

MEDIA TECHNOLOGY & INNOVATION

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tech



What's all the fuss about HbbTV?

Plus

- THE ADVANTAGE OF IMF
- ACCELERATING DIGITAL RADIO ROLL-OUT
- CREATING A RECOMMENDATION PLATFORM

and more...

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- 2 What's the buzz?
- 3 Editorial
- 4 RadioHack & Digital Radio Summit
- 5 Moving online at BroadThinking
- 6 Future content trends
- 7 DAB+ has taken over
- 8 Live & IP
- 10 In my opinion
- 11 What's all the fuss about HbbTV?
- 12 IMF: a solution for broadcasters?
- 13 The advantage of IMF as a service master
- 14 Creating a recommendation platform
- 15 HbbTV and linear enrichment
- 16 Accelerating digital radio roll-out
- 17 Future advanced techniques for spectrum
- 18 Latest news from ABU & DVB
- 19 'Go West' Fact finding mission & In the spotlight

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NETWORK TECHNOLOGY SEMINAR

21-22 June 2016, EBU, Geneva

Internet technology continues to enhance media production. The EBU Network Technology Seminar is the annual rendezvous for broadcast experts and system designers dealing with IT

infrastructure and IP networks as well as for IT specialists and architects that deal with broadcast media applications. This year's event will look in more detail at the feasibility and concept of using IP live production alongside file-based production. Over the last year we saw the first proof of concepts and a multiplication of plug tests. This year's NTS will highlight these achievements and showcase the accelerated knowledge and live experiences being made with IP. Get up-to-date on the latest concepts, technology and fresh content at this two day event.

<https://tech.ebu.ch/events/2016/nts>



DEVCON

01-02 November, EBU, Geneva

This year will mark the third anniversary of our annual EBU Developer Conference. A unique opportunity to learn more about best practices in software engineering and get hands-on current development

and deployment tools. Participants will brainstorm new ideas for running software-driven broadcast infrastructures and improving engineering workflows. The event is also a great place to meet experts who are addressing similar challenges on a daily basis.

<https://tech.ebu.ch/events/2016/devcon>

EBU @IBC

9-13 September 2016, RAI, Amsterdam

IBC is Europe's largest annual conference and exhibition dedicated to media broadcast technology. As usual, we will be present at this year's IBC Conference with demonstrations, presentations, conference sessions and more at the stand to ensure that public service media remains an important part of the broadcasting agenda and that the EBU is at the forefront of technology and innovation.

<https://tech.ebu.ch/events/2016/ibc>



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"Innovation is a great human adventure. We need to encourage, recognise and applaud our achievements"

Simon Fell, Director, EBU Technology & Innovation

In this issue we are featuring a number of hot topics such as DAB+ which really has traction now as the receivers become widely available. With demand for new channels and improved car radios, growth in the Netherlands was 90% last year. We'll also take a closer look at two IMF case studies to see how this technology is developing, and you'll find the results from our recent fact finding mission to the West Coast of the USA where technology companies shared with us their roadmaps and visions for the future – a most productive tour.

Back to radio, next month sees the launch of the first smartphone widely available from Europe to Australia with a built in DAB+ receiver chip. The culmination of this work began under the 'SmartRadio' initiative. The EBU worked closely with IDAG and other industry partners to develop a modern android phone with the facility to receive DAB+ on the move, and all that is needed is to plug in your headphones. It also streams via Bluetooth – a perfect companion to all those Bluetooth speakers you have lying around; or, more usefully, in a car which has Bluetooth but not yet DAB+.

Innovation is the great human adventure. Broadcasting and media technology have seen many important innovations, developed by our own fine engineers and innovators. In order to encourage,

recognise, and applaud them, the EBU has developed a new EBU Award for Technology & Innovation. EBU Members are currently nominating their candidates and the winners will be announced at this year's Technical Assembly in June 2016. For more information on the Award, please visit: <https://tech.ebu.ch/events/TA2016>. It will be awarded at the Technical Assembly which is being held in Geneva this year from 9-10 June 2016. Entry details can be found on the website: <https://tech.ebu.ch/events/TA2016>. The EBU Technical Committee will act as the judges' panel.

As I write, the hordes are gathering again for this year's NAB in Las Vegas. What themes will we see this year? It seems everything is relevant from drones (now 'Aerial robotics') to connected media IP and not forgetting the obligatory virtual reality. Will we see any certainty on a High Dynamic Range (HDR) standard yet? It also seems that the demand for 4K UHD TV contribution links is growing; our colleagues in Eurovision are getting more demand now on the network, so is this long awaited change beginning to happen? With a summer of sport ahead of us, the killer content for UHD TV, I hope so sooner or rather than later.

Until next time... Simon

EBU'S MATHIAS COINCHON TO TAKE ON NEW ROLE AS CHIEF TECHNOLOGY OFFICER AT RTS

Mathias has been with the EBU for nearly 10 years and has contributed much to the landscape of digital radio and Audio/Video Contribution over IP. He has extensive experience in the media technology sector, has pioneered the use of Open Source software in the EBU, and has been a key developer of Hybrid Radio.

As Peter Mac Avock, Senior Manager, EBU Technology & Innovation said, "Although the Technology & Innovation Department and our Members will be sad to see him go, we are happy to know that he will still be part of our EBU Community at RTS. Mathias will remain with the EBU until late summer, and while he will be hard to replace, we will work together to ensure we retain a high quality of service for EBU Members. We wish him all the best as he takes up this fantastic new opportunity." In his new role Mathias will be responsible for a number of strategic projects in both radio and TV. Mathias will take up his new role in August 2016.

EBU Radiohack

The annual EBU RadioHack event is a set of freeform workshops where developers, engineers and anyone interested in radio can experiment with the newest tools and techniques in digital and hybrid radio. The workshops are designed to have an informal, relaxed atmosphere, allowing participants to develop new ideas for tools and services and to start building them immediately.

As mentioned during the pitch session, “There is no competition. You are encouraged to collaborate, take time, discuss, make contacts, and most of all... create!”

Since last year, a lot of work has taken place. Delegates presented their latest developments to the group and announced what they would try to achieve during this year’s event. Some of the main topics included: SDK for receivers, open DAB transmission, creating an extension to allow geo-location (using a query to get a list of available stations in that region), hybrid and content radio, visual production and more!

Other projects presented included work on service following, DAB transmission with ARM devices, automated chaptering of radio programming, odr-mmbtools and a software defined digital radio receiver. For the rest of the afternoon – and well into the evening – RadioHackers shared experiences, collaborated and well, just hacked.

As the organizer, Mathias Coinchon (EBU) said, “it’s a great place to meet like-minded individuals and learn from one another.”

With nearly 50 “Hackers”, there is no doubt that many more projects will come out of this year’s meeting.



Digital Radio Summit

This year marked the 9th anniversary of the EBU Digital Radio Summit. With 120 delegates, the meeting kicked off with two important discussions: how can we make radio modern? And what’s next for radio in the car?

It is clear that nowadays everyone wants radio anytime and anywhere without hassle. But how close are we to achieving this and what barriers do broadcasters face? In his keynote, Graham Dixon (EBU) introduced how public service media can and do have a big impact on DAB, or as he put it with a twist “Delivering Audience Benefits.”

Richard Robinson (Strategy Analytics) shared some interesting statistics indicating the growing importance for car manufacturers to include digital radio in the car. Interestingly, he noted that data may in fact be of more value to car manufacturers who want to improve their “smart cars” and ensure essential safety features.

In accordance with this, new research was released during the event by Michael Hill (Radioplayer UK) that showed that: “Eight out of ten new car drivers would never consider buying a car without a radio, according to the biggest ever survey of drivers across UK, France and Germany.”

The EBU also recently released its latest Market Report on Digital Radio which offers a progress report of the roll-out of digital terrestrial radio in European markets and, when relevant, other digital platforms.

Delegates had the unique opportunity to hear from EBU Members and the industry as they showcased their developments in the annual proud to present session. Of particular interest was the report from Digital Radio Norway on how they will proceed to switch off analogue services for digital in 2017.

Other key areas of discussion included: how to get digital radio in your phone, the aggregating data, exploiting sports rights using visual radio and more!



Moving online at EBU BroadThinking 2016

SHANNON FRAME, EBU

Internet services are of growing importance for public broadcasters. Audiences are using different types of devices to access media and more media is being delivered via broadband networks. OTT techniques can help public service media continue to reach their audiences on new platforms.

Today's EBU BroadThinking event kicked off with a keynote from Egon Verharen (NPO) on state of the art over the top (OTT) techniques for public service media. He stated that, "Media companies are becoming more IT-centric. In fact, I would say that IT is at the core of what we do today. We are now more data-driven than ever before and we need to be in order to serve new demands from our audiences. When it comes to audience expectations, online is as important as linear broadcasting."

