

tech-i



Terrestrial Special

Plus

- NEW AUDIO TECHNOLOGIES
- MISSION: INTEGRATION
- INTERCOM INTEROP
- MEET THE TLOS
- SOLVING SATELLITE JAMMING
- DIGITAL AGENDA IN EUROPE

and more...

EBU

OPERATING EUROVISION AND EURORADIO

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Cover Story: The Stuttgart TV Tower was the first of its kind in the world, inaugurated on 5 February 1956. This issue of tech-i is particularly focused on terrestrial broadcasting and spectrum policy, from page 10.

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Keeping the digital economy on the road

Lieven Vermaele

EBU Director of
Technology & Innovation

Until ten years ago the world of media delivery was simple. Broadcast networks, whether terrestrial, satellite or cable, were central to the delivery of media (as indeed they still are). Though some broadcasters operated their own terrestrial transmitter network, normally there was a direct (contractual) relationship between the media organization and the network whereby the network operator's function was simply and solely the transport of media services.

With the growth of IP and broadband internet, the world of broadband media was born. In this world there is logical distinction between the delivery of data (the connection to the network) and the service (mail, video, etc. from service providers). However in reality they are 'tactically' connected. Telcos offer their own media services, but they also provide media services over the top (OTT), offered by third party service providers.

From a conceptual point of view this digital world is close to our physical world where people and goods are constantly in transit. If you want to deliver them from one place to another you need roads and service providers. And a digital economy needs digital roads.

In transport logistics we have public and private flavours. We use trains, buses, cars, motorcycles, etc. The different transport technologies and methods are complementary. For media it will be the same. Public and private, broadcasting and broadband, will all have their role to play in future.

In this context the spectrum debate can be seen differently. For a terrestrial broadcast 'market', taking into account the number of media users, usage and devices, the cost of distribution per viewer is minimal. A rough calculation shows that this cost could be matched only when universally available media CDN unicast services are offered at costs lower than 0.1 euro cent per GB. It will clearly be very many years before this is the case.

The pressure to release spectrum for

broadband is not there only because of growing public demand, but also because it may be a strategic asset for purchasers. Undeniably, it can be a strategy to minimize the relevance of the terrestrial broadcast platform, and by doing so, make alternative but more expensive media delivery methods the only real solution in the market.

Continuing with the transport metaphor, in today's digital economy more money is made with road tolls than with the services using the roads. A fertile digital economy should be built around the services that use the roads, not with the roads themselves. We should have a framework in place that makes it attractive to invest in services.

It's also useful to consider the net neutrality (OTT) debate in this context. Net neutrality is about removing road tolls and trade conditions that hinder third party service providers in developing or offering their services. As with spectrum use, opposition to net neutrality can be a strategic issue, with the objective to exclude or control third party services.

But if this is so clear, why is nobody at policy level taking action? A digital economy needs digital roads, wired and wireless. These roads ask for investment and returns. Telcos have come to the point where their network connection services are offered at low prices – which in turn makes it difficult to recover quickly the investments made. The easiest path to ARPU growth is in (media) services.

So what is really at stake? Debates about spectrum, net neutrality, CDN developments, etc. are all part of a bigger question. *In what kind of economic framework will media organizations and network providers operate in future?* Today we are defining the digital economy that we will live with as media organizations in the future. Both operators and media organizations need each other and need to respect each other. We have to find the right balance and the "win-win" for the future. The next phase of the European digital agenda should include this as part of a *digital media agenda*.

FORECAST 2012

CARING ABOUT SHARING

The EBU's annual FORECAST seminar remains as popular as ever. In November more than 110 participants drawn from public and private broadcasters, network operators, regulators, academia and the telecoms industry grappled with questions surrounding the future of terrestrial broadcast technology. Against a backdrop of uncertainty around how the 700 MHz band is to be used in future, discussions focused both on how spectrum is (and should be) allocated, and on the technologies that might allow it to be used more efficiently in future.

An analysis of feedback from participants shows that the session on shared use of the broadcast spectrum was of particular interest this time around. It included different analyses of the issues involved along with proposals on possible technical solutions. Prof Reimers of Braunschweig Technical

University presented his ideas around Dynamic Broadcasting and LTE overlay, both involving advanced network architectures to play to the strengths of broadcast, mobile and fixed broadband networks. However for these and for alternative solutions put forward by Ericsson, TDF and others to succeed, would require an unprecedented level of cooperation between the broadcast and broadband sectors. Some delegates voiced doubts about whether this would happen.

Aside from discussions about whether spectrum sharing is feasible, there were also updates on the work being done by the EBU, DigiTAG and others to ensure that broadcasters can continue to have access to the spectrum they require. The demands of the mobile industry for additional spectrum are unlikely to die down any time soon, but it's equally clear that



for broadcasting to thrive and to continue to fulfil its crucial role it will need sufficient spectrum.

This issue of tech-i features a number of articles around the topic of spectrum and terrestrial broadcasting, starting from page 10. The presentations from FORECAST 2012 are available to EBU Members from the website: <http://tech.ebu.ch/forecast12>

DIGITAG

NEW GUIDE TO DIGITAL SWITCHOVER



A new guide published by DigiTAG, the Digital Terrestrial Television Action Group, provides an overview of the key issues that need to be addressed when undertaking the digital switchover process. While for some European countries this process has already been completed and for others it's well under way, there are still many that have yet to begin. Those in the latter category have the opportunity to learn lessons from those that went before them, and the new DigiTAG guide gathers those lessons together.

Digital switchover is the process of launching the DTT platform and switching off analogue terrestrial television services. When the DTT platform is first launched, a transitional frequency plan will be put in place that can accommodate both digital and analogue terrestrial television services. It is not until analogue terrestrial television is switched off, that the final frequency plan will be implemented. This final plan makes optimal use of frequencies, with transmitter power and coverage to allow for a robust and universally available DTT platform. This new guide from DigiTAG examines the key regulatory, business and technical issues, as well as the management of the analogue switch-off process.

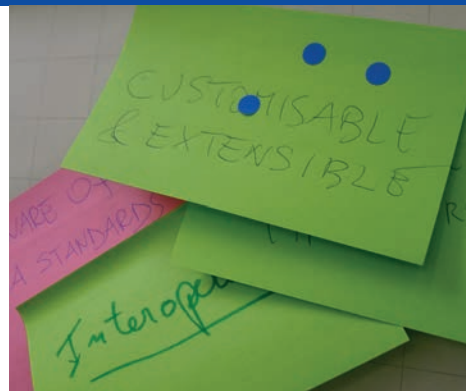
DigiTAG has entered a renewed phase of its existence and hopes to increase its already strong membership during 2013. It is the only organization that brings together all stakeholders involved in the launch, rollout, implementation and evolution of the DTT platform. This diverse membership reflects the different perspectives within the industry, with all members sharing a common interest in promoting DTT and safeguarding its future.

To learn more about joining DigiTAG, or to download the Guide to Digital Switchover, visit: www.digitag.org

CLOUD WORKSHOP



HARRY ZIMMER OF HITACHI
SPEAKING AT THE EBU CLOUD
WORKSHOP, NOVEMBER 2012



BRINGING CLARITY TO THE CLOUD

There's no sign of the buzz around the cloud dying down any time soon, and thus last November's EBU workshop on the topic was timely indeed. The workshop, titled "Out of the Cloud, into the light?", had the aim of demystifying the cloud for broadcasters. It attracted more than 50 attendees who participated in various interactive sessions designed to cut through some of the hype and work out how broadcasters can best move forward in this domain.

One of the big concerns that surfaced was around the privacy and security of data, with legal frameworks and reliability of services both being identified as key factors. A lively presentation from Harry Zimmer (Hitachi Data Systems) recommended that broadcasters should get their legal teams

involved before signing contracts with cloud providers.

Aside from these general concerns, there was also much discussion about which broadcast-related operations could realistically be handled in the cloud, with an important distinction being drawn between private, in-house clouds and third party providers that may not be optimized for many of the broadcaster requirements. The findings of a BBC proof-of-concept around cloud use provided a long list of areas that need to be addressed by any broadcaster starting out on this road: among them were governance, service levels, risk and compliance, scalability, interoperability and performance. The presentations from the workshop are available to EBU Members at: <http://tech.ebu.ch/cloudworkshop>

PRODUCTION TECHNOLOGY SEMINAR 2013

INFORMATION, INNOVATION AND INSPIRATION FOR USERS

The theme of this year's Production Technology Seminar was "Inspired by Users" – and the users in question came to Geneva in great numbers – almost 140 in total – to attend an event that the EBU is uniquely placed to offer. It's rare to find such a mix: a programme that covers the complete spectrum of media production technologies, with use cases, technology updates, forward-looking keynotes and tutorials; an attendance where EBU Members are in the majority, but private broadcasters and the vendors are also well-represented; a range of demos showing cutting edge tools and technologies; and a commercially-agnostic environment where technological discussion takes precedence.

