lists and aggregation of enriched programme metadata. It is based on a daily analysis of all free-to-air channels on the satellites, to update technical information and periodically renew the EPG with information from metadata providers.

All of this information is then exported to various backend and front-end environments to feed the DVB-I endpoints (central service list registry – CSR – and metadata servers), the HbbTV server, and the DVB SI/PSI generator. Thus, service lists and programme data information can be delivered to the whole Sat.tv ecosystem.

Sat.tv Connect will be launched in September 2024 and will be available immediately on all connected TV sets with integrated satellite tuner and HbbTV compatibility, as well as on a wide range of Vestel TV sets with integrated DVB-I client. Other TV partners will follow.

Ralph Edeine is Head of Engineering and Technical Solutions with Eutelsat Group, where he has worked for more than 15 years. He is an active contributor to DVB's standardization work across several domains.



DVB combined with 5G offers an evolved ecosystem for media delivery

Emily Dubs (DVB Project)

Earlier this year I wrote a paper that sheds light on the various initiatives targeting interworking – as opposed to convergence – between second-generation terrestrial broadcast and 3GPP systems. The paper, presented at NAB's BEIT (Broadcast Engineering and Information Technology) Conference, starts by outlining how DTT standards have embraced IP-based approaches and included mobile broadcasting in scope. It then describes how, at the same time, 3GPP incorporated broadcast technologies in its standards and released LTE-based 5G Broadcast as a new terrestrial solution.

The main intention of the paper, however, was to highlight interworking at the service layer, especially with the recent adaptation of the DVB-I specification to support the different Release-16-based 5G operation modes. These include not only 5G Broadcast – relating largely to infrastructure and networks typically used by broadcasters – but also 5G Media Streaming (5GMS), relating to mobile networks. The paper also touches on potential coexistence at the RF level between 5G Broadcast and ATSC 3.0 or DVB-T2 waveforms.

HIGH INTEREST

It has been gratifying to see so much interest in these topics, on which I have also presented – from various angles – at events in Southeast Asia and Europe. Interesting questions arose around, for example, content monetization opportunities that are enabled by the use of DVB-I as a service layer for 5G technologies. These relate to various use cases like enhanced venue-casting and dynamic offloading of unicast networks to 5G Broadcast. Interest was also generated by the possibility – offered by

the coexistence of 5G Broadcast and DVB waveforms on the same RF channel – to operate the Commercial Mobile Alert System (CMAS) on resilient broadcast infrastructure using 5G Broadcast, instead of relying on cellular networks.

Even more questions mushroomed on the topic of how second-generation terrestrial standards like ATSC 3.0 compare with 5G Broadcast for Direct to Mobile (D2M), also known as DTT to Mobile (DTT2M) broadcasting. And on why DVB-NIP/T2 (DVB Native IP used with T2), which would be easy to deploy in countries that already have DVB infrastructure, is not itself proposed as a candidate for DTT2M, despite being effectively the equivalent of ATSC 3.0 both in terms of spectral efficiency and in having a fully IP-based core. Many readers will remember broadcast-to-mobile trials undertaken in several countries, notably India, using DVB-T2/T2-Lite: while satisfactory technical performance was demonstrated, there seems to be a form of collective amnesia about the reasons why this has never been successful!

EXISTING CHALLENGES

The NAB BEIT paper is, however, only really just the start of the story. For me, it has served as a means of preparing the ground for raising awareness of the fact that DVB now offers a unique solution to help countries to build an integrated broadcast-broadband future: 5G networks can complement DVB ones (both legacy broadcast and new Native IP networks) as 5G coverage rolls out, and in a way that allows networks to be used for their own strengths. As outlined in the final section of the paper, the use of DVB-I on top of 5G technologies also provides a means for bridging 5G with

satellite delivery. While satellite was not in scope for the paper – it rather focused on terrestrial broadcast – adding OTT delivery over satellite into the equation makes a huge difference, providing groundbreaking, flexible and scalable solutions that meet the wide-ranging challenges currently faced in DVB markets. Key among these challenges are the following:

- How can operators adopt a flexible use of the most appropriate or cost-effective network according to the popularity of services or to whether services target high-density or more rural areas?
- How can the migration journey to hybrid delivery landscapes evolve at an appropriate pace and include new networks in the content delivery 'mix' as they become relevant?
- Above all, how can countries that already have DVB histories, especially those where broadband connectivity is not yet well established, connect *today* people living in rural areas, reusing existing infrastructure while at the same time paving the way for harmonized media delivery in a future where both 5G Broadcast and forthcoming (5G, 6G) mobile networks also come into play, as both coverage and devices become progressively available?