But, a number of challenges

still exist. Although public service broadcasters are moving to IP-based production and distribution, finding the expertise and resources to achieve this is not easy. It was clear in the discussion that EBU Members are part of a race to keep pace with rapidly developing technology. Do we differentiate our services for online and different platforms? Can we provide all our services in HD quality for free? These were some of the important questions raised.

Next on the agenda, delegates from IRT, Qualcomm, Technicolor and Harmonic gave participants overview of DASH profiles, its deployment and how to enhance quality with DASH. We also took a closer look at multicast deployment in an HTTP world.

The day ended with two key sessions: "how to make big data

practical" and "accessibility and security." In line with this morning's discussions, presenters drew attention to the importance of knowing your audience individually and personalizing services for them. The EBU RecSys Project which focuses on examining recommendation services for public service media was outlined in detail as well as player data for CDN analytics and user experiences.

Tomorrow will focus on: HbbTV, the future and OTT player developments. Delegates also have the unique opportunity to access more than 10 technology demonstrations ranging from multi-platform subtitle services, alternative audio production and distribution, sign language translation services, open source media players, virtual reality, HbbTV and recommendation systems.

Future content trends – object-based broadcasting

PHIL TUDOR, BBC

What is object-based broadcasting?

The story of broadcasting is one of providing ever more choice – from a single channel to many, adding bigger picture formats, better sound, and over the last few years providing catch-up services to deliver programmes when the audience wants them. But fundamentally, once the programme is selected, every member of the audience is presented with exactly the same content, until now...

The promise of object-based broadcasting is to be able to provide content experiences that can adapt and be personalised to address each member of the audience individually, by breaking down the content into independent objects, which may be delivered, assembled and rendered as required for the specific context and device.

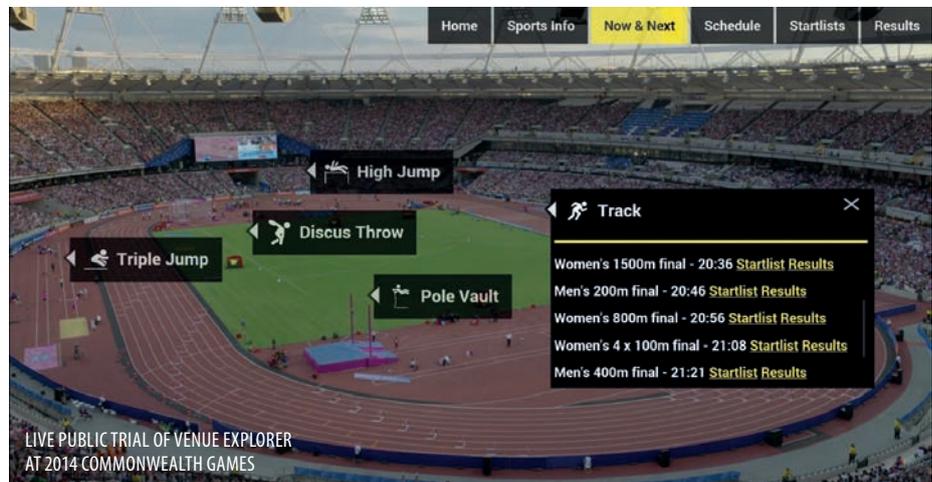
Conceptually, an object consists of media and associated metadata describing what the object is. A particular content user experience is then the product of application software acting on a set of objects. In summary:

Object = Media + Metadata
User Experience = Objects + Application

Why now?

From an Internet perspective, the web has always been object-based – a web page is defined using a markup language which references separate elements by hyperlink, and is rendered for display. With the growth in processing power and development of web-based APIs to manipulate media, this approach is becoming practical to control the presentation of the media itself.

As it becomes possible to “personalise every pixel”, the question for broadcasters is how this



could be used to offer compelling new content experiences.

Exploring the use-cases

BBC R&D has developed a number of prototypes to explore the possibilities offered by object-based broadcasting, both in terms of editorial value and to understand the implication for future IP production and broadcasting infrastructure.

In broad terms, adaptation may cover:

- adaptation to suit the device or system (akin to responsive design) e.g. use of content suited to particular screen size or audio capabilities
- adaptation to suit the presentation environment (e.g. in the presence of background noise increasing dialogue level in the mix)
- adaptation to suit the person (e.g. use of preferred subject matter, selection of version given available time, presentation with preferred accessibility choices)
- full interactivity (e.g. game-like environments allowing exploration within an environment such as a sporting or music event).

In all cases, the aim is to provide high-quality curated experiences in which the adaptation enabled by the particular responsiveness allows an individual audience member to



enjoy a particular version of the content; a version that is one of many.

“Venue Explorer” example: Venue Explorer is an interactive experience, which lets users experience an event or performance as they could if they were sitting in the audience, by zooming and scrolling around a UHD image. Audio is remixed to match the area of view and data explaining the scene can be overlaid. The application uses multiple video objects (separate streams of overlapping tiles for efficient zoom/scroll), audio objects with metadata specifying the area of the scene they are relevant to, and data objects with position and time tracking metadata.

Trials of Venue Explorer have been conducted at the 2014 Commonwealth Games in Glasgow and for the production of The Mad Hatter's Tea Party at the Royal Opera House in London.

More information at: <http://www.bbc.co.uk/rd/projects/venue-explorer>

“Augmented Video Player”

example: Augmented Video Player lets users view and interact with data associated with what they are watching, in the form of overlays on the video. Data can be in-depth and of interest to particular audience segments, no longer just “one size fits all”. The application uses single objects for main video and audio, and multiple data objects for rider tagging and bike instrumentation, which may be overlaid.

The Augmented Video Player was trialed at the North West 200 motorbike race in Northern Ireland.

“Forecaster” example: Forecaster lets users view a traditional weather forecast presented in a way that matches their preferences, drawing together the preferred weather map (normal or high contrast), preferred presenter (sign language or not), preferred layout for screen size and shape and automatically repositioning the graphics to avoid

crashing over the subtitles.

The Forecaster applications uses multiple video, audio and data objects and, based on user preferences, selects the preferred feeds to be composited together into a traditional weather forecast presentation in the browser. The demonstrator also shows the use of local calendar information to overlay individual “whereabouts” data on the broadcast weather map, to further personalise the map.

More information at: <http://www.bbc.co.uk/rd/blog/2015-11-forecaster-our-experimental-object-based-weather-forecast>



AUGMENTED VIDEO PLAYER AT THE NORTH WEST 200 MOTORCYCLE RACE

“Visual Perceptive Media”

example: Visual Perceptive Media is a film which changes narrative, background music, look and feel, based on the person who is watching. It uses profiled data from a short user survey app which is used to inform which media objects are used, in what order, and when. The aim is to create personalised media which feels natural to the audience and allows the storyteller to address large audiences of diverse individual audience members.

More information at: <http://www.bbc.co.uk/rd/projects/visual-perceptive-media>



BBC R&D FORECASTER SHOWING A RESPONSIVE WEATHER FORECAST

DAB+ has taken over!

MATHIAS COINCHON, EBU

It's that time of year again – that time when we send our experts to attend the annual Geneva Motor Show to get us the latest news on digital radio integration in the car.

This year, we could almost say “mission accomplished” as we saw that nearly all manufacturers now have DAB+ in their car displayed at the show – including entry level models. More and more manufacturers now offer line-fitted DAB+ radio in the car but many still keep it as an optional addition (to be chosen by the car purchaser). MCDT – the organization promoting DAB+ in Switzerland – was here to explain to visitors the benefit of digital radio and also work with car importers to ensure that they all have a DAB+ offered in the cars they sell.

However, work still need to be done together with manufacturers on the usability. Some car radios



are really difficult to use and trying to navigate to the station you want can sometimes be a nightmare. The concept of frequencies as it exists on FM doesn't make sense anymore to the user with DAB+. It's now up to the receiver to scan, update the list of stations and present it to the user in a consistent way. Additional features such as a slideshow can also lead to confusion. Sometimes you have to go in a special menu, select “multimedia” and then select “display slideshow”. It is almost certain that very few drivers will do this or know where to look.

