

tech*i*

End in sight for FM?

Plus
HIGH FRAME RATE TESTS
SECOND SCREEN PRINCIPLES
MEMBER PROFILE: ZDF
SWISS MEDIA CLOUD
and more...



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Cover Story: We're focusing on radio in this issue of tech-i, including an update from Norway, where plans are in place to switch off the FM network as early as January 2017. See page 6. (Photo: Tore Guriby/DRN)

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Setting the bar high

Simon Fell, EBU Director of Technology & Innovation

many Members are still firmly focused on installing end-to-end HDTV chains for delivery; and with the current economic climate there won't be much appetite for redeveloping facilities before current investments have been fully amortized.

My third IBC 2013 discussion point was around UHF spectrum and the demands of mobile broadband. Much is made of the insatiable demand for mobile broadband data and the year-on-year growth predictions do indeed look challenging. However, many millions of digital terrestrial TV viewers will suffer if UHF broadcast spectrum is further squeezed. Affordable and efficient broadcasting to a majority of homes in Europe could be replaced in the long term by an en masse switch out of terrestrial receivers for satellite and cable (where available) and a variety of mobile broadband solutions. Is fibre ready to deliver to homes at the required density? Not for some years to come.

We need to evaluate these predictions very carefully since the majority of in-home viewing of broadband services is largely on tablets via Wi-Fi. Are 4G networks being designed to meet in-home viewing demand? Not yet! In most early phase rollouts there are only a few cities and motorways covered. Rather than delivering to the mass audience in hard-to-reach regions it is predictably the highest revenue earning areas that benefit from such services first.

This debate will run and run and I predict will be a hot topic for the next few years. There must be a future for the most efficient and cost effective solution for viewers – broadcasting – to live on.

The topic of radio figures strongly in this issue of tech-i, with an update on the EBU's important Euro-Chip campaign, a call to smartphone manufacturers to give developers easier access to radio receivers, and an update from Norway, where a fully digital radio market is on the horizon. These are exciting times for the radio community and we're fully behind them in working to ensure that technology won't be a stumbling block.

Firstly I must thank my predecessor in this role Lieven Vermaele for the work he did before me at the EBU. I have inherited a great team, full of enthusiasm and invigorated to push forward with technology to benefit all the EBU family. We all wish Lieven the best of luck in his new venture.

September brought another successful IBC for the EBU, with thought-provoking demonstrations and a consistently busy stand. Highlights included the huge interest in the side-by-side comparisons of higher frame rate content and the genuine appreciation of the great work done by our Quality Control group in defining a baseline set of test criteria. Overall it was a pleasure to see the high regard in which the EBU Technology & Innovation team's work is held.

There were three general themes that struck me in Amsterdam this year. Firstly, the question of what the future holds for the studio and post-production infrastructure we've known and loved all these years. Are we going to extend the life of HD-SDI and have multiple connectors, or will the IP studio be a reality when we come to design the next generation of facilities? Watch this space.

The second big topic was Ultra High Definition, where CE manufacturers have moved quickly towards launching products based on increased resolution alone. The investigations done by the EBU and others indicate the industry and consumers will benefit more if we pause, draw breath, and challenge ourselves to see what we can deliver if we dare to dream of higher dynamic range, wider colour gamut and higher frame rates. It's true that this may be beyond the capabilities of today's electronics, but let's set the bar high this time and avoid letting the public down with false promises too early in the development cycle. After all,

SMPTE

TECHNOLOGY COMMITTEES MET IN MUNICH

SMPTE's 2013 European engineering meetings were hosted by IRT at the Munich Technical University from 18-22 September, co-sponsored by Harmonic, Harris and the EBU. Some 50 SMPTE members attended in person, with a similar number participating via web conference.

A comprehensive report of the meetings is available from the SMPTE website, but key developments for EBU Members are mentioned here. Among the newly approved projects in the 10E Essence committee is an effort to standardize a means of characterizing the performance of lighting systems, with an emphasis on LED luminaires. The EBU provided a key contribution based on its LED group's development of the Television Lighting Consistency Index 2012.

Three new projects propose to address the concept of immersive image formats for future TV systems – the concept of “better pixels”. The first investigates an expanded luminance range for next generation entertainment content, aiming to define a new Electro-Optical Transfer Function (EOTF) based on a human perceptual model. Two other projects deal with colour gamut/differencing and the metadata needed to carry information about the colour settings and dynamic range of the display used for mastering.

The Study Group on the UHD TV Ecosystem had completed its initial report in time for IBC, with more than 800 downloads from the SMPTE website recorded at the time of writing. This group will now concentrate on the UHD-2 format (8k). Also published are revisions to the 2052 document suite for SMPTE Timed Text, including a new document addressing conversion of CEA-708 Caption Data to SMPTE-TT (2052-12).

A newly formed study group is developing a mechanism for open binding of persistent content identifiers for audio/video material. The work will help protect and track high value programmes in B2B and B2C applications. While the study group is not conducting concrete standards work its report will outline the work required in future.

The Cinema Sound Systems committee is continuing its work on immersive audio systems. Two proposals have been received for object-based sound, and the possibility of harmonization will be studied. Work also continues on defining a SMPTE core metadata set for professional motion imaging applications and users.

The advent of UHD TV technologies has highlighted the need for real-time interfaces supporting the full range of parameters including higher frame rates (120 Hz) and increased bit depth. The initial focus in SMPTE concerns the evolution of the serial digital interface (SDI) towards multi-link 3 Gbit/s, 6 Gbit/s and 12 Gbit/s following a gearbox approach (as used in the telecommunications industry). The work builds to a large extent on the SMPTE 425 standards set.

Also on the agenda is the evolution of the existing SMPTE 2036-3-2012 standards (Ultra High Definition Television — Mapping into Single-link or Multi-link 10 Gbit/s Serial Signal/Data Interface). The current version doesn't support frame rates up to 120 Hz and therefore a new project has been proposed to cover the full range of parameters defined in ITU-R BT.2020. The next series of SMPTE engineering meetings will take place in Atlanta from 9-13 December at Turner Broadcasting. On Wednesday 11 December a full afternoon will be dedicated to user input discussions on the requirements for future media standards (technology and business views). User organizations interested in contributing should contact SMPTE engineering VP Hans Hoffmann (hoffmann@ebu.ch).

The 2052 documents and the UHD TV ecosystem report are available from www.smpte.org. For the full report of the SMPTE Engineering Meetings visit tinyurl.com/smpte-irt.



WEBINAR: UHDTV IN EUROPE

6 DECEMBER @ 14:00 CET

This free webinar will set out the technology roadmap towards the introduction of UHDTV in Europe, addressing when it might happen, why, and how it will be done. Presented by Hans Hoffmann, Yvonne Thomas, Adi Kouadio and David Wood.

[webinar-uhdtv](http://tech.ebu.ch/webinar-uhdtv)

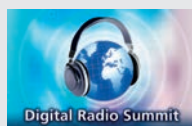


Production Technology Seminar 2014

28-30 JANUARY, GENEVA

The theme of this flagship EBU event for the media production community is *Changing Times, Challenging Times*. There's a strong emphasis on use cases, practical examples and tutorials, including a keynote presentation from Mark Harrison of the UK Digital Production Partnership.

<http://tech.ebu.ch/pts2014>



Digital Radio Summit 2014

12 FEBRUARY, GENEVA

The Digital Radio Summit brings together key players from Europe's radio community to discuss the latest ideas, trends and challenges around radio platforms and services. Other radio-related meetings also take place during this week, including the RadioHack workshops.

<http://tech.ebu.ch/drs2014>



BroadThinking 2014

26-27 MARCH, GENEVA

The event where Broadcast meets Broadband, it will be of interest to anyone working with hybrid services, interactivity, second screen, CDNs, IP delivery and everything related to providing media on the internet.

<http://tech.ebu.ch/broadthinking2014>



Network Technology Seminar 2014

24-25 JUNE, GENEVA

The Media and IT Rendezvous. Bringing together specialists in broadcast engineering and IT networks and infrastructure, whether for production, contribution, B2B, or primary distribution.

<http://tech.ebu.ch/nts2014>

Also on the horizon...

TECHNICAL ASSEMBLY 2014

12-13 JUNE, PRAGUE

Hosted by Czech Television

EUROVISION ACADEMY

UNIQUE EXECUTIVE PROGRAMME LAUNCHED

The EBU's corporate training division, EUROVISION ACADEMY, has launched its first executive programme tailored to the needs of public service media professionals. The three-week course was developed in association with IESE Business School, ranked first in the world for its executive education programme according to the Financial Times (May 2012), and UCLA's Anderson School of Management, a leader in media management education.

The head of the EUROVISION ACADEMY Nathalie Labourdette says that the diploma will foster the development of the next generation of top public service executives. "The course has been expressly designed with EBU Members in mind. Public broadcasters need to think big, to consider new ways the industry may develop, without losing sight of their public service remit," she said. "For several months, we've been working with IESE and UCLA to develop a unique curriculum that targets

the critical business issues, technical advances and challenges specific to public service media in Europe."

The three five-day modules, scheduled for May, September and October 2014, include lectures, case studies, workshops, simulations, and face-to-face meetings with key figures from leading media companies in Barcelona, Los Angeles and New York. Registration will be open to 25-30 participants whose applications will be reviewed by an EBU selection panel. For more information about the programme visit: www.ebu.ch or contact Frederic Frantz (frantz@ebu.ch).

