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**ABU Digital Broadcasting
Symposium 2016:
Full Report Inside**



DIGITAL BROADCAST SYMPOSIUM 2016: INNOVATING DIGITAL CONNECTIONS

The 2016 ABU DIGITAL BROADCASTING SYMPOSIUM was held from 29 February - 3 March at Hotel Istana, Kuala Lumpur. This symposium is held annually by the ABU and this was the twelfth, with the appropriate theme '*Innovating Digital Connections*'. Prior to the conference proper, three workshops were held at the same hotel. On 29 February, a half day DVB workshop focusing on the latest developments in DTT and progress of UHD was conducted in the morning. In the afternoon, another half day workshop was conducted by the principal sponsor WorldDAB. In order to meet to the diverse needs of the participants, a full day parallel workshop on archiving was also conducted on the same day. The three-day conference, a total of ten workshops and an exhibition, provided the rare opportunity for attendees to have interaction with broadcast experts who had gathered here from all around the world. The symposium attracted many participants representing public and private broadcasters, telcos, regulators, manufacturers and other industry players.



Report on DBS by
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Opening Session

The Industry Keynote address entitled '*How the Powerful Mix of Talent and Technology can Future Proof Broadcasting*' was delivered by Joan Warner, Vice President Asia Pacific WorldDAB as well as CEO Commercial Radio Australia. She related, from her experience, that radio is the most versatile of all media as it serves a diverse audience. It is a one to many form of technology that spreads and reaches out to audiences everywhere. It forms a unique bond between the celebrities and the listeners. Radio generates closer social media engagement as the fans do not have to wait until the next show to contact the celebrity. Content is shared across all platforms enabling closer interaction between the radio station and audience. The mobility of Radio is a crucial factor that must be taken into account because travelling time taken for motorists to reach their destinations can be considerable. Radio has been and always will be a reliable form of technology during times of emergencies. This has been proven time and time again when natural disasters, such as earthquakes or floods have struck a country.



Ms Joan Warner,
Vice President, Asia
Pacific WorldDAB and
CEO Commercial Radio
Australia

Towards Enhancing Experience

The first session was chaired by Mr Masakazu Iwaki, NHK-Japan and the panelists were Yoshitoshi Konda, NHK-Japan; Dr Peter Siebert, DVB Project Office; Lindsay Cornell, BBC UK and Graham Dixon, EBU. They examined the various broadcast technologies which, evolving over the years, are now entering the stage of maturity. According to EBU, Radio should incorporate six core values namely Universality, Independence, Excellence, Diversity, Accountability and Innovation. Universality signifies a very wide audience reach, because only a minimal cost of US\$15 may be incurred when purchasing a digital radio set and there is no monthly subscription cost involved. Diversity relates to the need to meet the demands of an ever changing demographic structure of society and response to niche markets. Innovation implies the necessity to have hybrid services, data/slide shows and contemporary look.

DAB+ chips are to be incorporated into the new generation of smartphones in order to reach a wider audience and of course the younger generation of listeners. Therefore, the future of



Mr Yoshitoshi Konda of NHK-Japan; Mr Graham Dixon of the EBU; Session Chairman Mr Masakazu Iwaki of NHK-Japan; Dr Peter Siebert of DVB and Mr Lindsay Cornell of BBC-UK

radio lies in using Hybrid Radio which is a combination of broadband and broadcast. Another innovation is the portrayal of new characters in LCD/LED displays and thus solving the technical issue of letters having accents occurring with the different spoken languages around the world. Many South East Asian countries which have non Latin based scripts are interested in this new improvement of DAB+.

Technical discussions are being held within the DVB to set new standards for the enhancement of UHDTV. UHDTV offers a wider field of view (FOV) from 30° to 100°, with more pixels. Now there is to be further improvement with High Dynamic Range (HDR) which does not lose detail in the dark areas and reduces highlight compression. Two solutions have been proposed by either using the “absolute” luminance approach or “relative” luminance approach for HDR. The former approach specifies a larger absolute luminance range that requires the Electro Optical Transfer Function (EOTF) to be included as part of the specification, but without the need to include the Optical Electro Transfer Function (OETF). The latter approach specifies the signal range for highlights that requires the OETF to be part of the specification as consistency of programme quality is necessary. DVB is also specifying standards for High Frame Rate, Wide Colour Gamut and Next Generation audio. The HFR portrays better and smoother motion while the wider colour gamut allows almost all surface colours to be reproducible. The audio has been improved with an immersive sound system that complements the visual sensation of reality.

8K-UHDTV or Super High Vision conveys to the viewer the sense of ‘being there’ at the scene and a sense of reality close to watching a real event. 8K has 16 times the resolution of present HDTV or 2K. There are more pixels as the 8K mode has 7,680 x 4,320 pixels. These pixels are better, providing a wider colour gamut by use of 12 bits/pixel and faster pixels at 120 frames/sec. The strong sensation of reality is produced by the increase in the Field of View (FOV) to 100° and higher pixel density of 8K which results in a pixel structure that is imperceptible, even at close viewing. The high frame rate portrays better and smoother motion while the wider colour gamut allows almost all surface colours to be reproducible. The sound system has been improved with a 22.2 multi-channel 3D surround sound system that complements the visual sensation of reality. In 2016, NHK will be transporting specialised OB vans to Rio de Janeiro to undertake 8 K live action coverage of the Olympics. NHK is also in the process of preparing for the 2020 Tokyo Olympics.

Beyond HD: What Changes can Broadcasters Expect

The Chairman was Magli Alias, Radio Television Malaysia with the panel comprising Craig Todd, Dolby Laboratories; SeoJaehyun, Electronics & Telecommunication Research Institute, Korea; Dennis Breckenbridge, Advanced Broadcast Solutions; Alexander Zink, Fraunhofer; Johnny Ng, AsiaSat and Khush Kundi, Ericsson APAC. DRM, announced that there has been considerable achievement in the implementation of its standards around the world notably in Russia, India, Bangladesh, Pakistan, UAE and Indonesia. A DRM+ trial using two 200 W transmitters was initiated in St Petersburg, Russia. One transmitter was operating at 67.46 MHz with horizontal polarization whereas the other was operating at 94.5 MHz with vertical polarization. Plans for complete coverage of the Russian Federation with DRM have already been worked out. A key finding was that a single AM DRM transmitter can provide the equivalent coverage of 167 analogue FM transmitters. Another country which has one of world’s largest digital radio deployments is India. At the moment, there are 35 MW DRM and 2 SW DRM transmitters representing an investment of 3 billion Indian rupees and reaching 0.6 billion people.