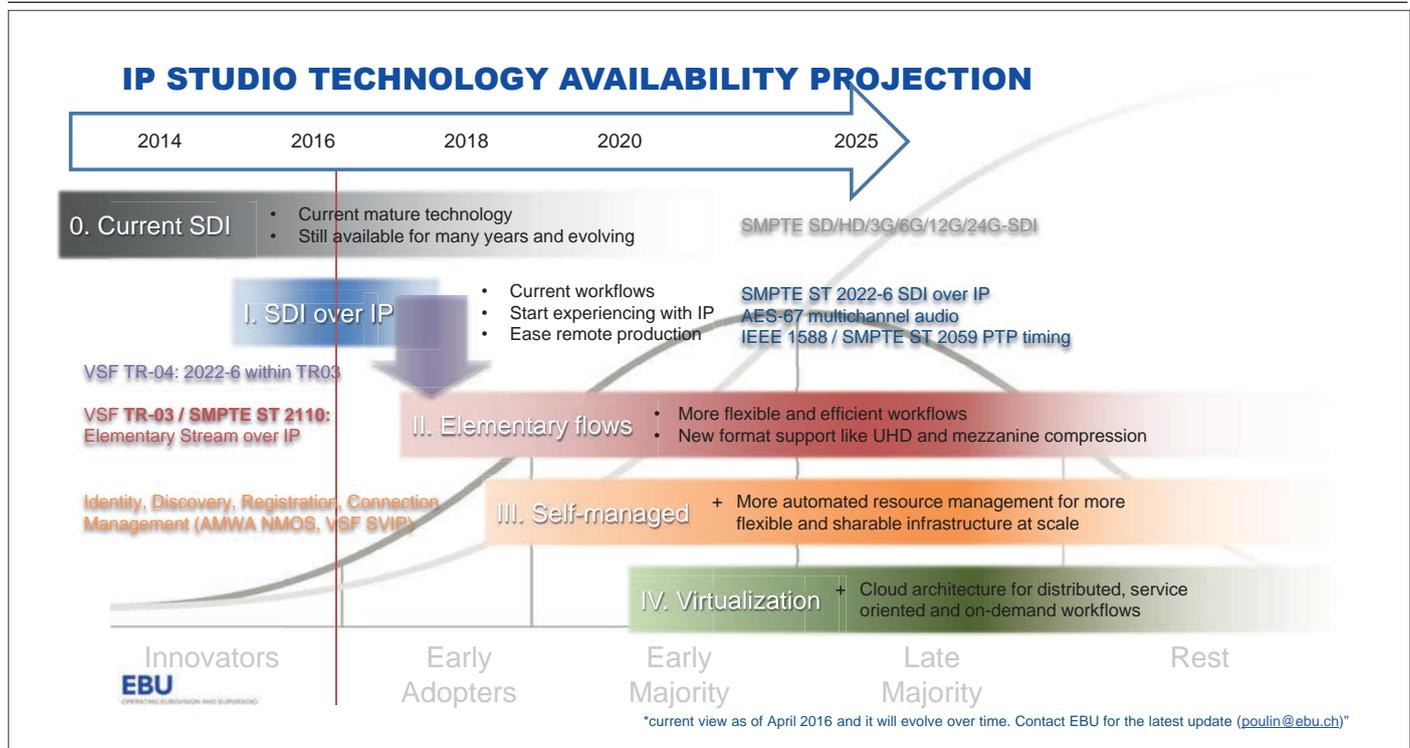
On the hybrid radio front, it is now known that some car manufacturers have hybrid radio features using RadioDNS but we couldn't spot a car with it at the show. So it is still work in progress. We could see some cars displaying the wrong logos for stations. This is due to some manufacturers that have acquired logo lists stored in their receivers that are sometimes wrong or not up to date. The only solution for this is to have broadcasters make their logo available through RadioDNS or directly transport them on DAB.

Broadcasters can join RadioDNS Project Logo (<https://radiodns.org/get-involved/project-logo/>) to make sure their logo is properly inserted. To learn more about how we can host it for free, visit the EBU RadioDNS Manager Platform (<http://ebu.io/ioprojects/rdns>).

Until next year!

Live & IP: The roadmap to open interoperability

FELIX POULIN, EBU



The current market evolution

The transition to IP in the live production environment has passed from theory – with a focus on requirements, abstract concepts like the Joint Task Force on Network Media (JT-NM) Reference Architecture and the development of the first standards – to practice with the first few proof of concepts like the Flemish public broadcaster’s (VRT) LiveIP Project and even real project announcements like the Luxembourg broadcaster’s RTL-City. As we saw at the NAB tradeshow in April 2016, most broadcast manufacturers are now offering IP-enabled products in their catalogue and, interestingly, we see an increase in new players coming from the software and internet culture.

However, the technology is still evolving and new standards are being developed. Some vendors are also offering proprietary solutions, mainly because standardisation is a slow process and the market is demanding new products, now. Many different alliances make the

promotion of one or the other solution. To give a few examples: Sony’s IP Live promotes the Network Media Interface (NMI); Aspen promotes the SMPTE Registered Disclosure Document (RDD) 37 which focuses on media transport over IP and is driven by Evertz; and, AIMS promotes a roadmap composed of SMPTE standards and VSF specifications, just to name the main ones.

Achieving interoperability

In addition to the current market situation, unlike a relatively simple SDI interface (maybe people were not saying this was so simple in the 90s when it was invented!), interoperability in IP production requires using a common stack of many different protocols and standards. This modularity design from the IT world (e.g. the Open Systems Interconnection model [OSI model]) is key to achieving the flexibility we want, but it comes at the cost of higher complexity.

This, of course, poses a challenge

to one of the most important requirements of public service media: The requirement to have the option to build their systems using components from multiple vendors of their choice that best suits their needs. What we call 'interoperability' – a word very hard to pronounce with my French Canadian accent!

An evolutionary roadmap

In order to help EBU Members in their technology investment planning, the EBU Strategic Programme on Future Networked Systems (FNS) made the exercise to project the technology evolution over the next few years. Research on this topic shows that the path to open interoperability is evolving in a coherent way, contrary to the general impression we sometimes have. It also shows the integrated and evolutionary nature of this technology as each generation adds features to the previous one. So potentially, the products of the first generation could bring later features in a software update.

0. Current SDI

The current mature technology for interoperability is Serial Digital Interface (SDI). This technology is still evolving with new 6G and 12G-SDI to support Ultra-High Definition (UHD) formats. We will see this technology around for many years and the most conservative uses will continue to rely on it for a number of years to come. SDI is not dead!

I. SDI over IP

A baby step evolution is to start by transporting the SDI, audio and time signals over IP Networks. The “SDI over IP” is the generation that is available today and for the coming years. It opens the doors to building your studio based on network switch fabrics rather than a signal matrix at the heart, a fundamental step in this transition. As a result, broadcasters can start to building the know-how and competencies urgently needed to achieve this transition. However, this technology generation usually results in very similar workflows of today and, therefore, is more of a migration path than the end result. The buyer of this technology generation will be very curious about the possibility to upgrade their components to next generations.

II. Elementary flows

The elementary flow generation will bring in some more flexibility in the workflows, some bandwidth optimization compared to SDI over IP and support new formats like UHD. This is an area of intense activity in the standardisation community as the open specification developed by the VSF, Transport

of Uncompressed Elementary Stream Media over IP (TR-03), is now in the hands of the SMPTE for standardisation. This due process optimistically takes many months before ratification and the widespread availability usually comes after a few iterations of interoperability workshops.

III. Self-managed systems

This generation is about automatizing network management and scaling up the size of the possible infrastructure. Automatic discovery, resource identity model and connection management were identified in the JT-NM Reference Architecture as a foundation for this generation. The AMWA developed the Network Media Open Specification (NMOS) that implement the JT-NM discovery and registration frameworks.

IV. Virtualization

This later generation is about fully exploiting cloud technologies. Many issues still have to be sorted out for live production applications, including the important security aspects, network speed and quality of service. We can expect it will take many more years of evolution to get there.

This EBU Networked Media Roadmap to Open Interoperability is a living document and will evolve over time as the FNS Group of experts gather new information.

It is intended to be used as a guiding tool to reflect the state of knowledge at certain moments in time. Be sure to consult the latest version at tech.ebu.ch/Live-IP and contact us if you have any questions (poulin@ebu.ch).

EBU Strategic Programme on Future Networked Systems

Our Strategic Programme on Future Networked Systems helps Members to get the most from their transition to IT/network-based infrastructures in their production studios, remote production and cloud-based production. We do so by providing a platform for you to share knowledge, experience and test results with your peers. We capture your requirements and keep you up to date on new technologies so that you can make well-informed decisions for future investments.

For more information, see: <https://tech.ebu.ch/groups/fns>



JOINT TASK FORCE LAUNCHES AN INDUSTRY COORDINATION PLATFORM

Since its foundation in 2013, the Joint task Force on Networked Media (JT-NM) has had the mission to drive open interoperability in professional networked media.