Feedback on the event suggests that delegates particularly appreciated the Video & Codecs session, covering HEVC, long-GOP implementation and non-linear editing systems. It was rounded off by a useful Q&A session on the topic of studio codecs with representatives of Sony and Panasonic. Other highly valued sessions were those on Quality

Control in File-based Workflows and Metadata.

The Display, Cameras & Lighting session was highlighted by many delegates: NRK's Per Böhler, BBC's Richard Salmon and camera expert Alan Roberts gave a set of highly informative and practical presentations. And Loic Barbou's presentation on the implementation of FIMS at Bloomberg was also mentioned by many.

The ideal keynote speech should provide a good balance between information and inspiration. Disney's Howard Lukk and BBC's Richard Smith certainly delivered on this front. Mr Lukk gave an intriguing glimpse into the way Hollywood is adopting hot new production technologies that are changing the face of movie-making. His fellow keynote speaker from the BBC shed some light on the difficult but important topic of how to make the business of broadcasting more environmentally sustainable.

All of the presentations from PTS 2013 are available to EBU Members via the website: <http://tech.ebu.ch/pts2013>

WBU-ISOG FORUM 2012



FROM OPERATIONS TO OLYMPICS

Broadcasters and network operators face many contribution network challenges today. Just as there is a threat to annex the television broadcast bands for wireless broadband, the eyes of network operators have also eagerly fallen on the 3 GHz band, often used for return feeds (backhaul) of news and sports contributions.

The complex issues don't end there. Deliberate satellite jamming of international television broadcasts occurs in some parts of the world (see page 15). Coupled with these are the accelerating rates of change in satellite and compression technology, plus the appearance of Ultra High Definition just over the horizon. These were among the subjects discussed at the WBU-ISOG Forum in Geneva last November.

There are eight broadcasting unions in the world, including the EBU. One of the collective activities of the Unions is the WBU-ISOG group, the World Broadcasting Unions' International Satellite Operations Group.

The group meets twice each year to discuss matters of common interest to broadcasters and network providers in contribution and distribution networks. The autumn conference was held at EBU headquarters in Geneva, and was attended by 84 delegates from around the world.

In practical terms, the group took a step forward to defining WBU equipment profiles which would allow satellite links from remote locations to be set up more quickly and perhaps eventually automatically. Also of interest were the sessions that examined the coverage of the 2012 Olympic Games – the largest televised event in the history of the world – in which the EBU's EUROVISION network played a major role. Delegates also saw some of the 3DTV material shot during the Olympic Games.

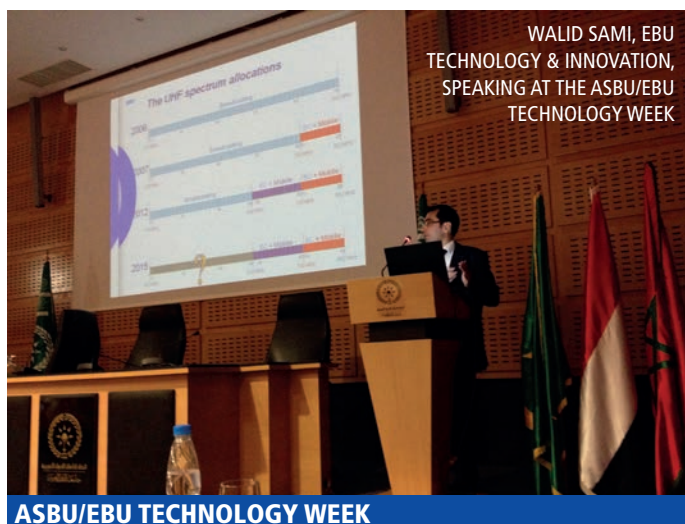
The EBU's Graham Warren chaired a session looking at the future plans of the large international contribution networks, EUROVISION, Asiavision and MENOS (the Arab world network). The coming years should see a network linked to MENOS expanding across the whole of the African continent. Exciting times ahead.

AT PTS 2013: HANS HOFFMANN (EBU), RICHARD SMITH (BBC) AND HOWARD LUKK (DISNEY STUDIOS).



Recommending Digital Radio

At the start of February the EBU Technical Committee approved an important new Recommendation, R 138, on Digital Radio Distribution in Europe. As the first general agreement from EBU Members on this topic, it will inject new momentum into the deployment of digital and hybrid radio services across Europe. The recommendation is available for download here: <http://tech.ebu.ch/publications>



WALID SAMI, EBU
TECHNOLOGY & INNOVATION,
SPEAKING AT THE ASBU/EBU
TECHNOLOGY WEEK

ASBU/EBU TECHNOLOGY WEEK

SHARING TECHNICAL KNOWHOW

In early November the EBU was pleased to join our sister organization ASBU, the Arab States Broadcasting Union, in organizing a week focused on broadcast technologies. Despite the differing commercial and political contexts in which they operate, the Members of the two unions face many of the same technical challenges and problems. Experts from the EBU Technology & Innovation team had the opportunity to learn about the experiences of ASBU Members while also sharing their expertise.

Twenty-one ASBU representatives attended the event in Tunis, coming from Algeria, Egypt, Morocco, Tunisia, Qatar, Sudan, Yemen and Kuwait. Among the broadcasters represented four were also EBU Members. Some of the presentations were delivered on-site by the EBU's Adi Kouadio and Walid Sami. Others were provided live over a video conferencing connection. The event was organized jointly by the EUROVISION Academy and the Technology & Innovation Department.

The delegates showed a strong interest in having an overall status update on broadcast technologies and were keen to learn about the EBU position on each topic. For this region the update on digital terrestrial technologies (particularly DVB-T2) and the implications for spectrum planning were among the most welcome contributions. Other topics covered during the two days of presentations included file-based workflows, integrated production strategies, future television formats (such as UHD TV) and hybrid broadcasting techniques. Among the latter were the HbbTV standard for hybrid television and the RadioDNS set of specifications for hybrid radio.

RADIOHACK

EBU Radio Week began just as this issue of tech-i was being finalized. While heavy snow in Geneva disrupted the travel plans of some, there was still a healthy turnout for the RadioHack workshops that kicked off the week. Developers and engineers from broadcasters, operators and labs gathered in the winter wonderland to discuss and work on new ideas around hybrid radio, mobile apps, metadata and more. (A report on RadioHack and the Digital Radio Summit will appear in the next issue of tech-i.)



MUSCADE Workshop

21 MARCH, BERLIN

The EBU and Fraunhofer HHI are jointly organizing this final workshop to present, discuss and demonstrate the results of the MUSCADE project, which has been investigating innovative technologies for 3DTV.

<http://tech.ebu.ch/muscade2013>



BroadThinking 2013

27-28 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/broadthinking2013>

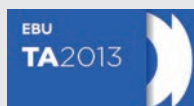


Immersive Audio Over Headphones

15-16 MAY, GENEVA

This workshop, open to all and free for EBU Members, will look at audio technologies that create a more immersive listening experience, with a particular focus on binaural audio.

<http://tech.ebu.ch/audio2013>



EBU Technical Assembly

13-14 JUNE, MUNICH

This year's TA takes place in Munich, hosted by the public broadcaster of the German state of Bavaria, Bayerischer Rundfunk (BR). All Technical Directors and Chief Technology Officers of EBU Members are encouraged to attend.

<http://tech.ebu.ch/ta2013>



Network Technology Seminar 2013

25-26 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/nts2013>

The presentations given at all EBU Technology & Innovation events are available from our website, often with accompanying videos. Just visit our Event Calendar and click on Past Events.

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

New Audio Formats

THE WORLD OF BROADCASTING HAS CHANGED SIGNIFICANTLY IN RECENT YEARS. THERE ARE NOW MANY MORE WAYS OF DELIVERING AND CONSUMING MEDIA. NEW FORMATS TO REPRESENT AUDIO PROGRAMMES ARE BEING CONSIDERED, AIMING AT INCREASING FLEXIBILITY AND ULTIMATELY IMPROVING THE AUDIENCE EXPERIENCE. **CHRIS PIKE**, BBC RESEARCH & DEVELOPMENT.

Currently audio programme content is represented using channel-based formats. A number of signals are stored in a file or distributed in stream, and each one corresponds to a loudspeaker used in reproduction of the programme. The Broadcast Wave Format (BWF) doesn't currently define what each channel in the file represents, nor does the Microsoft Wave Format upon which it is based. The loudspeaker setup is assumed from the number of channels and the speaker positions are based on their channel number. For example a programme with two channels of audio implies a stereo format; the signals correspond to the left and right loudspeakers, which should be placed in front of the listener with 60° separation. This is the set-up used for production and so the same layout must be used for reproduction, otherwise the experience will not be as intended.

Problems quickly arise when more than two channels exist. For 5.1 content there are different practices for ordering channels and there's no reliable way of telling from the file itself which convention has been used. RF64 is a BWF-compatible multichannel format, which uses a channel mask to map channels to loudspeaker locations using a descriptive label e.g. SPEAKER_FRONT_LEFT. This allows the speaker positions to be determined, but the order of channels must still be assumed.

