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Asia-Pacific Broadcasting Union

TECHNICAL REVIEW

From the Editor's Desk



We are in the midst of preparations for the Digital Broadcasting Symposium 2019, which will take place on 4-7 March in Kuala Lumpur. Celebrating 15 years of DBS, with our members and the support from our partners, we have devised an extensive programme to cover a wide range of interesting topics within the conference, workshops and masterclasses. Please visit www.abu.org.my/dbsymposium for more information and to register online.

We had fruitful annual meetings of our Technical Committee and Bureau in Ashgabat, Turkmenistan in early October as part of the ABU's annual General Assembly and Associated meetings. Our sincere appreciation to our host TVTM for the wonderful organisation of the meetings and for providing a memorable experience to all our members who joined us in Ashgabat. This issue includes the full report and extensive information from the proceedings of the meetings including the winners of the Engineering Awards 2018 and the articles that won the annual Technical Review Prizes.

This issue carries three interesting articles contributed by our members KBS-Korea, DDI-India and the DRM Consortium. The first one, "KBS ALL-IP Based UHD LIVE Broadcasting System", shares a case study from KBS introducing the reference technology and details of implementing an ALL-IP transmission system for UHD signals. The second article on "Anatomy of RF Amplifiers – Failure Mechanics and Maintenance Strategies" discusses RF Amplifiers specially those used in radio and TV transmitters with a special focus on best practices and strategies in their maintenance and operations to prevent common failures. The third article, "Digital Radio Broadcasting in India", presents a case study on the roll-out of digital radio in India using DRM technology. The article provides a background of the existing analogue network, and the requirements and planning strategies employed in implementing the ongoing digitalisation of AIR's radio network.

We had a very busy end of year programme in 2018, with a number of workshops and training programmes being pushed back due to the earlier than usual scheduling of our annual meetings. Reports from these workshops including the webinar series are included inside. Also, reports from our fellowship holders who visited the IBC2018 in Amsterdam and InterBEE2018 in Tokyo are presented. This issue is filled with a lot of information and reference material for our readers and we hope all of you will benefit from these articles and reports.

The Asia-Pacific Broadcasting Union (ABU) is a professional union of broadcasting organisations in the Asia-Pacific area which aims to co-ordinate and promote the development of radio, television and allied services in the region. It is non-governmental, non-political and non-commercial.

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KBS ALL-IP Based UHD LIVE Broadcasting System



Shin Jongseob
Korean Broadcasting System

summary

KBS decided to apply next-generation IP transmission technology to UHD broadcasting and completed the ALL-IP UHD sub-control room from September, 2017 to March, 2018 for about 7 months. After about three months of simulation, two different morning talk shows titled, 'The Morning Yard' and 'Ask Anything' are being broadcast live on the UHD 1TV channel of KBS, and titled, 'The girls Talks' is broadcast with pre-recorded material on the UHD 2TV. This paper introduces the reference technology and the details of construction for each stage, to transmit UHD video signals and audio signals through ALL-IP. Also it discusses the experience of the case study, the need for efficient planning and for the IP production system to continue to develop, as a conclusion.

1. Overview of UHD ALL-IP Multi-Control Room

Since KBS launched UHD1TV and UHD2TV, KBS has been running 2 UHD channels, which means KBS has twice the UHD TV programming schedule (mandatorily set by KCC1) more than other terrestrial broadcasters in Korea. As an initial step to fulfil this programming quota of UHD original content, KBS decided to install UHD sub-control rooms capable of originating live broadcasting rather than investing in 4K post-production, which is time-consuming and costly. The goal was to enable the production of two or more daily live broadcasts and recordings, supporting simultaneous UHD and HD production. In order to do so, KBS had to have at least three sub-control rooms and production studios ready. To reduce the initial investment cost, we designed the M : N structure so that one sub-control room(M) can operate a number of studios(N) by taking advantage of the IP method. In addition, a data centre for integrated operation of IP was created and shared in a multicast method.

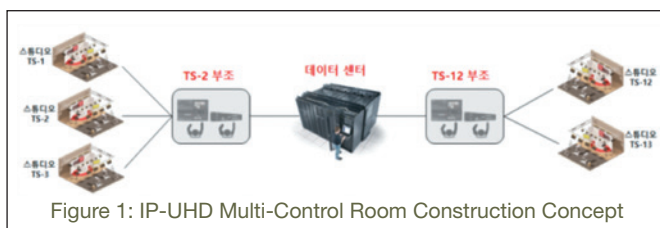


Figure 1: IP-UHD Multi-Control Room Construction Concept

2. UHD ALL-IP Multi-Control Room Construction Standard Technology

■ Video Reference

The video standard technology used a mix of SMPTE ST 425-5 (Quad Link SDI) and SMPTE ST 2022-6. At that time, there were not many devices that supported IP input/

output, so we used an IP gateway that converts Quad-SDI to VoIP (Video over IP). The SMPTE ST 425-5 standard has SQD and 2SI to transmit a single image of up to 12 Gbps using four 3G Quad-SDI links.

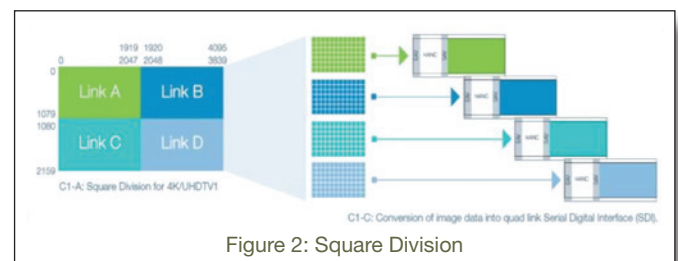


Figure 2: Square Division

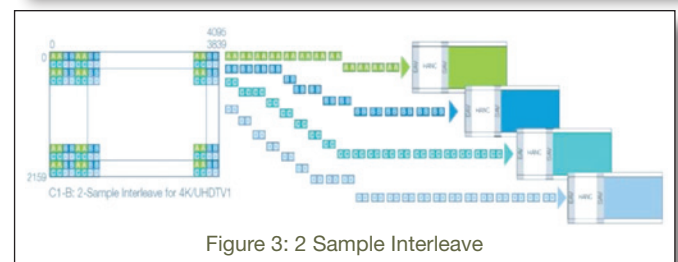


Figure 3: 2 Sample Interleave

KBS compresses 12G Quad-SDI (2SI) into TICO format and transmits VoIP to ST 2022-6. TICO compression can be minimised using FPGAs, 3G (4:1) compression and transmission over a 10G network. This was the best method considering the transmission capacity before 4K uncompressed standardisation.

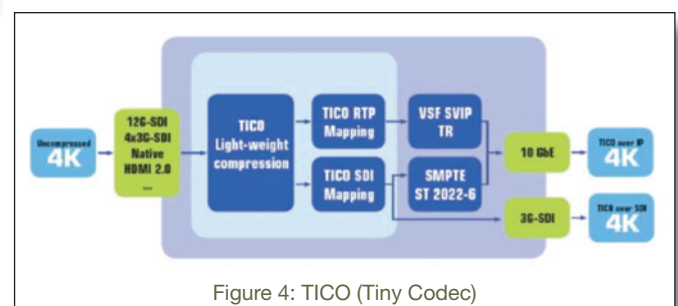


Figure 4: TICO (Tiny Codec)

The SMPTE ST 2022-6 is a standard for transmitting VoIP, which consists of 1428 bytes, 52 bytes for header information and 1376 bytes for 4 3G-SDI data packets in payload and transmitted over UDP.

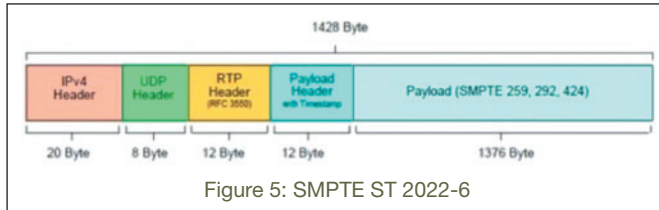


Figure 5: SMPTE ST 2022-6

The Fail Over standard is based on the SMPTE ST 2022-7 standard. It is an IP transmission standard that automatically switches over when there is a problem in one network line.

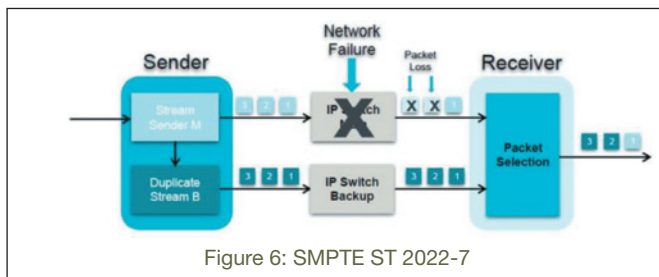


Figure 6: SMPTE ST 2022-7

■ Audio Reference

The voice standard technology used AES-EBU and AoIP (Ravenna/AES67). AES67 uses 24bit, 48kHz and 8 channels per stream supported by G.V IP converter for Multiplexing/De-Multiplexing with video signal. The payload of AES67 is 1440 bytes and includes UDP (Real Time Transport Protocol) header. Synchronisation supports PTP.

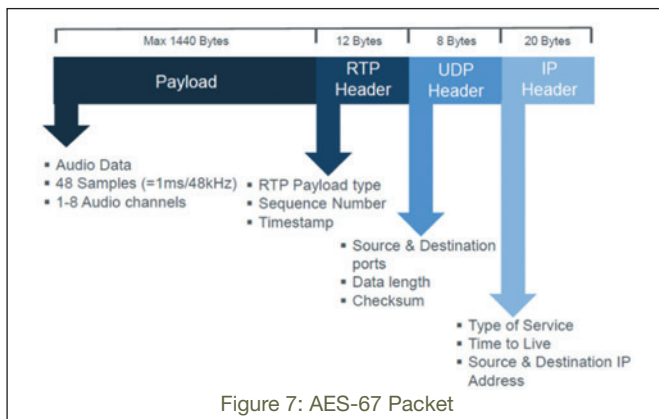


Figure 7: AES-67 Packet

Ravenna is an extension of AES67. Features include support for various sample rates, and scalable channels up to 128 channels per stream.

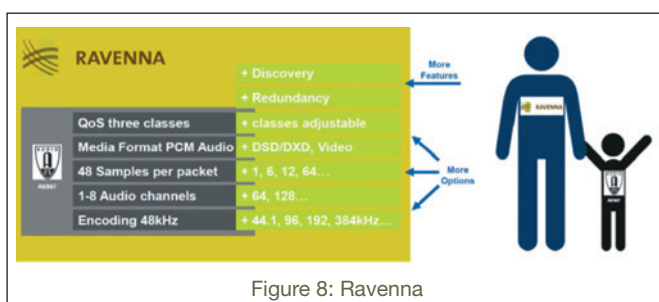


Figure 8: Ravenna

■ Network Reference

Instead of the existing SDI router and SDI distributor, the network switch was used to share the signal in a multicast method and transmit it to the equipment. In the same network, multicast group is managed using IGMP Ver.2 technology and PIM technology is used in other networks.

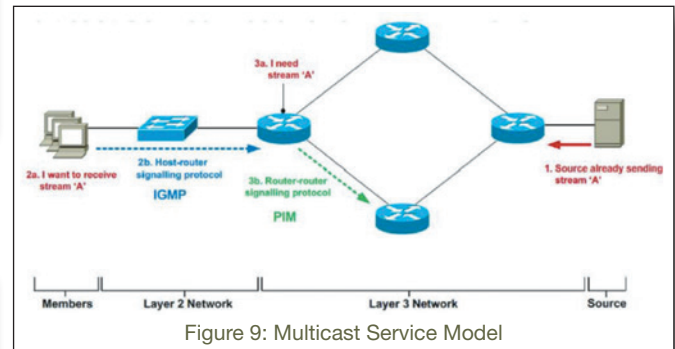


Figure 9: Multicast Service Model

PIM-SM (Protocol Independent Multicast – Sparse Mode) is a multicast routing protocol operating separately from the Unicast routing protocol. Features include the RP (Rendezvous Point) router in the centre to mediate multicast services.

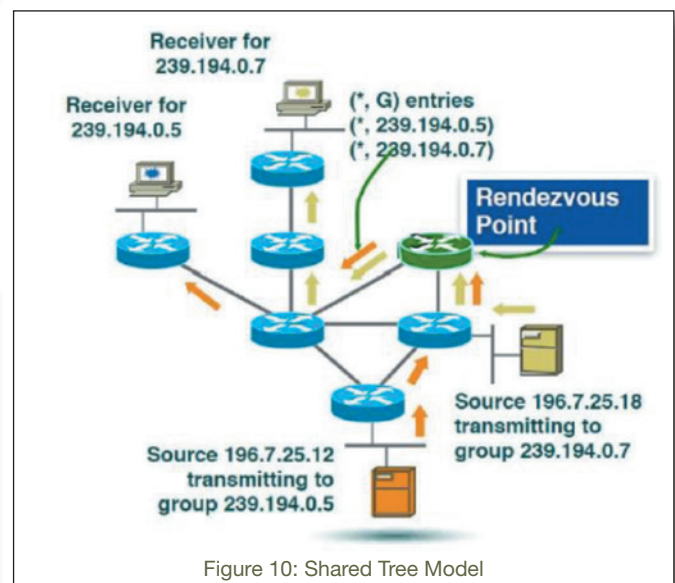


Figure 10: Shared Tree Model

PTP (Presence Time Protocol) for IP signal synchronisation uses the IEEE 1588 standard time transfer protocol. There are two main types of PTP clock. Depending on the hierarchical structure, there are a boundary clock that operates as a master and a slave, and a transparent clock that transmits only a PTP as a slave. The KBS UHD system uses a boundary clock. Cisco Network Switch is using SMPTE ST 2059 for both master and slave ports.

3. Detailed configuration of UHD ALL-IP Multi-Control Room

■ Video System

VoIP was implemented using a GV system. The core of

the GV system is an IP-SDI converter that simultaneously supports IP-Encoder / Decoder. The device compresses the Quad-SDI (12G) signal to TICO (3G) and transmits 2 channels of UHD and 2 channels of HD (1.5G) to the ST2022-6 standard over a 10G network.

It supports seamless function based on ST2022-7, AES67 (AoIP) Mux /Demux function based on PTP, and SWP-08 protocol for interworking with VSM (Virtual Studio Management). The basic concept of a video system is as follows.

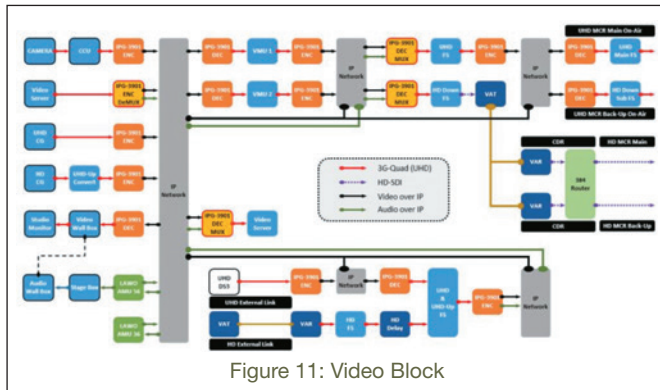


Figure 11: Video Block

Camera Quad-SDI output signal from CCU, video, CG etc. is encoded by IP converter and input to network switch. These signals are then decoded and transmitted back to the video switcher, video server, and other devices. The final PGM signal through the video switcher is multiplexed with the audio PGM signal from the IPG converter to make embedded VoIP. After final frame synchronisation for HDR Converting, it is encoded again with VoIP and transmitted to the UHD main control room.

Audio system

The main console of KBS main building was Lawo's MC56sc, and the standby console used MC36. The analogue input signal is converted to Ravenna via the StageBox (IP Converter) and then enters the console body (HD-DSP Core). And mc56 and mc36 share DSP-Core. AES67 was used for signal transmission between external devices. (G.V system & video server).

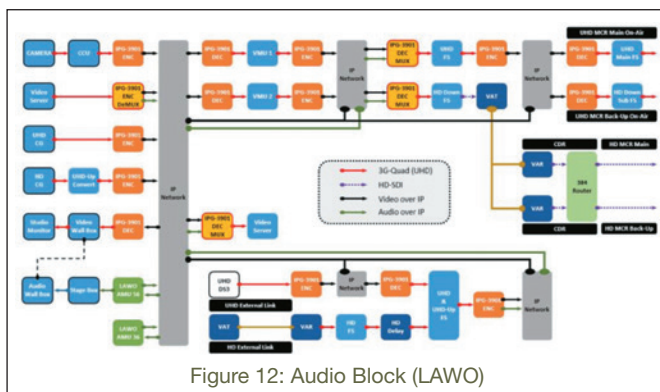


Figure 12: Audio Block (LAWO)

The main console of the KBS New building uses ARTEMIS from Calrec, the sub-console is DM1000 from YAMAHA, and shares the signal using an analogue divider. The PGM

of the Artemis console converts Hydra2 to AES67 using the AoIP Interface equipment and transmits. DM1000 converts MADI to AES67 using MADI Interface device and transmits. All audio systems have redundant configuration of both equipment and network.