Mr SeoJaehyun of ETRI Korea

The next generation video would be progressing from the standard specified by Recommendation ITU-R BT 2020 towards ITU-R HDR. The earlier document specified Higher Resolution, Higher Frame Rate (HFR) and Wide Colour Gamut (WCG). The new document extends these specifications by improving the High Dynamic Range (HDR) with brighter and darker pixels. These better pixels mimic real viewing experiences to excite the senses and physical and emotional responses. Audio standards would also be improved in tandem with the improved video. Work has already been undertaken to provide immersive audio with standards such as Dolby AC-4 and MPEG-H. Both ATSC 3.0 and DVB are expected to include immersive audio in their system. The end result will be a more realistic and moving content.

On 22 October 2015, AsiaSat officially launched 4K-SAT using AsiaSat4 for the transmission of UHDTV over the Asia Pacific region. DVB-S2 with configuration mode of 8PSK, 5/6 code rate and symbol rate of 30 Mbps was utilised. The maximum throughput is 72 Mb/s, sufficient for 3-5



Mr Johnny Ng of AsiaSat, Mr Alexander Zink of Fraunhofer, Mr Craig Todd of Dolby Laboratories, Chairman Mr Magli Alias of Radio Television Malaysia, Mr Khush Kundi of Ericsson and Mr Dennis Breckenbridge of Advanced Broadcast Solutions

UHD channels with HEVC. The transponder is limited by bandwidth which has to be overcome by a more efficient transmission technology. The improved DVB-S2X uses 16 APSK and a 5% roll off factor resulting in a payload increase by almost 40% when compared to DVB-S2 which utilises 8PSK and 20% roll off factor. The combination of DVB-S2X with HEVC source coding would allow even more UHD channels to be transmitted.

The Changing Media Business and Opportunities

Chaired by Dr Fintan McKiernan, Ideal Systems Singapore, the panelists were Charles Sevier, EMC; Jørn Jensen, NRK Norway; Poonam Sharma, MediaGuru; Vidar Sandvik, CryptoGuard; Dave Ulmer, SeaChange and Stephen Lee, Conax. Viewer consumption has been shifting over the past decade. They are increasingly adopting multiple access methods to watch high demand content. This in turn compels the traditional broadcasters to enable additional platforms at low incremental cost. Well-managed content can be easily repurposed across multiple delivery systems. The key enabling technology is file and stream-based content on an all-IP infrastructure. The broadcast company value to viewers is the content that it produces or to which it acquires exclusive rights. Viewers will expect to access that content at their convenience, on a big screen or an app. The delivery channel may not belong to the company, but that is not the issue. Advertisers value 'eyeballs' with viewer attention & engagement above everything. Crude mass-market audience ratings across linear channels are becoming outdated and untrustworthy. Digital delivery of content and related viewer engagement generates valuable measurement data.

Setting a Digital Switch Over date is important for mainly 3 reasons. The prohibitive cost of operation plus maintenance of both analogue and digital networks during the period of simulcast. There is also no encouragement and motive for investment in new content. Lastly, the radio set retailers cannot focus on the sale of DAB receivers to the public who may not be well informed on future direction of radio broadcasting. The Norwegian government has set conditions for DSO by specifying the necessity to have 99.5% DAB coverage of the country. FM will be shut off by 2017 if this condition is met. The cost of operating a FM channel is equivalent to the cost of running 8 DAB+ channel. This can be deduced from the fact that a DAB+ mux can have 20 channels.

For broadcasters, social media sentiment analysis can open many new doors. The number of followers or viewers does not provide much value. It only signifies reach, not user experience or sentiment. The real essence of social media is how to slice and dice the analytics and extract actionable insights which are accurate and logical. Consumers express their opinion through tweets, posts, blogs, forums etc. Data should be collated and then categorised as positive (happy), negative (unhappy/angry) or neutral. Categories are quantified and the popularity/ unpopularity quotient is determined. Sentiment analysis is an authentic & clinically accurate measure of public opinion. With sentiment analysis, the broadcaster can now find out, not just who is watching what, but also who is appreciating or disliking which programme and the reasons. The benefits are a better content strategy and consequently better audience ratings. Thus higher Return on Investment (ROI) is possible for advertisers due to better targeting of advertisements.

Cloud Technologies in Media

The chairperson was Sharad Sadhu, Media Specialist. The panelists were Jew Kok Lim, Aspera; Taehyun Ihm, Korean Broadcasting System; Oliver Linow, Deutsche Welle and Peter Bruce, IABM. Next-generation transport technologies are needed to move the world's digital assets at maximum speed, regardless of file size, transfer distance and network conditions. Existing TCP is unsuitable to satisfy the demands of today's big-data applications. Long distance degrades conditions on all networks due to latency, packet losses and traffic bottleneck. TCP is designed for low bandwidth and adding more bandwidth does not improve throughput. Fast networks have been proposed but they are inefficient, waste bandwidth and are not practical for large file transfer. A unique solution is provided by FASP, a universal high-speed data transport system which is file size independent with maximum transfer speed, optimal bandwidth utilisation and maximum I/O throughput on any storage platform.

