

ABU TECHNICAL COMMITTEE MEETS IN NEW DELHI



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Cover: ABU Technical Committee Meets in New Delhi

from The Editor

We are happy to bring to you the 4th quarter edition of 2022. It has been a wonderful year where we sort of felt like we are out of the pandemic and started organising in-person events including our annual meetings in New Delhi last November. It was indeed a wonderful feeling to be back and having the chance to meet with members physically after a break of almost three years.

Inside you will find detailed reports on the proceedings of our annual Technical Committee and Technical Bureau meetings which was hosted in New Delhi by our member Prasar Bharati as part of the ABU's General Assembly and Associated Meetings 2022. One of the highlights of the annual Technical Committee is the announcement of the winners of the Engineering Awards and Technical Review Prizes. We would like to congratulate all the winners once again.

Two feature articles are included in this edition contributed by our members and industry experts. The first one on "The Most Important Future Wireless Technologies and 6G Networks", contributed by our member IRIB-Iran, focuses on research on 6G technology and how broadcaster can foresee its usage. The second on titled "Performance Analysis of Digital Terrestrial Television (DTT) Services in The Central Region of Malaysia", contributed by our member RTM-Malaysia, looks at the performance of the DTT network in Malaysia with recommendations on how to improve it.

This edition also includes highlights from activities organised by ABU Technology during the last few months, together with the look at some technology news from around the region. We hope you will enjoy reading through and benefit from the information included with this edition.

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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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The Most Important Future Wireless Technologies and 6G Networks

ABSTRACT

Wireless technology is evolving in all areas of mobile and wireless communications, and it is one of the fastest growing sectors. The world has witnessed new mobile generations every decade, meaning a set of technologies in the form of a new architecture and structure. As researchers in the broadcasting industry, we must consider this new field of research and take advantage of its potential opportunities in broadcasting applications. In this paper, the aim is to draw a picture of future generation wireless technologies (6G) in terms of capabilities. 6G is envisioned to operate at Terahertz radio frequencies and to increase spectrum gain by Ultra Massive MIMO antennas and Full-Duplex communication. Comprehensive AI systems will be used. These technologies will enable data throughput in Terabits/s, which will easily cope with the future increase of video traffic and heterogeneous data for the next generation of digital TV, beyond 2030.

KEYWORDS

Wireless technology, 6G, Terahertz, Massive MIMO, ML, AI, full-duplex

INTRODUCTION

Wireless technology has evolved over the years, but the need for higher efficiency and reliability is never-ending. Wireless technology is continually evolving, and it has already changed significantly. Each generation of wireless technology has been designed to meet the needs of end users and network operators. Many possible multimedia services will require having high bitrate and ultra-low latency such as Holographic Type Communications (HTC), 8K TV streaming, and 3D video streaming [1]. Nowadays societies are becoming more and more data-centric, data dependent and automated. The rapid development these processes, which require data rates in the order of Terabits per second, a latency of hundreds of microseconds, and 10^7 connections per km^2 , may exceed even the capabilities of the emerging 5G systems.

This discussion has recently motivated researchers to investigate a new generation of wireless networks, i.e., sixth generation (6G) systems, to meet the demands for a fully connected, intelligent digital world. According to global research, it has been found that 6G will be in use by the end of 2030, and the pace of development is such that in 2035, 5G technology will be obsolete and will no longer be used. Therefore, 6G review is a necessity.

TV broadcast has traditionally been dependent on unidirectional, one-to-many delivery networks to fixed TV sets (broadcasting). Nowadays, an increasing number of consumers watch linear or nonlinear content on their traditional home screens as well as on their smartphones and tablets. These new forms of media consumption dramatically increase the load on mobile networks.

This situation may require new solutions and approach [2]. So mobile generations become important in creating the new concept of TV everywhere. We need to consider new wireless technologies and take advantage of their potential opportunities in broadcast applications. Improvements have been made in the 5G architecture for video streaming and broadcasting, but there are challenges that 6G will have to deal with in the future.

The rest of this paper is organised as follows. Section II presents the spectrum and Terahertz technologies in 6G. Section III describes the novel antenna technologies and Ultra Massive MIMO, Section IV describes the Artificial Intelligence. Full-duplex communication is also discussed in Section V and Section VI concludes the paper.

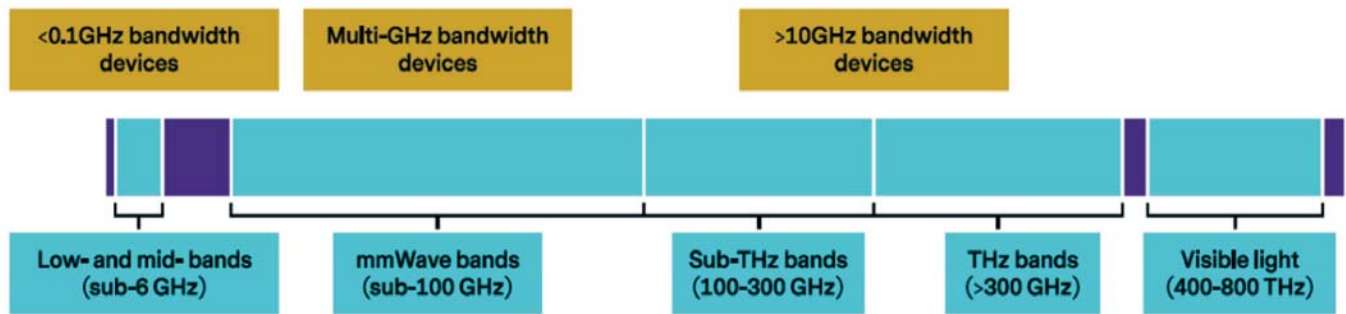


Figure 1. Potential spectrum regions for next generation of wireless networks.

SPECTRUM AND TERAHERTZ TECHNOLOGIES

Terahertz (THz) refers to frequencies in the 300 GHz to 3 THz range. We expect to see enhancements over the current 5G spectrum, and expansion of the spectrum into potential new bands from low GHz bands to low THz and the visible light region. The potential spectrum regions are illustrated in *Figure 1*.

The operation in existing bands will be enhanced in 6G with respect to the KPIs (Key Performance Indicators), but not every target is expected to be reached in all frequency bands. For instance, low frequency bands are often preferable in terms of spectral efficiency, reliability, mobility support, and connectivity density. In contrast, high frequency bands are often preferable in terms of peak data rates and latency [5].