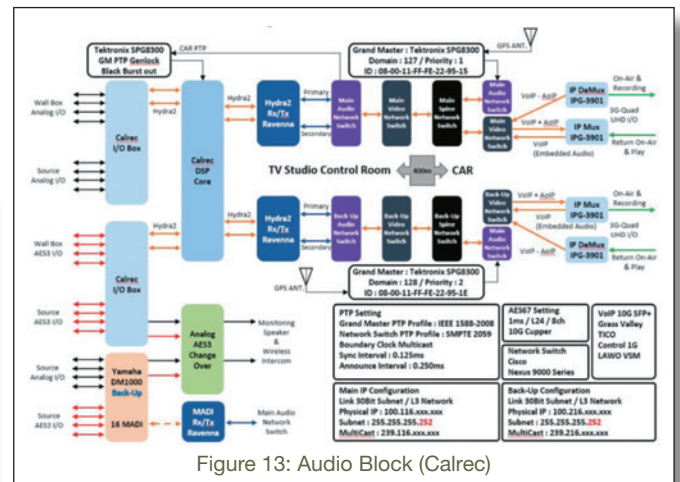


Figure 13: Audio Block (Calrec)

Also the audio system transmits a PTP signal for synchronisation. The sync-generator in the main building was locked by GPS and set as PTP Grand-Master. The PTP operates in a Boundary Clock mode. The main and new buildings are synchronised using a single mode optical cable. In interconnect with VSM it is also possible to route PGM in case of failure and to monitor signals.

Network System

The network bandwidth was designed considering the migration to SMTPE-ST2110, the uncompressed IP standard in the future. All media networks are based on Main/Backup redundancy. The network switch has a Spine / Leaf structure, which consists of a video and audio media network and a device control network.

Spine network switch and Video network switch use CISCO NEXUS 9K-9236C which can switch to 40Gbps / 100Gbps only by changing transceiver to each port.

The device supports 7.2Tbps throughput, 5.2Bpps(billion packets per second) forwarding and PTP. The G.V IP converter output 10G network is converted to 40G using Multi-fibre Push On (MPO) and input to the Spine network switch.

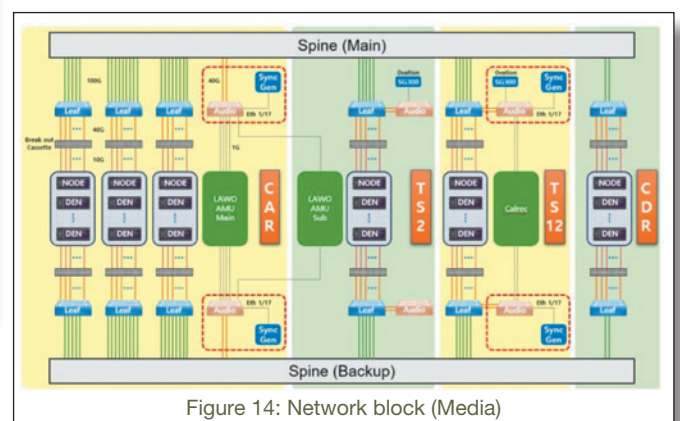


Figure 14: Network block (Media)

Because audio is not included in the migration target, it is composed of 1/ 10G port and Nexus 93108TC supporting Up-Link 40/100G. An audio network switch that transmits AoIP is also used for PTP/Video-Server file transmission.

The control network used a WS-C3850 switch. The control switch is responsible for the control and management of broadcasting equipment and network switches. In addition, it is composed of switches supporting PoE + and supplies power to some equipment such as camera OCP (Operation Control Panel).

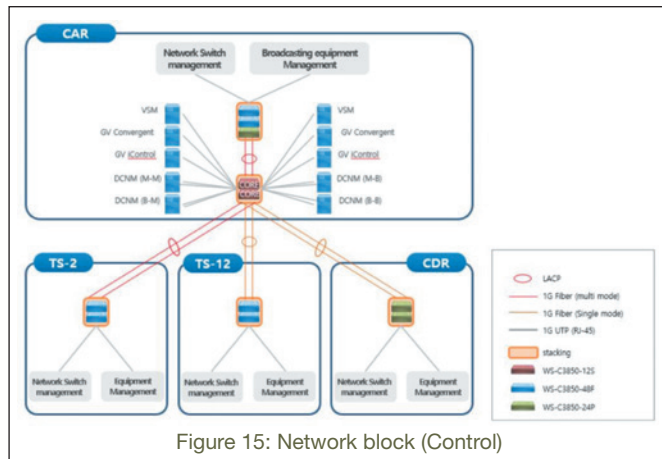


Figure 15: Network block (Control)

■ Other systems

The UHD camera used is Ikegami UHK-430. A total 16 of Cameras were placed in five studios in the main building and the new building. The camera supports UHD and HD output simultaneously, UHD is used for the source and HD is used for monitoring.

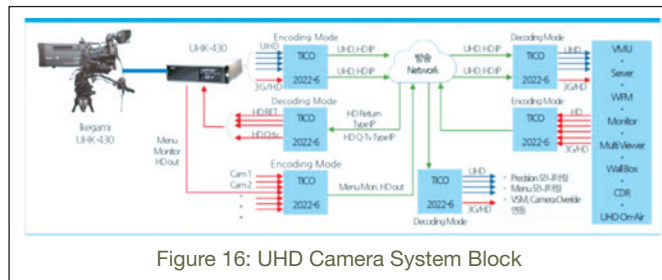


Figure 16: UHD Camera System Block

The video server was configured for five SAM LiveTouches in the data centre and two sub-control rooms. The SAM server is separate from the main storage and the management server. The main storage functions as recording, playback, and storage. The management server is responsible for material management such as transmission and transcoding, thereby maintaining smooth performance.

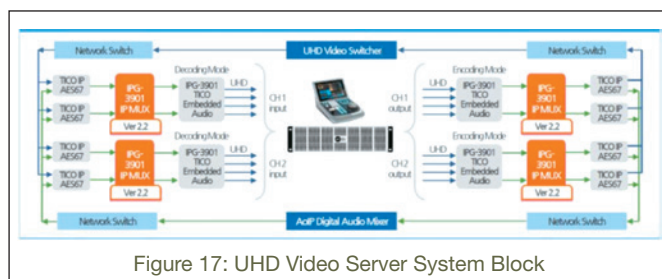


Figure 17: UHD Video Server System Block

The Sync-generator installed is the Tektronix SPG8000A in the main building and the new building, and locked by GPS antenna in the main building. This locked PTP signal was transmitted to the new building with a single mode optical cable, and all the systems were synchronised.

VSM (Virtual System Management) is linked with SWP-08 Protocol with G.V devices. The main function is VoIP, AoIP router function, and it is possible to store or recall 'preset' by linking with various broadcasting equipment. VSM Panel is installed in each control room so that routing and PGM master/slave switching are possible.

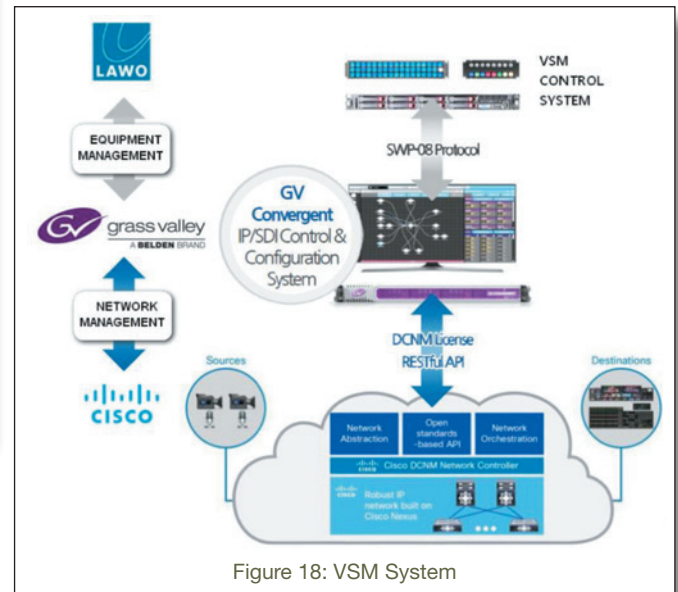


Figure 18: VSM System

4. Conclusion of UHD ALL-IP Multi-Control Room Construction

This system is the world's first example of implementing video + audio in an ALL-IP LIVE system. The biggest change in this system is the generation shift from coaxial cable transmission to network transmission. We built it in a multi-studio format, taking advantage of the network transmission method. First, all the video and audio signals generated by the studio were converted to IP and sent to the data centre. The collected IP signal is sent back to the necessary control room in a multicast method. This allows UHD signals to operate more flexibly than baseband routers. Also, it eliminates distance constraints and makes it easier to build.

On the other hand, there were many difficulties because it was the first system of its kind to be tried. It was the time when the new IP transport standards were to be announced, and it was difficult to find existing implementations. Particularly, it took a lot of time to design an appropriate solution for managing IP systems and an efficient network system.

In the future, when various devices using uncompressed IP standard are developed, the IP transmission method is expected to become more common. A variety of related standards that can systematically manage and monitor IP are coming soon, and system management will become

easier. Based on the know-how gained through this project, KBS will put more emphasis on fostering broadcasting

network engineers to lead network-based broadcasting system construction.

author

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Korean Broadcasting System

Shin Jongseob received his Bachelor of Science in Media Engineering from Seoul Tech University. Since he joined KBS in 2011, he has worked in the TV & Radio production technology department and transmission technology department in Gangneung station of KBS. He was moved to the head office of KBS, Seoul in 2015 and is now working in the production facility department. He is a project manager for planning, designing and installing world's first IP-based UHD PCR's (Production Control Rooms) at KBS. He is now in charge of expanding and advancing IP-based UHD production technology throughout KBS and around the world.



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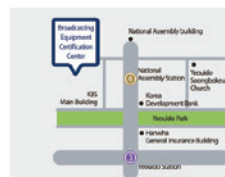


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IRIB Engineer Studying at NHK STRL in Japan

An engineer from Iran's national broadcaster, IRIB, is spending four months conducting research at the NHK Science and Technology Research Laboratories (NHK STRL) in Tokyo.

Mr Arash Ashtari Nakhaie is in Japan under NHK STRL's 2018 Broadcasting Technology Research Scheme for ABU members. His research theme is programme production technology using image analysis.

Under the scheme, young engineers and researchers from ABU members are given the opportunity to spend from three months to one year at the STRL.



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Anatomy of RF Amplifiers

– Failure Mechanics and Maintenance Strategies

summary

RF Amplifiers are the key component in any TV and Radio Transmitter. They use costly transistors and these are cascaded to provide higher powers. So, the main concern of broadcasters is to minimise the failure of these components. The cooling systems, alignments, skills of operating and maintenance personnel are key for minimising the failures and optimal performance of the transmitters. Heat management and stability of the gain of RF amplifiers can be greatly improved by improving cooling systems. This article provides an anatomy of failures of RF Amplifiers and improving their optimal performance through various maintenance strategies.



M.S. Duhan
DDG(E), DDI

1. Introduction

The RF power amplifier is a pivotal component in broadcasting systems because its performance & power consumption dominates the other parts in the system. The purpose of the RF PA is to amplify the radio signal to a desired power level. The RF output Power, efficiency and linearity in amplification process is of the essence. 50V LDMOS devices have dramatically increased power density, efficiency and reliability. The most prominent stresses on transistors are temperature, voltage, vibration and moisture etc. The number of Transistors used in some of the air cooled and liquid cooled TV Transmitters of Doordarshan's Terrestrial Network are detailed in Table 1.

Table 1: Transistors in TV HPTs

Make & Model & Power of Transmitter	Name of Transistor	Transistors on one TX	Cost of Transistors
NEC, PCN-16100SSPH/1, 10KW	2SK1543	168 (14x12)	\$ 43680
NEC, PCU- 1110SSP/1, 10 KW	2SK2396	196 (14x14)	\$ 39200
Thomcast, TVV 2010, 10KW	BLF278	70 (10X7)	\$ 11900
R&S, NH7100V, 10 KW	D1029	108 (6X18)	\$ 18900
R&S, NH7200V, 20 KW	BLF861A	252 (14X18)	\$ 44100
NEC, UA2000QC-S, 20kW	BLF861A	270 (15x18)	\$ 47250
Harris, Maxiva, 6KW, DTT	MRF6VP3450H	96 (12x8)	\$ 17200

The reliability of semiconductor devices depends on their resistance to various stresses applied to the devices and possible mechanisms to avert or minimise such stresses. The liquid cooling systems provide controlled temperature design of amplifier, reduces their size. The other important aspect of the maintenance strategy includes optimisation of the RF chain alignment, use of efficient jigs & soldering techniques and instilling skills among the O&M personnel.

2. Anatomy of Failures

LDMOS technology development is an ongoing process offering significant improvements. One of the major improvements is Idq drift reduction in LDMOST devices. A MOSFET dissipates little energy during its steady on or off states, but it dissipates considerable energy during times of transition. It is therefore desirable to switch as quickly as possible to minimise power dissipated. A high rate of voltage change over time (dv/dt) between the drain and source of the MOSFET may cause permanent damage or false switching.. Carriers that are injected into the depletion layer are accelerated by the high field, and some of them gain enough energy to cause impact ionization. These carriers have higher energy than thermal energy and are called hot carriers. In power transistors, failure is often associated to instability, which causes one or more device parameters (current, voltage and/or temperature) to diverge (runaway). RF Transistor failures does results mainly 50% parameter Change, 40% shorted, 10% open. More displacement current is built up with greater dv/dt. The displacement current is added to avalanche current and the device becomes more vulnerable to failure. A device experiences avalanche current and displacement current at same time. Therefore Vgs, Vds, Id must be within limits. There is also a power limit given by the maximum junction temperature. Basic values for the upper maxima of these parameters are given in the safe operating area (SOA) graph in the transistor datasheet.

New 50V LDMOS devices are introduced that dramatically increase power density, efficiency and reliability. The BLF861A transistor demonstrates exceptional performance for UHF transmitters, which can withstand source/load failures under full power conditions for a short period of time with no thermal damage. Bad handling of FETs can lead to damage by electrostatic discharge. The results of resistance tests on FETs are generally not as easy to interpret as in bipolar transistors. The only effective test for IGFETs, is by substituting a known good device. A component genuinely is another key issue as substandard components are also available in market.

Some of the basic causes of failure of amplifiers and other

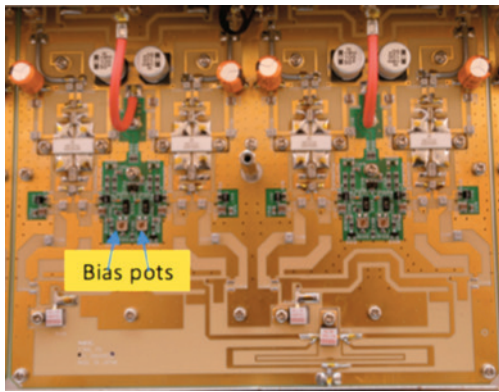


Figure 1: Bias Adjustment

broadcast equipment are temperature, humidity, vibrations, dust, static electricity stress, VSWR & thermal fatigue. So if we take care of these causes then the failure can be minimised. Of the above, heat or temperature is the biggest element. It is due to rise of junction temperature and the type of cooling system employed. It is important to note that every 10°C rise in temperature over the rated junction temperature (T_j), reduces the life by 50%. The junction temperature is related with the output power and cooling system employed.

The various observed stress mechanics of Transistors are explained as below:

2.1. Temperature:

The temperature affects the life of semiconductors. When a rapid or gradual change occurs to a device, the characteristics of the device may be deteriorated, and finally the device may malfunction. The power loss of the device turns into heat and increases the junction temperature. This degrades device characteristics and reduces its life span. It also affects the gain and linearity of the Transmitter. It is very important to lower the junction temperature by discharging heat from the chip junction. The bias adjustment is critical in this regard. The excessive RF power may cause a rise of junction temperature, and the rise of junction temperature may raise the failure rate. So, the electric current should be lowered to the permissible limits.

2.2. Humidity & Dust:

The surface of each IC chip is covered with a surface protective film. For this reason, IC chips are not easily affected by humidity, but resin moulded devices are water permeable. If it is expected that the device is operated under severe conditions of humidity, it should be operated particularly carefully. Dust creates a thermal barrier. The dust factor, combined with, is fatal and needs to be taken care of most.

2.3. Mechanical Stress/Vibrations:

If the device is strongly vibrated during transportation, loose foundation of racks, loose fan or, if an extremely strong force is applied to a device during installation or O&M, the device may be mechanically damaged. In addition, moisture or a contaminant may enter the device through the damaged area, and may cause deterioration of the device.

2.4. Static Electricity:

Electrostatic charges can damage equipment. Recently, plastic is generally used for the casing and the structure of equipment. To prevent electrostatic charge through the human bodies during repairs it is necessary to take preventive measures, such as the use of anti-static wrist bands against static charge.

2.5. Thermal Fatigue:

When a heating device is repeatedly turned on and off, thermal distortion of the material may be repeated, and fatigue may occur in the material and between different types of materials. As a result, the device may malfunction. Thermal fatigue typically occurs when the thermal resistance is increased by deterioration of die bonding material. Safe Operating Areas (SOA) defines the maximum value of the drain-source voltage and drain current to guarantee safe operation when a device is in a forward bias condition.



Figure 2: Damage due to high VSWR

2.6. VSWR:

The mismatch of RF output with the antenna system is another reason of MOSFET Failures. It may cause very high heat generation and various components may be blown, as shown in Figure 2. The circulators reject loads, combiners, capacitors, transistors and PCB track etc. are main failures with high VSWR.