Traditional broadcaster, Deutsche Welle was transmitting on satellite but has now ventured into sending programmes via the Internet. DW had two options of interconnection with the Internet namely In house playout or External playout by a provider. External playout offers advantages including high performance upstream capacity, no necessity for a data centre and no firewall issues. The disadvantages are that a dedicated contribution path is needed, the requirement to have facilities



Mr Stephen Lee of Conax, Mr Vidar Sandvik of CryptoGuard, Mr Jørn Jensen of NRK Norway, Chairman Dr Fintan McKiernan of Ideal Systems Singapore, Mr Charles Sevier of EMC, Ms Poonam Sharma of MediaGuru and Mr Dave Ulmer of SeaChange



Mr Oliver Linow of DW-Germany, Mr Jew Kok Lim of Aspera, Mr Taehyun Ihm, of KBS-Korea, Session Chairman Mr Sharad Sadhu, Media Expert and Mr Peter Bruce of IABM

for satellite reception and the effect of inflexible manufacturing of the stream. Therefore DW opted for In-house playout as it is more convenient to process the streams. There is more flexibility in the creation of programme streams and these can be tailor made for the different regions. DW can also encode formats for its own needs and undertake better testing of future formats. A Content Delivery Network is needed because of the delivery of multiple streams to thousands of users. CDN provides suitable infrastructure with streaming servers in the various ISP networks. It is also robust against virus attacks and has better backup capacity.

Creative Content for Enhanced Experiences

The session was chaired by Abdul Hakim Amir Bin Nazri, ASTRO and the panelists were Jaya Mahajan, Factual for Asia; Jaeheon Song, Korea Broadcasting System and Tuan Haji Burhanuddin Md Radzi, Les' Copaque Production. The broadcast station has almost lost control over its viewers as there has been a key shift in consumer habits. The viewers control the time they want to watch a show but the media company cannot do so. They choose a show depending on recommendations of friends or rating in social media. The emergence of portable devices are like extensions of one's self because a show can be watched anytime and anywhere without restrictions. The old world consisted of audience watching a fixed TV set at home. The world of digital media has changed all that by making



Mr Jaeheon Song, KBS-Korea, Session Chairman Mr Abdul Hakim Amir Bin Nazri, ASTRO-Malaysia, Ms Jaya Mahajan, Factual for Asia and Haji Burhanuddin Md Radzi of Les' Copaque Production

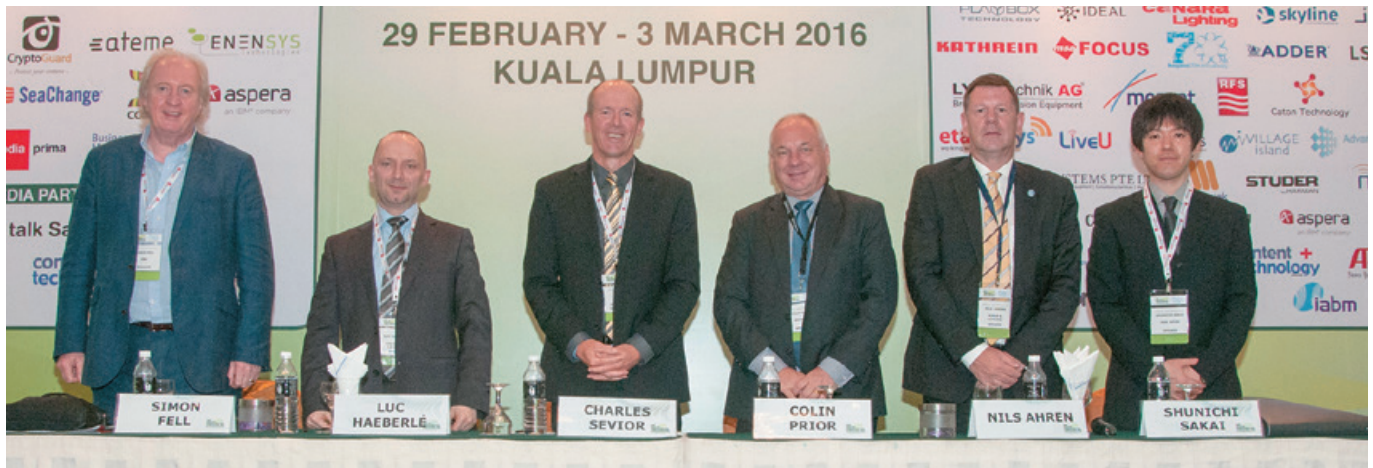
content available on smartphones which are accessible at any place or time.

Viewers also control what they consume as can be observed with interactive content. Interactive content can be likened to Virtual Reality, which in this case does not only happen in a specially equipped studio but occurs in the news, documentaries and dramas. One can not only see an event but also feel as if he is part of the scene. It is moving from the virtual world to the real world. Interactivity is not a genre, as it has become an essential ingredient to attract viewers. Time must be equally spent on user experience as has been done on the laying out the concept of the show. Simplicity and interface design are as important as storytelling. Content is still the King no matter what level of technology is used for creating the show.

Challenges in Media Delivery

The session was chaired by Charles Sevier, EMC and the presenters were Simon Fell, EBU; Colin Prior, Enensys Technologies; Nils Ahren, Rohde & Schwarz; Shunichi Sakai, NHK and Luc Haeberlé, LS Telcom. The DTT platform is capable of offering local content due to its infrastructure and it is estimated that 50% of content originate from the region. The challenge is to avoid creation and distribution of a multiplex for each region when 99% of the content is identical. This problem can be overcome by operating the DTT networks in SFN but there is need to handle advertisement requests. Centralised Ad insertion requires delivery of as many multiplexes as regions and requires a huge capacity to distribute data to transmission sites. The result is that national content distribution is duplicated many times. An alternative is regional advertisement insertion to a regional head-end which requires a secondary distribution network and must be implemented at the transmission site. A better method is to incorporate deterministic ad insertion designed to target certain regions. It is SFN capable with no modification of A/V content and without service loss.

The tendency or argument of "More Programs/Data in Less Spectrum" will not be valid any longer if very high quality UHD is to be offered. Only one UHD programme may be



Simon Fell of the EBU, Luc Haerberlé of LS Telcom, Charles Seviour of EMC, Colin Prior of Enensys, Nils Ahren of Rohde & Schwarz and Shunichi Sakai of NHK-Japan

possible, as present day field trials indicate that at least 27 Mb/s is necessary for fixed rooftop reception using DVB-T2 with 256 QAM and 20 Mb/s for DVB-T2 with 64QAM for indoor reception. Tomorrow's receivers will incorporate the H265/HEVC chip capable of decoding HDTV formats up to 1080P, 60Hz and during Phase 1, the UHDTV formats up to 2160P, 60 Hz. Phase 2 will have more features including a higher frame rate of 120 Hz, higher dynamic range and immersive sound system. Higher Frame Rates will definitely improve the picture quality especially in sport events but production and infrastructure cost would increase.