**EUROVISION
ACADEMY**
OPERATED BY EBU



FORECAST'13

EBU MEMBERS CALLED TO ENGAGE IN THE SPECTRUM DEBATE

The EBU's annual seminar on broadcast technologies, media delivery and spectrum use took place in Geneva at the start of November. FORECAST'13, which was the first event to use the redesigned main meeting room at the EBU, attracted more than 110 participants. There were, of course, many EBU Members present, but also representatives of network operators, regulatory bodies, policymakers, manufacturers and research labs.

The keynote presentation, from EBU Media Director Annika Nyberg Frankenhaeuser, opened the event with a reminder of why the topics under discussion were so important, as per the event's subtitle, "Mission Critical for Public Service Media". She stressed the importance of a sustainable terrestrial broadcasting platform in ensuring that public broadcasters can continue to deliver free-to-air services with universal coverage.

The environment in which broadcasters are operating is evolving quickly and becoming more complex. The convergence of technology is creating more divergence in distribution for EBU Members: they have more platforms to cover, more types of service to produce and more costs. And of course all of this must be done with less funding. The regulatory environment is also changing. In the context of FORECAST there were two key areas for concern. Firstly there is ever-increasing pressure on the spectrum currently used for broadcasting, from those pushing for more to be allocated to mobile services; and secondly there is the likelihood of interference problems growing as 4G networks are deployed. The IRT's Christoph Dosch was one of a number of speakers that called on the broadcasters present to make their voices heard more loudly. There is a strong alliance pushing for more spectrum for wireless broadband - broadcasters need to work hard to counter-balance this. "If you don't use it, you will lose it", was the message.

There was plenty of evidence that broadcast technology is evolving, but still many open questions. When might UHDTV find a place on terrestrial networks? Will there be receiver legacy

problems as third generation broadcast standards emerge and how can they be addressed? As distribution technologies approach the theoretical limit of what's possible, it becomes difficult to produce more efficient systems.

The topic of content consumption on mobile devices – which goes beyond narrow definitions of "mobile TV" – also generated lots of discussion. While all seemed to agree on the importance of the issue, even if it still represents a very small proportion of overall viewing figures, there were no clear answers yet on the best way to meet consumer demands in future. For indoor consumption on mobile devices (which represents the majority in fact), the demand is met by fixed broadband networks extended by Wi-Fi. Mobile broadband networks, even with additional spectrum, will struggle to meet the demand.

Hybrid broadcasting solutions were on the agenda once again this year, with the continued interest evident in the number of questions generated by the presentations. Talks on DVB-T2 Lite, transcoding from DVB-T/T2 to Wi-Fi in the home, and the Tower Overlay concept for DVB-T2 were all well received. While it's far from clear whether these or other proposals will actually come to market, it's certain that close cooperation between the broadcast and broadband worlds would be required.

FORECAST'13 was coordinated by the EBU's Elena Puigrefagut. In wrapping up the event she once again called on the EBU Members present to ensure that they engage with their respective national administrations and regulatory bodies. She acknowledged that the EBU can do more to assist with this lobbying effort, in addition to its valuable technical studies. David Hemingway (BBC), who chaired FORECAST'13, encouraged Members to join the EBU's strategic programme on Spectrum Management and Regulation, a group that he leads.

FORECAST'14 will take place on 18-19 November. The presentations from FORECAST'13 are available online to EBU Members. See <http://tech.ebu.ch/forecast13>



PUBLICATIONS

IBA TECHNICAL REVIEWS 1972-1988

The Independent Broadcasting Authority (IBA) was the regulatory body for commercial television and radio in the UK over the period 1972 – 1990, *writes the EBU's Roger Miles*. It had its engineering headquarters for the majority of this period in Crawley Court near Winchester, although many of its staff were dispersed throughout the UK at transmitting stations and maintenance sites. The IBA was active not only in designing, building and operating transmitter networks; it also made significant contributions to then-new digital broadcasting standards and their implementation. Over a period of sixteen years, 24 volumes of the IBA Technical Review were published. These were primarily written by the technical staff of the IBA, while some articles were also written by others from the Independent Television companies and by external specialists.

These Reviews effectively document

engineering theory and practice during a period of considerable change in broadcasting, and both analogue and digital technology is addressed. This group of documents is an extremely valuable engineering resource that contains a wealth of information that even now is fundamental to a proper understanding of television and radio.

They were always freely available to those who requested a copy when in print, but that was a long time ago. Fortunately for us, Gordon Drury (one of the IBA stalwarts) has scanned the complete set and they have been made available for free download from the NTL Pension Association website (<http://www.ntlpa.org.uk/memorabilia>). As fresh as the day they were published – do not miss the opportunity to get your hands on them; Volume 2 (Technical Reference) and Volume 10 (A Broadcasting Engineer's Vade Mecum), at least, should be on every young engineer's smart device of preference.



EBU TECHNOLOGY
& INNOVATION
DIRECTOR
WELCOMING
DELEGATES TO
FORECAST'13.

EBU.IO

SOFTWARE DEVELOPMENT PORTAL LAUNCHED

When I arrived in the EBU in 1994, *writes Peter MacAvock*, I met with a world of photocopiers and fax machines. Everything was handled on paper. Today, the EBU continues to work through a lot of paper, or at least print-based, documents: recommendations, technical reports. While the majority of EBU groups continue to work with such traditional means of documenting techniques and experiences, there is a parallel development unfolding in the software development world.

As more and more developments take place in software only, and as the experience of the EBU and its Members grows in this domain, the Technology & Innovation team has worked to apply the same rigour to the way it carries out software development as it does with print based media. Of primary importance is to retain the same high quality in software as the EBU has in print.

So there are two major pillars: a set of software development guidelines describing the way in which we expect our developers to work; and an innovative shop window for EBU T&I software developments: EBU.io.

Based on scrum and agile development techniques, applied to the particularities of media software development, the EBU T&I guidelines are designed to ensure that the output from our work is of the highest quality, and it re-use can be maximized. To do this, we encourage software developers to work in teams, to review each other's code, and to work in "sprints": a series of short timeframe concentrated development cycles.

Since many of the developments require a core set of features, user management, media players, etc., we have gathered these together into a common publication platform called EBU.io. By having a common set of features available to all projects, we ensure that each development can concentrate on core innovations in the media sector.

EBU.io itself is equivalent to the publications database on tech.ebu.ch. It is designed to publish our internal projects, discuss potential candidate projects, and allow EBU Members to publish their work.

The aim is to ensure that once a software development has been finalized, it is available to all Members and the wider community for use in an easy-to-access facility. See: <http://tech.ebu.ch/io>

Norway's digital transformation

NRK IS SYSTEMATICALLY WORKING TOWARDS BEING THE WORLD'S FIRST BROADCASTER TO SWITCH OFF FM IN 2017. HOW TO ACHIEVE THAT? BY LAUNCHING MORE AND BETTER RADIO STATIONS. AND BY DISTRIBUTING THEM EXCLUSIVELY DIGITALLY, SAYS EBU TECHNICAL COMMITTEE CHAIR **ARILD HELLGREN**.

NRK, the Norwegian Broadcasting Corporation, has together with the private radio broadcasters established a separate company to organize and promote digital radio. "Digital Radio Norway" (DRN) is jointly owned by NRK and Norway's biggest commercial radio group P4 (owned by Modern Times Group). It also cooperates closely with the second private radio company, SBS Radio Norway, and the association for local broadcasters. In this way virtually all of the radio industry in Norway is gathered under the same pair of wings.

PUBLIC-PRIVATE COOPERATION

This construction satisfies the authorities' demand that the radio industry itself should plan and fund the new nationwide DAB network. The present DRN, established in 2009, is built on public-private cooperation dating back to the early days of digital radio in Norway, in the 1990s. As in many other countries, digital radio had a slow start in Norway. But the public-private cooperation has been firm throughout the years. The competition between the different players in the market is fierce. But they agree on the playing field and the rules of play – to the benefit of all. This has been a key factor for the success of digital radio over the last few years.

In addition to promotion, DRN is an operator in the private part of the radio industry. It is also facilitating a new common internet radio player, along the lines of the UK's Radioplayer.

The payback is a shorter period of costly double distribution (FM and DAB) and an early FM shut-off.

By the end of 2013, two DAB+ multiplexes will cover more than 90% of the Norwegian population, the authorities' demand for coverage to the private broadcasters. NRK has a tougher challenge. By the end of 2014, NRK's multiplex will cover 99.5% of the population – even indoors, as required.

During 2014, there will be approximately 30 radio services in Norway, more than half of which will be private. Both multiplexes will cover all

THE GOVERNMENT
REQUIRES THAT
50% OF RADIO
LISTENERS SHOULD
BE TUNING IN ON A
DIGITAL PLATFORM
DAILY.



the main roads and it's planned to cover 500 tunnels over 500m in length. 37 local networks are also being built and there is frequency capacity for at least one more national commercial multiplex, should the demand arise.