3. Tryst with Cooling System for RF Amplifiers

The number-one factor determining the reliability of solid state devices is temperature. Heat management and stability of the gain of RF amplifiers can be greatly improved by introducing an effective cooling system. Air cooling systems may cause dust accumulation on the heatsinks etc., which act as heat insulation. Figure 1. shows the provision of bias adjustment to prevent overdrive of RF Amplifier. Further the fans are probably the most unreliable components, having moving parts and therefore a limited life. They are also susceptible to shock and vibrations. Generally about 13°C rise in temperature may occur between inlet and outlet duct. The optimal air pressure is another vital requirement. Some observations related to cooling system etc. are summarised below:

3.1. Experiments with air Cooling:

Normally the air cooled transmitters use air from outside

the building. It is filtered and dried by an electrostatic source and then a blower directs the air to the transmitter through an inlet duct. The air is then passed through narrow ducts over the heatsinks of the PAs. The outlet duct passes the air out of building. Modifications were carried out at many Transmitters, Vadodara, Surat etc. for closed air cooling. There the outlet duct is routed in the blower room where the same air is cooled and recycled to the Transmitter. The advantage is the absence of dust and humidity. Further experiments were carried out at HPT Ajmer and Varanasi where the outlet duct was opened in the top of the transmitter. The air route from transmitter to blower room enabled further cooling and reduced the PA temperature by about 6°C. Various cooling systems are shown in Figure 3.

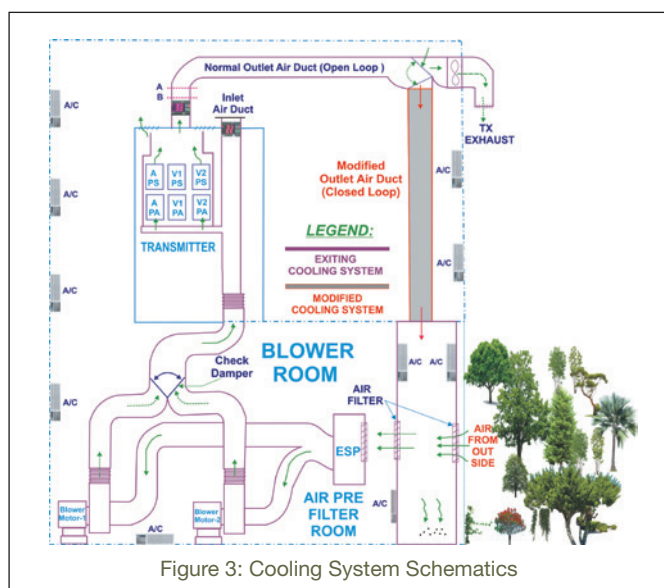


Figure 3: Cooling System Schematics

- 3.2. The planting of trees alongside the Transmitter building improved the cooling system at HPT Surat and LPT Khetri, where the efficiency and life of the air-conditioning units were also improved.
- 3.3. Glazed white tiles were installed on the roof of the transmitter at HPT Vadodara and, by reflecting the heat, this achieved about 2°C drop within the transmitter hall.
- 3.4. Liquid cooling of the amplifier's solid-state transistors has a number of advantages. The various advantages of liquid cooling over air cooling are; controlled temperature design of amplifiers, reducing the size of the amplifier due to absence of large metal heat sinks, reduction of the heat load in the amplifier room and its resulting HVAC requirements, it also allows for fewer fans, which makes the amplifier audibly quieter. Humidity and dust/dirt control is excellent in liquid cooled systems. Thus operating costs can be reduced.

4. Observations, Field Experiments & Experiences of Transistor Failures

The field unit of DD Kendra carried out repairs and maintenance of the transmitters. Technical workshops were

also organised at various Kendra's. A few experiments, experiences and observations on the repair of various Amplifiers and modulators proved educative for the maintenance engineers and are expounded as below:

- 4.1. Liquid cooled Transmitters have far fewer failures of RF Transistors. A 20 kW liquid cooled NEC Make PCU-1320 SSPQ/1 TV Transmitter was commissioned at HPT Dharamshala w.e.f 31.12.2007. It uses 18 BLF 861A MOSFETs in each PAs(12 Visual and 3 Aural Pas). There has been no failure of any MOSFET so far. In comparison, from 2011 to 2018, 185 2SK1543M transistors failed in the 10 kW air cooled TV Transmitter NEC PCN1610SSPH/1, with 12 Vision PAs and 2 Aural PAs, at HPT Kanpur.
- 4.2. There are two 10 kW HPTs at Vadodara – Thomcast (VHF) and NEC (UHF). During two years of observations between June 2006 to June 2008, the monthly cleaning, alignments of bias & AGC and measurements/calibrations etc. were carried out under direct control of only two expert engineers during night time, after close down of Transmission. The closed cooling system was kept optimal. There was no failure of transistors (BLF 278 and 2SK2396) during that period.



Figure 4: Temperature Analysis of RF Transistors

- 4.3. Soldering Irons with temperature controlled tips should be used and peak soldering temperature should not exceed 260°C for 4 seconds. The pre-heat & Soak temperature gradient should be 2°C/s and cool down temperature gradient should be -2°C or less. Anti-static wrist bands should be worn by engineers during repair of Transistors.
- 4.4. Heat dissipation of transistors: Heat dissipated by Transistors need to be checked as shown in the

Figure 5. The required alignment or replacement of components needs to be carried out within limits of parameters for optimal functioning.

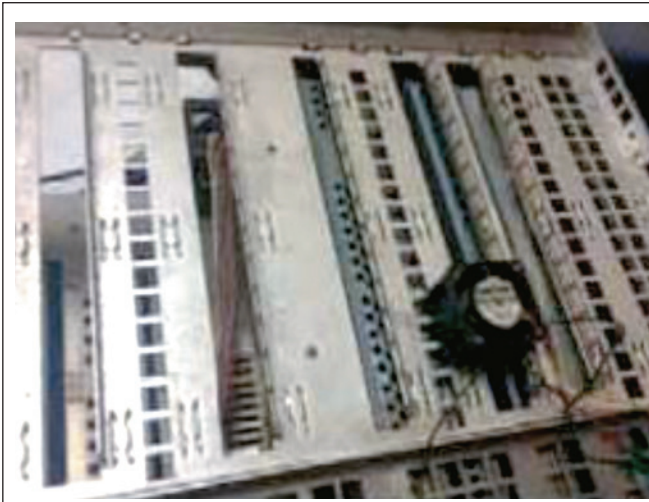


Figure 5: Heat Management in Modulator

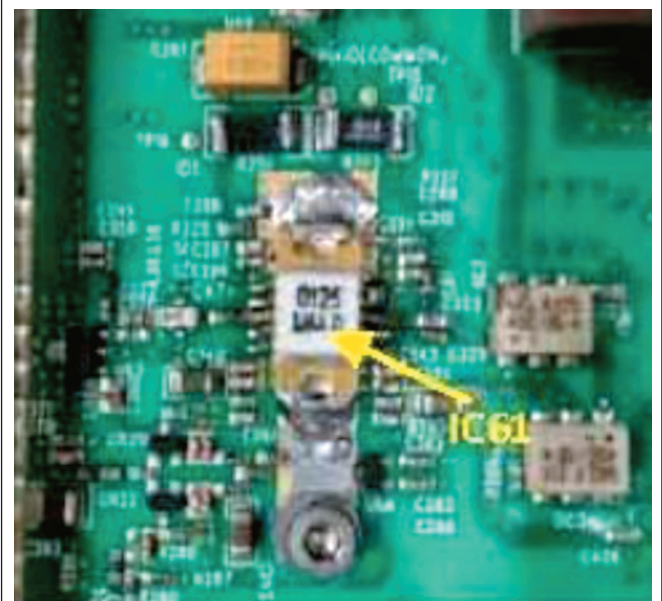
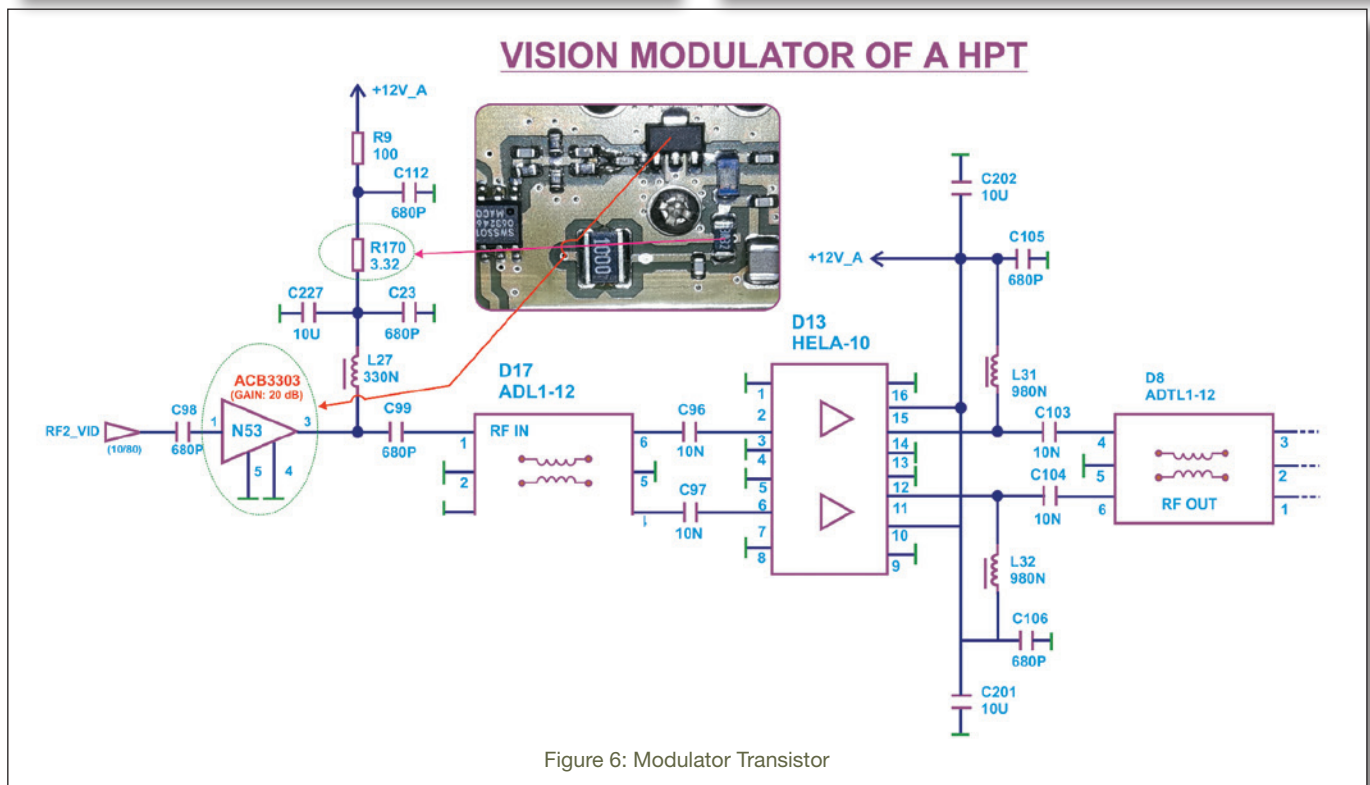


Figure 7: DTT Up Converter



4.5. For electronic equipment, the most prominent stress is temperature. The importance of observing the limits cannot be overstressed, since the failure rate of the components will double for a 10°C increase in temperature. Decreasing the size of a unit without increasing its efficiency will make it hotter, and therefore less reliable. Two examples for relieving thermal stress are given below:

- i. Vision modulator in R&S Transmitters, NH7100V, 10 KW a Transistor Amplifier ACB 3303 (gain 20 dB) in Modulator unit was failing frequently. The circuit detail of it shown in Figure 6. It was observed that heat accumulates in the cabinet. A fan was mounted on top of cabinet to extract the heat (Figure 5). The failure reduced significantly.
- ii. One typical fault was occurring in the exciter of 6kW DTT transmitter. It was analyzed & repaired. It showed RED indication in front screen as "RF MUTE". The TCU showed "power low" and its up-converter voltage Vdc showed 0 V instead of 20 V. The Exciter output showed 1 mW peak instead of 100 mW. GaAs MMIC U 61 AM 012535MM in UP/DOWN Converter was faulty. It was replaced. Its channel temperature range is 175°C and its gain is 20 dB. After replacing U61 the drain currents were adjusted by R202 and R299. The position of IC61 is shown in Figure 7. To prevent re-occurrence of such faults, a fan was mounted at the back of module chamber to extract the heat from the area.

5. Modern Transmitters use various firmware. So, backup of flash storage cards etc., used in the transmitter, must be kept safely. The flash storage card used for display of TCU in 6 kW DTT Transmitters at HPT Jalandhar and Pitampura. Copier/duplicators for flash storage are also available. Such a copier is shown in Figure 8.



Figure 8: Flash Card Copier



Figure 9: DC Supply Test Kit

6. Test Jigs

Some test jigs were prepared for repair of DC Power Supplies in RF Amplifiers. Two of such jigs are as shown in Figure 9 and Figure 10. Figure 9 shows the 3 Phase supply was given through a test board consisting of series lamps in each phase to check for any shorting etc. If there is no shorting, then direct supply is given. The 3 Phase AC Supply is then fed directly through the test board. In order to switch ON the DC supply a command is to be given from PA. For this the required command is given using the shorting jig as shown in the Figure 10. Thus, **PA PRESENCE** is activated. To protect the DC supply from electrical transients the MOV should be replaced every 5 years.

7. Technical Workshops

Technical workshops were held at various HPTs of DD Network. Two such workshops were held, at HPT Varanasi and HPT Kupwara. Useful handouts were prepared to develop technical skills among staff, and tutorials were provided. Hands-on training was given on various equipment repairs, like DC power supplies, power amplifiers, exciter modules, control units etc.



Figure 10: PA Presence Kit

8. Innovative drawings and Workshop Tables

The architecture of PAs, control circuits, alignment process etc. have been displayed in transmitter halls at various Kendra's like Kasauli, Karnal, Agra, Vadodara, Surat etc., for better understanding of technical personnel. The Workshop Tables were prepared with provision of various DC supplies, ammeters, voltmeters, CRO, signal generators, waveform monitors, power meters etc. at various transmitter sites like HPT & DMC Vadodara, LPTs at Godhara, Chottaudaipur, Dahod, HPT Amritsar and others. These provisions improved the confidence of staff and enriched the working environs.

9. Conclusions

The reliability of semiconductor devices depends on their resistance to stresses applied to the devices, such as electric stress, thermal stress, mechanical stress, and external stress like humidity, etc. The vital requirement is to overcome these stresses by proper cooling system, optimal drive, matched loads, selection of genuine transistors, trained personnel for periodic alignments and cleaning, awareness of maintenance strategies etc. The core team of engineers needs to strive for any modifications to weak circuits or systems. The drawings & workshops are also vital features for repairs and maintenance. Eventuality study of the anatomy of Transistor failures and maintenance strategies leverages the repair & operational costs of transmitters.

10. Reference & Acknowledgements

- i. Technical Manuals of various TV Transmitters.
- ii. Field experiments and observations at various HPTs, LPTs etc.
- iii. Technical Workshops organized by O/o ADG (DDM) (NZ) AIR & DD New Delhi.
- iv. OEM data of various semiconductors.
- v. Tutorial by Philips on Semiconductors.
- vi. Tutorial by Panasonic on Failure Mechanics of Semiconductor Devices.
- vii. Technical discussions with DD Engineers e.g. Sh. A. K Singh ADG(E), Satyapal DDE, Amritpal Singh DDE, Dharmendra Kumar EA et al., and Engineers at field units of AIR and DD.

author

M. S. Duhan
DDG(E), DDI

Sh. M. S. Duhan entrained vision for the system design and maintenance of all broadcasting organs encompassing Studios, Earth Stations and Transmitters of AIR and Doordarshan. He has over three decades of experience in broadcasting sector with a predominant focus on digital terrestrial technologies, eco-system and solutions. He possesses degree in Electrical Engineering, MBA and Master of Mass Communication. Sh. Duhan is a participant at various industry forums, events, Journals and TV Talk shows. He is a recipient of numerous honors and awards conferred by ABU, BES and DD Awards.

He has published many papers/articles on issues related to terrestrial TV and Radio Transmission and usage of RF Spectrum in National and International Journals. He has contributed significantly in the implementation of DVB T2 Transmitters in India and finalization of BIS Standard for DVB T2- HDTV STB and IDTV. He was resource person for "AIBD/RTM in-country Workshop" organised at Kuala Lumpur by ABU in May 2015 on DVB-T2 technology. He is currently posted in the Zonal office of AIR & Doordarshan at New Delhi and is responsible for maintenance of Doordarshan TV Network in North Zone. With his penchant for perfection and pursuit of excellence, he is anchoring new initiatives in repairs, alignments and measurement methodology etc. for optimal functioning of TV Network.

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ABU at the WBU-IMCG



The WBU International Media Connectivity Group forum was held at the EBU in Geneva on 29-30 November 2018.



The ABU was invited to be on the panel on Radio Issues. The session explored the impact on radio stations of digital transition, the benefits and challenges of digitising radio distribution, the content opportunities that open up and the experiences of those who have made the transition. Frequency issues like interference to AM, lack of spectrum in FM and freeing up band III for DAB, were a part of the discussion. The session was moderated by Lindsay Cornell, Principal Systems Architect, BBC Research & Development. The panelists were Bassil Zoubi, Director, Technology Dept., Arab States Broadcasting Union (ASBU), Michael Beach, VP, Distribution, NPR, Jorn Jensen, Sr. Advisor, NRK and Ahmed Nadeem, Director Technology & Innovation, ABU.

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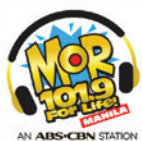
Mike Woods
Nautel Head of Engineering

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Mike Kernen
Director of Engineering,
Beasley Media Group Detroit



This GV60 transmitter broadcasts HD Radio at MOR 101.9 For Life! Manila, an ABS-CBN station in the Philippines.

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Technical Bureau Meeting

The annual meeting of the ABU Technical Bureau was held a day before the Technical Committee Meetings in Ashgabat.