The main reason for moving to higher frequency bands is to greatly expand the available spectrum compared to mmWave systems. But they also come with some major challenges due to the nature of propagation at these frequencies (including very short communication distances, blockage, and frequency dependent molecular absorption), hardware and system design.

In the THz region, hardware constraints and computational complexity will challenge the efficient use of wide bandwidths. Moreover, investigations into new waveforms, mitigation of hardware impairments and implementation of devices operating in that spectrum, are required. New transceiver architectures are needed along with new THz propagation models [6]. High power, high sensitivity, and low noise figures are key transceiver features needed to overcome the very high path-loss at THz frequencies.

Barriers to this technology advancement are the effects of high frequency on human health, ability to manufacture of equipment by vendors and business and commercialisation models.

These challenges make the THz region a new area where many open research problems exist from the

hardware to the physical layer protocols.

ULTRA MASSIVE MIMO

The Massive MIMO (Multiple-Input Multiple-Output) concept was introduced in 2010 [13] and is a technology where the access points are equipped with a large number of antennas, which are utilised for spatial multiplexing of many data streams to one or, preferably, multiple users. In 5G evolution and 6G, further advancement is expected, such as Massive MIMO with more antenna elements, more layers for spatial multiplexing, and distributed antenna arrangement combined with new network topology. This technological evolution is called Ultra Massive MIMO. The Massive MIMO technology can bring at least ten-fold improvements in area throughput by increasing the spectral efficiency (bit/s/Hz/cell) [11].

The capacity of Massive MIMO grows with the number of antennas [12] so it would be desirable to have nearly infinitely many antennas, but how can that be deployed in a practically viable way? One option: physically very large arrays¹ of classic antennas that are small and well separated to enable essentially invisible deployment as shown in *Figure 2*. An ELAA consists of hundreds of distributed antennas that are jointly and coherently serving many distributed users.

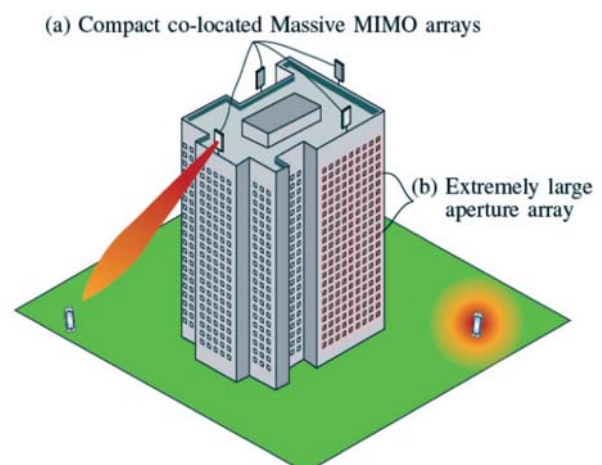


Figure 2. The first deployments of Massive MIMO use compact arrays (a). ELAAs where the antennas are distributed over a large area (b) [9]

¹ Extremely Large Aperture Array (ELAA)

Another option is to integrate an infinite number of antennas into a limited surface area, in the form of a spatially continuous transmitting/receiving aperture. This requires a new way of designing and analysing antenna arrays. Research in this direction is taking place under the names of Holographic Massive MIMO, and Large Intelligent Surface.

The concept of a large intelligent surface (LIS) has recently emerged as a promising wireless communication paradigm that can exploit the entire surface of man-made structures for transmitting and receiving information. An LIS is expected to go beyond Massive MIMO systems. Future structures, such as walls, are expected to be electromagnetically active. The LIS concept can be essentially viewed as a scaled-up version of conventional Massive MIMO systems. *Figure 3* shows an example of LIS system.

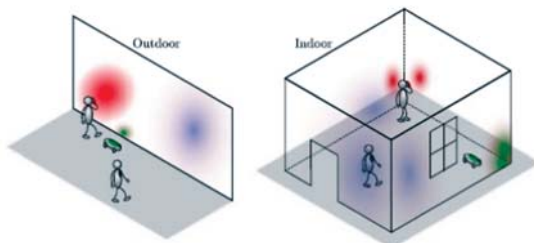


Figure 3. An example of three terminals communicating to a LIS in indoor and outdoor scenarios [10]

In fact, the 5G developments enhance the transmitter and receiver functionalities, but the wireless channel propagation remains an uncontrollable factor that can degrade system performance. Looking beyond 5G, the advent of electromagnetic components that can shape how they interact with wireless signals enables partial control of the propagation. A reconfigurable intelligent surface (RIS) is a two-dimensional surface whose properties are reconfigurable rather than static. The surface consists of many discrete elements with controllable properties. When an RIS with N elements is added to the system which are illustrated as coloured squares in *Figure 4*, N controllable paths are added to the end-to-end channel. The amplitude and phase of each element can be tuned to improve the signal quality at the receiver.

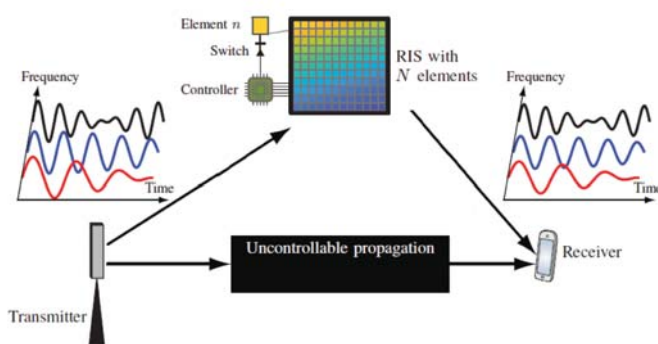


Figure 4. RIS-aided communication system with controllable propagation paths [3]

The limit of a large number of antennas has been studied in the multi antenna literature for decades and is a main motivation behind the Massive MIMO technology. The emerging technologies, such as Holographic Massive MIMO, ELAA, LIS, and RIS can be utilised to increase the capacity of communication systems beyond Massive MIMO [8].

ARTIFICIAL INTELLIGENCE

Machine learning (ML) along with Artificial Intelligence (AI), are revolutionising technologies that create new research opportunities in various areas, including 6G communications. Wireless technology becomes more complicated for every generation with many sophisticated problems to design for and optimize. AI allows all system components to obtain and evaluate a massive amount of real-time information. In this way, system can handle complex optimisation tasks and improve overall system performance.

