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INSIGHT FROM EBU TECHNICAL

Contents

Issue 02 December 2009

FUTURE RADIO

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2010: a sporting year

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The European Commission and CEPT have taken important steps to realise the Digital Dividend (see page 12). More directly formulated, their plan is to encourage the closing down of broadcasting services and the introduction of mobile and broadband wireless technologies in the 790-862 MHz frequency band (TV channels 61 to 69).

The direction has been set but the real work still has to be done. Whether a Digital Dividend of this kind is feasible, now rests largely on the shoulders of the EU Member States and their national regulators.

When referring to the Digital Dividend the term 'dividend' is well chosen. A dividend is normally the return you get on an investment. The investment in this case is partly being made by broadcasting organisations which are switching off analogue and investing in digital broadcast networks. But the consumer, or the whole population/society, is the forgotten (and overall the largest) investor. They have to buy new equipment to receive the digital broadcast signals. But do they get something back? It all depends.

What is exactly the return? Technically speaking, the spectrum. More properly, a public resource today mostly used for free-to-air broadcast services. In the future at least part of this spectrum will probably be auctioned off (and therefore generate significant government income) and used for mobile broadband services. One of the arguments for this was the economic growth that mobile broadband services would generate for Europe. Another earlier argument strongly put forward at EU level was that this spectrum can be used to provide wireless broadband in rural areas. However, nothing remains of this in the latest EC Recommendation.

The digital dividend plan will have an impact on existing and future broadcasting services, and probably will not guarantee the broadband services we deserve. The re-arrangements to make the band available for mobile broadband will require large investments. In the future, home equipment will need to have better resistance against interference. These will all have a cost - and today it is unclear who will have to pay for them. Finally, it is questionable whether there is a real dividend when a public resource is given over to commercial interests. The digital dividend could become a 'digital deficit' for society as a whole.

Does the digital dividend make terrestrial broadcasting an inferior technology?

For all media organisations broadcasting is the key service. It is the most efficient and most popular way to deliver our linear radio and TV channels to large audiences. In most European countries terrestrial broadcasting is the most important distribution mechanism for first and second screens in the home. It provides a free basic package and universal access for the whole population.

However, having less spectrum means less opportunities for new and future broadcasting services. We see the future as an increasing number of channels, HDTV as the next 'standard TV', and the introduction of more 'datacasting' services like pushed video on demand. Doing this with less spectrum would lead to a reduction either in the number of services or in the bandwidth at the expense of visual quality. Further evolution towards new technologies and services on the terrestrial platform would be limited.

If we give up more broadcasting spectrum we will inevitably reach a point where terrestrial broadcasting will become an inferior offering because it will not be able to deliver an attractive package of (free-to-air) services to the public. Imagine if, in the past, terrestrial broadcasting had been limited to a black and white service and if you had to subscribe to another platform to get colour TV.

It also seems that terrestrial broadcasting itself, as a useful technology, has disappeared from the radar screen in certain fora. Broadcasting is, in reality, still the most efficient way to deliver programmes to a large group of users. The mobile networks of today are clearly not able to cope with such high demands. ►4

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European Broadcasting Union
17a Ancienne Route,
CH-1218 Grand Saconnex, Switzerland.
Editor-in-Chief: Lieven Vermaele
E-mail: tech@ebu.ch
Tel: +41 22 717 2111

Editors: William Daly, Harold Bergin
Production: WHD PR
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They have to look at what kind of broadcasting services they want to support, how much scope they want to leave for further developments, and how important the concept of terrestrial broadcasting is for their countries.

3► A recent trial in Germany to deliver TV over a 3G network failed. It is obvious that terrestrial broadcasting has a value. Both broadcasting and mobile operators need to work out how to deliver the best end user experience at minimum and reasonable network cost.

It is now up to the national regulators to decide how the digital dividend will be implemented. They have to look at what kind of broadcasting services they want to support, how much scope they want to leave for further developments, and how important the concept of terrestrial broadcasting is for their countries. The national regulators are key in creating a digital dividend, or digital deficit.

Is the spectrum for mobile broadband services the guarantee for a real dividend?

Broadcasting organisations are undergoing challenging times. Many EBU Members are active in radio, TV, online and mobile media. They are not just broadcasters anymore, but media organisations. These organisations have services and brands on various platforms in order to reach the end users, wherever they are.

Broadband, both wired and wireless, is an increasingly important platform for media organisations. Media services play a fundamental part in the uptake of broadband. The open framework and accessibility were essential factors from the very beginning with the internet. I believe that both media and telecom organisations have very good reasons to make wireless broadband really happen. It is very difficult today to have this discussion without falling into a debate on spectrum or digital dividend and this is a real obstacle to the introduction of new services in Europe.

The wireless future of Europe should be addressed in a wider context.

The high speed wireless broadband that we need, can hardly be delivered in the digital dividend spectrum alone because of its limited capacity. The lower we go in radio frequency, the lower the data rates that can be delivered. If we only rely on the digital dividend spectrum, the result will be a second class broadband - a disappointment for both the media organisation and the end users.

What we need is a wireless broadband made for the future. For that, higher frequencies and dense networks are needed. Surprisingly, such frequencies already exist. There is already allocated spectrum for wireless broadband (e.g. 2.6 GHz and 3.4 GHz) which is not used everywhere. So, please, 'first use what is not used' – the available unused spectrum.

Furthermore, today in many countries we still have 2G networks, an almost 20 year old technology, and subscribers have only recently begun to upgrade to 3G. Can we please switch-off these old inefficient networks, invest in the newest mobile technology and apply innovative approaches, like cognitive radio, in these bands? This would create a 'mobile (spectrum) dividend'.

A discussion that hardly ever takes place is the one about the future framework of broadband wireless networks. If we are freeing up public spectrum used today for broadcasting, how can we safeguard the same public value in the wireless broadband scenario? The connection has never been made between the digital dividend discussion and the framework in which the future wireless broadband networks will operate. Universal access, like for broadcasting, is not guaranteed for wireless broadband. A reduction in prices is not guaranteed (the networks will be cheaper in the lower frequencies). Neutrality principles for the services are not discussed and a dialogue about a basic free wireless broadband package for everybody is also left out. Where is the dividend and value for the end user?

There are opportunities, if only we seize them, in the digital dividend discussion to make an important leap forward, as a society, relating to commercial and public value, in both basic and advanced services, in hybrid scenarios including broadcasting and broadband services and technologies.

Spectrum is a resource given by nature and owned by the people. We have to use it wisely. Otherwise, the digital dividend will become a digital deficit for society.

Lieven Vermaele
Director, EBU Technical

Converting Standards

Adi Kouadio on 'Where to position my standard converter?' – an EBU N/SC report.