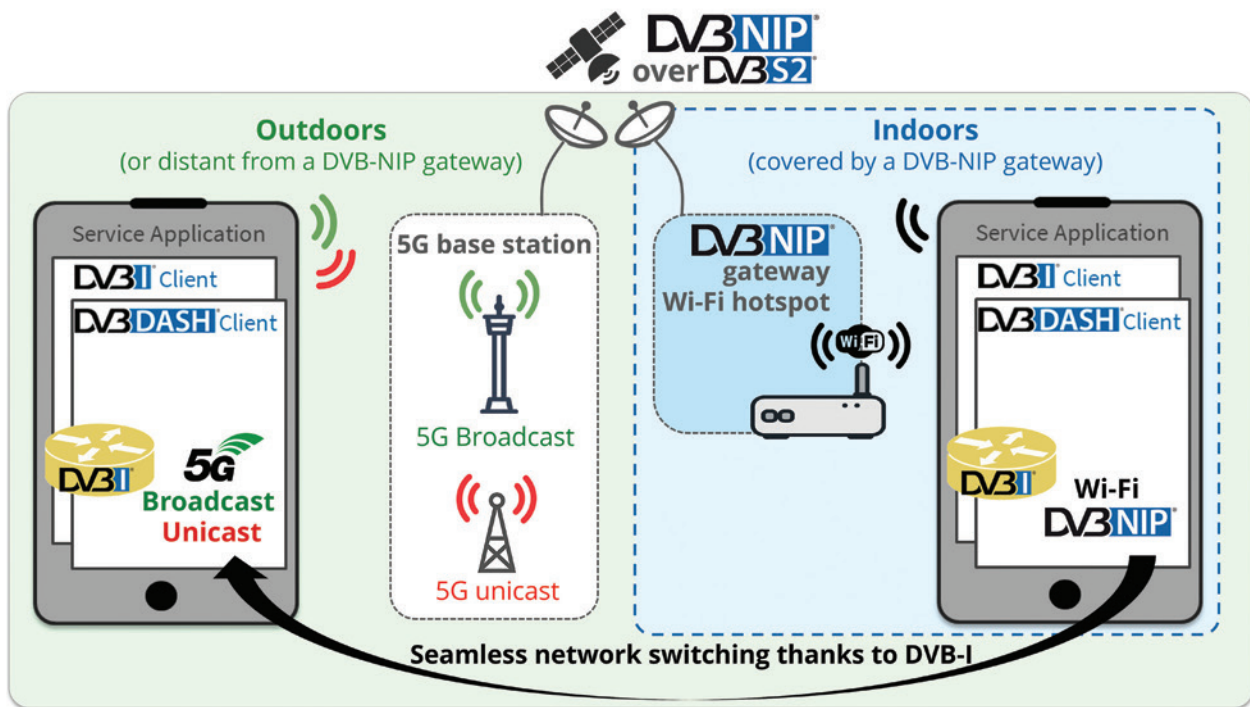
WHAT DVB OFFERS

DVB-NIP delivery combined with – network-agnostic – DVB-I service discovery is the answer. DVB-NIP allows OTT services to be delivered over existing DVB (satellite or terrestrial) networks, while DVB-I enables the discovery of such services delivered through either DVB broadcast networks, LTE-based 5G Broadcast, or 5G Media Streaming (5GMS) mobile networks.

We see, therefore, that combined solutions involving both 5G and DVB networks can seamlessly coexist thanks to DVB-I. In low connectivity areas, for instance, DVB-NIP over existing satellite links (DVB-S2) can be used to reach legacy devices through DVB-NIP gateways and Wi-Fi hotspots. In this way, indoor coverage is easily ensured simply by leveraging the infrastructure already in place (headends, satellite links) and without requiring any device adaptation on the end-user side, while outdoor



Emily Dubs is Head of Technology for the DVB Project, leading on technical and standardization activities, representing DVB around the world at conferences and tradeshows, and supporting its modules and working groups.



DVB-I bridging OTT delivery via satellite and 5G

coverage is left to either 5G Broadcast or 5G unicast networks as they come on stream, and for devices that progressively support 5G technologies.

Such a combination offers the advantage of alleviating the current spectral efficiency disadvantage of 5G Broadcast by removing the need to take indoor coverage into account in the link budget. This reduces the number of transmission towers that are needed to ensure 5G Broadcast coverage for a given target reception area. Above all, such a 5G/DVB-NIP combination is totally seamless for end users thanks to the interworking between heterogeneous distribution networks, enabled at the service layer through the use of DVB-I. In addition, the relevance of such a scenario is strengthened by the fact that DVB-NIP is also envisioned for feeding 5G base stations.

SOLUTION FOR INDIA?

India is a particularly interesting case. There, stakeholders are actively grappling with the problem of direct mobile broadcasting (the aforementioned DTT2M), including connecting devices in rural areas, and there is clear interest in 5G Broadcast. However, since it will make most sense to roll out 5G Broadcast

first in areas of high population density, relying on it to provide coverage in rural areas doesn't seem realistic. Nevertheless, the huge size of the market naturally encourages companies to put forward various solutions *whatever* the price might be, and the Indian government is currently focused on assessing candidate solutions for DTT2M (with ATSC 3.0 also under consideration, in addition to 5G Broadcast). However, DTT2M meets only part of the challenge, as the broader need is to connect people beyond the main cities and to serve content (live and on-demand) directly to mobile devices, preferably the *existing* ones!

Now that DVB-NIP is standardized, and now that DVB-I is better understood and supports 5G technologies, DVB offers the key to a standards-based solution to India's needs. It is a solution that combines DVB networks with 3GPP ones thanks to DVB-I, that doesn't require specialized hardware in mobile devices, and that leverages the broadcast infrastructure already in place in India. I believe it is a more appropriate solution when compared with a fully blown 5G Broadcast deployment that would be very challenging considering the huge investments (and amount of time) that would be required to achieve good

coverage – including indoors – and to address the legacy base of mobile devices, that may last for a long time yet.

It is noteworthy that my NAB BEIT paper was referenced in a landmark report on “Television Broadcasting to Mobile Handheld Devices” that was published by the Telecommunication Engineering Centre (TEC) of the Government of India. Even if it *does* include mention of this deployment scenario, whereby DVB-NIP ensures indoor coverage, such a scenario doesn't yet seem to be fully accepted as being part of the solution. I am glad, in any case, to be in dialogue with the TEC in India and to have opportunities to tell the full story. And it's a story that is relevant to many other markets, not least in Southeast Asia, where similar discussions are under way.

IN CONCLUSION

DVB's evolved ecosystem is now in place: a modern, standards-based approach that enriches resilient broadcast systems with well-rounded IP-centric solutions, including for the delivery of OTT services, whether over broadband or broadcast; and those networks can be combined and/or bridged with 3GPP technologies in a flexible and seamless way.

DVB-I and the future of television distribution

John Moulding

DVB-I is the standards-based service discovery and programme metadata standard. It is also presented as a solution for delivering live, linear and on-demand television in the internet age. At one level it is dull but worthy, and on another it is potentially game-changing.