Some potential research areas include channel modelling by ML techniques in situations where the traditional approach leads to highly complex algorithms or in complex propagation environments that have unknown channel properties. So, there is a potential advantage in optimising the physical layer using ML. Other research fields are channel estimation and detection based on ML, resource allocation, management and power control, beamforming in Massive MIMO, etc. *Figure 5* shows an example of multiple ML-based use cases.

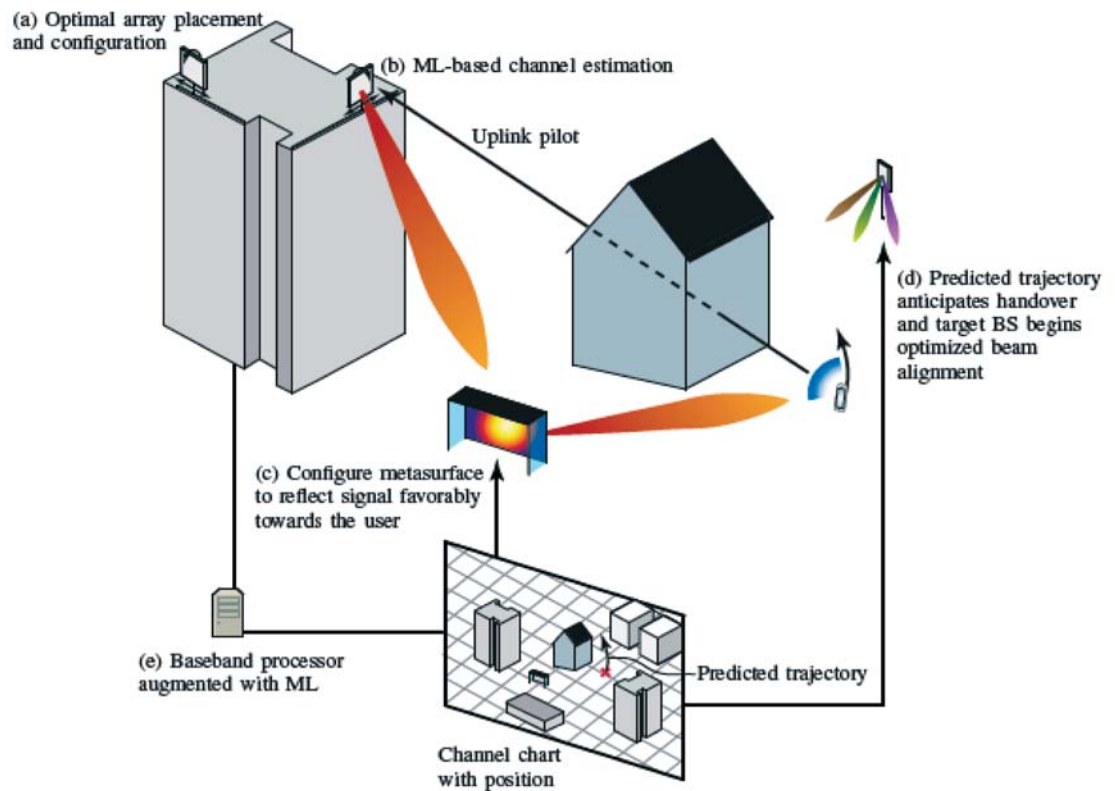
6G implementation will require fundamental support from Artificial Intelligence (AI) and Machine Learning on the network's edge and core [4].

FULL-DUPLEX COMMUNICATION

Current wireless systems use time division duplex (TDD) or frequency division duplex (FDD) methods, which are called half-duplex, where transmission and reception are not performed at the same time or frequency. In full-duplex communications, the transceivers will be capable of receiving a signal while also transmitting concurrent in the same frequency band as shown in *Figure 6*.

This can potentially double the spectral efficiency and allow a more flexible use of the spectrum, therefore making it a promising technology for future wireless networks. The main challenge is self-interference (the interference generated by the transmit signal to the received signal) suppression in system design and planning. Full-duplex deployments require antenna and circuit redesign to reduce the interference between transmitter and receiver circuits in a wireless device. Future technology advancements will enable simultaneous

Figure 5. Five different parts of the network where ML can be applied. [9]



transmit and receive, to increase multiplexing gain and the system throughput without using additional bandwidth [7].

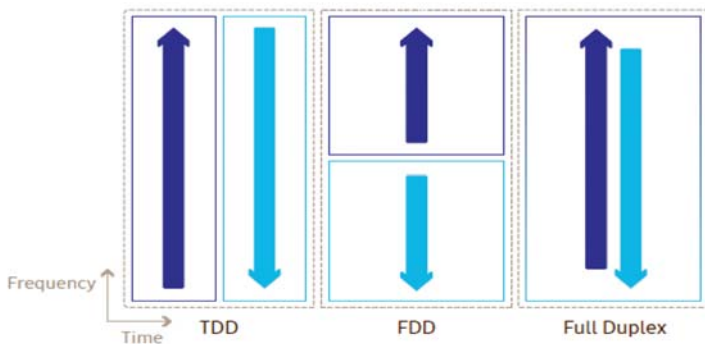


Figure 6. Operation of duplex modes.

Related research has been done on self-interference cancellation techniques, which typically require both analogue and digital domain. Some techniques used to cope with self-interference are isolation between transmit and receive antennas, analogue cancellation in the RF domain and digital cancellation in the baseband.

CONCLUSIONS

The design of future wireless communication will be the result of evolutionary changes of technologies already used, and of the emergence of new technologies. Several technologies will converge with next generation wireless networks (6G) to

enhance the performance of existing applications while expanding capabilities to support new and innovative applications. It would be very much energy and bandwidth efficient. This paper discusses technologies that will evolve wireless networks towards 6G, and highlights some important lines of research from the recent literature include support of the terahertz band and higher frequencies leads to much faster connections and a better experience for people, novel antenna technologies and ultra-massive MIMO, evolution of duplex technology to support Terabit data throughputs, and comprehensive AI to realise more efficient, reliable, and low cost communication systems.

These technologies are still in the early stages, but both academia and industry are initiating research activities to shape the next-generation wireless communication system and taking the first steps. The development of Massive MIMO communication technology is now in the hands of the product departments of companies such as Ericsson, Huawei, Nokia, etc. A large number of communications, signal processing, and optimisation algorithms have been developed over the years and it remains to be seen which ones will work well in practice.

The goal is forecasting potential future requirements for critical multimedia services and the advanced video and image applications and defining the ideal conditions based on their KPIs.