Innovating Digital Connections

The session was chaired by Simon Fell of the EBU and the presenters were Dr Leon Mun, WY of Sony, Masaru Takechi of NHK-Japan, Dr Les Sabel, S-Comm Technologies, Aale Raza of Whiteways Systems and Thomas Humeau, Village Island. It would be misleading for broadcasters to regard the smartphones app as an opportunity to make profits. Although it adds value to content, complete IP delivery is expensive. Broadcasters have pay for Content Delivery Network (CDN) services to deliver extreme volumes of audio. As for the listeners, they must pay for mobile access while on the move. Hybrid Radio would be the better alternative

as it provides interactivity. Content for Hybrid radio can be delivered by broadcast or IP more efficiently compared to streaming which costs both broadcasters and listeners. Streaming one-to-one costs more than broadcasting content one-to-many besides the fact that streaming on mobile is not robust. Hybrid Radio utilises logos that adds visual branding and enabling easier selection of service. There is faster access to online content associated with the broadcast delivered mode. Advertisement value is enhanced because of the potential for click through sales model. Hybrid Radio brings in more revenue as it adds links to specific products and services offered by the sponsor. The key business drivers are improvement in branding, value added services, listener loyalty and interactive participation.

Social media platforms are witnessing a phenomenal rise fuelled by several factors. Social technologies can unlock markets worth billions of dollars to customers. This value can be in the form of unlocking customer insights about products feature, product design, buying behaviour etc. Media companies can collaborate with advertisers by listening, analysing and interpreting valuable customer habits. Media companies can also develop their own brands by having a powerful social media presence across the different platforms. They must plan long term strategy by building a strong presence across social media platforms.



Dr Leon Mun, WY of Sony, Mr Masaru Takechi of NHK-Japan, Dr Les Sabel of S-Comm Technologies, Session Chairman Mr Simon Fell of the EBU, Mr Aale Raza of Whiteways Systems and Mr Thomas Humeau of Village Island



Mr Alexander Zink of Fraunhofer, Mr Naoki Kashimura of Ikegami Tsushinki, Session Chairman Dr Peter Siebert of DVB, Mr Peter Poers of Jünger Audio and Mr Femin John of ATEME

Relationship with the viewers must be built on social media. Media companies have to engage the viewers, touch their lives, bring them on board and keep enlarging the circles. They must enter into partnership with the advertisers in this endeavour, build a digital media revenue base and become part of the new, fast growing digital advertising landscape

Broadcasters in the region lack a coherent strategy on social media. They lack the technology and resources to track and maintain the various social media platforms and are losing out in the war of the eyeballs. The only way to remain relevant, interesting, informed and connected is by embracing social media platforms.

Immersive Media Technologies

Chaired by Dr Peter Siebert, DVB Project Office with panelist comprising of Femin John, ATEME; Peter Poers, Jünger Audio; Naoki Kashimura, Ikegami Tsushinki and Alexander Zink, Fraunhofer. The latest upgrade to the AAC family is the MPEG xHE-AAC which is a unified audio and speech coding standard adapted for Digital Radio and Mobile Streaming. When DRM was created in 2001, AAC with SBR was the best codec available, but needed more than 14 kbps to work. The most robust DRM modes could only provide around 10 kbps payload in a 10 kHz channel. The speech codecs allow DRM to carry audio in these robust modes and multiple services in less robust modes. The DRM core standard provides choice of three MPEG audio codecs: HE-AACv2 (general-purpose, i.e. all kinds of audio signals), CELP (speech content only), HVXC (speech content only). With advances in audio compression, the improved codec xHE-AAC is available and capable of replacing the speech-only codecs HVXC and CELP

With Extended HE-AAC (xHE-AAC), there is no need to restrict content to only speech in very robust modes. Broadcasters can deliver their normal programming even when they are using NVIS or multi-hop around the world. Opportunities are available to provide multiple audio services in good audio quality even in standard 9 kHz MW channels. Broadcasters can provide alternate programming like news in different languages simultaneously but with all their usual jingles and sound beds.

As stated before, xHE-AAC Audio is not only suitable for Digital Radio but also for Mobile Streaming. It enables cost-efficient audio streaming on 3G/4G networks, and efficiency/robustness improvements on WiFi. It serves 2G users, saves Content Delivery Network (CDN) costs in any market and offers better service reliability together with shorter buffering times. There is better audio quality for any type of content, improving listener experience, especially on mobile. As a result listener loyalty base is increased and the brand name's reach broadened considerably. Effortless upgrade can be undertaken as xHE-AAC encoders can easily be added to the existing infrastructure without changing existing encoders

Media Management and Workflow Enhancements

The chairperson was Haji Zulkifli bin Abdul Rahim, Radio Television Malaysia. The panelists were Michel Beke, MediaGenix NG; Michel Merten, Memnon; MC Patel, Emotion Systems and Paul Jones, Oracle. Broadcasters have to carry out large scale projects to handle archive preservation. It is a great challenge to undertake Archive Digitisation which may initially be costly but ultimately leads to operational advantages and benefits. This initiative would avoid loss of content asset because according to recent reports from UNESCO and EU, most media is at the risk of oblivion. UNESCO reported that there is ten to fifteen years left to transfer available audio visual recordings to digital media in order to prevent their loss. The situation as portrayed by BBC is even more grim as a recent press message stated that 75% of the analogue video held in Europe in the year 2006, will be lost by 2023 when video digitisation will cease to exist. The physical lifetime of tapes is limited and there are not enough analogue playback machines. Analogue know-how is fading and the number of experts is declining as they head towards retirement.