A CHANGING WORLD

Recently we've seen new reproduction formats emerging with a greater number of loudspeaker channels. One example is NHK's 22.2 system, which was used for public UHDTV screenings of the Olympics in the UK this summer. The RF64 format does not support description of all of these channels. The list of available formats is growing and becoming more diverse. Existing channel definitions could be extended as new formats emerge but this may not be sustainable in the future.

An EBU project is developing proposals for revising BWF and RF64 to allow flexible multichannel audio content to be carried. A new chunk of data in the file header will carry a look-up table of



channel identifiers, and metadata stored in an accompanying XML file will be used to describe the channels. An updated EBUCore metadata set will allow more accurate definitions of the content within a file to be obtained.

Broadcasters often deliver programmes in several different formats to cater for different audience platforms. The revised BWF will allow a programme to be stored in multiple formats within a single file, for example stereo, 5.1 and binaural headphone versions. This update will clearly define when a stream contains coded audio as opposed to PCM (pulse code modulation – uncompressed audio data) and indicate the loudspeaker channels that are contained within that stream.

FREEDOM FROM LOUSPEAKERS

With channel-based representations, the format is determined during production and fixed throughout the rest of the broadcast chain. For years researchers have been working on audio formats that are independent of the loudspeaker configuration. Ambisonics formats represent the scene differently, without a set loudspeaker arrangement. Object-based formats describe components within the scene with time-varying metadata giving maximum flexibility. Several commercial systems now exist

that allow this kind of production.

For broadcasters this approach is appealing. Programmes can be produced once and distributed in several different formats, which are generated automatically. The new BWF work aims to allow scene and object representations, which will enable broadcasters to carry and exchange programmes made in these formats.

At BBC Research & Development we recently experimented with the object-based approach when producing a radio drama. Rather than panning sound sources between loudspeakers, they were positioned freely in 3D space, and the programme was stored as a set of objects with time-varying data about their position and level. The production was monitored in 3D on a 24-speaker system, and stereo and 5.1 versions were automatically generated for broadcast from the object-based representation.

Eventually Ambisonics and object-based formats might be delivered to the audience and adapted to their reproduction system, and perhaps even to personal preferences, in a decoder. MPEG is beginning work on a new flexible 3D audio codec, MPEG-H Part 3, with the aim of doing exactly that. The first step however is to create an open standard that will allow programmes to be created in these exciting new formats.

Two ears, three dimensions

WITH TWO EARS AND ONE BRAIN, ALL OF US ARE ABLE TO LOCALIZE ANY SOUND SOURCE IN A THREE DIMENSIONAL ENVIRONMENT. TODAY, A COMMON SMARTPHONE PROCESSOR CAN SYNTHETIZE THIS PHYSIOLOGICAL SKILL TO OFFER A 3D SOUND FIELD OVER HEADPHONES.

MATTHIEU PARMENTIER,
FRANCETÉLÉVISIONS.

From an early age, our brain learns how each sound simultaneously hits our ears; it interprets every tiny time difference and spectrum alteration between our two ears to perfectly locate the sound's provenance. Over tens of years, many studies have delivered strong proof that we can localize a sound source in many conditions such as reverberant acoustics or noisy environments. We can even make our brain adapt to another pair of ears if we could accept living for a few weeks with synthetic pinna (the visible part of the ear that resides outside of the head) placed over our own.

Now you probably understand that your head size and pinna shapes are deeply linked to the way your brain analyses the sound field. Today the hot news is that a smartphone has enough processing power to create a multichannel sound field to mislead your brain when listening with headphones or ear buds. It is simply necessary to use a couple of mathematic functions that imitate your personal hearing system to provide a deeply immersive sound. These so-called "left and right Head-Related Transfer Functions (HRTF)", responsible for our natural ability to hear in 3D, are quite personal – but average functions exist.

WHO IS MR KEMAR?

Artificial heads such as KEMAR are famous in research centres. They provide average measurements that are usually convenient for most listeners. Some models also allow pinna substitution to study carefully its influence. Two other parameters have been studied in detail for



Immersive Audio Workshop

Binaural audio and other immersive audio techniques will be explored in more detail at an EBU workshop on 15-16 May 2013. The workshop is free for EBU Members to attend; others are charged a 100 CHF registration fee. Information: tech.ebu.ch/audio2013

years: interaction with room acoustics and head movements. Thus a complete professional solution for spatial audio rendering over headphones should offer head tracking within a virtual 3D acoustic space, in addition to personal HRTF processing.

Today, many professional solutions already offer a list of such different measurements and virtual room configurations. The user is invited to select his preferred settings from a list, and then produce and/or monitor a multichannel signal using headphones. This opens new perspectives: multichannel monitoring in the field, reference monitoring in bad conditions (too much background noise or reverberation), simulating several listening environments without leaving the studio (living room, car, home cinema), quick quality check of multichannel track assignment and level alignment in a broadcasting venue, etc.

CONSUMER PRODUCTS

These days we jump between smartphones, tablets and connected TV

THE KEMAR HEAD AND TORSO SIMULATOR IS WIDELY USED FOR ACOUSTIC RESEARCH.

sets, the result of living in what we might call the 'smart era'. Every device has to provide something new and simple but better. While a professional can take time to create a coherent spatial listening setting, it's unlikely to become a common skill among consumers. Marketing now drives research to achieve this 'smart' goal, to accompany the explosion of headphones sales.

As we are usually invited to login when using software as a service, the storage of a personal listening setting would probably be worth it when multichannel and 3D audio content arises everywhere. To easily acquire a coherent setting for consumers, many options exist: from picture scans to interactive multimedia games, the competition has begun. Another key feature could also deliver real benefits for consumers: the standardization of a free format to store and exchange personal listening settings. Work on this has begun.

BINAURAL FOR BROADCASTERS

EBU Members such as BBC, Radio France and francetélévisions are today involved in developing the potential of spatial listening over headphones. Historically, binaural broadcasting started more than 80 years ago on an American radio station – and in the 70s Lou Reed even released three albums in binaural – but too many constraints have limited its development during the analogue era. Today, in a multichannel audio era, for producers such as radio broadcasters this technology opens up a massive new potential network for multichannel sound broadcasting, thanks to internet streams and podcasts.

TV broadcasters today compete with the second screen and providers of non-linear content. They are also involved in delivering hybrid broadcast-broadband services to maintain their audience, offering catch-up TV and video on-demand services. The second screen usually becomes a first screen when on the move or simply away from the house. Providing spatial sound over headphones makes sense in this context. The smaller screens of tablets and smartphones would benefit from the immersive audio delivered in this way. It also provides a more natural hearing experience and creates a credible opportunity for premium broadcast content coupled with ultra-high definition tablets.



SVT'S NEW HD NEWS STUDIO IN STOCKHOLM. INSET: FILMING A DRAMA PRODUCTION AT SVT

SVT - Sveriges Television

PER BJÖRKMAN, HEAD OF DISTRIBUTION AT SWEDISH TELEVISION AND EBU TECHNICAL COMMITTEE MEMBER, SHOWS HOW THE BROADCASTER KEPT PACE WITH – AND SOMETIMES LED – ON MEDIA TECHNOLOGY.

The official start of television in Sweden occurred on 4 September 1956. At that time it was the public service radio company that was responsible for the transmissions. Then in 1979 Swedish Radio was divided into separate companies for Television (SVT) and radio (SR), which remains the situation today. At the beginning there was only one TV channel, but in 1968 a second was added. At that time trials with colour TV also started in Sweden. In 1979 SVT became one of the first broadcasters in the world to start a regular teletext service. SVT engineers were also involved in the development of digital stereo audio (NICAM), which was introduced on broadcasts in Sweden in 1988.

A DIGITAL PIONEER

Sweden's digital terrestrial network was launched in March 1999 – it was the second country in Europe to do so. Only eight years later, in November 2007, the very last analogue transmitter was switched off. In November 2010, after several years of test transmissions, SVT1 HD and SVT2 HD were launched on all relevant platforms including DTT, satellite, digital cable and IPTV. These two new channels are simulcast 720p versions of the regular main channels SVT1 and SVT2, including regional content. For the terrestrial network this also meant the start of DVB-T2 transmission in two new multiplexes.

Today SVT operates five channels, SVT1, SVT2, Children's Channel, Knowledge Channel and SVT24. In addition SVT has a special satellite service for Swedes abroad, SVT World, which is a compilation of programmes from SVT1 and SVT2.

Our headquarters are located in Stockholm where about 1,500 employees are based, with an additional 27 affiliates around Sweden. In total, there are approximately 2,100 employees.

TAPELESS

SVT was quite early with trials of tapeless production. Already in 1998 we started to experiment with tapeless production for our new 24-hour news channel SVT24. In 2001 this new workflow was introduced for all news production within SVT. The core of this tapeless workflow was a MAM (media asset management) system that would later become the commercial product Ardome from Ardendo (today Vizrt).