TRIGGERING THE SWITCH

All this is being financed and paid for by the broadcasters themselves. That increases the motivation for having the old analogue FM network switched off as soon as possible. Double distribution is expensive and unnecessary. But to get the final governmental approval to switch off FM, some conditions must be fulfilled:

Sufficient coverage, reasonably priced and well-functioning car adaptors and "added value" to the listeners when they convert from FM to DAB. In practical terms, this means more and better radio on DAB than what you currently find on FM. And it means additional services, which digital radio is capable of delivering.

But there is one more mark that must be made, and the government will measure the probable success in early 2015. By then, 50% of the radio listeners must tune in on a digital platform daily. A digital platform means DAB, the internet, a mobile app, or radio via digital TV. If these criteria are not met, the FM shut-off will be postponed from January 2017, but to no later than January 2019.

EXPENSIVE DELAY

If the radio broadcasters in Norway should fail to meet the criteria listed above, NRK's extra daily bill is estimated to be €34,000 (275,000 NOK). In the very worst case, a possible two year delay will amount to almost €25 million. For a public service broadcaster which is funded by license fees from less than 2 million households, that is a huge amount of money.

Therefore NRK as an organization is working hard to fulfill the criteria. The technical demands are "easy", and coverage is being built according to plan.

The hardest job is to educate and motivate the radio listeners to actually move away from their good old radios into the new, digital world. The good news is that they have already started to move. NRK P1+, the broadcaster's new digital only radio station, was launched on 2 October. It targets senior audiences, and they were already praising the new station shortly after launch. On the very first day, about 235,000 listeners tuned in. Over the next two weeks the daily audience has averaged 185,000 listeners. That is over 4% of the total radio audience in Norway. The success confirms our knowledge that what really can help to move our audiences is quality content. Good coverage and available devices are merely necessary preconditions. Over the next months, NRK will launch yet another new digital station and upgrade several of the existing ones.

Tune in to SP-DRP

IN THE REALM OF DIGITAL AND HYBRID RADIO THERE IS A DIZZYING ARRAY OF GROUPS, TECHNOLOGIES AND PLATFORMS THAT TOGETHER WILL FORGE THE FUTURE OF RADIO. **MATHIAS COINCHON**, COORDINATOR OF THE EBU'S DIGITAL RADIO PLATFORMS GROUP, DESCRIBES HOW MEMBERS CAN GET INVOLVED.

DAB, DAB+, DRM, RadioDNS, hybrid radio, internet streaming, visual radio, EPG, tagging, service following, Radio API, etc. These are all commonly heard terms when talking about radio platforms nowadays. The EBU strategic programme on Digital Radio Platforms (SP-DRP) was created in this context to help members to clarify their strategies, identify work to be done and exchange on technology.

WHY ANOTHER GROUP?

One could ask why create another group dealing with radio platforms? Certainly there are lots of external groups dealing with radio, but SP-DRP is actually the only group under the EBU Technical Committee focused specifically on radio matters. It is chaired by Javier Sánchez Pérez of RNE (Spanish National Radio).

Compared with television, for radio there is considerable fragmentation in terms of organizations dealing with the definition of platforms. We have WorldDMB, RadioDNS, the DRM Consortium, the Internet Media Device Alliance and others. These organizations bring together the industry and broadcasters on the technologies they are promoting. However there was no platform-agnostic group to consider all these technologies together and allow public broadcasters to exchange between themselves on the strategies and technical developments. This is the gap that SP-DRP fills.

With guidance from SP-DRP, the EBU Technology and Innovation Department is active in many areas related to radio:

- Organization of the Digital Radio Week, incorporating the Digital Radio Summit and the RadioHack developer workshops. By facilitating the different radio organizations to

hold meetings and assemblies in the same place, the Radio Week offers a unique networking opportunity. The Digital Radio Summit is the public conference in the middle of the week, bringing all of the key stakeholders together. RadioHack is a workshop made for developers and geeks to share developments, and work on tools for setting up new services. It is useful for both broadcasters looking at implementing new services and industry representatives who want to explore ideas for future products.

- Representing EBU Members and liaising with organizations such as WorldDMB (Steering Board and Technical Committee), RadioDNS (Steering Board), IDAG and the DRM Consortium.
- Development of open tools for hybrid radio and a platform to help broadcasters to experiment and enable services.

SP-DRP acts as the umbrella group for all of these activities and can also act as a proxy group for Members when the EBU is representing broadcasters on radio-related issues.

The EBU also has a New Radio Group, sitting within the Media Department. It is focused mainly on content while SP-DRP handles technology and platforms.

A key milestone this year for SP-DRP was the publication of the R 138 Recommendation for Terrestrial Digital Radio Distribution in Europe. While it is "only" a one-page document it required lots of exchanges to reach agreement on the way forward for radio delivery platforms for Europe. This simple document helps to set the scene in Europe both for broadcasters planning a digital rollout and for manufacturers who need to consider technologies and

features to implement. Its publication coincided with the launch of the EBU-led Euro-Chip campaign promoting free-to-air digital radio integration in media devices. (See page 8)

NEW PRIORITIES

A number of new trends are under discussion in the context of SP-DRP. These include:

- Hybrid Radio: How do systems connect? What is the experience? How to produce content and services? "Second screen" for radio?
- Mobile Integration: Collaboration with the Universal Smartphone Project (see page 18), use cases.
- Production: Automation of processes, Metadata extraction, Visual radio production.
- Advanced Audio applications for radio: Use of binaural and surround in radio, use cases, showcases.

Of course the group cannot address all these topics at the same time so it will decide on a prioritization of the objectives. It depends strongly on the active participation of EBU Members, so if you feel you could have an impact on one of these topics, please join. The strategic programme has the authority to initiate project groups with specific objectives. RadioHack is at the moment the only project group under SP-DRP.

Joining the group doesn't create an obligation to attend all meetings. Participants are added to the mailing list and can access the wiki and other resources. Meetings happen mainly via teleconference. However, for the success of the group, active participation is crucial so organizations that are active in radio developments are warmly invited to come and share their experience.

For more information, or to join the group, visit: <http://tech.ebu.ch>



DIGITAL RADIO SUMMIT 2014

12 FEBRUARY • EBU, GENEVA

Bringing together key players from Europe's radio community to share ideas, experiences and inspiration around technology and platforms. The Summit is the highlight of the EBU's Digital Radio Week, which includes meetings of the main radio technology associations and the RadioHack workshops. Visit: <http://tech.ebu.ch/drs2014>

RIGHT NOW THE
FOCUS FOR EURO-
CHIP IS ON THE
MOBILE PHONE
INDUSTRY

Euro-Chip: what do we want to achieve?

EBU MEDIA DIRECTOR **ANNIKA NYBERG FRANKENHAEUSER** SETS OUT THE ORIGINS AND AIMS OF THE EURO-CHIP CAMPAIGN, AN EBU-LED INITIATIVE THAT EMPHASIZES THE NEED FOR FREE-TO-AIR RADIO RECEPTION CAPABILITY TO BE INCLUDED IN ALL DEVICES.

It all started with a lunch in March 2012. Tim Davie, who was at the time responsible for radio at the BBC, came to see Michael Mullane and me in Geneva. We sat in the EBU cafeteria, talking about radio in general, about the slow uptake of digital radio in Europe and about what could be done to speed up developments. And then Tim said: "You know, one of the really important things we did in the UK to drive the development of digital radio was to have regular, rather informal meetings between people in leading positions in both commercial and public radio. These meetings built trust and understanding in a crucial way. Do you think we could do something similar on a European level?" Mike and I looked at each other and said, hmm, well, it will not be easy, but why not? Let's try.

We set to work, and in June we were ready for the first meeting.

START SMALL

CEOs and DGs from public service radio organizations in France, Germany, Sweden and the UK joined, the AER (a Europe-wide trade body representing the interests of private/commercial radio stations) was represented, as was commercial radio in the UK. We deliberately wanted to keep the first meeting rather small, just to see how it would go.

And it went well. At the first meeting we succeeded in building an understanding and also a feeling of trust. We agreed on a name for the initiative, the Euro-Chip

Campaign, and we agreed on the basic message, which is: *we support free-to air analogue and digital broadcasting in all devices as a minimum requirement*. The underlying assumption is that radio will not survive as just analogue, nor will it have a future if it is only distributed on the internet. Radio needs a broadcast backbone, and the future for radio is hybrid and digital. We need a combination of broadcast and broadband.

Thinking about it afterwards it was rather astonishing that we did manage to agree. After all, most of the people who met in Brussels in June 2012 had never met before, and the meeting did not start well. Tim, whose presence was really important, was horribly late due to some airport disaster, the projector in the room refused to work and it took a while to get organized. But once we got going everything was fine and it all ended well.

After that first meeting the initiative took off at great speed. The name of the campaign – Euro-Chip – first caused a lot of confusion and emotions ran high for a while, particularly in the technical community. "What is this? Is the EBU starting to produce chip sets?" These were the kinds of question we were confronted with. But the confusion was soon settled, and more and more broadcasters and others have joined the initiative.

BUILDING MOMENTUM

We still haven't quite achieved the level of support we would like to have from

commercial radio across Europe, but we know that our progress is followed with a keen eye and commercial radio is increasingly represented in meetings. Overall the response has been positive and there is a lot of support for what we are trying to achieve. We have written a Memorandum of Understanding, which has already been signed by all the major PSM (public service media) organizations in Europe, to support the initiative and to increase credibility.