The JT-NM believes that open interoperability can be developed in a coherent way, that it will continue evolving in accordance with a pre-planned roadmap over the next few years, and that there is solid communications between different industry efforts that result in a strong foundation upon which we can build future media businesses. In order to support this message, JT-NM created a platform for those involved in open interoperability to use to coordinate themselves to facilitate a harmonized evolution of complementary standards and specifications.

This new JT-NM subgroup will be composed of representatives of interoperability-related activities from standards bodies, user and industry groups that agree on using common approaches for some foundational system components (as identified in the JT-NM Reference Architecture).

Finally, the original three sponsors of JT-NM – the EBU, the Society of Motion Picture and Television Engineers (SMPTE) and the Video Services Forum (VSF) – are welcoming a forth partner to the Task Force: the Advanced Media Workflow Association (AMWA) as it recognises the increasing importance of the role of software and APIs in the professional networked media environment.

If you are interested by this coordination activity (subject to selection) of if you want to join the JT-NM reflector (open to all), please contact Félix Poulin at: poulin@ebu.ch

It all depends on what you mean by 'compatible'!

DAVID WOOD (EBU)



What does the word 'compatible' mean? According to one dictionary it is: "capable of existing or living together in harmony - as in a married couple". But different human couples have different degrees of 'compatibility', don't they? Television does too. Broadcasters have needed to wrestle with what compatibility means for them since the dawn of colour television.

Whenever a new television system is developed, the question arises of what should be, or could be, its relation to earlier or future systems. This is compatibility – backward or forward – in our context.

And it is rearing its head today in UHDTV as the broadcasting world decides what shades of compatibility are needed for success with UHDTV.

The NTSC, PAL, and SECAM television systems were all 'compatible' with monochrome television - an old TV still gave a monochrome picture. But there were 'degrees' of compatibility. Risking offending the developers, though there were other distinguishing features to influence the decision, it was said that the 'compatible' black and white images you saw when PAL images were being broadcast were better than the black and white images you saw when SECAM images were being broadcast. But conversely it was said that the colour images you saw when SECAM images were being broadcast were slightly better than when PAL images were being broadcast. There was a trade-off between picture quality for old generation sets and for new generation sets.

For HDTV, a new fundamentally different TV set was needed, and so nothing could be done to enable old SDTV to receive images other than by broadcasting the services

twice at the same time – once in HDTV and once in SDTV. This is backwards compatibility by 'simulcast'. It works - provided you have the capacity.

For UHDTV, viewers will need a new UHDTV set, but - and here is the problem - there is not just one UHDTV system. UHDTV systems are rolling out in phases over the years as technology makes additional features practical.

The first UHDTV system, termed UHD-1 Phase 1, is the simplest system, with features found in the services available since 2015.

The next phase of UHDTV services, likely to be available in 2017, called UHD-1 Phase 2 CPA, will have additional features. One of these is the capability to exploit more fully tomorrow's TV sets that have a higher peak brightness – it's called High Dynamic Range or HDR.

The audiences in some markets will include viewers with both original and new sets. In other markets there will have been no Phase 1 (Standard Dynamic Range or SDR services). If you are in the first market, you may want to do whatever is needed to ensure 'backward compatibility'. That is, Phase 1 sets should still give decent images when Phase 2 is broadcast. If you are not in such a market, you may not want to go to the trouble of doing so.

There are alternative systems being proposed for HDR systems. The choice between them is linked to the question of what compatibility should mean in practice.

But even when a choice of system is made, there will still be the issue of deciding whether to 'favour' the previous or the new UHDTV sets. It probably will not be possible to provide images that are at the same time the absolute best that could be done for both SDR and HDR TV sets. So, should broadcasters go for something which is the best for one or other type, or take a middle ground and go for something less than the best for both?

It is not just the issue of HDR that raises questions about what compatibility should mean. 2019 may see the additional feature of 'High Frame Rate' (HFR) in Phase 2 CPB. Broadcasters will need to decide whether to provide a system that also works for CPA TV sets that have the Standard Frame Rates (SDR), or whether this is not worth the trouble.

Going beyond this, if the pundits are right, the next decade will see a Phase 3 which has all the features of UHD Phase 2 CPA and CPB, but in addition has four times the spatial resolution. Services like this are scheduled to begin in Japan and Korea in 2020 or later, so Europe may follow. Should such a system be backwards compatible with Phase 2 CPB?

Without even going into the question of sound, it's clear that there are difficult decisions ahead for broadcasters about what compatibility will mean in the UHDTV world. Are they, I wonder, simpler or more complex than the compatibility issues of a human couple?

What's all the fuss about HbbTV?

PETER MAC AVOCK, EBU



You won't hear Apple mention HbbTV. You won't hear about it either from Netflix. Does that mean it's passé and old fashioned? If everything fashionable has to come from Apple, and every game-changer has to come from Netflix, then I guess you're right, and the EBU amongst many others is wasting its time.

We don't think we are.

HbbTV won't change the world. It shouldn't even be the centrepiece of a broadcaster's online strategy, but it should be a cornerstone of how broadcasters see TV sets. Let's look a little deeper.

We all know that good TV is all about content. It is, but it's not quite as simple as that anymore. Broadcasters send linear content via cable, satellite and DTT to TV sets much as they have done since the 1960s. Public service broadcasters were the pioneers of TV and radio and continue to be amongst the most popular brands in their respective countries. But, any broadcaster will tell you that the competition for eyeballs is fierce. What with multi-channel offerings, catch-up TV, video on-demand like Netflix, Apple TV, etc., it's quite hard to make sure your brand is still being viewed by the consumer. Luckily broadcasters, and particularly public broadcasters, retain the attractive, relevant and trusted content people want to watch. HbbTV is all about providing the platform to bring linear and on-demand content together on connected TVs.

By leveraging the cornerstone of linear broadcasting, and the convenience and personalization of online content on connected TVs, HbbTV helps broadcasters increase viewer engagement thereby improving their competitive advantage. As HbbTV publishes its 2.0.1 standard, incorporating requirements from the Italian and UK markets, the standard is adding essential elements to modernize the content being proposed, all the while retaining the simplicity of the proposition.

You see, HbbTV has a restricted scope, ensures that the technology it incorporates has been standardised elsewhere (and so has the weight of industry support behind it) and is only published when test materials are available. This innovative approach isn't going to change the world, but it helps HbbTV be the technical platform of choice on connected TVs, with appropriate measures to ensure interoperability.

So what's new? HbbTV 2.0.1 is an incremental update

from HbbTV 2.0, but it fixes some 50 issues found with the HbbTV 2.0 specification and critically includes some features required by Italian and UK markets that are proposing to migrate from their MHP and MHEG-5 systems respectively. These two markets represent the most significant developments in the HbbTV space for some time and confirm the importance of HbbTV to the future of broadcasting on connected TVs. These additional features don't add much functionality over 2.0, but enhance some features such as security, and the way HbbTV applications interact with background functions like channel banners, etc.

HbbTV is based around a partnership between the different stakeholders, with broadcasters providing content and consumer electronics manufacturers supplying appropriate equipment. We would expect to see HbbTV 2.0.1 features implemented in many TV sets from 2017 onwards, particularly in the UK and Italy. Support from the Consumer Electronic (CE) industry, who themselves offer their own platforms. But they're happy to support HbbTV because it opens up avenues to content that would otherwise be difficult to attract to their own proprietary platforms.

What kind of content do broadcasters deliver? Catch-up TV and other video on-demand services are the key drivers. Unlike in the US, where broadcasters have licensed their catch-up content to external brands like Hulu, broadcasters in Europe tend to have their catch-up bundled into brands like iPlayer. Freeview play – based on HbbTV – will see a backwards Electronic Program Guide (EPG) in the UK on free-to-air terrestrial TV. While catch-up TV is a key proposition, there are many other applications possible. Commercial broadcasters are working to maximise revenue from advertising and HbbTV can help by providing additional revenue possibilities behind a red or green button press.

But the proposition should be simple: linear content is king, and this drives the broadband delivered applications like data services (e.g. click here for more data on your favourite sports star), catch-up TV (view previous episodes of this program), advertising (e.g. click here to find out more), etc. The viewer doesn't know how his content is being received, so EBU Members have found that a rich broadcast data offering, encouraging consumers to connect their TV sets to their broadband connections, are good ways of increasing the connectivity of connected TVs.

If you'd like to find out more about EBU's involvement in HbbTV, please see our Strategic Programme on Broadcaster Internet Services: <https://tech.ebu.ch/groups/bis>. This EBU Group of EBU Members deals with all manner of broadband distribution from Content Delivery Network (CDN) architectures to interoperability issues in connected TV systems.

IMF: a solution for broadcasters?

