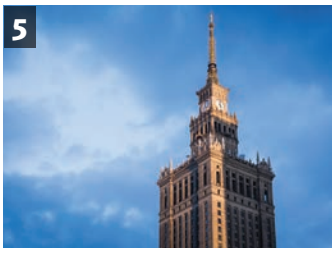
# DVBSCENE

SEPTEMBER 2018
ISSUE 52






## CONTENTS

# A word from the DVB Project Office

Several years ago, Ulrich Reimers, then chair of the DVB Technical Module (TM), stated after the completion of DVB's 2nd generation transmission standards that we had come so close to the Shannon limit that further improvements could not be expected. At the most recent round of TM, Commercial Module (CM) and Steering Board meetings, it was agreed that WiB technology didn't constitute a reason to specify a new terrestrial system (see page 4), nor would we undertake any further activities on the physical layer for cable for now (see page 14). Keeping in mind that our work on a possible 3rd generation satellite system did not deliver sufficiently increased spectral efficiency to be worthy of the name DVB-S3 (becoming instead DVB-S2X), and that a decade after we developed DVB-T2, our colleagues across the Atlantic could deliver only marginal spectral efficiency gains for the single channel use case in ATSC 3.0, we see that Prof. Reimers was correct.

Providing the physical layer standards for satellite, cable and terrestrial was a major contribution of DVB and triggered the success of digital broadcasting. Now, exactly 25 years later, we can arguably say "mission accomplished" for our broadcast transmission standards.

But this does not mean that our work is done. DVB's main focus is shifting from the lower protocol layers to the ones above the IP layer. Our current activities are largely focused on OTT delivery and targeted advertising. In the TM we are working on Low Latency DASH (page 7) and ABR Multicast. The CM has just finalized a first round of Commercial Requirements for targeted advertising and will soon do the same for DVB-I. The latter will bring the convenience and quality of experience of broadcast DTV to the OTT world. These new developments are also relevant for cable, so we will continue to be a player in this space.

For the DVB organization this is a major shift in activities and will also require new ways of creating standards. We will, I believe, hear more in future about conformance testing, reference implementations and open source development. At 25 years, DVB brings a valuable mix of experience and energy. We are determined to support the industry with specifications that maximize the benefits of combining broadcast and IP delivery.

**Peter Siebert**
Head of Technology, DVB Project




Published by the DVB Project Office,
c/o European Broadcasting Union,
17a Ancienne Route,
CH-1218 Grand Saconnex, Switzerland.

Editorial Board: Peter MacAvock,
Eva Markvoort, Peter Siebert.
Editor: Eoghan O'Sullivan (osullivan@dvb.org)





Printed by Graphius.

# DVB News

## Reorganization in the Project Office

We have made some changes in the DVB Project Office with a view to streamlining our internal processes and improving our service to the Members.
Eva Markvoort (pictured above) is now Head of the Project Office – she assumes responsibility for its day-to-day running and the coordination of activities requiring Project Office input.
Peter Siebert is Head of Technology, focusing on the technical challenges facing the DVB Project as well as representing DVB externally. He is also secretary to the Steering Board and General Assembly, as well as the Technical, Commercial and Promotion & Communications Modules.
Désirée Gianetti continues in her role as Events Manager, while additional support on communications activities is provided by Eoghan O'Sullivan.

## New CM chair

The July meeting of the DVB Steering Board confirmed Sky's Martyn Lee as the new chair of the Commercial Module. He replaced Graham Mills, who had chaired the CM since its very first meeting in January 1997.

Martyn comes to the role having been active within DVB for 20 years. He also represents Sky at various other industry organizations on standards, spectrum, business and regulatory issues. He holds an MEng (Honours) from the Open University and an Executive MBA from the University of Hertfordshire. Outside of work, Martyn finds time for the gym, karate, scuba diving and his first grandchild!

## NEW MEMBERS

**Broadcast Networks Europe**, based in Brussels, is an international non-profit association of terrestrial broadcast network operators. www.broadcast-networks.eu

**Unified Streaming**, based in the Netherlands, is a vendor of software for online delivery of live and on-demand video, with DVB-DASH among the technologies used. **www.unified-streaming.com**

**Verance**, based in San Diego, develops and delivers innovations that enhance, protect and measure the delivery of media and entertainment. **www.verance.com**

**YouView** provides software for set-top boxes and connected TVs together with cloud services to provide a platform in the UK that combines live TV, delivered by DTT and IPTV, with on-demand content. **www.youview.com**


## NEW STANDARDS

**TS 101 154 V2.4.1:** Specification for the use of Video and Audio Coding in Broadcast and Broadband Applications (February 2018)

**TS 103 285 V1.2.1:** MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks (March 2018)

**EN 303 560 V1.1.1:** TTML subtitling systems (May 2018)

**TS 103 615 V1.1.1:** Metadata generation and deterministic DVB-T-megaframe/DVB-T2-MI stream generation from MPEG-2 Transport Stream(s) for a DVB Single Illumination System (August 2018)

## DVB webinars on YouTube

Did you know that you can access a growing playlist of DVB technology webinars on our YouTube Channel? You can find it by visiting **www.dvb.org/webinars**

- UHD in TS 101 154
- Smart TV security
- Subtitling systems
- DVB-DASH
- DVB-SIS (Single Illumination System)

The next DVB webinar will be on Next Generation Audio. More details at the URL above.

# DVB News

Join us on Friday evening at IBC to continue the celebrations that began at DVB World 2018 in Warsaw!