We have also established tight cooperation with many other campaigns and initiatives in the field of radio, with the aim of aligning the messages to the industry as much as possible. Many parts of the radio industry – for instance the car industry – are important, but for us focus right now is on the mobile phone industry. We talk both to manufacturers and to network operators. A chip capable of delivering what is included in the basic message of the Euro-Chip initiative in smartphones and tablets as soon as possible is our target. This would be a major breakthrough for the future of radio.

A slight decline in the listening to radio among young audiences can be seen in many markets, but we are convinced this is not because radio is not interesting. On the contrary, radio is well suited to our modern lifestyle. But young audiences do not use traditional radios; they use tablets and smartphones. If radio wants to have a future, this is clearly where radio needs to be.



DAB FIRST APPEARED A QUARTER OF A CENTURY AGO, BUT IT HASN'T HAD ANYTHING LIKE THE SUCCESS THAT'S BEEN SEEN WITH DIGITAL TELEVISION BASED ON DVB STANDARDS. **DAVID WOOD** CONSIDERS SOME OF THE POTENTIAL REASONS FOR THIS.

“It’s a great system. How could it not be successful?”

Digital Radio – why is it taking so long?

It's 25 years since EBU colleague Franc Kozamernik arranged the first demonstration of a revolutionary digital radio system, DAB, in Geneva. Franc retired from work several years ago; DAB hasn't left school yet. In 1988, we were so sure it would be everywhere, long before digital television. We were impatient to choose the parameter values, and we were not even prepared to wait for digital television to align them with it.

Radio is a uniquely valuable media form. We wanted to give the public radio with compact disc audio quality, much more choice, easier to find stations, and multimedia. Providing all that, it would also be more efficient than FM radio (more channels in a given amount of radio spectrum) and consume less power. It's a great system. How could it not be successful?

RADIO ROLLERCOASTER

In the mid 1990s, services began in a modest number of countries. News about DAB since then has been a rollercoaster. At one point it looks to be on the threshold of great success; the next it takes a dive. There were and are imaginative plans in the UK. In Spain and Finland, DAB services were provided, but later switched off, because there were no receivers and no audience. In France enthusiasm for DAB has had highs and lows. In Germany it's been slow, but today there is growth. The brightest star in the DAB universe is in Norway, which plans to switch off FM leaving only DAB as early as 2017.

In the years since the first demo, we saw the failure of discussions with NAB about using the DAB system in the USA. In spite of its efficiency, the DAB principle of a number of radio channels sharing the same transmitter mast was seen as incompatible with US stations competing with each other. We were told: “How would we ever decide who cleans the mast?”

In more recent times, a version using a higher efficiency compression system, DAB+, was developed, to make the system even more commercially attractive – and tools are available to give added multimedia features, and to hook up to internet content too. More recently the EBU has launched a renewed push for the integration of digital radio in cars and, particularly, mobile phones, via the Euro-Chip initiative. It's also involved with a

separate project to find technical solutions for making hybrid radio in smartphones take off. (See page 18)

So why is there the hesitation? People are the same everywhere, aren't they? What Europeans in one country find attractive, those in another will too? With all this great technology and some examples of successes, why is DAB having such a chequered career? And why has the arrival of digital television (five years after DAB) succeeded universally in Europe while digital radio has not yet?

CONTRASTING CONTEXTS

The answer must at least partly lie in the different contexts of digital television and digital radio. An obvious difference between digital television and digital radio is that there are national policies and timescales in all European countries for switching over from analogue to digital television, but this is not (usually) the case for radio. Broadcasters had no choice but to change to digital television and the public had no choice but to obtain new receivers. The future might have been costly for the broadcaster and the public, but at least it was clear. And part of the payback for the transition to digital television was that spectrum could be freed up, and sold by the government.

The radio situation is different. The spectrum radio uses is much smaller than television, so if governments were to sell off the spectrum used now for analogue radio, they would only gain pocket money. There is less cash incentive for the government to make the transition.

A barrier to the transition is the cost (to the broadcaster) of building a DAB transmitter network that will duplicate or exceed the coverage areas that FM has. Only when this step has been achieved could FM be switched off, and until it is switched off, broadcasters have to bear the cost of duplicating the service on FM and DAB. The public has also to bear the cost of buying a new radio – not expensive, but still more so than an FM radio. But similar challenges were faced and overcome with digital television.

Can we conclude that unless and until European nations have firm policies to make the transition from analogue to digital radio, and give timetables for doing so – even long ones – DAB may not graduate from school? What do you think?



For the second year running the EBU stand included a presentation theatre with half-hourly updates on a range of topics related to our work. Show visitors appreciated the EBU's unbiased perspective on topics such as UHDTV technology, broadcasting from the cloud and networked media production. ▼

An eye on IBC 2013

IBC IS EUROPE'S BIGGEST ANNUAL EXHIBITION AND CONFERENCE DEDICATED TO BROADCAST TECHNOLOGY. THE EBU WAS PRESENT ONCE AGAIN, WITH DEMONSTRATIONS, PRESENTATIONS, CONFERENCE SESSIONS AND THE MANY, MANY MEETINGS AND EXCHANGES THAT ENSURE AMSTERDAM IN SEPTEMBER REMAINS AN ESSENTIAL FIXTURE IN THE CALENDAR.



▲ One whole wall of demonstrations was dedicated to more immersive media experiences, with side-by-side comparisons of higher frame rate content and demonstrations of HEVC video coding for UHD-1 content, and not forgetting the audio element. This picture was taken during the EBU drinks reception, which around 200 EBU Members and others from the wider technology community attended.

New Technology & Innovation Director Simon Fell chaired the EBU conference session on Saturday afternoon. Six EBU Members presented projects from across Europe, demonstrating that technology innovation is alive and well in Public Service Media. Pictured, from left to right: Simon Fell, Pere Vila Fumas (RTVE), Joost Negenman (NPO), Jørn Jensen (NRK) and Hervé Dejjardin (Radio France). ▼





▲ A steady stream of visitors took the opportunity to immerse themselves in the auditory wonderlands enabled by binaural audio delivered over headphones.

▼ Exhibition visitors took away thousands of copies of tech-i magazine and the newly updated set of Technology & Innovation Fact Sheets.



► The second edition of the EBU Loudness Breakfast once again gave a dedicated audience of audiophiles a good reason to wake up extra-early on Monday morning. ORF's Florian Camerer, who leads the EBU's Loudness group, chaired a session that was both informative and entertaining.

The new EBU Periodic Table of QC Criteria was unveiled, serving as a neat way of presenting the work of the Quality Control group. Visitors were encouraged to visit the various vendors around the exhibition that had incorporated the EBU QC criteria into their products; but also to play an interactive game for "Quality Players". The lucky prizewinner was Clovis Lunel of Emsytech (France). ▼



▼ Bram Tullemans (below left) presented an EBU proof-of-concept for a scalable cloud-based infrastructure using open protocols. Right – Mathias Coinchon welcomed members of the radio community to a showcase of the latest developments in digital and hybrid radio, including a display of some of the RadioDNS hybrid services already on air across Europe.



BBC R&D demonstrated the work they've been doing on using IP networking technology for live production. There was a huge amount of interest in their IP studio demo, which showed high bit rate signals being exchanged in real time. Lead engineer Peter Brightwell is pictured here. ▼



The TLCI: what happened next?

IMMEDIATELY AFTER IBC 2012, THE DOCUMENTS DESCRIBING THE TELEVISION LIGHTING CONSISTENCY INDEX WERE PUBLISHED BY THE EBU*. FORMALLY THAT COULD HAVE COMPLETED THE WORK, BUT THERE WAS MORE TO BE DONE. **ALAN ROBERTS** REPORTS ON RECENT DEVELOPMENTS.



ALAN ROBERTS DEMONSTRATING THE TLCI AT A JUNE 2013 WORKSHOP JOINTLY ORGANIZED IN LONDON BY THE EBU AND THE GUILD OF TELEVISION CAMERAMEN.

The TLCI had been successfully demonstrated at IBC 2012, and lighting manufacturers seemed, if not delighted, at least to accept that a more reliable metric than the CRI (colour rendering index) was needed for television use. So now it became possible to assign a quality value to a luminaire which indicated its worth for television lighting. After further discussions with television lighting people, a variant has been developed which calculates how well lighting works when different sources are used together, rather than sequentially. This is now the Television Luminaire Matching Factor (TLMF). It has not yet been formally specified, but the documents are almost ready for release.

The TLCI is a unique descriptor of a single luminaire used alone; the TLMF is the joint property of two luminaires used together. It includes the effects of lighting gel filters. (The software includes data for the entire range of Lee Lighting filters.)

DESCRIBING THE UNDESCRIBABLE

Any delay in releasing the updated documents can be attributed to our wish to be accurate. The intention of the scale in both the TLCI and the TLMF is that it should relate to the degree of ease of correcting for colour errors in post-production, such that 100 means 'perfect colouring, no correction', and 0 means 'impossible'; but in between there are only subjective opinions. Initially, the intention was to propose a scale such as the following:

- 85~100 - 'good enough without correction'
 - 70~85 - 'good, possible to make most colours acceptable'
 - 50~70 - 'reasonable, possible to make some colours good enough'
 - 25~50 - 'poor, but possible to make some colours almost acceptable'
 - 0~25 - 'impossible to make it acceptable'
- Clearly these boundaries cannot be sharp and rigid – there has to be a degree of

overlap. But, on consulting a professional colourist, we found that some luminaires apparently score wrong values, in that they don't fit the scale. Otherwise, the colourist has confirmed that the scale is about right.

