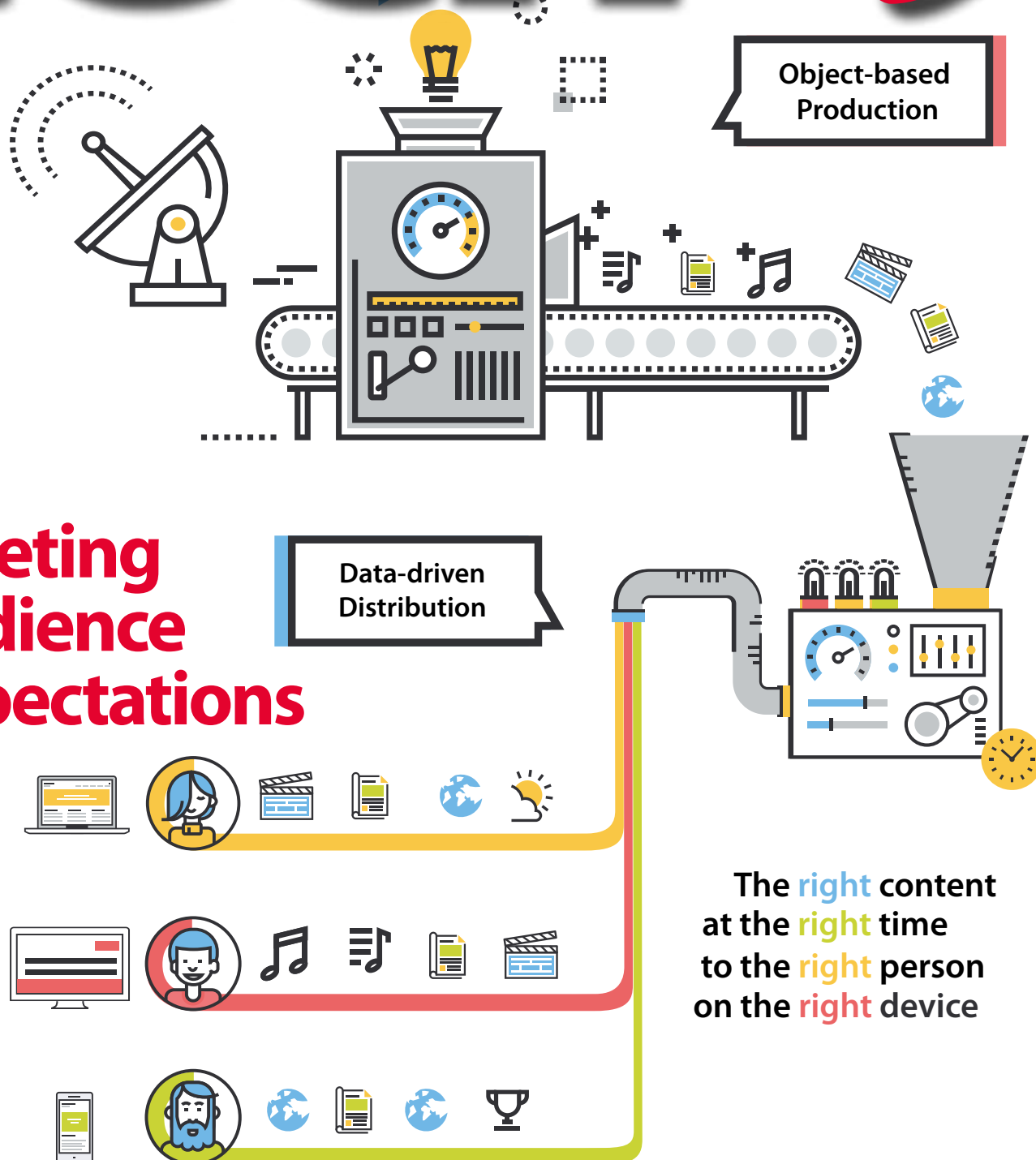


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 Printed on FSC certified paper by New Goff n.v.

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What's the buzz?



EBU @IBC

9-13 September 2016, RAI, Amsterdam

IBC is Europe's largest annual conference and exhibition dedicated to media broadcast technology. As usual, you will find us at Stand 10.F20 during the event. We have plenty of demonstrations to showcase this year, including: high dynamic range, high frame rate, a personalized news experience, the use of semantic data for asset management in sport, virtual reality and more! Join us on Monday, 12 September at 17:30 at the stand for drinks, snacks and networking!

tech.ebu.ch/events/2016/ibc-2016



for running software-driven broadcast infrastructures and improving engineering workflows. The event is a great place to meet experts who are addressing similar challenges on a daily basis

tech.ebu.ch/events/2016/devcon

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 practice in software engineering and get hands on with current development and deployment tools. Participants will brainstorm new ideas

FORECAST

23-24 November, EBU Geneva

Our annual seminar that deals with broadcast technologies, spectrum management and more! This year's event will take a closer look at reaching audiences wherever they are, how television consumption patterns are changing and how the satellite industry is adapting. This event is a great opportunity to meet experts in this area and learn more about future developments.

tech.ebu.ch/events/2016/ebu-forecast-2016



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"It is at times like these that we realise what is great about free-to-air television; and, by extension, the value of radio"

Simon Fell, Director, EBU Technology & Innovation

As I write we are experiencing the so called 'Summer of Sport'. It is at times like these that we realise what is great about free-to-air television; and, by extension, the value of radio, especially with Roland Garos, Wimbledon, Euro 2016, and soon the Olympics appearing daily on TV and notifications of significant developments via mobile. We have a great ecology of delivery systems satisfying our needs. The EBU's Eurovision network is experiencing one of its busiest years. We often overlook the significant infrastructure and team efforts behind such events.

Today, we expect HDTV coverage, and we have seen a number of UHD TV 4K feeds from Euro 2016. Over the top services are improving, and mobile viewing of highlights, clips and live feeds are a significant benefit to viewers. Interestingly, there is one place where this great coverage still does not reach, and that is in airplanes. On a recent flight during the Wales football game, passengers were checking the live scores on the way to board, and it was the first thing they did on landing. How long before we see Wi-Fi on flights? This is normal in the USA now, although significant payments are required for anything other than a trickle of an email.

5G is in the news again as well. I still attend conferences where people cannot identify what 5G is, but it is offered as the solution to all things in the future – if you believe the hype. All parties are gearing up to make their particular country or their economic area the centre of this next great industrial revolution. Whilst the scope of expectations for 5G is all encompassing – from Medical to Internet of Things and Machine to Machine – the benefits for media are less obvious at this stage. Yes, a future receiver could receive both broadcast and on-demand from one network, yet the cost of building and distributing media to such a network are unknown. The topic is a large one that will engage our working groups and our technology strategists for many years to come, however we should ensure that there are recognisable and significant benefits before we proceed down the path of 5G.

We recently held the annual Technical Assembly here in Geneva and a fine set of presentations kept attendees engaged throughout the two days. Topics ranged from

'Semantic Data in Sports,' an essential topic for the future use of data to enhance sporting events, to our 'Women in Technology' panel reported on our website recently. This is an increasingly discussed area - how does our industry attract the right balance of talent to better utilise all the skills of our society, maintaining a better balance between genders. Personalization of media services and the increasing importance of OTT delivery were also other areas of interest during the event.

The very first EBU Technology and Innovation Award was given to VRT for the VRT Sandbox LiveIP Studio Project which helped launch a new age of convenience and flexibility in professional television programme production. This topic was at the heart of our recent successful Network Technology Seminar held in June.

In his wrap up to the Network Technology Seminar, our own Felix Poulin stressed the importance of virtualisation as a long-term aim, finding the balance right between 'perfect' and 'just good enough', standardisation needs to accelerate and the industry must coalesce around common standards to give certainty in this area. This will be a key topic for IBC this year where I hope you will be reading this issue of tech-i magazine.