## Celebrate with us in Amsterdam!

For the DVB community, Friday night at IBC is always a chance to catch up with old friends – and to make some new ones – when we invite you to join us for a drink and a chat at the DVB booth. It will be an extra-special gathering this year, celebrating 25 years of success and looking forward to an exciting future.

We will get the party started earlier that same day, at 11:30 in room G102/103, with a special free access conference session that will feature a panel discussion exploring DVB's pioneering role in the success of digital broadcasting. All are welcome to attend this session and to join us right outside the conference room afterwards for refreshments.

The DVB Cocktail Reception will take place on our booth (1.D81) from 17:00 to 19:00. We're grateful to our five sponsors: Funke, Dolby, Neotion, Newtec and Broadcast Networks Europe.

We're looking forward to meeting as many DVB Members as possible at IBC 2018. On the DVB booth we will demonstrate state-of-the-art digital TV services that use existing and forthcoming DVB technologies.

**See: www.dvb.org/ibc2018**

## WiB: decision made!

The respective WiB study missions of the Commercial and Technical Modules delivered their reports in June 2018, *writes* ***Peter Siebert***, with the Steering Board (SB) endorsing their recommendations not to continue activity in this domain.

WiB, standing for Wideband Re-use 1, was seen as a candidate technology for a next generation terrestrial transmission system. This new technology promised to cut CAPEX and OPEX by reducing the transmit power while at the same time increasing the capacity of the overall network.

The technical study mission confirmed these promises in part: yes, the transmit power can be reduced drastically, however, there was not such a clear result when it came to adding capacity. Depending on the underlying network architecture and boundary conditions, WiB could either increase or decrease the overall capacity. It was also observed that WiB must be introduced in a wide area simultaneously, with no other terrestrial services at the boundaries. With DTT already on air in many countries, this is a highly unlikely scenario.

The report of the commercial study mission concluded that there was not sufficient commercial interest to go ahead with WiB. The SB agreed that WiB didn't constitute sufficient reason to start developing a new DVB terrestrial system.


The WiB study missions of the Technical and Commercial Modules were ably led by, respectively, Chris Nokes (BBC, left) and Peter Barnett (on behalf of Ericsson).

PCM Chair Helmut Stein kept a tight rein on the opening session, seen here inviting questions for NAGRA's Laurent Piron, who spoke about forensic watermarking.


IRT's Martin Schmalohr led the pre-conference masterclass, a deep dive into media streaming protocols and formats.

Graham Mills (right), attending his final DVB World as CM chair, with CM-WIB chair Peter Barnett.



Muriel Deschanel (b<>com) provided an update on DVB's work around multicast adaptive streaming.

Chair of the DVB Project, Peter MacAvock

# Warmly welcomed in Warsaw

More than 150 people attended DVB World 2018 last March at the InterContinental Warsaw. The conference offered two and a half days of presentations, with plenty of debate and discussion on the future of media delivery and the role that DVB should play. Here are just a few snapshots – we hope to see you in Dublin next year (11-13 March).

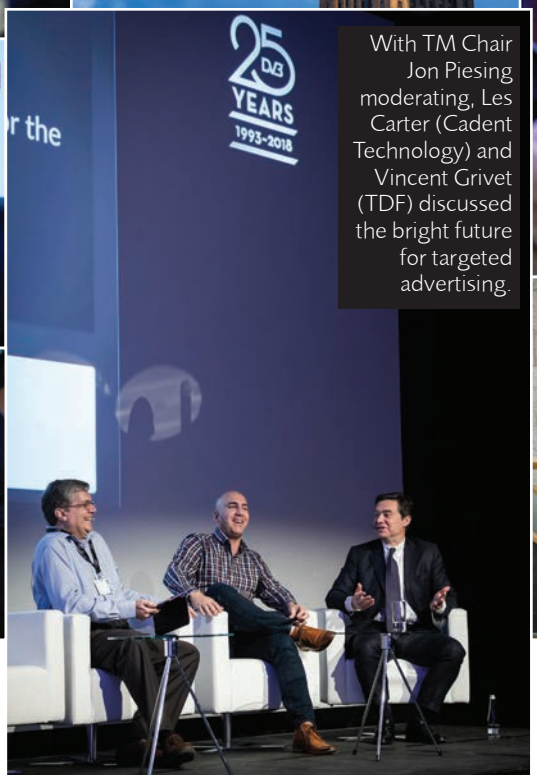

Many delegates were proud to earn their "official" vodka taster certificate!

Who better to set out the lessons learned in DVB's first 25 years than opening keynote speaker Ulrich Reimers?

Just across the road from the venue, Warsaw's magnificent Palace of Culture and Science provided an eye-catching backdrop; the blue skies were welcome too!

Synchronicity.


Sky's Stephan Heimbecher outlined the broadcaster's plans for the shift to UHD.




With TM Chair Jon Piesing moderating, Les Carter (Cadent Technology) and Vincent Grivet (TDF) discussed the bright future for targeted advertising.

DVB and HbbTV: the best of friends! Stan Baaijens (Funke), incoming chair of the DVB PCM and Angelo Petazzi (Mediaset), chair of the HbbTV Marketing & Education Group.

The Grand-Saconnex delegation: David Wood, Peter Siebert, Eva Markvoort, Frans de Jong, Désirée Gianetti, Peter MacAvock and Eoghan O'Sullivan. The DVB Project Office team ensured the smooth running of the conference, while the EBU's Frans de Jong provided an entertaining review of the state of subtitling technology.