Archive Digitisation has the potential to generate revenue and increase user engagement. It would leverage growing demand for content and new channels in Digital Transformation. The archive increases user value by the leverage of file based workflows and Big Data with better Meta-Data and indexations. Running operating costs are reduced as storage space is saved, physical infrastructure minimised and energy



Mr MC Patel of Emotion Systems, Mr Michel Beke of MediaGenix NG, Session Chairman Haji Zulkifli bin Abdul Rahim of Radio Television Malaysia, Mr Michel Merten of Memnon and Mr Paul Jones of Oracle

optimised. Broadcasters are also obliged under national laws to preserve electronic media as part of a country's heritage that can be passed on to the later generation of citizens. Expenditure must be properly managed as the cost of inaction can be prohibitive if the project is postponed. The delay would increase overall costs as spare parts and labour go up with inflation. Unless broadcasters archive and track the analogue media all down in the next 8-10 years, the means to play it back may become very costly. There is also loss of reputation as archives are considered as part and parcel of a broadcast station services to the public and government.

Advanced Solutions for Inclusive Broadcasting

The session was chaired by Aqeel Qureshi of Techbilty and the panelists were Makiko Azuma, NHK; Natalia Ilieva, ABU; Yunhyoung Kim, KBS and Shohei Sato NHK. Japan should be lauded for its efforts in aiding the disabled who in this case are deaf and mute. In this context, NHK has conducted research into tactile and haptic presentation methods, Japanese sign language computer graphics (CG)

system and speech recognition for closed captioning. It is vital to convey information in sign language to those who are born with hearing difficulties as it is their mother tongue. A closed caption service is not suitable for them and few TV programmes are produced with sign language. There are not enough sign language interpreters and it is not easy to have sign language interpreters on site any time. Weather information to the disadvantaged public is expanded by sign language Computer Graphic animation system. The fixed pattern CG animation system generates sign language animations directly from weather data.

NHK has also ventured into Real-time Automatic Captioning System as existing Closed Caption using typewritten text from a keyboard is no longer adequate and too slow for live action or telecast. The new system utilises speech recognition technology which deciphers rephrased speech even with background noise. The recogniser is followed by manual correction of any recognition errors. It is also capable of direct speech recognition as it recognises programme speech. Briefly speaking, the new system reduces the burden and delay of manual error correction which was the basis of conventional system.



Mr Shohei Sato of NHK-Japan, Session Chairman Mr Aqeel Qureshi of Techbilty, Ms Makiko Azuma of NHK-Japan, Ms Natalia Ilieva of the ABU and Mr Yunhyoung Kim of KBS-Korea



The Ministerial Session

The 2016 ABU Digital Broadcasting Symposium was officially opened by the Malaysian Deputy Minister of Communications and Multimedia, YB Dato' Jailani Johari. He was joined by the Director-General of RTM, Dato' Haji Abu Bakar Ab Rahim and the ABU Secretary-General Dr Javad Mottaghi in the designated ministerial session and the official opening of the exhibition.

In his opening address the Deputy Minister said that during the last 12 years, the ABU Digital Broadcasting Symposium has offered a unique opportunity for broadcasters in the region to share expertise and experience. He underlined that today's connected environment needs creativity and innovation in content and what is most important is to provide value-added services to the audience. He

added that broadcasters should be aware that consumers' needs and demands determine the market and shape the whole industry.

This year a total of 46 exhibitors showcased their latest technologies and services within the 52 booth exhibition. Along with the 3-day international conference and workshops the event attracted participants from over 220 organisations from 52 countries.

Towards Digital and Alternate Delivery Platforms in Broadcast

The final session was chaired by Aale Raza, Whiteways Systems and the panelists were Helmut Jung, Dimetis; Tatjana Medic, Funke Digital TV; Saifuzzaman Yusop, Radio TV Malaysia and Charles Disneur, Eutelstat.

The horizontal device market choices has many different reception devices to be considered namely STB, iDTV and antennas. They deliver variable levels of quality and therefore a good specification plays a crucial role. Various models in this horizontal market have been ascertained not to fit to the network specifications. Testing and conformance avoidance of these devices is a mandatory in order to control the unregulated market. There are many reasons to test and certify reception devices. Each country's requirements are different and that may lead to low cost STB software or antennas being imported from other markets. Frequently, these items are not optimised and do not follow the local specifications. Problems would arise for the viewer who would then call and complain to the authorities. The problem can be avoided by developing a specification suited to a country's requirements. Reception devices available on

the market must be tested so that they comply with the required specification. These devices can be stamped with certificates and quality labels.

The ABU wishes to thank the team from Taylors' University for their valuable role in making the symposium a success.



Mr Saifuzzaman Yusop of Radio TV Malaysia, Mr Helmut Jung of Dimetis, Session Chairman Mr Aale Raza of Whiteways Systems, Ms Tatjana Medic of Funke Digital TV and Mr Charles Disneur of Eutelstat

Industry Debate:

“Digital Radio for the Future?”



The industry debate this year was moderated by Mr Lindsay Cornell, BBC-UK, which looked at the theme “Digital Radio for the Future”. The debate was initiated by posing the question of the progress of digital radio, which is slower than that of digital TV. Simon Fell, EBU responded that in the case of DTT, Digital-Switch-Over brings a windfall in terms of benefits including spectrum dividend. The wide spectrum that is freed is later auctioned to telcos, resulting in financial gain that can run to hundreds of million dollars. Thus, the vital factor here is the drive for spectrum, which is getting scarce and congested. Radio digitalisation is slower as the FM spectrum is narrower and spectrum dividend less. Kathryn Brown, WorldDAB opined that radio is not as glamorous as TV with its celebrities. Many countries too have not given any mandate to their regulatory bodies for the decision and roadmap towards a switchover to digital radio.

Azlina Yusuf, MCMC Malaysia commented that broadcasters are reluctant to disrupt operations and moreover there is no business case to do so. The Malaysian regulatory body does receive applications to rollout new FM services but has not approved them as the FM spectrum is already too congested. Hence, MCMC will support any move towards digital radio and promote it by conducting seminars and workshops around the country.