A very important part of the new tapeless workflow was the possibility to share system resources and video material between SVT HQ and the different regions. For that purpose SVT created a private WAN (wide area network) to connect all the different offices. The network consists of several rings for redundancy reasons. During 2013 we will upgrade this network. The largest ring will have a capacity of 10 Gbit/s and the others 1 Gbit/s each. The network carries everything from office data

and telephony to large media file transfers and real time video in both SD and HD quality.

From 2005 to 2007 a separate project was launched to digitize our huge tape archive that included basically every format between 2" and DigiBeta. Over 150,000 hours of TV programming were transferred to files with DV50 compression. Together with the current file-based archive, SVT today has over 4 petabytes of video storage in the archive. With mirrored storage it adds up to 8 petabytes in total.

THE HD UPGRADES

In recent years, SVT has upgraded all studio facilities to HD. The upgrades happened first in the regional facilities, and then in 2012 our five large studios in Stockholm were equipped for HD production. Up to now the facilities are configured for production in 720p or 1080i, but hopefully we can soon migrate to 1080p/50 production.

In 2005 SVT launched the first version of the web-based on-demand service called SVT Play. It has grown incredibly popular in Sweden over the last years. Today, almost everything that SVT transmits on our linear channels is also available for free on SVT Play for 7 or 30 days. For rights reasons some sports events and feature films are excluded from the service. During 2012 we had over 600 million video starts and delivered over 40 petabytes of streaming data to the audience.

Mission: Integration

ONE YEAR INTO THE IMPS PROGRAMME IT'S POSSIBLE TO DRAW SOME EARLY CONCLUSIONS THAT WILL HELP BROADCASTERS TO BENEFIT FROM MORE INTEGRATED APPROACHES TO PRODUCTION.

HERBERT TILLMANN (BR – BAYERISCHER RUNDFUNK, IMPS CHAIR) AND **HANS HOFFMANN** (EBU, IMPS COORDINATOR) PROVIDE AN UPDATE.

The digital media revolution has had a profound impact on the business models of many media sectors, including music, printing and movies. Broadcasting is no different. As the ways in which media content is consumed change drastically, public service broadcasters need to ensure they remain competitive and relevant. Alongside traditional linear television and radio, which continue to be hugely popular, the delivery of multimedia content to a range of platforms has become a crucial part of the mix.

The output of public service media organizations needs to include audio, video, text and images that meet high editorial and journalistic standards and excellent technical quality. Taking into account increasing budgetary pressures on EBU Members, the solution lies in a modern integrated environment and organizational structures along with highly motivated, multi-skilled staff.

Today many broadcasters have organizational structures and production environments for TV, radio and online that are effectively independent silos. This structure doesn't allow them to react flexibly to the shifting expectations of the public. Swiftly changing and adapting workflows to new needs is almost impossible under these conditions; personnel as well as tangible assets are not used in an optimal and synergistic way.

A compounding factor is that these production system silos for radio, TV and online are hardly ever networked. Content exchange between departments, including common planning, is not available. The vision of a common content repository (archive) for all media is not implemented.

ENTER IMPS

The EBU's IMPS programme – Integrated Media Production Strategies – kicked off just over one year ago. To date it has attracted around 90 participants from EBU Members, across the editorial and technical domains. The aim of this strategic programme is to develop reference models for technology and organizational workflows based on the experiences of selected broadcasters that have already transitioned to more integrated approaches. IMPS also aims to make the change management processes transparent and to develop best practice guidelines.

While the IMPS programme was initiated by the EBU Technical Committee, it has been interdisciplinary from the outset. Thus it involves several EBU units: the Technology & Innovation and Media Departments, the EURVISION Academy and the EUROVISION News Exchange.

Following the four workshops that took place during 2012, at Radio Bremen, YLE, VRT and RTBF, we can now present some intermediate results.

NEWSROOMS, EDITORS & JOURNALISTS

A transition to common cross-media programme planning, content research and content management across departments is the first step in developing the organizational structures required for a networked media production environment. Workflow analysis and specifying the functional requirements are elementary planning parameters. Interactions between staff and the design of the office spaces will also support the change processes.

TECHNOLOGY

The integration and networking of individual production and planning systems together with a central Content Repository represent the backbone model. Software components are interconnected via standardized APIs and media bus systems (e.g. by applying FIMS). The overall guiding principle is to guarantee interoperability. It must, however, be stressed that the fundamental goal of interoperability is not currently facilitated by the broadcast industry in many cases. An overall concept consisting of generic hardware on which specialized software components interoperate is often not possible, due to different requirements, use and modification of media in the workflow or simply because of unaligned investment cycles (legacy).

A modern innovative newsroom design with, for example, synergy between special broadcast and generic IT systems and a service oriented architecture (SOA) can offer new cost-effective methods to produce multiplatform content. It should, however, be designed and implemented in accordance with the specific needs and applications of broadcasters. It is important that the broadcasters' experts and other staff are part of the design and installation and that a dedicated team of technology experts is available via a helpdesk after the installation.

ORGANIZATION & CHANGE MANAGEMENT

To implement the required changes, a high level, well-defined change management process has to be established. This must include all concerned media departments, units and personnel. In particular the dialogue between journalists/newsroom, technology and IT has to be addressed. The planning of all of the individual steps involved requires time. Intensive training for staff involved is indispensable. And after installation, support and a strategy for future developments must be implemented.

At the time of writing, further IMPS visits to SWR in Germany and DR in Denmark are planned. Two sub-groups have been formed, with one working on analyzing current workflows for user and the other focusing on technical architectures and infrastructures/interfaces. Information: <http://tech.ebu.ch/imps>

IMPS PARTICIPANTS VISITING RADIO BREMEN, JUNE 2012.



The 700 MHz band in Europe: an imposed change

THE EBU'S **WALID SAMI** TAKES A TIMELY LOOK AT KEY ISSUES AFFECTING THE USE OF THE 700 MHz BAND IN EUROPE.

In a previous issue of *tech-i* (June 2012) I wrote about the decision of the World Radiocommunication Conference WRC-12 to allocate the 700 MHz band (between 694 MHz and 790 MHz) in Region 1 on a co-primary basis to the Mobile service immediately after the next Conference scheduled in 2015. As expected, this decision has accelerated the debate in Europe and forced some administrations to make decisions earlier than expected. Finland has been the first to announce officially, on 26 September 2012, that the 700 MHz band will be allocated to wireless broadband in 2017. The UK followed on 16 November 2012 with a decision to support the international process and seek to enable a harmonized release of the 700 MHz band for mobile broadband use, but no timeline was indicated.

For the time being, the pace is imposed by the International Telecommunication Union's schedule, in particular the timelines of:

- WP5D, which prepares the channelling arrangements for IMT (International Mobile Telecommunications) in this band, and
- JTG4-5-6-7 which prepares options for the lower band edge, recommendations on compatibility with the existing services, and solutions for accommodating applications ancillary to broadcasting requirements.

The ITU schedule sets the deadline for draft Conference Preparatory Meeting texts at mid-August 2014, which means that all technical studies will have to be carried out in the coming eighteen months. In Europe, the CEPT has organized its activities to meet this schedule. The Project Team CPG PTD is tasked with preparing the CEPT input to the ITU process on the relevant agenda items.

In addition, the European Commission is preparing a draft mandate to CEPT asking for the preparation of minimal (least restrictive) technical conditions for the use of the 700 MHz band by mobile broadband, similar to the mandate which was issued in 2008 for the 800 MHz band. The main driver for this new mandate is the priority given to a global harmonized use of the 700 MHz band for mobile broadband.

SIGNIFICANT ISSUES FOR EUROPE

Unlike the major part of Africa and Middle East, where DTT is at an early stage of introduction, many European countries have already implemented DTT in the UHF band. According to the results of an ITU questionnaire sent in July 2012, several European countries indicated an effective use of the 700 MHz band (12 channels from 694 to 790 MHz) representing about 30% of the total number of their DTT UHF transmitters (using the 40 channels from 470 to 790 MHz). This indicates a similar level of use of the 700 MHz band compared to the remaining UHF band.

The first issue for Europe in releasing the 700 MHz band is timing. Referring to the experience of the coordination activities which were carried out to release the 800 MHz band, it is expected that releasing the 700 MHz band will require several years of intensive negotiations for cross border frequency coordination. In some parts of Europe, like the area around Belgium, extremely difficult negotiations are expected, especially considering that around 60% of the GE06 plan entries for the French community in Belgium are above 694 MHz.

Another concern about timing is the necessary transition to new modulation and compression systems to be able to accommodate the same number of programmes into fewer multiplexes. Based on the GE06 planning experience, the release of the 700 MHz band corresponds to a loss of two full coverage multiplexes. A

migration to DVB-T2 and the introduction of HEVC would be required if all existing DTT programmes are to be retained and upgraded to HDTV. In a recent proposal to the French government, the French broadcasting regulatory authority recommended an enforced supported transition to MPEG4 by end 2015 and a future transition to DVB-T2 and HEVC at the earliest in 2020.

