

# tech-i

INSIGHT FROM EBU TECHNICAL

## Contents

- 03 Viewpoint: Lieven Vermaele
- 04 Second Screen
- 06 Digital Radio Standards
- 07 Predicting the Future
- 08 FIMS
- 10 Reference Display Issues
- 12 DVB-T2-Lite
- 13 3DTV Update
- 14 ITU-R 6A & 6C
- 15 Diary

Issue 10 December 2011



Is this the  
future  
of media?



# EBU PARTNERS WITH ERICSSON FOR MAJOR EVENTS



This premium global sports content will be distributed to EBU members and other rights holders across the globe over satellite and fiber networks in MPEG-2 Standard Definition (SD) or MPEG-4 AVC 4:2:2 High Definition (HD) using nearly 1000 Ericsson RX8200 professional receivers, part of the company's market-leading contribution and distribution portfolio. Ericsson has a long history supporting the EBU with innovative solutions for major sporting occasions including the 2008 Games in Beijing, Tour De France, Wimbledon and European football.

The RX8200 Advanced Modular Receiver has been designed to address a wide range of contribution applications. Based on a modular architecture, it delivers a perfect balance between functionality and cost. Innovative features like high quality down conversion enable significant cost saving by eliminating the need to transmit both SD and HD material.

Key features of the RX8200 include:

- › MPEG-2 and MPEG-4 AVC Decode
- › Standard and High Definition
- › 4:2:0 and 4:2:0 mode
- › 10-bit precision
- › High quality Down Conversion
- › Satellite/ASI/IP input

“The EBU has over 60 years' experience in delivering premium live content in a seamless, reliable and cost-effective way. We are delighted to extend our relationship with Ericsson for the most prestigious sporting event in the world - to allow us to provide our broadcast customers with the high-quality and flexible service they demand.”

Paolo Pusterla  
Head of Procurement & Network  
Partnerships, EBU.



# Where we made a difference in 2011

The end of the year is an appropriate time to take stock of a year's achievements, and therefore for this issue of our Tech-i, I would like to share with you some of our key achievements for 2011.

It goes without saying that these achievements would not have been possible without the dedicated staff of the Technology and Development Department, working closely with their EBU Member colleagues, the industry, and the different standardisation bodies and associations in the world.

This has been a year in which much progress has been made, as I hope the following will show. The list below is far from complete, but hopefully will illustrate the range of our work in the EBU Technology and Development Department.

#### In media production technology, our results included:

- Requirements and interoperability standards for file-based HDTV production, in close cooperation with the key supplier industries.
- Guidelines for next generation HDTV (1080p50) studio codecs and 3G SDI infrastructures, interoperability for file-based exchange and acquisition camera metadata.
- Finalised Loudness Recommendation (R128), metering specifications, and practical guidelines. EBU R 128 is now supported in more than 40 products.

- Key contributions in the field of Semantic Web and Linked Open Data (W3C MAWG and EUScreen, the European audiovisual portal with 12 EBU Members and national archives, using the EBUCore ontology to exchange data with Europeana). The community of EBUCore users and implementers is growing steadily.
- A joint task force with AMWA on interoperability of digital workflows and media services in Service Orientated Architecture (SOA) based software production environments.
- A management report and recommendations for production exchange formats on the impact of 3DTV for broadcasters, and significant influences on worldwide standards activities.

#### In media delivery and services, our results included:

- Help in the standardisation and launch of hybrid TV in Europe, including in the founding of the HbbTV association.
- Cooperation in the development of the RadioDNS specification and launch of a RadioDNS server and production tools.
- An integrated open software radio platform for DAB+, DRM, and FM.

- Demonstration of hybrid radio real applications at the Geneva Motor Show and Digital Radio Show at the European Parliament in Brussels.
- A strategy report on the future of terrestrial broadcasting, and continued activities in spectrum policy and interference issues.
- A codec comparison (VP8/H.264) for web applications. This helps broadcasters to decide which codec is the most valuable for them.

#### In relation to the development of the Eurovision Network, our results included:

- Tests and evaluation of new contribution codecs for the evolution of the Eurovision Network.
- Development of a pilot for file-based contribution and distribution for the News Department.
- Management of a study on the future network architecture of the Eurovision Network (FUNA).

It just remains for me to wish you best wishes for the holiday season and 2012.

Cover photo courtesy of zeebox.

Visit <http://tech.ebu.ch> to subscribe to tech-i free of charge

© tech-i 2011

All rights reserved. The reproduction of articles in tech-i is authorised only with the written permission of the publishers.

The responsibility for views expressed in tech-i rests solely with the authors.

Published by EBU Technical  
European Broadcasting Union  
17a, L'Ancienne-Route,  
CH-1218 Le Grand-Saconnex, Switzerland.  
Editor-in-Chief: Lieven Vermaele  
E-mail: [tech@ebu.ch](mailto:tech@ebu.ch)  
Tel: +41 22 717 2111

Editors: William Daly, Harold Bergin  
Production: WHD PR  
For editorial & advertising enquiries contact:  
WHD PR  
E-mail: [news@whdpr.com](mailto:news@whdpr.com)  
Tel: +44 20 7799 3100  
Printing: New Goff n.v.

# TV2.0: Goodbye Passive Viewing, Hello Dual-Screen

**Anthony Rose, Co-founder & CTO of zeebox wonders whether just simply watching the television is satisfying enough and takes a look at the second screen experience.**

Although television has only been with us for 50 years, somehow we take it for granted that this is the only form that drama can take, a big screen beaming out at us while we sit passively consuming it. The programme maker is the creator, you are the consumer.

But the wonderful thing about technology is... it keeps changing! We're entering a brave new world where we don't just watch television – we're far too accustomed to multitasking to do any one activity at a time ever again – so we now sit with iPads, smartphones and computers on our laps, partially watching television, partially doing things related to what we're watching.

The stats say this is going to be huge:

- 86% of people have used a smartphone or tablet in front of a TV in the past week
- 30% of internet time is in front of the TV

What are people doing with these devices? Doesn't multitasking break the drama; doesn't it ruin the experience that the TV programme maker has so lovingly crafted?

Well, if you ask an old-school "we make it, you watch it" programme maker, I guess the answer is yes, you're ruining everything by not paying attention to the wonderful experience we've crafted for you. But it's clear that this old-world way of watching is changing, and it's changing unbelievably quickly.

Of course we've all heard about companion viewing apps – they are the hottest area in media technology right now. There are so many companies entering this space, and so much noise about this, that it's worth taking a few moments to classify the types of 'second screen' apps that you'll encounter:

**1. Programme discovery apps** seek to reinvent the concept of the programme guide / EPG, replacing the traditional

channel order with programme listings powered by your friends or server-generated recommendations. While these apps sometimes do a fine job helping you decide what to watch, once you've started watching, well, they're not much use anymore.

**2. The Check-In app** is a short term variant of the above, where the app offers so little of real use that the app makers try to bribe their users with stickers or points to keep using it and draw in their friends. But in the same way that none of the websites you use give you stickers – you only return to websites that have a real function – so these check-in apps will be a short term fad, consigned to the graveyard just as soon as the first truly functional companion apps appear.