Come and see us at the EBU Stand (10.F20) at IBC where we will be showing some of our latest work. The future is bright and the future is high dynamic range (HDR), and as the time runs out for choosing the HDR standards, we need to get HDR production rolling. DVB has a challenge ahead to standardise the system(s) that will enable HDR. Early signs are the Hybrid Log Gamma (HLG) meets many broadcasters' needs, and that this can be used alongside HDR 10 PQ type content for those so equipped. There are a number of solutions being analysed that industry is still making its mind up about – time will tell.

Finally, welcome to the new EBU Technical Committee elected during the TA. We here at the EBU Technology and Innovation Department welcome the opportunity to work with you for the next two-year term to keep things moving forward.

Until next time... Simon



EBU hosts first Women + Technology panel at annual Technical Assembly

Do you work in the technical field or are you interested in technology? This year, the EBU was proud to host its first ever panel discussion on the topic of Women + Technology during the 22nd EBU Technical Assembly!

The aim of the panel discussion was to highlight the topic of bringing more diversity into the workplace, especially in the area of broadcasting technology. “Looking into our own statistics over the last five years, we realized that there were very low levels of participation from women in technical groups and in attendance at technical seminars. We wanted to see how we could improve this and what might be holding women back from exploring more technical (or management) roles” said Elena Puigrefagut, EBU.

The panel was made up of leading experts who shared their experience as well as how they see the workplace transforming to meet new consumer demands and take advantage of new technologies. Panelists included:

- Galina Fedorova, (RTR, Russia)
- Dagmar Driesnack (IRT, Germany)
- Barbara Lange (SMPTE, United States)
- Brigitta Nickelsen (Radio Bremen, Germany)
- Frode Hvaring (EBU, Switzerland)

The EBU strongly values the topic of diversification.

As Shannon Frame, EBU, stated: “For innovation to thrive in the workplace, we need to have diversity. At the end of the day, this does not come down only to increasing the participation of women in technology, but more importantly, to creating an atmosphere that encourages diverse teams in general. Where do I see the most innovation? I see it in teams that have a mixture different backgrounds, ages and gender.”

In the lead up to the event, the group asked other EBU Members and women interested in technology to send short video clips answering a few key questions – what inspires them about technology, what possible barriers exist and what advice they would give to others – before the event.

To watch the video, see: tech.ebu.ch/techwomen.

The positive reaction of the audience during the event was a key indication of the importance of such a topic and the discussion will not stop here. An area on the EBU Technology & Innovation website has now been launched to share best practice and experience and the group plans to report back at the next Technical Assembly.

If you are interested in following the discussion, please contact frame@ebu.ch.

New EBU Technical Committee elected

SHANNON FRAME, EBU



Every two years, the EBU Technical Assembly elects a new team to drive the broadcasting technology and innovation agenda forward. The new EBU Technical Committee will continue to be chaired by NPO's Egon Verharen who was re-elected for a second term this year.

Egon is responsible for research and development at the public broadcaster, NPO, in The Netherlands and brings with him valuable experience in innovation as well as his familiarity with running the EBU Technical Committee. The new vice-chairs of the EBU Technical Committee will be Klaus Illgner-Fehns, Managing Director of IRT and Gino Alberico, Head of Study & Research of RAI.

This leadership is joined by nine other committee members, including:

- Kazimir Bacic (HRT, Croatia)
- Per Bjorkman (SVT, Sweden)
- Galina Fedorova (RTR, Russia)
- Grigoris Maliotis (CyBC, Cyprus)
- Michel Nugent (ERT, Greece)
- Judy Parnall (BBC, UK)
- Thomas Saner (SRG SSR, Switzerland)
- Olli Sipila (YLE, Finland)
- Bruno Tezenas du Montcel (GRF/

FFM, France)

- Richard, Waghorn (RTE, Ireland)

The tasks of the Technical Committee will include bringing together the next EBU Technology & Innovation Workplan 2017-2019 as well as ensuring that EBU Members are well prepared for future broadcasting technology developments.

Simon Fell, EBU Director of Technology & Innovation and Secretary of the Technical Committee, stated: “A warm welcome to the new team! We are pleased to have such talented and committed Members in place to help represent the work of technology and innovation in the EBU and at Members for the years to come.”



VRT Sandbox LiveIP Studio wins first EBU Award for Technology & Innovation

The recipient of the 2016 EBU Award for Technology & Innovation, the VRT Sandbox LiveIP Studio, has launched a new age of convenience and flexibility in professional television programme production. In the future, the award will be given annually, based on an evaluation of factors such as impact and innovation.

The right content at the right time to the right person, on the right device

MICHAEL BARROCO, EBU



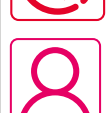




Meeting audience expectations is becoming easier for broadcasters with hybrid broadcasting. The advent of transport technologies such as Hybrid Radio and HbbTV facilitate a wide range of opportunities for custom-made content aggregation, discovery and, ultimately, media consumption.

People like it because it is convenient. You can access it on every device. It is simple and personalized. Interesting content is one step away. You switch on the device, and select the content, like it used to be for broadcast channels.

However, although it may seem convenient for the user, in reality for a broadcaster it is much more difficult to keep a direct link with their audiences who are often distracted from their main channel due to all of the other available options e.g. YouTube, Facebook Instant Articles, SmartTV portals and more...

In terms of strategy, these connected players are becoming gatekeepers. For instance, recently, Facebook was accused of manipulating its news feed, which is actually curated by an editorial team. How are public broadcasters supposed to provide complete and objective information to the public if they can only access a subset of the information? And, in most cases, many people may not know that they are only receiving only subset of news articles (for example).

With this in mind, it is now key for public broadcasters to be able to leverage data while carefully respecting audience privacy and wishes. The European Broadcasting Union (EBU) has started few initiatives in order to help the broadcast industry to wisely collect data and let the audience decide on the kind of information they would

- 
- 1

Open standards and interfaces: Broadcasters' metadata related to the channels and content should be available to the rest of the system.
- 2

Analytics: Data collection to measure the audience and to track system performance needs to be done.
- 3

Single sign-on: A robust cross-platform authentication mechanism allowing each user to authenticate on each of their devices (Online, Radio and TV included). A good design should support identity federation and should let the user choose their preferred identity provider.
- 4

Recommendations: A broadcaster's ability to provide coherent non-linear access and discovery of its content catalogue.
- 5

Personalization: A broadcaster's ability to adapt its user-experience to the user across all platforms. This includes direct access to relevant content and preferences as well as the ability for editorial teams to target and propose tailored content to audience clusters and, ultimately, to any individual of the broadcaster's audience.
- 6

Business intelligence: The ability for a broadcast organization to understand its total audience experience in order to positively impact its business.
- 7

Data broker: A broadcaster acts as identity provider in order to provide user authentication to access external services. Good examples for public service media are libraries, mobility, etc.

like to share with the broadcaster. From a broadcaster's strategic point of view, delivering a unified and data-driven media experience requires organization-level adoption and implementation of the elements in the box above.