LAURENCE STOLL, MARQUISE TECHNOLOGIES

Originated by the major studios back in 2008, the Interoperable Master Format (IMF) was created to establish a file-based workflow for home content deliveries. As the number of versions and multiplicity of assets had grown exponentially with the explosion of VOD and web streaming services, it became necessary to find a reliable successor to tape. Since its first standardization by SMPTE, IMF was developed according to – mainly – big movie producers' business needs. Several applications are available, each of them defining different constraints on the codecs, image resolutions or the color spaces supported. Today, work is being done to augment the fields of applications towards archiving or broadcasting. However, something that is common to all IMF Apps and has never been modified is the internal architecture of the format: the core framework where the real power of IMF is located.

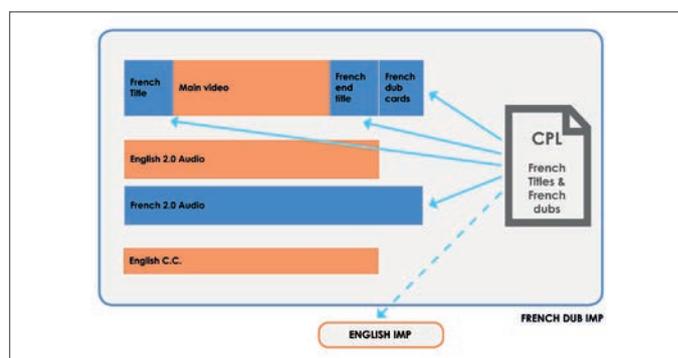
The nightmare of versions management

Global releases of TV/Over the Top (OTT) series are becoming more common and offer a new selling point for premium content providers. This massive consumption of content, anywhere and everywhere, has modified the delays formerly given to localize a production. In addition, the creation of local dubbings or subtitles is often made by different entities, at different times, generating problems when trying to re-connect them with the original version. To make versioning operations a little more complex, each content receiver has its own delivery specifications to follow (e.g. logos, duration, audio-mix, naming, etc.). Storing and managing all those versions may be the biggest challenge of all!

A powerful architecture

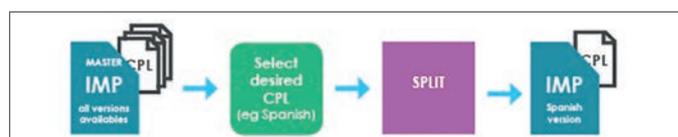
Is IMF a solution for providing an efficient versioning method for broadcasters? It could be. Thanks to its very particular architecture, IMF offers unique capabilities in comparison with other traditional file formats. One of the key elements of the IMF structure is the Composition Play List (CPL). The CPL defines the assets to read with synchronicity: audio, video, subtitles and closed captions. This is an entity logically separated from the assets, meaning that different CPLs can refer to a common asset. Hence, an asset used for different versions like the main video track will be stored only once, optimizing the size of the package.

The number of versions is often related to the different languages and the different audio mixes (stereo, 5.1 etc.). IMF supports multiple soundfields in the same package. Adding a new audio mix in the package is simple: it is only necessary to create a new CPL that will reference the new audio tracks in addition to the previous ones (you don't have to regenerate the whole package). One big benefit is the amount of time you gain back when working with long episodes. In addition, the editing capabilities of the CPLs in



segments and sequences apply independently to each of the soundfields and other essence tracks. This virtual editing allows the insert or replacement of one small part of a soundfield without modifying the rest of the essences.

Another advantage of IMF stems from its ability to 'juggle' with the packages. They can be merged to store all the available versions of content in the same "box" for archiving purposes or split on demand for exchanging only a specific version of it. This is made possible because each asset and CPL is assigned a Unique ID which allows immediate and reliable identification. Universal Unique IDs are very friendly to databases and media management systems which can use them to build a comprehensive catalog based not on separated versions but under the global concept of oeuvre. The computer-friendly design of the format has another plus: the versioning process can be fully automatized and orchestrated.



Ideal IMF-based versioning system

With all these capabilities, a versioning workflow built on IMF infrastructure could result in an easier and more efficient work process. High quality masters are stored using minimal space and it is possible to add new essences related to that master at any time. From this master one can get unlimited numbers of new versions according to delivery specifications, mixing independently soundfields, subtitles and video tracks. A dream come true for broadcasters? Most probably, but this medal has a reverse. Adopting an IMF-based workflow means a change in the mindset and new skills for the technical team. It also implies the development of a new generation of media management systems. And of course, broadcasters have to concur with an IMF Application that fits their needs.

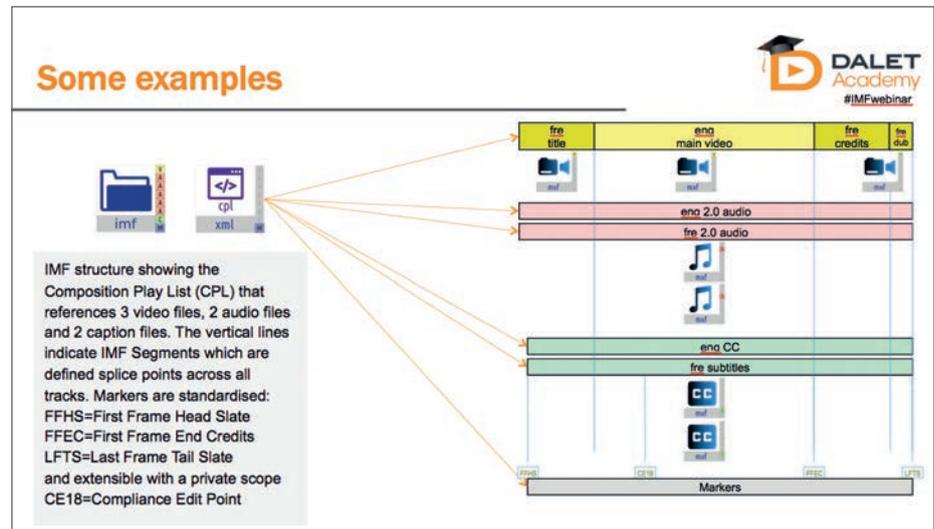
Earlier this year, the EBU Technical Committee started a new project to study the application of IMF in television, cross media and mastering workflows. For more information, see: <https://tech.ebu.ch/imf>

The advantage of IMF as a service master

BRUCE DEVLIN, DALET

Technology is just a tool to improve some aspect of our lives, and IMF is one such tool. The increasing diversity of media delivery solutions combined with the ability of consumers to obtain media via different networks and consume that media on different devices give content creators and distributors the modern day “versionitis” problem. OK, so versionitis isn’t a real word, but you know what it means. You have to somehow create a dozen different timeline edits and compliance versions that are then fed into a transcode farm to create hundreds of different technical variants that are then coupled with different metadata descriptions ready for shipping. Even the best processes on the planet have a large number of manual steps, and there isn’t really a way to audit what’s going on.

The most common approach to tackling this business problem is to create one or more Service Master representation(s) of a title that are used to service all the distribution requests. In many organizations you have to create a service master per language variant or a service master per timeline variant in order to cover the full range of versions that must be created. Wouldn’t it be great to have a single, software friendly, automation-ready format that you could build a workflow around? Enter the SMPTE Interoperable Master Format (IMF) standard (ST 2067). It is purpose-built for this problem space. Based on Material Exchange Format (MXF), D-Cinema practise and AS02 files, it is pretty much the only standardised, component-based format that can cover the complexity of multi-platform distribution and allow vendors to create best-of-breed solutions that will work together from day one. The format ties versions, timelines,



metadata, resources and transcoder instructions with IDs rather than file names. This tight binding encourages the use of software tools to track versions in much the same way that software developers use tools to track changes in code over time periods of many years. Why is this important? Well, with all these versions being created, storing the service masters is becoming a major problem. It would be advantageous to be able to create a self-describing archive of the versions in a standardised form so that they could be recovered years into the future and re-created or even modified with minimal work. Proprietary formats evolve too quickly and with today’s economy, there is no guarantee that the company that made a proprietary format will still be around in a decade.

IMF to the rescue once again. Dalet is working with a customer to migrate a proprietary database and AS02 formatted content into a self-describing IMF record of the versions of the Assets. IMF is used:

- To store the different timelines,
- To store the in-house, external and registered identifiers of each version,
- To identify the different segments

where a version might change,

- To annotate the different segments for later automation,
- To store in clear XML the properties of audio and video assets,
- To annotate in clear XML the audio languages and sound fields,
- To annotate in clear XML the languages of the captions being used,
- To store private/custom metadata for later retrieval.

The creation of the IMF assets is being performed automatically with minimal human intervention, and the process has the added benefit of validating database information against the assets as the IMF files are created.