The second issue is technical. The potential harmonized band plan in the 700 MHz band for mobile services will most likely be based on a conventional duplex, i.e. transmissions from the mobile terminal will use the lower part of the band, close to the broadcasting channels 48 and below. This configuration will require stringent limitations on the out-of-band emission levels in the mobile terminals and in the DTT high power transmitters using channel 48. Possible interference from mobile terminals into portable and fixed reception using active antennas will be an issue, for which mitigation techniques are still to be identified.

Still on the technical side, the different timing in the use of the 700 MHz band between Africa (sooner) and Europe (later) will require co-channel operation in the Mediterranean area. Similar issues may face countries around the Gulf area. The feasibility of this co-channel operation is still to be verified due to the potential impact of DTT high power emissions on uplink reception at mobile service base stations.

The 700 MHz Issues In Summary

- Releasing the 700 MHz band will require several years of intensive negotiations for cross border frequency coordination.
- A migration to DVB-T2 and the introduction of HEVC would be required, with associated transition periods.
- Possible interference from mobile terminals into DTT portable and fixed reception using active antennas will be an issue.
- The feasibility of DTT and IMT co-channel operation between southern Europe and North Africa for example (required due to significant differences in likely implementation timetables) is still to be verified.
- The cost of releasing the 700 MHz band in European countries is still to be assessed.
- Cable TV service channel plans will need to be reorganized locally and immunity of their installations and receivers will need to be improved.
- Solutions and related costs will be needed to accommodate PMSE applications which will lose access to the 700 MHz band.
- Quick decisions are required in Europe under external constraints. There is a lack of time to consider alternative solutions to satisfy wireless broadband requirements.



DECISIONS MADE AT THE ITU IN GENEVA IMPACT
ON HOW VALUABLE UHF SPECTRUM IS USED.

The third issue is economic. The cost of releasing the 700 MHz band is still to be assessed. This calculation should include the cost of equipment to be modified at emission and reception sides for DTT. It will vary between European countries depending on the level of the actual use of the 700 MHz band. It should also include the indirect cost of the coordination activities to agree on alternative frequencies in the remaining part of the UHF band.

Another economic effect will be the impact on cable TV and PMSE (programme-making and special events). Cable TV service plans will need to be reorganized locally and immunity of their installations and receivers will need to be improved to mitigate possible impact on the cable TV distribution from mobile service transmitters using the same band. Solutions, and related costs, will be needed to accommodate PMSE applications, mainly radio microphones, which will lose access to the 700 MHz band.

WAS THERE ANY ALTERNATIVE?

The surprising early allocation in ITU Region 1 of the 700 MHz band at WRC-12 was mainly motivated by the unavailability of the 800 MHz band for IMT, combined with low requirements for terrestrial broadcasting in African and Arabic countries. In Europe, the 800 MHz band had previously been allocated to IMT with harmonized technical conditions, but the increasing demands of wireless broadband in Europe have led to considering the early allocation of the 700 MHz band for sake of global harmonization. However, the requirements for wireless broadband in Europe might have been satisfied using technologies other than mobile broadband, which is essentially based on the LTE standard. This latter requires almost exclusive use of its frequency bands. It does not allow sharing with broadcasting, PMSE or with any innovative cognitive radio systems. It also puts constraints on cable TV distribution systems and receivers. The release of the 700 MHz band from broadcasting also increases the difficulty of making HDTV widely available and introducing UHDTV on the terrestrial broadcasting platform.

A legitimate question is why “harmonization” has not been reason enough to motivate African and Arab countries to release the 800 MHz band in Region 1 while this same “harmonization” has been enough for Europe to increase by more than double the resources used for mobile broadband in the UHF band (9 channels in the 800 MHz band plus 12 channels in the 700 MHz band, reaching 42% of the UHF broadcasting band).

With the 700 MHz band story, it seems “harmonization” has won a battle over “flexibility” and “innovation”.

Across the spectrum

ELENA PUIGREFAGUT, COORDINATOR OF THE EBU STRATEGIC PROGRAMME ON SPECTRUM MANAGEMENT, PROVIDES AN OVERVIEW OF THE GROUP'S ACTIVITIES AND PRIORITIES.



The digital terrestrial television (DTT) platform provides the near universal coverage, guaranteed quality of service and free-to-air content essential for public service media (PSM) to fulfil their mission. DTT uses the UHF band, 470-862 MHz, which with its propagation characteristics offers the possibility of achieving large coverage with reasonable network infrastructure. In Europe, the 800 MHz band, i.e. 790-862 MHz, is to be released from broadcasting services to mobile services. The next tranche, the 694-790 MHz band or '700 MHz' is also to be allocated to mobile services in 2015 (see page 10) and several European countries have already announced their intention to use it for wireless broadband applications.

The mobile industry is ready to pay for the frequencies in the UHF band to improve their indoor coverage without increasing their network density. At the same time, mobile networks are experiencing an increasing data capacity

demand and to be able to cope with that demand are also requesting higher frequency bands such as the L-Band, 1452-1492 MHz planned for T-DAB, or the C-Band, 3.4-4.2 GHz used among others for satellite broadcasting contribution links.

In this situation, the EBU Strategic Programme on Spectrum Management (SM) works to ensure that an adequate amount of spectrum is allocated to broadcasting services and that the spectrum allocated is used in the most efficient way, achieving the necessary quality and coverage requirements. The work has been divided into four main areas:

1. SPECTRUM PLANNING

This area covers the definition of spectrum planning parameters for broadcasting standards (DVB-T/T2, DAB+, DRM) and related spectrum planning studies. The project group SM-EDP (Evolution of Digital Planning) has produced the report EBU Tech 3348 'Frequency and Network Planning Aspects of DVB-T2', the report BPN 101 'Report on Frequency and Network Planning Parameters Related to DAB+' and the report EBU Tech 3357 'Case Studies on the Implementation of DRM+ in Band II'. The work currently focuses on SFN (single frequency network) aspects of DVB-T2 relating to network planning and spectrum usage, and on planning issues arising from decisions related to the co-primary allocation to the Mobile Service in the UHF band.

2. SHARING AND COMPATIBILITY

This area covers technical aspects of sharing between digital broadcasting and other services (in particular mobile systems and white space devices). The project group SM-SDB (Sharing with Digital Broadcasting) made many contributions to ensure adequate protection for broadcasting services below 790 MHz when allocating the 800 MHz band to the mobile service. In particular the group identified that the cumulative effect of interference from cellular networks had to be addressed. The group has also been actively contributing to the CEPT work on white space devices with similar sharing studies. The work currently focuses on the sharing studies related to the allocation of the 700 MHz band to mobile services.

3. ELECTROMAGNETIC INTERFERENCE

This area covers technical aspects of electromagnetic interference and compatibility (EIC). The project group SM-EIC has been particularly active on electromagnetic compatibility implications for broadcasters in the LF/MF/HF and VHF bands of power line transmissions (PLT) and smart grid, smart metering using PLT. The work has been crucial in the standardization process led by CENELEC.

4. REGULATION AND POLICY

This area covers regulatory and policy aspects related to the spectrum allocated to broadcasting. The project group SM-RAP coordinates and promotes EBU positions for WRC-15 on agenda items related to broadcasting issues. One of the points where broadcasters will have to express clear positions is the allocation of the whole UHF band to mobile services, i.e. 470-694 MHz. The group will analyze new regulatory frameworks under discussion such as Licensed Shared Access. The group has also been giving support to spectrum requirements for Programme Making and Special Events (PMSE) equipment.

Over the next two years preparations for WRC-15 will have the highest priority on the SM agenda. The major activities to be carried out by the EBU are summarized in a WRC-15 Action Plan and this is regularly reviewed by the SM group. To respond to the most urgent task, defining spectrum requirements for DTT, a correspondence group was created. To contribute to the WRC-15 discussions on solutions to accommodate spectrum requirements for PMSE, another group, SM-PMSE, also working by correspondence, has been created.

In the coming months discussions at the European Commission level (see page 14) will accelerate the work and the SM WRC-15 Action plan will need to reflect these demands.

Download the reports mentioned in the article: <http://tech.ebu.ch/publications>
Join the strategic programme on Spectrum Management: <http://tech.ebu.ch/sm>

No end in sight for broadcast

WITH RESPECT TO BOTH QUALITY AND COST, BROADCAST DISTRIBUTION DELIVERS DISTINCT ADVANTAGES AS COMPARED WITH THE INTERNET. THE TWO APPROACHES ARE IN FACT FULLY COMPLEMENTARY, SAYS THE EBU'S **DARKO RATKAJ**.

Broadcast technologies have been developed and networks rolled out with one goal in mind: to enable efficient delivery of radio and TV services to the audiences. The state-of-the-art broadcast specifications include the most advanced modulation and coding techniques capable of carrying future services, such as UHDTV and 3DTV. Business models are well-known and relatively stable. Distribution costs are predictable and sustainable. Regulation is in place to ensure the prominence of public service media (PSM). Broadcasting is mainly a national business where partners and competitors are pretty well known. The viewers and listeners enjoy a growing service offer at minimum cost and maximum quality. Everything seems well.