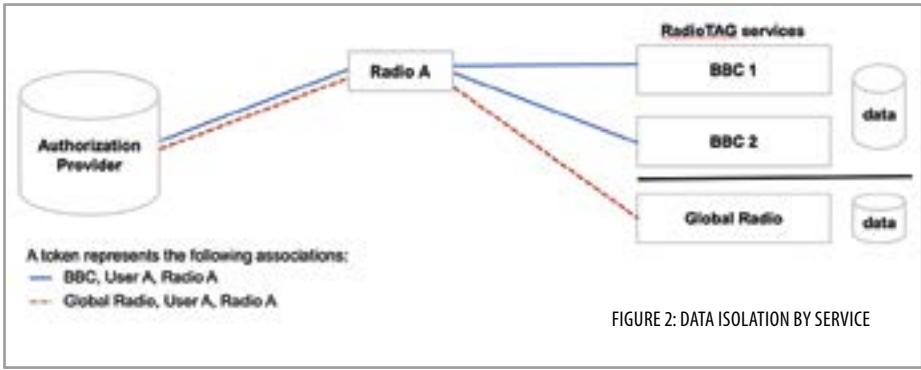
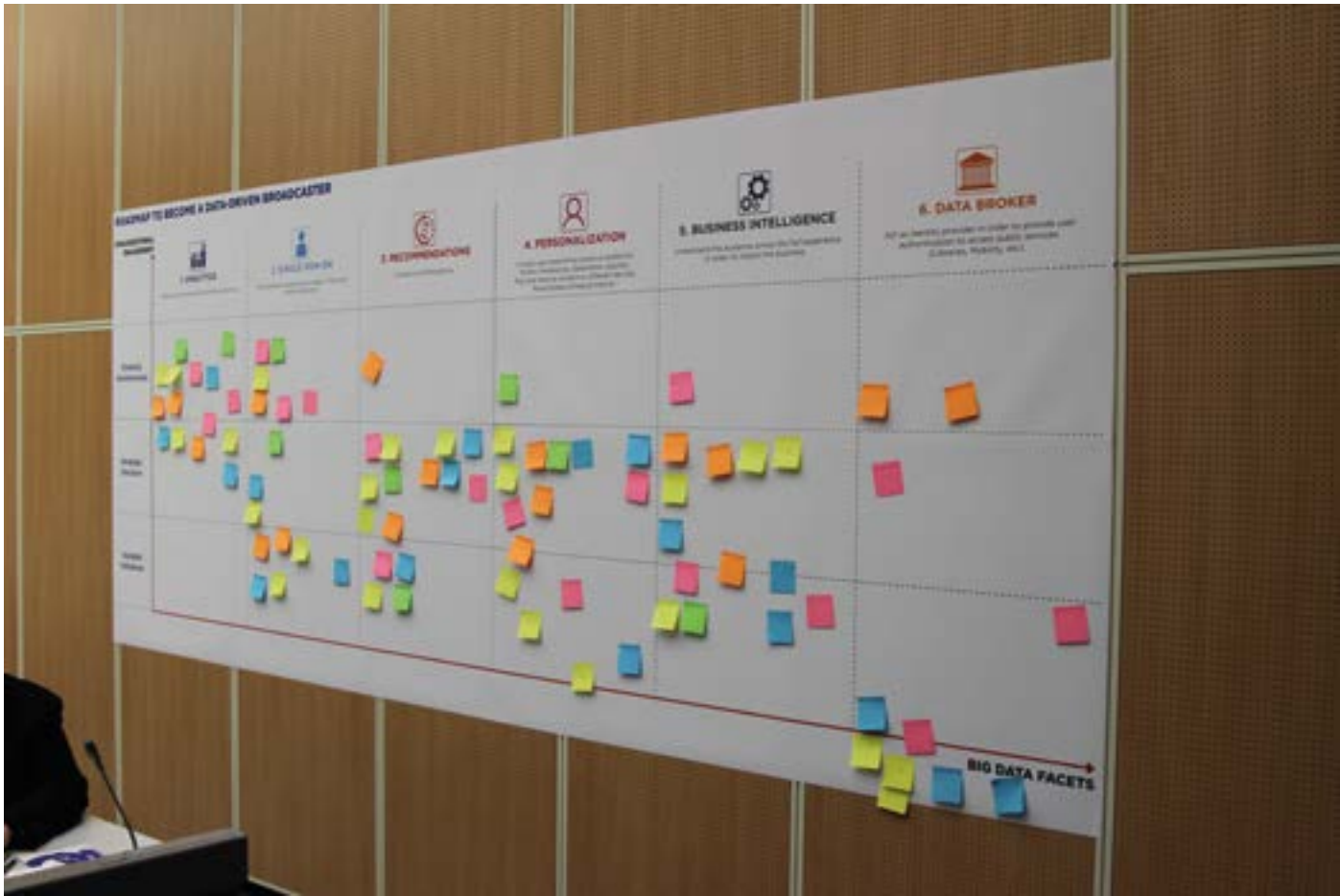
During March 2016, at the Big Data Workshop in Geneva, broadcasters shared the status of their developments on a roadmap as shown in Figure 1. The vertical axis represents the 3 following states (top to bottom):

- Globally implemented
- Strategic decision
- Isolated initiatives

As you can see, broadcasters acknowledge the importance of these various elements, but they struggle to globally implement them. In order to help broadcasters roll-out these milestones, the EBU started multiple

projects around metadata, user authentication and recommendation systems a few years ago. A good example of such activities is the ETSI's Cross-Platform Authentication protocol (CPA) which was designed by an EBU Group to associate online user identities with media devices and was eventually published as ETSI Technical Specification: TS 103 407 in April 2016.

One of the specificities of TS 103 407 is that the user can enjoy personalization at the device level and later bring this experience to other devices. Unlike the OAuth2 framework where each deployment varies, CPA defines a single protocol, which does not have to be implemented multiple times, depending on which broadcaster's service you are talking to. A key requirement of the CPA design is to



preserve a clear isolation between the different services while enabling the user to authorize or deny access to his data and profile. Behind the scene, this authorization is represented by a secret token that the device can store and can then use to access users' data (such as a user's profile, playlists, recommendations or RadioTAG services) as shown in Figure 2.

The challenge is technical, but editorial as well. Indeed, moving from linear scheduling to deliver content on every platform at any time doesn't only consist of providing our broadcast catalog on-demand. It requires a data-driven approach and culture, which will enable

personalized playlists and products in order to maintain what's makes broadcasting so beautiful, its simplicity!

This is why, public broadcasters are now joining forces to develop and deploy a recommendation system which will be able to interface with third party providers and give editorial teams the ability to provide the right content, at the right time, to the right person, on the right device.

Based on open source state of the art technologies, the data pipeline is currently tested and co-developed by RTS (Switzerland), RTVE (Spain), RTP (Portugal) and BR (Germany). Moreover, the CPA reference implementation (<https://github.com/>

ebu/cpa-auth-provider) developed by the BBC and RTS supports hybrid radio, connected TVs and native applications.

With the help of BR, RTS is going to extend its tool to support OAuth2.0 Authorization Code Grant and Implicit Grant. These two grant flows will be used to authenticate users on web server-side applications and browsers client-side applications. The system will be able to support Identity Federation in order to allow the audience to use their favorite Identity Provider (Facebook, Google, etc.) in order to login, while keeping user's data within the broadcaster's realm.

Want to know more? Discover it for yourself: visit our demo at this year's IBC (EBU Stand 10.F20). We will demonstrate an example of a hybrid personalized channel. Come and see a news channel which offers the ability to skip content to user tailored segments created by object-based production and selected by the recommendation system. For more information, see: <https://tech.ebu.ch/personalization>

NTS 2016: Broadcasters expect IP to bring flexibility, agility and scalability

FRANS DE JONG, EBU

"What do media enterprises want?" This was the main question that François Legrand (CBC) asked in his keynote presentation at this year's EBU Network Technology Seminar. He answered his own question in detail and ended with a plea: Let's call it "Legrand's 3-2-1 on IP". Here we go...

"3 desires" which include: flexibility, agility and scalability

First of all, broadcasters expect new IP systems to be flexible; that means they must be able to adapt cost effectively in a given timeframe. Secondly, they demand (business) agility, which refers to solutions that can rapidly respond to changes by adapting their initial stable configuration. The third desire from media companies is to have infrastructures that can scale with increased workloads.

These requirements are not uncommon in the software world, but they do not fit well with the traditional broadcasting industry, which is strongly hardware-dependent (think of your vision mixer, for example) and built around highly specialized interfaces, such as SDI. This brings us to the second part of Legrand's answer.