All photos by Tomas Hercog

# Turning the ship around

## DVB's chair on the future of the organization.

**Peter MacAvock**
Chair, DVB Project

We have reached a point where each new application sees the establishment of a new body to provide the framework in which to gather requirements, profile technologies, specify some of these, provide tools for interoperability and then move to implement.
Why? Speaking for a moment as a representative of an organization (EBU) that must follow all these bodies to make sure that broadcaster requirements are included, I'd much rather have all the stakeholders in one group and then work on the different applications in that structure – with one membership fee.

The problem is – as always – people. Although the same companies are often involved, those active in one organization may not be involved in another. Looking around DVB, I see the same faces attending our group meetings. Sometimes their companies change, but encountering new people actively contributing to our work is rare. And yet their own companies have fostered the creation of similar organizations elsewhere to cover a specific topic, e.g. VR, DASH, etc.

### HIGHER LAYERS

The 'user experience' we all seek to define is moving further up the OSI stack. Black-and-white TV sets linked broadcast TV channel selection to switching VHF frequencies – physical layer channel selection. This has moved to the remote control, and now is done via some form of application running on the receiving device. So, the reliance on the physical layer to determine user experience has been replaced by an ever-increasing reliance on software development.

This change has far-reaching impact on the organizations that gather stakeholders together to work on common technologies. Specifying the physical layer involved traditional standardization and big-industry engagement to fund the substantial development costs for the technologies and the silicon. Contrast that with open source software, where contributions can be made by anyone with a computer at home, and communities of thousands of contributors across continents and employers are common. This brings a different philosophy of how you go about developing applications, releasing them, testing them, etc. And what of the role of traditional standardization? Is there any?

Luckily DVB's forefathers – some of whom are still involved by the way – thought of this and insisted that DVB was a "pre-competitive, industry-led, specification body working through consensus". DVB outsources its actual standardization to competent SDOs like ETSI; it retains the flexibility to shape itself to best suit the purpose of producing specifications. So – at least in theory – DVB could adopt a new philosophy and a new approach if that would better address industry needs. The problem then centres on how you turn around an organization composed of hundreds of companies, and their representatives, who are happy doing what they are. Hmmm.

### DVB TOMORROW

Although I am one of those dinosaurs around since the start of DVB, in 2016 when I agreed to stand for election to chair DVB, I did so on the basis that change was required at different levels in the organization. It will be hard to turn the ship around, but DVB's heritage says we should try. DVB-I is all about bringing the linear TV experience to OTT. For this to work, fundamental changes must come to the way DVB does its work: working on interoperability, using open source tools and development techniques, permitting more failure, etc. Profitable OTT today is the preserve of very few organizations, and for it to become mainstream, substantial technical work needs to be done right through the delivery chain to minimize the cost, maximize the interoperability, and augment the user's experience. DVB won't develop OTT from the ground up, as it did with other technologies, for the reasons I outlined above, but it will play its part.

SOMETIMES THEIR COMPANIES CHANGE, BUT ENCOUNTERING NEW PEOPLE ACTIVELY CONTRIBUTING TO OUR WORK IS RARE. AND YET THEIR OWN COMPANIES HAVE FOSTERED THE CREATION OF SIMILAR ORGANIZATIONS ELSEWHERE TO COVER A SPECIFIC TOPIC.

**Peter MacAvock** is the chair of the DVB Project. He has been Head of Delivery Platforms and Services in the EBU Technology & Innovation Department since 2008. He was Executive Director of DVB from 1994 to 2008.

Streaming of live sports events is one use case that benefits from low latency.

# Decreasing the delay in DVB-DASH

Viewers watching live video content over the internet today tend to see pictures that are delayed by tens of seconds. To allow for reliable viewing over the wide range of internet connections that viewers use, video streaming clients such as DVB-DASH players tend to hold a large buffer of media to maximize the chance of playing without interruption even when the network throughput fluctuates.

Also, for efficient encoding and distribution, media streams using HLS or MPEG-DASH use 'segments' of several seconds duration and today these can be output from the encoder only when they are complete, adding further delay.

## NEED FOR SPEED

While for some content and services, the high latency of internet delivery is not of great concern, there are many use cases where it becomes problematic. One example would be someone watching a football match over IP, next door to someone watching the same match over broadcast. Overhearing their neighbour's reaction 30 seconds before they see what has happened limits their enjoyment of the match.

Viewers may also be keeping an eye on social media feeds while watching a live event. If their viewing is significantly delayed, they may find out what's going to happen before they see it and will also find it difficult to participate in discussions with others who are at the event or watching with less delay.

Content providers are also seeking to combine the efficiency of broadcast distribution with the personalization that internet distribution can offer. Examples include insertion of a local news programme into a national broadcast news channel, and synchronized companion screen services. When these require a combination of broadcast media and live IP-delivered content (as opposed to on demand) this can be very challenging while broadcast and internet distribution latencies differ significantly.

With these and other use cases in mind, DVB has defined commercial requirements for a revision of the DVB-DASH specification to add support for low latency delivery. Technical work is now progressing within TM-IPI.

## TECHNICAL CHALLENGES

Low latency delivery over the internet will not be possible for all viewers from day one. Viewers across the world have internet connections with very different characteristics and performance. There is a fundamental trade-off between latency and reliability and for many viewers, substantial buffering is still required to avoid unacceptable frequent pauses. However, the time is right to be working on a low latency solution. The performance of domestic internet connections is improving year on year and we expect low latency services to be practical for a significant proportion of homes by the time the specification is finished and devices that support it become available.

The key technical challenges to lowering the latency are firstly to allow content to be more progressively delivered through the network, allowing clients to receive video and audio with a minimum of delay while still allowing for efficient distribution. Experts within TM-IPI are evaluating approaches such as shorter segment durations and progressive delivery of segments using HTTP chunked transfer encoding. Clients need improved algorithms to maintain reliability with limited buffering, and parity with broadcast delivery also requires fast random access. Finally, backwards compatibility is a key consideration as producing a second set of streams for low latency clients can be prohibitively expensive.