**3. Second screen advertising apps** let you buy things you see on television. When you see an ad, simply stop what you were doing on your smartphone, scroll through all your apps to find the one that works for this ad, wait for the app to load, point your phone at the TV, count to 10 while it tries to identify the ad and offers you a coupon. Yes, I think it's a stupid idea too.

**4. Social chat apps** let you interact with friends during a programme, usually using some combination of Facebook and Twitter.

**5. Programme-specific apps** are those apps created to accompany a given TV programme. Now in theory these should be the best of all worlds, being an amazing opportunity for programme makers to create truly new and innovative cross-media social and interactive experiences. But creating an app is not cheap, and so for now we're seeing these apps mostly for big-name shows. But the concept doesn't really scale – are you really going to go to the iTunes store to find and download a new app every



**Anthony Rose**  
Co-founder & CTO, zeebox

Anthony Rose is a technical and product visionary, now working on zeebox, a new platform that turns live TV into a two-way, social and interactive viewing experience.

From 2007 to 2010, he headed up the BBC iPlayer project, taking it from pre-launch to a major success story.

Prior to working at the BBC Anthony was at Altnet and Kazaa, creating a digital music store and download application. Before that he was at Brilliant Digital, building a real-time 3D engine and tools for creating interactive branching-plot movies.

time you change channels or start watching another programme?

**6. Remote control apps** seek to replace those horrible old plastic TV remote controls with a nice shiny smartphone that can act as a much smarter remote control. In theory this is very cool, but many of the remote control apps out there don't do much beyond emulating the functionality of the horrible old plastic remote. Clearly there's room for much innovation here.



... an amazing opportunity for programme makers to create truly new and innovative cross-media social and interactive experiences.



Of course many companion apps combine several of the above functions to create a more compelling proposition.

But the real problem is that most of these apps are just too much work to use, and none of them, for me, rise to turning television into an exciting new medium.

Now, what form would this 'meta television', an experience around and related to television, take? Wouldn't it be great if some app magically delivered all the above contextual experiences, and then some, directly to you in the same lean-back, no work way that you've become accustomed to in front of a TV...

And this is exactly what we're trying to do with zeebox, a companion viewing app that we hope will change the way you watch television, forever. As CTO at zeebox I've had the opportunity to try out our app well before launch, getting a preview of the future – bugs and all – on my couch at home. And I think we're onto a real game-changer.

zeebox shows me what my friends are watching. I see that John is watching Match of the Day. I click to watch with John. Instantly, my TV jumps to the same channel John is viewing. I click to chat with John. A message pops up in John's zeebox app – Anthony would like to watch TV with you. We begin chatting, using zeebox's embedded chat window. The programme pauses – ad break. We're bored with that programme, I suggest to John that we change channels. He responds, sure, let's do it. Instantly both our TVs jump to the new channel.

In the space of just a few weeks, zeebox has changed the way I watch TV. I'm now 'surfing' TV in a whole new way, with the TV show providing the backdrop to an amazing range of social and information experiences, all brought to me so seamlessly and easily that I've almost forgotten that those experiences never existed in the past. Instead of seeing the TV EPG in old channel order, I now see channel ordered by the ones my friends are watching.

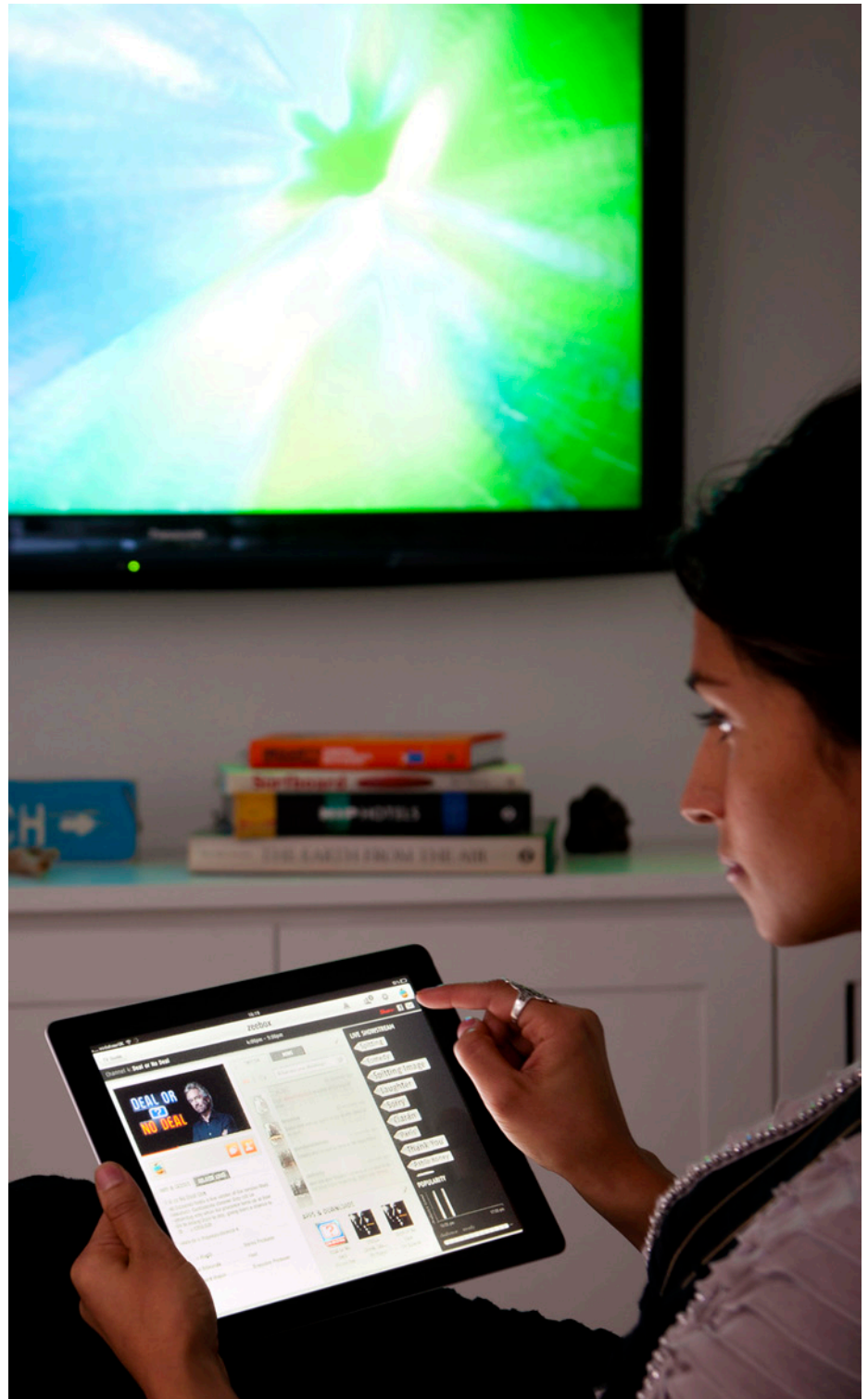
And this is just the beginning... Over the coming months zeebox will connect the world of live TV with on-demand. Deliver synchronised advertising to the second screen. Let you buy things you see on TV.

With zeebox being able to act as a remote control for most connected TVs, and with it linking to both live and on-demand content, you can now seamlessly move from live TV playing on your TV to another episode of that programme, playing on your iPad or PC, all driven by the scheduler of the future, your social network.

zeebox launched in November as an iPad app and a website (<http://zeebox.com>) viewable by any computer or tablet that has a web browser, with iPhone and

other devices coming soon afterwards. We launched in the UK first, with other territories to follow.