The problem luminaires are those whose chromaticity doesn't lie close to the Daylight or Planckian locus (i.e. the 'd' value is large). The CIE (Commission International de l'Eclairage, which holds colorimetric standards) says that CCT values are unreliable when this distance is large, so maybe this is the effect we are seeing.

However, there's another possibility. During the software development of the algorithms, we ran subjective tests to find out which of the CIE's six colour-difference metrics was the most suitable. Unsurprisingly, the most recent one scored best, but all observers reported that it wasn't 100% accurate (it actually scored about 80% success, in that the observers agreed with it for about 80% of the test samples). This implies that the TLCI (and TLMF) results can be relied upon for only about 80% of measurements; but which ones, and can the user tell?

CALLING ALL COLOURISTS!

Looking back through hundreds of measurements, it seems that those which produce unexpected TLCI results may not be only those whose chromaticity is far from the CCT, but whose spectral content is far from smooth as well. Assessment of this is difficult, because it is subjective in nature; and the best people to assess it are those who assess colours as part of their normal television work, the colourists. So far, only one colourist has found the time to help us in this quest, although we are actively chasing several others in the hope of getting time with them. But they are busy (and expensive) people.

Nevertheless, the search goes on, and with luck, we might be able to formulate a modification to the algorithm for the TLCI and TLMF which estimates these effects. At that point we can sit back, confident that we can't do any better. But it is going to take time, and in the meantime we have to accept that the scale is a bit blurred with overlaps as follows:

- 80~100 - 'good enough without correction'
- 65~90 - 'good, possible to make most colours acceptable'
- 45~75 - 'reasonable, possible to make some colours good enough'
- 20~55 - 'poor, but possible to make some colours almost acceptable'
- 0~30 - 'impossible to make it acceptable'

* R 137, Tech 3353, 3354 and 3355 are available from <http://tech.ebu.ch/publications>

The Second Screen according to NPO

WITH A FEW YEARS OF EXPERIMENTATION UNDER THEIR BELT, PUBLIC BROADCASTERS IN THE NETHERLANDS (NPO) HAVE LEARNED VALUABLE LESSONS ABOUT WHAT WORKS – AND WHAT DOESN'T – WHEN IT COMES TO THE SECOND SCREEN. NPO'S **JOOST NEGENMAN** SETS OUT SOME BASIC PRINCIPLES.

NPO, the Dutch public broadcast organization, started second screen initiatives in 2009 having recognized changing desires in the audience. People had become accustomed to accessing TV programme websites, because suddenly every programme had one, but NPO was keen to look more closely at audience behaviour and at live viewing in particular.

Together with the Hilversum based company Angry Bytes, NPO developed a "Platform for Interactivity" that allowed public broadcasters in the Netherlands to cost-effectively experiment on second screen initiatives. A broad range of experiments were performed, ranging from small radio-based polls to massively viewed TV programmes.

Quite soon and on multiple occasions NPO and Angry Bytes became aware of the limits of the technological state of the art in terms of massive audience play-along applications. At that time, the inefficiencies of the Amazon open polling cloud solution as well as synchronization issues led to great audience disappointment. Now, in 2013, these technical limitations seem to have been largely resolved with new techniques, but that's a topic for a later article.

Technical issues aside, our experiences up to now enable us to make some statements on how to effectively develop a second screen application. On the basis of trial and error, NPO distinguishes five principles as follows:

1. Second Screen as "edge of your seat" – Rarely

The excitement experienced by a participant in a TV show, about to lose or win a big money prize, can never be translated to the second screen. The hot studio lights, the quizmaster counting down, the swelling music; all essential elements that are missing for the audience at home, sitting comfortably on the couch, only waiting to see the outcome. If there is a possibility for them to win as well, create a separate reality. But this shouldn't be in the context of the live show, where the second screen acts only as a distraction.

(One exception, however, can be made where live studio audiences are playing



along; in this case the audience can be widened to the couch, where the second screen becomes a voting panel. In these limited circumstances audience engagement can be terrific.)

2. Second Screen as "Companion" – Very Likely

Viewers can become bored or irritated by a particular programme item or a commercial break. Companion screens that offer an instant option like 'what's next?', a promo, a highlight from a recent show, etc. can provide an alternative to the tendency for channel zapping.

3. Second Screen as "Call To Action" – Very Possibly

Informative, entertainment and news shows often refer viewers to their websites. But for a viewer arriving there, the quest has just begun. Many websites do not follow the index of the latest show, which can leave the audience in confusion and will result in them quickly leaving the website, disillusioned. Second screens should offer a direct entry to the relevant information. "For more information on this subject, press here and now."

4. Second Screen as "Remote" – Definitely

Most broadcasters, by now, have a mature

and fully-featured catch-up service; many broadcasters refer their viewers to them on a regular basis. Audiences viewing in the standard linear TV mode are forced to leave this mode to access the TV catch-up application. Second screen devices however are capable of 'casting' content to a connected TV and from there controlling the play out. This way, accessing a dedicated TV application is not needed. Having a second screen as a remote will enable switching from linear to on demand viewing as seamlessly as channel switching, thereby closing the gap between on demand and linear viewing.

5. Second Screen as "Competition" – Promising

With the introduction of connected TV and HbbTV in particular, new and promising features are on the horizon. HbbTV, which is 'projected' on to the linear broadcast, can become the central interface between live shows and the second screens. HbbTV increases the possibilities of creating a separate and engaged reality in the household. For instance, by including competitive elements between the second screens in a single household network. "On-couch or Online".

It is in relation to this last principle that NPO is part of an EU consortium in a project called TV RING. It's funded the European Commission's ICT Policy Support Programme as part of the Competitiveness and Innovation framework programme. In the project NPO focuses specifically on finding the ultimate match between HbbTV and second screens. Stay tuned at: www.linkedin.com/company/tv-ring

One final remark: the second screen as a remote control device is here to stay, but don't underestimate the staying power of the good old remote control... It's not dead yet!

ZDF German Television

IN 2013 ZDF CELEBRATES ITS 50TH ANNIVERSARY. THIS ALSO MEANS 50 YEARS OF DEVELOPMENT OF TELEVISION TECHNOLOGY AND 50 YEARS OF EBU MEMBERSHIP. ITS CHIEF TECHNOLOGY OFFICER **ANDREAS BERECHKY** PROVIDES THIS PROFILE.

Germany's nationwide public service TV channel ZDF went on air in April 1963 and thus celebrates its 50th anniversary this year. In the last 50 years ZDF has developed to become one of Europe's largest broadcasters and currently the most favoured TV channel in Germany. As an independent non-profit corporation under the authority of the sixteen states making up the Federal Republic of Germany, ZDF is financed by television licence fees and advertising revenues. Based in Mainz (Rhineland-Palatinate), ZDF maintains bureaus in all state capitals and 18 foreign bureaus worldwide. ZDF Director General Thomas Bellut leads a team of 3,600 employees and around 4,500 freelancers.

ZDF was founded at the Prime Ministers' Conference in June 1961 in Stuttgart with the signatures of the Prime Ministers of the German states under the treaty for the establishment of the public institution "Second German Television". On 1 April 1963 ZDF began broadcasting from Eschborn near Frankfurt with a technical innovation: the use of the UHF band, instead of VHF, for nationwide terrestrial broadcasting. The first programme in colour (PAL) was shown in 1967.

NEW PLATFORMS

In 1974, ZDF moved its facilities to Mainz-Lerchenberg, after being temporarily located in Wiesbaden. ZDF has also been represented on cable television since 1984, when the first such networks started. Broadcasting of ZDF via the Astra 1C satellite began on 27 August 1993. In the same decade digital video broadcasting (DVB) found its way into television technology. ZDF's digital bouquet "ZDFvision" has been in operation since 1997. The platform is broadcasted via satellite and cable, and carries today the main TV channel ZDF, three digital-only thematic TV channels (ZDFneo, ZDFinfo, ZDFkultur), the partner TV channels 3sat and KiKA and the three partner radio channels (Deutschlandradio Kultur, Deutschlandfunk and DRadio Wissen).

Furthermore, ZDF is involved in the joint TV programmes Phoenix and Arte. These are transmitted within the digital bouquet of the ARD. The ZDF bouquet for digital terrestrial television (DVB-T) includes ZDF, 3sat, KiKA/ZDFneo (time shared) and ZDFinfo. In December 2008, analogue



terrestrial TV transmission was switched off completely followed by the analogue switch-off of the satellite transmission in 2012.

ZDF's well-known video-on-demand platform ZDFmediathek was launched in 2001. Today we also offer the harmonization of broadband and broadcast delivery of media content via HbbTV, including the ZDFmediathek.

The classical transmission methods for linear programme distribution via terrestrial, satellite and cable have been supplemented by IPTV and WebTV. The latest step in this context is the live streaming of ZDF's programmes (24/7), which went on air in February 2013.