"2 changes" to focus on: IP and virtualization

To achieve the desired benefits, we need to move from specialized hardware to virtualized software. This will happen gradually, but it is the real IP revolution that is needed. It is called 'IP' because of a necessary first step that until now has received the most attention: the move from SDI to IP networks. But as Legrand explained, this first step is far from allowing broadcasters to benefit from the brave new IP world. To do this, we will need to virtualize the



complete technology stack and make it Commercial off the Shelf (COTS) equipment friendly.

The picture above shows an estimation of where we are on the path to IP Nirvana. Maybe more important is for us to understand where we are compared to other industries. According to Legrand we are about two steps behind the IT industry, in general. What is cutting edge there is the move to hardware accelerated cloud platforms, while the media industry is only just starting to virtualize.

"1 set of standards" that are: open and interoperable

How do we catch up? For Legrand, the main thing the media industry should do is approach the challenges together. The media market is too small for multiple, incompatible series of standards. Instead, it is better for us to focus on a common



set of standards and make sure to benefit from the (75x) larger global IT industry. This may mean killing some of our darlings e.g. do we really need 'clean switching' for every purpose? Could we lose packages sometimes if we conceal the errors? And is a simpler videoscaler good enough if it saves processing time and energy?

In the audience there seemed to be a common understanding that the current standards divergence is not good for the industry. A few hours after Legrand's plea, a vendor representative from the other side of the world repeated it in a discussion session, asking for the opening up (= making freely available) of the core SMPTE IP specifications (ST 2110). Let's see what comes next...

For more information and to access pictures and presentations from the event, see: tech.ebu.ch/events/2016/nts

Part 1: Vertically integrated audio platforms and the need for a standard audio renderer

ROGER MILES, EBU



The really big names in audio can be counted on the fingers of one hand. They are the names that you see on practically every cinema screen, home theatre system and, increasingly, smart TVs and sound bars. If you're to name the names, you'd perhaps say Dolby, DTS and MPEG. Between them they have an enormous impact on our audiovisual lives.

Outside Hollywood, in what used to be called broadcasting, the situation is somewhat different. What comes out of your portable radio, car radio and smart phone is overwhelmingly monophonic and stereophonic, with some 5.0 surround sound available alongside the stereo on HDTV services. Here, the purveyors of the sound systems are much less in evidence. That's because broadcasters (let's call them that) use non-proprietary, open standards; things like PCM, MPEG-1 Layer 2 (still used for satellite and terrestrial delivery of TV and DAB radio) and more exotic but nevertheless standardised systems such as HE-AAC used for DAB+ and internet delivery. Licences are needed for some of these codecs but the principle remains – they are accessible, affordable technologies whose capabilities are well known and exploitable with confidence.

Conventional multichannel surround sound is precisely that; several sound streams are created for playback on a known arrangement of loudspeakers in the listening environment. The classic surround sound is 5.1, where the "5" describes the five main sound channels (Left, Centre, Right, Left Surround and Right Surround) whilst the "1" describes the band-limited LFE (Low Frequency Effects channel that beefs up the

explosions in the cinema and which is usually omitted in a broadcast channel, hence "5.0"). There is also 7.1 channel surround sound, which includes an extra pair of rear surround speaker channels. All these speakers should be arranged to give an unobstructed access to the listening audience's ears – and that audience is usually seated, so all the speakers are roughly at a seated head height in the room. What we know as multichannel surround sound is therefore something that creates a flat plane of surround sound.

That's more or less satisfactory for a domestic environment where the TV screen size is such that a sound that should come from something at the top of the screen is within 50cm (with a 40" TV) to 80cm (with a 65" TV) from a sound emanating from something at the bottom of the screen. It doesn't work in the cinema, of course, or for homes with the new breed of 85"+ UHDTV screens where picture heights are well over 1m. Cinemas use layers of surround sound speakers to accommodate the screen height; domestic UHDTV A/V installations will need to adapt to increased picture height too. The Japanese layered UHDTV audio system espouses 22.2 speaker channels; the Korean system requires 10.1 speaker channels. This is a game where numbers count (pun intended). There is a way around this though.

If we step back to Hollywood for a moment, one of the newer things around is "Dolby Atmos", shortly to be joined by "MPEG-H" and "DTS-X". These offerings from Dolby and others step beyond what is commonly understood as multichannel surround sound and enter the world of object based audio.

An audio object is simply a piece of audio (recorded as PCM or another, possibly compressed, format) that is completely described in terms of its audio characteristics (identity, level, duration, loudness etc.) and its position and movement in the 3D space that the listeners occupy. The absolutely essential point to grasp is that the number of objects that comprise the sound scene has nothing to do with the number of speakers that reproduce the sound scene. An audio object might need to emanate directly from a speaker if that is its position in space, but if it's a noise that is somewhere in the middle of the 3D space and moving in that space, it will be produced by an appropriate (and varying) mix emanating from several of the speakers addressing the space.

What the author/creator of the sound scene generates is a payload of bits, some of which quantify the audio sounds (PCM etc.) and others that describe these sounds (the metadata); all these bits are delivered to their destination where the replay environment has to make sense of them for reproduction through loudspeakers or headphones. If there is any hope at all that the generation of the audio objects is repeatable and transferable between audio systems, the metadata used for the description must be a common, preferably standardised set. Such a set is the ADM (Audio Definition Model) that started out life as EBU Tech 3364 and became adopted by the ITU-R as Recommendation BS.2076 in 2015.

Stay tuned for Part 2 in the next issue of tech-i magazine!

Should We Believe The 'Futurists'?

DAVID WOOD, EBU



Imagine you are in a large conference room in Brussels with a very excited audience. A speaker from MIT enters to face a transfixed mass and, strutting across the stage in the manner of TEDx, expounds his 'truth' that television, as we know it, is about to perish to the almighty Internet. Sound familiar?

In fact, the scene I describe here actually took place a generation ago in the mid-1990s – over 20 years ago. Those present really believed what they heard that night. I was convinced that, by the time I got back to Geneva the next day, TV broadcasting would already be no more.

The EBU itself at the time was not deaf to such voices, and set up a group to examine what future, if any, broadcasting might have. We were sent videos, usually involving gurus from the US, with the same message. I recall the cynicism of the group's Chair, Geraint Stanley Jones: "Let's just watch the tapes, and we can get back to making real television".

Nothing of those predictions of the 1990s 'futurists' came to pass. Yet, there was never an admission that they were wrong. No one suggested that the speed of such change – even if true – was vastly over-estimated, and that – at best – timescales would need to be revised backwards. I guess it's quite difficult to admit that you were not right.

Over the last 25 years, we have seen cyclical predictions of the same death of television, none of which have come to pass. The lectures/presentations still happen today. They keep the circulation of several magazines buoyant.

But, if you look back over the last 100 years of the media, you can see that a 'new media' has never ever supplanted an existing media. Why would it be different now? In each case, the new media has simply added to the existing media, creating more media options to consume. Newspapers were not killed by the cinema. The cinema was not killed by radio. Radio was not killed by television. Satellites and terrestrial were not supplanted by cable. In each case, there were gurus explaining that the new media will kill the old – but it didn't.

Television consumption has only increased since we first heard the predictions of its demise. Yet year in, year out, there are those who tell us television is dying. I know of nobody working in television who has ever said the reverse – that the Internet is dying. That would be crazy – in its first 35 years, the Internet has become indispensable and ubiquitous; we cannot imagine life without it. In its first 70 years, television too has become ubiquitous; we cannot imagine life without it.

Futurists can also offer paradoxes that we should look out for. It has been claimed that the spectrum used by terrestrial television today should be given over to mobile broadband – no doubt this would bring the desired contraction of television broadcasting. But is there a need? Why not live and let live? We are also told that, by 2020, there will be a new '5G' wireless mobile broadband system that will need much more spectrum than the UHF bands could ever provide. It will call for a much higher frequency band – this is available and its use will not disturb any broadcasting bands. 5G will provide much greater capacity wireless broadband at much lower costs. Wouldn't people be crazy not to use 5G? Why bother with a 2CV when you could get a Rolls Royce at a lower cost?