Certainly, market fundamentals have shifted in favour of this standard. Our first cost-of-living crisis in the digital subscription economy reminded everyone about the value of 'free'. There is renewed interest in linear, as witnessed by investment in FAST*. The importance of super-aggregation reflects consumer desire to break away from app-to-app content navigation.

NEXT-GEN FREE-TO-AIR

The initial use cases for DVB-I are being defined by its biggest supporters, the broadcasters. They include creating a next-generation free-to-air experience complete with a network-agnostic programme guide that can help transition linear-centric viewers into streaming (whether in IP-only homes or during broadcast switch-offs). Streaming can be used for channel-level innovation like UHD, next-gen audio, pop-up and thematic channels, etc.

At a high strategic level, DVB-I could give broadcasters security of carriage – and guarantees of prominence even without regulation – via their Logical Channel Numbers (LCN). That is a comfort when app positions must be paid for and renegotiated.

Ireland's free-to-air platform Saorview is running a second DVB-I PoC as part of a wider examination of what a next-generation hybrid broadcast-broadband platform should look like. **Jim Higgins**, Brand Compliance and Business Development Manager, says: "We want

to stay with our audience and serve them where they are with something they are familiar with. DVB-I is a technology that allows a continuity of universal access and prominence, and gives broadcasters the ability to reach audiences in a competitive landscape."

Changing demographics in Ireland mean more people are living in apartments without DTT reception, providing an incentive to investigate a solution that allows broadcast or streaming to share the same EPG channel number. **Frank Heineberg**, VP Standards & Innovations at RTL Technology, who is co-leading the DVB-I taskforce at Deutsche TV-Plattform, sees DVB-I as a way for broadcasters to progress their transition towards more streaming, in particular reaching a new generation of consumers who have neither DTT nor cable reception.

Asked what DVB-I adds when a broadcaster already has its own app, Heineberg answers: "The prospect of high technical reach for linear IP streams on all TV sets on the basis of an open standard."

SUNSETTING DTT

DTT spectrum loss (anticipated or actual) has been one motivation for investigating DVB-I in Italy and **Peter MacAvock**, former DVB Project Chair, says: "Different territories are discussing the role an internet-centric system like DVB-I could play by facilitating seamless access-network switching between broadcast and broadband. This would be a necessary condition for the sunset of extensive DTT-only platforms."

In the UK, where regulator Ofcom has set out three possible scenarios for the future of television distribution, including full DTT switch-off, Freely

provides the broadcaster-friendly, linear-first UX where each LCN can be served with either a broadcast or streamed version of the same channel, albeit without using DVB-I. This new service shares the same objectives as continental broadcasters, including a roadmap for IP-only homes or an all-streaming country.

Freely is a unique beast, however, backed by an operating company (Everyone TV) that is owned by four public broadcasters and creating a platform and UX (using HbbTV OpApp) that runs on smart TVs. Other markets could 'do a Freely', using DVB-I, if broadcasters wanted to group together as a platform and were allowed by regulators. The alternative model is to organize themselves to create a broadcaster-friendly DVB-I service list that is the basis for programme guides developed by device manufacturers.

This is the approach in Germany, where the media regulator is playing the role of a neutral moderator for a round table of stakeholders to figure out what an implementation of DVB-I should look like. In Germany it is expected that any deployment of DVB-I would start with a single, central service list containing the main broadcast groups, with broadcasters in control of the list. There could be a technical aggregator working on their behalf.

REGULATORY ENVIRONMENT

DVB-I raises questions for regulators in any market, like how many service lists they want, the extent to which service lists are regulated, and what any regulation looks like. Heineberg assumes that in Germany a central, shared DVB-I list would be a regulated environment. **Remo Vogel**, Chair of the DVB Project and co-lead for the DVB-I taskforce at Deutsche TV-Plattform (who also leads strategic development of distribution technology for Rundfunk Berlin Brandenburg) agrees. He reckons inclusion on the DVB-I list will require a broadcast licence, at least at the outset. There is a possibility that in Italy the regulator will issue a licence to stream as the basis for appearing among the top 1,000 LCNs.

Anonymously, one connected TV device, OS and channel provider stated a preference for best-practice self-policing,



John Moulding is Editor of Streamification, and a freelance writer. He has reported on the technology and strategy evolution of television since 1999 and was Editor-in-Chief at Videonet for 13 years. He has written the agendas for Connected TV World Summit and the Future of TV Advertising Global since 2010.



Frank Heineberg, RTL Technology



Raymond Chung, ZEASN



Dylan Wondra, TiVo OS

“An important point about DVB-I is that it could be many things, from inconsequential to epic, depending on how it is used.”

noting that it already vets FAST channels to ensure its platform is fit for families. This company is concerned that the potential cost of regulatory compliance for streamers could stifle innovation in DVB-I.

Marco Pellegrinato, R&D Director at RTI (Mediaset Group), recognizes this argument and expects that currently unregulated streamers would reject DVB-I environments if expected to meet broadcast-like regulation. He hopes for fair but regulated access, nonetheless.

DVB-I could be of interest to the non-broadcaster streaming marketplace as a way to place themselves in a new shop window. Our anonymous device company sees DVB-I as a potential opportunity for FAST channels and recognizes the benefits from appearing in any list containing major broadcasters.

There is a school of thought within the DVB-I fan base that multiple service lists per market would encourage innovation, possibly with thematic lists. Broadcasters understand that there could be alternative DVB-I lists and will need to decide if they want to be in them, and under what conditions.

VENDOR SUPPORT

Support from device manufacturers will rest on whether the presence of a DVB-I environment helps them sell units. Pellegrinato notes that the standard helps broadcasters “do more and better stuff” because innovation is no longer

constrained by broadcast streams that must be compatible with 100% of television sets, enforcing a ‘lowest common denominator’ mentality. “With DVB-I we can cater for different receiver capabilities.” He also points to the interactivity and personalization possible when combining HbbTV with DVB-I.