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ABU Technical Bureau Annual Meeting

25 November 2022



The annual meeting of the ABU Technical Bureau was held on 25 November in New Delhi, India, alongside the ABU General Assembly. It was held in hybrid mode. Bureau members from Phoenix TV- Hong Kong, TVB-Hong Kong, TRT-Turkiye, MediaCorp-Singapore, RTPRC-China, RTM-Malaysia, VOV-Vietnam joined online and members from IRIB-Iran, KBS-Korea, RRI-Indonesia, NTV-Nepal, NBT-Thailand, SBA-Saudi Arabia, Prasar Bharati-India, VTV-Vietnam, NHK-Japan attended in-person.

TC Chairman Mr Hamid D Nayeri from IRIB-Iran chaired the meeting and thanked Mr Sunil for hosting the meeting in India. Mr Sunil, Additional Director General of Engineering at Prasar Bharati and vice-chairman of TC committee, welcomed all members and delegates. ABU Secretary-General Dr Javad Mottaghi also joined the meeting and thanked Mr Sunil and Prasar Bharati for doing an excellent job in hosting the General Assembly and the TB/TC meeting. He observed that we all are in new environment and that ABU members are facing a 'digital gap'. A lot remains to be done, presenting a challenge to TB members to develop action plans

for ways to conduct more activities in the years ahead. Dr Mottaghi also shared the success of Asian countries in the preliminary round of the FIFA 2022 World Cup being held in Doha, Qatar. Dr Mottaghi, who will complete his term as Secretary-General in March 2023, expressed happiness that Mr Ahmed Nadeem would take over the post from April.

The meeting heard status updates from the bureau members. Members from KBS-Korea, RRI-Indonesia, NTV-Nepal, NBT-Thailand, SBA-Saudi Arabia, Prasar Bharati-India, VTV-Vietnam, NHK-Japan, Phoenix TV-Hong Kong, TVB-Hong Kong, TRT-Turkiye, MediaCorp-Singapore, RTPRC-China, RTM-Malaysia, VOV-Vietnam and IRIB-Iran shared information on technological developments and new projects & services within their organisations during the last year.

The Bureau discussed several agenda items and received updates on the progress of twelve different tasks and action items. Two ABU Decisions on, 1. 'Amending the Engineering Award guidelines in accordance with the recommendations of the EA



review Task Group' and, 2. 'Instituting ABU Young Engineers' Broadcasting Award' were noted for discussion by the Bureau. Importantly, the two ABU recommendations on, 1. 'Supporting the WBU Recommendations related to Cybersecurity issued in 2022' and, 2. 'Supporting the WBU-TC Recommendation on the Need to Maintain Resilient Mix of Media Distribution Infrastructures for Times of Crisis', were presented and discussed. In addition, there had been some progress from the task group reviewing 'Study Topic Areas and Study Projects' and its outcome would be presented at the mid-year meeting in 2023.

The annual meeting also made a review of topic areas and terms of reference in the four areas: Production, Transmission, Training & Services and Spectrum. Prasar Bharati had nominated co-project managers for most of the study projects and other members were asked to provide additional contributors. Other key topics discussed were the programme schedule for the Technical Committee meeting to be held in the following two days. Dates for the next mid-year Bureau meeting were suggested as either, June alongside the Broadcast Asia 2020 in Singapore or, early May in Kuala Lumpur. ■

TECHNICAL COMMITTEE MEETING

26-27 November 2022

The ABU Technical Committee meeting was held from 26-27 November 2022 and was hosted by ABU full member in India, Prasar Bharati, at the Pullman Hotel, New Delhi. The event started with an address by Mr Hamid Dehghan Nayeri, Director, International Technical Affairs, IRIB, Iran and ABU Technical Committee Chairman.



OPENING SESSION

In his opening remarks, Mr Nayeri welcomed all delegates and thanked Prasar Bharati for hosting the prestigious event. He showed his delight at the resumption of in-person events after a halt of two years due to the covid pandemic. Mr. Nayeri informed the delegates about the periodical reviews and activities published on the ABU website along with other resources. He introduced the newly added category of awards for the young engineers, the "ABU Young Engineers' Broadcasting Award". He emphasised the importance of cyber security and invited all the delegates to give their views and share their experiences on this key topic of concern. He provided an overview of the following two days of interesting topics and updates on the upcoming activity. Mr Nayeri then invited Director General of Doordarshan, Mr Mayank Kumar Agrawal to address the delegates.

Mr Agarwal started by welcoming all the attendants to India and the ABU Technical Committee meeting. He emphasised the importance of the technical team in any broadcasting organisation. He encouraged the technical team to keep learning and being a part of the evolving broadcasting technologies. He insisted the technical team should share their learning with the other ABU members.

The use of 5G technology rollout, enhancement of picture quality right from SD to 4K and now going towards 8K and 16K and, Broadcast on Mobile were highlights of his address. He introduced the training facilities formed at Doordarshan to bring its engineers and technicians up to par with the latest trends in the broadcasting industry.

Mr Sunil, Additional Director General (Engineering) & Head International Relations, Prasar Bharati-India was hereafter called upon to share his views and address the assembly. He started his address with a warm welcome and thanked all the attendees who had accepted the invitation to come to India and make this event a grand success. Mr Sunil continued his speech with the key responsibilities that lie on the shoulders of a national broadcaster. He also spoke about the continuous challenges faced by a public service broadcaster, which are fulfilment of public mandate, being commercially viable, and continuous content development. Doordarshan has a vast network of TV channels in different languages which carry different genre of content such as educational content, informational content, entertainment content, to name a few.

Dr Javad Mottaghi, Secretary-General of the ABU, added his welcome to the delegates and expressed his happiness



to be in India. He continued by thanking Prasar Bharati for hosting its third major event of the year. He was overwhelmed to be attending the in-person conference after 2019. Since the outbreak of Covid pandemic, the ABU had been hosting a vast number of online events, which included the DBS, GA, song festival, and a lot of online trainings. Dr Mottaghi called for better cooperation between ABU Members to bridge the digital divide. He requested the broadcasting members who have a much better infrastructures and much more advanced technology to help the broadcasters who are trying to catch up in these areas. There were some broadcasters who had had to quit their memberships during the pandemic due to financial crisis. Finally, he congratulated Mr Ahmed Nadeem for being selected as the new Secretary-General of the ABU and who would take over his position on the 1st of April, 2023.

In another welcome address to the august gathering, Mr Gaurav Dwivedi, Chief Executive Officer of Prasar Bharati, India welcomed Secretary-General, ABU Team and the Member delegates to India. He wished for the next few days' interactions and deliberations to be a success.