Broadcasters including those in the US share a substantial amount of today's HDTV content. As content is produced in different HD standards this international exchange makes standards conversion necessary. Standard conversion is the process of adapting one TV standard to another using spatial and/or temporal conversions. It has become more complex with the introduction of HDTV, due to additional HDTV image formats and frame rates as compared to the existing SDTV formats. In such a contribution environment, with increasingly complex systems, broadcasters have expressed uncertainty about the potential impact of the standard converter position in the chain, with regard to the feed quality. In order to provide guidance on this particular issue, the EBU N/SC project group (IRT, EBU, BBC) has conducted a series of test and viewing sessions. A range of professional standard converters that included the FOR-A FRC 7200, the Alchemist Ph.C-HD and Ukon from Snell, and the Teranex VC 100 was used in the tests. These converters can be classified into the two main classes of motion and non-motion compensation systems. Each implements one or a hybrid version of spatial/temporal conversion algorithms (linear inter-field interpolation, motion adaptive multi-field interpolation, block matching motion estimation, phase correlation motion estimation, etc.). The test sequences were natively generated in 1080i/29.97.

The test scenarios are depicted in figures A and B. Two viewpoints were considered in the evaluation: the broadcaster (point 1 in the figures) and the final user viewpoint (point 2 in the figures).

Test Results

From the contribution feeds subjective evaluation (viewpoint 1), we were able to draw the following conclusions:

• Motion compensated standard converters perform the best frame rate conversion (none or less perceptible image judder). Therefore, are strongly recommended for video sequences involving high motion such as premium sport events where

Contribution in 1080i/25

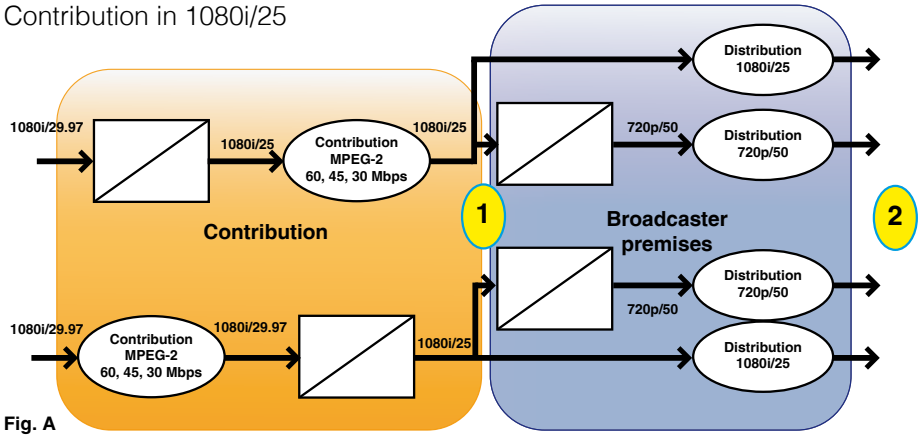

Fig. A

Contribution in 720p/50

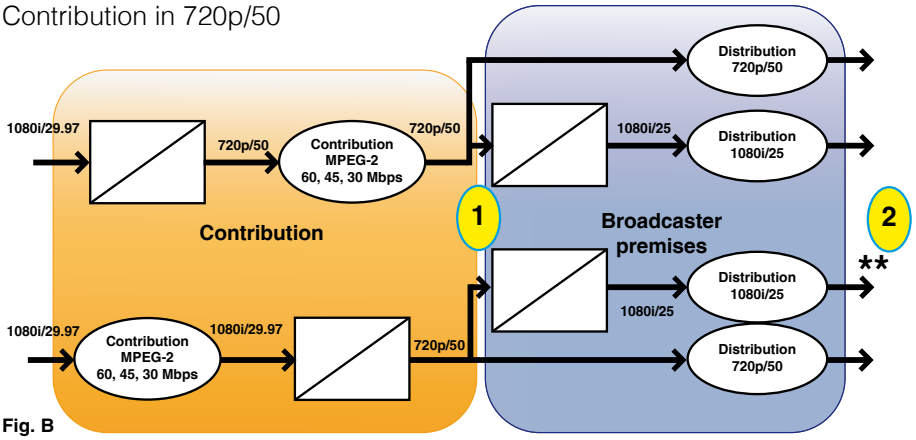

Fig. B

intensive motion components can be experienced.

• The image judder introduced by the standard converter before the contribution is not masked by the compression at any bitrate. It remains visible (same intensity before or after the codec) throughout the sequence at high or low contribution bitrates. The motion judder introduced by a non-motion compensated system will be interpreted by the compression system as a required motion component. The codec in its attempt to render motion with the highest fidelity will replicate the input judder as closely as possible.

• Having the standard converter before the contribution codec leaves the final contribution feed with just perceptible coding noise and artefacts which can be sometimes interpreted as artificial resolution at higher rates (60Mbps).

• Having the standard converter after the codec leaves the final contribution feed with less noise but also a barely perceptible loss of resolution at higher rates (60Mbps).

• The two last statements are even more valid as the contribution bitrate rises. The coding artefacts slowly mask the difference in resolution as the bitrate decreases.

In the second session, the performance of the standard converters were evaluated and compared in a standalone manner. Specific behaviours of each system could be identified such as loss of resolution, breaking artefacts and blocking artefacts around a static object with moving background.

After assessing the influence of the conversion on the distribution feeds (viewpoint 2) it was concluded that:

• The image judder introduced in the contribution domain is not overcome or masked by the compression. It remains perceptible with the same intensity throughout the whole chain up to the end user.

• Specific standard converters' effects can still be distinguished and recognised even after distribution encoding. This consequence, however, is independent of the standard conversion positioning in the contribution chain. Indeed, the comparison of the distribution feeds at 12Mbits and 8Mbits has shown that for each of the systems under test the quality of the feeds was equivalent. However, the specific artefacts of each of the converters could be identified at almost the same time instant and same intensity in each feed. Therefore, It can be considered that the differences seen at the contribution side with regard to the converter positioning in the chain are not perceptible after the distribution encoding, even at a bitrate of 12Mbps.

To sum up the results, it can be said that:

• Motion compensated standard converters are highly recommended for high motion content cross-conversion.

• The positioning of the standard converter in the chain causes the same amount of impairments.

The assessment made above can help the broadcaster make practical choices for the positioning of their system in the chain and allow for savings on equipment shipping if necessary. To complete the study, the 50-60Hz counterpart will have to be conducted at a later stage.

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01. Teranex VC100
02. For-A FRC 7200
03. Snell Ukon
04. Snell Alchemist Ph.C-HD

What will it take for digital radio to fly?