There are lessons to learn. One may be that in a market economy, public needs and demands, and the public good, determine what services are available, not a desire for the most dramatic change. Another may be that when we hear from the futurists, we need an 'open minded scepticism' about what they say. There is an adage that we have a tendency to overestimate the speed of technical change and under-estimate its long-term impact. This seems as true today as it was in 1995.

Quality work at the EBU

ANDY QUESTED, BBC & FRANS DE JONG, EBU

Keeping track of changing standards and how they impact day-to-day work may not be trivial, but it is key when those standards are used in business transactions. This is the case for broadcasters, post-houses and other media organizations which work against agreed delivery specifications for example. The European Broadcasting Union's (EBU) work on Quality Control includes a database of QC Tests media companies can perform on material to ensure its quality. Many of these are based on standards, recommendations or simply, the best industry practices. These are not limited to specifications from the EBU, but just as well include work done by the ATSC, ITU, ISO/MPEG, etc. As the standards evolve, the QC Tests database gets updated. So effectively the EBU.IO/QC platform provides a tracked view of the standards it references. How often do they change? That depends. And it depends on the depth of the change if the QC Items need updating. Two recent examples of recent changes to widely used video standards are the following.

Safe areas drop 14:9

In the days when the only screen shape was a 4:3 rectangle, life was pretty simple. Now we have to cope with 16:9, 4:3 and the requirement for compatibility and protection for action and captions, with consumer displays that have "over-scan" and "pixel mapping" as well as regulators that want to protect the audience's enjoyment of the programme. To ease the transition from 4:3 to 16:9, some countries decided to protect programmes by using the 14:9 aspect ratio as a middle ground. A noble initiative, which resulted in a legacy of programmes that are not 4:3 or 16:9! This was all defined in EBU Recommendation 095 which was valid and used for more than 15 years - before both the 14:9 legacy



TEXT SAFE	
	Broadcaster Requirements
	Golden Eyes, EBU R 095
	Text is within Safe Area
	Written Report Only

and the old CRT requirements were removed. The recommendation has now been simplified and updated in line with other standards bodies and it includes both UHD resolutions.

Colour errors made simple

In June of this year, the EBU updated another of its well-known recommendations: EBU R 103. Since its publication in 2000 this specification has been the reference for the tolerances allowed before video signal levels are deemed 'illegal' or 'out of gamut'. The original version was born in the days of analogue processing, when measurements were performed with analogue waveform monitors. The new version 2.0 removes most of the 'traces' from that period. Numerical ranges are now defined for 8, 10, 12 and 16 bit video systems. The update also works for high dynamic range and wide colour gamut but the EBU QC group will monitor how these options affect programme exchange as they become more widely used.

Both updates take advantage of more tolerant digital processing and experience gained over the years. The updates demonstrate the on-going commitment of the EBU to keep its specifications



VIDEO SIGNAL LEVELS	
	Luma, Chroma, Gamut Violations
	EBU R 103
	Luma, Chroma Thresholds
	Gamut Error, Illegal Values

up to date so the quality of programmes can be guaranteed. It is not for nothing the EBU used the strapline "Your Reference in Media Technology" to refer to its Technical work. Over the years, the EBU has pioneered and published many technical specifications and recommendations; ranging from the EBU colour primaries, timecode, and audio loudness through to video safe areas and measurement guidelines. The EBU has literally set "reference" practices for the media industry. But no matter how well grounded, technical work sometimes needs a revision.

The EBU Strategic Programme on QC continues to update the existing EBU QC Test Items collection and to add new ones, including fresh test definitions related to subtitling and the Interoperable Master Format (IMF). However we encourage all EBU groups to contribute to the work to keep EBU.IO/QC the reference for quality and quality control.

See more at: EBU.IO/QC

IMF: Promises and benefits

MATTHIEU PARMENTIER, FRANCE TÉLÉVISIONS

When TV broadcasters replaced tapes by files, they adopted MXF OP1a – a file format that structures content as if it were still on tape - where video and audio essence and metadata are linked within a single file, often frame per frame. This choice allowed the smoothest possible transition to a pure IT infrastructure, the most sensible evolution since the digitalization of audiovisual signals. Fifteen years later, at the point where you find the last tape recorders in archive departments, it is time to reconsider the strategy to store and exchange media and to embrace the real benefit of file-based workflows.

The Interoperable Master Format (IMF) is an evolution of the Digital Cinema Package (DCP). DCP was created to replace film copies in movie theatres, ready to be sent over network and used for immediate playback by standard operators. Similar to DCP, IMF stores different parts of the essence in different files. Like other file formats, IMF uses a mechanism of unique identifiers and references to represent the links between essences. This structure allows editors to create update edits faster, such as a subtitle replacement, the addition of a new audio language or a simple playlist edit to move a marker. From the consumer's point of view, alternative and social media have created a market for personalized content overnight. To stay on par with alternative media, traditional media (print, radio and TV) will have to re-engineer their production and distribution model. Personalization has different aspects: technical (video size, bitrate, codecs, audio language, accessibility services) and editorial (content preferences, continuous playback over several devices, clever search and recommendation tools, etc.). To address these needs, broadcasters have to design their infrastructure to allow versioning at marginal cost, and a file format like IMF offers such flexibility.

In a world where content is primarily distributed via Internet, including radio podcasts and new multimedia creations, it is necessary to collect, enrich and publish trusted metadata related to the available content, as it is exactly these metadata that feed search and recommendation engines. New services for content monetization, such as virtual channels, product placement or target advertisement, need these accurate metadata to work properly..

New metadata are created early on throughout the actual production processes; the choice of the genre, the person who speaks, where and when the action takes place, the brand of the T-shirt the actor is wearing, the context... thousands of applications need to be tested as soon as these metadata become available. Thanks to the tools created to filter big data, some of these applications will become the cutting edge services of tomorrow.

To enable such services, a future file format must be able to store, update and exchange the sheer volume of metadata linked to video, audio, subtitles... and each other. As a good starting point we have EBUCore, an open and powerful schema to collect and classify metadata. Yet, whether the industry will decide to use EBUCore or an equivalent model, the metadata has to be properly stored in or associated with the essence container. This is exactly where IMF will prove to be very useful.

Until now, IMF has had no applications in a broadcast environment. However, recent evolutions in broadcasting, including multi-devices and multicast strategies, have pushed IMF to the forefront as a candidate master format for broadcasters, too. Using IMF as a master format, the producer or broadcaster can easily convert all necessary files to address the full spectrum of distribution networks.

IMF master files, capable of transporting Ultra High Definition, are designed to archive or distribute long-term productions. They require infrastructures that can cope with significantly larger file sizes (10 to 20 times larger compared to a traditional broadcast MXF file). But we should not forget that TV broadcasters also play out live programmes, daily shows and several other short-term productions. For these applications we need a file format that can be produced and played immediately without any process of conversion. Since IMF addresses many of these key issues, the EBU and several partners are now collaborating to create a specification of an IMF for a TV format that adds an immediate playback feature.

France Télévisions is helping by leading a proof of concept of a complete workflow where metadata is collected from pre-production to the delivery of the master file. This MetaDataTV project, supported by the French Cinema & TV Center, involves 3 external partners. Setkeeper manages the collection of thousands of metadata items during the pre-production to facilitate and reduce the cost of the production itself (costumes, sets, accessories, casting, and scenario). Limecraft connects to Setkeeper to harvest the metadata, so each shot is automatically tagged. Subsequently, the metadata are traced throughout the different steps in post-production, so that the master eventually is delivered including a full set of accurate metadata. Perfect Memory ingests such a metadata master file and offers its semantic tools to enrich and publish incomparable information related to this programme, ready to feed any kind of search engine, TV guide, recommendation tool or contextual advertisement service.