The event continued with the Announcement of Winners of the Annual ABU Engineering Awards and Technical Review Prizes 2022.

ABU ENGINEERING AWARDS 2022

Mr Ahmed Nadeem began with the awards of Technical Review Prizes. The awards were given to several authors of Technical Review magazine articles published between October 2021 to September 2022 in different categories, as follows.

The Award for Best Article, in the category of Practical



Implementation was given to Ms Fatemeh Fallahi from Islamic Republic of Iran Broadcasting for her article on “How DVB-I helps broadcasters to get prepared for the future” the award was presented by Mr Masashi Kamei, ABU Technical Committee Vice-Chairman.

Award for Best Article, in the category of research was presented to the team of Mr Javad Mardanpour Bogar, Mr Mohammad Reza Noorifard and Mr Mohammad Behdadfar from Islamic Republic of Iran Broadcasting for their article on “A resource allocation metric for multimedia content in LTE network”. The award was presented by Mr Masashi Kamei, ABU Technical Committee Vice-Chairman.

Award for Best Article, in the category of Case Studies was given to Ts. Ahmad Shafiq Mirza Bin Mansor from Radio Television Malaysia for his article on “High Definition (HD) News Digital Archive, Revolutionary broadcast technology towards effectiveness future demand”. The award was presented by Mr Masashi Kamei, ABU Technical Committee Vice-Chairman.

The Engineering awards consist of four categories:

- ABU Broadcast Engineering Award on SDGs implementation
- ABU Developing Broadcasters' Excellence Awards.
- ABU Engineering Industry Excellence Awards.
- ABU Broadcast Engineering Excellence Awards

The first category of awards announced was ABU Broadcast Engineering award on SDGs implementation. These awards are presented to organisations for their contribution towards sustainable development goals. There were three joint winners for this category.

All India Radio, Dibrugarh was awarded for establishing an energy efficient infrastructure for preserving the environment and ecosystem. The award was presented by Dr Javad Mottaghi, Secretary-General of the ABU. The Radio, Film and TV design research institute (RTPRC

– China) was the second joint winner of the award. The award was presented by Mr Masashi Kamei, ABU Technical Committee Vice-Chairman. The third joint winner of the awards were NHK Japan for their development of AI based multi-language technology to reduce the inequality between people. The award was presented by Mr Hamid Dehghan Nayeri, ABU Technical Committee Chairman.

The second category of award presented was the ‘ABU Developing Broadcasters' Excellence Awards’. The award was presented to Mr Udaya Krishna Shrestha from Radio Broadcasting Service, Radio Nepal (RNE), by Mr Hamid Dehghan Nayeri, ABU Technical Committee Chairman.

The third category of award presented was for ‘ABU Engineering Industry Excellence Awards’. The award was presented to Ms Qiao Xiaoyan, from Wasu Media Holding – RTPRC China. The award was presented by Dr Javad Mottaghi, Secretary-General of the ABU.

The final award presented was for the category ‘ABU Broadcast Engineering Excellence Awards’. The award was presented by Shri Mayank Agarwal, Director General of Doordarshan, to Mr Cui Jianwei from China Media Group – CMG China.





Concluding the award ceremony, Mr Nayeri congratulated all the winners and invited Dr Javad Mottaghi to present a token of appreciation to Prasar Bharati for hosting the event. This was received by Shri Mayank Agarwal, Director General of Doordarshan.

KEYNOTE PRESENTATION

The keynote presentation was made by Mr. Nigel Fry, Director of Distribution at BBC world service. His presentation was on 'Cloud solutions and sustainability - Learnings from lockdown, opportunities, and challenges for the future'. In his presentation, Mr Fry noted that the BBC has been producing programmes in 42 languages across different broadcast platforms. The BBC has set several production goals, such as clean energy and gender equality just to name a few. He also spoke about the new lessons learned, post-lockdown, and different ways of working following the lockdown events. Remote operations were a good mode of working, but presented several challenges in themselves.

Nigel spoke about the advantages of Cloud based broadcasting. These included; High availability; Low entry cost; avoiding physical server rooms; Increase of tools, and so on. In his view, questions regarding the platform arise concerning security and continuously growing bills. The solution of having an internal cloud platform is much more effective, as the public cloud platform can be very volatile and economically unviable for broadcasters. Mr Fry also spoke about the importance of sustainable and clean energy, such as solar energy and wind. He also discussed the importance of energy storage and connected grids. BBC has implemented the clean energy-based transmission sites at Bamian for a 30W FM transmitter in 2003 and at Ascension Island Five, 330kVA wind energy converters (2010).

Nigel also expressed his concern for rural populations, amounting to almost 2.7 billion people worldwide, who are still not connected to mobile data services. This makes the MF and HF platforms all the more important, to make sure even the people who are not connected using internet are able to stay informed using conventional Radio and TV. He talked about a new version of DRM receivers. which are

in the testing phase and expected to reduce the price of DRM radio sets. There was also a concern raised by Mr. Fry regarding the workplace safety of team members.

CONFIRMATION OF THE AGENDA AND TC-2021 PROCEEDINGS AND APPOINTMENT OF RAPPOREURS

Mr Nayeri led the delegates through the agenda, which was confirmed together with the proceedings of the Technical Committee meeting 2021. The Rapporteurs for reporting the next two days of proceedings were appointed namely Mr Yashovardhan Sharma from Whiteways Systems, Singapore; Ms Arunima Singh from Prasar Bharati – India; Mr Warren Robert from VBTC – Vanuatu and Mr Udaya Krishna Shrestha from RNE – Nepal.

ABU TECHNOLOGY ACTIVITY REPORT

Mr Ahmed Nadeem was invited by Mr. Nayeri to take the participants through the ABU Technology Activity report. A webinar series on Member Innovations had been started by ABU Technology and a lot of members were working remotely during the pandemic. The idea of this event was to share the learnings of ABU Members during past years. ABU had conducted webinar sessions with over 110 participants per session on average. Similarly, there was another webinar series, for capacity building activities, had about 25 sessions and an average of over 140 participants per session. The first in-person workshop on Cloud Technologies for Media Services took place in Kuala Lumpur from 25-27 July. This workshop on media services received a lot of traction and fifty delegates from ten (10) countries, representing 19 organisations took part. During the period of pandemic, DBS was still hosted as an online event. However, ABU is pleased to announce the resumption of in-person ABU DBS next year from 6 to 9 of March 2023 in Kuala Lumpur.