The group is collaborating with the DASH Industry Forum on technical solutions as well as on approaches to testing and hopes to complete the technical specification by Q1 2019.

BACKWARDS COMPATIBILITY IS A KEY CONSIDERATION AS PRODUCING A SECOND SET OF STREAMS FOR LOW LATENCY CLIENTS CAN BE PROHIBITIVELY EXPENSIVE.

**Chris Poole** is a lead research engineer with BBC Research & Development, where he has worked on digital, interactive and IP television systems since 1998. He is a member of the DVB TM-IPI Task Force developing a specification for Low Latency DASH.

# 25 years, 25 people, 25 words

TO MARK AND CELEBRATE THE FIRST QUARTER CENTURY OF THE DVB PROJECT, WE INVITED THE WIDER DVB COMMUNITY – MEMBERS AND NON-MEMBERS, ACTIVE AND RETIRED – TO SEND US A 25-WORD SUMMARY OF WHAT DVB HAS MEANT TO THEM, WHETHER PROFESSIONALLY OR PERSONALLY.

"DVB provided the opportunity to help introduce leading-edge technologies to many parts of the world, to work with brilliant technologists and make some lifelong friends."

JOHN BIGENI, FORMER DVB ASIA-PACIFIC REPRESENTATIVE

*"DVB provides a forum where I can join together along with critical friends, to expertly develop ideas to make television better, with a global impact."* SIMON GAUNTLETT, DOLBY

"In a short quarter century, DVB enabled the transition to the digital era for TV. We can be collectively proud of this peaceful revolution!"
GÉRARD FARIA, FORMERLY SB REPRESENTATIVE FOR TEAMCAST

"THE BABY BOOMERS ENSURED THAT OUR FIRST QUARTER CENTURY WAS A SUCCESS; NOW LET'S GET THE MILLENNIALS ON BOARD TO DEFINE NEXT GENERATION DVB DELIVERY!"

EVA MARKVOORT, DVB PROJECT OFFICE

**"DVB's tremendous success stems from its excellence in combining commercial and technical acumen with an atmosphere of trust, fairness, sincerity and humour. Happy birthday, DVB!"**

REBEKKA PORATH, INTEL

"DVB standards allow television transmission on amateur radio to flourish despite spectrum reallocation, whether from the ISS, locally or later this year from geostationary orbit."

CHARLES BRAIN, AMATEUR RADIO SOFTWARE DEVELOPER

*"I am proud to have been involved in the DVB Commercial Module's initiation of UHD, DASH, ABR Multicast, Targeted Advertising and VR 3DoF."*

THIERRY FAUTIER, HARMONIC INC.

**"DVB has changed the television experience for the better, benefiting millions of people around the world. It's been a pleasure to be part of that community."**

GRAHAM MILLS, FORMER DVB COMMERCIAL MODULE CHAIR

"**D**ozens of **V**aluable **B**uddies! We've grown together and significantly changed the world of video broadcasting and consumption! Thank you all so much and HAPPY ANNIVERSARY!"

THORSTEN HERFET, SAARLAND UNIVERSITY

"After the pork-barrel politics and fiasco of HD-MAC, DVB was the exciting club for those intent on creating new possibilities for television, primarily pay-TV and satellite operators."

ERIK LAMBERT, THE SILVER LINING PROJECT

**"25 years = my professional life, which has run in parallel to DVB's, planning DVB-S, DVB-T and DVB-T2 services. Looking forward to the next 25!"**

ELENA PUIGREFAGUT, EBU

"For 25 years, DVB has developed high quality standards that meet customer expectations, and this drives me to convince business colleagues worldwide to join DVB."

STAN BAAIJENS, FUNKE

**"A most satisfactory professional experience… but, in 2014, a letter: 'I had a perfect 25-year-old analogue television – now I must buy a digital one. Shame on you!'"**

ALBERTO MORELLO, RAI

"The stuff that dreams are made of. Krystyna and I managed the DVB Project initially. Original idea? John Forrest and others. Greatest contribution? Ulrich Reimers" DAVID WOOD, CONSULTANT

"It is always a pleasure to attend DVB meetings or events in a friendly atmosphere with a very skilled and knowledgeable community." CHANTAL BONARDI, ETSI

"I am happy that I could help to orchestrate a successful transition from old analogue television towards the new digital DVB era of entertainment (HD)TV."
DIETRICH WESTERKAMP, FORMERLY SB REPRESENTATIVE FOR TECHNICOLOR

*"Our IPR policy amended DVB's initial MoU. It contained novel elements: "negative disclosure", arbitration, pool fostering. It's held up well: pools for leading standards, zero arbitrations."* CARTER ELTZROTH, DVB LEGAL DIRECTOR

"The outstanding element was DVB's economical basis driven by market and business needs. The consensus principle has often made developments difficult but also safeguarded their success"
GEORG LUETTEKE, LUTEK:TC

*"For me, a co-founder of DVB and chairman of the Technical Module for 20 years, DVB was the place to enjoy success and indeed fun"*
ULRICH REIMERS, TECHNISCHE UNIVERSITÄT BRAUNSCHWEIG

25 DVB YEARS 1993–2018

"At DVB I learned large scale collaboration before it was fashionable. Our success is that normal people have no idea how complicated digital TV is."
PAUL BRISTOW, OPEN INNOVATION CONSULTANT