Finally: The World's First Smartphone with DAB+

GUNNAR GARFORS, IDAG AND NRK

It took a while. Broadcasters have actively spent at least seven years trying to convince mobile phone manufacturers that it would be a great idea to introduce a smartphone with built-in DAB+ radio. All in vain, until LG announced its exciting smartphone during 'Radiodays Europe' in Paris on 14 March 2016. LG had teamed up with IDAG, an international radio and TV organization, for development, introduction and marketing. The phone, LG Stylus 2, hit the shelves in 20 countries across Europe and in Australia less than two months later and has reportedly sold better than expected. Broadcasters believe that it could sell much better still, but the DAB+ functionality is not very prolific in the phone marketing material, despite its apparent USP.

LG Stylus 2 is not just a DAB phone; it also has an abundance of functionalities anyone would expect from a modern Android model. "To introduce a phone with DAB+ would be useless. We have introduced a great phone with DAB+", said LG's Joël René-Corail when announcing the phone in front of over 800 delegates. Upon receiving spontaneous ovation. The radio industry had almost given up. Their disbelief, followed by relief, smiles and even laughter could be felt throughout Le Palais des Congrès in Paris the following two days.

But DAB+ isn't just DAB+. The smartphone comes with an API (Application Programming Interface) too. That means that developers can create apps that control the DAB+ radio inside, combine the power of broadcasting with the magic of the internet and create compelling functionality never seen before. "Hybrid," the ten year old and heavily hyped buzzword, finally came to life in a Korean handset. Phone users can now listen to the radio



for free, with an abundance of new individualized features thrown in, without wasting their data. To stream radio will typically set you back 70MB per hour. The most common subscriptions in Norway now come with only 0.5GB data per month included (recently cut in half from 1GB). That means 7 hours of radio listening, with no data left for emails, Facebook and Youtube. Which means that you will have to pay to listen to the radio rather early each month. A number of app companies such as All In Media, ARS, Fraunhofer and IRT have all developed their own apps for the LG Stylus 2, and more are in the making. While both Radioplayer and Commercial Radio Australia made their preparations early on and agreed with LG to have their DAB+ apps preinstalled on phones sold in several countries. A little bonus with DAB+ is the extended battery life that broadcasting provides over streaming. And the lack of a gatekeeper between your favourite radio DJ and your listening experience.

Good news, but no time to rest on laurels. A group has introduced an open and universal API that may lower the barrier for phone manufacturers to introduce DAB+ in their handsets while letting app

developers make apps that instantly work on any DAB+ enabled phone. The EBU, the BBC, WorldDAB, Commercial Radio Australia, IRT, IDAG and others have worked on a project called OMRI (Open Mobile Radio Interface) for months. OMRIv1.0 was first made universally available in September 2016.

The broadcasting industry worldwide hopes that this work, together with the projected success of the LG Stylus 2, will propel DAB+ enabled smartphones from various manufacturers to the top of bestseller lists. IDAG and the EBU have continued their talks with LG and are in conversation with other global phone manufacturers about future DAB+ enabled phone models. Some mobile network operators support such phones too, as broadcasted radio offloads data traffic from already congested telecom networks. In the end, the final say is that of the consumer, but there are compelling reasons for why DAB+ radio may soon be among the must-have functions on any new smartphone. As is the case with both GPS and a good camera or two.

LG Stylus 2 also supports DMB, the mobile TV sister-standard of DAB+. DMB is currently on-air in the Netherlands, Norway and Korea.

Broadcast Cybersecurity Challenges

ANDREAS SCHNEIDER, SRG SSR, ADI KOUADIO, EBU

Digitalization hits the broadcast industry

The broadcast industry currently undergoes a broad digitalization, affecting all areas of its business. Customers change their consumption behaviour as well as media companies change their production workflows and techniques, mainly driven by business opportunities such as increasing flexibility and reducing cost.

Conventional Information Technologies providing the new digital broadcast production, and more specifically IP as the conveying medium, fundamentally transform the underlying technology for traditional Radio and TV production and distribution. Even the profession of a Broadcast Engineer is evolving into an IT Engineer. As a result, media companies are becoming an integral part of a new IT-driven ecosystem.

Increasing threats toward media companies

Yet there is a twist in the perfectly IP-interconnected and IT-driven world which other industries (like the energy industry) had to painfully experience. The cyberworld is traditionally the home of malware and hackers. Beginning with the Arab Spring and the Wikileaks whistleblower disclosures in 2010, a growing radicalization and ideologization of hackers has raised a new type of hacker whose intent is not to gain money but to destroy or manipulate systems or institutions at any price. Such activities may even often be government driven, being part of defence departments or national intelligence offices.

Recent hacks like the disastrous attack against TV5Monde in 2015, Sony Pictures in 2014, and a steadily increasing amount of DDOS attacks against public broadcasters have shown the potential damage that can be done.

Even more often the damage of small malware incidents harm a media company substantially. The reason often lies within the architecture of the new IT based broadcast systems which have not yet adopted modern architectures and protection best practices and therefore pose a high risk in the new IP interconnected world.

The EBU Media Cybersecurity Group

So what do we do in light of all of the above? The changes in technology and hackers' approaches require a fundamental paradigm shift to transform and actively address security risks as corporate cyber risks. Security is no longer an operational, technical issue; it is an integral part of wider business decisions which are not limited to the broadcaster itself. It's the whole industry that needs to adequately address security.

For these reasons, the European Broadcasting Union (EBU) has started a Strategic Programme on Media Cyber Security (MCS)¹ to address these new and

evolving threats. The EBU MCS Group consists of Chief Information Security Officers of EBU Members (including SRG SSR). These Members actively share their knowledge to provide broadcast specific recommendations on cybersecurity (e.g. EBU R141 on DDoS Mitigation). These recommendations are built on proven security practices and further refined with the specifications of the media world. Below are a few examples of the types of recommendations the group makes for media companies:

1 Involve security governance at the highest corporate level:

First and foremost, it is key for organizations to create awareness for the topic, especially among senior management. A company's security advocate is required to have the necessary skills and competencies to address security related topics.

The EBU MCS Group has created a security governance guideline (EBU R144) which helps organisations benchmark their security awareness level and also establish an efficient security hierarchy.

2 Raise the security-level of media-specific systems and services:

Even though most media products and services run on conventional IT platforms, the security best practices from the IT world are not necessarily implemented in the media domain. The EBU's recommendation (EBU R143) helps manufacturers and media companies benchmark the minimum security levels of their products or services.

3 Consider security aspects in the design of media application and standards:

Security in media is mainly related to digital rights management around the content. However, in this ecosystem of apps and web-based services, not only the content should be secured, but also the application itself (Android/iOS Media Apps, HbbTV, etc.). If flawed, the application can be used as an entry point to either hijack the device (create a bot) or gain other privileged access. The EBU liaises with different standards bodies and consumer electronic vendors associations to consider minimum security requirements and implementation best practices (e.g. EBU R142 Cybersecurity best practice for connected TVs and services).

This year, the EBU will host a special session on cybersecurity at the IBC conference in Amsterdam to discuss this important topic. Join us in Room Emerald on Saturday, 10 September 2016, from 15:30 – 18:00.

¹ tech.ebu.ch/groups/mcs

TV, radio and the widening generation gap

MEDIA INTELLIGENCE SERVICE, EBU

Television and radio remain central in the lives of European citizens and represent the bulk of their media consumption. They also have well-established measurement systems, which help researchers analyse trends in audience behaviour. In this article, colleagues from the Media Intelligence Service (MIS) share the key trends for television and radio markets across Europe.