A training course on engineering fundamentals for broadcasters was organised by the ABU, with experts from Prasar Bharati-India, TRT-Turkiye and IRIB-Iran. Level-1 completed in 2021 and Level-2 of the course was conducted from April to June 2022, The training had more than 90 participants from 31 organisations across the region. The course continues while ABU is designing the course for the third level. Mr Ahmed Nadeem went on

to inform the delegates about online recordings available on the ABU website. This portal hosts all the webinars from 2020, available only to ABU members. Delegates can register on <https://vod.abu.org.my> to get access to the knowledge base. Mr Ahmed informed that cooperation and collaboration with international organisations like World Broadcast Unions, Broadcast Asia, Inter Bee, IBC and HFCC continues to be a high priority for the ABU. All the ABU Technical Review details are available online at www.abu.org.my/technical-review.

Finally, Mr Ahmed thanked all his team members Dr Veysel, Mr Shree Bhadra, Ms Najwa, Mr Saravana, Mr Siva, Mr Sharzuan, Ms Nerina and Ms Irfah who had worked tirelessly to make this event a success.

BUREAU PROPOSALS (INTRODUCTION)

Finally, Mr Ahmed Nadeem introduced the bureau proposal for the introduction of a newly added category of awards for young engineers called "ABU Young Engineers' Broadcasting Award". A task group on Review of Engineering Awards Guidelines was setup in 2022 when some members highlighted a demand for revisiting the criteria and guidelines of the awards. Some of the points highlighted were as follows:

On the point to allow repeat winners, as it is not a competition but a recognition of contributions, there will not be a repeat winner in the same category, but if in different category repeat winner will be eligible after a three year gap. The second point was the clear difference between BEEA & DBEA and BEEA & EIEA which is stipulated in the document. The third concern was that as most of the awards were being won by highly experienced professionals, it was time to recognise young engineers with a new category of young engineers award. All these all points were to be incorporated and the current guidelines updated.

FUTURE STRATEGIES



Mr Sunil, ABU Technical Committee Vice-Chairman chaired the afternoon session on 26 November 2022. He invited the speakers to deliver their presentations on different topics.

Miss Emily Dubs, Head of Technology, DVB Project presented the topic "How DVB unifies IP-centric media delivery". She stressed the fact that DVB is bringing a broadcast-like experience to broadband technology. It gives seamless experience from delivery to discovery. A converged media delivery ecosystem is being enabled due to DVB-NIP and DVB-I. DVB-NIP approaches to the aforementioned task, by working at the transport layer. DVB-I does the same by working at the user end.

Ms Dubs stated the advantage of DVB-NIP is that it leverages existing broadcast and broadband infrastructure and opens up new business models for B2B segment. Live TV can be enabled in rural areas where there is poor internet connectivity and TV-less environments. Monetisation of the existing entertainment methodologies, like incorporating live TV for audiences in busses can be done to generate revenue. Operators can launch OTT services in rural areas and public places. Satellite providers can sell additional bandwidth for OTT and stay relevant with the future DTH. OTT providers can scale down



infrastructure costs and extend their market reach. All will gain with Native IP, leveraging the existing infrastructures & mobile devices proliferation. The presenter also introduced DVB-I (TS 103 770), which defines the mechanisms for the discovery of service lists and to retrieve EPG over the internet. DVB-I offers a common service layer across networks.

Mr Matthew Phillips, VP Marketing, CML Microcircuits Ltd. was the second speaker, and his topic of presentation was “A breakthrough innovation in Digital Broadcast Radio Receivers”. The presentation started with emphasis on the relevance of radio over the last 100 years. In times of natural disaster radio provides a vital service when infrastructure is compromised. With analogue transmission coming to an end in the near future, digital transmission is becoming popularised. However, the biggest bottle neck in the spread of digital radio technology has been the absence of low-cost radio receivers.

DRM is an energy efficient broadcasting standard which requires between 25% to 30% of the energy of analogue broadcasting. The various benefits of DRM are that the technical standard is complete, published and open and readily available for use, the technology is a cost effective, content management, delivery and transmission system, compatible with existing analogue broadcasting. The limited resource of spectrum can be effectively utilised by DRM.

Mr Matthew introduced CML/CC DRM1000 DRM Receiver module which is a core component to implement a full DRM capable of behaving as a broadcast receiver covering all bands. It is jointly developed by CML Microcircuits and Cambridge Consultants (CC). A fine tuning of frequency ranges from 150 kHz to 108MHz with no-gaps and supporting AM/FM/DRM broadcasts is very well achieved with it. DRM 1000 receiver will play for 30 hours continuously on 3 X AA cells. Miniaturisation has led to its

use in pocket, with compatibility with smart phone and smart devices.

The next speaker was Mr Jens Fischer, Territory Sales Manager, Signiant, and his topic of presentation was “Live File contribution technologies”. Signiant is a well-known name in the area of file transfer, with 50,000 businesses in more than 200 countries worldwide. An expanding set of applications and services makes working with media more efficient. The main innovation is the transfer of more information without increasing bandwidth.

Mr Jens laid focus on the fact that prior to the data transfer, channel characteristics are measured thoroughly. Smart OB workflow is a dire need in the current, changing broadcasting industry. This will lead to reduction in OB parking time and production costs, more data volume due to new production standards (e.g., UHD), sharing content immediately. It works with modern and older trucks, is fully encrypted and accelerated transports, allows reduction of production time and satellite transponder time and it also works with any internet connection and any Slomo solution. Signiant can provide a universal solution for every broadcasting organisation, with no demand for dedicated hardware.

The last speaker of the session was Mr Kazim Pektas, Chief Engineer of TRT Turkey. The topic of his presentation was “Digitalisation Digital Transformation” and was delivered virtually. “Digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities” said Mr Kazim Pektas. He further described the process of moving to a digital business. Digitalisation deals with information processing, or how digitised data can be used to improve workflows through automating existing processes. Finally, digital transformation is all about leveraging knowledge and integrating it in all business areas to enhance engagement and create new value. Various TRT mobile applications like





TRT World TRT Haber, TRT Izle, TRT Spor, TRT VOT, TRT NUCE are currently in the market.

TRT's previous electronic document management system was largely manual and time consuming but has now been replaced with digitalisation and now document can be signed anytime and anywhere. Digital transformation is the process of using digital technologies to create new or modify existing business processes, business models, organisational culture, and audience experience. In this regard, Mr Kazim Pektas laid emphasis on explaining different parameters of Digital Transformation. Organizational culture is defined as the underlying beliefs, assumptions, values and ways of interacting that contribute to the unique social and psychological environment of an organisation. Business models deal with all people who are involved and cooperate. Talking about audience experiences, Mr Kazim stated that each person is uniquely identified according to their needs and can be catered for accordingly.