The Bureau was able to complete a thorough follow-up on the tasks and action items from its mid-year meeting held in early May in Kuala Lumpur.

Remarkable progress was reported on the tasks that were set.

Key issues included cyber security controls and the protection of C-band satellite spectrum for broadcasters.



The Bureau proposed two recommendations and two decisions to the Technical Committee which were:

RECOMMENDATION 1/2018:

Supporting the WBU C-Band Position

DECISION 1/2018:

Amendment to the Engineering Awards Guidelines

RECOMMENDATION 2/2018:

Supporting the WBU-TC Recommendations for Core Cyber Security Controls

DECISION 2/2018:

New Evaluation Criteria for Technical Review Prizes



ABU Technical Committee Meeting

The ABU Technical Committee Meeting was held on 1-2 October 2018 during the 55th General Assembly in Ashgabat, Turkmenistan.

Opening Session



Mr Masakazu Iwaki

The Chairman of the Technical Committee, Mr Masakazu Iwaki, welcomed delegates to the meeting. Mr Iwaki described Ashgabat as a well-selected venue and extended his gratitude towards the government of Turkmenistan and TVTM (State Committee of Turkmenistan for Television, Radio Broadcasting and Cinematography) for hosting the event. Mr Iwaki briefed delegates on the Technical Bureau meeting that was held on 30 September and then took them through a quick tour of what to expect in the next two days of the Technical Committee meeting.

Mr Yagmur Turshekow, Deputy Managing Director of TVTM, welcomed all delegates from around the world to Turkmenistan and expressed his happiness to be the host of such a prestigious event. He thanked the ABU Secretary-General for involving him in discussions and making him a part of the ABU team and for the support received in organising the event. Mr Turshekow expressed his hope that the ABU will keep on supporting not only TVTM but also the broadcasting community across the world. Mr Turshekow expressed his gratitude towards the Honorable President of Turkmenistan, Mr Gurbanguly Berdimuhamedow, for embracing Turkmenistan with technology and vision. Mr Turshekow also thanked the President for his support in hosting this event.



Mr Yagmur Turshekow



Dr Javad Mottaghi

Dr Javad Mottaghi, ABU Secretary-General, welcomed the delegates and guests to Ashgabat. He praised the hospitality and thanked TVTM and Mr Yagmur for hosting the event. Dr Mottaghi talked about the digital divide i.e. the gap between broadcasters. Some are advanced and leading the way while other broadcasters are lagging in terms of technology. He said that the ABU is always there to support the members in need of support. He also put emphasis on the contribution of forums like DBS and was happy for its success. He said all broadcasters should adapt to the changing trends of the industry and have an online presence. Companies like Amazon and Netflix have already taken a lead in understanding what the viewers need and prefer watching, he said. He urged broadcasters to make

the most of online platforms to reach the masses. Dr Mottaghi concluded by again thanking TVTM for partnering with the ABU to host the 55th ABU General Assembly and Associated Meetings.



Mr Iwaki presented Mr Yagmur Turshekow with a token of appreciation for hosting the meetings in Ashgabat.

Industry Keynote

The Industry Keynote was presented by Ms Muirne Laffan, CEO and Founder of LaffanLABs. Ms Laffan spoke about the role of the digital chief officer in RTE Ireland. The main task of the chief digital officer is "How to Manage Digital Disruption".



Ms Muirne Laffan

ABU Technology Activity Report

Mr Nadeem introduced the ABU Technology's Activity report for the 2017-2018 period and went through all the activities organised by the department. Mr Nadeem commended the support of international organisations like BES Expo 2018, BroadcastAsia (Singapore) where ABU has its own booth, Inter BEE in Japan and IBC where ABU sends members to attend. He also thanked the World Broadcasting Unions, the EBU, WorldDAB, DRM, ITU, ASBU, the AIBD and DVB as ABU's partner organisations. He thanked his team comprising Nam, Geraldine, Hamidah and Shree Bhadra for their tireless efforts in making these events successful.

Bureau Proposals

Mr Nadeem then gave details of the ABU Technical Bureau's recommendations and asked for suggestions from delegates.



Recommendation 1/2018

– Supporting the WBU C-Band Position

The main outcome of this was to promote and encourage use of C-Band for broadcasting as it is more reliable, ideal for tropical climate as it is less effected by heavy rainfall or thick cloud cover and is ideal for news gathering etc.

Recommendation 2/2018 – Supporting the WBU-TC Recommendations for Core Cyber Security Controls

This was to make broadcasters realise the threats cyber-attacks are posing to the broadcasting world. It emphasised the reliance of the broadcast world on IT infrastructure and with broadcasters using OTT and IBB platforms to deliver the content, they are even more prone to attacks. Proposers expressed their concern about the recent cyber-attacks. The ABU recommended that members take serious measures to evaluate their security protocols and place better security against the upcoming attacks. The members and delegates agreed to the recommendations.

Decision 1/2018 – Amendment to the Engineering Awards Guidelines

The amendment was aimed at making the process of selection of winners of the Engineering Awards more transparent. An award-winning organisation will not be considered for the same award for the next two years.

Decision 2/2018 – New Evaluation Criteria for Technical Review Prizes

There will be three categories: Practical implementation and application of technology, Technology research, new development and New ideas and information documents, case study and others. There will be five judge panel who will review the nominations and select the winner. Members backed both decisions.

Industry Updates and Developments

The panel members were Mr Lindsay Cornell of BBC-United Kingdom, Dr Peter Siebert of DVB, TC Chairman, Mr Masakazu Iwaki, Mr Haeng Un Jung of KBS-Korea and Dr Li Leilei of RTPRC-China.

Dr Peter Siebert explained the use of 5G in broadcast and why 5G is the hot topic. He reviewed a few online articles published about 5G and talked about the Release 16, the latest one on 3GPP (3rd Generation Partnership Project). He ran through the timeline of 3GPP which started in 2017 and will be finalised by the end of 2019.

Answering the big question “When will 5G broadcast become available?” Dr Siebert said 2023 was the earliest we could expect some movement in 5G broadcast. He said the field of 5G broadcast should not be left to operators (NMOs)



Dr Peter Siebert

and urged broadcasters to participate in 3GPP, to make 5G suitable for broadcast.



Mr Haeng Un Jung



Dr Li Leilei



Dr Lindsay Cornell

Mr Haeng Un Jung from KBS-Korea shared some ideas on Technical Issues for Expanding Terrestrial UHD Broadcasting. The implementation of UHD started in 2017 in Seoul and neighbouring areas. The second phase covers five major metropolitan cities. The third phase will cover about 95 percent of the country. By 2027, Korea plans to go fully digital.

Dr Li Leilei presented on Digital Terrestrial Multimedia Broadcast (DTMB) Development and Frequency Planning. DTMB has been the TV standard for mobile and fixed terminals used in China since 2006.

The final presentation was from Dr Lindsay Cornell of the BBC who gave a Digital Radio Update, which included the progress of DAB in several countries. Norway completed digital switchover to DAB+ in 2017, and Switzerland will be the next in the list with digital switchover in 2020. Russia has announced the adoption of DRM+ for VHF bands I and II in September 2018 and France is expanding to 28 more areas (DAB+ only, no DMB-radio). Dr Cornell said digital radio was finding its way into major car brands, with more than 41 brands using it.

Future Strategies

Mr Aale Raza, Director of Whiteways Systems-Singapore, gave an amazing presentation on The Coming Revolution in Virtual set/AR/VR production with the real-time 3D Gaming Engines. He explained the revolution in Virtual Set, Augmented and Virtual Reality mainly by showing videos and concluded that augmented reality is the future. It is a great tool to make stunning videos, and to explain complex stories. Broadcasters should embrace this new technology, he said.



Mr Aale Raza

Mr Kenichi Murayama, Senior Manager at NHK-Japan, spoke on 4K/8K Broadcasting in Japan. He discussed the major policy in NHK's corporate plan for the period 2018-2020. The priority was in bringing the very highest standards of broadcasting and other services to Tokyo 2020 Olympic games using 4K/8K Super Hi-Vision (SHV) to help people share in the excitement of Tokyo 2020 Olympics and Paralympics. He also provided the Roadmap for 4K/8K Broadcasting in Japan including 4K/8K Test Satellite Broadcasting done on 1 August 2016. Mr Murayama said NHK dispatched 8K production trucks to Russia to cover



Mr Kenichi Murayama

the 2018 FIFA World cup. He also talked about the NHK coverage of the Winter Olympics in Pyeongchang, Korea, in 2018.



Dr Mei Jianping

Dr Mei Jianping spoke on the technology plan of CCTV UHD and provided an overview of its implementation. China Central Television has just launched its first 4K UHD Television. In recent years, China has seen rapid growth in the UHDTV market. It is expected to reach 4 trillion RMB in 2022. The main considerations are to establish a brand new UHD production and broadcasting system in CCTV; to launch the first 4K Television in 2018 and deploy across all CCTV programs in future 3 years; and to cover China via CATV, DTH (satellite) and IPTV, which may meet the demands of all users.

Mr Evghenii Sestacov, Engineer at the International Telecommunication Union (ITU), spoke on BR Assistance in Improvement of Spectrum Usage for DTTB by providing a brief review of BR Radiocommunication Bureau's assistance in improving the usage of spectrum for Digital Terrestrial Television Broadcasting (DTTB). He mentioned the benefits of frequency coordination as Harmonisation of the use of spectrum; Preventing the occurrence of harmful interference; Facilitating the Analogue to Digital Television transition and the allocation of the Digital Dividend; Discussion of actual and future national plans; and Building informal consensus towards the conclusion of formal agreements.



Mr Evghenii Sestacov



Mr Charles W Kelly Jr

Mr Charles W Kelly Jr, Regional Sales Manager Asia/Pacific at Nautel-Canada, gave a presentation on Radio: Continuing to Evolve and Serve. He began with the birth of radio, roughly 100 years ago, and noted how adept radio had become in changing to meet new challenges and using new technologies. He said that in the US, more than 93 percent of people listened to radio regularly. Radio was local and immediate, and its future was bright.

Members' Present

– Digital Implementation and Migration

Mr Kachan Kannika, Director Engineering Support and Development Bureau at NBT Thailand, spoke on the Digital Switchover in Thailand. He gave an update on the status in Thailand with regard to Digital Television Transmission and an overview of the digital switchover in the country. Thailand started preparation for DSO in the year 2012, issued licences for five DTT networks in 2013, and in 2014 24 DTT services went on Air. DTT expansion continued over the years while analogue and



Mr Kachan Kannika

digital simulcast was going on. The Analogue Switch Off (ASO) was expected in 2018.



Mr Nguyen Duc Tue

Mr Nguyen Duc Tue, Deputy Director Technical Centre, at VTV-Vietnam, spoke on the Digital Migration Roadmap. He said that VTV, the national public TV channel, produced and broadcast nine FTA HD channels and from 2016 the production had been fully HD and file based. They had 10 full HD studios, six HD OB vans and a fully file-based newsroom system. Digital Terrestrial Television (DTT) in the country started in 2012 with MFN first because of frequency available.

Ms Hong Young-Kyung, Senior Manager, Technology Management at KBS-Korea, gave a presentation titled Looking Back at the Digital Transition and Looking Forward to the New Era, UHD. She explained that the Digital Transition Special Act in KBS had been in force from 28 June 2008 to 31 December 2013. The law stipulated the way of strengthening the promotion of DTTB to the public, supporting the cost of DTTB, alleviating the digital divide and ensuring ASO announcement notices in all TV receivers.



Ms Hong Young-Kyung



Mr Sunil

Mr Sunil, Additional Director-General at Doordarshan-India, spoke on DDI's Achievements and the Way Forward. He gave a detailed overview of Doordarshan (DDI), the public service broadcaster of India. DDI has 107 production studios at 67 centres including three HD Studios, 95 SD Studios and four analogue studios. Thirty OB vans and 224 HD Camcorders are used in the network. DDI's terrestrial TV network consists of 1,394 analogue transmitters and 23 digital transmitters

Summary from Topic Area Chairmen

The Production Topic Chair, Mr Kazim Pektaş, Chief Engineer at TRT-Turkey, introduced the session and spoke of some of the important developments. Especially important was creation, storage and use of metadata, he said; the EBU had developed very useful documents. In the ABU region, KBS had started regular UHDTV broadcasting and useful documents have been made available describing the history of the development and the production facilities. NHK had provided helpful information concerning 8K satellite broadcasting. Also relevant to production were cyber security and big data. This was a new area for many and was important because with changes from SDI and AES interfaces to IP interfaces, the potential for cyber issues was increasing.



Mr Kazim Pektaş

The Transmission Topic Area was presented by Mr Kenichi



Mr Kenichi Murayama

Murayama, Senior Manager, Planning & Management Division at NHK-Japan. He explained that there are three topics - frequency planning for digital broadcasting, next generation terrestrial broadcasting, and integrated broadcast broadband & OTT. He provided some details of the work.



Dr Li Leilei

The Spectrum Topic Area was introduced by Dr Li Leilei, Professor at Academy of Broadcasting Planning, RTPRC-China. The spectrum group is concerned with the preparations for WRC-19. Dr Li detailed a number of agenda items that concern broadcasting. Among them is Topic 7, which concerns possible changes in response to Resolution 86.

Although there are many issues, the main one is for BSS networks under RR Article 23. Regarding topic 7, NHK said one issue involved UHDTV transmissions in Ku-band. Due to rain fading in the Asia-Pacific region and the need for high bit-rates for UHDTV, increased power is needed. He urged ABU-TC to support the issue.

Bureau Proposals (Final Reading)

Mr Nadeem stated that no comments had been received since the first reading and as such the Recommendations and Decisions were adopted.

WBU Cyber Security Presentation

A WBU video presentation on Cyber Security was screened. It was prepared by Mr John Lee, Chairman, NABA Technical Committee and Cyber Security Sub-Committee and Vice-Chairman of the WBU-TC.



Mr John Lee

The presentation noted that as media companies increasingly adopt IP based workflows, in production, in distribution, OTT, IBB, etc., all this creates greater risks for cyber-attack. These attacks take different forms - reputational damage from a hacked website; content theft with pre-release material; data leakage; and software corruption compromising activity.

NABA started producing cyber security recommendations in 2015 and established the cyber security committee in 2016. Its mandate is to share issues, address vendors in various ways, create basic cyber controls, input to standards, educate technical staff when designing IT systems, and collaborate with other broadcasters and broadcasting unions.

The EBU has a well-established cyber security committee which has produced several recommendations, R141 to R146 and R148. These are highly recommended.

The WBU comprises all the broadcasting unions, and has produced a document, released in January 2018, which makes recommendations to suppliers about cyber security. The idea is to include the document with requests for information or supply so that you are well informed as to

the status of cyber security for the equipment you buy. There are 34 recommendations in total, and it prioritises issues into critical, important and best practice.

Updates from Status Reports

TRT, DDI, RTHK, NHK, RTPRC, KBS, TVB and NBT presented their status reports covering a wide range of developments in their organisations.

Mr Nadeem then introduced the 17 new members who joined the ABU the past year.

Technology Panel

The theme was Cyber Security and Big Data in Media and the panel was moderated by Mr Akira Negishi, Senior Manager at NHK World Department. The Panelists were Mr Aale Raza, Mr Lindsay Cornell, Dr Peter Siebert, Ms Hong, Young-Kyung and Mr Sunil.



Mr Akira Negishi

Mr Cornell said BBC utilized the Internet channel to distribute its programmes very early and used big data for news analysis and to see the trends. Dr Siebert said DVB made the standard for transmission and contributed questions in transmission security. Ms Hong mentioned a case of cyber security in KBS and KBS used big data in making programme video.



Mr Sunil

Mr Negishi asked why cyber security was so important for broadcasters. Mr Raza said everyone used the huge function of mobile phones and, later, the Europeans had come up with regulations to restrict the exclusion of personal connectivity. Mr Cornell said an attacker could take something away and put different content on air. Mr Sunil said the broadcaster have to see when, where and how the attack occurs.

Mr Negishi asked Dr Siebert how to secure the transmission chain and how it could be damaged. Dr Siebert said that two or three years ago, someone in Germany had demonstrated that he could receive a terrestrial transmission, modify the programme and re-transmit again. They could even control the studio and change the transmission path. DVB had upgraded the standard so the broadcaster could add a digital signature to make sure the signal came from the right source.

Mr Negishi then asked Ms Hong about any such incident in KBS. Ms Hong said that after the broadcast system moved to an IP base, the network was connected all the time. The possibility of illegal access was raised. Ms Hong said one cyber security issue had occurred five years ago. Three major broadcasters and five international business, including banks, were affected. The outcome was that service was down over seven hours and needed several days to recover.



Ms Hong Young-Kyung

To cope with this, KBS used two different networks, one for office work and one a dedicated network for broadcasting.

Mr Raza showed a film of an incident when a hacker interrupted a live national TV interview in the US. He said some broadcasters maintained high security in key components and kept equipment behind a firewall. Mr Cornell said cyber security should be handled at managerial level, as ordinary people were reluctant to become involved. Ms Hong advised against opening suspicious emails. The best way to prevent attacks was to share information with fellow broadcasters.



Mr Aale Raza



Mr Masakazu Iwaki

Mr Negishi then changed the topic from cyber security to big data. The panelists discussed how broadcasters could best use big data. Dr Siebert spoke of a regulation in EU law on data protection, which placed strict conditions how people collect and use data and imposed heavy fines on offenders. Ms Hong said KBS used data from social networks to analyse what aspects of drama productions would appeal most to viewers. Mr Iwaki said NHK also used social networks to obtain data.

Updates from the AIBD, IABM, DVB, EBU, DRM, and the ITU were provided by the respective representatives.