Or, does it? Perhaps it would be if it were not for the fact that the users expect more. They've grown accustomed to the convenience of on-demand services, they expect an ever-increasing choice of instantly available content, and they love watching their favourite programmes on computers, and sometimes even on mobile phones. All this is beyond the current capabilities of broadcast networks, which carry scheduled programming and can neither deliver on-demand services nor reach the popular personal devices such as smartphones, PCs and tablet computers.

But the internet can. This is why the internet has emerged as a powerful new way of distributing media services. The PSM organizations were quick to recognize its importance and have put their content and services online. Indeed, in many countries the most popular locally originated online content comes from the national broadcasters.

If the internet brings so many advantages one could ask why we still use broadcast networks. Would it not be better to concentrate our efforts on internet distribution instead of broadcast?

I suggest the answer to this question is NO.

The internet is a much more complex and dynamic environment than traditional broadcasting and is not always friendly to PSM.

THE QUESTION OF QUALITY

Consider quality, for example. Technically, the internet is a giant network of computers. At the origin data files are 'sliced' into standardized data packets and each packet is transported individually across the network. The original file is reassembled at the destination computer. This enables any type of content or service to be carried over the same, general purpose network.

A downside is that such service-agnostic architecture cannot easily be optimized for the delivery of media services. The routing of packets is automated, no one has control over the whole delivery chain and it is very difficult to ensure a sustained quality of service (QoS) comparable to that of dedicated broadcast networks. This is why on the internet one can only speak of 'best effort' and not of guaranteed QoS.

Furthermore, the network capacity is generally shared between concurrent users. As the number of users increases each of them has access to less bandwidth. Beyond a certain point this leads to network congestion and deterioration of QoS. None of these constraints exist on broadcast networks.

COUNTING THE COST

Let us look now at the distribution costs. On broadcast networks the costs are broadly determined by the size of the coverage area and the quality requirements, but are independent of the size of the audience. The opposite is true on the internet where distribution costs are usually proportional to the number of users. That means the overall distribution costs are difficult to predict and any successful piece of content may cause the costs to escalate.

The internet is dominated by network operators, content integrators, search providers and, increasingly, consumer equipment manufacturers. They all seek to 'own the consumer' and there is virtually no regulation that would safeguard the interests of PSM.

If EBU Members are to prosper on the internet they must retain direct access to the audience, as they do on broadcast platforms, and this implies sufficient control over the distribution channel. Additional regulation may be required, in particular around transparency, net neutrality, and the prominence of PSM.

Internet distribution currently accounts for less than 2% of the total viewing time spent on PSM content while more than 98% is delivered over broadcast networks. This may change in the future but for now it is safe to conclude that the two distribution models are complementary and yes, we still need broadcast networks.





AN EBU DELEGATION MET WITH EUROPEAN COMMISSION VICE-PRESIDENT NEELIE KROES DURING JANUARY 2013; SHE IS PICTURED HERE ON THAT OCCASION WITH EBU PRESIDENT JEAN-PAUL PHILIPPOT AND EBU DIRECTOR GENERAL INGRID DELTENRE.

EBU HEAD OF EUROPEAN AFFAIRS **NICOLA FRANK** EXPLAINS HOW THE DIGITAL AGENDA FOR EUROPE AND ITS FOCUS ON HIGH SPEED INTERNET CONNECTIVITY IMPACTS BROADCASTERS' MEDIA DELIVERY STRATEGIES.

The EU Digital agenda: it matters broadly

"High speed internet connectivity is the basis for the digital economy; without it, essential services such as [...] audiovisual services – and the benefits thereby derived – will simply not take off," says European Commissioner Neelie Kroes. In Brussels, her name has become synonymous with the EU Digital Agenda, an ambitious plan to boost the European digital economy with investment in broadband and faster networks.

Broadband delivery matters to broadcasters: it fuels new and innovative ways of bringing services to audiences, such as catch-up and second screen entertainment. In effect, the success of the online experience is very much driven by broadcasters investing massively in domestic content and ensuring its availability over terrestrial, cable and satellite networks.

With Commissioner Kroes renewing her plans in a more targeted manner last December, the European broadcasting sector needs to continue demonstrating its uniqueness and capacity to be an engine for the Digital Agenda. But it also confirms that broadcasters must further reflect together on their future needs and engineer future-proof solutions for media delivery.

SCARCE SPECTRUM, MOBILE BROADBAND AND DTT

Commissioner Kroes is convinced that more spectrum availability for mobile use is crucial for realizing her objectives. This transpired in the 2012 European Radio Spectrum Policy Programme (RSPP), which set the target of identifying at least 1200 MHz for mobile use by 2015. A

Commission action plan out later this year will assess further ways of rolling-out wireless broadband networks. But apart from the release of the 800 MHz band under the RSPP, no other broadcast spectrum was originally meant to be opened up.

But then came the WRC-12 decision to authorize co-primary allocation of the 700 MHz band to mobile services after 2015. The Commission has subsequently tried to develop an EU approach for the 700 MHz band, providing technical guidance to EU Member states who would like to move more quickly on 700 MHz ahead of WRC-15, which will define technical and regulatory conditions of the WRC-12 decision. The Commission is now finalizing a mandate for the CEPT to develop the necessary harmonized technical conditions.

In parallel, Mrs. Kroes wants to know more about *"the possibility of long-term convergence of broadcasting and wireless broadband to deliver voice, data and audio-visual services via a converged platform."* A recent meeting with the EBU on the 700 MHz band helped her better understand the importance of the DTT platform, and she concluded that a future-proof media delivery solution needs to involve all the interested parties.

OPEN INTERNET VS MANAGED SERVICES

Broadband access to broadcasters' content will continue to appeal to audiences provided that a high-quality and unrestricted internet is guaranteed. That's why net neutrality is a hot topic in Brussels, a debate in which the EBU makes the case for a strong commitment

to an open, transparent and secure open internet, highlighting its crucial role for innovation and freedom of expression.

Commissioner Kroes will publish a European recommendation this July after gathering evidence on blocking and/or throttling by operators (mainly hitting P2P and VoIP traffic) in 2012, taking stock of various reports published by BEREC, the Body of European Electronic Communications Regulators, and running two public consultations in the last three years. The Commissioner also bears in mind that several European countries have already enshrined net neutrality in their national legislation.

Kroes' initial conclusion: citizens need to be empowered to manage their connection with clear information on actual, real-life broadband speeds and on the limits of their subscription packages. However, operators should remain free to offer differentiated internet offers if they wish to do so. *"I do not propose to force each and every operator to provide full internet."* (See also "Must Carry Net Neutrality, tech-i, December 2012, p.13)

AUDIOVISUAL CONVERGENCE: HEADACHE OR SOLUTION FOR THE COMMISSION?

Finally, broadband and broadcast will meet again this year in the upcoming European Commission Green Paper on "Preparing for a Fully Converged Audiovisual World: Growth, Creation and Values." Raising a broad range of questions, the paper will in particular formulate initial thoughts from the Commission on how to get the best of both broadcast and broadband worlds on one single device.

Solving the satellite jamming problem

AS THE FREQUENCY WITH WHICH SATELLITE BROADCASTS ARE AFFECTED BY DELIBERATE INTERFERENCE INCREASES, THE HEAD OF DISTRIBUTION AT BBC GLOBAL NEWS, **NIGEL FRY**, EXPLAINS WHAT'S BEING DONE TO ADDRESS THE ISSUE.

The BBC Persian Television service (BBC PTV) was launched in January 2009. The service is very successful and has achieved much critical acclaim for its content, a mix of news and documentary entertainment programmes. Some programmes have been commissioned jointly for both BBC PTV and the BBC's domestic UK TV service. BBC PTV has achieved good ratings, with an estimated audience in excess of 6 million people.

In June 2009 the service was affected by deliberate interference. Since then we know that a number of services originating from different countries have been affected by deliberate interference. The frequency with which this act of international vandalism is occurring is of considerable concern to many bodies. A number of steps are being taken to address the issue.

A POLITICAL PROBLEM

As the use of military power decreases, international media companies and especially broadcasters are likely to have an increasing role in the development of civil society. The influence of international broadcasts is understood, however this more overt role draws closer attention to such broadcasts and with it the increased risk of deliberate interference. Historically there have been a few incidents, typically related to regional tensions. Since 2009 there has been a considerable increase in the number of incidents, rising to over 300 in 2012. Such deliberate interference is not easy to perform and in many cases quite large uplink systems (a 7m dish or similar) are required to interrupt a broadcast service. Given the changes in geo-politics we may expect deliberate interference to continue despite it being contrary to the ITU regulations that govern the use of satellites.

Deliberate interference is produced by an 'illegal' carrier being transmitted on the centre frequency of the transponder carrying the 'wanted' service. A consequence of this action is that all services in the transponder or in the multiplex stream (possibly 12) are affected by the interference. As a result, the uplink service provider has little choice but to suspend the service that is identified as the target for the interference. As the broadcaster, we then have to find another service provider that is prepared to carry the channel and then inform the audience of the change, through the internet or other means, to encourage them to re-tune their receiver. Throughout this process, the audience will have typically lost the channel and can be confused about reason for this.