Of course we're not the only ones trying to reinvent television – there are hundreds of companies innovating in this space, each with their own view on the future, each trying to find a new niche, a new opportunity. The way we consume television is about to change, dramatically. The future is a journey, not a destination, but this is sure to be one exciting ride.



# In Tune

## The BBC's Lindsay Cornell takes a look at Digital Radio Standards and their similarities and differences.

Both DAB and DRM are digital transmission systems designed primarily for radio using OFDM for robust transmission and psycho-acoustic audio coding for efficiency. OK, but what do they do? Basically, both these digital systems provide some key features:

- simple to use receivers;
- good audio quality;
- worldwide open standards;
- good spectral efficiency;
- digital enhancements.

DAB has three variants for radio: the original DAB, with MPEG layer 2 audio; DAB+, with HE AAC audio; and DMB radio, also with HE AAC audio. All three of these radio variants provide the same core features. The DMB variant can also deliver mobile TV, and indeed this was its original purpose; around 40 million DMB-TV terminals have been sold in South Korea.

DRM has two variants - DRM30, for the AM bands; and DRM+ for the VHF bands. In both cases the audio coder is HE AAC, although DRM30 also allows two speech only coders which operate at very low bitrates. Both variants have the same feature set. DRM also has a nascent small scale video application called Diveemo, but this cannot be compared to DMB-TV since it operates at much lower frame rates and resolutions.

Both DAB and DRM allow audio and data services to be carried and they allow users to access those services in an intuitive way. They both provide station names of up to 16 characters in length for service selection: no frequencies need to be remembered. And they provide additional information - a text message of up to 128 characters is common to both standards.

In common with all digital systems, there is a relationship between the audio quality achieved and the bitrate allocated to

the service, and the broadcaster's decision on what is acceptable to the audience is one of some debate amongst audio enthusiasts. The raw numbers cannot be directly compared, however, even when the AAC coder is in use, because of differences in the super-framing and error recovery mechanisms in the different standards and variants. When an analogue station goes digital, the change in audio quality will be greater for an AM station than for an FM station, simply because FM fidelity is so much higher - in audio bandwidth, in the opportunity for stereo, in terms of interference. The difference has much less to do with the digital system than with the analogue starting point and the chosen digital bitrate.

DAB and DRM are internationally agreed open standards that have been designed to work across the globe. DAB principally uses band III and L-Band spectrum, although it could be deployed in other frequency bands too. Coverage from a single transmitter may be up to around 75 km, but this can be extended by using multiple transmitters in a single frequency network (SFN). It's a wideband system, using 1.536MHz per transmission, and a multiplex structure which typically carries around 10 DAB services or 16 DAB+ services. DRM30 uses the bands below 30 MHz and is designed to fit within the ITU AM spectrum mask in 9 and 10 kHz channels, although it also has modes that can use 18 or 20 kHz channels giving more capacity or more ruggedness. Coverage can be very large, and indeed can be out-of-area, using the sky-wave propagation characteristic of the MF and HF bands. DRM+ is designed for the VHF bands, using 100 kHz per transmission. Coverage from a single transmitter is similar to DAB; DRM can also be configured as an SFN to enhance coverage. DRM allows up



**Lindsay Cornell**

BBC, Principal Systems Architect  
WorldDMB Forum, Technical Committee Chair  
DRM Consortium, Technical Committee Chair

Lindsay Cornell leads the BBC's work on The Future of Radio which aims to provide technical leadership to the development of radio technologies that will maintain and extend the reach of the BBC's radio services, both in the UK and across the globe.

to four services per transmission, but this is only really feasible for DRM+ because of the bitrate requirements.

Digital radio also offers the opportunity for broadcasters to enhance their audio programmes with text, programme guides, images, time-shifting and many other features that are attractive to audiences, especially younger audiences. The data applications designed for DAB can also be used with DRM, so there's a lot of commonality for content generation which is good news for broadcasters and receiver manufacturers alike.

So overall, there are far more similarities and synergies between the two systems than differences. In 2006 Morphy Richards produced a small batch of DAB/DRM30/FM/AM radios. This product is no longer available, but demonstrated the idea of introducing multi-standard products to enable reception of all radio stations with a single device. This concept is still alive with Frontier Silicon announcing at IBC2011 that they were demonstrating their Kino 3 processor with DRM30/DRM+ added to the existing DAB/DAB+/DMB/FM capabilities.

01



02



01. Morphy Richards multi-standard radio  
02. Frontier Silicon's Kino 3 processor

# Coming Down To Earth

## Over-optimism, new media, and history

**One of the skills needed by many a ‘futurologist’ is to revise backwards the dates you claimed something will sweep the planet, and explain why you had to do so. The following may be candidates for revisions. “What do you think?” asks David Wood.**

### Wireless broadband & broadcasting

We hear about a great future Europe where every citizen has 100Mbit/s broadband internet available, and in the same breath about how ‘wireless’ broadband, taking over the existing broadcast bands, is the way to provide all content. Yet when you look closer, these two statements contradict each other. Wireless telephony (and wireless e-mail) works very well because only a very small percentage of users want to use it at the same moment. Once everyone wants tens of megabits from wireless broadband at exactly the same moment – as they will for entertainment content – congestion will limit the service.

Its fifteen years since we first heard from them the phrase ‘television is obsolete’ – yet today there are an astounding number of television channels (over 8,000 in Europe alone) and the public is watching ever more television.

The problem with the ‘television will be replaced by internet’ hypothesis is that it doesn’t happen like that. Remember that at no time in the last 100 years has a new media ‘killed’ an earlier media. In fact they all coexist together.

What is happening today is actually the reverse of the decline of television. Television is growing in use – partly because of ‘internet’. Fuelling the rise of television is also ironically the great success story of the internet – the ‘social network’. Everyone likes to chat to friends and share experiences, and what they like most to chat about are television programmes. Social networks drive up the audiences to television, not reduce them. Television is the place for the shared experience, prepared by media professionals, and internet is the place to talk about it. Television is obsolete? It just isn’t true.

### 3DTV

3D is a fascinating experience that certainly has a future, but it is not the ‘ultimate experience’ in television. Three times in the past it has come and gone when the public (apparently) tires of it. It is better technically than it was – though some of the 3D movies of the fifties were actually as ‘good’ as those today. Enjoyable as it is, 3DTV is not something you can watch continuously throughout an evening.

So how seriously should we take 3DTV? For sure we should learn about it, and try it. The fact that it keeps coming back in spite of the fashion cycles means that there is a latent public demand for 3D.

One thing is that through it all, we should remember that the ‘2D’ world is not standing still. The ITU is close to worldwide agreement on a common standard for ‘Ultra High Definition Television’ (UHDTV). The ‘8K’ version of UHDTV has so much definition (more than 100 times that of standard definition television) that the pictures have much ‘depth’ without any help from glasses

or left and right images. It is true that this is probably 10–20 years from being a feature of our living rooms, but even so it could be more sensible to wait for this than to invest too much now in 3DTV. 3DTV is great but let’s not oversell it.