EBU Deputy Technical Director David Wood examines the current issues surrounding digital radio and looks to identify the elements which could influence its success.

'Radio' is unique. European radio has the richest content in the world. Drama, news, documentary, with all the music that exists. Just about everyone listens to the radio at some point every day of their lives. It is the media of the people - quietly efficient, low cost, and effective.

We all know that just about everything electrical in the material world has gone, or is going, 'digital'. The transition from 'analogue' to 'digital' is one of the great transitions of history, like sail to steam, or horses to cars. It is inevitable because digital technology is inherently more efficient and more flexible.

No media can be immune from 'digitisation', and there are well laid plans underway for the transition for television and even cinemas.

'Radio' research engineers were no slouches. Technical systems for 'digital' radio were developed long before anyone even thought of the transition for television or cinema. Throughout the 1980s there were tests and demonstrations of digital radio systems, and some operational services. Parts of the DAB digital radio standard are actually different from equivalent elements of the DVB television standards because radio engineers were not prepared to wait for television to catch up.

Instead of beating television to the punch by many years, the transition from analogue to digital for radio, when seen across Europe, has been well and truly lapped by television. There are national success stories for digital radio, but the truth is the digital transition of radio across the continent (and world) has been very slow.

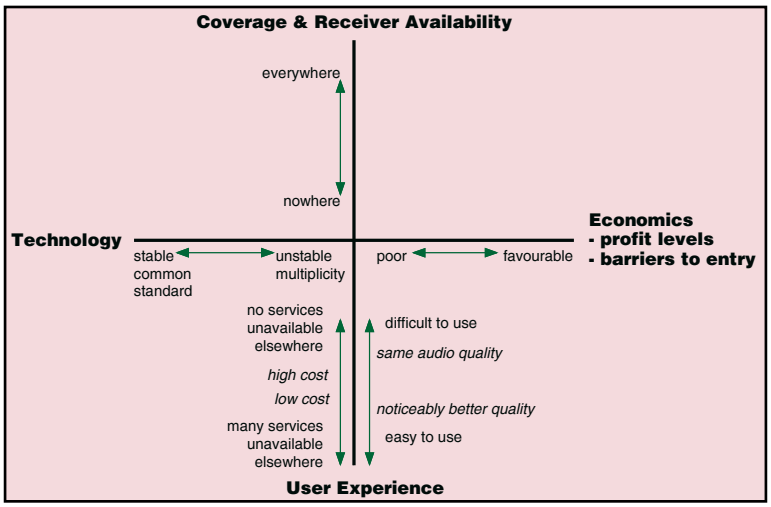
Broadcasters need to understand why this has happened, and what can be done to ensure the future of radio in an 'all digital' world. There is no magic dust that can change the situation overnight. However, with the benefit of hindsight we may be able to identify many of the 'tick boxes' for success. Radio broadcasters do need a road map for digital. There is an old truism 'any road is the right one if you don't know where you are going'.

One way to get to grips with digital radio is to identify the elements which will influence 'success'. These 'success factors' include things like cost, availability, offer, etc. It is the summation of these, and the weighting and strength of each of them, which will make the difference.

The diagram below shows the author's appraisal of the principle success factors for digital radio. There are four main axes. Digital radio will succeed (or would have succeeded) if we can arrange to give the axes near maximum scores. Low scores on any of the axes can drag the system down, and make it, at best, a slow mover. There are four main axes: the economics for all those involved on the supply side, the degree of coverage and receiver availability, the total user experience on the demand side which includes cost, quality, ease of use, and offer, and finally the technology and its stability. The lower the scores in the combination of these four, the less likely a given digital radio system/service is to succeed.

To avoid over complication, this diagram does not give the complete picture. In practice there are more axes, and they interconnect in various ways with each other. But maybe the diagram is a 'way in' to a discussion about what strategy broadcasters should have for digital radio.

One of the 'missing axes' is the 'substitutes'. In the digital radio world, internet can provide radio programming and podcasting, and today these could be a substitute for listening to digital radio. The more substitutes there are, and the easier and cheaper they are to use, the less likely is the public to find digital radio a 'must have', all other things being equal. Similarly, using television multiplexes for digital radio services can also be seen as a substitute. MP3 players or iPods are also substitutes for radio in some circumstances. The presence of substitutes makes higher scores on the four axes in the diagram ever



> ...volume defines receiver cost, so any national systems will always cost more than international common systems.