Software technologists have long known the power of incremental workflows and software versioning tools. IMF does that for media as a standardised auditable format that’s software and MAM friendly. Recent interoperability trials showed great results from vendors making this SMPTE standard a reality. Economic savings in quality control (QC), storage and processing all stem from using IMF in versioning workflows, and the fact that self-describing repositories of the content can be made in IMF is an added bonus!

Creating a recommendation platform for RTVE

MANUEL GOMEZ ZOTANO AND PERE VILA FUMAS, RTVE

As audiences increasingly access content on different devices and through different online channels, they want more personalized services that save them time when looking for the next show. We at RTVE, the Spanish public broadcaster, noticed that our audiences were becoming more social and we wanted to be able to offer them more personalized, recommended content. We set up a programme to create a recommendation platform for RTVE. At the time, we wanted to better understand our users' preferences and their content consumption. We also wanted to focus our attention on reaching our users through the social networks they already use. In the end, the goal is to provide valuable content to users, which will result in a better engagement with the RTVE brand.

From a technical point of view, this process was split into five different projects, focusing on different areas: social interaction hub; analysis of user tracking and browsing; the semantics behind the content; the data lakes; and, finally the recommendation system. All the projects are related and interlinked, as is described in the following Figure 1.

Project 1: The social interaction hub focuses on user opinions shared in social networks. The idea is to gather interactions around the RTVE accounts, its analysis for approval or denial and the identification of prescriptions around the RTVE content. All of this will help measure the online reputation of RTVE and allow us to continuously improve our content sharing and overall reputation in the future.

Project 2: The second area of focus is the analysis of user actions on the www.rtve.es website, RTVE applications on devices, SmartTV and HbbTV. Currently, RTVE uses different tracking tools like Google Analytics or Adobe Omniture to measure unique visitors and the number of visits to our platforms. Additionally, we are implementing tools and techniques to gather user behaviour i.e. by links clicked or page scrolling. This information is collected, merged and saved for future analysis using big data techniques.

Project 3: The third project identified is the semantic content enrichment. News, media and categories are enriched with metadata based on accurate ontologies. Thus, the content can be semantically interlinked, key for thematic related recommendations.

Project 4: All of the data obtained from the three first projects are saved, analysed and standardized into a system called Data Lakes. The purpose of this

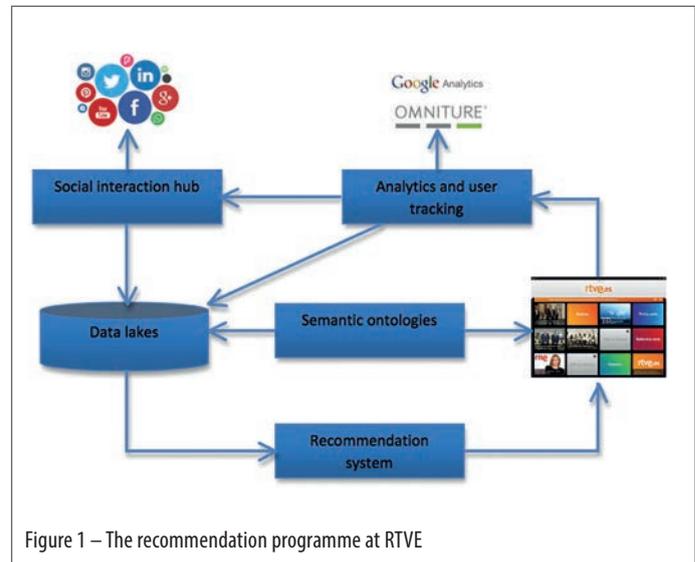


Figure 1 – The recommendation programme at RTVE

project is to handle the data obtained from the users (using standardization), including social interactions, information regarding the pages they browse and the events gathered from their services usage. A second goal of this project is to create storage and data exchanges among the different services. In the end, the Data Lakes will become the big store of structured and standardized data. RTVE wants to promote the definition of user-based Data Lakes standards in the European context to create the situation where private and public initiatives will be able to create tools and products based on those standards.

Project 5: All of the information obtained from the above projects is used in our RTVE recommendation system for offering personalized services and content to our users. Machine-learning as well as thematic-based techniques will be analysed for the sake of accuracy. The goal of this project is to find the best set of processes and algorithms for recommending more suitable content to our users.

We will pay special attention to the audiovisual right restrictions, mainly those involving geo-blocking. Finally, the recommendation system will use the users experience and user actions for a better understanding of their preferences, creating a virtuous circle between our recommendations and the user likes.

As it can be seen from above, creating a new personalized paradigm requires different tools, approaches and techniques. The different projects tend to handle different aspects that need to be considered for the whole recommendation system. Each of the projects will start during this year and we estimate to have the first versions in place before the end of the year.

HbbTV and linear enrichment

JOOST NEGENMAN, NPO, DAVID GEERTS, MINTLAB, KU LEUVEN - IMINDS, RALF NEUDEL, IRT

When HbbTV arrived in 2011 it was quickly adopted as a platform for broadcasters' catch-up and over the top (OTT) video services. In a 2015 Techradar interview, Nick Broughall (Freeview Australia) stated that: "In the early days, FreeView Plus... [was] limited to simply combining catch up TV services with traditional broadcasts."¹ This was a logical step because HbbTV is part of the broadcasters' (web) ecosystem. Applications do not need to be adapted to the different manufacturers' software developer kits (SDKs) and it frees development from – at times – tiresome Q&A procedures. Broughall, however, also emphasised that: "In the future, the HbbTV (ed.) overlay could include anything that can be delivered via the internet: a news ticker, a Twitter stream or multiple camera angles". In this article, we would like to take this vision a step further and express our view on how HbbTV can be more directly beneficial for linear programming.

Television

William Cooper (Informitv), in his 2015 study *Why we watch TV*², captures the spirit of television quite nicely when he says that "TV shows still bring families together, providing a pretext for spending time together. It's a reason to be in the same room at the same time, or simply to sit next to someone. Television can engage us like no other medium." Even though many experts have claimed television – as a service or as a device – dead for many years, figures do not support that image. Thanks to Netflix and similar services, the television as a device for on demand viewing is becoming increasingly popular.

So a combination of linear and on demand viewing on our big screen makes perfect sense, and HbbTV can play a vital role in acting as an intersection, unlocking the full broadcaster's ecosystem. Connected TV is not only about being online; it's also about connecting viewers to the TV. Connected TV Apps, mobile apps, and cast devices simply lack this seamless experience because they are hidden in app stores and clothing pockets while sharing attention with numerous other social and communication apps.

Another disadvantage is that apps undermine the lingering television experience. With all these other attention-grabbing devices in reach, channel switching, commercials and programme credits are more detrimental for keeping viewer attention than ever before. This is where HbbTV, in our opinion, can be an opposing force. Zapping is still a powerful "search and browse" tool and the red button is right under your thumb.

At NPO (the Dutch public broadcaster) we are experimenting with offering watch-on packages through HbbTV notifications to keep the viewers' attention on

the channel. Positioned on the right middle section of the screen, just before the credits starts, a widget-like HbbTV application provides a glimpse of the upcoming programme and viewers are invited to receive more information on the next show by pressing the red button. During programme indents viewers can get ready for the next show by easily accessing freshly updated programme information, promo videos and any internet related content provided by the TV station.

Once in the show again, HbbTV can prove itself useful to linear broadcast by offering engaging play-along experiences – right where the action takes place: on the big screen. In the EU-funded TV RING project (www.tvring.eu) NPO and its partners created *See2Gather*, an HbbTV overlay that aggregates scores of multiple players in the living room, creating a competitive social experience around a television show. Attention is kept on the common TV screen and otherwise distracting personal second screen devices are degraded to a simple voting box.

Internet

Internet is famous for its real-time and detailed analytics. By using HbbTV we can take advantage of this knowledge and enable new forms of audience measurement models. Although TV is becoming increasingly less linear due to integrated catch-up features, the order of everyday events and time itself remains linear, which is reflected in commentary on social media timelines about television programming. Real-time awareness on viewer's digital whereabouts in both the broadcast and online world can create exciting new insights and formats. In turn, combining these worlds for services through HbbTV can again help to motivate user engagement. In 2014, the German broadcaster, RBB, experimented with social media interaction on the TV screen. Viewers were offered to browse through live comments and tweets or to vote on candidates in the show – right on the TV with a simple button click on the remote control.

Blending the worlds of television and internet hold many promises, and we believe enriching linear television is one of them. If people don't like what's on, we still have this easily accessible red button to offer. It's time for us to make that as valuable and rich as possible!