Heineberg suggests that, “Manufacturers will have a more interesting user experience to offer – it will make a DVB-I enabled television set attractive to consumers.” Higgins adds: “People love to have more, and they love free.”

Raymond Chung, CTO at ZEASN, which offers whaleOS for use on smart TVs, supports the concept of comprehensive blended EPGs that combine DVB signals, FAST and vMVPD offers. ZEASN aims to support Freely over time, hailing a brand that is recognized by consumers as guaranteeing relevant public broadcaster entertainment. “It enables TV brands to drive significant volumes in the UK,” he says.

What is the message to draw from this in DVB-I supporting markets? Maybe to build a consumer brand to go with a DVB-I service list.

TiVo has integrated Freely on its TiVo OS for smart TVs, clearly understanding the pull of next-generation free-to-air.

Dylan Wondra, Senior Director of Product Management for TiVo OS, says the company is closely monitoring DVB-I developments, “and would support

participation when there is a strong customer and market need.” Meanwhile the anonymous CTV/OS provider is closely monitoring consumer benefits and demand in DVB-I trials.

MacAvock frames DVB-I as a technology that allows broadcasters to rethink their high-level distribution strategy. “Today, all broadcasters are obliged to invest heavily in their own apps but only a few will turn themselves into top ten destinations.” He believes the trend towards super-aggregation creates an opportunity for broadcasters to present themselves in a new way, using DVB-I in collaboration with platforms.

WHO IS IT FOR?

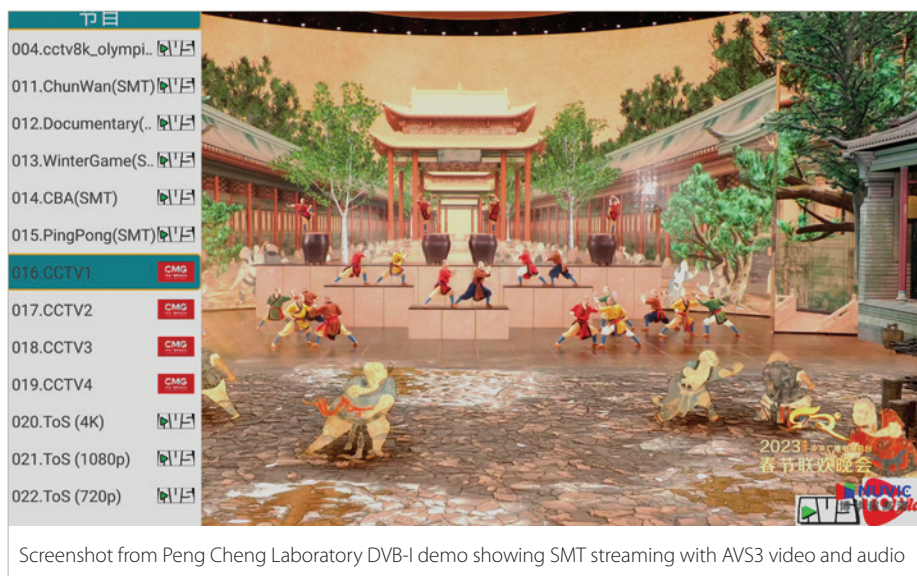
An important point about DVB-I is that it could be many things, from inconsequential to epic, depending on how it is used. It is something of a blank sheet, and market-by-market implementation is everything. Is DVB-I mainly for broadcasters, or will born-digital streamers get involved? Is it primarily for hybrid guides or is there room in the early days for IP-only service lists? Can smaller broadcasters use it immediately for streaming-only channels?

As with most standards, there is technology, there is strategy, and there is policy. DVB-I ticks the first box, and each market must decide how to handle the rest. But from what we see already, DVB-I has established itself as a part of the discussion on the future of TV distribution.

*Free ad-supported streaming television

China moves closer to service launch integrating DVB-I and AVS3

Jianhua Zheng (Peng Cheng Laboratory)



DVB-I unifies classical DVB broadcast services and IP streaming through service discovery, making all content available to end users in a single DVB-I service list – from TV sets to tablets, smartphones and beyond. It greatly benefits end users and television service providers and unifies the user experience of the one-to-many broadcast model and the on-demand internet model through dedicated apps.

Starting from the trials of DVB-I services in Italy and Germany, and the integration of DVB-I into HbbTV compliant TV sets, more interest has been shown from China too, including from local operators, chip vendors, and manufacturers of TV sets and other end-user devices, not least since many such manufacturers are based in China and supply products to other regions in the world.

With the addition of AVS3-P2 to the

DVB toolbox as a next-generation video codec, the path for the use of DVB specifications in China has been eased. It makes it possible to use DVB-I with AVS3 technologies, which are already adopted in the Chinese market.

COLLABORATION WITH DVB

In February 2023, the first DVB–AVS workshop on UHD standards was organized in Shenzhen by the AVS Workgroup, to explore the opportunities for integrating DVB-I with AVS UHD standards. Lots of interest was expressed and stakeholders were keen to know more.

A formal liaison agreement between DVB and the AVS Industry Alliance was signed at the World Ultra HD Video Industry Development Conference (WUVIC2023) in May 2023 to promote a deeper collaboration between these two standards organizations

on the integration of AVS and DVB technologies. At the same conference, a further agreement provided AVS with a copyright licence to translate the DVB-I specification into the Chinese language. The final DVB-I Chinese specification is expected to be published as an AVS Industry Standard by the end of 2024.