MODERNIZING PRODUCTION

In the production domain the most significant changes of the last decades were the digitization of studios and the move towards file-based production workflows. The change to file-based production started in ZDF in the mid 1990s with the introduction of the first non-linear editing systems. This was the start of a real revolution in production workflows which is still ongoing.

After having introduced interconnected production islands based on Storage Area Networks (SAN), multiple editing clients and a lot of video servers, we also started to build up a digital archive using a Media Asset Management (MAM) system in the early 2000s. First deployed as a lo-res-browsing-tool only, ZDF started with

archiving also the high quality hi-res-files in DVCPro in an MXF OP1a wrapper in 2006.

In 2009 ZDF began to also use a MAM for production purposes as well as fully file-based play-out systems - both still ongoing projects. About the same time ZDF started producing and broadcasting more content in HD, which didn't make file-based workflows easier. The next steps will be the start of backwards digitization and fully file-based play-out. File-based delivery from production houses and partners is currently under investigation. In that domain the challenges today are interoperability issues with HD MXF-files and also IT-security.

With the ongoing change to file-based workflows the number of interfaces and consequently the complexity of the whole technical production landscape increases. The challenge here is not losing serviceability while optimizing business processes and workflows.

And last but not least, the trend away from specialized video protocols and interfaces towards IP-based contribution and real-time studio applications started a few years ago. In the field of contribution ZDF put in place an IP-based network for the connection of different ZDF locations within Germany, used for office communication, VOIP, video file transfer and real-time contribution over IP. The next step to come in this context, ZDF believes, is the deployment of IP also in the studio instead of classic (HD-)SDI-connections.

A cloud over Switzerland

SWISS MEDIA CLOUD, OPERATED BY SWISS TXT, HAS HIT THE GROUND RUNNING, WITH CONSIDERABLE GROWTH SINCE ITS LAUNCH IN JANUARY 2013. SWISS TXT'S **ANDREAS HERREN** DESCRIBES HOW THE SERVICE WORKS.

Offering new media content today requires greater flexibility and a shorter time-to-market to stay competitive. This means that broadcast services are making increasingly larger demands on their IT providers and infrastructure. At the same time, cost pressures in the media environment have continued to rise. The solution to these growing demands and constraints needs to address them directly and requires specific expertise.

Cloud technology allows businesses to manage their IT infrastructure with great flexibility. SRG SSR, the Swiss public broadcast organization, asked its Biel-based subsidiary SWISS TXT Multimedia Solutions to develop a cloud solution that would use cutting-edge technology that has been tested and applied in other fields. The solution, Swiss Media Cloud, has subsequently been adapted to the needs of other digital content providers bringing additional economies of scale. It has a rapidly expanding customer base, also in the private market, proving that there is a demand for the service and indicating the potential for further growth.

SPECIFIC REQUIREMENTS

Conventional IT service providers usually know little about the media business and even less about its specific requirements. Swiss Media Cloud now offers a potentially attractive alternative to maintaining a proprietary IT infrastructure. As a private cloud, it also has advantages over public clouds: for SRG SSR there is personal, client-oriented support including standby service 24 hours a day, seven days a week, where users have direct contact with engineers with new media industry expertise. Another advantage, especially in today's political world, is transparency with regard to location. All of the data and data centres are located in Switzerland and subject exclusively to Swiss law.

The service is built on a highly-available infrastructure in two data centres located directly at internet peering points. This allows SRG SSR to use the latest infrastructure in new media, but at the cost and scalability of a service. There is a state of the art network and computing and storage infrastructure for all media use cases (archive, nearline, streaming) supported by multiple redundant content delivery infrastructures. This reduces the



need to make large individual investments.

The features provided include a self-service portal (for computing, backup, storage, and network services); configurable zones (data centres) and accounts (environments); content delivery services (podcasts, streaming, etc.); round-the-clock professional operation; transparent usage reporting; accounting of effective usage; customer-oriented service management processes (incident, problem and change processes); and short intervention times for service adjustments.

An entirely new technical platform was built for the launch of Swiss Media Cloud. It features superb disaster tolerance, excellent cost efficiency, virtually unlimited scalability, high bandwidths for delivering online content, and high levels of standardization, agility and flexibility. Its technology also sharply distinguishes between the hardware layer, cloud orchestration and the front end layer. In addition, there are clearly assigned staff responsibilities and transparent cost calculations based on usage. Since different business models may have vastly different needs, the applications are run by local teams.

PERFORMANCE & SCALABILITY

Via a self-service web portal and an open API, infrastructure can be automated. The platform also provides server (CPU, RAM, disk) provisioning and scaling, network services such as IP configuration and forwarding, as well as local and global load balancing.

The system is compatible with Amazon EC2, and allows for full network configuration, template management, and access to two zones at the internet peering points. Various storage tiers ranging from low-latency, high-performance storage, to cost-efficient object storage compatible with Amazon S3 provide optimal performance and ensure further scalability.

The configuration management and automation system uses Puppet and CloudStack API featuring continuous deployment. The infrastructure is agile, programmable, and can be scaled in seconds to react quickly to changes. These features significantly improve the platform's quality and availability, which can save time and money.

The new platform has demonstrated rapid growth since it was launched in January. The number of servers has grown from 50 in the first month of operation in January 2013, to 710 as of September 2013. In addition to SRG SSR, several other providers of the Swiss Top 100 websites are using the infrastructure. Traffic saw even greater gains: an initial 300 TB of traffic had increased to over 1130 TB as of September 2013.

The service has been a clear success for SRG SSR, as well as for its other clients. It demonstrates clearly the potential that lies in the cloud approach and we believe that its future will be even brighter.

THE USER PERSPECTIVE

One of our three multimedia production systems has been migrated to the Swiss Media Cloud in 2013, writes **Thomas Saner** of SRG SSR. The other two systems are in the migration phase. Besides some technical issues, which one expects with a new system, the most demanding task was to switch from a physical infrastructure to a multi-site cloud infrastructure – not only in the technical domain but in the human domain as well. The benefit then is the possibility for fast and flexible modifications or addition of services.

Besides the multimedia production systems, the creation of the SRG SSR HbbTV platform on the Swiss Media Cloud has enabled a flexible development of the Smart Hybrid Services RTS+, SRF+ and RSI+.

Another important “H”

SUBJECTIVE TESTS CARRIED OUT BY THE BROADCAST TECHNOLOGY FUTURES GROUP HAVE PROVIDED VALUABLE INSIGHTS INTO THE IMPACT THAT FRAME RATES HAVE ON THE VIEWING EXPERIENCE. IRT'S DAGMAR DRIESNACK PROVIDES THIS REPORT.

Early conversations about UHDTV tended to focus on just one “H”, namely higher resolution, HR. But we should also consider HDR (higher dynamic range, adding more steps in contrast) and HFR (higher frame rates, increasing the temporal resolution)*. The latter topic has been on the agenda of the Broadcast Technology Futures (BTF) group during 2013.

HOW HIGH?

Various standards bodies, such as SMPTE, DVB or ITU-R, have been dealing with the subject of HFR. In the ITU-R.BT2020 specification, for instance, 120 Hz is defined as the highest frame rate, aiming at a single worldwide frame rate. No multiples of the 50 Hz frame rate, like 100 Hz or perhaps 150 Hz, are mentioned. However, it is not clear whether a 120 Hz frame rate will be enough for UHDTV or if other frame rates could provide the same or better experiences for overall broadcast chains, particularly in Europe.

At the beginning of 2013, a study of the visual impact of higher frame rates for television was established in the framework of the BTF group, involving the labs of BBC R&D, EBU, IRT, RAI CRIT and NHK. The main goal of this study was to guide the broadcasting industry with scientific investigations and demonstrations with respect to HFR.

Because there are no HFR-capable display panels with a UHDTV pixel resolution (3840 x 2160) available in the market, the group initially focused its investigations on HD resolution (1920x1080). Investigations for HFR at higher resolutions may follow later. In the first place the group wanted answer questions such as: is there an upper limit for higher frame rates? Does the observer appreciate higher frame rates?

PREPARATIONS

NHK kindly provided a modified display (52”), which was capable of showing frame rates in 240 Hz under controlled conditions (e.g. no display internal inter-frame creation). Having the 240 Hz rate as “master”, various test sequences had to be created. In 2008, BBC R&D conducted the first HFR tests up to 300 frames per second for HD resolution. These sequences were slowed down to 240 Hz.



VISITORS TO THE EBU STAND AT IBC COULD VIEW SOME OF THE HFR SEQUENCES USED FOR THE SUBJECTIVE TESTS.

NHK also made native 240 Hz content available.

All sequences were shot with a 100% shutter (corresponds to 360°) so that all other frame rates under test could be derived afterwards by temporal averaging over frames without introducing additional artefacts. The following combinations were tested:

- 240 Hz @ 100% shutter = reference
- 120 Hz @ 50% and 100% shutter
- 60 Hz @ 50% and 100% shutter

To evaluate the impact of higher frame rates subjective tests according to the ITU-R BT.500 DSCQS (double-stimulus continuous quality scale) test methodology were carried out in August 2013 at IRT's facilities. A total of 26 people (experts and non-experts) participated in these tests.

PRELIMINARY RESULTS

The tests have shown that there is a positive impact regarding subjective picture quality when increasing the frame rate. Speaking in ITU-R.BT 500 terms: In general, a minimum subjective quality difference of 1 grade point can be achieved when doubling the frame rate at a viewing distance of 3H (three times picture height).