more important.
Another of the missing axes is 'complements'. These are elements in the opposite sense that can make digital radio even more valuable - they could even reduce the scores that are needed on the four axes in the diagram. An example of a 'complement' would be a tagging system whereby whenever a listener hears music he likes a lot, he can click on his receiver and it can be purchased and downloaded automatically.
A further missing element may be listener 'inertia'. In the UK, sales of digital radios to the home are quite high. Yet reports have found that even those homes that have digital radios still listen a disproportionate amount to the old analogue FM. Does the public have some kind of 'love affair' with the old days and with FM? This kind of phenomena also occurs with other media. But, with television it is different, governments are asking broadcasters to switch off the analogue broadcasts in the next few years, so the viewer will be forced to 'kick the analogue habit'. This seems less a government imperative for radio.
For the sake of starting somewhere, let us put substitutes, complements, and inertia aside for the moment. We may ask how digital radio has met the challenges of the four axes in the diagram over the years. If you do so, you will see that the school report is mixed, and there have been low scores in many of the axes. There were a series of digital radio systems developed for satellite broadcasting in the 1980s, but they were only moderately successful, and were eventually closed. Having to buy a dish and a new receiver for not much more than a handful of radio stations, many already available, was not a million seller. There were too few strong 'success factors'.
In the 1990s, the T-DAB (terrestrial) and S-DAB (satellite) technology was finalised, and spectrum was allocated (the Wiesbaden plan) to T-DAB in the mid 1990s. The stage seemed set for the age of T-DAB, and services were trialled in many countries. Once again, there were too few strong 'success factors'. There was a lack of receivers, coverage, and new services not available elsewhere. Eventually, several of the factors were strong enough in the UK, Flanders, Switzerland, and Denmark for usage to rise. But even so, today, twenty years after the first demonstrations of DAB, listening in these countries is done more often by analogue radio than digital radio.
One of the additional hazards of slow growth for technology systems is that technology itself can improve during a long implementation or roll-out cycle, to an extent that a service just about to be introduced can seem like 'yesterday's technology'. This has happened with DAB. Latter starters have been attracted by variants of DAB which use more modern technology.
Coupled with this, pulling us down the technology axis toward multiplicity in the diagram, are other systems, such as DRM, DRM+. Though technically excellent systems, they may still contribute to multiplicity.
Finally, we have seen a propensity for individual countries to take their own decisions about which digital radio systems to adopt. If nations decide on different standards for digital radio, the luckless driver crossing a border may find his radio stops working. And of course, volume defines receiver cost, so any national systems will always cost more than international common systems.
It is becoming clear why we have not had the success we hoped for in digital radio – n'est-ce pas?
Is it possible for radio to pull itself out of this, and make a success of digital radio finally? We hope the answer is 'yes'.
The EBU's 'white knight' for digital radio has been the agreement in 2008 with the receiver industry and WorldDMB on three digital radio types or profiles, which, if all goes well, can be bought anywhere in Europe, and will work anywhere in Europe. The idea is that each profile provides us with more sophisticated service offers. The normal level would be audio plus rolling caption, the level above (for those broadcasting it) would include this and multimedia on a small display, and the level above would include all of that plus video play-out on a small screen. Any of the three receivers will work anywhere for audio and captions, but the upper levels will also provide multimedia or video if it is being broadcast. It sounds a clever and good solution. But…there are questions.
Will all EBU Members adopt and use this family as recommended by the EBU Technical Committee? Will all broadcasters arrange for services to be available which are not available elsewhere? Can we can provide near universal coverage? If all this can be arranged, we will be there, and European digital radio's path will be set. Though broadcasters will also need to serve some of the 'substitutes' mentioned above as well, for listener convenience.
If the profiles are not a success, ahead probably lies years of uncertainty for radio broadcasting. There will be a mixture of FM, limited DAB and DAB+ services, Internet Radio, and confusing issues about the relative use of alternatives. Radio will always survive as a media form, but it will certainly cost the public a lot more in money and convenience. In addition, there will be a whole lot more meetings to attend.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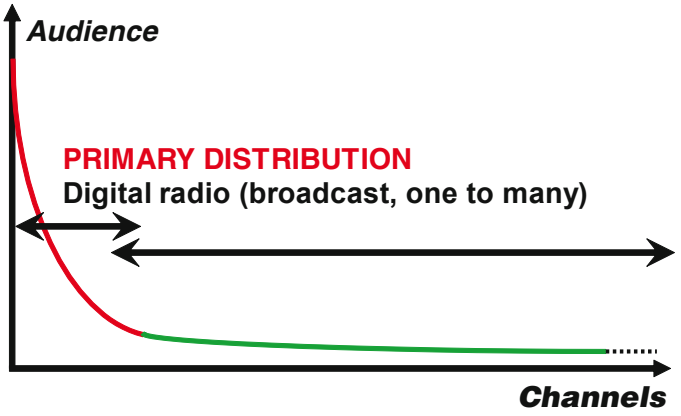
01. iriver B30 DMB Receive
02. Cowon D2+ DAB Receiver
03. E-Steresys Diablo DMB Radio
04. Pure Sensia Internet & DAB Receiver

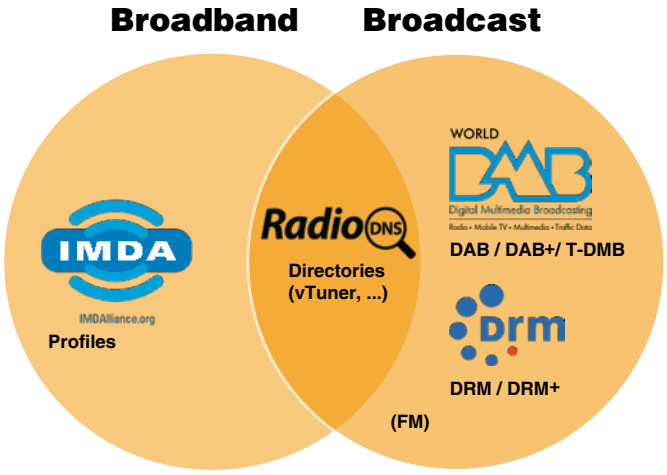
Digital Radio **Today**

Mathias Coinchon takes a look at the current digital radio situation in Europe from the technology through to the economic factors.

Since the harmonisation of digital radio receivers profiles (reported in the article by David Wood on page 6) in Europe in 2008 by WorldDMB, the EBU and 'Digital Europe' (formerly EICTA), the industry has focussed on producing compatible receivers that include DAB, DAB+ and T-DMB.
Main chipset manufacturers such as Frontier Silicon offer backward compatible chips that can be integrated by any receiver manufacturer. Car manufacturers plan that by 2014 all receivers for cars sold in France and the UK will include integrated digital radios.
So, with reference to the four axes shown in the figure on page 6, we can examine technology, coverage and receiver availability, economic factors and user experience.
'Technology' is now mature and stable with the DMB family (DAB, DAB+, T-DMB), and indeed the DRM family (DRM/DRM+) is in the process of becoming mature. It must also be noted that patents for DAB are starting to expire, making the technology even more 'democratic'.
'Coverage & Receiver Availability' is good in prospect. Since the ITU WRC-06 conference, sufficient spectrum has been available in all European countries to achieve good coverage, including indoor coverage. It is time for broadcasters and operators to build or upgrade their networks to provide good coverage.
Receivers are also starting to appear for DRM as large countries such as India show an interest. There are now more than 350 different receiver models on the market for DAB with prices starting from 30 euros.
'Economic' barriers to entry are now very low, but still depend on government administrations to define regulatory frameworks and offer spectrum. Digital radio at the moment is more an evolution than a revolution, but the new multimedia receiver profiles offer new perspectives for making radio attractive, and for possibly generating new revenues.
The exciting recent 'hybrid broadcast/ broadband' approach for combining broadcast and broadband in one receiver is also very attractive - both for the listeners and broadcasters, and may be a major complement to digital radio. Users would have plenty of content available while keeping free-to-air reception for popular programmes. Broadcasters retain an efficient way to deliver their content, thanks to broadcast networks. They also have the possibility to offer personalised content, interactivity and out of normal service zone coverage thanks to broadband networks.
As far as the 'User Experience' is concerned, digital broadcasting techniques are already simple to use while broadband techniques must be developed further to make them as user friendly as today's radio. This is the aim of two new bodies, the Internet Media Devices Alliances (IMDA) and RadioDNS.
However, the shortfall in many countries remains the availability of content. Content is the key to the success of digital radio. There's no great reason to go digital if there's no new offer. Many countries are still in the first generation of digital radio with a simulcast of programmes on FM – and relatively poor digital network coverage. This can only hinder success.
Countries such as the UK, Norway, Denmark and Switzerland are experiencing success because they offer added value on digital platforms. Radio plus multimedia is in its early days and may be important. France will be the first country to make multimedia part of its strategy from the beginning.
The risk with doing nothing is to see audiences decreasing slowly on FM while competition on the internet increases or becomes locked into vertical markets with mobile operators, with no direct access to spectrum in order to reach listeners in an efficient manner.