Since February 2023, many AVS members have been not only keen to study the DVB-I specification, to ensure that new DVB media delivery can be compliant with AVS3 technologies, but also to collaborate on kicking off the integration of technologies from AVS and DVB. First demos of DVB-I with AVS3 video were presented at the DVB–AVS UHD workshop, with further demonstrations at events such as WUVIC 2023, IBC 2023, ICTC 2023, ABU DBS 2023, ABU DBS 2024, DVB World 2024, etc. These demonstrations have shown that the integration work is moving quickly and making great progress.

Not only the AVS3 video codec, but also the AVS3 audio codec and AVS SMT streaming have been demonstrated under a DVB-I framework. This integrated solution has been supported in chipsets, set-top-boxes and TV sets via a native DVB-I app, and on smartphones and tablets for implementation via an HTML5-based approach. The rapid progress with integration underlines the flexibility, openness, and friendliness for development of DVB-I technology.

In the past few years, AVS3 technology has been used for the live broadcasting and live streaming of several major events, including for the CCTV Spring Festival Gala (2021), Beijing Winter Olympics (2022), FIFA World Cup (2022), Asian Games 2023, and UEFA European Championships (2024).

The integration of DVB-I and AVS3 for live broadcasting and live streaming is under preparatory testing as of Q2 2024. China is one of the largest markets for UHD1 and UHD2 using DVB solutions; we look forward to the imminent start of new DVB-I services with AVS3 in the coming few months, and to the continued collaboration between DVB and AVS to promote further the reach of our standards.



Jianhua Zheng has been involved in media coding standardization work for 19 years. He is a Research Fellow of Peng Cheng Laboratory.



AVS3 Part 3 Immersive Audio on track to extend the market reach of DVB solutions

Gao Yuan (Huawei)

Earlier this year, the DVB Project approved a new version of its commercial requirements for Next Generation Audio (NGA) codecs. This paved the way for AVS3 Part 3 Immersive Audio (AVS3-P3) to become the latest candidate for inclusion in the DVB audio and video codecs specification. The DVB Commercial Module confirmed in February that the codec had passed the commercial criteria and asked the relevant Technical Module working group, TM-AVC, to initiate the work to evaluate the technical performance of AVS3-P3.

The AVS3 series of standards is developed by the Audio Video Coding Standards Workgroup of China (AVS). The new audio codec brings the potential to extend the market reach of DVB solutions and bring its own features to deliver efficient NGA.

LIAISON AGREEMENT

The audio work follows DVB's inclusion of the AVS3-P2 video codec in 2023 and builds on the liaison agreement between DVB and the AVS Industry Alliance, which promotes collaboration between the two organizations on the integration of AVS and DVB technologies.

Work on the AVS3-P3 standard started in the AVS Working Group in April 2021 with 14 AVS members making technical contributions to the specification. This culminated in reaching the Final Committee Draft (FCD) stage in Q3 2022, leading to publication in Q1 2023 as both a Chinese broadcasting industry standard and an AVS Industry Alliance standard (in English), called T/AI 109.3-2023.

The standard supports lossy and lossless audio coding and NGA audio encoding and decoding, as well as loudspeaker and binaural rendering for 3DoF presentation. The AVS3-P3 for DVB profile also allows support for channel-based, object-based and scene-based audio coding, as well as multiple

objects mixed multi-channel audio coding. The metadata schema defined in this standard is compatible with the EBU's Audio Definition Model (ADM, ITU-R BS.2076).

To improve coding efficiency, AVS3-P3 adopts many new technologies, including neural networks, which means it would be the first NGA codec in DVB to include AI tools. As a general full-rate audio coding tool, in typical applications AVS3-P3 supports audio bitrates from 32 Kbps to 3 Mbps.

END-TO-END ECOSYSTEM

Since the official publication of this specification, more than 20 vendors have joined the AVS3-P3 end-to-end value chain. These include operators, platform and content providers, and manufacturers of encoders, decoders and SoCs. Several successful trial transmissions have been run in preparation for full deployment. Given this maturing ecosystem, it was the perfect time to bring AVS3-P3 to DVB.

Work to evaluate the compliance of this new candidate audio codec with the commercial requirements and to develop draft DVB specifications has been under way at DVB for some months. The profile to be used by DVB specifications will include support for general full-rate audio coding and metadata coding of AVS3-P3. Initial test results from proponents show performance and subjective quality levels comparable to the existing NGA codecs; a full independent test report will be shared with TM-AVC as the work item progresses.

While AVS3-P3 is targeting the same full NGA requirements as other codecs included in DVB's toolbox (AC-4, MPEG-H and DTS-UHD), commercially it has the potential to extend DVB's footprint in Chinese markets. The first specification release with addition of AVS3-P3 is anticipated by the end of 2024, subject to successfully validating technical compliance.

Gao Yuan (Alex) has been involved in media coding standardization work for over 10 years. He is a researcher and inventor at Huawei 2012 Lab and was a key contributor to the standardization of AVS3-P3.



Adding support for DVB-DASH font downloads to the dash.js client

Chris Poole (BBC)



The use of a custom hand-drawn font enabled easy testing of the new functionality

Subtitles are an important part of television and VOD services, making content more widely accessible as well as supporting increasing numbers of viewers who simply prefer to watch content with subtitles.

In preparing for the launch of the new Freely platform in the UK, we wanted to ensure that the subtitles were clear and readable for all BBC channels.

The Freely platform has both broadcast and IP-delivered linear services and supports both hybrid and IP-only installations. Channels are accessed through a single programme guide that does not distinguish between broadcast and IP services. As such, we need to deliver an equally high-quality subtitle experience for both cases.

STREAMING FONTS

Our subtitles for broadcast channels are

delivered as bitmaps using the DVB-SUB specification. This gives us full control over the font used and the overall appearance of the text.

For our IP services, we use DVB-DASH to stream the content. This also supports subtitles but delivered as text using the EBU-TT-D TTML¹ format. In this case, the client (e.g. a television) renders the text. TTML subtitles can indicate an order of preference of fonts to use for rendering but with this functionality alone, subtitles will ultimately be rendered using one of the client's built-in fonts, and the fonts used may vary between devices and platforms.