### And, finally...

By the way, how about the new cycle of enthusiasm for television broadcasting to mobiles? The last cycle of optimism in the last decade came to an end in Europe with a realisation that financing the infrastructure to deliver the broadcast to mobiles was a barrier. Viewers watch a ‘full meal’ on normal television, but only ‘snack’ on mobile content, and they were not willing to pay enough for a ‘snack’ to meet the costs of the additional delivery infrastructure. Could history repeat itself? Will this be any different today?

We can’t predict the future with complete certainty, but one of the keys to making accurate predictions must be to learn from history. After all “Those who do not learn from history are doomed to repeat it”.



# FIMS

**The EBU and the Advanced Media Workflow Association (AMWA) established the Framework for Interoperable Media Services (FIMS) project to develop solutions for more efficient workflows in file-based Service Oriented Architecture production environments for the creation and delivery of content across a wide range of media.**

After several years of sherpa work in EBU and AMWA, the FIMS project was launched in December 2009. In addition to its projects on 'Networked Production' and 'Common Processes', the EBU had organised and participated in several conferences and workshops on the theme 'asset management and service oriented architecture for media production'. Simultaneously, AMWA had launched the Media Service Architecture Group (MSAG). The foundations of the FIMS project were established building upon the experience gathered in both organisations and with the support of their members.

FIMS was successfully demonstrated at NAB and IBC in 2011, at which senior executives from both media companies and vendors showed great excitement for the potential for our industry.

The following Q&A will help to explain the objective of FIMS.

**Q. What is FIMS in technical terms?**

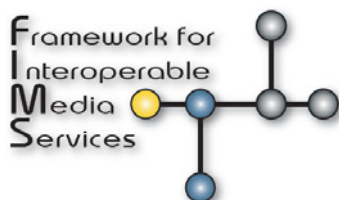
**A.** It is a framework of service definitions for implementing media related operations using a Service Oriented Architecture (SOA) approach and promoting interoperability and reusability of services. FIMS defines service models with associated management, error handling, communication, time awareness, and security components.

**Q. How will FIMS change my workflows and processes?**

**A.** Today's file-based workflows are often 'hard wired' and disconnected from business processes. FIMS defines open service 'best-in-class' media systems. The services can span a wide domain of operations and permit integration of FIMS into business and management systems. Bottom line, it is an agile environment that is more easily configured, modified, managed and governed compared to non SOA systems.

**Q. Should I take the FIMS initiative seriously?**

**A.** Ultimately, you must decide. The EBU and the AMWA have been keen supporters of Service Oriented Media Workflows ever since the idea was first proposed. The cost savings that can be achieved through an open architecture and a broadly accepted industry standard has great appeal.



**Q. What will FIMS do for my business? How will it make my life easier?**

**A.** For a long time media companies have operated with completely separate media workflows and business systems. Also programme workflows were 'hard wired' so that processes had to be performed in a strict order, sometimes resulting in underutilised processes and bottlenecks. FIMS allows much greater efficiency, scalability and flexibility, where each process can be called upon as a 'service' when needed and direct connection with business systems becomes possible. Maintenance is easier. For users, FIMS is an alternative to vendor lock-in.

**Q. Is the industry taking this seriously? What level of interest is there?**

**A.** The list of media companies and vendors that actively support FIMS grows continuously. FIMS counts more than 40 member companies. FIMS active representation at NAB and IBC illustrates this engagement.

**Q. Can I realistically expect to build a system using products from a range of manufacturers?**

**A.** Yes! The objective is to establish a connection standard that will allow 'best of breed' systems to be built using products from a wide range of vendors. Ask your preferred suppliers about their involvement in the FIMS initiative.

**Q. What makes FIMS possible? Are there standards that everyone can refer to?**

**A.** One of the goals of the NAB and IBC exhibit was to show real vendors performing some common activities, all made possible with an early draft of the FIMS specification. Vendors and users have been hard at work over the summer getting the v1.0 specification ready for submission for public and peer review by AMWA and EBU Technical Committees. All participants have agreed that their contributions to the specification are provided for free, permanently.

**Q. Are there early examples of working systems?**

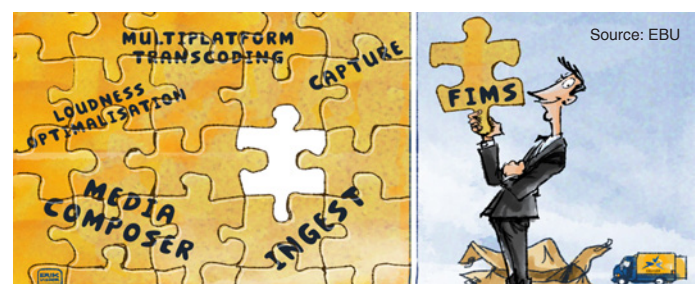
**A.** At present, the only publicly working systems have been built for demonstration at NAB and IBC. We anticipate that working systems will begin to be installed during 2012.

**Q. What can I do next?**

**A. 1-** Anyone can see the progress at <http://wiki.amwa.tv/ebu/>  
**2 -** If you wish to join in the work, you will need to sign a Participation Agreement (online) to become a FIMS Participant. This is free and open to all.

FIMS is Chaired by Giorgio Dimino, RAI and John Footen, Cognizant.

This article was co-authored by Jean-Pierre Evain, EBU; Brad Gilmer, AMWA; and Neil Dunstan, AVID.



Interoperability, MISSION ACHIEVED!



## Support for FIMS



“Manufacturers and users are finally agreeing on the strategic need to standardise the interfaces between software components for media production in order to cut system integration costs and leverage on state of the art technologies. The FIMS Task Force is the right place to achieve this ambitious goal. Specification 1.0 is the first tangible result of the group and I am convinced it has the potential to become the foundation of a series of successful standards.”

### Giorgio Dimino

Manager of the research unit on IT based production, Rai, and Co-Chair, FIMS.



“Sony is pleased to be involved in an emerging new standard that promises to break down traditional barriers in the development of software services for media workflow systems. The open approach will boost confidence in media-based SOA systems and drive the development of new markets for media services. It has been encouraging to see the high degree of cooperation and enthusiasm among those of us who are directly involved in developing the specifications.”

### Paul Gardiner

Standards Manager, Broadcast & Professional Research Labs, Sony Professional Solutions Europe - Chair of the FIMS Specification Development Group



“The progress we have made in the FIMS initiative is very exciting. We have seen tremendous interest in using FIMS as a way to enable standards-based integration of systems in broadcast workflows. We expect the initiative to continue picking up steam in the year to come as we expand FIMS capabilities and the workflow elements that are addressed by it.”

### John Footen

Associate Vice President, Broadcast Consulting, Cognizant, and Co-Chair, FIMS.



“For more than 15 years Cube-Tec International is a strong supporter of open standard media activities. The FIMS initiative helps media industries to catch up with well established industrial grade service orientated technologies - to streamline their media workflows and improve quality control. FIMS makes media business more agile. New third party technology can be included as loosely coupled services, reducing risk, cost and time.”

### Jörg Houpert

Technical Director, Cube-Tec International GmbH



“Avid has been a FIMS supporter from day one. From FIMS spec contributions to supporting both the NAB and IBC demos, Avid is involved. FIMS has the potential to be the leading services framework for media systems. As it matures, we expect it to spread into every corner of the media enterprise. Our Integrated Media Enterprise product portfolio will support FIMS overtime.”