The Hybrid Broadcast Broadband Approach



Television Displays

Richard Salmon of BBC's Research & Development and Chair of the EBU P/Display Group examines the current situation, developments and progress of new technologies for displays.

In the domestic market, Liquid Crystal Display (LCD) and Plasma Display technologies have now essentially replaced the CRT (Cathode Ray Tube). Domestic TV screen sizes have continued to increase, and 37 or even 42 inches is foreseen as the biggest market segment in the very near future. New models are appearing in the 46-47 inch range, and the largest practical sizes for domestic use are now 57 and even 65 inch. The market is now such that most models above 32 inch diagonal offer full 1080 line resolution, and 100Hz or higher frame rates is common even at smaller sizes. The back projection TV market is now essentially dead in Europe and even America, but front projection retains a niche market.

Plasma Displays

Plasma displays are emissive devices, characterised by excellent viewing angle and colour rendition, but require (and have generally received) attention to ensure adequate rendition of grey-scale in the darker areas of an image, and improved motion rendition.

Having developed 1080 line resolution panels at most sizes, further costly developments have been required to enable plasma to continue to compete with LCD. This has left Panasonic as the only Japanese plasma panel manufacturer, now supplying panels to most of the other Japanese manufacturers. The next generation of plasma panels, the NeoPDP, is designed to give a big cut in power consumption and thinner and lighter panels, all increasingly important factors.

Liquid Crystal Displays

For TV use, a liquid crystal display is a transmissive device. That is it requires a separate back-light, modulated by varying the polarisation of the light as it passes through the liquid crystal. Poor viewing angle, colourimetry and response speed have characterised these displays in the past, but recently the introduction of LED backlights and faster switching LC materials have largely solved the latter two problems. Cutting display power consumption has also been on the agenda for LCD manufacturers, and their massive dominance in the market remains, with investment in new plants in recent years now coming online. With ever-reducing manufacturing costs the main focus for LCD panel producers, in March 2009 Sharp put into production what may well be the last Japanese LCD facility, costing $3.2bn, bringing still greater economies of scale. Future Sharp manufacturing capacity will be through partnerships outside Japan.

Potential alternative technologies

A variety of new technologies have been shown in prototype form over recent years. Several of them looked set to give plasma and LCD a run for their money, but now that the money has itself run away, in the current financial climate no company is in a position to invest significantly in the new technologies. All of them are emissive technologies, with excellent viewing angle and response speed characteristics.

What has happened to TDEL and SED?

Thick-film Dielectric Electro-Luminescent (TDEL) technology looked very promising 5 years ago, with an impressive 34 inch full colour prototype on show by iFire. The technology has been sold to a Canadian-Chinese joint venture, CTS Group, and further developments are now awaited.

Surface-conduction Electron-emitter Display (SED) technology also looked very promising until 2 years of legal wrangling (now resolved) resulted in the loss of the opportunity for Canon and Toshiba to go into production.

Other new technologies (FED and OLED)

The last couple of years has seen a resurgence of interest in FEDs. FET Inc, a spin-off from Sony, was set to purchase Pioneer's old plasma display factory earlier this year, but lack of financial backing caused this development to be abandoned in March 2009. This is very disappointing, since Ikegami had demonstrated a very promising prototype monitor based on a prototype panel.

Although Samsung have demonstrated a 40 inch OLED display, they do not expect OLED to become a mainstream product for 4-5 years. The major problem is how to create the larger screen sizes needed for TV. The current offering from Sony, a 3mm thick 11 inch panel, is in low-volume production. Also shown as a prototype viewfinder for Sony's HD and CineAlta cameras, the OLED panels are impressive and attractive. However, OLED is still some years (possibly a decade) from making a major impact in the TV market.

3D displays

Many stereoscopic 3D-ready back-projection and, more recently, plasma screens (time-sequential 3D displays requiring expensive shuttered glasses) have already been sold in the US market. In Europe, Hyundai and JVC are the most readily available stereoscopic displays, based on LCD technology, and requiring polarising glasses. In both cases the quality of the 3D effect depends on the level of perceived crosstalk between views (i.e. visibility of the right-view to the left eye and vice-versa), and this is dependent on the combination of display and glasses. If the display knows the characteristics of the glasses then some crosstalk can be precorrected.

Conclusions

The current economic conditions will probably result in a period of relative stability in terms of display technology. LCD appears secure in a dominant position. It is not only potential new entrants to the field which find it hard to match the huge economies of scale and market dominance which LCD has achieved, but even plasma display manufacture finds itself under pressure, following the effective demise of back-projection from the TV market. OLED technology currently appears the most likely challenger for the future, but is unlikely to seriously challenge LCD for some 5 or even 10 years to come.

Pictured - Sony XEL-1 OLED TV

Germany's Public Service Broadcasters' Mediathek Portals

Franc Kozamernik, Senior Engineer, EBU Technical, outlines the success of Germany's Mediathek web service with input from ARD's André Berthold and ZDF's Jochen Schmidt and Rainer Kirchknopf

It is important to understand that Germany is a federal country with a very complex and diverse public broadcasting system. Its two most important public broadcasters, ARD and ZDF operate successful web media platforms. ARD Mediathek and ZDF Mediathek are distinct and editorially unrelated.

The ARD Mediathek portal represents programming from the nine public service broadcasters within 16 states (Länder), including the international broadcaster Deutsche Welle. The service carries ARD's TV and radio content. Additionally, ARD also runs the pan-German TV service, Das Erste TV Mediathek, which consists of ARD's principal TV channel's output as well as programming contributed by the nine public service broadcasters.

Launched at IFA 2007, ZDF Mediathek carries the national broadcaster's entire multichannel output and is a dedicated on-demand service portal. Today, the Mediathek repurposes video content for three different platforms: PC, Media Center and 3G. While Media Center uses PC hardware, it is TV centric in as much as the user uses a remote control and has a feeling of watching TV ('lean back'). The next step will be to complete the lean back scenario by supporting set-top boxes or TV sets. This leads us to the HBB (hybrid broadcast broadband) platforms, which are beginning to emerge in various forms across Europe, and can facilitate interactive services.

November saw the launch of a redesigned ZDF Mediathek. ZDF currently also makes its content available on other internet portals, such as YouTube, Facebook, etc. To this end, ZDF's production facilities are equipped to repurpose content for the different distribution pipes.