Promotional videos were shown of the ABU DBS 2019, which will be held on 4-7 March in Kuala Lumpur, and the 5th ABU Media Summit on Climate Change and Disaster Risk Reduction, which will be held on 25-26 April 2019 in Kathmandu. The videos were introduced by Mr Nadeem and Mr Chinta Mani Baral of NTV-Nepal.



Mr Chinta Mani Baral



Mr Akira Negishi

Mr Akira Negishi, Senior Manager at NHK World Department, announced the NHK Broadcasting Technology Research Scheme for ABU 2019. It is an ABU activity to enable young engineers from ABU members to conduct research at NHK STRL for a period of three to

Appointment of Honorary Vice-Chairman from the host of the 2019 ABU GA

As the host of the 2019 ABU General Assembly in Tokyo, NHK announced that Mr Kenichi Murayama, Senior Manager, Planning & Management Division, Engineering Administration Department, NHK, had been appointed Honorary Vice-Chairman of the ABU TC. He welcomed ABU TC participants to the 2019 GA and associated meetings, which will take place from 17 to 22 November at the Hyatt Regency in Shinjuku, Tokyo. A film introducing Japan was shown.

Thank you to our outgoing TC Vice-Chairmen



Mr Tharaka Mohotty
MBC/MTV-Sri Lanka



Mr Lasantha Samaranayake
EAP-Sri Lanka



Before the closing session, Mr Nadeem thanked the Rapporteurs and the two outgoing TC Vice-Chairman, Mr Tharaka Mohotty and Mr Lasantha Samaranayake.

He then thanked the outgoing Chairman, Mr Masakazu Iwaki, for his contributions during the past 10 years. A presentation of photographs of Mr Iwaki was shown as a tribute. Mr Iwaki then made a short presentation and thanked members for their support.

12 months. The research areas of the STRL include 8K Super Hi-Vision, 3-dimensional imaging technology, Internet technology for future broadcasting service, technologies for advanced content production, user-friendly broadcasting technology and devices & materials for next generation broadcasting.

Thank you to the Rapporteurs



Mr Yashovardhan
Sharma
Whiteways-Singapore



Mr Utpal Kanti Mandal
AIBD-Malaysia



Mr Lindsay Cornell
BBC-United Kingdom



Mr Yuen Man
TVB-Hong Kong-China

Technical Committee Elections

Held every two years, the Technical Committee elections were held on the second day of the meetings. Special thanks to the Scrutineers, Mr Aale Raza of Whiteways-Singapore and Mr Paul Treleven of IABM.



New Line-up of the ABU Technical Committee



From Left to Right: Dr Kong Bin of RTPRC-China, Mr Hamid Dehghan Nayeri of IRIB-Iran, Mr Sunil of DD-India and Mr Masashi Kamei of NHK-Japan

Mr Hamid Dehghan Nayeri of IRIB-Iran has been elected the new Chairman of the ABU Technical Bureau and ABU Technical Committee for a term of two years.

Mr Nayeri is the Director, International Technical Affairs at IRIB and has been actively involved in ABU activities since 2005. Mr Nayeri served as Technical Committee Vice-Chairman from 2012 to 2016.

Dr Kong Bin of RTPRC-China was re-elected as a Vice-Chairman of the Technical Committee. Mr Sunil of DD-India and Mr Masashi Kamei of NHK-Japan were elected as new Vice Chairmen.

The Honorary Vice-Chairman of the Technical Committee for 2019 is Mr Kenichi Murayama of NHK-Japan.

The 18 members elected to the ABU Technical Bureau are Phoenix TV-Hong Kong, AIR-India, MTV-Sri Lanka, RTPRC-China, EAP-Sri Lanka, TRT-Turkey, TBC-Tonga, TVB-Hong Kong, NHK-Japan, Mediacorp-Singapore, IRIB-Iran, RTM-Malaysia, KBS-Korea, NBT-Thailand, RRI-Indonesia, SBA-Saudi Arabia, DD-India and VTV-Vietnam.

The ABU Technical Committee also confirmed the appointment of Mr Kazim Pektaz of TRT-Turkey as Topic Area Chairman for Production, Mr Kenichi Murayama of NHK-Japan as Topic Area Chairman for Transmission, Mr Tharaka Mohotty as Topic Area Chairman for Capacity Building and Dr Li Leilei of RTPRC-China for the Spectrum Topic Area.

The Technical Committee expressed its thanks and appreciation to the outgoing Chairman, Mr Masakazu Iwaki of NHK-Japan. Mr Iwaki had served two terms as the Chairman and the TC farewelled him with a gift.



Mr Hamid Dehghan Nayeri presenting a token of appreciation to Mr Masakazu Iwaki of NHK-Japan

ABU TECHNICAL BUREAU 2018/2020



Chairman
Mr Hamid D Nayeri

IRIB-Iran



Vice-Chairman
Dr Kong Bin

RTPRC-China



Vice-Chairman
Mr Sunil

DD-India



Vice-Chairman
Mr Masashi Kamei

NHK-Japan



Honorary Vice-Chairman
Mr Kenichi MURAYAMA

NHK-Japan
Chairman Transmission
Topic Area
Bureau, Ex-Officio



Mr Garry Kum

TVB-Hong Kong



Mr Terence Yiu Shun Tat

Phoenix TV-Hong Kong



Mr C B S Maurya

AIR-India



Mr Rahadian Gingging

RRI-Indonesia



Ms Hong, Young-Kyung

KBS-Korea



Mr Jamel Seman

RTM-Malaysia



Mr Ayman Al Zahrani

SBA-Saudi Arabia



Mr Peh Beng Yeow

Mediacorp-Singapore



Dr Tharaka Mohotty

MTV-Sri Lanka
Chairman Capacity Building
Topic Area



Mr Lasantha Samaranayake

EAP-Sri Lanka



Mr Kachan Kannika

NBT-Thailand



Mr Solomon Finau

TBC-Tonga



Mr Sahin Demir

TRT-Turkey



Mr Nguyen Duc Tue

VTV-Vietnam



Dr Li Leilei
RTPRC-China

Chairman Spectrum
Topic Area
Bureau Ex-Officio



Mr Kazim Pektas
TRT-Turkey

Chairman Production
Topic Area
Bureau Ex-Officio





ABU Engineering Awards 2018

The Engineering Awards consist of the ABU Broadcast Engineering Excellence Award, the ABU Engineering Industry Excellence Award, the ABU Green Broadcast Engineering Award and the ABU Developing Broadcasters' Excellence Award.

In 2018, the ABU received a total of nine nominations for the awards.



The ABU Engineering Awards were judged by two panels of judges.

Mr Masakazu Iwaki of NHK-Japan was the Panel Chairman for the Broadcasting Engineering and Developing Broadcasters' awards and Mr Hamid Nayeri of IRIB-Iran was the Chairman for the Engineering Industry and the Green Broadcast awards.

The members of the panels were Mr Tharaka Mohotty of MTV-Sri Lanka, Mr Rahadian Gingging of RRI-Indonesia, Mr Naoki Kashimura of Ikegami-Japan, Mr Peter Bruce of IABM, APAC, Mr Alexander Zink of Fraunhofer-Germany, Mr Sahin Demir of TRT-Turkey, Ms Hong, Young-Kyung of KBS-Korea, Dr Fintan Mc Kiernan of IDEAL Systems Singapore, Mr Charles Sevier of Dell-EMC Australia and Mr Asaad Sameer Bagharib of Thinking Tub Media Singapore.



The sponsors of the 2018 awards were Whiteways Systems and Nautel, who were represented in Ashgabat by Mr Aale Raza and Mr Chuck Kelly respectively.



The ABU Green Broadcast Engineering Award, which recognises outstanding contributions in developing, implementing and/or promoting green technology in the broadcasting industry, was awarded to Radio Film & Television Design & Research Institute (DRFT), China, for the development and promotion of green technology in China's radio and TV projects.



Mr Aale Raza, Director, Whiteways Systems,

presented the award to Mr Song Zhankai, a member from DRFT who accepted the award on behalf of DRFT.

The ABU Engineering Industry Excellence Award, which recognizes the most outstanding engineering contribution made by an individual to the broadcasting industry in the region, was awarded to Mr Yong Duk Kim of Korean Broadcasting System for his outstanding contributions to the development of UHD broadcasting.



Mr Chuck Kelly of Nautel presented the award to Mr Haeng Un Jung, Head of Transmission Planning Department at KBS, who accepted the award on behalf of Mr Yong Duk Kim.



The ABU Broadcast Engineering Excellence Award, which recognises contributions of an outstanding nature in broadcast engineering made by an individual in a broadcasting organisation, was awarded to Mr Sunil of Doordarshan India for his contributions to the modernisation and development of Doordarshan.



Mr Masakazu Iwaki, the ABU TC Chairman, presented the award to Mr Sunil.



ABU Technical Review Prizes 2018

ABU Technical Review Prizes were awarded for articles contributed to the Technical Review from October 2017 to September 2018.

There were nine eligible articles for 2018 and three prizes were awarded – one Best Article Prize and two Commended article prizes.

NHK-Japan was the winner of the Best Article Prize for 2018 for the article titled AI-Driven Smart Production. The authors were Ms Yuko Yamanouchi, Mr Jun Goto, Mr Yoshihiko Kawai, Mr Takahiro Mochizuki, Mr Shoei Sato and Mr Atsushi Imai of the NHK Science and Technology Research Laboratories. The article appeared in the July-September 2018 issue and Mr Masashi Kamei, Senior Research Engineer, NHK-STRL accepted the award on behalf of the authors.



Ms Yuko Yamanouchi



Mr Jun Goto



Mr Yoshihiko Kawai



Mr Takahiro Mochizuki



Mr Shoei Sato



Mr Atsushi Imai



Mr Satyajeet Dash

The First Commended Article Prize was awarded Mr Satyajeet Dash, Dy Director General (Engineering), Doordarshan-India, for the article titled Human and Technical Resource Development for Digital File-based Solution for HD/SD TV Workflow, which appeared in the April-June



2018 issue. Ms Supriya Sahu, Director-General, Doordarshan-India, accepted the award on behalf of Mr Dash.



The Second Commended Article Prize was awarded to Mr Mostafa Darjazi, Director of Information Technology and Systems, Planning and Finance Department, Islamic Republic of Iran Broadcasting. His article was titled Analysis of the Information Technology Maturity Level of the units in the Islamic Republic of Iran Broadcasting (IRIB) based on the ISO/IEC 20000 Standard with a Fuzzy Approach. It appeared in the October-December 2017 issue of the ABU Technical Review.



Dr Abbas Naseri Taheri, Adviser to the President of IRIB & Chairman of the Center for International Affairs/Director General of International Affairs, accepted the award on behalf of Mr Darjazi.



Mr Mostafa Darjazi

Mr Hamid Dehghan Nayeri, Director, International Technical Affairs, IRIB-Iran, presented the ABU Technical Review Prizes to the winners.

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The ABU Technology Webinar Series, 15 August – 14 September 2018



Participants from the Voice of Viet Nam (VOV) attending the webinar from Ha Noi

This year, the ABU Technology Webinar series was held from 15 August to 14 September 2018. Participation was offered free of charge to ABU members and others in the industry interested in broadcast technologies and their applications.

The webinar sessions were run twice each day with one morning session, repeated in the afternoon. This was to facilitate the participation of attendees from different time zones. Each webinar session was around 60 minutes long, starting with presentation(s) on the subject matter by experts, followed by a question and answer session.

The webinar sessions were grouped under five main themes,

with a total of 38 sessions over 19 days being presented throughout the month long series. The themes were:

- Digital Radio: Technologies and Implementations
- Audio Enhancements
- Archiving
- IP Technology and Security
- OTT and IBB Technologies

The ABU Webinar series received 402 registrations from participants within and outside the region. The event recorded the attendance of 1,604 participants from 189 organisations in 56 countries. Some ABU members prepared training rooms with AV projectors to allow their technical staff to participate in the webinars together.

The ABU Arranges Study Tour for RTA Colleagues in Collaboration with AIR-India in Delhi



Radio Television of Afghanistan (RTA) plans to establish its own media training centre and, in preparation for this, has been studying the methods of training institutes and university media broadcasting organisations in Asia since 2017, with support from the ABU. To augment this training experience, the ABU arranged another study tour for two RTA colleagues, Mr Farhad Ahmad Noori, Deputy Manager, International News Studio, and Mr Mohammad Ismail Alizai, Director, Local News, in Delhi, India from 6 to 10 August 2018 in collaboration with the national public radio broadcaster, All India Radio.

The two RTA colleagues took a study tour of the National Academy of Broadcasting and Multimedia (NABM), Doordarshan (DDI) and All India Radio (AIR). It was an important and valuable trip for the RTA colleagues. They learned a great deal from these Asian media training centres and observed the differences in the teaching, planning, training methods and techniques from various media organisations.



IBC 2018 Report from National Broadcasting Service of Thailand

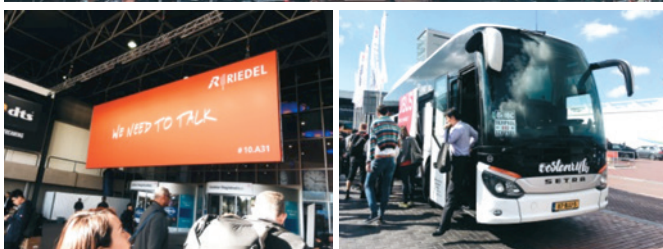


Ms Phattamapohn Bunchoo

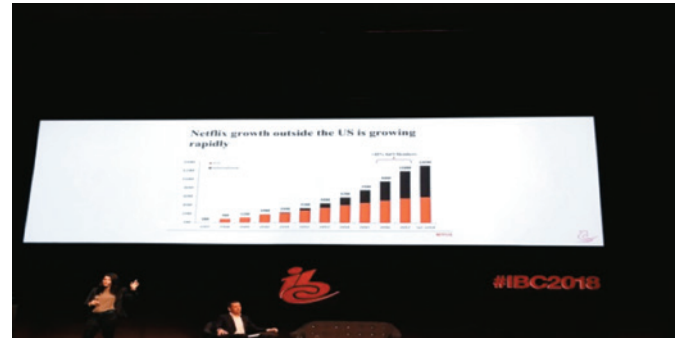
Electrical Engineer.
National Broadcasting
Service of THAILAND

To start, I would like to say thank you so much to ABU and IBC for the continued collaboration which gave me the fellowship opportunity to represent NBT Thailand (National Broadcasting Service of Thailand) at the great event that was IBC2018 at RAI in Amsterdam. I was excited to observe the industry roadmap presentations, future technology progress, new policies and new strategies presented by adept speakers in the conference sessions, with tracks such as Keynotes, Smart connectivity & Multiplay Devices, Lounge talks etc. The exhibition had 1,700 exhibitors spread across 15 halls, showcasing future technology, new solutions for production, measurement, monitoring and control, infrastructure implementations, OB trucks and the latest trends in technologies.

I was very interested in Netflix's growth story presentation, because the platform is growing so rapidly in The USA and internationally. Audiences can join Netflix through multiple platforms such as smart TVs, mobile devices (phone and tablets), cable and ISP set-top-boxes, PCs and laptops and internet TV devices, all of which can display 4K with HDR quality.



In the conference sessions, I learned about 5G-Trials at the PyeongChang 2018 South Korea conference. The characteristics of 5G are developments from 4G, and offer ultra-high speed (20 Gbps), ultra-low latency (1ms), hyper connectivity and can support up to 16K UHD TV, Connected car and IOT. 5G service trialed at the February 2018 winter Olympics allowed athletes, visitors and spectators to experience data transmission 10 times faster than 4G which, seen for the first time, was at once surprising and stunning



Another interesting topic was, 'The big picture – Where next for TV, as TV and digital media collide and converge?'. This session, led by four industry experts, shared experience and ideas about the biggest challenges for commercial broadcasters, with changing viewing patterns over the next five years and the role of business players in the TV market, etc. This showed me ways to study and develop in my work.



In the future zone, I was surprised by the spherical drone display by NTT Group. At 88 centimeters in diameter and weighing in at 3.4 kilograms it had a spherical LED display frame from top to the bottom. It flew above the crowd displaying information and advertising for companies who wanted a new way to present their products at the event.

The innovation and new technologies showcases in the Exhibition halls included 8K satellite broadcasting. NHK (Japan Broadcasting Corporation) is researching and developing practical 8K equipment to produce more attractive programmes. This exhibit let me watch 8K Super



Hi-Version programmes in a 'living room' in the NHK booth. It had an 88-inch 8K OLED (Organic Light Emitting Diode) display, together with a 22.2 multichannel sound system with discrete loudspeakers. There I enjoy the 8K program "Amazing Nature in YELLOWSTONE". Widespread use of 4K/8K viewing at home is expected from 2020.



I could not miss the DVB booth, due to its leading digital media and technology and a commitment to designing open technical standards for digital TV delivery and more. My organisation uses DVB-T2 for digital TV. This booth showed me the next steps in DVB-T2, which will be updated to support a second generation DVB-EWS (Emergency Warning System) with fully backwards compatibility. DVB has also developed a specification called DVB-SIS. The concept is to derive content and metadata from one delivery path for re-delivery via other paths, called respectively Parent and Daughter.

High speed camera ROBOTICS appeared in the exhibition hall with high specifications, such as 'the fastest camera robot in the world', ultra-high speed camera movement and robotic-hand image captures.



In the live-streaming camera section, a new camera created a multi-camera production from a single camera. Shooting in full 1080p HD and recording at up to 4K, it can stream live to any platform from virtually anywhere via Wi-Fi or LTE. In addition it can be zoomed, panned and cut in real-time.