### Al Kovalick

Technical Strategist, Avid



“Mesclado - a French based systems architects company - has been supporting the FIMS initiative from the beginning. Mesclado was founded to help the media industry build new, more agile workflows, in fact more sustainable systems. We're keeping the momentum going by offering hands-on training and technical readiness seminars to help spread the word that SOA for Media is the future of broadcast systems.”

### Philippe Martin

Senior Systems Engineer, Mesclado



“At Cinegy, we have invested in FIMS because we believe it will help the media industry grow and evolve quicker. A standard like FIMS helps customers focus on rolling out the tools and products they need rather than wasting time working out how they could fit the tools they want together. With ever more ways to reach an ever more fragmented audience, smarter ways of using technology is both desirable and necessary.”

### Lewis Kirkaldie

Product Manager, Cinegy Workflow



“FIMS is one of those rare innovative developments that can benefit all stakeholders. During the FIMS demonstrations at IBC2011, I personally witnessed how visitors from a wide range of backgrounds were quickly able to recognise the advantages. I do believe that this is an epoch making activity that will have a positive effect throughout the media and entertainment industries, and I am pleased to be involved in it.”

### Toshiaki Kojima

Senior Manager, Technology Development Group, Sony Corporation

Companies and individuals who have submitted signed Participation Agreements and participate in meetings and contribute work to move the FIMS project forward.

AmberFin	Cube-Tec International GmbH	Isilon Systems	Oracle Corp	Video Stream Network
AMWA	DCA – Digimetrics	Limecraft BVBA	Perspective Media Group	Vidispine
Avid	EBU	Marquis Broadcast	Portability 4 Media	VRT Medialab
BBC	Flying Eye GmbH	MBC Group	RadiantGrid	Yangaroo, Inc.
Broadcast International	GLOOKAST	Mesclado	RAI Research Centre	Andreas Georg Stascheit
Canadian Broadcasting Corp.	Harmonic, Inc.	metaFrontier.jp	Red Bee Media	Gary Olson
Cinegy	Harris Corp.	MetagLue	Snell	
Cognizant	IBM	National TeleConsultants	Sony	
Compression Labs, Inc.	IRT	NBC Universal	Tixel GmbH	

# The Reference Display Issue

Dolby PRM 4200

**Adi Kouadio studies reference flat panel monitors for TV production and asks “Where are we since the CRT (almost) died?”**



It is certainly less of a hype subject than 3DTV, Cloud based application or Connected TVs which attract thousands of visitors on blogs, conferences and trade shows, but the reference display issue is certainly one of the very important problems professional broadcasters face in their production environment.

A reference display is used to ensure the visual consistency of content in a programme. Having such a ‘standard’ facilitates content exchange between broadcasters, and the mixing of archive and new material from a variety of sources. For years, the CRT has been the de facto standard, providing consistent colour and greyscale reproduction as long as basic parameters such as the white point, contrast and brightness were correctly set.

In both domestic and professional TV installations, plasmas and LCDs (CCFL or LED based) displays now dominate, and lately OLED displays are being introduced. In addition to different problems intrinsic to their core technologies (e.g., viewing angle, nonuniformity, differential ageing, different motion rendition) all Flat Panel Displays (FPDs) make use of look-up tables (LUTs) to create colour values for each pixel instead of relying solely on physical characteristics for colour reproduction like with the CRT, and most are inherently progressive so have to incorporate de-interlacing.

Sony BVM E250 monitor



## The standard...

The challenge posed by an increasing choice of technology options is to specify key parameters that a reference display should fulfil, especially from a user point of view while staying technology agnostic. The EBU P/Display Group chaired by Richard Salmon (BBC) since 2006 has been collecting those parameters and defining tolerances to create the now well known EBU Tech 3320 specification (‘User requirements for video monitors in TV production’). Its first issue (2008) was highly welcomed by the user community but then no display that could match its requirements was available. In 2010, a second version was published where major changes were made based on user feedback. Amongst the refinements there are:

- The black level was lowered from 0.1 cd/m<sup>2</sup> to 0.05cd/m<sup>2</sup> after measurement made on CRTs in European production studios but also considering the lower value recommended by ARIB for Japanese broadcasters (0.01cd/m<sup>2</sup>). Tests at BBC studios showed that displays set at 0.15cd/m<sup>2</sup> could not be used for camera or lighting adjustment for drama production.
- The grey-scale and test colour reproduction tolerances ranges are tighter than in the 2008 version, and are defined in terms of CIE LUV rather than CIE Δu’,v’, giving better perceptual uniformity of errors over the luminance range.
- Uniformity now considers measurements methods involving the whole display area (small area uniformity) in addition to a set of sampled measurement points (large area uniformity). This avoids missing periodic uniformity errors, or other problems more likely to arise on a fixed matrix display than on a CRT.
- Gamma characteristic is currently specified as 2.35. The tolerance ranges for gamma tracking have been revised. Using a single value to characterise gamma is not totally accurate but 2.35 was a good approximation. The CRT EOTF is a function of the display black level, preserving the visual consistency of content through different viewing conditions. However this section might evolve to follow the lately issued (May 2011) ITU Recommendation on EOTF for reference displays (ITU-R BT 1886). It specifies a reference gamma function for programme exchange and an alternative function for CRT-Gamma matching.
- The colour matching functions: we emphasise the need for a reassessment of the CIE 1931 colorimetric observer standard. Indeed, experience and measurements have indicated that the existing colour matching functions (well suited for CRT measurements) are not sufficient to characterise LED based displays which have a very spiky spectrum. This can result in metamerism mismatch, i.e., two monitors (LED and another technology) may not display the same colour visually even if the same measurement equipment is used for setup. The CIE is encouraged to investigate the question.

The specification is tighter than before in terms of requirement but those are as close as possible to the users real requirements. Tech 3320 is refined as new technologies appear, to assess whether all criteria (if met) will provide the same experience as on other technologies.