Launched in spring 2008, ARD Mediathek was designed to handle three different sets of bitrates for audio and video (small, medium and large).Web S was for modem and ISDN bitrates of up to 128 kbit/s and will be phased out in 2010. Web-M mode covers video bitrates of around 500 kbit/s offering 25 percent PAL resolution. It is increasingly used by the broadband users with capacities (speeds) of 1 to 3 Mbit/s. Web-L provides a full PAL-equivalent resolution with either 4:3 or 16:9 aspect ratio at a bitrate of 1.5 Mbit/s but it is used only for some selected programmes, mainly due to cost. A 'Web-XL' mode for HD content should follow ARD's start of regular HD distribution over satellite in February 2010, but there is no decision yet.

ARD Mediathek currently employs unicast delivery provided by several Content Distribution Networks. To reduce distribution costs ARD is contemplating the use of IP multicast when it is available for the whole network chain or perhaps P2P when it has proven to be effective.

Unicast on-demand traffic accounts for 95 percent of ZDF Mediathek hits. The current networks can cope with peaks of 60 or even 80 Gbit/s that can occur during live events. However, the normal on-demand traffic of an evening is currently much lower (around 10 Gbit/s) but this could change when living room devices become connected to the internet. Present internet networks are suitable for today's level of on-demand traffic with no need to change basic network infrastructure. In the last 10 years costs have been significantly reduced from 1 Euro to below 10 cents per Gigabyte.

Internet prime time viewing time has shifted from lunchtime to the evening hours. Both TV and internet prime times are now between 8 pm and midnight. The

ZDF Mediathek experiences between 10 and 15 million video viewings per month. With the improvement of video quality, viewing duration has gone up from a couple of minutes to full length broadcast programmes of around 10 to 30 minutes. The easy to use ARD and ZDF Mediathek portals have been well received by the German speaking public, both at home and abroad. ZDF has found that its Mediathek is used increasingly in a lean back scenario and should soon be available in the living room using large flat panel TV displays.

ARD's Mediathek audience increased three-fold over the last year. This is due mainly to the amount and quality of the content now on offer. Technically the quality has significantly improved and much of the content is more appealing to younger audiences.

The question remains: should Mediathek provide only on-demand services or should it also cover live events, which will require significantly higher peak capacity and are costly? Or do conventional terrestrial and satellite broadcast networks remain the most suitable delivery mechanism for large-scale, live events.

ZDF's Rainer Kirchknopf, Jochen Schmidt & ARD's André Berthold

HBB

What's The Deal?

As the buzz and hype in the industry that surrounds Hybrid Broadcast Broadband continues and even heightens, EBU Technical's Peter MacAvock takes a realistic look at what is a complex situation and reports.

Where did it come from? Suddenly the whole industry is excited about the prospect of hybrid broadcast broadband devices and services. However, there is much to resolve; we have a long way to go to ensure successful services on interoperable devices.

The origins of hybrid broadcast broadband (HBB) lie in the interactive TV services which have been successful in only some markets around Europe. When originally conceived, these interactive services relied on a telephone line and a modem for a return channel. The platforms could broadly be divided into declarative, like MHEG-5 (sophisticated teletext if you like) and executional, like MHP (little software programmes running on set-top boxes). But there was always a problem with the fact that there is typically a significant separation between the telephone connection and the antenna downlink. Such internal wiring presents substantial problems for the pay TV industry, let alone free-to-air services where the industry relies on the consumer keeping the telephone line plugged into the TV set or set-top box.

The consumer equipment was also not very powerful. The modems were slow and you couldn't rely on them being connected. Result: very few interactive applications rely on the telephone return channel.

So the telephone line is being replaced by a broadband connection. Isn't that what HBB is? Well, yes. However, there are a number of key differences. The first thing to note is the consumer equipment has become much more sophisticated. Indeed, many set-top boxes come with graphics accelerators, which provide good graphics rendition on the flat panels that populate most of today's living rooms.

Whilst all this has been happening in the living room, broadcasters have begun to offer extensive catch-up TV and live streaming services on their websites. Currently, these are geared towards the PC mainly (with notable exceptions in the UK), and they currently use one of two systems that dominate the sector: Adobe Flash or Microsoft Windows Media. In addition, internet delivery of high bandwidth media is becoming more reliable as domestic DSL improves. Therefore, the time is ripe to jump from the computer screen to the main TV set.

So there's the technology. The engineers can come up with loads of exciting potential applications for an internet connected, broadcast enabled, domestic TV set or set-top box. But is it going to be catch-up TV on a big screen? Or is it going to be a seamless linkage between broadcast and broadband where the user browses a set of services without even knowing how they're reaching him? Well frankly, these questions remain, but we can still dream can't we?

The industry is gradually moving forwards from basic interactive services and is seeking to combine rich online offerings with multichannel, high-quality free-to-air broadcasts. All of this in a sophisticated consumer device with a big screen. So where's the catch? Well there are a few unfortunately.

01

02

Remember the separation between the telephone connection and the broadcast downlink? Well it's still there. You should be able to get over it with a WiFi dongle on your consumer device, but domestic WiFi is still not yet fast enough for streaming high quality video. But we're getting there.

Then there's the platform problem. There are just so many of them. Interactive TV systems like MHP and MHEG-5 have now been upgraded to include the possibility of replacing the telephone with a broadband connection, but they are still very closely linked with the set-top box architectures of old. But they work: the new generation of Freeview HD boxes in the UK incorporates H.264/DVB-T2 with MHEG-5 and broadband connection. It's hoped that these will offer catch-up TV as a minimum like iPlayer.

What to do? Well, it's a complex situation, but there are a number of common elements: we're all talking about streaming video across the broadband connection, and we'd all like to be able to signal our broadband applications in our broadcast channel. Luckily, there are a small number of commonly agreed techniques for doing these two. Let's see if we can agree these, and then walk towards the stony ground that is the definition of common platform characteristic, DRM and the like.

03

01. TF1 Vision
02. Arte+ 7
03. BBC iPlayer

EC & CEPT Reach Alignment On **Digital Dividend**

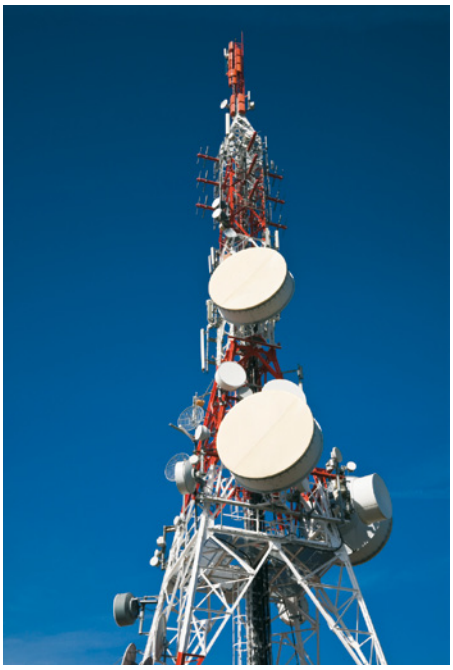
In the last week of October, the European Commission and the CEPT made aligned decisions towards the realisation of the Digital Dividend. National regulators will now be responsible for making the digital dividend happen. It is important that broadcasters should be actively involved in the process of implementing these decisions at the national level.