*"Structuring the broadcast world means giving a face to the technical framework for TV-technology-oriented and broadcast-centric companies. DVB is this face, by-the-way a friendly one!"* SVEN REUTER, STELLA COM

*"DVB means developing technology that improves the delivery of entertainment and information to over a billion people, through working with great friends on great challenges."*
KEVIN MURRAY, CISCO

*"DVB, MoU, Peter Kahl, Transport Stream, ATSC, ISDB-T, Ulrich Reimers, coffee break, Peter MacAvock, Common Scrambling, Theo Peek, temperature-taking, T2, Phil Laven, Project Office, Geneva"*
HELMUT STEIN, ISDM

"DVB has been integral to life for most who work in the TV ecosystem. It's a good example of the industry working together for success"
ADRIANA MATTEI, ZETACAST

"In a melting pot of ideas, opinions and interests, the cornerstone of DVB's foundations – consensus – always prevailed and very significant contributions to digital broadcasting emerged."
SHEILA CASSELLS, FORMERLY CHAIR OF THE DIGITAL INTEROPERABILITY FORUM (DISBANDED)

# Bringing enhanced protection to CI Plus


CI Plus is a technical specification that adds additional security and other features to the proven DVB Common Interface standard. Compatible consumer electronics (CE) devices can access a wide range of pay TV services wherever CI Plus technology is supported by the local provider. A new enhanced security level has now been added.

## 600 MILLION DEVICES

CI Plus LLP, the Trust Authority for the CI Plus standard, is celebrating ten years of operation. CI Plus technology is in use by more than 100 pay TV operators in 37 countries, involving 110 CE manufacturers and more than 600 million CI Plus certified devices, mainly in Europe, but also in Asia and South Africa.

Since the CI Plus V1.3 specification (the last to be defined by CI Plus LLP), the specification has been defined by DVB. The DVB CI Plus V1.4 specification has been profiled by CI Plus LLP and supporting it is mandatory for any new device registered since 15 September 2017.

The revocation of devices in breach of the CI Plus License Agreement is an essential matter for CI Plus LLP. In that respect, we have mandated the support of the revocation mechanism for new Conditional Access Module registrations since July 2017. In parallel, we are working with operators on the definition of a new Content Distributor Agreement with the common objective of providing an addressable market for pay TV based on horizontal market products, recognizing the interests of both ends of the value chain.

## ENHANCED PROTECTION

At the DVB World 2018 conference, we officially announced the launch of the CI Plus Enhanced Content Protection (ECP) security level, designed to meet the requirements of MovieLabs, the technology lab of the main Hollywood studios. We are actively engaged with studios and other stakeholders to enable the use of CI Plus ECP for the distribution of content requiring enhanced protection, including UHD content.

CI Plus LLP has appointed security experts from Trusted Labs for the definition of a CI Plus ECP security analysis, including robustness considerations, attacks and countermeasures. We have also updated the certification regime and test tools to ensure the compliance of registered devices with the ECP specifications. A CI Plus ECP logo has been defined to facilitate visual identification of a device registered under the CI Plus ECP security level.

For ECP device certificates, the SHA-1 hash algorithm is replaced by SHA-256 and therefore a new root of trust, namely the CI Plus 2nd Root of Trust, has been established. ECP products using SHA-256 certificates will be deployed in the market alongside current CI Plus products using SHA-1 certificates. We have shared with licensees a transition plan that enables the interoperability of CI Plus ECP devices with legacy devices for as long as needed by the market.

The documentation related to CI Plus ECP is available from the CI Plus LLP website (www.ci-plus.com). Additional documentation about the CI Plus ECP registration process is available from the CI Plus Trust Center website (https://knowledge.digicert.com/generalinformation/device-certificate-services-documents-for-ci-plus.html). Registration of ECP products is possible since June 2018.

CI Plus LLP is positive about the DVB CI Plus 2.0 specification (with a USB form factor) and sees it as a natural evolution of CI Plus, subject to market demand. The current CI Plus Trust Authority can be extended to support deployment of the DVB CI Plus 2.0 specification. We are evaluating the extension of the current regime to support it; we will have ongoing communication with licensees on this topic and will share progress with the wider market when appropriate.

AT THE DVB WORLD 2018 CONFERENCE, WE OFFICIALLY ANNOUNCED THE LAUNCH OF THE CI PLUS ENHANCED CONTENT PROTECTION (ECP) SECURITY LEVEL, DESIGNED TO MEET THE REQUIREMENTS OF MOVIELABS, THE TECHNOLOGY LAB OF THE MAIN HOLLYWOOD STUDIOS.

**Nicolas Stefanelli** is the chair of CI Plus LLP and has represented Neotion in the organization since 2012. With more than 13 years of experience in digital television and security, he is currently in charge of Strategic Partnerships at Neotion.


# What's cooking in the subtitling kitchen?

Broadcasters are like restaurants. The dishes they serve include audio and video as the meat, with subtitles as a popular – sometimes mandatory – side dish.
The EBU, DVB and other organizations create recipes. They allow the chefs in broadcasters' kitchens to create and serve great food. But what does the subtitling cookbook look like?
The basic recipe for subtitling goes back to the 1970s. The introduction of analogue Teletext allowed the serving of closed subtitling, which means the viewer decides if he wants to see the subtitles or not.
The system was revolutionary in its day. Industry veteran David Wood was one of its first users and remembers how the eight colours and double height characters made US colleagues jealous. In 1991 the EBU published the STL format, which made it possible to exchange subtitles in production. It became a big hit and the number of STL files stored in broadcast archives around the world is probably in the millions. The format is still in use today. Over time it got 'extended' by implementers.