#### Light at the end of the tunnel for broadcasters...

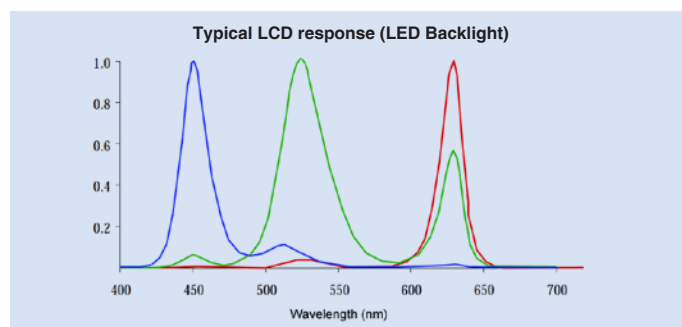
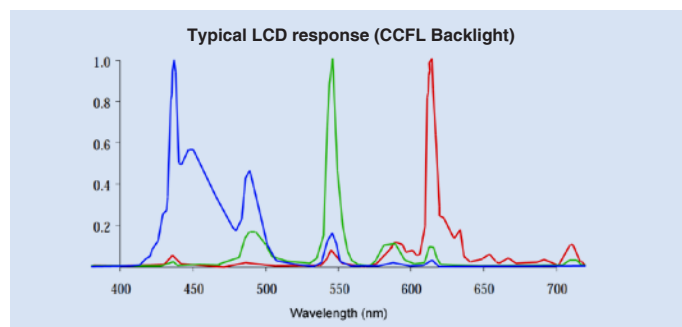
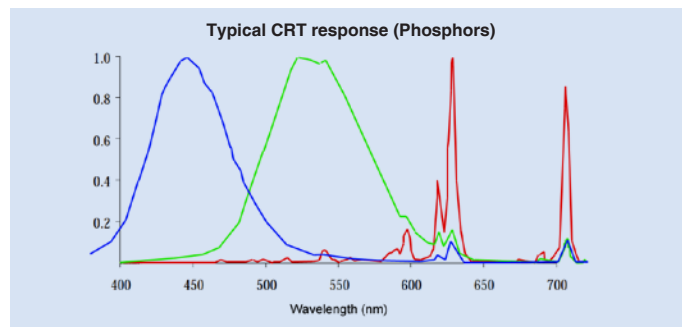
Several displays in the market use EBU Tech 3320 as a benchmark. To date no display officially measured by an EBU Member's lab has fulfilled all requirements. The latest (and closest to fulfil the whole specification Tech 3320 v2.0 (2010) is the Dolby PRM 4200 measured by the IRT (early 2011). In addition, it has the advantage to be the only large size flat panel display (42" inches). While 24" is the common size for production displays, larger size reference monitors are needed to assess consistently the quality of HDTV content normally viewed on displays larger than 32" inches.

Other displays such as the Sony OLED 24.5" BVM-E250 and F250, unveiled at IBC'11, look highly promising in fulfilling the whole specification. Measurement of these displays are planned to confirm their performance.

#### The Threat...

Some manufacturers claim to fulfil the EBU Tech 3320 requirements without having their product measured by one of the EBU Members' labs or providing proof to the EBU Display about such performances. The EBU Display Group is working on means to track and enforce strong policy around EBU Tech 3320 fulfilment. Strong and consistent efforts to improve monitor performance have been witnessed from other manufacturers and chances are high that they will succeed. It would thus be unfair to allow non-certified/verified statements around Tech 3320. A common database of display measurements open to EBU Members might be part of the solution.

Spectral output for separate R, G and B inputs to different types of display, showing the much narrower characteristic in green and blue of the LCD displays compared to a CRT. It is thought to be some particular aspect of these characteristics which has revealed possible issues with the accuracy of the CIE 1931 colour matching functions.



# EBU's loudness work enjoys strong uptake

The EBU Loudness Recommendation continues to enjoy strong support from both broadcasters and equipment manufacturers. At IBC it was clear that at least some 40 manufacturers offer products supporting EBU R 128, not only in live meters, but also in file-based products. For example, those products that are used for Quality Control.

Broadcasters have been quick to implement the EBU's loudness work. Just before IBC, EBU R 128 Loudness normalisation was introduced for television commercials and promos broadcast on Dutch national television stations, both public and private. From 1st of January next year, -23 LUFS will be the norm on the French DTT platform. And a few weeks later, EBU loudness normalisation will be introduced on Switzerland's national TV channels.



The introduction of loudness metering and normalisation does not have to be a one-step approach. In France, for example, there are different dates for the loudness normalisation of short programmes (1st January), live programmes (1st July) and all programmes (end 2012). The main thing is to bring together all parties involved, such as broadcasters, advertisers, signal distributors and CE manufacturers to jointly define the roll-out plan.

To help, the EBU is organising a special, free Loudness Workshop on 8-9 December 2011, which will focus on distribution aspects. The Loudness Distribution Guidelines (EBU Tech 3344) will be explained and there will be experience reports on how to deal with loudness in, e.g., cable head-ends and CE equipment. There will be ample room for Q&A and the exchange of ideas too. One week later, Resolution Magazine in cooperation with the EBU, will organise an event that is more production-oriented: the first Loudness Summit.

On the documentation side, the EBU recently published updates of its main loudness specs and test material. And EBU Members translated the EBU R 128 specification into German and Slovenian (a Spanish version was already available). The EBU also helped revise the ITU-R BS.1771 Loudness Metering specification, so it can soon include momentary and short term meters - similar to those available in the EBU toolset (EBU Tech 3341).

All info on loudness can be found via: <http://tech.ebu.ch/loudness>.

Frans de Jong

# T2-Lite Profile

The BBC's Chris Nokes explains the rationale for the creation of the subset of the DVB-T2 standard.

DVB-T2, the technology standard that enabled high definition on Freeview now has a new profile called T2-Lite. This new profile will allow simpler receiver implementations for very low capacity applications such as mobile broadcasting. This new profile can be mixed with conventional DVB-T2 signals in a single multiplex, to allow separate optimisation of the individual components. The T2-Lite component could provide audiences with a reliable live 'broadcast' TV or radio experience on their handheld devices. Using this new profile, live broadcasts can be delivered to multiple audience members at a fixed cost to the content provider. This article gives a brief introduction to the T2-Lite profile.

The latest draft version of the DVB-T2 specification, version 1.3.1, includes a new annex describing the T2-Lite profile. This is formed by taking a suitable subset of the original DVB-T2 specification. The modes that are chosen for this subset have been selected to allow several simplifications within the receiver. So a receiver designed just for the T2-Lite profile, can benefit from a significant reduction in both the logic and the memory needed, and therefore a corresponding reduction in power consumption. These simplifications are possible because T2-Lite has been

restricted to low data rate applications – a maximum of 4Mbit/s output data rate. In addition to the bitrate limitation, the other main simplifications are:

- FFT sizes limited to 2K, 4K, 8K or 16K
- Time interleaving memory size roughly halved
- Simplifications to the FEC decoder (only using short FEC blocks and limiting the required throughput)

In addition to these, two new lower code rates have been added to allow for even more robust performance in a mobile environment.

In order to facilitate the introduction of any services broadcasting to mobile devices using T2-Lite, the new specification also allows the T2-Lite profile to be multiplexed together with conventional DVB-T2 signals. Therefore a network designed for reception of standard definition or high definition services using DVB-T2 may have a portion of its capacity allocated for low bitrate services aimed at mobile and handheld devices. Whilst this was already possible using DVB-T2 alone, through the Multiple PLP feature, all of the services would have needed to use the same frame structure (and hence FFT size and guard interval). With T2-Lite, this constraint has been removed. So, for example, a network for HDTV using 32K FFT may be combined with a set of services for mobile and handheld devices using T2-Lite with an 8K FFT, which would be a good choice for mobile devices. This is achieved by using the Future Extension Frame (FEF) feature within DVB-T2. So the T2-Lite part of the signal is constructed as a FEF of the DVB-T2 signal, and a DVB-T2 receiver will simply ignore the T2-Lite data. Similarly the DVB-T2 signal is configured as a FEF of the T2-Lite signal and will be ignored by T2-Lite receivers.