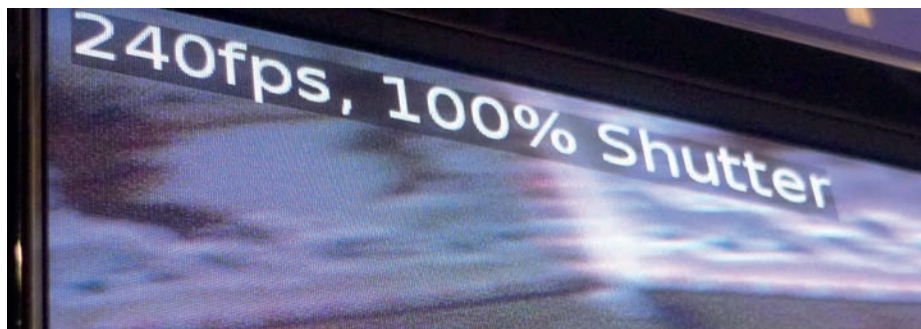
Of course, there are differences depending on the content of test sequences. Between 60 Hz (close to today's frame rate) and 120 Hz (a potential HFR candidate for the future) there is at least 1 grade of difference which is clearly perceptible. Moreover, with reference to previous subjective tests (January 2013) this difference is significantly more noticeable than a pure resolution increase from HD to UHD-1 while staying at frame rates of 50/60 Hz.

As these tests had to be conducted on a display with no internal processing, like motion compensated frame interpolation, there may still be effects masking the subjective quality at lower frame rates for acquisition. It is clear, thus, that further HFR studies are needed – and indeed already planned!

ACKNOWLEDGEMENTS

Appreciation is expressed to members of the BTF group for working hard, helping, supporting and participating in the tests at IRT in August and to the EBU team for presenting the HFR content on their booth at IBC. Special thanks are given to NHK for the provision of the HFR displays and to BBC R&D for supporting extra HFR playout devices.

**Colours and audio should also come into consideration. See issue 17 of tech-i magazine for more on the UHD equation.*



The ultimate UHDTV delivery enabler?

WITH HEVC NOW PUBLISHED, IT IS IMPORTANT TO VERIFY ITS PERFORMANCE AND SUBJECTIVELY DETERMINE APPROPRIATE DELIVERY BIT RATES FOR UHDTV CONTENT. THESE QUESTIONS ARE PARTICULARLY RELEVANT WHEN ASSESSING THE ECONOMIC FEASIBILITY OF UHDTV SERVICES OVER TRADITIONAL DELIVERY NETWORKS, SAYS THE EBU'S **ADI KOUADIO**.

HEVC / H.265 – High Efficiency Video Coding – is the new compression system jointly standardized by MPEG and the ITU in January 2013. It is foreseen as the successor of the well-established H.264/AVC system throughout the media delivery chain and was developed with the target of an average 50% bit rate saving compared to its predecessor; in other words providing the same visual quality at half the bit rate compared to H.264/AVC.

HEVC IN BRIEF

HEVC, like its predecessors MPEG-2 and MPEG-4 H.264/AVC, is a block-based compression algorithm. The picture to be compressed is subdivided into smaller blocks of pixels for prediction (previously called macroblocks, now called Coding Units – CU).

Innovative aspects of HEVC include a larger choice of CU sizes and forms for predictions (up to 64x64 CUs), useful for compression of large image sizes; more prediction directions improving the motion prediction granularity; a single entropy encoder CABAC (context-adaptive binary arithmetic coding); and many others. These innovations have increased significantly the complexity of the encoder and decoder compared to AVC but the constant improvement in computing power should

help overcome this.

The current version of HEVC is structured with three profiles (Main, Main10 for 10 bit coding and the Main Still Picture profile) and 13 levels, addressing image formats from QCIF to UHDTV 8k at 120 Hz. A further profile, Fidelity Range Extension – FRExt – is expected by January 2014, to address professional applications such as contribution.

While AVC had special tools (PAFF and MbAFF) to encode interlaced content (in practice inconsistently used and not widely implemented, especially MbAFF), HEVC as it stands does not provide a specific toolbox aside from the signalling mechanism. However it can nonetheless encode interlaced content with a significant gain compared to AVC.

PUTTING IT TO THE TEST

An ad-hoc group within the EBU's BeyondHD strategic programme has conducted both objective and subjective evaluations to determine the performance of HEVC on UHD-1 (3840x2160 pixels) content and assess the minimum broadcast quality bit rate. Group participants were BBC, Panasonic, Orange Labs (representing the 4Ever project), Technicolor, University of Wiesbaden and RAI.

A selection of UHD-1 content with different coding criticality was used,

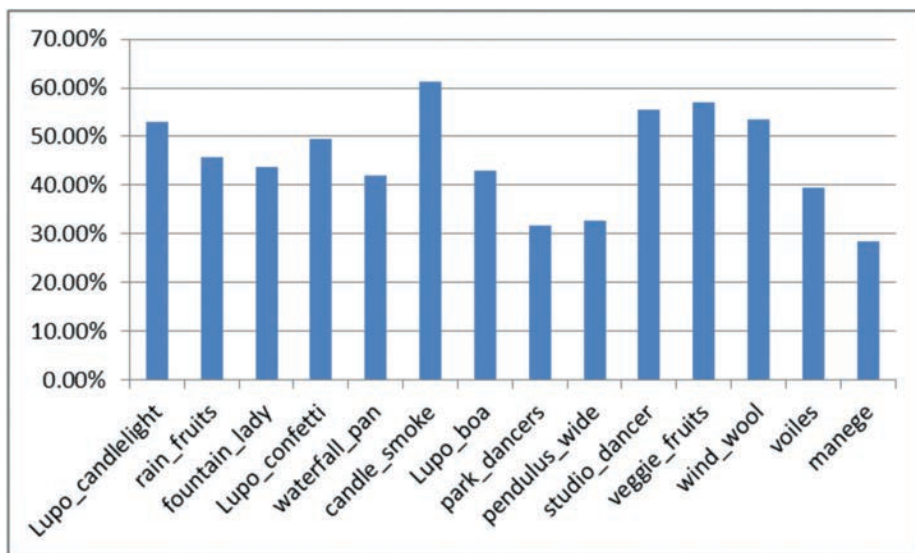
mainly from the EBU and 4Ever sets of test sequences. The HEVC software reference (non-real time) encoder and decoder (HM version 10.0) was used throughout the experiments. While it does not represent the exact performance of a real-time encoder, the latter provides a good approximation of the codec capabilities. Based on the experience of MPEG-4, the assessed performance could be achieved in real-time after one or two product generations.

The objective results based on the PSNR Metric have shown an average gain of 46% over H.264/AVC on the selected test content (see graph). These conclusions were confirmed by subjective assessment performed in Wiesbaden. In addition, the test demonstrated an objective gain of the HEVC Main10 (10 bit) profile compared to the Main (8 bit) profile.

A subjective evaluation performed at Orange Labs (Rennes), based on the SAMVIQ method, has shown in preliminary results that for the selected test sequences an appropriate transmission range for UHD-1 would be 12-16 Mbps. This would accommodate the variable coding complexities within the test sequences. These results are encouraging for the potential of UHD services over traditional broadcast networks but further tests should be done, especially with sports content.

One heavily discussed parameter in UHDTV is the higher frame rate. While it certainly improves the motion portrayal it also doubles the raw data rate. However, for delivery, intelligent mechanisms such as temporal scalability tools available in HEVC can help reduce the required bit rate. Preliminary results from BBC indicate that the bit rate overhead might not necessarily go beyond 20%. Further tests will be conducted on a wider range of content to confirm these early findings.

At IBC 2013 major chipset manufacturers unveiled HEVC decoding chips supporting HDTV and UHD-1 at 50/60 Hz. In the meantime, DVB has an aggressive timeline to provide a suitable HEVC stream specification (TS 101 154) by Q1/2014. Therefore, it can be foreseen that by IBC 2014 we might see the first HEVC (DVB compliant) UHD-1 set top boxes.



AVERAGE BIT RATE GAIN PER SEQUENCE – HEVC MAIN10 COMPARED TO AVC/H.264 HIGH10

Your phone's not smart without radio

RADIO, BOTH THE DEVICE AND THE MEDIUM, IS NO LONGER THE FIRST THING IN THE EARS AND POCKETS OF PEOPLE EACH DAY. THAT NEEDS TO CHANGE, SAYS **NICK PIGGOTT**, HEAD OF CREATIVE TECHNOLOGY, GLOBAL RADIO (UK).