Three years later ETSI published the DVB Teletext spec, that allowed for subtitles to 'go digital'. Receivers could simply pass Teletext through in VBI or render the received subtitles with (their own) fonts. A real innovation was the invention of 'baked subtitles' at the end of the 90s. The DVB Subtitling recipe provided broadcasters with more presentation certainty, because the subtitles are sent as high-quality bitmaps. Both DVB Teletext and DVB Subtitling are still in use today.

## HAUTE CUISINE

2010 marked the arrival of an *haute cuisine* recipe for subtitling: W3C's Timed Text (TTML). The analogy is fitting, because compared to the previous standards, this recipe is rather complex and allows for extravagant presentation. The EBU saw TTML as a way to improve HDTV and file-based production workflows and in 2012 published a broadcaster-oriented version of TTML, namely EBU-TT. Replacing STL with EBU-TT could be compared to installing a new kitchen, however we realized that restaurants had a more pressing need for subtitle *delivery* recipes, especially for streaming. So the EBU created the smallest profile of TTML that is internationally standardized: EBU-TT-D (the 'D' for Distribution).

In the meantime, several other bodies had defined their own new subtitling specs. Common sense and the arrival of a new restaurant chain that delivers to the home on demand (Netflix) resulted in the IMSC 1.0.1 profile becoming the convergence point of most of these. It has been adopted in MPEG CMAF, IMF, on iOS, in ATSC, DVB TTML, HbbTV and Freeview Play. (For the latter two, via EBU-TT-D, which is a subset of IMSC.) The main exception is WebVTT, which may be best compared to street food; looks simple but is harder to cope with than you may think.

## DVB RECIPES

DVB cooks have followed all these kitchen innovations and added to their own cookbook, both by updating the image-based DVB Subtitling spec to UHD (including HDR and Wide Colour Gamut) and by creating a new recipe: text-based DVB TTML Subtitling. The latter fits especially well with the EBU-TT-D/IMSC progression in the rest of the food chain.

With all this in place, the focus will now move upstream, from subtitling delivery to subtitling production. Many parts of broadcasting facilities are still constrained somewhere in the chain by the Teletext/STL legacy. We can expect this to change when the cooks start to look for new equipment that is designed with the latest recipes in mind.

**Frans de Jong** has worked in the EBU Technology & Innovation Department since 2003, focusing on production technology topics, such as (U)HDTV, System Integration, Quality Control, Loudness and Access Services. He holds a Master's degree in Information Theory from Delft Technical University.

# TV broadcasting in India: a vast market with vast potential

More than 800 DTH TV channels are currently operating in India, including more than 60 twenty-four hour news channels. Public broadcaster Doordarshan (DD) has around 50 channels, both terrestrial and DTH. DD's analogue terrestrial TV viewership is reported to vary from around 5% to 11%.

All the commercial TV operators are said to be losing money, with prominent brands among them. Only the stakeholders in the carriage area – cable, DTH satellite and teleport operators – are said to be making profits in this horizontal chain.

## DTH VERSUS DTT

Until last year, a debate raged among media policymakers as to whether DTT should be implemented at all, given the powerful presence of DTH and cable and their access to the majority of TV households. Rationally, one could understand a decision not to proceed, given the huge monetary savings that could accrue if DTT were not implemented in such a vast country.

However, in parallel, DD has been building capacity in its transmission network with the installation of a substantial number of DTT transmitters. And, rather quietly, lower power analogue transmitters have been shut down in many parts of the country. This is just an analogue to digital transmitter replacement with no effort invested in digital TV programme production. There is, as yet, no publicly declared exit policy for analogue terrestrial TV.

## NEW FOCUS

The focus shifted after the Telecom Regulatory Authority of India recommended to the government that the commercial TV operators be allowed to operate DTT services. Following this, policymakers have been discussing whether commercial operators should be accommodated in the DTT multiplexes. More importantly, it seems highly probable that DD will be asked by the government to open up its DTT network for this purpose on a carriage payment basis. It is expected that around 50 DTT services will enter into operation in the next few years. This is a watershed idea. It means that around 100 million fixed receivers will be targeted. If it materializes, DTT in India will proliferate, with both public and commercial broadcasters vying for DTT eyeballs.

Broadcast-mode mobile TV is still being pushed. Though it is a a green-field area in India, mobile TV technology has great business potential. The best way to approach mobile TV is for the broadcasters to enter into joint ventures with parties across the industry.

## WHICH TECHNOLOGIES?

Such is the explosive potential of DTT with the associated uptake of DTV sets for a country with the customer base size of India, it is imperative that efficient and modern technologies be employed by the emerging Indian DTV industry to maximize cost and capacity benefits. Relevant technologies should, therefore, be included in the specifications for DTT broadcasters and also of the Bureau of Indian Standards.

Using non-proprietary technology (open standards) for video and audio compression (coding) is always beneficial during the development phase. Such use provides substantial business benefits in terms of gains through higher efficiency, better performance, future-proof avenues for progression, open licensing and easy availability of devices.

As an example, HEVC (H.265) video compression should be employed for DTT (instead of MPEG-4), doubling the channel capacity in the same spectrum (mux). This technology will have a lifespan of around 10 years from now. A comparable modern audio compression technology should also be employed.

**Sharad Sadhu** has worked in the media industry for five decades. His roles have included Director of Technology for the Asia-Pacific Broadcasting Union and Director of Engineering for Doordarshan, India. He now works as a consultant on broadcasting and spectrum issues, including for the ITU.