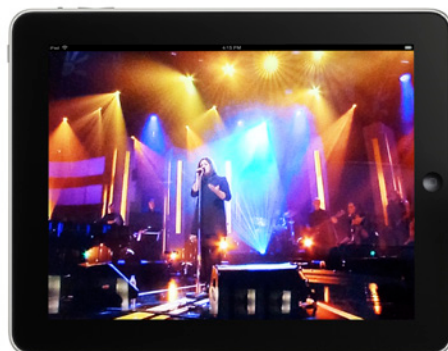


**Chris Nokes**  
Section Lead, Distribution Core Technologies, BBC Research & Development

BBC R&D has implemented the new T2-Lite profile within our modulator and demodulator, and so we were able to start test transmissions from the roof of our South Lab from July 2011. We were also able to show a live over-the-air demonstration of the technology in Amsterdam, on the DVB Stand at the International Broadcasting Convention in September 2011. This showed both HDTV services using DVB-T2 and lower resolution services for small screen and handheld devices using T2-Lite being transmitted together in the same multiplex. This demonstration generated significant interest from around the world and won a TVB Europe's Best of IBC 2011 Editors' Award.

For our tests and demonstrations we have used a DVB-T2 signal with 32K FFT, 1/128 guard interval and 256-QAM code rate 2/3 modulation, carrying 33.4Mbit/s, whereas the T2-Lite signal uses 8K FFT with 1/32 guard interval and QPSK code rate 1/2 modulation, giving a data rate of 1.0 Mbit/s.

The new T2 specification has been approved by DVB and is available from their website as the latest version of BlueBook A122, and is now being standardised by ETSI, with publication currently expected in April 2012.



# EBU publishes recommendations for 3DTV production

The EBU 3DTV Project Group has published the Recommendation R 135 'Production & Exchange Formats for 3DTV Programmes' for those EBU Members that need to produce, exchange, archive and distribute 3D programmes using their existing 2D HD production infrastructure and transmission technologies.

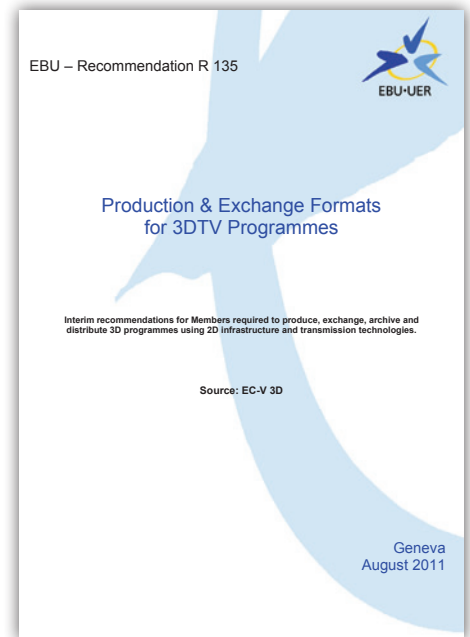
The document was issued in September 2011, in time for IBC 2012. 3DTV is still a hot topic in the media industry, and these recommendations should help to ensure the way to exchange or archive the 3D content in the best possible quality. In December last year, the EBU 3DTV Project Group published a Management Report TR 10 on 3DTV.

Several production formats, 720p50, 1080i25, 1080i50 or 1080p50, are included

in R 135, as different broadcasters have different requirements in their specific environments. The formats follow the established EBU HD formats as described in Tech 3299 (2010). Thus the Recommendations give technical aid to broadcasters who intend to use the current or future 2D HDTV infrastructure to produce 3DTV programmes.

To carry the full resolution in 3DTV production, the EBU recommends to use two HD-SDI links ( SMPTE ST 292-1) or one single 3G-SDI link (SMPTE ST 424 & 425-1). The camera recording should comply with the EBU R 132 (e.g., min. 2 x 50 Mbit/s 4:2:2 inter-frame coding or min. 2 x 100 Mbit/s 4:2:2 intra-frame coding).

Currently the 3DTV Project Group is working on Production Guidelines for how



to produce 'comfortable' 3D. The upcoming Guidelines should help EBU Members to decide on whether they start trials producing their own 3D content.

The full document can be found at: <http://tech.ebu.ch/docs/r/r135.pdf>.

**Yvonne Thomas**

## The link between Stereo 3D technology and health

The EBU Technical hosted a workshop on '3D Technology and Human Factors' on the 6th and 7th of October.

The morning of the first workshop day began with an explanation of the basics of 3D.

In 2010, 3DTV services experienced what might be called the 'positive novelty' phase. Today, it is less of a novelty and it is time to realistically take stock of 3DTV and its long term value. Realistically it also means thinking about the health issues of watching 3DTV.

The second session considered the human visual system in more detail. Objectively there are no clear answers yet about how 3DTV affects a child's visual system. Many research studies are not yet done, and we cannot yet conclude about the positive or negative value of stereoscopy.

In a use case session, with examples of 3D movies (PINA), live production (Sportcast), 3D transmission (BSkyB) and first 3D experiences from EBU Members (ZDF, Hueberbuam), participants were given the possibility to see some 3D productions for themselves, and to examine 3D quality check tools.

Day 2 of the conference started with an update on standardisation activities within the ITU, SMPTE, DVB and 3D@home. The different bodies are already very active in 3D standardisation, and presented their plans.

During the discussion on 3D viewing in the home a number of delegates voiced their experiences with 3D. One possibility is that one eye is stronger than the other one (left or right) and this can have a negative effect on the 3D perception.

One other reason for physical problems while viewing 3D is the need for the separation of the link between accommodation and vergence which is needed in the 'unnatural stereoscopic viewing' compared to the 'natural stereoscopic viewing'.

In the final session, delegates learned that postproduction specialists see a commutation of production errors and are the last stage to correct those errors. This is why automatic quality check tools can be really helpful in a 3D production.

In summary, the workshop brought to light many issues across the whole chain of 3D production and distribution, and how

they can affect the human visual system, or in other words, how our visual system can influence the progress of technology.

More information and presentations can be found at: [http://tech.ebu.ch/events/s3d\\_technology\\_workshop](http://tech.ebu.ch/events/s3d_technology_workshop)

**Yvonne Thomas**



# Terrestrial broadcasting at ITU-R

Working Party 6A is responsible for ITU-R studies related to terrestrial broadcasting delivery, within Study Group 6 which covers all aspects of the broadcasting service from production to delivery. The meeting held in Geneva from September 27 to October 5 was the last in the study period 2007-2011. More than 100 participants attended this meeting. The coming four year study period will start after the WRC12 in February 2012.

The major issues dealt with are related to:

1. Protection of terrestrial broadcasting services from potential interference caused by other services having frequency allocation or applications without frequency allocation. The possible sources of interference are mobile systems in the 800 MHz band, cognitive radio systems in the TV white spaces between 470 and 790 MHz and power line telecommunication devices and networks using frequencies up to 300 MHz.
2. System and Planning parameters for new generations of digital terrestrial television systems and for systems dedicated to terrestrial multimedia broadcasting for mobile reception using handheld receivers. The considered systems are DVB-T2, (A)T-DMB, ISDB-T, DVB-SH and DVB-H.

Significant progress was made on defining methods for use by administrations to apply protection criteria defined so far in ITU-R texts. As an example, a protection criterion, expressed in terms of limited increase in the total noise power of the receiver system, is translated into a field strength threshold at the receiving antenna, which is more easily used by broadcasters. Also, the impact of a given level of interference is expressed in terms of resulting degradation in the percentage of locations covered by a broadcasting transmitter.

A considerable amount of field tests and laboratory measurement results were included in the output documents at this meeting.