"Television and radio are strong but we are starting to see a decline in their ability to reach youth. For example, one in four young people do not watch TV on a weekly basis," comments Francesca Cimino, EBU. Her colleague David Fernández Quijada, EBU, adds: "We also observe a continuous decline in the amount of time that young people spend listening to radio, which is also the case for young television viewers".

Below are some of the main findings of the Audience Trends Report 2016. EBU Members can access both the TV and Radio reports on the Media Intelligence Portal at: www.ebu.ch/mis.

What about television?

Television still plays an important role in European citizens' lives, with nearly 89% of them watching it every week. Over the past three years, we have seen only small declines in television reach across the 47 markets with available data.

Perhaps, surprisingly, given the increasing competition for the audience's attention, the time that people spend watching TV has remained fairly flat over the past 5 years. In fact, at 3 hours 41 minutes, average daily viewing time is 1 minute higher than it was in 2010 before the likes of Netflix entered the European market.

TELEVISION WEEKLY REACH (INDIVIDUALS, %)



However, when putting the focus on youth the story is quite different. Average weekly reach falls to 76%, a decrease of 5 percentage points versus five years ago. In addition, contrary to the general trend, time spent watching television among youth has decreased 17 minutes since 2010, to 2 hours and 6 minutes per day. This means that less young people are watching television and that those who do are watching less. Clearly, this should be a major concern for the television industry.

TELEVISION WEEKLY REACH (YOUTH, %)



What about radio?

If television is a popular medium, then so too is radio. Every week, more than 447 million individuals listen to radio in Europe, representing 85% of the population in the 32 markets with available data. The reach of radio is generally robust, having remained flat over the last five years.

Contrary to the stable viewing trend for television, we are beginning to see a decline in the amount of time people spend listening to radio. Average daily listening time has decreased by 13 minutes since 2010, and is now under two and a half hours for the first time.

RADIO WEEKLY REACH (INDIVIDUALS, %)

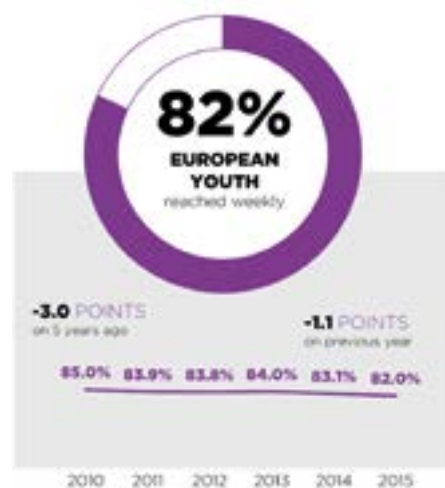


There is a widening gap between youth reach and overall reach. Five years ago, the number of people listening to radio weekly was marginally higher for youth than for the total population. However, while overall reach remains constant, youth reach has dropped by 3 percentage points to 82%.

In terms of the time young people spend listening to radio, the downward trend is even more marked. Average listening time has decreased by approximately 20%

versus five years ago, now it standing at one and a half hours per day.

RADIO WEEKLY REACH (YOUTH, %)



EBU's Peter Mac Avock elected new DVB Chairman

The EBU is pleased to announce that Peter MacAvock (EBU) has been elected to the role of DVB Chairman. At the 83rd meeting of the Steering Board, Peter was chosen to take over from Phil Laven who has served in the position since 2008. Peter was DVB Executive Director for 14 years before taking his current position of Head of Delivery, Platforms and Services at EBU Technology & Innovation. He takes over at an exciting time for DVB as it engages in the ongoing development of UHDTV with decisions on HDR, HFR and Next Generation Audio; future transmission systems; Study Mission Groups on Virtual Reality; amongst others. With the rising importance of OTT, Hybrid TV, and other methods of delivery, the DVB environment is changing, and DVB will adapt to meet the new challenges the TV industry is currently facing.

DVB continues to be the focal point for the technical development of the core systems used by millions of people around the world to enjoy TV. It is unique in its success at standardizing a set of technologies which meets the demands of an ever changing industry, and in doing so gathers together all the stakeholders and decision makers in the industry.

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).

What is LDM and what are the benefits?

LDM is based on spectrum overlay technology and allows broadcasters to transmit on the same RF television channel multiple data streams with different robustness and data capacity, synchronised in time and frequency. Signal cancellation is used to retrieve the upper layer (UL) signal first, cancel it from the received signal, and then start the decoding of the lower layer signal (LL). The UL will normally be targeted for robust low Signal to Noise Ratio (SNR) mobile services and robust fixed service with large coverage, whereas the LL would be best suited for high SNR, high data rate services.

LDM offers an efficient and flexible approach to deliver high quality services, e.g. HDTV and UHDTV, simultaneously to portable indoor/mobile and fixed receivers using a single frequency channel. This technology results from the cooperation between the Communications Research Centre (Canada), the Electronics and Telecommunications Research Institute (Korea) and the University of the Basque Country (Spain). LDM has been included as part of the baseline (mandatory) ATSC 3.0 standard tools.

Results of simulations and field measurements

The performance of the LDM technology has been tested for a wide range of system configurations, injection levels, MODCOD combinations, propagation channels and broadcast network structures. During 2013 and 2014 a field test was operative in Bilbao (Spain) in order

to test different reception conditions for LDM.

The results of simulations and field measurements show that a combination of LDM and DVB-T2 outperform a TDM scheme (DVB-T2+NGH): a clear enhancement of capacity transmitted and of SNR is achieved (for the cases analysed, 30% and 5 dB, respectively). The advantage comes from the fact that LDM uses 100% of the spectrum and 100% time resources for all layers.

Implementation considerations

The major complexity of LDM relies on the receiver side which would require latency and memory requirements to perform cancellation. The receiver first needs to recover the UL transmission symbols. The best way to assure that there will be no errors in the upper layer stream is to rebuild the mobile service transmission signal. Although this cancellation processing involves additional complexity to perform channel decoding and re-encoding, it provides the most reliable UL signal estimate. Nevertheless, it is important to note that, when there is sufficient SNR to decode the LL signal, UL signal is at very high SNR condition, and thus, the LDPC decoder will require very little iteration to converge.

Available only to EBU Members – the latest EBU BPN 107 provides an introduction to layer division multiplexing: tech.ebu.ch/publications/an-introduction-to-LDM.

¹To read more about Time-Frequency Slicing (TFS), see Part 1 in Issue 28 of the tech-i magazine: <https://tech.ebu.ch/docs/tech-i/ebu-tech-i-28.pdf>



DVB – A Progress Report

DVB continues to experience sustained growth in the installed base of consumer devices using DVB specifications, across Cable, Satellite and Terrestrial

broadcast networks as well as IP devices connected via broadband networks. The first products using DVB-S2X, the enhanced version of DVB's satellite specification, are now reaching the market. Basically, all providers of professional Satcom equipment now offer S2X modulators and receivers. Also, the DVB-RCS2 standard is being widely used to deliver high-speed broadband services by satellite. The efficiency and operational flexibility offered by RCS2 has resulted in its adoption by several network operators, supported by terminal devices from a range of suppliers.

Meanwhile, the number of countries implementing DVB-T2 networks continues to grow, with 37 now in operation. 36 further countries have announced plans to introduce DVB-T2 networks. In established markets using DVB-T2, the number of broadcast channels is increasing and the installed receiver base is growing rapidly.

The first broadcast services using DVB's UHD-I Phase 1, offering higher resolution and a wider color gamut are now being implemented. DVB's UHD-I Phase 2 specification will be finalized in the coming months, offering High Dynamic Range (HDR), wider colour gamut and object-based Next Generation Audio (NGA). DVB also plans to provide a specification for High Frame Rate (HFR).