TAKING ACTION

In response to deliberate interference the BBC has taken action in the technical, regulatory and political arenas. At a technical level, an initial step is for the satellite owner/operator to locate the source of the interference. This is not a quick process and requires

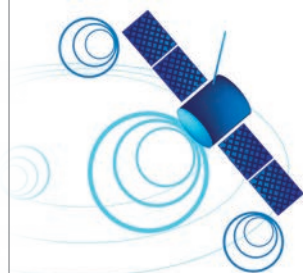
"The frequency with which this act of international vandalism is occurring is of considerable concern."

access to a suitably equipped satellite adjacent to the one affected, considerable skill, specialist equipment, and time to be able to identify the offending signal. Fewer than 50% of cases can be successfully located. Power levels and gains can be adjusted in an effort to 'overpower' the interfering signal but in time this can be overcome.

With the regulatory community we achieved support and dialogue at the ITU Plenipotentiary meeting 2010 and escalation of the matter to the ITU WRC-12. A series of meetings were convened to consider the matter through the course of the event. This resulted in some changes to the Regulations, in the context a good result.

The ITU is a body that works on the basis of international consensus and is not best equipped to deal with deliberate acts that contravene its regulations. We have continued to work in this arena and at the end of November 2012 the BBC hosted an event to focus the attention of the industry and stakeholders on the matter. Technical delegates also heard from the industry about technologies that could be used to counter deliberate interference. The event was very successful in reinvigorating action against the interference and we have since have learnt of technical changes that may help some operators and broadcasters counter the issue.

Where next? Firstly our focus is on ensuring that the ITU Radio Regulations Board have the requisite information and proposals to suggest appropriate action on the matter. We are building stronger links with the broadcast community in the Middle East and a major session is being planned at CABSAT 2013 to brief delegates on the issue, as it affects contribution and distribution platforms. Beyond that our focus is on developing the best approach for WRC-15. Above all, we need the whole industry to recognize that this is an issue that can affect any operator and to work together to combat the issue.



Intercom Interoperability: time for testing!

THE EBU'S I3P GROUP HAS CREATED A SET OF GUIDELINES (TECH 3347) THAT WILL DELIVER REAL BENEFITS WHEN IT COMES TO THE USE OF INTERCOM SYSTEMS IN STUDIOS AND IN THE FIELD. GROUP CHAIR **CLAIRE MERIENNE-SANTONI** OF FRANCETÉLÉVISIONS TELLS THE STORY.

Since January 2009, the I3P project group – Intercom Interoperability over IP – has been working on audio interoperability for Intercom Systems. By audio interoperability we mean the possibility for intercom devices to establish audio connections through IP, excluding ancillary data such as labels, control commands, etc.

The group's forerunner NACIP (Networks: Audio Contribution over IP) had been working since 2004, but participants noted that the group's work wasn't really being implemented in the world of intercom systems. In the first place this was because intercom manufacturers were developing their own codecs for transporting audio over IP and, not being involved in NACIP (which was dedicated to audio coding for production), they weren't aware of EBU Tech 3326 (Audio Contribution over IP - Requirements for Interoperability). For these reasons the Technical Committee decided to invite intercom manufacturers to contribute to a project that would write a recommendation that could fit this specific use. And thus I3P was born!

In fact intercom applications face bandwidth limitations and have latency requirements that are not the same as for production. These factors influence the choice of audio coding algorithms. Tech 3347, the Audio over IP Interoperability Requirements for intercoms, was written with care to maintain compatibility with Tech 3326, the earlier ACIP interoperability requirements, while addressing the specific needs of intercom systems.

The first meeting, bringing together most of the intercom manufacturers, was held at IBC in September 2009. Tech 3347 was first published 18 months later, in February 2011. It then took a year for all of the elements to fall into place for a plug test where the manufacturers could see how the guidelines would work in practice.

PLUG TEST

In April 2012, all of the manufacturers who were involved in the project came together in Munich, where a plug test was hosted by IRT. The participants were

AT A PLUG TEST HOSTED BY IRT IN MUNICH IN APRIL 2012 INTERCOM MANUFACTURERS HAD A FIRST CHANCE TO TEST THE INTEROPERABILITY GUIDELINES IN PRACTICE.



For any questions, suggestions or feedback about interoperability within intercom systems, you can contact Mathias Coinchon, EBU project manager (coinchon@ebu.ch) or Claire Merienne-Santoni, I3P chairwoman (claire.merienne-santoni@francetv.fr).

BARIX, CLEARCOM, DIGIGRAM, INTRACOM, MAYAH, RIEDEL, RTS / Telex and TRILOGY. The session was a good opportunity for them to conduct real-life testing of their implementations. The results were pretty good: most of the issues could be solved easily, with some even being solved on site during the two days of the plug test. Tech 3347 was then revised to address some specific points raised at the Munich event. Tech 3347-rev1 was published in November 2012.

With respect to audio coding algorithms, the plug test focused on G711 and G722 (mandatory and the most widely adopted by manufacturers), but also on Speex (recommended / non-mandatory). The guidelines also specify interoperability with other codecs such as G729, MPEG 4 Low Delay and AMR-WB, and they could be further extended in the future (for example with Opus).

As a result of the good work done by the I3P group, EBU Members and the

wider broadcast community can now take advantage of interoperability from intercom vendors. Of course features of this kind need to be used in the field to be fully tested. That's why we're inviting anyone that's in the process of renewing or increasing the size of their intercom systems to request the implementation of Tech 3347 and to test it.

Tech 3347 will prove particularly useful for those that have intercom systems from different vendors, but also to establish audio over IP communication directly between intercom systems and audio over IP contribution codecs. Another field of application is collaboration with third party studios or OB vans that do not use the same brand of intercom. With Tech 3347, users can establish direct audio over IP communications from their intercom panels to a third-party device in any of these situations. That's worth a bit of effort to test, isn't it?



DAVID WOOD SUGGESTS THAT ENGINEERS MUST BE MORE THAN “ENGINEERS”. THEY NEED TO LOOK BEYOND HOW TECHNOLOGY WORKS, TO TAKE INTO ACCOUNT, AND HELP SHAPE, HOW IT CAN BE USED. THEY NEED TO BE PART OF THE CREATIVE PROCESS TOO.

“Engineers need to be as creative about how the technology will be used as they are about the technology itself.”

Being Creative with New Media Technology

One of today’s rising stars is hybrid broadcast-broadband – also known as Connected TV, OTT, Smart TV, or Integrated Television. The central idea is the same: the TV set is used not just for television broadcasting, but for bringing content from the internet to the viewer’s screen as well. There are many hybrid sets (and, alas, many different systems) on the market already.

Engineers need to know what the technical choices for hybrid are, but they also need to see what its uses may be; and, from that, help estimate whether or not they are likely to be successful. What would the public be sufficiently attracted to?

VIDEO: THE KILLER APP

Users click through huge amounts of text and graphics on the web, but the highest audience attractor is video. Hybrid broadcast-broadband will provide useful programme guides and other information services, but if it is to be a serious contender for the viewer’s time and attention, it has to provide video content. A main task will be to provide things like TV programmes via internet. The technical capabilities of systems differ, as does the consequential user equipment cost. And there are differences from country to country in what broadcasters are legally allowed to do. But, within the legal and technical framework, a strategy needs to be set through the combination of technology and use.

The higher the technical quality of the picture, the longer viewers will watch. Requirement number one for hybrid is to be able to deliver high internet bit rates into the home reliably. Success will not depend solely on the choice of system technology - HbbTV, YouView, Smart TV, Hybridcast, MHP, etc. It’s about having the infrastructure to deliver high bit rates to the audience. If you can’t do that, the hybrid service won’t achieve its potential.

ATTRACTIVE SERVICES

Beyond that, there are areas where judgment is needed in the services to be offered. Which is (are) the right horse (horses) to back? Engineers need to be part of this discussion

too. The options fall into four groups.

The first is to provide television programmes that have already been broadcast. This is video-on-demand (VoD) catch-up TV (for recently shown programmes) or programmes from the archives. These are professionally made programmes, and usually made by, or in association with, the broadcaster.

The second is VoD of new programmes that have not been, or will not be, seen on broadcast television. These might be, for example, movies or events. They are still made professionally. In some senses they represent a competitive service to linear broadcast. This kind of service can be, and is today, provided by organizations independent of broadcasters. But, broadcasters could be in this business too, and could see this as the equivalent of additional broadcast channels.

The third is content made at little or no cost, but still attractive. This would include citizen-generated content. Think of much of YouTube and Daily Motion, among others. We might call this ‘amateur content’. Should broadcasters leave this entirely to others? Could providing a platform for this kind of content be seen as part of their mission, serving to interconnect the public?

Finally, we need to think about multimedia services. These are sometimes categorized into ‘declarative’ content (multimedia on the screen), and ‘executable’ content (Apps). For the second – multimedia and data that runs like a computer programme - one of the issues can be (depending on the system technology) whether the content runs on the television set’s processor, or runs from a remote internet location. Which of these is likely to be most attractive? What kind of Apps will the public want?