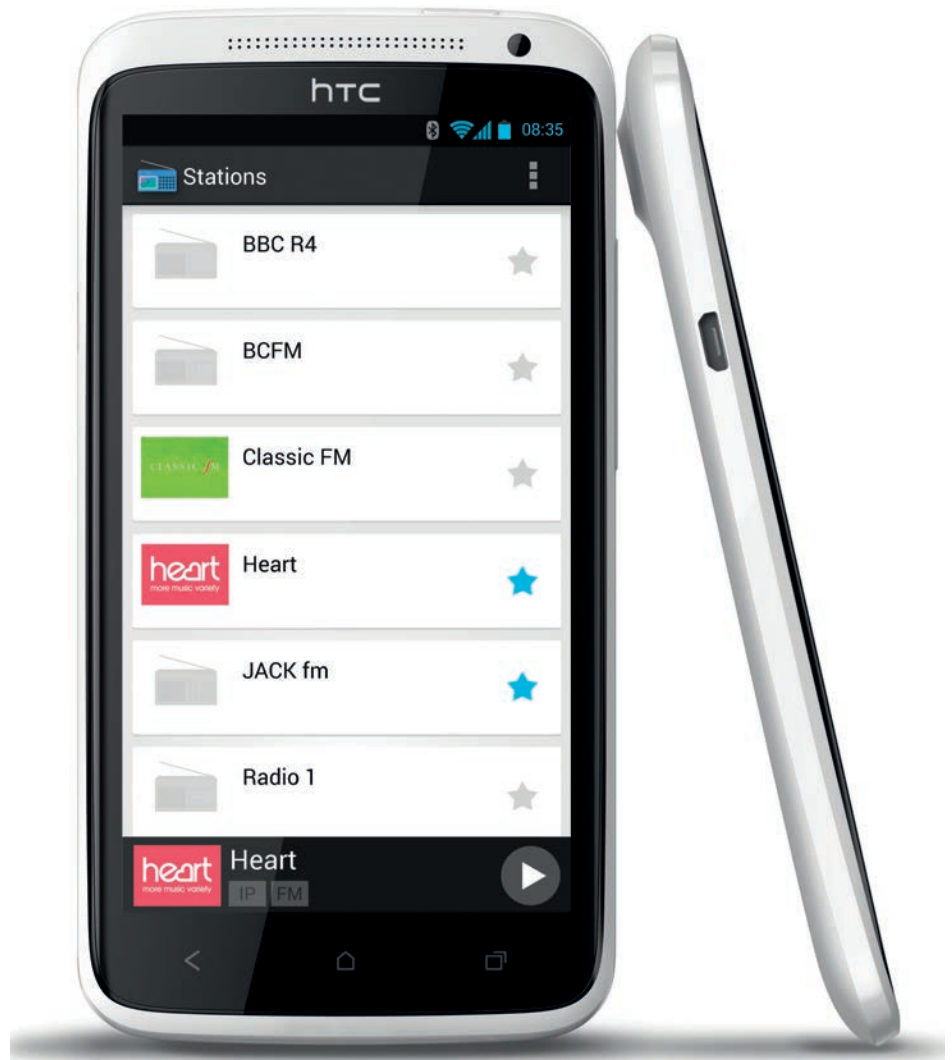
A miracle of industrial engineering enabled the bulky valve to be transformed into the tiny and power efficient transistor, which in turn created the transistor radio as the world's first pocketable media device. Today, tens of millions of transistors can be etched on a tiny wafer, which means our smartphones put media capabilities beyond imagination in our pockets.

Broadcast radio sometimes suffers an inferiority complex. It doesn't have HD pictures, it isn't personalized, it's not trackable, and doesn't obviously contribute to a 'big data story'. In one way, it's missing the digital attributes that seem essential in today's connected world. But it still retains one essential attribute - its popularity. Far more people listen to radio than use Twitter, for far longer than they spend on Facebook, and in more places than they use Google. We can't afford to be complacent - listening by younger people is in decline in some countries - but we can be confident in saying that radio justifies its place in today's media world.

The popularity of streaming radio apps seems to support that assertion. A recent survey showed that over half of smartphones had some form of streaming radio app on them. The biggest global app, TuneIn, is consistently near the top of the popular 'music' apps. Broadcasters see mobile streaming in strong growth, comparing favourably to the desktop, and their own apps are engaging and contemporary.

NEGLECTING BROADCAST

The presence of *broadcast* radio on smartphones has not been so confident. While FM hardware capabilities have survived, often nestled within the Bluetooth functionality, access for programmers has decayed. In comparison



with the continual improvements and enhancements to APIs for virtually every other hardware function, access to broadcast radio is inconsistent, weak and unreliable. Broadcast radio has not been cared for.

Delivering live radio over mobile IP isn't necessarily cheap or simple. While the absolute bandwidth requirements of live radio are low, the quality-of-service parameters are demanding. Most streaming apps paper over bandwidth fluctuations and coverage gaps by using buffering. This delays live radio (by up to a minute) and still doesn't deal with large rural areas traversed by motorways that don't warrant consistent 3G/4G coverage, nor congested areas, with transient peak loads, that don't warrant dense cells. Power consumption is relatively high, so batteries go flat faster, and as networks

move to phase out the questionable promise of 'unlimited' data, it's no longer 'free' to listen to radio if it uses up a finite data allowance.

FRESH START

Broadcast radio technology ought to be valuable, to manufacturers, network operators and listeners, but in its current state, it isn't close to realizing that value. It needs to be relaunched and repositioned as a great new feature of smartphones, not a legacy clinging on.

As with any relaunch, it starts with getting everyone to think differently about broadcast radio, and specifically thinking about the experience of broadcast radio you can create when it's in a powerful, connected media device. When broadcast radio becomes hybridized with IP, then all those 'missing' digital attributes

become available to a huge new audience, revolutionizing the perceived value. User Experience designers can begin to understand and design for radio in their own terms, not trapped in the paradigm of the old radio dial; commercial people understand how to sell radio in new ways; researchers understand how to measure it differently; strategy people can pull it into their 'big data' projects; listeners can share their listening with their social networks, and feedback individually to the broadcaster, even switching easily between live radio and on-demand audio.

I WANT MY API

Underpinning a relaunch is a fundamental change in the way radio becomes accessible to mobile app developers. It's up to the radio industry, which has people who understand the intricacies of radio technology, to create standard APIs that make it easy for app developers to integrate broadcast radio in their apps. APIs that abstract the developer from the detail are easier to work with, and are likely to give a more consistent experience than leaving the interpretation up to thousands of individual developers with little desire to understand the detail of RDS PS, Type B AF, FIG 1/1 or FIG 0/6. When you consider the most important radio functionality, only a relatively small set of APIs is required, and their behaviour is quite well understood within the industry.

Getting APIs for radio clearly defined and widely implemented means broadcast could replace streaming in broadcasters' own apps and in aggregator apps. Offering APIs for radio into Android, Windows Phone and even iOS would open up radio to hundreds of thousands of intelligent, creative developers to use in their own apps, and in new ways. It has tremendous potential to unlock new listening, particularly with younger people, which would be invaluable.

This change will take effort, from both the radio industry and from manufacturers. Manufacturers will want reassurance that these 'APIs for Radio' will work in globalized operating systems, which means the radio industry will need to pull together analogue and digital radio systems and create a global cross-platform solution. Manufacturers will also want to know that investment in engineering time, to implement APIs, freshen up existing silicon/antennae, or even integrate brand new silicon solutions (analogue and/or digital), will be repaid in additional sales or better margins. Simply asking nicely isn't sufficient; we need to prove to them what we already know: that listeners love and value broadcast radio.



Dieter Boen



IN EACH ISSUE OF *TECH-I* WE ASK A MEMBER OF THE EBU TECHNICAL COMMITTEE TO STEP INTO THE SPOTLIGHT. THIS TIME IT'S THE TURN OF **DIETER BOEN**, HEAD OF RESEARCH AND INNOVATION AT BELGIUM'S VRT.

WHAT ARE YOUR CURRENT RESPONSIBILITIES AT VRT?

I'm head of the research and innovation lab and the web development team. The lab performs midterm research on hot topics for broadcasters. Currently we focus on ever faster production, personalization, automatic annotation and distribution of content, crowd sourced content and data driven journalism. We combine our love for technology with a user-centric approach, focused on professional users as well as people at home. The web development team does technical development for VRT's websites, such as our news, sports and culture sites.

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

The reorganization of the VRT technology department a few years ago. Back in 2007 when VRT introduced file-based production for news, it had an enormous impact on both the newsroom and the technology department. It became clear that the technology department needed new processes and organizational structures. As a programme manager I helped create an environment that allows people to do their jobs in a better way. I'm still very excited I played a role in this change.

WHY DID YOU STEP FORWARD AS A CANDIDATE FOR THE EBU TECHNICAL COMMITTEE?

VRT is and always has been a dedicated contributor to the EBU's technical work. I believe cooperating in the EBU is crucial in the changing media industry.

Historically public broadcasters are big local companies but they are in fact very small from a global perspective. Moreover with new players entering the media industry public broadcasters are lucky to have an organization like the EBU with a long tradition. As a member of the Technical Committee I want to help the EBU to become even more relevant in this challenging industry. I believe the right approach, as established in the EBU Technology & Innovation workplan, is to compete on content but collaborate on technology. Now is the time for this collaboration to take place at a European level.

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

These days, being supported by your audience is one of the biggest challenges for a public broadcaster. Therefore, we shouldn't consider new technologies as threats but opportunities.

They can give rise to possibilities to personalize content, for instance, taking into account all necessary privacy issues, of course. Initiatives like the EBU's Vision2020 project (vision2020.ebu.ch) take very important steps in getting our audiences involved in our content. I'm very honoured to be part of it.

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

I'm very fond of travelling. In my spare time I try to practice some sports like mountain biking and running. Occasionally, I play some music.

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