The exhibition had more innovations, such as the Big Crystal LED display, Android TV certified set-top-box, remote production over an IP network with low latency, a smart wireless broadcasting system for live TV on the road, High quality cameras and lenses, lighting innovations and many others.

Importantly, at night, IBC2018 showed a complimentary Big Screen presentation of 'Jurassic World; Fallen Kingdom' and 'Incredibles 2' in 4 Dolby Vision and Dolby Atmos. Moreover, IBC2018 featured the IBC TV, awards for Innovation and stand design, The Tech Talks and Cyber Security Forum featured discussions among Chief Technology Officers, Chief Information Officers, Chief Information Security Officers and Chief Digital Officers, focusing on how to effectively manage cyber risk in broadcasting. Indeed, this became the hot topic in IBC2018.

In closing I must again thank the Asia-Pacific Broadcasting Union (ABU) for sponsoring my visit on behalf of NBT-Thailand. It was a most valuable opportunity and wonderful experience for me. I was really happy and greatly enjoyed this visit to the great event, IBC2018, in Amsterdam. Thank you.

IBC 2018 Report from Radio Television Malaysia

Introduction

I would like to extend special thanks to ABU, Radio Television Malaysia (RTM) and the Ministry of Communication and Multimedia, Malaysia for giving me this huge opportunity in order to be exposed and to be a part of the discussion on content and delivery for effective information distribution sufficient to our future needs.

IBC is an annual event, organised by the RAI Exhibition Centre in Amsterdam, Netherlands. This year 12 to 16 September 2018 were reserved for the conference. In parallel the big exhibition, ran from 13 to 17 September 2018. There were 57,000 visitors, 30,000 decision makers, 1,700 Exhibitors, 700 press representatives and 400 speakers from 170 countries all around the world.

IBC 2018 was divided into four (4) segments, which were Conference, Executive Forum, The Big Screen and the Future Zone area.

Conference

Global Gamechangers day brought creative, technology and business chiefs such as Zahra Rasool from Al Jazeera, Peter Salmon from Endemol and Lindsay Pattison from WPP to the stage.

Executive Forums

The discussion 'The boundary of Media and Communication Industry', addressed industry evolution and market needs. As we know the Information Technology is taking over many human needs and it is accessible at any time. Implementation of Internet of Things (IoT) will allow limitless boundaries and ease the requirement for daily activities such as searching, storing, sharing and publishing information at the tip of one's fingers. To make this a reality requires merging of industries in order to produce the very sophisticated tools needed to meet and boost market demand.

The Big Screen

We observed the effects in Game of Thrones and Pixar's Dominic Glynn talked about the animation marvel that is The Incredibles 2, and how things had changed in the 14 years since the original movie. Experiences behind the scenes were shared, such as production special effects and how they affect daily life. Feel good factor and success stories, being discussed as during pre-production, production and post-production highlighted the impact for the producers and the community.

Future Zone

Presentations from researchers and academic bodies developed the ideas which may become hit products five years from now. A lot of findings and proposals were presented. Artificial Intelligence (AI) technology requires a huge database which is getting nearer to implementation. But, there are limitations to accessing some data, due to ownership and considerations of a Personal Data Protection Act. Without broad access it is almost impossible to obtain and generate the information required to implement AI.

The Social Media Revolution discussed the trending of Social Media where users of such platforms require sharing of information and getting instant feedback.

Real Time Messaging Protocol (RTMP) Rules, widely implemented in most new broadcast equipment. Still, depend for effectiveness on infrastructure availability, especially on Internet Service Providers (ISP) and concurrent numbers of users.

Internet Of Things (IoT) utilisation is facilitated where most equipment nowadays is IoT compliant. IoT allows a lot of information to be gathered along the way and developments in Artificial Intelligent (AI) will allow us to manage that information.

Production Implementation becomes more realistic with

stable IP infrastructures and effective compression with multiple applications moving towards transporting Huge Data. With the SMPTE ST2110 guideline, the manufacturer, system integrator and end-user enjoy the benefit of versatility of solutions using the same standard. Baseband over IP may grow very fast and theoretically this will make the production operation costs more reasonable. However this it is still dependant on how good the IP infrastructure is and how reasonable the subscriptions.

In the future Push By Audience Segmentation will increasingly contribute to the effectiveness of content production for specific target audiences determined by the input from these audiences.

Current Developing and Existing Technology

Throughout the 5-day exhibition, it was well noted that IP Stream Technology has been widely introduced, especially in telecommunications industry. Currently, IP Stream Technology only focuses on audio and data transmission since the data carried is not comparatively large. But as we move forward and IP Stream Technology embraces more efficient compression technologies, higher resolution broadcast-quality video will be transmitted using the same media. This could be seen as an extension of what we have witnessed in, say, the evolution from mpeg4 or h.264 to .ts format. Additionally, IP Stream Technology can be used for two-way communication such as IFB (Interrupt-Fold-Back) and Low-Res Visual Monitor. All these are possible options I can use for IP Production (News and Programmes), where it seamlessly facilitates communication between the Production Gallery and Studio Floor.

Personal Experiences and Interests

One of my favourite experiences during the 5 days exhibition was observing the vast growth of advanced Artificial Intelligence (AI), introduced by a major database companies worldwide. AI has been used widely in Social Media (SocMed), especially Facebook and also in mobile operating systems such as iOS and Android. Major database companies have also been selling AI to other industries such as military and security-based company to expedite the information required by such agencies. Previously, the AI concept was fed manually by keying-in all the required data. However, the latest automated implementations of AI in the broadcasting industry, especially in news and sports media, will offer faster searching and analyses.

As an example, all the footage received from in-field reporter on a particular day traditionally feeds only one specific event along with a press release. Now, with the new AI technology, additional information can be generated in the forms of text, audio, video and moments. The editorial team will be able to obtain new inter-related data such as the environment in the field, such as what happened before the event, who is tagging along even, down to details like the type of car that someone is driving! In short, analyses can be done more easily and widely without any important features being missed..

AI is however limited if restricted only to our own database. In the future, integration between media sources, including footage and data, will allow more useful information to be gathered and analysed. Not to forget, the wide usage of AI must also come with enhanced hardware capabilities, networking, infrastructure and powerful processors.

In summary, this visit was good exposure for me to experience the 'winds of change' in the broadcast industry and it has contributed much to my potential for being a better influencer of decisions regarding the our future broadcast requirements.



Ahmad Shafiq Mirza Bin Mansor
Assistant Director,
Engineering
Radio Television Malaysia
(RTM)

Regional Workshop on

OTT and IBB Technologies and Services

23-25 October 2018, Kuala Lumpur

The ABU in collaboration with the Asia-Pacific Institute for Broadcasting Development (AIBD) conducted a regional workshop on Over-The-Top (OTT) and Integrated Broadcast Broadband (IBB) technologies and services from 23 to 25 October 2018 in Kuala Lumpur.



The three-day workshop addressed some of the main market trends with the latest features and advancements of OTT and IBB technologies and services. Case studies from Asia-Pacific region were also presented with some reference to European implementations. Over sixty participants from thirty-four organisations in eighteen countries attended the workshop. Eleven speakers were from broadcasters, solution providers and industry.



Mr Ahmed Nadeem, Director, ABU Technology & Innovation, opened the workshop and welcomed participants. The ABU started this series five years ago in 2013 and since then many changes have happened. He reviewed the development of OTT and IBB technologies around the region and beyond. OTT has become one of necessities for any media organisations that want to increase their content distribution. IBB now are the way forward to take the benefit of both traditional broadcast as well as Internet connection. Broadcasters should consider taking this into their strategies and go forth with it. Technology providers like CDN (Content Delivery Network) providers and others solution providers are very deliverable to help. The workshop is a chance to know-how the OTT and IBB technologies are developing and how CDN providers are helping broadcaster. This is also a chance for participants to interact, get in touch with experts, industry speakers, solution providers and other colleagues from broadcasters. He thanked participants and speakers for their participation, contribution and supports over the time.

Mr Utpal Kanti Mandal, Programme Manager, AIBD, welcomed participants and gave a short introduction on the AIBD and its activities. He presented an overview of programme, aims and objective of this year workshop.



Mr Utpal Kanti Mandal, AIBD

On day 1, speakers focused on the latest features and advancements of OTT and IBB platforms. Ms Mardhiah Nasir, Vice President Sales, Integriti Padu, Malaysia, began the first session with a presentation titled "Future of TV – What will be the Focus for Broadcaster, Telcos and Content Providers". She started with a market landscape that is happening around Asia. Broadcaster, Telcos and Content Providers were three deference areas and deference markets but they are now combining, converging and consolidating. Five key areas really driving the OTT trend right now are Internet Bandwidth, Battle of Screen Time, F.A.A.N.G (Facebook, Amazon, Apple, Netflix and Google), Battle of Wallet Share and the Five Secs Rule. Voice-activated artificial intelligence (AI) is now helping you navigate media and entertainment experiences. Five conclusions were:



Ms Mardhiah Nasir, Integriti Padu

- Internet TV will continue to grow across all markets for the next 5 years
- Local player must have GAME PLAN – EXECUTION to scale in online video
- Content spend in Asia growing at CAGR 5% from US\$ 21 billion in 2017 to US\$ 31 billion in 2023
- Consolidation and Convergence – Content Provider, Telco and Broadcaster lines will be more blurred out.



Mr Masaru Takechi, NHK

Mr Masaru Takechi, NHK Engineering System Inc, Japan, presented the latest advancements and developments of Hybridcast. The new version of Hybridcast standard (Japanese version) has been released recently and the English version will be available soon. He gave an overview of current Hybridcast services on the market and analysed the deployment statistics. The shipment of receivers is increasing gradually and reached 8 359 000 units as of August 2018. Thirty-one broadcasters in Japan have experience to offer services include six of seven major broadcasters and one regional broadcaster in Tokyo and two satellite broadcasters offer the services daily. Many regional broadcasters offered trial services (including MPEG-DASH 4K video experiment). Companion screen is an important entrance to escort viewers to TV. Companion Screen (CS)-centric model is necessary to improve UX (user experience) that is problem of TV-centric model. The harmonisation between Hybridcast and HbbTV 2 was also mentioned with the way to approach and how to share software between two platforms. The technical development continues with Hybridcast Connect X, harmonisation with other systems etc.

We had the latest features and updates on HbbTV given by Mr Mika Kanerva, COO, Executive Vice President, Sofia Digital. OTT and streaming services are coming and they will not kill TV, Internet is making TV stronger. Taking the advantages of Internet video services into TV will be the receipt for the success in the future. The remarkable news is that HbbTV



Mr Mika Kanerva, Sofia Digital

2.0.x is coming with HEVC/UHD/NGA (Next Generation Audio) etc., media synchronisation and better HTML+CSS support. Seven new companies join in HbbTV i.e Google, Sky, RAI, Skyworth. Another interesting thing is Content Substitution with audio and/or video replacement, localised or personal experience and Ads replacement functions. Most of productions and services are still using HbbTV 1.5 while 2.0.x is coming. HbbTV Operator Apps gains a lot of interest and DVB-I project are also interesting trends to highlight. He then presented on key facts and status of HbbTV in Europe as well as over the world. Most of new smart televisions in South-East Asia have HbbTV capability build-in already. One of challenges in HbbTV is how to reach households who do not use DVB signal. HbbTV Operator App is a solution that allows everyone with compatible SmartTV to access HbbTV services using any Internet connection without connection live to TV-signal.



Ms Teresa Cheung, Eurofins Digital Testing

Ms Teresa Cheung, Managing Director HK, Eurofins Digital Testing, focused on QA (Quality Assurance) strategy, cybersecurity and how to do cybersecurity assessments in the media distribution industry. Broadcasters are trying to capture more audiences to stay competitive by going online but with that, they also have to compete with global service providers e.g. YouTube, Facebook, Netflix, etc. in an intense global screen time competition. Audience measurement provides a “feedback” loop for broadcasters to understand their audience’s habits and interests, which enables adjustment to revenue strategies. “Quality” in media distribution can be divided by deferent purposes like content, advertising, App functions, device, CDN, new releases, content security, cybersecurity and future features. Six recommended testing types include conformance (hardware & software standards), compatibility (network, platform and third parties), functionality, stability, performance and security. Test automation helps to increase the speed of product developments and release cycles. It also improves the focus of manual resources which results in better productivity. Above all, test automation makes sure your end product or service works as expected. Cybersecurity can be divided in four type assessment services, compliance services, device security services and security strategy & governance. Details about organisational cybersecurity and device cybersecurity were also explained with examples.

On the cybersecurity side, Mr Ahmed Nadeem also highlighted some activities that the ABU have been doing in his presentation in day 2. The ABU has set up a study project focus on the cybersecurity area and will continue the collaboration with other sister unions and industry to share threat information, actions taken and preventive methodologies. The ABU will continue to address the issue through seminars, workshops, conferences, reports, recommendations, guidelines, best practice methods etc.

Mr Jiri Vorisek, Chief Marketing Officer, Hybrid, gave a presentation titled “Reality Check: IBB is not the Next Big Thing. It is Now Big Thing”. IBB helps to attract more TV viewer by new content development features: VOD, social engagement, gaming, polls & news, questionnaires, customisation, commercial VOD and so on. HbbTV must generate profits and values for market (TV channel and viewer). It used to be technology but now it is business. HbbTV allows delivering online advertiser source not only to smartphone, tablet, notebook, PC but also TV. The power of HbbTV and its benefits for broadcasters are:



Mr Jiri Vorisek, Hybrid

- Wide range of targeting methods
- Cross channel campaigns on multiple TV groups
- Cannot be unnoticed, without effect of “banner blindness”
- Online metrics reporting
- Absence of ad blockers

The principle is to distribute content via three layers: Commercial layer for creating money, Menu layer for main video and Self-promotion layer for communication and all of these layers can be personalised. Mr Jiri Vorisek also shared a successful case study on how Prima Group (Czech Republic) develops and implements its HbbTV services.



Mr Asaad Sameer Bagharib, Thinking Tub Media

Presentations of day 2 and day 3 focused on OTT and IBB business models, implementations, case studies and hands-on demos. Mr Asaad Sameer Bagharib, Director, Thinking Tub Media Pte Ltd, began day 2 with a presentation titled “From Broadcasting to IP-tising - the Recipe for Survival”. The broadcast industry is facing a challenge of epic proportion brought about the advent of digitalisation and the Internet.

These have led to major shifts in the way media is consumed today. The bigger and well endowed broadcast organisations have been able to embrace the new platforms quickly by building their own in-house infrastructure as they have the financial and human resources to do so. Unfortunately, the smaller broadcasters are caught in a major dilemma. Dwindling viewership results in lower advertising revenue that leads to cost-cutting. It is very hard to justify new capital expenditure to enable building the necessary infrastructure to distribute to the new platforms. What can these broadcasters do to get out of this conundrum? Fortunately, there are cost-effective IP-tisation solutions for broadcasters to consider.

The presentation first outlined the major developments that have brought a quantum shift in the media creation, management and distribution workflow. Then examine what some big broadcasters have done and what are the cost-effective solutions that smaller broadcasters can employ to embrace the new media landscape without burning a big hole in their pockets.

Mr Stefan Meltzer, Fraunhofer IIS focused on MPEG-H audio system and its solution for broadcast, OTT and VR/AR (Virtual Reality/ Augmented Reality). The presentation covered the features of the MPEG-H audio system and the current status of the implementation in different standards as well as in operation. The impact on the existing broadcast infrastructure were explained. MPEG-H audio is now also a part of the latest HbbTV standard and can be used with DASH (Dynamic Adaptive Streaming over HTTP) streaming applications. During the football World Cup this year, Fraunhofer IIS conducted an OTT trail with NRK showing the advanced features of the MPEG-H audio solution. Target markets of MPEG-H audio include mobile; over-the-air, IPTV, cable and satellite TV services; OTT video services and immersive music services.



Mr Stefan Meltzer, Fraunhofer IIS



Mr Geoffrey Low, Dolby Laboratories

Another valuable presentation on the audio side was given by Mr Geoffrey Low, Staff Content Engineer, Dolby Laboratories. He took an overview of Dolby technologies experiential trends on OTT platforms and how it can enhance the user experience. The success of OTT services will hinge on operational flexibility,

creativity with business models, technical agility and the top notch is content and superior user experiences. Dolby helps to advance the science of sight and sound to create and enable spectacular experiences. Dolby Atmos are applied for broadcast/OTT by scaling the data with Spatial Coding concept. Spatial Coding converts an object based cinematic mix into a manageable set of audio elements. Listening Tests with content creators confirm spatial encoding process provides perceptual transparency to the original cinematic mix in a 7.1.4 playback environment. Spatial Coding allows object-based audio to be delivered to the maximum capability of the home AVR systems.



Mr Bram Tullemans, EBU

Mr Bram Tullemans, Senior Project Manager, Broadband Networks & Software Platforms, EBU Technology and Innovation Department, EBU, had a video presentation on EBU/Eurovision Flow multi-CDN project. Broadcasters are delivering more and more channels online and TV set is becoming the main screen for streaming. Flow measures media delivery performance of the whole Internet and selects the optimal content delivery network to reach member audiences. Therefore, it helps to reduce members' online delivery costs whilst improving quality of service. Key objectives of Flow are improve quality of online delivery, reduce the cost, no single point of failure, unrivalled capacity and robust network.

On the receiver side, OTT on Android TV topic was presented by Dr Leon Mun, Head of OTT and IPTV, SW Asia R&D, Sony EMCS, Malaysia. Android TV has been gaining momentum in the market and more OTT applications for mobile devices have been translating for Android TV. After analysing the differences between mobile OTT app and Android TV OTT app, Dr Leon shared his experiences on how to port a mobile OTT app to Android TV. The advantages and benefits of using fully featured Android TV app were also emphasised on three aspects: operator/broadcaster, user and TV manufacturer.