Sunarya Ruslan, RRI-Indonesia touched on the position of Indonesia in this matter. Indonesia consists of thousands of islands and radio coverage is a rather complex operation. In Java, FM spectrum is congested and quality unstable. However, more transmitters are needed to reach the population in this rugged island, with its mountains and valleys. It is neither efficient nor effective if analogue radio is to be used.

Masakazu Iwaki of Japan reported that, although digital radio was started in 2003, there was not much interest generated from the public. Japan experienced a massive earthquake that shook the nation, but AM radio proved the most resilient. Hence, there seemed no reason to have a Digital-Switch-Over. Since then, this has been compounded by the emergence of smartphones which link to radio stations via the Internet.

According to Alexander Zink, Fraunhofer, the initial launch of digital radio in Germany ended in failure. In order to avoid making the same mistakes again, several measures for proper management were taken. Relaunch was initiated by setting a new date with all stakeholders who were kept well informed about the new developments. The relevant ministries were consulted and the retailers gave their cooperation. These initiatives stimulated consumer interest, driven by the new technical features and content provided by digital radio.

Dato' Abu Bakar of RTM noted that they considered digital radio very early on initiating a trial on 2009 which is still running. The main advantage for us was reducing operational costs but one of the strongest stumbling blocks we had, like many others, was the cost and availability of receivers. The fact that the receiver availability and prices have comedown drastically and the digital radio technologies have matured to provide many other value added services in the recent years I think it is now an opportune moment to move ahead with our rollout both in terms of economics and the choices we can offer the target audience.

Simon Fell felt that car radio would lend an impetus to the growth of digital radio. The biggest challenge would be to equip cars when AnalogueSwitch-Off takes place. This statement was echoed by Kathryn Brown who said that timing is now right for all cars to be equipped with digital radio sets. In Australia, the radio industry had worked closely with the car manufacturers by having face to face meetings. As a result 25% of cars in Australia have already been fitted with DAB+ receivers.

The industry debate ended on the note that it would be the auto industry of a country which would play a major role in digital radio usage, provided the timing and conditions were right. New cars would roll out fully equipped with digital radio sets if the standard was widely used.



DBS Workshops

The fifteen workshops conducted at the Digital Broadcast Symposium 2016 provided in-depth knowledge of the latest developments and opportunities in the broadcast industry



Mr Craig Todd,
Dolby



Mr Khush Kundi,
Ericsson



Mr Markus Fritz,
Eutelsat

Digital Broadcasting: Radio and Television for Future

On 29th February 2016, a full day workshop was organised and presented in collaboration with DVB and WorldDAB. After having implemented the new structure of the DBS symposium that was announced last year, there was an audience of nearly 200 at this workshop. The morning session was dedicated to television broadcasting and the afternoon to digital radio.

DVB: The Future of TV



Dr Peter Siebert, DVB



Mr Kazuhiro Shimizu,
SONY



Mr Simon Fell, EBU

Six eminent speakers from the industry, all experts in their respective fields, presented current developments of the television broadcasting technology. After a brief introduction, given by the Director of Technology & Innovation, ABU, Dr AMAL Punchihewa, the Executive Director of the DVB project, Dr Peter Siebert, presented DVB's plans for the future of television broadcasting. Dr Siebert informed the audience that currently any capacity gains that have been achieved since DVB-T2 do not warrant announcing a new standard for next generation terrestrial broadcasting. DVB-T2 performance is very close to the theoretical channel limit proposed by Shannon. Mr Kazuhiro Shimizu from SONY gave a presentation on readiness of Mobile device technologies for DVB-T2/Lite. He also mentioned the availability of chip sets for mobile broadcast reception. Mr Simon Fell, Director of Technology & Innovation, EBU, outlined the outcomes from the WRC-15 for broadcasters and how the decisions will influence the future of DTT in various regions and worldwide.

As DVB has already standardised number of augmentations related to UHD signal processing, two hours of presentations

and discussions, relating to those topics, were well received by the audience of over 200 delegates. Mr Craig Todd, Senior Vice President and Chief Technology Officer of Dolby Laboratories presented the topic of 'The Brave New World of Immersive Radio'. He explained Object based audio processing, which allows the audience to render the multi-channel sound to suite their environment and availability of resources. Mr Khush Kundi, Head of Compression Solutions, APAC, Ericsson presented on 'What you always wanted to know about HDR'. He explained the 'wow factor' of high dynamic range (HDR) and various solutions to implement HDR. One of the key concerns for the future would be a shorter technology life cycle due to rapid advancements. Ending the morning session Mr Markus Fritz, Senior Vice President Commercial Development and Marketing of Eutelsat, explained the delivery of UHD signals via satellite.



Moving Forward with DAB+



Ms Joan Warner,
CRA and WorldDAB



Ms Bernie O'Neill,
WorldDAB



Mr Lindsay Cornell,
BBC-UK

In the afternoon, WorldDAB presented the DAB+ Digital Workshop, which addressed the mechanisms for, 'Moving Forward with DAB+'. A number of experts from various parts of the world discussed International developments, building blocks for success and regulatory, technical and content factors that contribute to break the stalemate, enabling APAC broadcasters move forward with digital radio. Ms Joan Warner, Vice President Asia-Pacific WorldDAB and CEO Commercial

Radio Australia provided welcome and opening remarks. Ms Bernie O'Neill, Project Director of WorldDAB presented regional and country updates, followed by Mr Lindsay Cornell, Chair of Technical Committee, WorldDAB, who informed the audience on the integration of DAB+ with Mobile phones and broadband to provide hybrid features and functions.



Dr Graham Dixon, EBU

Dr Graham Dixon, Head of Radio, EBU explained the EBU tool kit for successful implementation of DAB+ service. Mr Jorn Jensen of NRK presented a Norway Case study on digital-switch-over, followed by Ms Joan Warners' presentation on 'Progress in Australia'. A video message from Mr Lynn Mansfield of SABC provided an update on South African deployments.



Mr Jorn Jensen,
NRK-Norway

The final session of the day ended with discussions in three groups, viz. Regulatory, Technical and Content. Each group discussed their respective barriers or challenges in planning digital radio migration. A detailed paper on this discussion will be published in the next edition of the

technical review and will provide information on how to plan digital radio migration.