*The views expressed in this short article are those of the author and do not represent the positions of any of the organisations he is associated with.*

# BROAD CAST/BAND?

# Moving beyond the broadcast vs broadband narrative

Nearly all broadcasters, in one way or another, are making the transition to IP whether it be in production workflows or in distribution. Ultimately all will need to get IP-delivered content to consumers.

So, to IP or not to IP is not really the question. The question is when and how do broadcasters make use of IP delivery to their viewers. Assuming the status quo is not a reasonable option, there are two options to consider: switch from broadcast to unicast; or implement a hybrid system.

## STREAMING CHALLENGES

Making a wholesale switch from broadcast to unicast is viable, but is akin to throwing the baby out with the bathwater. To leave behind the benefits of fat pipes and the inherent efficiency of broadcasting at a time when the streaming of high-quality video is so challenging would be shortsighted. The insatiable appetite of video consumers suggests that broadcast and unicast must coexist for some time.

And, yes, some broadcasters have adopted IP over their pipes, or have licensed content to 'skinny bundle' services distributed over the internet. Some of it is to test new technology and new business models and some of it is to maximize revenue by licensing content over all distribution methods. But this activity is not being done to the exclusion of broadcasting. Network crashes, automated picture degradation and frequent pixelation for real-time live popular events delivered over the internet illustrate why broadcasters are most trusted to deliver this type of programming.

This compels broadcasters to adopt a hybrid solution(s). Combining the best of both distribution worlds into a hybrid scenario is an obvious desire but can be as complex as it is desirable. The earliest and least complex efforts come from the consumer-receiver side, where STBs include reception of broadband- and broadcast-delivered content. The HbbTV standard, which provides for a common STB interface for both transmission types, has met with some success. Also, DVB efforts are under way for developing DVB-I, a new set of specifications that promises to bring a broadcast-like user experience for content delivered over the public internet. And some traditional pay TV suppliers now recognize they must provide popular internet-delivered services to their customers, with Netflix and more recently Amazon Prime Video available within the cable infrastructure.

## MARRYING IP & TERRESTRIAL

DTT broadcasting presents its own set of challenges for offering a hybrid service. Apart from the 'HbbTV method' and the development of internet-delivered TV service through companion mobile device apps, there is the marriage into a single delivery system of IP and terrestrial delivery.

The step beyond separately broadcasting and unicasting is to do both in one system. Development of such a system is new and not yet fully tested in commercial deployments. A handful of terrestrial broadcasters (in the USA and South Korea) are testing applications enabled by the new ATSC 3.0 standard that make use of IP distribution once the content is received from a terrestrial transmission. The idea is to prepare content so that it can be broadcast and travel over public IP networks, as well as to give broadcasters the tools to do targeted advertising and programme delivery. DVB is also working on solutions for targeted advertising.

The idea that viewers make a binary choice between broadcast and unicast services is an overworked narrative. Today, most viewers get TV both ways. Tomorrow, combining broadcast and unicast in a way that is seamless to viewers is where broadcasters will be.

THE IDEA THAT VIEWERS MAKE A BINARY CHOICE BETWEEN BROADCAST AND UNICAST SERVICES IS AN OVERWORKED NARRATIVE. TODAY, MOST VIEWERS GET TV BOTH WAYS.

**Myra Moore** is president of DTC, a boutique market intelligence firm that analyses the worldwide consumer digital TV market and aids TV providers in transitioning to next-generation technologies.

# Why did DVB-C2 remain on the runway?


The development of the DVB-C2 specification closely followed DVB's tried and tested processes: commercial requirements (CRs) were drafted, taking into account the requirements of all relevant stakeholders. Several European cable operators asserted in writing their intention to implement DVB-C2. The technical group, under the chairmanship of Christoph Schaaf, provided an excellent technical specification, complemented by an equally comprehensive guidelines document.

Equipment manufacturers were eager to support the new specification – as soon as the draft specification was stable, interoperability was tested and confirmed in various plugfests. Chipset providers integrated the new solution in their silicon and it is fair to say that, very soon after its publication, the complete DVB-C2 value chain from the headend to the receiver was available. However, the operators ignored the new specification and continued to use DVB-C!

## BUILDING ON SUCCESS

Let's rewind for a moment: DVB's first-generation delivery standards had been hugely successful. DVB-S, DVB-C and DVB-T were used by countries and operators throughout the world to introduce digital broadcast television. DVB-C became the de facto standard worldwide, with the exception of North America, where CableLabs' DOCSIS (Data over Cable Service Interface Specification) was dominant. China remains a major user of DVB-C, using it to deliver TV services to around 160M households.

With DVB-C having been so successful, it was natural that DVB would provide a second-generation cable system, to emulate the success of DVB-S2 and T2. So, why did the cable operators not implement DVB-C2, which promised significantly increased spectral capacity for cable networks? At that time HD resolution was the new kid on the block. It was assumed that DVB-C2 with H.264 would be the enabler for HD in cable. There are basically three reasons why this did not happen:

1. Cable operators – and their shareholders – required a faster return on investment than would have been achieved by replacing DVB-C STBs with the newer version. Instead, to overcome bandwidth bottlenecks, they preferred node splitting.
2. There was no real killer application. Since the introduction of DVB-C, the quality of cable networks had increased sufficiently to allow the use of 256 QAM instead of 64 QAM. The resulting capacity increase was sufficient to support a seamless transition for HD signals delivered by DVB-S2 into the cable channel.
3. The unanticipated success of OTT.

And so, DVB-C2 did not take off.