The liaison between WP6A and other ITU-R working parties, especially WP5D that deals with IMT, was a major subject at this meeting. This demonstrated that there is an interest by both working parties to get a common understanding of the issue of compatibility between broadcasting and mobile services.

All WP6A documents can be accessed through the ITU website ([www.itu.int](http://www.itu.int) – using access codes that can be obtained through the National Administration responsible for frequency management in each country).

Walid Sami

## Beyond HDTV AT ITU-R

ITU-R Working Party 6C's job is to agree 'baseband' formats for new video and audio systems that will be used in the broadcasting and media environments. A challenge today is to prepare for the new world of 'beyond HDTV'. There are two elements to this. The first is 3DTV. The second is Ultra High Definition Television.

Two 'Special Rapporteurs' on 3DTV have worked over the past year on what needs to be done to facilitate the making and exchange of TV programmes in 3DTV. One conclusion is that the basis of the 3D production format should be a pair of one of the existing HDTV production formats. The work will continue.

The work on Ultra High Definition Television focuses on the preparation of a potential Recommendation for the formats of the '4K' and '8K' UHDTV systems. These have 8M pixels per image and 32M pixels respectively per image. The number of pixels for these formats has been agreed, together with an 'extended colour range'. At the most recent meeting, there was agreement on the number of pictures per second. The existing picture rates should be allowed, with the addition of 120Hz. This should make a substantial difference to 'motion portrayal'.



NHK 8K UHDTV Demonstration



NHK 8K UHDTV Demonstration

The main area of discussion was the 'colour encoding'. This is the way that, when needed, reduced bandwidth signals are derived for the benefit of programme production bit rates, and for eventual compression for delivery. The objective of the colour encoding is to reduce the bandwidth either by a half or a third without the image quality being affected. This is possible because the eye is less sensitive to colour than to brightness, and the colour encoding exploits this.

Two colour encoding approaches were discussed. Both have advantages, but in different circumstances. The meeting finally agreed to establish a Rapporteurs Group to evaluate the two approaches more fully.

During the meeting, NHK gave demonstrations of the 8K UHDTV system for delegates, and this helped to focus attention on this subject which is critical for the future of broadcasting.

David Wood

# In the Spotlight

Jorma Laiho is Director of Technology at YLE (YLEisradio Oy – Finnish Broadcasting Company). After graduating as an electronics and radio engineer, Jorma joined the company in 1973 and served, from the start, as a technical expert at the ITU meetings regulating international radio frequencies.

In the international field, Jorma is a member of a working group of IASS (Masts and Towers). He has participated in the work of CCIR (International Radio Consultative Committee) and contributed to various EBU publications. He is a member of the EBU Technical Committee since 2008. Jorma has also participated in the work of DigITAG and is a member of the DVB Steering Board.

## Can you tell us something of your current responsibilities at YLE?

I am CTO (Director of Technology) at YLE. So my key areas are technology management and my team is responsible for the whole investment process at YLE. I am also a member of the YLE Steering Board.

## It's always interesting to hear about 'outside interests' - what are yours?

I have many outside interests. Some are very active and some rather idling and passive. At this moment the active is farming, I have a small farm 100km west of Helsinki. Then, I have always been interested in aviation. So, I am an eager aviation enthusiast though I am not a pilot, but interested in aviation in various ways. I travel every now and then around the world visiting museums, air displays and air shows, etc. I am also an amateur photographer and I am interested in history, Finnish local history, and the history of radio and TV.

## What do you consider as your finest achievement so far in your career?

There are many fine moments. My first international project was joining the Finnish delegation in Geneva in 1975 for the LF/MF radio frequency planning conference (frequency allocation) that took seven weeks. We, the Finnish, were one of the first to use computers for this, together with some other EBU Members. That was my first contact with the EBU. Ironically the plan still exists, but there is not a single LF/MF-transmitter at YLE anymore and only one MF, and that is not YLE's.

However, the top one was the transition to digital TV in Finland on the 1st of September, 2007. And, over one night, not gradually, we did it. The most recent was when YLE started totally tapeless production last year.

## Why did you step forward as a candidate for the EBU Technical Committee?

I have to thank my Nordic colleagues. Of course this is an excellent position to follow what is really happening in this business. You also have the opportunity to influence what is happening. International contacts are very important and the EBU is a good place for making them.

## What are for you the most important challenges facing EBU Members, particularly those with circumstances similar to YLE, today?

Challenges, we certainly have, both technical and nontechnical.

One big challenge is the position of technology in an organisation. I feel that the importance of technology is growing again,



**Jorma Laiho**  
YLE

but that is not seen by every management team. Technical directors and technology directors are somewhere in the background. However, the technology is still the driver.

Another challenge is to put IT and conventional broadcasting technology together. However, we have not yet succeeded in that. We can build radio and TV studios, but quite often we have problems in our IT projects. Engineering is also more and more system engineering.

Also, the trend to outsource everything causes challenges. Companies are more and more specialised, and some have started to speak of micro specialisation.

How to control that, without losing your flexibility? YLE has some experience, we were one of the very first to outsource some very critical functions, with good and bad experiences. Before, it was your own team who was responsible for the whole chain, from the camera to the tube, now you have tens of contractors.

## diary 2011 - 2012



### Loudness Distribution Workshop

08 - 09 Dec 2011 / EBU, Geneva (CH) / No fee. A workshop to explain and discuss the background and implementation of the EBU Loudness Distribution Guidelines - EBU Tech 3344.



### MXF Master Class

13 - 14 Dec 2011 / Geneva (CH) / Fee. Acquire expert knowledge in MXF technology to better understand how to migrate to a file-based workflow system.



### Production Technology Seminar - Production: @ transition

31 Jan - 02 Feb 2012 / Geneva (CH) / Fee. This seminar covers tri-media broadcast production, new technological developments in video, audio, metadata and SOA. Outlook for the future, plenary sessions and small group tutorials on specific topics.



### Digital Radio Week

13 - 17 Feb 2012 / EBU, Geneva (CH) / Fee. Coming together of the radio community from DAB, DAB+, DMB, DRM, IMDA and RadioDNS. A chance to exchange views and share common solutions for the success of digital and hybrid radio.

Further details and up to date information can be found at <http://tech.ebu.ch/events>



An evolution in technology.  
A revolution in business possibilities.



## The Selenio™ Media Convergence Platform

Every day our industry accelerates its migration from a traditional, broadcast model to a more flexible, efficient IP-based workflow. Productivity demands it — and new revenue is reliant on it.

Enter Selenio™. The industry's first media convergence platform.

With Selenio, baseband video/audio processing, compression and IP networking are combined into a single, scalable, space-saving platform.

So go ahead. Expand your channel portfolio. Make that transition to HD. Or move into web/mobile services. Selenio enables you to add new services confidently and cost effectively.

**Selenio. An evolution in technology. A revolution in business possibilities.**

UK, Israel, Africa  
+44 118 964 8200

North, Central, Eastern Europe  
+49 89 149 049 0

Southern Europe  
+33 1 47 92 44 00

Middle East, South Asia  
+971 4 433 8250

**SELENIO™**  
MEDIA CONVERGENCE PLATFORM



Global Award Winner



[broadcast.harris.com/Selenio](http://broadcast.harris.com/Selenio)

DRAWING THE NEW LINE

[harris.com](http://harris.com)

**HARRIS®**  
assuredcommunications®