¹Nick Broughall <http://www.techradar.com/news/television/hbbtv-and-freeviewplus-everything-you-need-to-know-1254169> (Accessed on: 09 December 2015)

²Cooper, Dr William. "Why we watch television: English: Sony Professional". Corporate. Why we watch television. <http://www.sony.nl/pro/article/broadcast-products-why-we-watch-television> (Accessed on 05 March 2016)

Accelerating digital radio roll-out

DAVID FERNÁNDEZ QUIJADA, EBU

Some highlights of the past year show that digital radio is gaining traction across Europe: in Norway, Switzerland and the United Kingdom more than 60% of the new cars sold are now fitted with digital radio as a standard²; two commercial radios in Germany and Norway have switched off their FM transmitters voluntarily to concentrate on digital radio; and Germany, the largest European market, is accelerating its adoption of DAB+, with more than 4 million households owning at least one DAB+ receiver.² On top of that, Norway took a historical decision: to become entirely digital by switching off nationwide FM radio in 2017.

Digital is necessary

In most European countries the FM dial is crowded and there are almost no technical solutions to the demands of broadcasters that want to expand their offer or join the radio market. At the same time, medium wave radio is fading out: Germany switched off medium wave in 2015 and only one station remains in that band in France.

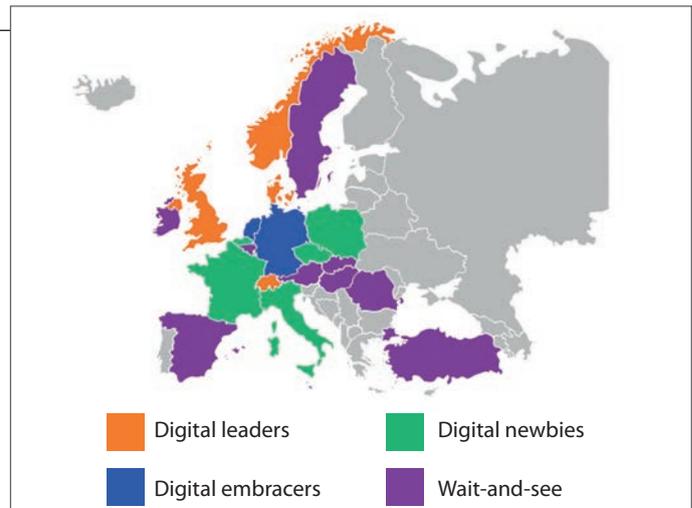
In this context, digital radio provides a solution for those broadcasters while at the same time adding value to the offer received by the audience. This trend is led by public broadcasters, which offer more than 70 digital terrestrial services that are not available in analogue. For example, one commercial and seven public digital radio stations in Europe target children, which have no specific offer for them in analogue. Seniors also have the opportunity to listen to digital public radio stations talking about their specific topics in their language and with their music in Denmark, the Netherlands, Norway and Switzerland. At the same time, theme digital stations for news and sports, not so widespread in FM, have popped up in several European countries, not to mention minority music genres underserved in analogue, such as folk and jazz.

Internet radio not an alternative

Despite the fact that digitization has brought many new opportunities for distributing radio services terrestrial radio is still the backbone of its consumption. In countries with a high penetration of DAB or DAB+, the consumption of digital terrestrial radio is much higher than internet radio: the proportion is 4:1 in the United Kingdom and 2:1 in Denmark and Norway, with Switzerland the only leading country in digital radio where the audience listens to both of them in similar proportions.

The third biggest radio station in terms of market share in the German-speaking part of Switzerland is digital-only, as is the case with the fourth in Denmark and the fifth in Norway, but no internet-only service can claim similar market relevance.

Obviously, there are differences between markets



and many factors have an influence, such as internet penetration or the offer available online, or in digital terrestrial and analogue. But in most cases, internet radio is not significant in terms of audience figures, even if DAB or DAB+ are not massively developed. In Germany, the radio set was used daily by 74% of people to listen to radio in 2015 while only 4.2% used their computer or tablet or 1.9% their smartphone. In Spain, where only simulcasts are available in DAB, the daily reach of internet radio was barely 3.7% in 2015 and only since 2013 has the figure for internet been bigger than for medium wave.

Future steps

Digital radio is moving forward in some key areas. For example, the penetration of cars equipped with digital radio and the use of DAB/DAB+ in cars are rapidly increasing in the leading markets, including easier and cheaper aftermarket solutions. This trend is likely to accelerate as major car markets, such as Germany and Italy, are growing fast and making digital radio more attractive for car manufacturers as a sales argument.

Similarly, regional and local services are expanding dramatically, including cheap transmission solutions that make DAB+ affordable for small broadcasters, including community radio stations.

Despite a few countries still needing to fix some weaknesses, such as insufficient collaboration among stakeholders or scarce political initiative, the developments highlighted above mean that we will be listening to and talking more about digital radio in the next few years. We expect a future that is more complex, richer and, hopefully, more attractive for listeners.

Find these and other trends in the latest Digital Radio report from the EBU's Media Intelligence Service at <http://www3.ebu.ch/files/live/sites/ebu/files/Publications/EBU-MIS%20-%20Digital%20Radio%20Report%202016.pdf>

¹Digital Radio Norge, MCDT, SMMT

²Digitalisierungsbericht 2015

Future advanced techniques to increase the efficient use of spectrum

ELENA PUIGREFAGUT, EBU

Wireless platforms are facing a scarcity of spectrum with new services requiring access to frequencies and a growing demand for transmission capacity. The EBU Project Group Broadcast Network Planning was tasked to study advanced techniques that could increase the efficient use of spectrum by future terrestrial broadcasting platforms. In particular, the group focused on Time-Frequency Slicing (TFS) and Layer Division Multiplexing (LDM). In this issue, we take a closer look at TFS. Our next issue will look in more detail at LDM, so stay tuned.

What is TFS and what are the benefits?

TFS is a technique that enables multiple frequency channels to be aggregated into a single wider frequency channel. The content of individual programmes is sliced into 'blocks' of information which are transmitted in different frequency channels within the TFS aggregation.

TFS takes profit from frequency diversity between channels (e.g. differences in antenna diagrams and receiving antenna gains) and from larger statistical multiplexing pools coming from the wider aggregated frequency channel. The TFS gain could be used to extend the core coverage area of the multiplexes transmitted or, alternatively, increase the capacity of the multiplexes (by changing the system variant to take advantage of the improved robustness), or a combination of both. Additional capacity could facilitate the introduction of more high- and ultra-high definition (HD and UHD) programmes.

Results of simulations and field measurements

A number of simulations have been carried out to estimate the gain that TFS may offer. Results indicate that combining four to six frequency channels may achieve, for standard fixed rooftop reception, a capacity gain of some 20 – 25% for Multiple Frequency Networks (MFN). In addition, research shows there would be statistical multiplexing

gains in the order of 15%.

Field measurements by Teracom in Sweden indicated a TFS gain of around 4.5 dB that translated to capacity gain corresponds to 25% which perfectly correlates with the simulation results.

In case of Single Frequency Networks (SFN), the TFS gain would be lower because SFN already has a higher efficiency than MFN. In both cases, the gains would reduce if the number of RF channels involved in the TFS-mux would be lower.

Implementation considerations

TFS has the effect of equalising the coverage of all multiplexes in a TFS-signal. This is particularly well-suited to applications where this is desirable, but might be a problem in cases where services have different target areas. This would require using multiple Physical Layer Pipes (PLPs) as services with different coverage areas could be delivered by using different transmission modes.

Broadcasters and network operators would need to upgrade

modulators and multiplexing systems and introduce more SFN-like timing (to synchronise all the multiplexes to be aggregated into a TFS signal). The use of common transmission sites is also preferable, but this would not necessarily require modifying the network structure or the frequency plan. However, the benefits of TFS would be maximised if introduced into a network and frequency plan specifically designed for TFS without any legacy constraint.

Consumers would need to buy new TFS-compatible receivers but would not need to change their receiving aerials. To minimise disruption to viewers and make the transition more attractive, TFS would need to be introduced alongside other improvements such as HEVC or UHD Phase 2 to provide improved quality and a greater range of programmes.

The new EBU Technical Report 035 'An introduction to Time-Frequency Slicing (TFS)' gives further information.

New EBU Loudness Guide

The EBU has published version 2.0 of its Loudness Guidelines for distribution and reproduction (EBU Tech 3344). The document has been completely rewritten and updated. The new guidelines are easier to read, as they have been halved in size (-3bb technically speaking), but without losing any of their power.