## DVB AND CABLE

In the meantime, DOCSIS, with its inherent interactive capabilities, became the established cable system for Layers 1, 2 and 3 (physical, Ethernet and IP). This does not mean that DVB's involvement in cable has ended. Aside from our active liaison with CableLabs, we are working on several specifications which are positioned above the IP Layer and will improve OTT delivery, including on cable networks. Adaptive Bit Rate (ABR) Multicast will bring multicast scalability in bidirectional IP networks, while Low Latency DASH (see page 7) will reduce the delay experienced by those watching live content, more closely matching the performance of broadcast systems. These specifications are part of the overall DVB-I (Internet) work package, that aims to bring a broadcast-like user experience to OTT delivery.

In the March 2011 edition of DVB Scene, I wrote the following: "I am positive that DVB-C2, like its two older siblings S2 and T2, will revolutionize the way video, as well as data, is delivered via cable systems." I was not the only one who got it wrong! However, I am convinced that our work on developing DVB-C2 was valuable for the industry as a whole and I know that DVB learned from the experience. Onwards and upwards!

WHY DID THE CABLE OPERATORS NOT IMPLEMENT DVB-C2, WHICH PROMISED SIGNIFICANTLY INCREASED SPECTRAL CAPACITY FOR CABLE NETWORKS?

**Peter Siebert** is Head of Technology for the DVB Project. He joined DVB in 2009, having previously worked with Philips, SES and Siemens, in a career that has spanned all aspects of audio-video technology including video transmission over telecommunication networks, satellite and IPTV networks.

A demonstration of the HbbTV OpApp specification was presented by TNO on the DVB booth at TV Connect 2018 in London last May.

# The beginning of the end for the STB?

More and more TV viewers are able to access content through apps on their smart TV. In the Netherlands, already half the population has a connected smart TV[1]. So why do operators still use set-top boxes (STBs)? It should be possible to dump that brick, and to provide services – linear and on-demand – straight to an attractive app running on the TV set.

## STB-LESS TV?

The ability to access content on a TV without the need for an STB offers many advantages. For consumers, it means freedom and flexibility. No hassle with cables, no provider lock-in, no external box and no limitations associated with a legacy box when you buy a new TV. With millennials in mind, STB-less operation allows for easy signup and cancellation, like they are used to on other devices.

To offer these benefits, TV operators need a way to deliver linear TV directly to the smart TV. As operators are already moving functions to the cloud, replacing the STB with an app is an obvious way forward. Obvious, but not that simple. The STB has two major advantages that are relevant in this context: it works with all TVs, and services available on the STB can be easily accessed via the TV input source menu – users do not need to navigate through app selection interfaces. A virtual STB should offer the same advantages.

In contrast to a regular smart TV app, a virtual STB needs to appear as an input source, to make access to live TV services as convenient as accessing these services via an STB or direct-to-TV DVB-C.

There is another challenge in getting operator apps to work as a virtual STB. In Europe alone, there are hundreds of TV operators, and thousands of different TV models. For operators, it is impossible to develop an app for each platform. For TV manufacturers, it is complex to manage tens of different applications with specific requirements in different geographical regions.

1 extrapolated from SKO figures sko.nl

AS OPERATORS ARE ALREADY MOVING FUNCTIONS TO THE CLOUD, REPLACING THE STB WITH AN APP IS AN OBVIOUS WAY FORWARD.

## HBBTV OPERATOR APP

The HbbTV Operator Application (OpApp) specification addresses the challenges mentioned. Building on the widely implemented HbbTV specification, it enables deployment of a single app across multiple TV platforms. It specifies aspects like discovery, installation, the user interface and accessibility. It covers the use of remote control keys and the app-as-a-source behaviour. The standard has recently been published by HbbTV and ETSI, in time for TV manufacturers to adopt the technology in their 2019 and 2020 models. From that moment on, HbbTV OpApps have the potential to work on all TVs and truly act as a virtual STB.

Early in 2018, KPN in the Netherlands conducted a first proof-of-concept (PoC) to verify the feasibility of an HbbTV OpApp. The PoC showed that it was possible to quickly develop an 'app-as-a-source' virtual STB, and for KPN it provided evidence that HbbTV OpApps are a solid foundation for STB-less TV services. The PoC also underlined that cooperation between TV manufacturers and operators remains essential, as the HbbTV OpApp spec assumes that the operator and the TV manufacturer agree bilaterally to cover various deployment aspects.

Several IPTV and satellite TV providers in Europe are now developing PoCs and commercial products in cooperation with leading TV brands. We expect to see the results of these efforts at major trade shows. All these tests are a first step towards new STB-less TV propositions that might come to the market soon.

**Teun van der Veen** (left) is senior consultant in the Networks department at Dutch research and technology organization TNO. He is team lead in Media Networking, across R&D projects in the Dutch and European telecom markets. **Martin Haselhoff** is product owner of KPN Telecom's Navigation Squad, which is responsible for the overall vision of KPN TV and explores new product concepts, features and technologies.

WORK MICROWAVE

Over 30 Years Experience

# Leading Global Satellite Communications

## Bandwidth Beyond Ka-Band

4 Channel V-Band Upconverter

Q/V-Band available to order today!

Full range of Frequency Converters designed to support the next generation of HTS/UHTS systems.

## Maximum Capacity for HTS/UHTS

A-Series AX-80 Modem

All-IP Platform designed to support ultra-wideband transponders up to 500 Msps.

First end-to-end transmit and receive solution on the market!

WORK Microwave devices are deployed by operators worldwide to support a range of broadcast and data applications in satellite communications markets, including HTS/UHTS, SNG/contribution, direct-to-home, IP networking, government and defence, and more.

Learn more at **www.work-microwave.com**

DVB S2X