So, the engineer needs to use his insight and judgment about technology choices, but also needs to perceive which services will be attractive in the market. This is no easy task - but it is a necessary part of the job to ensure that technology choices will be fit for purpose. Engineers need to be as creative about how the technology will be used as they are about the technology itself.

The TLOs: Who? What? Why?

THE EBU'S **TECHNICAL LIAISON OFFICER** NETWORK WAS ESTABLISHED IN 2011, WITH MEMBERS ASKED TO NOMINATE A SINGLE POINT OF CONTACT FOR TECHNICAL MATTERS. **EOGHAN O'SULLIVAN** PROVIDES THIS PROGRESS REPORT.

Towards the end of their first full year performing the role, we invited our Technical Liaison Officers (TLOs) to a meeting in Geneva last November. It was intended as a chance to ask how well the system was functioning and see whether it could be improved and developed further. For those present it proved to be a positive experience – a chance to meet with peers and exchange information and insights into the most pressing technical challenges facing EBU Members. The value of having TLOs was endorsed and the network is well on the way to being firmly established.

At the time of writing 57 TLOs have been nominated by EBU Members. (Sixteen of these attended the November meeting.) The role was originally conceived of as being a single point of contact that could act as a kind of ambassador for the EBU's technical activities within their organization. The Technical Assembly brings Technical Directors together once a year, as the most senior EBU body in the technical domain. However it was recognized that TA members wouldn't always have the time to deal with day-to-day matters. They were therefore invited to nominate a colleague, usually a senior technical manager, to take on the role.

The TLO role is defined as follows:

1. to identify within their respective organizations potential participants in EBU technical activities;
2. to ensure that EBU technical activities are known in their organization;
3. to assist in the definition of the annual workplan by providing input and feedback.

In practice the role encompasses both reactive and proactive aspects. From time to time specific requests for action are sent to the TLOs. Recent examples included a request for responses to a survey on Future Networked Studios and feedback on a set of media use cases being defined by the SP-CTN group. But they are also asked to follow the activities, events and outputs of the Technology & Innovation Department and ensure that the relevant people within their organization are kept informed and, where relevant, encouraged to engage actively with the work.

The TLO network has already become an important bridge between the EBU and our Members. We rely on each individual TLO for the success of the system and we're grateful to each and every TLO for their support and engagement. Long may it continue!

MEET THE TLOs



YLE, Finland

Juha Vesaja • Senior Technology Adviser • YLE Operations

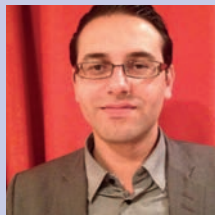
As TLO I distribute material about seminars and workshops to the appropriate colleagues and managers. I also encourage the management level to take a positive attitude towards their employees' EBU-related activities. Twice a year I organize a meeting for those who have joined the Technical Committee's various Strategic Programmes and Project Groups. Being the TLO has strengthened and clarified my role in our organization as a kind of "middleman" between the EBU and YLE.



VRT, Belgium

Kris van Bruwaene • Senior Researcher • Research and Innovation Department

For a relatively small broadcaster like VRT it is very important to rely on the knowledge and experience of other broadcasters. The EBU and its TLOs provide us with an excellent forum to tap into this vast pool and offer our own findings. Therefore we at VRT value the EBU very much, and want to keep our engineers keenly aware of that value. Directing them to the EBU and fellow broadcasters is what I see as my prime role as a TLO.



TDA (Télédiffusion d'Algérie), Algeria

Dr. Chawki Sahnine • Director of Studies and Development

Having a TLO allows my organization to be an active member of the EBU and participate in its various activities. This allows us to better prepare current and future projects in integrating the latest technological innovations and trends in order to meet the technical challenges at TDA.



ERT, Greece

Michael Nugent • Engineer

A TLO has the significant task of promoting EBU activities within his organization and encouraging participation in the work carried out by the Strategic Programmes. Increased involvement in the EBU can greatly help the organization's decision-making in technology issues and overall provide insights to optimal technical frameworks. ERT resources are not sufficient for active participation in many areas; therefore a TLO must make a further effort to manage these more efficiently.

EBU TECHNICAL LIAISON OFFICERS (AS OF FEBRUARY 2013)

If your organization is not listed below, this means a TLO has not been nominated. The TLO should be nominated by your Technical Assembly member, who is usually the Technical Director, Chief Technology Officer, or similar. Nominations can be forwarded to osullivan@ebu.ch.

RTSH, Albania - Dritan Mila
TDA, Algeria - Chawki Sahnine
AMPTV, Armenia - Karen Navasardyan
VRT, Belgium - Kris van Bruwaene
RTBF, Belgium - Patrick Moulin
BNR, Bulgaria - Konstantin Kounov
BNT, Bulgaria - Ivan Todorov
CBC, Canada - John Lee
HRT, Croatia - Kazimir Bacic
CBC, Cyprus - Yioula Kyriacou
CR, Czech Republic - Pavel Balicek
CT, Czech Republic - Petr Vitek
TV2, Denmark - Lars Esben Hansen
DR, Denmark - Lis Grete Møller
MTV, Finland - Antero Hoffman
YLE, Finland - Juha Vesaoja
FT, France - Manuel Naudin
SRF, France - Francois Ragenard
SWR, Germany - Bertram Bittel
DRADIO, Germany - Chris Weck
IRT, Germany - Klaus Illgner
ZDF, Germany - Wolfgang Wagner
ERT, Greece - Michael Nugent
MTV, Hungary - András Korompai
MR, Hungary - Laszlo Suto
RUV, Iceland - Eyjólfur Valdimarsson
RTE, Ireland - Pat Fenton
TG4, Ireland - Neil Keaveney
RAI, Italy - Gino Alberico
LR, Latvia - Guntar, Plucis
TL, Latvia - Tawfic Halawi
LRT, Lithuania - Vytautas Marozas
CLT, Luxembourg - Jean Lampach
RTCG, Montenegro - Dejan Vujovic
SNRT, Morocco - Hassan El Mhami
NPO, Netherlands - Egon Verharen
NRK, Norway - Nils B. Foss
TV2, Norway - John Inge Brattetveit
TVP, Poland - Krzysztof Kucharski
PR, Poland - Pawel Mathia
RTP, Portugal - Carlos Gomes
ROR, Romania - Constantin Burloiu
CIR, Russian Federation - Denis Vinkus
RTR, Russian Federation - Ghennadi Katchalov
RTVS, Slovakia - Ivana Holickova
RTVSLO, Slovenia - Matej Zunkovic
COPE, Spain - Isaac Moreno
RTVE, Spain - Pere Vila Fumas
SR, Sweden - Hasse Wessman
SVT, Sweden - Per Björkman
SRG SSR, Switzerland - Thomas Saner
TRT, Turkey - Ferhat Uzaktas
NRU, Ukraine - Tetyana Havrylyuk
NTU, Ukraine - Valerii Vergilesov
BBC, United Kingdom - Judy Parnall
ITV, United Kingdom - Andrew Ioannou
RV, Vatican State - Paolo Lazzarini



WHAT ARE YOUR CURRENT RESPONSIBILITIES AT IRT?

As managing director of the IRT my key responsibility is to keep the organization running. Besides the daily operations I look into the strategic impact of technical developments in the international markets for broadcasters. My aim is to help broadcasters to understand technical and market developments. Fostering an innovative environment, which is able to influence technical developments for the benefit of broadcasters and bringing technical developments to market reality are key objectives.

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

Looking back the finest achievement so far was, when I was part of a small team in the US, bringing an idea to reality in the market. This included not only lots of fascinating software and algorithmic development work but also supporting colleagues in the team to convince customers and finally to sell the technical solution. It was fascinating to see that the solution did indeed make a difference in the market.

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

To my mind it is important that the EBU creates a common position for broadcasters, which is voiced in the international domain towards industry and other market participants. The EBU TC needs to understand the strategic

Klaus Illgner IRT



THE IRT IS THE RESEARCH CENTRE FOR THE GERMAN-SPEAKING PUBLIC BROADCASTERS OF EUROPE. **KLAUS ILLGNER**, VICE-CHAIR OF THE EBU TECHNICAL COMMITTEE, IS ITS MANAGING DIRECTOR.

relevance of international technical developments and their market impact as well as the distinct needs of the EBU Members, in order to guide the organization's activities in the technical domain. With experience from different market segments, responsibility for a broadcast-centric internationally-connected research facility, and being tightly connected to the German public broadcasters I think I can fruitfully contribute to the work of the TC.

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

The broadcasting environment is changing dramatically. Technical developments are embedded in an international context and more and more driven by other branches. The challenge is that the requirements of broadcasters (and public service broadcasters in particular) with respect to the technical infrastructure must be heard and considered in the market. I see challenges in the standardization of interfaces in the IT-based production infrastructure. I see also challenges that broadcast services can be accessed freely by any citizen on any device. Standardization is key and those standards must become common in the market. And finally the EBU's technical work should be much better connected with the colleagues that make the content.

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

None. ;-)

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