Mr Sunil, the session chair, thanked all experts for their presentation and closed the session.

MEDIA TECHNOLOGIES AND SOLUTIONS

Mr Masashi Kamei, ABU Technical Committee Vice-Chairman chaired this session, which had four presentations.

The first speaker in the session was Mr. Christian Christiansen, COO Silver Trak Digital / DAMsmart and the topic of his presentation was "Empowering Broadcasters to monetise their legacy audio-visual archives". DAMsmart is the leading agency in audio-visual digitisation in APAC. They have over 16 years of experience and have a proven track record in handling digitisation of national audio video projects. They have a highly trained team with professional backgrounds in the broadcasting industry, with unmatched expertise and experience.

The main problem posed at the international level for

archive bodies is that the year 2025 is the deadline for all forms of Analogue AV Legacy content to be digitised, failing which they can never be digitised. DAMsmart started a project with Telstra and AWS for saving the Australian Football League (AFL) historical collection. The major challenge which was faced by AFL was inefficiency in managing the video archive and relied on skilled technicians to access the vision. Even the distribution and reproduction of tape footage as short clips and stories was challenging as it was not scalable for digital consumption in multiple video formats. Telstra Broadcast Services provided an end-to-end Platform-as-a-Service solution to the AFL, bringing together all aspects of the digitisation, and the connectivity to support the MAM platform hosted on AWS.

Mr Yogendra Pal, Honorary Chair of India Chapter, DRM Consortium delivered a presentation on the topic of "DRM Social Benefits – Distance Learning & Emergency Warning Functionality (EWF)". DRM is mainly for non-profit organisation, and they have global presence in countries like Brazil, Germany, India, South Africa, Pakistan and Indonesia. DRM Digital Radio standard is an Open System and has all required tools built-in for a quick and complete mass-notification in case of disasters / catastrophes. DRM is finding its use in distance education as it offers conventional audio and data services. Due to the wide coverage area of radio, DRM can be easily put to use to provide education to remote areas during pandemics or crises.

DRM offers education/ information free to air to everybody, without the need of internet. In DRM due to the feature, Journaline, which deals with textbook content, distance learning has been made possible. DRM distance learning have several benefits like live lessons with teacher as scheduled radio programmes; self-teaching of students in their own language and at their own speed of learning through on-demand lookup of lessons. Mr Pal introduced one of its first energy-saving, low-cost and multi-functional DRM modules, which could be a true game-changer



for the receiver market. He also updated participants on the latest DRM developments and gave an insight in the efficient introduction of DRM into the analogue FM market.

Mr Aale Raza, Managing Director, Whiteways Systems was the next speaker and the topic of his presentation was "Bid Good Bye to the green screen, say welcome to XR". Mr Aale Raza stated that his company had drawn inspiration for augmented reality from the gaming industry. The previous virtual studio setup was horrendous and very time consuming. But with this new LED studio set up of XR has mitigated all the drawbacks of the former. He spoke about the launch of Unreal Engine 5.1, which allows virtual simulated environments to be projected onto an LED wall. The camera is equipped with a tracking system that allows 3-D set to adapt to the position. The XR frees the production from constraints of time and space. Allowing one to be instantly transposed to any part of the planet while remaining in the comfort of the studio.

Virtual shoot allows creation of the illusion of dizziness and emptiness with complete safety. Beyond the technology, XR is totally immersive experience that creates bridge between real and virtual worlds. Various programmes can use XR like musical album, production of a TV serial, Product Launch, Online event, Dynamic TV setup studio, real time audience, etc. Creativity is the limit. There are many benefits associated with the use of XR, like minimising real lightning usage, texture constraint, real time environments and physical production can be easily made available; free from real-time constraints. The benefits of XR are mainly safety versatility, ease of production and cost cutting.

Mr Lindsay Cornell, Principal Systems Architect, BBC Digital and World DAB TC Chairman was the next presenter and the topic of his presentation was "Economics, environment and emergencies leading the way for DAB+ development". As he was unable to attend in-person, he presented virtually.

The three major reasons for widespread usage of DAB+ are economics, environment, and emergencies. In terms of economics, the cost per service of DAB is far lower than FM, with approximately 80% less consumption. The share of new consumer radios with DAB have been almost doubled in last four years. DAB has led to extension of opportunities from London in UK, along with Asia Pacific markets which are running trials. DAB is 33% more efficient than FM and consumes significantly less energy. In terms of emergencies DAB is resilient in comparison to mobile services. Due to European Union mandate (EECC) all new car radios must have digital terrestrial capability and this has led to incorporation of DAB in almost all cars in Europe. The usage of DAB in natural disaster like the floods in Germany in 2021 emergencies was highlighted.

Mr Masashi Kamei, the session chair, thanked all experts for their presentations and closed the day's activity. Both the foregoing sessions were open to questions from the



NEW MEMBERS

November 2021 – November 2022



floor and the speakers had the audience engaged with their responses to relevant questions.

TOPIC AREA REPORTS

27 November commenced with the Topic Area reports session. Mr Hamid Dehghan Nayeri, ABU Technical Committee Chairman opened the session and invited first Mr Kazim Pektas to present the Production Topic Area report.

The Chairman of the Production Topic Kazim Pektas of TRT-Turkiye introduced the session and spoke of some important development. He spoke about the Radio and Television archiving, including metadata for international programmes and Ultra High-Definition TV with some of the loudness related standards. He also informed the delegates about considerations for people with special needs; that sometimes virtual reality can create a temporary change in a person's sensory functions which can affect their movement and orientation.

Finally, Mr Kazim Pektas briefed the audience on the Internet Protocol media experience, which is the new free and open standard for AV over IP, the transmission of very high-quality video, audio and control signals over IP Network. He closed his report by highlighting the reliable internal stream transport in an open source, open specification transport protocol designed for reliable transmission of video over a lossy network with low latency and high quality.

The Chairman of the Transmission Topic Kenichi Murayama of NHK, introduced his report and spoke of the important developments taking part in these fields. He thanked all project managers and contributors in preparing the report. He talked on the project entitled 'Frequency Planning for Digital Broadcasting', about the ITU-R BT. 2144 about the guidance for introducing new digital terrestrial television

broadcasting (DTTB) system, technologies and applications for broadcasting services. Also, he presented several updates from the ABU members who had completed analogue switch overs, an example being Fiji, where DVB-T2 had been launched with an increase in the number of customers to 217,358.