To access EBU Tech 3344, see <https://tech.ebu.ch/publications/tech3344>
For more information, contact Frans de Jong at dejong@ebu.ch





Latest News from ABU Technology

DR AMAL PUNCHIHEWA, ABU

The ABU Digital Broadcasting Symposium 2016 began in Kuala Lumpur with three workshops. The first, done in collaboration with DVB, took a closer look at “The Future of TV.” The second, organized in collaboration with WorldDAB, focused on “Moving Forward with DAB+.” And finally, the third workshop focused on “Preserving Heritage Archives.”

After a brief introduction by Dr Amal Punchihewa, Director of Technology & Innovation, ABU, Dr Peter Siebert, Executive Director of DVB, presented their project plans for the future of television broadcasting. Dr Siebert informed the audience that the capacity gains achieved since DVB-T2 do not warrant announcing a new standard for next generation terrestrial broadcasting. DVB-T2 performance is very close to the theoretical channel limit proposed by Shannon. Mr Kazuhiro Shimizu from Sony spoke about the readiness of mobile device technologies for DVB-T2/Lite and ISDB-Tmb. He also mentioned the availability of a chip set for mobile broadcast reception. Mr Simon Fell, Director of Technology & Innovation, EBU outlined the outcomes from the World Radiocommunications Conference (WRC-15) for broadcasters and how such decisions will influence the future of DTT in various regions and globally.

Mr Craig Todd, Senior Vice President and Chief Technology Officer of Dolby Laboratories spoke about ‘The Brave New World of Immersive Radio’. He explained the concept of object-based audio processing which allows

audiences to render a multi-channel sound to suite to their environment. Mr Kush Kundi, Head of Compression Solutions, APAC, Ericsson, explained the ‘wow’ factor of high dynamic range (HDR) and various solutions to implement HDR. One of the key concerns for the future is shorter life cycles of technology due to rapid advancements. Finally, Mr Markus Fritz, Senior Vice President Commercial Development and Marketing of Eutelsat explained the delivery of UHD signals via satellites.

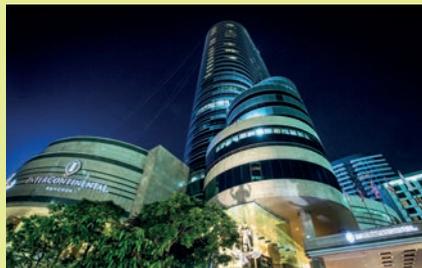
In the afternoon, WorldDAB hosted the DAB+ Digital Workshop. Ms. Joan Warner, Vice President Asia-Pacific WorldDAB and CEO Commercial Radio Australia provided welcome and opening remarks. Ms. Bernie O’Neill, Project Director of WorldDAB gave regional and country updates followed by Mr Lindsay Cornell, Chair of Technical Committee, WorldDAB who spoke about the integration of DAB+ with mobile phones and broadband to provide hybrid features and functions.

Dr Graham Dixon, Head of Radio, EBU unveiled the EBU Tool Kit for successful implementation of DAB+ services. Mr Jorn Jensen of NRK presented a case study from Norway about the digital switch-over followed by Ms. Joan Warners’ presentation on progress being made in Australia. The day ended with group discussions focusing on: regulatory measures, technical issues and content. A detailed paper on this discussion will be published in the next edition of the ABU Technical Review and will focus on how to plan digital radio migration.

DVB in 2016

The first half of 2016 was again a busy period for DVB, with its crowded calendar of conferences, exhibitions and member meetings. Our own DVB World, this year held in Venice, was a great success with 180 delegates attending from countries all over the world. NAB, BroadcastAsia and other conferences covering Satellite, Cable and Terrestrial Broadcasting also fall in this time frame.

This is also a busy time for DVB Members taking part in the DVB Modules to define next generation technologies. Work is ongoing in the DVB TM-AVC sub-group on UHD-1 Phase 2 to provide the necessary standards for transmitting ‘better pixels’ with High Dynamic Range, High Frame Rates, wider color gamut and Next Generation Audio. One study mission is looking at moving ‘Beyond the Transport Stream’ for IP based mechanisms in DVB systems. Another study mission is investigating the option of including Virtual Reality systems in DVB delivery systems. Other active Technical Module topics include: CSS (Companion Screens and Streams), CI Plus 2.0, the



Transport of DVB Services over IP, DVB-S2X satellite applications and more. Membership of the DVB is open to all organizations involved in digital broadcasting and offers the opportunity to be involved in the development of the DVB specifications.

For more information contact:

markvoort@dvb.org.

Later in the year, DVB is organizing its first DVB conference in Asia (29 November to 01 December 2016). Catering specifically to the region's digital TV needs, DVB Asia 2016 will present a technology packed 3-day conference and workshop covering a wide range of topics with leading industry experts in Bangkok, Thailand. The conference will be accompanied by an adjacent exhibition space, which will offer an opportunity for exhibitors to show their latest DVB-related products and services. This is a particularly relevant time as countries in the Asia region are now well on track with their migration to digital. The majority have chosen either DVB-T or leapfrogged directly to DVB-T2, especially since the introduction of HEVC. Further information: www.dvbasia.org

EBU technical leaders 'Go West' on fact-finding mission

HANS HOFFMANN, EBU

Initiated by the EBU Technical Committee, EBU technical leaders embarked on a fact finding mission to visit leading technology companies on the West Coast of the United States. Delegates had the unique opportunity to spend a week networking and learning from key players in media from 01 – 05 February. In total, 13 technical leaders from the EBU Members (BBC, ORF, IRT, SWR, RTE, VRT, TVP, CYBC, SRG SSR, TRT) and representatives from the EBU Technology and Innovation department met executives and experts at the headquarters of Microsoft, Dolby, Google/YouTube, Netflix, Fox Broadcasting, 20th Century Fox, Disney and Warner Brothers.

The objective of the mission was to communicate EBU technology strategies and requirements to key industry partners, and to better understand the state of the art in media technology in the United States. The EBU delegation was left in awe by the technology demonstrations provided and interactive strategic discussions on the trends and impact of emerging technology innovations. Several areas of common understanding and mutual interest for future media technologies were identified.

The EBU Technical Committee will discuss actions and ways to continue this positive dialogue.

DELEGATES

Simon Fell, Director of Technology & Innovation (EBU)

Hans Hoffmann, Head of Media Fundamentals & Production (EBU)

Dieter Boen, Innovation Manager (VRT)

Martin Decker, Head of Production (ARD/SWR)

Michael Eberhard, Director (ARD/SWR)

Klaus Illgner-Fehns, Managing Director (IRT)

Grigoris Maliotis, Director of Engineering (CYBC)

Wieslaw Lodzikowski, Director of Technology (TVP)

Judy Parnall, Head of Standards & Industry (BBC)

Karl Petermichl, Advisor to the CTO (ORF)

Thomas Saner, Head of Strategic Distribution Planning (SRG SSR)

Ferhat Uzaktas, Chief Engineer (TRT)

Richard Waghorn, CTO (RTE)



In the spotlight Olli Sipilä

HEAD OF TECHNOLOGY
AND DEVELOPMENT (CTO),
OPERATIONS, YLE

WHAT ARE YOUR CURRENT RESPONSIBILITIES?

Right now I'm heading the Yle Technology and Development Department. Our team focuses on long-term issues like technology roadmaps, investment policies, technology strategy and distribution solutions.

WHAT DO YOU CONSIDER AS YOUR FINEST ACHIEVEMENT SO FAR IN YOUR CAREER?

Hopefully the finest moment is still to come! With a long history at Yle it is difficult to choose one particular issue, but if I have to mention one it would be our new technology management style: from traditional self-doing broadcast technology working methods to modern team-based agile development, partner-centric and lean-based working methods. We are still on our way to achieving this, but the first results prove the concept's power.

WHAT ARE YOUR PREDICTIONS FOR BROADCASTING TECHNOLOGY IN THE FUTURE?

I would rather talk about media technology. In production, the next big steps are moving to the cloud and IP. In distribution, our focus is now on telecommunication networks and development at LTE and 4G/5G. Data, data-analytics and data-driven planning and content production are new challenges for technical departments.

WHAT, FOR YOU, ARE THE MOST IMPORTANT CHALLENGES FACING EBU MEMBERS TODAY?

All over Europe there is lots of discussion about the role, assignment and funding of public service media and it seems that there are many groups who want to narrow our role. The other major challenge is competition from international players with new business models and overpowering resources.

TELL US ABOUT SOME OF YOUR INTERESTS AWAY FROM THE WORKPLACE.

We have a getaway place outside the city by the seaside, although I have – as an engineer – equipped it with modern gadgets and connections. I love to spend time in nature. Also being middle-aged, I have started golf which is a good counterbalance for work and endless meetings, not forgetting the wine, food and good life.

Network Technology Seminar

21-22 June 2016,
EBU, Geneva



DEVCON

1-2 November 2016,
EBU, Geneva