European Commission (EC)

The EC has published the first set of tools towards the harmonised use of the Digital Dividend in the European Union. It includes an official 'Recommendation' and a 'Communication'. The EC recommends that Member States take all necessary measures to switch-off terrestrial analogue television by 1 January 2012 and to support regulatory efforts towards harmonised conditions for the 790-862 MHz sub-band for electronic communication services.

The Recommendation will be complemented by a 'Decision', which will set the technical requirements for the use of the sub-band. Although the Recommendation is not binding and leaves freedom for Member States to decide whether to open the band to non-broadcasting services or not, a discussion on making it mandatory might follow in the European Parliament and Council.

The Commission's Recommendation is only the starting point. The real discussions will follow at national level. It



is now up to Member States to implement the Recommendation and to see: how broadcasting services can be moved to lower frequencies, who is going to pay, how to solve the interference cases, etc. So this is a crucial moment for broadcasters. They should be part of these discussions to ensure the future of the terrestrial television platform.

The Electronic Communications Committee (ECC) of the CEPT

The ECC has approved a package of regulatory documents on the Digital Dividend. Most important is the new ECC Decision ECC/DEC/(09)03 on 'Harmonised conditions for mobile/fixed communications networks (MFCN) operating in the band 790-862 MHz'. This ECC decision is based on the results of compatibility studies. The ECC has adopted a flexible approach which leaves it to national administrations to decide how the 790-862 MHz band is used. If this frequency band is to be used for mobile/fixed communications networks, administrations shall adopt the harmonised technical conditions specified in the Decision ECC/DEC/(09)03. This is consistent with the regulatory approach currently adopted by the European Commission.

However, the ECC has recognised 'that the protection of broadcasting may require adoption of additional measures at the national level to mitigate the possible remaining interference cases'. ECC/DEC/(09)03 also provides flexibility for national administrations to adapt the harmonised conditions to their specific national circumstances. This is particularly important since all TV receivers are potentially vulnerable to interference caused by future mobile networks and terminals.

Lieven Vermaele

ITU Experts Approve **Loudness** Recommendation

Helped by input from the EBU P/LOUD Group, ITU experts in WP6C have now reached agreement on a Loudness Recommendation. The text recommends using an ITU-R BS.1770 compatible meter on all audio channels (except the LFE).

It leaves it to the programme provider to measure the full mix or dialogue only.

If metadata is used, it should be set to the measured loudness value. The target level is -24 LKFS (ungated). The Recommendation is in line with the EBU's work, although there are differences in scope. In P/LOUD there is a preference for measuring the full mix (simpler in practice and works with any programme). The ITU text does not refer to broadcasting but only to international exchange. The EBU aims to clarify the use of loudness meters and normalisation early in 2010. P/LOUD is currently performing subjective evaluations to advise on the use of gating. Much praise has been given to EBU Group P/LOUD, led by Florian Camerer of ORF for the work.

Frans De Jong

Harmonising HDTV Production

The EBU's highest technical body, the Technical Committee, has endorsed a new project following a series of meetings with manufacturers and the EBU's P/HDTV group, under the chairmanship of Massimo Visca (RAI). The project's aim is to cooperate with key industry manufacturers such as AVID, Grass Valley Group, Panasonic and Sony to solve important interoperability questions in HDTV production.

The project is called 'Harmonisation and Interoperability of HDTV Production Standards (P/HIPS)' and is chaired by Christoph Nufer of IRT. EBU Technical Program Manager Dr Hans Hoffmann will serve the project from the EBU Technical side. The project will run on an aggressive time schedule, starting with a meeting on 16-17 December that will address the following objectives:

- interoperability between HDTV equipment employing MXF OP1a and OP Atom;
- future HDTV compression formats in HDTV production (e.g. for news/mainstream/premium quality in 720p/50, 1080i/25, 1080p/25 and potentially 1080p/50) and to ensure open and standardised formats;
- minimum requirements on metadata provided at the source device (e.g. camcorder, live camera etc.), to determine how they can be transported through the production chain (HD-SDI) and how they can be delivered into an IT-based domain (file) and last but not least, to define an EBU position on the use of different levels with 3Gbit/s HD-SDI (1080p/50).

EBU Members or industry representatives that are interested in joining the project should contact Dr Hans Hoffmann (Hoffmann@ebu.ch).

Dr Hans Hoffmann

WorldDMB Report

At its recent General Assembly, hosted by Radio France in Paris, WorldDMB elected Jørn Erik Jensen of Norway's NRK, as its new President. The same meeting elected a new Steering Board for a period of two years and three Vice-Presidents - Woojik Chun (ETRI, South Korea), Anthony Sethill (Frontier Silicon, UK) and Joan Warner (Commercial Radio Australia). Full details can be found at www.worlddab.org.

Jørn Erik Jensen will replace Quentin Howard who has served as WorldDMB President for the past five years. The General Assembly thanked Quentin for his excellent work in steering WorldDMB at a time when digital radio was launching successfully in a number of countries. Coming from EBU Member NRK, Jørn will take over a healthy project with a positive outlook.

The meeting coincided with the formal launch of France's digital radio services based on the WorldDMB standard. Digital radio promises to be a cornerstone of the French digital broadcasting environment with services rolled out in Paris, Nice and Marseille and plans to extend coverage over the coming months.

Peter MacAvock

Forecast '09 Annual Update

EBU Members know that if you can afford the time to go to only one EBU seminar a year, then you should make it Forecast! Once again, the programme committee assembled a very strong set of presentations from expert speakers dealing with many of the important broadcasting topics of today.

The first day focussed on delivery technology topics beginning with a review of the activities of the DMC project groups. Sessions then dealt with an update on HDTV technology and services, the hot topic of 3D-TV, the Synergies between Broadcast and Broadband, and the ongoing Digitisation of TV and Radio.

In the afternoon, participants divided between workshop sessions to encourage discussion on these topics in greater detail.

The second day concentrated on frequency spectrum issues, with a review of the activities of the project groups of the SMC during the last year, followed by presentations on the main themes of Spectrum Regulation and the Digital Dividend, and Issues for the Future of Terrestrial Broadcasting. In the afternoon, attendees participated in workshop sessions to encourage further detailed discussions.