Recognizing that content providers may wish to use a specific font for subtitles, DVB included additional functionality in the DVB-DASH specification that allows streams to use downloadable fonts. In this case the

DASH MPD² includes a location from which the font can be downloaded. The content provider can indicate either that the specified font is preferred, but others can still be used if for any reason it can't be downloaded, or that the specified font is required and the subtitles cannot be presented without it.

TV sets complying with the HbbTV specification have supported downloadable fonts in their native DASH players for several years, through their implementations of the DVB-DASH specification. However, BBC, like many other content providers, now prefers to use the flexibility of the W3C Media Source Extensions (MSE) to take greater control of media streaming by using DASH players implemented in JavaScript. This applies not just to VOD but for linear channels too.

JAVASCRIPT CODE

On Freely, presentation of all IP linear services is handled by an HbbTV Operator Application that uses the dash.js JavaScript DASH player. Unfortunately, dash.js did not have support for downloadable fonts. Since we wanted to ensure that the subtitles in our linear IP channels are rendered in a modern and very readable font, BBC R&D decided to contribute code to dash.js to implement the DVB-DASH downloadable font signalling.

Fortunately, though not by chance, the font formats required by the DVB-DASH specification are formats that are supported by the web platform. Thus it was possible to fully support the DVB-DASH requirements in the browser environment.

One challenge we faced was how to test the new functionality. To an untrained eye, one font may look much like another. The approach we took was to create a custom font that uses character substitutions to indicate very clearly on screen whether or not the downloadable font is being used.

Our contribution, which supports live and VOD content, is included in dash.js 4.7.4 and is now in production use on Freely.

¹ Timed Text Markup Language;

² The Media Presentation Description (MPD) contains metadata required by a DASH client



Chris Poole is a Lead R&D Engineer at BBC R&D, leading a team specializing in media streaming and connected television. He has been a contributor to DVB for over 20 years.

Common Media Client Data – does it matter for DVB?



GET /segment3456.m4s?custom-data=a=1,b=2
← custom-request-header: a=1,b=2



Player running in Client

As the player makes HTTP requests for content, it attaches the CMCD data as either query arguments (appended after the ? in the URL) or as HTTP headers. The server can read these when it processes the request and extract the CMCD data.

CMCD: what it is and does

Will Law (Akamai)

Media players and the content delivery networks (CDNs) that serve them live in two separate worlds. At the media player is the notion of a playback session which, as an example, may last for an hour as the end user watches a sporting event. Over that time there may be some rebuffering issues and the player may switch bitrates.

Due to the nature of segmented media playback, the CDN's view of this same event is thousands of independent requests for video files, audio files, caption files and playlists. These requests are intermingled with the millions of other requests made to the CDN at the same time. It is very difficult for content distributors or the CDNs themselves to look at CDN logs and infer anything about the quality of experience (QoE) of an individual session, or of the aggregate health of a player cohort.

The industry needed a bridge between these two worlds – a mechanism by which a player can communicate mutually beneficial media-related information to a CDN. This method of exchange was standardized as Common Media Client Data (CMCD) CTA-5004 by the Consumer Technology Association in September 2022.

CMCD defines a simple set of rules by which media players attach structured information to each media object request as either a query argument or a custom header. This CMCD data is added to the CDN logs and is processed by both the CDN and the content distributor. Player support has grown rapidly, with most player ecosystems, including AVPlayer and Exoplayer, now supporting CMCD.

CMCD is simple to understand, simple to implement and common across all players and all CDNs. The use cases that CMCD enables are broad, including robust prefetching, analytics solutions, forensic debugging, CDN delivery optimization, alerting and monitoring systems, low-latency optimizations, server-side switching, research analytics, and content steering decisioning.

CMCD: why it matters for DVB

Thomas Stockhammer (Qualcomm)

Television and media distribution is gradually migrating to IP- and internet-based delivery. DVB has taken major steps to support this transition, with the development and continuous improvements of DVB-I, DVB-DASH and related technologies serving the needs of internet-based television.

CDNs are the backbone for new media delivery. DVB-based television services are known to be of the highest quality and provide a consistent and reliable user experience. Traditional DVB broadcast systems, such as DVB-T2 or DVB-S2, can ensure consistent quality through proper network planning ahead of operations. For DVB-I signalled services delivered with DVB-DASH, one must rely on best-effort networks and the opportunistic nature of CDNs and the internet. In order to monitor the service across a variety of DVB-DASH clients in DVB-I signalled services, the collection of client metadata is of utmost relevance. This data may then be used for operational improvements of the service, for example changing encoding, adding CDNs, using advanced technologies such as content steering, and many more opportunities.

Examples for such operational improvements include understanding regional streaming and network performance in real-time; or switching selected users mid-stream to the best available infrastructure. In a data-driven world, such real-time operational information will change entirely the way television services can be operated.

DVB has thus decided to adopt CMCD in its DVB-DASH specification and has initiated technical work based on requirements that were approved in Q2 2024, considering specifics on collecting CMCD data in DVB services. Furthermore, DVB will investigate whether CMCD data can also be collected and beneficially used for DVB-MABR, DVB-NIP and potentially traditional DVB broadcast services, if they are part of a DVB-I service offering.