Dr Leon Mun, Sony



A case study was presented by Ms Imaliana Muzni, Engineer, Broadcast Technology, Media Prima Berhad. She focused on DTV service setup and challenges of developing and implementing IBB services in Media Prima. Participants also experienced several hands-on demos from Sofia Digital, Hybrid & Benchmark Broadcast Systems (S) Pte Ltd; Fraunhofer IIS, SONY and Media Prima Berhad during the three days of the workshop.



Ms Imaliana Muzni, Media Prima



The workshop ended with a half-day tour visit to RTM in the afternoon of day 3. RTM colleagues introduced the Media City project which is underway to upgrade its broadcast infrastructure with modern broadcasting facilities including virtual studio, music and television studio. Participants were briefed on how RTM developed and operates its OTT platform MyKlik. The RTM research and development team also gave an update on its IBB system. There was a big discussion to exchange experience on other IBB systems like Hybridcast, Tonton and Toggle.



Digital Radio Broadcasting in India

1. Radio Broadcast Scenario in India

Radio broadcasting is one of the most popular means of mass communication in India, largely owing to its wide coverage, mobility and affordability.

Terrestrial radio broadcasting is carried out in India on Medium Wave (MW) (526-1606 kHz), Short Wave (SW) (6-22 MHz) and VHF band II (88-108 MHz).

All India Radio (AIR), the public service broadcaster, used to be the sole radio broadcaster in India. It has a vast network of 670 transmitters – 48 Short Wave, 139 Medium Wave and 483 FM – covering 99.2% population of the country via the very popular MW and FM. For radio listeners in neighbouring and other countries, AIR broadcasts in 27 languages (15 foreign and 12 Indian) for almost 72 hours daily, covering over 108 countries.

Private participation in radio broadcasting in India was introduced in the year 2000 by allowing private radio stations to broadcast programmes with local content on FM. At present over 330 Private FM stations are operational and the Government has announced plans to expand their number.

In addition to the public service broadcaster AIR and private FM radio stations there are also Community Radio Stations (CRS) broadcasting in India. The Government allowed these to be set up so that communities can focus broadcasts on particular issues to do with local life and activities. These are low-power FM radio stations. About 200 CRS are operational and their number is being expanded.

2. Digital Radio Broadcast Standards

Considering the audio quality issues encountered by terrestrial analogue radio transmissions, several digital audio broadcasting standards have been developed. Three major standards in use worldwide for digital radio broadcasting are – **DRM**, **DAB/DAB+** and **HD Radio**. All three standards are recommended by the International Telecommunication Union (ITU). Different countries have adopted a particular standard depending on the time of digitalisation, existing broadcast legacy, broadcast coverage requirements and other factors.

DRM is the latest digital radio standard and was introduced in 2003 for MW and SW bands (AM) and 2011 in all three VHF bands. It is the most technologically advanced global and open digital radio standard and works in all frequency bands (both AM and VHF bands). DRM is a digital radio standard in direct succession to its analogue

predecessor technologies AM and FM. With its bandwidth of 96 kHz per VHF band transmission, it **matches existing ITU-conforming channelisation and frequency regulations**, and puts **full ownership** of the technology, its deployment, product development and roll-out in the hands of the broadcaster and the industry. It allows for multiple FM-like radio services plus associated data such as multi-lingual news articles to be carried in place of or as an extension to the former analogue radio services, while maintaining the large-area service coverage of the AM bands.

Irrespective of the digital standard used for domestic coverage, most of the leading broadcasters in the world are using DRM for their external services, as this is the only digital standard available for the SW band. As per the information compiled by the HFCC (<http://www.hfcc.org/drm/>) some of the major external broadcasts available in the world via DRM are from – BBC World Service, Radio New Zealand, Radio France International, Voice of Nigeria, Radio Romania International, Radio New Zealand, Radio Vatican, NHK, China National Radio, Ministry of Information – State of Kuwait, Bit Express (Germany) and AIR.

3. Digital Radio Broadcasting in India

After considering and testing the most popular digital standards AIR decided fairly early on, to take advantage of the great benefits offered by the only global, all band digital sound broadcasting standard recommended by ITU, Digital Radio Mondiale (DRM).

A regular digital transmission in SW was started by AIR on 16th Jan 2009 from a 250 kW transmitter in Delhi. In April 2010, the Government of India approved AIR's Digitisation Plan on MW and SW using DRM transmitters as Rs 9.20 billion were earmarked for AIR to convert 35 MW and 3 SW transmitters to DRM digital. Use of the DRM standard by AIR was further endorsed by a high-level committee in January 2014 in their report entitled, "Report of the Expert Committee on Prasar Bharati".

As per details available on the official website of AIR (www.allindiaradio.gov.in), 35 MW transmitters of power ranging from 20 kW to 1000 kW (having total power of 7,020 kW), are operating in DRM – 2 of these in pure DRM and 33 in simulcast. 25 of these are working in pure DRM daily for one hour. A Committee constituted by AIR has recommended gradual increase in time of digital transmissions from MW DRM transmitters.

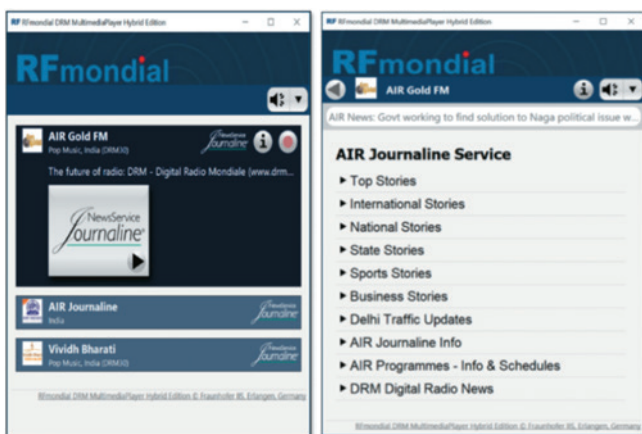


Yogendra Pal
Hon. Chairman,
DRM India Chapter

xHE-AAC coding is being used by AIR for better audio quality. At present this is installed at 5 DRM transmitters. It is expected that AIR will buy new content servers for the other transmitters so that full features of DRM can be available from all the DRM transmitters.

AIR in Bengaluru has added on their website (www.airbengaluru.com) a dedicated section called Listen Live. DRM features there prominently under the heading: 'DRM Digital Radio Bengaluru'. The two best known AIR programmes, Vividh Bharati and AIR Gold FM, can be accessed and listened to on this site with exactly the same excellent quality as the one experienced during the terrestrial DRM transmissions. In addition, Journaline advanced text is also accessible on that site. The AIR Bengaluru site can be accessed easily on any type of device, including smartphones.

Here is an example of the AIR Bengaluru on-air monitoring service, with current DRM programmes and the 'AIR Journaline Service' text content (including latest AIR news on various topics, 'EPG' programme information and schedule, DRM updates, and AIR contact and background information).



AIR has successfully carried out tests of the Emergency Warning Functionality (EWF) embedded from both the DRM MW transmitters installed in Delhi. The tests were carried out in association with the National Disaster Management Authority (NDMA).

AIR is publicising the availability of their DRM programmes on social media platforms and on air. There are also messages on the availability of car models with DRM line-fit receivers. Two AIR SW transmitters also carry DRM programmes. Two more SW transmitters, 100 kW each, are being tested in Delhi and they are expected to be operational soon. On the 5th and 6th June 2018, AIR in Delhi tested these newly installed transmitters in the DRM mode. The schedule was: 0400-0630 UTC (0930-1200 IST) on 9950 kHz beamed to South India (Pure DRM, Channel A – Urdu Service, Channel B FM Rainbow).

Aware of the advantages of digital radio broadcasting, the Telecom Regulatory Authority of India (TRAI), the regulator for all broadcast services, issued a recommendation on 1st Feb 2018, recommending that the Ministry of Information and Broadcasting should allow private broadcasters to broadcast in the digital white spaces available in the VHF

band II. This recommendation is under consideration by the Ministry. The Ministry also held a meeting devoted to the issue on 30th Aug 2018. All stakeholders (public and private) were in favour of digital broadcasting in VHF band II and suggested that the Ministry announces a regulatory policy as soon as possible. Cellphone manufacturers also gave their support provided no additional costs were involved. In the meeting the AIR Director General announced that AIR had also decided to use the DRM standard for digital transmission in VHF Band I.

4. Availability of DRM Receivers

A digital receiver is required to receive digital radio broadcasts as analogue receivers cannot decode the digital signals. But most of the available digital receivers decode only one digital standard (and analogue). There are already prototypes of multi-standard digital receivers, but any standard addition incurs IP costs and would be therefore costlier than a single standard receiver, be it as standalone, car or mobile.

One of the welcome features of the current roll-out of DRM in India has been the early and overwhelming commitment of the car industry, which is already equipping new car models with line-fit DRM radio sets at no extra cost to the consumers.



Keeping pace with the digital radio developments, the car receiver industry in India has invested millions of rupees in the domestic development of DRM digital radio receivers and chipsets. It is pleasing to see that the roll-out of DRM equipped cars is growing rapidly outstripping growth in other parts of the world. At the end of 2017 this number was estimated to be about half a million cars. At present the number is understood to have surpassed the one million mark.

In parallel, efforts are being made by a large number of Indian and foreign receiver manufacturers to provide standalone DRM receivers. These remain relatively expensive. Like with any new technology increasing volumes will make the cost of these receivers come down.

An App for digital VHF band II reception on mobile phones has been already developed. However, the industry wants to

see the publicised policy of the Government before making the necessary adjustments and working improvements to the App.

4.1 Cars with line-fit DRM Digital Radio Reception

Most of the leading car manufacturers in India have either already incorporated DRM receivers in their cars or are in the process of incorporating them. The increase has been spectacular in comparison with similar digital radio rollouts in other established markets in the world. Indian listeners benefit already from the domestic car industry's joint effort to provide the in-car DRM functionality as a line-fit option for new models without any charge to the consumers. In comparison, other digital radio markets elsewhere in the world have needed decades to reach this level of commitment. In these markets car manufacturers expect the buyers to pay extra if they want to enjoy digital radio.

Hyundai installs built-in DRM radios in all its models except one. After incorporating DRM receivers in all variants of **Elantra, Tucson, Grand i10, Xcent, Verna** and **Elite i20** models, Hyundai launched **Creta** and **i20 Active** in May 2018. From Oct 2018, another low cost model called **Santro** is fitted with line-fit DRM receivers, too.



Creta and i20 – May 2018; Santro – Oct 2018

Maruti Suzuki has also incorporated DRM receivers in 6 models (three of them pictured below) and all their models are soon expected to have built-in DRM receivers.



Mahindra has also installed DRM in its TUV model.



Radio in India is driven by listening in cars, which explains the paramount importance of the early-on commitment of the Indian automotive industry to DRM for the ongoing success of India's digital roll-out programme.

4.2 Standalone DRM Radio Receivers

In the past 18 months there has been an increased activity and commitment to produce standalone DRM radio receivers.

4.2.1 Communications Systems Inc. (www.avionelectronics.in) is the first radio manufacturer in India to domestically develop and produce a DRM receiver (AV-1401), an ambitious full-featured digital radio. It offers a colour screen display, stereo speakers, built-in chargeable battery with 10-hour capacity on full charge, external power source connection, detachable remote control, recording and playback from an external source and a full-fledged media player for all types of digital content. In terms of digital radio reception, it supports all the DRM-specific features including Journaline advanced text and Emergency Warning Functionality (EWF). As part of the company's continued commitment to DRM in India, the model was recently updated and easily meets the DRM's minimum receiver requirements as recommended by the DRM Consortium. Enhancements through the newly improved model include superior sensitivity, enhanced support for EWF with provision to switch on the receiver automatically on EWF alarms, even from deep-standby, and a bigger and improved LCD screen. The upgraded unit can receive AIR DRM signals of both the transmitters in Delhi in very good quality even inside the buildings. The company is in the process of supplying AIR with receivers and has received orders for export, too.



Several additional Indian companies are also in the process of designing/developing DRM receivers.

4.2.2 Inntot Technologies (www.inntot.com), a young start-up enterprise in India, which won the Confederation of Indian Industry (CII) Industrial Innovation Award 2017 and several other awards, has developed a software-based DRM receiver based on a generic processor. It also meets all the specifications for the Minimum Receiver Requirements, supporting all DRM core functionality such as Journaline advanced text and EWF. The design has been field tested in a number of cities in India and it is expected to be very cost effective.

Recently it was announced that the Software Defined Radio (SDR) startup Inntot Technologies has raised about US\$ 0.5 million in its seed round from early-stage venture capital firm Unicorn India Ventures for developing DRM receiver solutions and other digital radio products. "The USP of our solution is that it runs on generic hardware thus making it an affordable solution for the OEMs. We are also exploring the mobile phone segment to use our SDR solution for radio reception," declared Rajith Nair, cofounder, Inntot, to the Economic Times of India. The company is open to collaboration for its projects and for the manufacturing of their solutions. While the first models included solutions for DRM in AM, provision for DRM in the FM band is also planned to be incorporated in the unit soon.

4.2.3 GeekSynergy (www.geeksynergy.com) another start-up company in India given awards by the President of India and the Karnataka Government, is working on the development of a highly affordable yet full-featured DRM receiver, which is likely to be showcased soon. The company is also working on incorporating DRM into smartphones using one of the most well-known chips.

4.2.4 Gospell Digital Technology Co Ltd (www.gospell.com) located in China has presented a very well-reviewed DRM Receiver, GR216, which is already in production. These units can receive DRM signals in the AM and VHF bands for large-area and local services, respectively. Core DRM features such as Journaline advanced text and EWF with automatic device-wake-up from deep-standby are supported. The model has obtained CE certification for international distribution, including to Europe and is on sale in Australia. In addition, Gospell is developing a DRM receiver dongle, GR-227, which can be plugged into existing audio systems in automobiles via USB ports or Aux input, to receive DRM signals. In June 2018 this was even highlighted in the Tweet feed of AIR's DG. This receiver model will allow legacy cars, already on the road with analogue AM and FM receivers to be upgraded to DRM digital reception through this simple add-on device.



4.2.5 Titus SDR (www.titusradio.com), a Panamanian based company, has developed a multi-standard and software-based digital radio receiver, supporting DRM in all bands (LW, MW, SW, VHF bands I, II, III), FM analogue including RDS and AM analogue including AMSS. The full feature set of DRM functionality is supported by this device, including Journaline advanced text with full Unicode multi-script support, Slideshow images, EWF, transparent file transmissions (e.g. for educational services, when combined with the power of the full integrated Android based tablet), EPG/SPI, service logo download, etc. In addition, the model features a Wi-Fi hotspot feature, which allows all Wi-Fi enabled mobile devices to connect to the Titus and receive all the DRM services, including audio streaming and Journaline, using their standard web browser. The Titus receiver was showcased at the IBC Exhibition in Amsterdam, at HFCC meetings and at the 2018 DRM General Assembly in Spain. The company is offering an innovative OEM model for production to interested markets by encouraging local expertise and manpower – another excellent open solution ideal for joint ventures.

4.2.6 Starwaves GmbH (www.starwaves.com) – The firm, which developed the world first commercial solution for automotive DRM reception in 2006, recently presented a prototype DRM (and DAB) receiver. The DRM receiver works in MW as well as the VHF bands. Depending on features and order quantity, the firm is offering the range at very competitive prices.

5. AIR in Phase-II of the DRM Roll-Out

So far, the national DRM roll-out project by AIR focused on establishing the transmitter network all over the country (which was successfully concluded). It is now the time to concentrate on optimising the DRM coverage and service quality, while also finalising the content offerings with additional audio services and the innovative advanced DRM features such as Journaline advanced text. Those enhanced DRM services with greatly improved coverage and audio quality, along with Journaline and service logo transmissions, have already gone on-air in Delhi, Bengaluru, Chennai and Pune. Remaining DRM transmissions throughout the country need to be upgraded in order to offer the full DRM experience.

This ongoing AIR activity aimed at upgrading the services in order to offer the full DRM experience is on the agenda of the interested stakeholders who meet regularly. In a recent high-level Round Table held on 10th October 2018 in New Delhi, the stakeholders put forward several ideas and suggestions including:

- i. Introduce pure DRM broadcasts during peak travel times in the morning and evening, increase these transmissions as suggested by the committee set up by AIR, announce a roadmap for switch-off of analogue transmissions in MW and allocate time slots on AIR MW network in pure DRM to private broadcasters.
- ii. As recommended by TRAI, Government is encouraged to announce a roadmap for digital radio broadcasting in VHF band II (FM band) by private broadcasters and AIR should also announce a similar plan so that industry (cellphone, automobile and standalone receiver manufacturers) can gain confidence to start the mass production of receivers.

- iii. Consider giving incentives to the private broadcasters to start DRM services and to the domestic DRM receiver manufacturers so that standalone DRM receivers are available in ever increasing numbers at affordable prices.

6. Road Ahead

As already demonstrated, a lot has been achieved in India recently by AIR, experts, the industry and the DRM Consortium. AIR has the opportunity now to explore the full potential of DRM digital broadcasts so that radio listeners see the benefits of acquiring and using digital radio desktop receivers and line-fit DRM radios in cars.

Work is also being done to find the best solution for fitting DRM into **mobile** handsets, ensuring at the same time that

radio remains indeed free to air on such devices; a key element to ensuring listeners' interest.