Management and Digitisation of Audio-Video Archives for Broadcasters



Mr Aale Raza,
Whiteways



Mr Yasuhiko
Iwasaki, NHK



Mr Hiroshi
Nimura, NHK



Mr Charles
Sevier, EMC



Mr Nobu
Yamashita,
NHK



Mr Paul Jones,
Oracle



Mr Supachai
Chanyasawad,
Panasonic

The workshop was presented by Aale Raza, Whiteways; Yasuhiko Iwasaki, NHK; Hiroshi Nimura, NHK; Charles Sevier, EMC; Nobu Yamashita, NHK; Paul Jones, Oracle and Supachai Chanyasawad, Panasonic. Although footages from old tapes can be retrieved, they are still not usable. The main reasons are colour degradations, stains, film grain, noise and vertical line scratches. However software is now available that provides cleaning and restoration for old and defective videos. NHK has a huge collection of video tapes numbering 600,000 and, even with constant maintenance, the VTR machines are reaching the end of their lives. Hence a file-based solution is the answer and can lead to efficient management and fast operation. The video tapes are played back, converted to files which are then

recorded on data tapes. The data tapes would be supplied to the Huge File Storage facility. In order to realise the fast "File Delivery", frequently-used files are kept in HDD cache and another file is kept on the data tape (Hierarchical Storage Management). By using multi-format transcoders, the delivery or entry in various formats is enabled.

New Developments in Audio Content Production

Steve Ahern, Ahern Media and Toni Fiedler, Fraunhofer presented this workshop on audio production. MPEG-H 3D audio is an advanced standard for TV sound involving objects, 3D audio and metadata. An audio object is audio essence or piece of audio with metadata, providing additional descriptive information about the content such as position in space. Audio objects are rendered on the reproduction side and are flexible in regard to different reproduction systems. Rendering is conducted with the help of the metadata and other information that can be fed into the reproduction system such as number of available speakers (e.g. stereo or 7.1), position of speakers and control data generated by the user.



Mr Steve Ahern,
Ahern Media



Mr Toni Fiedler,
Fraunhofer

The producer can allow the listener to interact with audio objects within pre-defined limits by switching between different objects, turning an additional object on or off and adjusting the volume of certain objects. An object consists of essence plus metadata where the essence is an isolated signal such as clean commentary signal, ambience or car sound. Immersive 3D audio provides more detailed room information, higher spatial resolution, freedom to spread sounds all around the sonic space and more flexibility for panning/movement of sounds.

Korea's UHD Broadcasting Service



Korea Radio Promotion Association (RAPA) presented their workshop on recent UHD developments changing the broadcast landscape. Korea is a pioneer in UHD, having started the world's first 4K UHD broadcast which was delivered via a paid TV channel. Paid UHD services started in April 2014 (cable TV), June 2014 (satellite TV), and October 2015 (IPTV). Terrestrial broadcasters are also entering the market by planning to start UHD broadcasts in February 2017. Terrestrial UHD broadcast will commence in Seoul followed by gradual expansion towards nationwide UHD by 2021. 5 RF channels have already been allocated and more channels from the DTV band will be reassigned if necessary. The Korean government has issued an official

statement that a 108 MHz band in the 700 MHz range will be divided into a 40 MHz frequency band for mobile broadband, a 30 MHz frequency band for UHD broadcasting, a 20 MHz frequency band for the national disaster safety communications network, and 18 MHz for guard bands. At present, Korea is in the process of determining the UHD terrestrial standard. A UHD standard committee has been set up to comparatively consider DVB-T2 and ATSC 3.0. Separate field trials using ATSC 3.0 and DVB-T2 are currently underway to determine the final UHD terrestrial standard.

Designing a Cloud-enabled Infrastructure for your Media Digital Transformation



Mr Charles Sevier, EMC



Mr Richard Jones,
Grass Valley

Charles Sevier, EMC and Richard Jones, Grass Valley presented a workshop on cloud-enabled infrastructure. Viewers will increasingly adopt multiple access methods to watch high demand content, driving traditional broadcasters to create additional platforms at low incremental cost. Well-managed content can be easily repurposed across multiple delivery systems and the key enabling technology is file and stream-based content on an all-IP infrastructure. Viewers will expect to access that content at their convenience, either on a big screen or an app. Thus the broadcast industry is evolving with companies seeking a media cloud service which can be bought or built. Hence, the emergence

of cloud enabling technology that gathers all components together into a single infrastructure solution which is faster and more efficient.

DRM – For Full and Efficient Country Coverage



Mr Alexander
Zink,
Fraunhofer



Mr John
Abdnour,
Nautel



Mr Gerhard
Filip,
Ampegnon



Mr Radu
Obreja, DRM
Consortium

The presenters were Alex Zink, Fraunhofer; John Abdnour, Nautel; Gerhard Filip, Ampegnon and Radu Obreja, DRM Consortium. DRM broadcast has already started in many countries including Saudi Arabia, Nigeria, Algeria and South Africa. 600 million people in India can now receive DRM which is broadcast from 35 MW transmitters and 2 SW transmitters. The Indian government has ordered that all DRM transmitters must operate on simulcast modes and as such relevant technical parameters have been defined. DRM is eminently suited for countries like India which are trying to grapple with issues such as appropriate technologies and availability of affordable digital receiver for the rural masses. The Indian broadcast manufacturing industry has been handed an excellent opportunity to develop cost effective digital receivers which have now become a national priority. Car manufacturers have also started to line fit DRM receivers into new models.