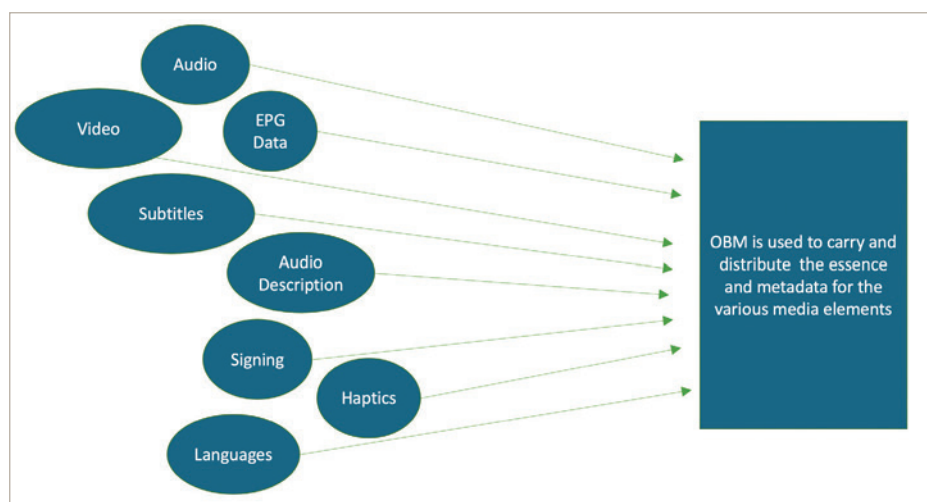
Will Law is a Chief Architect within the Cloud Technology Group at Akamai, involved with streaming media for over two decades, with a strong focus on client-side development. **Thomas Stockhammer** is Director of Technical Standards with Qualcomm. He is a leading contributor to a wide range of standardization activities.

DVB SCENE | SEPTEMBER 2024



Object-based media: forthcoming DVB report identifies use cases and opportunities

Elfed Howells (Huawei)



Inspired by trials and service launches worldwide, the DVB Project launched a study mission to gain insight and collect use cases for object-based media. The group's final report is due for publication in Q4 2024.

The term object-based media (OBM) is used to describe an approach to producing, distributing and consuming media content that uses separate media assets, known as 'objects'. An object consists of *essence* and its associated *metadata*, which describes the essence. Some objects are considered essential to the default content, such as the standard audio or video, while other objects might be additions.

For example, a viewer watching a football match might choose to hear commentary from a pundit who is a supporter of their team, instead of the standard broadcast commentary. By producing three audio objects, one for each team and one standard broadcast, alongside the video object, this choice can be offered to the viewer, whether

selected through an explicit interaction or automatically adapted based on user preferences or device characteristics.

OBM can also be used to optimize the presentation of content for the device being used or the environment in which the content is consumed.

THE SITUATION TODAY

Most programmes today already contain at least two additional media tracks (e.g., audio description, subtitles) but many have several more (such as visual signing, director's commentary, additional graphics, EPG links, trailers and references to online information). These can be – and sometimes are – considered as objects, and in some cases can be combined to offer different experiences.

Although these tracks exist today, they are not currently seen as OBM as each one is a stand-alone service that can be enabled or disabled and has limited metadata. They rarely have the metadata that describes how they can

be combined to form an object-based presentation.

Recently, however, it has become possible to create and deliver more sophisticated OBM, such as branching narratives or personalized presentations, which offer totally new viewing experiences. Additionally, media may be composed dynamically from separate digital assets and made responsive to user preferences or interaction, rendered dynamically by the client device or a cloud service.

Many of the underlying media types are *delivered* in existing standardized ways but the methods used to identify them and link them to the primary programme or to each other often rely on proprietary or app-specific data.

DVB's existing specifications are designed for carrying the most common types of media essences, e.g., subtitles or alternate audio tracks, but a common method to label, identify and carry metadata for multiple objects is not available.

PREPARING FOR THE FUTURE

As media and media delivery systems evolve, the number of elements associated with content is increasing. Social media posts, promotional web content, photos, and a host of other assets are now associated with media. All these elements have traditionally been managed in an ad-hoc way and the media archive for many programmes in the past merely consisted of a master copy of the programme itself, with a short filename, or label on the tape or storage media.

The DVB study mission on OBM has examined how objects are being used in the industry, determining how well existing specifications cover the carriage of multiple objects and whether there are commercial drivers that justify further standardization by DVB. This includes the carriage of the underlying media essence, its metadata, and re-assembling the experience or "rendering" it at each stage of delivery.

While the focus has been on the distribution of the media, questions of ease of use, accessibility, user experience, interaction and enabling presentation to and selection by the user were also in scope.



Elfed Howells, leads the DVB Study Mission on Object-Based Media and is also the chair of the DVB Promotion & Communications Module. He consults for Huawei on media standards and is a technologist, board member, and founder in media technology.

Revenue and platform diversification: Europe's video industry stands on four legs

Ophélie Boucaud (Dataxis)

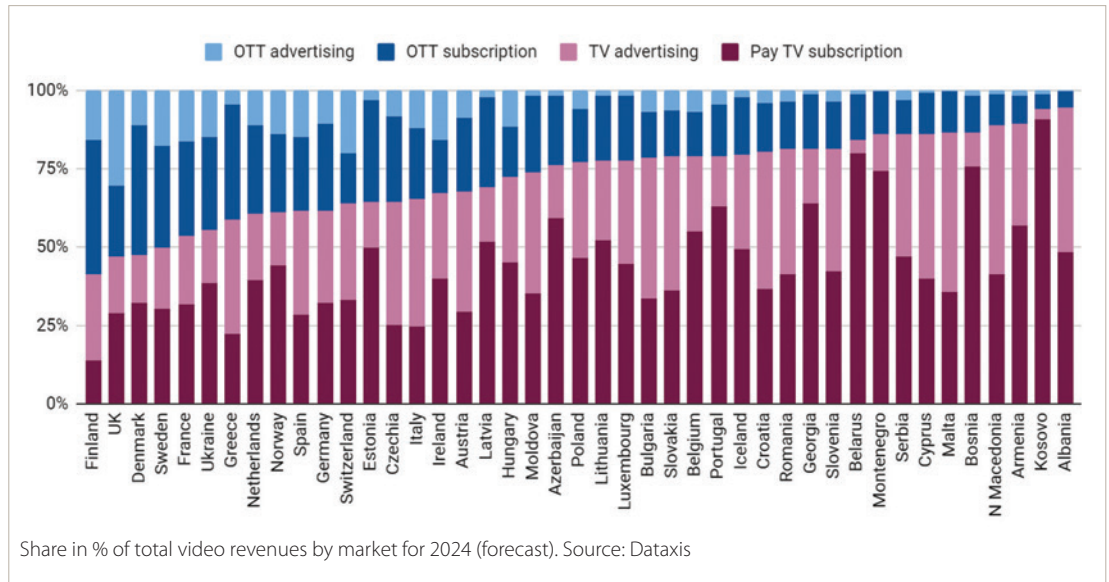
The key point for media groups operating in the video space now revolves around diversification, both in terms of platform and revenue streams. OTT is already a leading force on the market, but it remains far from the volumes that linear television can still drive. Still, traditional television has peaked and won't be a growth driver in the coming years.