India is now in a leading position worldwide as it is rolling out digital radio nationally using the DRM standard. This offers **great cooperation and product export opportunities** into countries all over Asia-Pacific and beyond. After the development of the DRM radio standard, a large number of countries, such as Russia, South Africa, Indonesia, Pakistan and many more, have started the process of adopting and/or rolling-out DRM for national coverage in MW, as well as VHF bands. In addition, a huge portion of the world's population is already covered by DRM transmissions on international shortwave. The Indian electronic industry sees this as a great opportunity to meet the domestic demand but also export and fulfill the **Make in India** mission of the Honorable Prime Minister.

author

Yogendra Pal

Hon. Chairman, DRM India Chapter

Yogendra Pal is the Honorary Chairman of the India Chapter of DRM Consortium, the international not-for-profit organisation which has been created for the development and implementation of the DRM standard for the digitisation of the terrestrial radio transmissions. He is also the honorary member of Board of DRM Consortium.

He was Advisor with the Ministry of Information & Broadcasting, for the implementation of Digitisation Addressable System (DAS) in the Cable TV network in the country and was closely associated with the strengthening of the Community Radio network in the country.

He superannuated from All India Radio & Doordarshan as Additional Director General after over 36 years of glorious service and was associated with implementation of state-of-the-art fully digital studio setup (New Broadcasting House) in Delhi; News-on-Phone, Internet and AIRNET services and networking of AIR stations.

He is the life fellow of Broadcast Engineering Society (India) and Institution of Electronics & Telecommunication Engineers.



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DRM Digital Radio for ALL



Inter BEE 2018 8K Broadcast & Video Productions

by **Cheong Chee Keong & Haji Daud Haji Zakaria**
Radio Television Brunei



The latest broadcasting technologies were on display at Inter BEE 2018, a major international exhibition held in Chiba, Japan, from 14 to 16 November.

First held in 1965, the International Broadcast Equipment Exhibition (Inter BEE) brings together the latest innovations relating to the content business from Japan and overseas. It is staged by the Association of Commercial Broadcasters in Japan.

The 2018 exhibition featured 2,054 booths from 1,152 companies and organisations, and attracted a record high of more than 40 thousand visitors. Since 2009, the ABU's partnership with Inter BEE has enabled selected ABU members to attend the exhibition each year with sponsorship from Inter BEE.



The latest video, broadcasting, communications, audio, lighting, and media business innovations were all showcased under one roof. The trade show focused on an interesting mix of known technologies including 4K/8K satellite broadcasting, 4K/8K production systems and 12G SDI systems.

Japan's public broadcaster, NHK, plans to launch the world's first 8K channel in December. With 8K now a reality for consumers in Japan, and NHK continuing its efforts to roll out 8K production units that can be deployed around Japan in preparation for the upcoming 2020 Tokyo Summer Olympics, this year's Inter BEE encouraged a number of manufacturers to display 8K broadcast and production systems.

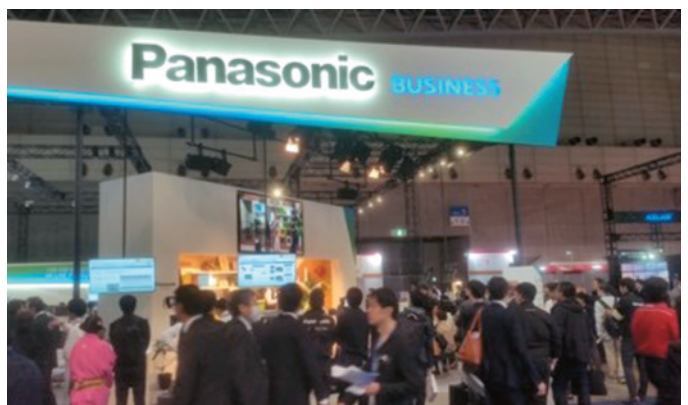
Some big names including Sony, Panasonic, Ikegami, Astro Design and AJA rolled out their respective 8K capable production components, displaying a comprehensive range of high quality and robust professional 8K products.

8K technology was on display throughout the exhibition, from 8K cameras and displays to 8K being sent over IP via a 5G phone network, indicating a future for 8K reality.

Inter BEE says its aim is to hold a comprehensive annual media communication and entertainment event with an emphasis on content, production, transmission and reception.

Its purpose is to deliver industry information to targets while considering markets in Japan and overseas in response to the needs of professionals. At the same time it aims to provide opportunities for exchanging information and creating business links between exhibitors and visitors.

Inter BEE 2019 is due to be held at the same venue on 13-15 November.



Regional Workshop on DRM Digital Radio Rollout

More than 40 radio specialists from nine Asian, African and Indian Ocean countries have attended a DRM Digital Radio Implementation and Rollout Workshop in Kuala Lumpur.

The ABU held the workshop, on 26-27 November 2018, in partnership with the Asia-Pacific Institute for Broadcasting Development (AIBD) and the Digital Radio Mondiale (DRM) Consortium. The participants represented 15 organisations.

The workshop was the first of its kind for DRM. Its aim was to discuss the benefits of DRM digital radio in meeting the diverse needs of countries wishing to offer full national coverage, regional and local flexible solutions with spectrum and energy savings in all bands (including VHF bands II and III).

The workshop shared expert knowledge and up-to-date information on the current status of digital terrestrial radio broadcasting, and issues and challenges faced by the industry. Also discussed were case studies and experiences in transition from analogue to digital radio from the region and beyond.

DRM experts from Fraunhofer IIS and RFmondial, as well as the DRM Marketing Director and the Honorary Chairman of the DRM India Chapter, struck a balance in their presentations between the theoretical aspects of the standard and the practical experience and lessons learned in many countries.



Ruxandra Obreja,
DRM



Yogendra Pal,
DD – India



Alexander Zink,
Fraunhofer IIS

strategies available for anyone planning to move from analogue to a digital radio system, from planning to full-scale countrywide rollout.

DRM demonstrations on DRM receivers, hands-on sessions and the discussion of various scenarios kept participants fully engaged. The key topics presented during the workshop were:

- Introduction to DRM and Industry Update
- DRM Features, Benefits and Solutions for Radio Broadcasters
- DRM Digital Radio – Regulatory, Policy, Planning, Design, Implementation and Rollout
- Planning Our Transition from Analogue to Digital Radio – AM and FM bands
- DRM Transmitters – Features, Advantages and Choosing the Right One
- DRM Receivers: Updates, Challenges and Opportunities
- Implementation Examples and Case-studies



Mr Ahmed Nadeem, the ABU Technical Director, described the workshop as a success. "It covered not only all the areas of the technology and the DRM solution itself but it also led to the understanding of the requirements and policy level decisions and what it entails in working with the regulator and planning the rollout of DRM step-by-step in the preferred bands, specially FM. The experiences shared from case studies like India and other countries were very valuable to all the participants".

What struck Mr Utpal Kanti Mandal, the Programme Manager of AIBD, as well as Ms Ruxandra Obreja, DRM Consortium Chair, was the exceptional level of participation during the workshop.

"The over 60 questions asked during the two days certainly kept us on our toes" said Ms Obreja. "They demonstrated a detailed understanding of the DRM possibilities but also the various options available when planning for a real rollout of digital radio."



The workshop gave participants a clear understanding of DRM digital radio broadcasting, its technology and features, planning methods, step-by-step implementation examples and the various solutions and

I found this workshop very informative, interactive and useful, giving me a clear picture about how DRM works. Furthermore, all the speakers' presentation's were interesting, relevant and applicable. Thank you for organising such a helpful workshop with good engagements from the participants.

Ms Jirayu Pukboonmee,
Executive Director, Manager, Audio Media Center and Radio Station, Thai-PBS

Firstly we would like to acknowledge the ABU, AIBD and DRM for organising this workshop. We are privileged to be here attending this workshop as it is timely where we are discussing and planning to implement DRM in our country, Papua New Guinea. The presentations were very informative and very encouraging for us. To know that the benefits and advantage of having the DRM compared to analogue system speaks for itself. We are looking at piloting the DRM project by simulcasting with our current systems in place. Having the geographical changes that we have and the consumption of power energy in our country is paramount. We see that what we've learnt for this past two days is very encouraging for us. Though it is challenging for us to go back to our country to start the process of preparation and the introduction of DRM, we are optimistic that it is achievable and it can be a reality for us.

Seloka Lewangu, Transmission Engineer, and Ignas Yanam,
Executive Director, Engineering Division, National Broadcasting Corporation, Papua New Guinea

The workshop provided me with a new perspective of the DRM technology. Having myself worked on DRM transmitters on Ascension Island for the BBC broadcast to South Africa some years back I always had the feeling that the technology never really took off the ground. However the workshop proved otherwise and the new developments mentioned got me even more excited about DRM as a whole. This is one project which I would like to propose for my country after seeing all the benefits it can bring and hope that it is welcomed.

Herve Cherry,
Manager Engineering, Seychelles Broadcasting Corporation



5th ABU-AIBD Regional Workshop on Engineering Fundamentals for Broadcasters

3-7 December 2018, Kuala Lumpur



The ABU in collaboration with the Asia-Pacific Institute for Broadcasting Development (AIBD) held the 5th Regional Workshop on Engineering Fundamentals for Broadcasters on 3-7 December 2018 at IPPTAR Technology Building in Kuala Lumpur. The workshop provided basic engineering fundamentals to broadcast engineers and technicians who are at the beginning of their careers. It provided the underlying theory of how audio and video systems have developed and shared knowledge of the basic building blocks of TV and radio engineering.

The workshop started with a session on Audio and Video Engineering Principles by Dr Mohieddin Moradi from IRIB. He covered the details of Sound and Vision Basics, Analogue to Digital Conversion with Compression Algorithms, and different MPEG Video Schemes and Standards. In separate sessions, he discussed concepts of Serial Digital Interface for SDTV, HDTV, UHDTV Production and Distribution systems. On the third day, Dr Moradi briefed the participants about the latest media trends such as 360-degree video, Virtual reality (VR), Augmented Reality (AR), Mixed Reality (MR), 3D Audio Video, Ultra High Definition TV (UHD) phases and High Dynamic Range (HDR) Delivery.

A session on On-Air Chain was presented by Mr Shree Bhadra Wagle from ABU with the concept of workflow of audio and video signals throughout the broadcast path from microphone and camera via console and transmitters into the screen and speakers.

On the second day, some details on analogue transmission along with digital transmission systems including prevailing standards and modulation technics were discussed by Mr Matt Ashe from Benchmark Broadcast Systems. Another interesting session was delivered on Immersive Sound and Audio Processing by Mr Geoffrey Low from Dolby Singapore. Before demonstrating the Surround Sound experience, he gave the details of 5.1 surround sound understandings, its production, post production and planning.

Another important topic on radio studio and system design for the future, on the third day, included the types of radio consoles and central routers, their features, and other source components connected into it. Mr Bala M Subramaney from Astro Radio delivered the topic with other planning considerations that must be planned by Radio Broadcasters

to survive in the future. IT Basics and Computer Networking with such details as the computer network and its topology, OSI Model, network components and cabling types were covered in the session that followed. The session also included an introduction on the SAN and NAS technologies with their architecture and use for broadcasters.

The fourth day began with the session on Spectrum for Broadcasting Services with details about frequency bands, ITU frequency allocation and radio regulations, VHF and UHF channels for TV broadcasting. Mr Utpal Mandal from AIBD also talked about other issues such as TV broadcast planning methods, propagation mechanism, protection ratios and interference issues. The session on File based Workflow and Automation demonstrated different audio and video file conversion examples with A/V setup specifically noting the importance of file based workflow for the media industry and broadcasters.

In the afternoon, the participants visited Radio Television Malaysia (RTM) facilities including the Transmission Operation Centre and Production & Control facilities of several RTM FM Radio channels. They met the engineers and production staff and learned about the different equipment and process workflow.

On the last day, Mr Noel Teng from myLAN Sdn Bhd gave a talk on Cloud Computing, explaining its role and necessity with technical details such as cloud computing stack and components required for its management. He spoke about the Microsoft Azure Cloud service and its components, with video clips. The last technical session was on New Media Platforms, Online Delivery, Cybersecurity and the use of Big Data within broadcast and media organisations. The presentation explained the use of cloud for on-demand media such as AVOD, SVOD, TVOD before highlighting media platforms like IPTV, OTT, HBB and social media with audio-visual clips. The presentation also looked at some cyber-attacks on media and introduced two recent WBU recommendations which provide guidance on how to address and safeguard media networks from cyber threats. The session concluded with the introduction of Big Data and how the big players like Netflix, YouTube, Amazon and the like have been dealing with huge chunks of data for attracting Internet savvy consumers. This was followed by the presentation of certificates, with participants sharing their views on the workshop.





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Kiri One TV/WAVE TV Kiribati

Kiri One TV/WAVE TV Kiribati is based and locally owned and is the only first digital TV Station in Kiribati broadcasting local and current affairs with support from SPC (Pacific Way) and pacifika NZ.

Affiliate Members

China Media Group

China Media Group is the predominant state radio and television broadcaster in the People's Republic of China. It was founded on 21 March 2018. China Central Television (CCTV), China National Radio (CNR) and China Radio International (CRI) have merged and now operate under one umbrella-entity, called China Media Group (CMG). Mr Shen Haixiong is the President of China Media Group.



Kuzoo FM

Kuzoo FM Kuzoo FM has 2 stations – one airing all content in English and the other in Dzongkha, the national language. Kuzoo is Bhutan's second largest radio station with nation-wide coverage, headquartered in the capital city of Thimphu with 15 team members.



Rekam Indonesia

Rekam Indonesia, established in 2017, is a digital platform, as well as an audio-visual storefront, that records a variety of archipelago treasures, which are packaged in the form of documentaries



Happy Campers Productions Sdn Bhd

Happy Campers Productions Sdn Bhd is a multifaceted production company operating on two main divisions. The home division of Happy Campers Productions is focused on providing production services to both local and international television networks as well as corporate clients.



ABU TECHNOLOGY CALENDAR OF EVENTS

2019

17-19 January	25th BES Conference and Expo	New Delhi, India
4-7 March	ABU Digital Broadcasting Symposium 2019	Kuala Lumpur
8 March	ABU Technical Bureau Mid-Year Meeting 2019	Kuala Lumpur
11-18 March	ABU-ASBU DTV Training	Tunis
April	Central Asia Media Forum (CAMF)	Tashkent
May	Regional Workshop on Radio Studio Automation	TBA
June	Workshop on Satellite Technologies for Broadcasters	TBA
18-20 June	BroadcastAsia 2019	Singapore
July	ABU-ASBU-AIBD WorldDAB Digital Radio Workshop	Kuala Lumpur
August	Workshop on IT Infrastructure for Broadcasters	TBA
August-September	ABU Technology Webinar Series	Online
12-16 September	International Broadcasting Convention 2019	Amsterdam
Sep	Regional Workshop on OTT and IBB Technologies and Services for Media	Kuala Lumpur
13-15 November	Inter BEE 2019	Japan
17 November	ABU Technical Bureau Annual Meeting	Tokyo
18-19 November	ABU Technical Committee Meeting	Tokyo
21-22 November	ABU General Assembly	Tokyo
November	ABU-AIBD-DRM Regional Workshop on Digital Radio 2019	Kuala Lumpur
November	16th Iran Media Technology Conference IRIB Annual Technical Assembly	Tehran
December	Training Course on Engineering Fundamentals for Broadcasters 2019 (ABU-AIBD)	Kuala Lumpur

Personalities & Posts

Mr Shree Bhadra Wagle

Joins ABU Technology

Shree Bhadra Wagle has joined ABU Technology as Manager Production & Delivery Technologies.

Mr Wagle served at Radio Nepal, a government broadcaster, from 1992 to 2017 and retired as Deputy Executive Director.

He was Associate Professor at Kantipur Engineering College, Nepal from October 2017 to September 2018.

Mr Wagle holds an M Tech degree from Andhra University in India and a Masters in Communication Management from Coventry University in the UK.

He has published several professional articles in International Telecommunication Union proceedings on 'Migration from Analog to Digital Broadcasting', 'Convergence and ICT Regulation', 'e-Applications' and 'Satellite-based Disaster Management'.



Dr Alexander F. Peregudov

New Technical Liaison Officer for RTR-Russia

Dr Alexander F. Peregudov, Chief Expert, Production and Technology Department at The Russian Television and Radio Broadcasting Company, RTR, has been appointed ABU Technical Liaison Officer.

Before joining RTR in 2016, Dr Peregudov worked for 11 years at St. Petersburg University of Film and Television as Vice-Rector on Science and Innovations and Head of the Digital Cinema Research Department.

In 1990, he founded the D.I.P. Company, which specialised in hardware and software developments for TV broadcasting and digital cinema, and within 20 years he realised many projects in broadcasting automation for Russian TV companies.

Dr Peregudov replaces Mr Gennady Kachalov who has been the ABU contact at RTR for several years now. We thank Mr Kachalov for his assistance and cooperation with the ABU Technology over the years.



Mr N Shanmugam

ABU Staff of the Year

The 2018 ABU Staff of the Year was awarded to Mr N Shanmugam, ABU Administrative Assistant.

Shan joined the ABU in October 1998 and has made himself quite indispensable to all his colleagues.

His quiet, pleasant manner is most appreciated by his colleagues.

Shan also takes care of many administrative assignments dealing with members.

For many years now, Shan has been the face of the ABU DBS Registration. He has brought his usual quiet efficiency to this huge assignment in addition to the administrative tasks that go with this event.



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- Migrating to IP – Standards, Strategies and Challenges •
- Big Data, Artificial Intelligence and Personalisation of Media •
- Workflow Enhancement, Media Management and Cloud Integration •
- The Future of Radio – Digital Radio, Podcasting and Audio Streaming •
- Production and Delivery Technologies for the Future – UHD, NGA, and 5G •
- OTT, IBB and Content Delivery Platforms for Building a Global Audience •



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