Forecast 2009
THE ANNUAL UPDATE FOR EBU MEMBERS

The formal presentation programme was supplemented as usual with plenty of opportunities for active discussion in question and answer periods and in the less formal networking outside of the meeting room in the breaks and at the evening receptions.

This year's Forecast, held on the 24 & 25 November, was open to EBU Members and 81 people attended from 20 countries.

Ed Wilson

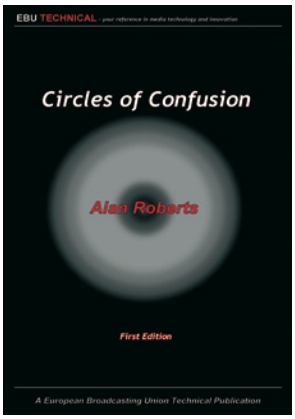
Eurosport HD Experience – Paris

On the kind invitation of Eurosport HD a group of EBU Member representatives met in October at Eurosport in Paris to discuss their experience in HD migration. It was followed by a tour of their installations. The Thematic Visit was initiated and organised jointly by EBU Technical and EBU Training. EBU Members from VRT, BNT, ARD,SWR, RTE, TVP, RTP, RTVE, RSI, Swiss TV and BBC Sport enjoyed the very structured and detailed presentations given by Eurosport experts, who explained the different stages of their migration phase to HDTV . It was particularly impressive to note that the whole HD migration project was brought into operation within half a year. Eurosport aimed to reach the highest level of technological excellence by setting up a fully tapeless HDTV workflow in production and exchange. Topics addressed and discussed included systems and processes, migration architectures, tapeless workflow and IT developments in a digital workflow. The presentations generated a lot of questions and stimulated lively discussions between the EBU Members, those who also have HD services, as well as those who are in concrete planning phases. The participants were then taken on a guided tour in small groups around the technical facilities.
Overall, the visit clearly met its objective of sharing experiences between broadcasters that are undertaking challenging technology migrations. Eurosport deserves particular thanks on behalf of the EBU for hosting this excellent event.

Dr Hans Hoffmann

Book Review:

Cirlces of Confusion by Alan Roberts



Circles of Confusion can be purchased through EBU Technical at http://tech.ebu.ch

Before retiring recently, research engineer and scientist Alan Roberts spent his career at the BBC Research Department in the UK, and amassed an immense amount of knowledge of television technology in the process. Alan was (is) one of the few experts in the world in television colourimetry - and much else besides. Happily for us, Alan has produced a really splendid book which ensures the baton of knowhow will pass to the next generations. In 400 or so pages Alan explains just about everything you need to know as a television engineer. He begins with colour science and how it applies to television, television coding and colour gamuts. Alan moves on to the fundamentals of sampled digital systems, which are at the heart of digital television, and the characteristics of today's SDTV and HDTV. Scanning and displays come next, followed by television cameras, with sorties into aperture correction and such. The book then takes on displays, moves to compression and recording, followed by film. The next chapters on light, optics, images, and human vision are certainly worth their weight in gold. The natural course of the book takes you through camera testing and measurements, the longest chapter. Alan seems to understand all aspects of television and equipment, and explains them well. Practicing engineers, researchers, and students will find it to be a must have. A university course on television technology could also be based on it. Sometimes quirky but always truthful, this book is a real tour de force by an expert - a one-off book by a one-off individual.
P.S. In case you wonder, the concept of a 'Circle of Confusion' comes from the way 'in focus' is defined.

David Wood

TTI Workshop – Geneva

In September the EBU TTI Group, which concentrates on Traffic and Travel Information,

hosted a workshop that focused on the Message Exchange Server (TTI MES), a language independent platform that collects international road traffic information from EBU Members in TPEG format. In contrast to TISA (Travel Information Services Association), which addresses the development and deployment of future standards and services, the TTI Group focuses on issues facing broadcasters. This includes the deployment and harmonisation of traffic information services broadcasted in Europe, as well as promoting the sharing of experiences. Road safety and multi-modal information are also amongst the priorities for broadcasters that the TTI Group concentrates on. The meeting also allowed the group to host its board elections and discuss its future activities including the organisation of next year's Eurotravel Conference. All broadcasters planning to introduce traffic and travel information should follow the activities of the TTI Group.

Mathias Coinchon

DIARY 2009 - 2010

Digital Dividend Webinar

08 Dec /Online - 14:00 (CET) / EBU Members only / No fee. Insight into Report 30 from CEPT and the associated EC decision for the use of band 790-862 MHz provided by the EBU's Dr Walid Sami. There will also be an update on the ITU work related to the 790-862 MHz band.

MXF Masterclass

14-15 Dec / EBU, Geneva / EBU Members only. The Material Exchange Format (MXF) is of key importance to file-based broadcast facilities, but the format can be complex to understand. The two day masterclass will provide attendees with expert knowledge on MXF in order to better evaluate the operational challenges related to migrating to a file-based workflow with MXF.

HBB Webinar

14 Jan / Online - 14:00 (CET) / EBU Members only / No fee. The EBU's Peter MacAvock provides an update on the status of Hybrid Broadcast Broadband and its implications for broadcasters.

HD Formats Webinar

18 Dec / Online - 14:00 (CET) / EBU Members only / No fee. What is the difference between 1080i, 720p and 1080p? And what is the current status on 1080p/50 production and distribution? In this HD Formats Webinar, the EBU's David Wood and Dr Hans Hoffmann provide the answers.

Production Technology Seminar 2010

02-04 Feb / EBU, Geneva. Provides a reality check on what was promised by the industry for digital file-based HDTV production workflows. HDTV is here although the matter of efficient HDTV production workflows, integrated archives, and interoperable file-based content exchange is still debated. The seminar also addresses operational tasks on quality control and monitoring, asset management and the latest development in HDTV production. Cutting edge technologies and new perspectives applicable to broadcast production are presented with half a day dedicated to the latest developments in audio.

Internet Distribution Webinar

04 Feb / Online - 14:00 (CET) / EBU Members only / No fee. Discover the results of the DVB Study Mission on Internet TV Content Delivery, which is part of an effort to establish a horizontal market of interoperable internet connected TV sets, STBs, games consoles and mobile devices.

HD Contribution Codecs Webinar

03 Mar / Online - 14:00 (CET) / EBU Members only / No fee. Join EBU's Adi Kouadio for an update on the performance of HD Contribution Codecs used to get signals from venues to broadcasters' facilities.

3D TV Webinar

16 Mar / Online - 14:00 (CET) / EBU Members only / No fee. Has the 3D TV dream become a reality already? In this EBU Webinar, long-term 3D enthusiast David Wood updates you on the status of 3D TV and its standardisation.

Further information can be found at http://tech.ebu.ch/events

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