Broadcast Live Quality Monitoring and Control



Mr Eric Li Bin,
Rohde & Schwarz

The presenters were Eric Li Bin and Simon Roehrs from Rohde & Schwarz. Both hardware and software solutions are available for broadcast monitoring. Monitoring of Ingest, Compression, Multiplex and Encoder Quality verification can be done at the headend. Monitoring of signal pre- and post transmission is conducted at the transmitter. Measurements are logged, metadata displayed and components decoded. Network failure analysis quickly identifies the cause of problems and pinpoints the area. It provides detection of hidden network problems without any direct service impact thus enabling network optimisation. Video Quality Monitoring is needed in broadcast networks for the detection of over compression, encoder failures and Statmux failures

Open Internet IP Delivery Make Possible for Live Video Transmission and Fast Files Transferring

Wu YuTa from Caton Technology presented a workshop on IP delivery of video. Real time video streaming faces three most significant challenges in the form of bandwidth, jitter and packet loss. First mile uplink & last mile downlink traffic is not guaranteed in open Internet scenario because and unconditioned IP network decreases the Bandwidth Utilisation Ratio (BUR). The lower bit rate means lower video quality. Jitter is a normal phenomenon in IP networks but is has significant impact that can cause impairment on decoded video in live from end to end transmission. Packet loss is data packet error that has direct impact on video QoS. UDP cannot handle well although it utilises the bandwidth effectively while TCP is only able to improve byte level correction but poor BUR and buffering cause higher latency thus higher jitter. Real-time Transport Protocol (R2TP) is an IP based transport protocol implementation, designed & developed to resolve the Quality of Service (QoS) & Quality of Experience (QoE) issues with live video transmission over the open Internet. The R2TP algorithm is a highly effective error recovery mechanism that makes use of a unique traffic congestion control technique. The algorithm improves BUR hence delivering higher quality of content in the given bandwidth.



Mr Wu YuTa,
Caton Technology



Dolby hosted a series of presentations and demos at ABU DBS 2016. Held across 2 days, 1 and 2 March 2016, High Dynamic Range Video Technology, object-based immersive audio for broadcast, enhanced audio for mobile OTT, Dolby 5.1 Content Production Case Studies and HbbTV- Interactive Digital TV feature were 5 next-generation Dolby Technologies presented and demonstrated at ABU DBS 2016.

High Dynamic Range Video Technology

Dolby Vision™ delivers a dramatically different visual experience – astonishing brightness, incomparable contrast, and captivating color – that brings entertainment to life before your eyes. It achieves this stunning image quality by leveraging breakthrough HDR and wide color gamut imaging technologies, both on-screen and in specially mastered content. As a result Dolby Vision enabled devices deliver images with much greater brightness, and provide much deeper, more nuanced and detailed darks, while rendering a fuller palette of rich new colors never before seen on screen.



To deliver this experience, Dolby Vision augments the video fidelity of 2k and 4k content for cinema, and Ultra HD and HD video for over-the-top online streaming, broadcast, and gaming applications by maintaining and reproducing the high dynamic range and wide color gamut of the original signal as created during the artistic post production process.

Key technology elements behind Dolby Vision- the technology elements span from content creation (production and postproduction), distribution (codec), and playback (decode and display, plus interfaces).

Object-based Immersive Audio for Broadcast

Dolby Atmos delivers moving audio – sound that can be precisely placed and moved anywhere in three-dimensional space, including overhead. It brings entertainment alive all around the audience in a powerfully immersive and emotive experience.

Enhanced Audio for Mobile OTT

Dolby Audio for Mobile Applications meets the needs of audiences around the world, by bringing:

- Loud and clear sound:
 - Enhanced dialogue control and loudness management provides greater detail across a wide range of sounds, letting audiences discover pivotal dialogue in crystal clarity.

- Personalization Capabilities
 - A robust set of features allows viewers to personalize their listening experience.
 1. Language selection in Dolby Audio quality
 2. A choice between home/away commentators while watching live sports
 3. Improved accessibility through descriptive video services
- Immersive audio experiences
 - To let audiences feel like they are in the center of the scene or live event, viewers can now enjoy virtual Dolby Digital 5.1 surround sound and Dolby Atmos of the highest quality, when listening through headphones or built-in speakers.
- Consistent Dolby Audio quality across platforms
 - Dolby Audio for Mobile Applications is compatible across device platforms, empowering all audiences, regardless of device OS, to fully immerse themselves in their stories.

HbbTV – Interactive Digital TV Feature

Transitioning from analog to digital terrestrial television comes with the opportunity for the broadcast industry to offer better picture and audioquality, and HbbTV can bring the TV experience for the user to a new level.

HbbTV is a standard by which broadcasters can complement their services delivering additional content and features via broadband.

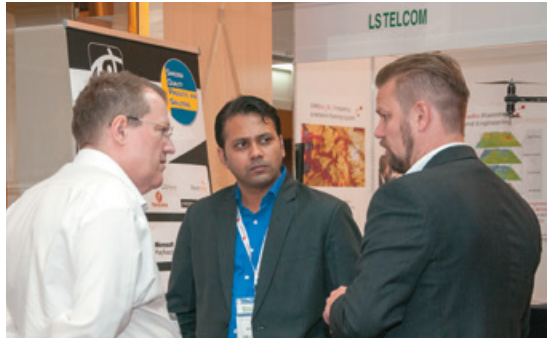
Some newer DTT (Digital Terrestrial Television) platforms are offering HbbTV.

South East Asia has started adopting this technology, some of the early adopters are the DTT platforms in Malaysia and Vietnam.

At Dolby, we are working with broadcasters in SEA ensuring that the audio quality for HbbTV continues to be “broadcast quality” thus helping a seamless transition between broadcast and online. Offering Dolby audio via HbbTV also helps meeting consumers’ expectations for online content where well established and very successful online video delivery services like Netflix, Amazon Video and iTunes offer Dolby audio.



Exhibition



An exhibition was also held in conjunction with the symposium showcasing the latest trends in technologies, applications and services provided by major manufacturers and other industry players. The products range from digital TV cameras, test & measurement equipment and audio mixers. Forty-six exhibitors from 14 countries exhibited at the DBS 2016 exhibition. For the first time a Best Booth award was presented based on design, presentation and value. The winning exhibitor was selected by the participants of the Lucky Draw and the prize is a complimentary booth at the 2017 DBS. The winner of the 2016 DBS Best Booth award was Sony. Mr Masakazu Iwaki of NHK-Japan presented the award to Mr K C Wong of Sony.