Whilst linear broadcast is, and will be for a long time, the main platform for receiving information and

entertainment, broadband delivered OTT services are gaining in popularity. To support the future growth of IP-delivered OTT content, DVB is starting work on specifications for the use of multicast in OTT content delivery. The majority of consumer internet traffic is video based and that proportion is expected to rise to over 80% by 2020. Efficiently handling OTT delivery of popular broadcast content, simultaneously consumed by millions of people, is vital both for the network operators and for cost management reasons by content providers. Multicast should provide both more efficient bandwidth use and better quality of experience to the end viewers.

In parallel with supporting and enhancing the delivery of content using IP technologies, DVB is actively exploring the relative roles of the Transport Stream and Internet Protocol based system layers in content delivery. Given the widespread deployment of, and huge investment in Transport Stream technology, it seems unlikely that Transport Stream will be abandoned overnight. A more likely outcome is a co-operative approach where both systems co-exist and can enhance one another. DVB is in the early stages of investigating the need for future standardization work that may be required to foster such cooperation and interoperability.

Lastly, DVB is organizing conferences that enable people to learn more about DVB technologies and how to implement them. The annual DVB World conference next takes place next year in Vienna, March 13-15, and the first DVB Asia conference will be held later this year in Bangkok from November 29 to December 1. More information on these events is available on www.dvbworld.org and www.dvbasia.org.

EBU Technical Review on LiveIP published

WILLEM VERMOST AND FELIX POULIN, EBU

The phenomenal success of Internet technology in recent years has led broadcasters to adopt new ways of working. Almost every part of a broadcaster's production chain has now evolved into an IT and IP based infrastructure. Today, only one part of the production chain still relies on dedicated SDI based networks: live production.

The LiveIP Project is a major proof of concept of just how far the industry has already moved towards a possible IP enabled live production. This exploration was made possible by building and operating a live TV production studio with state of the art IP-based equipment using available interoperable open standards.

LiveIP is the result of collaboration between Belgium's national public broadcaster VRT, the European Broadcasting Union (EBU) and a group of innovative broadcast technology partners including Axon, D&MS, Dwesam, EVS, Genelec, Grass Valley, Lawo, Nevion, Tektronix and Trilogy.

This EBU Technical Review is based on experience



gained from current, ongoing LiveIP projects. It attempts to answer and give insight to the many questions around this topic, including: why should a broadcaster change to IP and IT for live production? What is already possible, technically? What operational changes will this bring? And, will all this be possible at a lower cost?

Find out more now by downloading your copy the EBU Technical Review on LiveIP here: tech.ebu.ch/publications/live-ip-a-practical-exploration.



Metadata Developer Network meets at EBU Workshop

JEAN-PIERRE EVAIN, EBU

On 07 – 08 June 2016, the EBU organized its annual Metadata Developer Network (MDN) workshop. The purpose of this workshop is to address a wide range of different aspects related to information management that are relevant to broadcasters. The two-days were highly interactive in order to ensure that delegates had the opportunity to get hands on.

Media information management is an important aspect of broadcasting. As IT-based technology becomes the norm, it is essential that broadcasters use flexible models including web technologies as well as agile systems and architectures that support adaptation to new business models workflows, and prevent vendor lock-in situations.

Topics such as these were well reflected by the

programme. In a nutshell, presentations addressed semantic web in production, data journalism, rights management, tagging, multi-lingual automatic metadata processing, access to cultural heritage, user-oriented information and regulation, developer feedback on FIMS adoption, as well as ‘food for thought’ about unknown future needs to better meet viewers’ expectations.

When asked at the end of the workshop, participants showed their enthusiasm for the event, stating that it was “the best MDN workshop since its inception 4 years ago.” A special thanks was given to the speakers who came with their area of expertise and covered their topics in depth and in an inspiring way. What more could you expect!

Cybersecurity and strategies for media companies – EBU

SESSION – 15:30 – 18:00, 10 SEPTEMBER IN THE EMERALD ROOM AT IBC

More than ever before, Media companies are exposed to cyber-attacks. Several recent examples have unveiled the disastrous potential of these attacks as well as the low awareness level of the broadcast industry toward these threats. Until recently, Cyber Security was usually considered to be an issue for IT as broadcasting was usually an isolated ‘technology island’. However, the introduction of internet-based services as well as the convergence toward broadband has modernized the industry and opened the door to

cyber threats. Through a series of short, dynamic presentations, this session will focus on the broadcasters’ next move when it comes to considering Media Security. Join us.

A panel discussion with top experts from EBU Members and industry will address key questions such as:

- What are the typical attacks toward media companies and the types of attackers?
- How should media companies protect themselves from cyber-attacks?
- How can the awareness be raised within the broadcast industry?

You're invited...
...for drinks, snacks and networking at the EBU stand at IBC 2016. Join us on Monday, 12 September at 17:00 (Stand 10.F20).



EBU redefines illegal colours

EBU R 103 is probably one of the most well-known recommendations the EBU has produced. Since its publication in 2000 it has been the reference in terms of what video signal levels are deemed ‘legal’. The original version of the recommendation stems from a period when video levels were predominantly measured with analogue waveform monitors. The new version 2.0 removes most of the direct traces from that period and rewords the recommendation in digital speak. It is also slightly more tolerant on video excursions than the original recommendation.

Going out of gamut

The origin of EBU R 103 lies in the fact that processing video levels in YUV space may lead to R, G, B levels that are outside of the expected range. Experience has shown that small excursions both in terms of level and affected image area (up to 1% of the image) can be allowed. In fact, trying to ‘cure’ small gamut errors could result in more disturbing quality degradations than the gamut errors themselves! This is why EBU R 103 specifies tolerances, so that the (R, G, B, Y) signals can go a few percent beyond the expected range.

Simpler to use

The new version of EBU R 103 is easier to read, as it defines the ranges in numerical form for 8, 10, 12 and 16 bit video systems. It also has done away with the different treatment of Y vs R, G, B levels. This also means EBU R 103 v2.0 is better prepared for television systems using High Dynamic Range (HDR) and wider colour spaces. The EBU expects to update R 103 again when new HDR and colour standards are published.

For more information, see: <https://tech.ebu.ch/publications/r103>



In the spotlight François Legrand

SENIOR DIRECTOR,
CORE MEDIA SYSTEMS
ENGINEERING,
CBC/RADIO-CANADA

WHAT ARE YOUR CURRENT RESPONSIBILITIES?

CBC (English Services) and Radio-Canada (French Services) used to have separate Media Engineering Departments. As a result of a recent re-structuring, I was asked to lead a new department in charge of back-end/core systems engineering and capital project management for CBC/Radio-Canada media needs.

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

I’m thankful to work for an organization that gives me the opportunity to learn something new every day. After spending more than a decade in various positions, I had the opportunity to gain a good understanding of our digital, radio and TV workflows; including their strengths and limitations. However, what’s even more important is that I recognized that I work with very skilled people than can make anything happen. Our recent newsroom automation project is a good example of a collective success.

WHAT ARE YOUR PREDICTIONS FOR BROADCASTING TECHNOLOGY IN THE FUTURE?

Less hardware, more software. Traditional purpose built static and inflexible broadcast infrastructures will be replaced by technologies borrowed from the IT world. Software defined infrastructures will bring much-needed flexibility, agility and scalability. As an industry, we collectively have to do it before others decide to.

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

On the technical side, cybersecurity is a major challenge that we all need to consider more seriously. One of the virtues of traditional SDI/AES based “baseband networks” is intrinsic immunity to cyber threats. Since this will no longer be the case with the switch to IP for real-time media transport, cybersecurity needs to be included in every step of the process and cannot simply be an afterthought. By working together, EBU Members can help manufacturers and solution providers to offer safer systems.

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

I like to build things, all kinds of things, from simple wooden toys all the way up to complex servo controlled CNC machines. Being a maker is part of what I am.



DEVCON

**1-2 November 2016,
EBU, Geneva**



FORECAST

**23-24 November 2016,
EBU, Geneva**