The industry is progressing steadily in its transition towards digital video platforms,

but some markets are well ahead: last year, OTT accounted for 50% of overall television and video commercial revenues in the UK and 45% in the Nordics. These countries have been testbeds for global OTT players to launch their services in Europe for over a decade now. They are generally characterized by a higher ARPU* and well-developed access to premium content, generally through a high penetration of pay-TV services.

On the other end of the spectrum, OTT video services accounted for just 17% of revenues in Southern Europe and under 23% in Central Europe during the same period. These less developed markets are usually associated with lower ARPUs for home services, which makes them less attractive for revenue-driven platforms, and with significant fragmentation of languages and preferences, which also makes them less readily accessible to foreign entrants.

Markets like Spain, Italy or Greece still have a strong free-to-air television industry, and linear viewing remains the main access to content for local audiences, which explains a slightly delayed uptake of OTT services. Similar trends are observed in strong pay-TV markets like



the Baltics, Hungary or Ireland, where OTT's share of video revenues remains under the regional average.

DOMINANT PLAYERS

Television subscription revenues in Europe generally are driven by regional pay-TV giants, with a strong legacy from satellite through Sky and Canal+. Telco operators also drive a significant part of the market, with tier-1 players like Deutsche Telekom, Orange, Telefonica and Vodafone collectively generating €7.5 billion in pay-TV subscriptions in 2023. On free-to-air television, €25 billion advertising revenues are fragmented across local broadcasters, with each European country counting three to four national television groups that secure their domestic market.

Meanwhile, in the OTT segment, global leaders have flattened their local competitors. Netflix held a 34% market share of OTT subscription revenues in Europe last year. It is the leading OTT service in value in all but a few European markets. The closest competitors for Netflix are all US media giants: Prime Video, Disney+, and WBD's Max and Discovery+.

In the advertising-driven segment, the picture is similar with YouTube accounting for almost 60% of all digital video ad revenues across Europe. TikTok comes second, with a steadily growing market share, leaving only a quarter of the whole segment for European-grown platforms to secure digital ad budgets.

With traditional broadcast remaining barely stable, or even showing a slight decline, most growth pockets for the video industry are on digital platforms. European pay-TV platforms and broadcasters are on a mission to maintain their status as media leaders in their domestic markets, and to claim a top position in the OTT segment.

However, monetization is a two-way game. With European audiences showing signs of subscriber fatigue, and with lower ARPU markets and target groups being harder to address with solely premium services, advertising is becoming an important pillar of OTT platforms' monetization strategy. But ads alone won't be enough to ensure revenue stability – and subscription models are here to stay, as they have the upper hand when it comes to leveling up ARPUs.

* Average revenue per user

Ophélie Boucaud is a Principal Analyst for Dataxis in charge of research and data analysis related to the TV, telecoms and OTT industries in EMEA. She regularly publishes strategic insights on streaming markets, advanced advertising and telecom technologies, and is a regular conference panellist.



Memories of Munich: an engaging and energizing DVB World

DVB World 2025 will return to the smartvillage Bogenhausen in Munich on 18–19 March. Here we take a look back at this year's event, which brought almost 200 people together for an intense half-day conference and an even more intense full day of breakout discussions.

Registration for DVB World 2025 will open in the final quarter of 2024. Visit: dvbworld.org



Above: UHD on DTT: Jacques Donat-Bouillud (France TV) and Angel Álvarez (Televisión).



Martin Gold (YouView TV) and Ophélie Boucaud (Dataxis) looked at the prospects for targeted advertising.



DVB Head of Technology Emily Dubs with event moderator Eoghan O'Sullivan.



The exhibition area provided opportunities to experience some of the latest technologies first-hand.



The opening keynote came from Sophie Lersch, Senior Head of Distribution and Controlling at Bayerischer Rundfunk.



Taking DVB-I to the next level: Jon Piesing (TP Vision), Remo Vogel (rbb), Marco Pellegrinato (Mediaset) and Veit Olischläger (BLM).



Jill Mulder (EKT), Laurent Leveil (Eutelsat), Richard Lhermitte (ENENSYS) and Tom Christophory (SES) highlighted the business opportunities enabled by DVB-NIP.



With plenty to discuss following the opening afternoon, not least ideas for the following day's unconference, Tuesday evening's gathering at the Augustiner Stammhaus was a lively affair.



Above: DVB's third unconference kicked off on the second day of the event. Above right: There was no shortage of volunteers to pitch and host unconference discussions.



The unconference sessions involved anything from 10 to 30 or so participants, with hosts encouraged to include all attendees in the discussions and to focus on identifying the next steps for the topic in question.



The unconference agenda filled up with a total of 31 sessions, generating difficult choices for some attendees.



A media technology gathering in Munich? A great opportunity for some of the IRT 'alumni' to catch up. DVB SCENE | SEPTEMBER 2024



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