Murayama San informed the delegates that a few countries were auctioning spectrum for 5G implementation. These include Bangladesh, South Africa, Belgium and India. Another project discussed was the Next Generation Terrestrial Broadcasting update from NHK Japan, which has been engaged in an 8K-UHDTV field experiment with channel bonding. This is performed by bonding two channel frequencies to transmit data from a physical pipe. Korea Broadcasting Service (KBS) had developed and launched its ATSC 3.0 and 5G broadcast transmission technique. It is a multi-channel/ mobile/ interactive service. Also, Mr Murayama reported on the IBB/OTT project, and mentioned cybersecurity threats that are happening frequently to some major broadcasters. Therefore, there is a need to strengthen this area. The final project topic was the updated report on the ITU-R BO. 2397 satellite transmission for UHDTV for satellite broadcasting. Mr Murayama informed that it had been updated at the ITU-R Study Group 4 meeting in September 2022.

Mr P Das of Prasar Bharati, Chairman of the Training & Services topic area continued a discussion on the ABU Activities. This topic mainly focused on capacity building and technical training among the members of ABU. Mr Das reported on three different projects within the topic area. Information was provided to members that a survey would be done regularly to examine the needs in various technical areas. Also working with the ABU Media Academy, a curriculum will be formulated which will be standardised among members of broadcasters and this will eventuate in recognised certification. Also, some training programmes

on non-technical, managerial, financial and occupational safety & skills enhancement would be identified and developed.

Mr Das briefed the audience on the ABU activities that are completed in the last year, such as webinars, technical advisory services and international cooperation projects. He also briefed the activities that are undergoing & will be updated with the help of project managers and co-project managers to assist in the coming years.

The next topic area report on Spectrum was prepared by Dr Li Leilei of RTPRC-China who is the Spectrum Topic Area chairman. As he was unable to attend the meeting the report is to be made available on the ABU website.

INFORMATION EXCHANGE

Mr Nayeri informed the audience that, in total, seven information documents had been received. Six from China and one from KBS-Korea. The documents contributed as follows are:

- KOBA 2022 KBS Exhibition Booth Introduction by Jeongseob Kim, Korean Broadcasting System
- 4K UHD live video broadcasting over 5G wireless transmission network by Linda Guo, Sumavision Technologies
- Immersive Video in China by Ouyang Yue, Radio, Film & TV Design and Research Institute, NRTA
- Introduction of HDR Vivid Standard by Jinhui Ning, Academy of Broadcasting Planning, NRTA
- Audio Vivid – The next generation of audio coding standard by Jinhui Ning, Academy of Broadcasting Planning, NRTA
- Olympic Winter Games Beijing 2022 on the Cloud by Guangliang Zhang, Alibaba Cloud
- Bullet-time /FreeView Application scenarios Powered by 5G by Pengzhou Zhang, Beijing International Cloud Broadcasting Technology

Mr Jeongseob Kim from Korean Broadcasting System introduced a document and briefed the meeting about KBS services and solutions during the KOBA 2022 Show in Korea. KBS had promoted a few services at the exhibition booth when the show was held from 29 June to 1 July 2022 in Seoul. KBS promoted UHD IBB Service, UND Multimedia Emergency alert Service, Broadest-Telecom Digital Convergence network, Advanced TPEG-Broadcast RTK Service, AI-based Vertigo video service.

As the delegates from China were not present in person, the information documents were briefed by the ABU Secretariat. Mr Nayeri thanked the contributors of the information documents from Korea and China.

Similarly, delegates heard about status reports from various broadcasting members detailing what development they had achieved and what their plans and services were for the following year. The nineteen (19) organisations who contributed these updates were National Radio and Television Administration (RTPRC-China), National Broadcasting Services of Thailand (NBT-Thailand), Korean Broadcasting System (KBS-Korea), Radio Republik Indonesia

(RRI-Indonesia), Japan Broadcasting Corporation (NHK-Japan), Sri Lanka Rupavahini Corporation (SLRC-Sri Lanka), Radio Television Hong Kong (RTHK), Turkish Radio Television Corporation (TRT-Turkiye), Pakistan Broadcasting Corporation (PBC-Pakistan), Radio Television Brunei (RTB-Brunei), Vanuatu Broadcasting & Television Corporation (VBTC-Vanuatu), Mediacorp Pte Ltd (Mediacorp-Singapore), Vietnam Television (VTV-Vietnam), Radio Broadcasting Service (RNE-Nepal), Nepal Television (NTV-Nepal), Voice of Viet Nam (VOV-Vietnam), Television Broadcasts Limited (TVB-Hong Kong), Radio Televisyen Malaysia (RTM), Kiribati Hope Radio (Kiribati).

BUREAU PROPOSALS

Mr Hamid Dehghan Nayeri, ABU Technical Committee Chairman had a final reading of the following bureau proposals for any further comments.

- Decision 1: Amending the Engineering Award guidelines - in accordance with the recommendations of the EA review Task Group.
- Decision 2: Instituting an ABU Young Engineers' Broadcasting Award
- Recommendation 1: Supporting the WBU Recommendations related to Cybersecurity issued in 2022
- Recommendation 2: Supporting the WBU-TC Recommendation on the Need to Maintain Resilient Mix of Media Distribution Infrastructures for Times of Crisis

As there were no further comment or objections, the two ABU recommendations and the two ABU decisions were approved by the meeting.

TECHNOLOGY PANEL

The next session of interest was the Technology panel session on 'Opportunities and Challenges to Broadcast and Media Organisations in Managing the Connected vs the Traditional Environment. Mr Aale Raza, Managing Director at Whiteways Systems-Singapore chaired and moderated the session. The invited panelists were Nigel Fry- Director of Distribution at BBC World Service, Christian Christiansen-COO at Silver Trak Digital, Jens Fischer-Territory Sales Manager at Signiant, Bishnu Ram Neupane- Deputy General Manager at Nepal Television, Shri N Thiagarajan- Additional Director General (South Zone) at Prasar Bharati-India and Dr Riyadh Najm, ABU Alumni from Saudi Arabia.

The expert panel deliberated on the Opportunities and Challenges of traditional Broadcast Organisation. Today, Facebook, TikTok, Netflix and other platforms have overtaken traditional media platform such as analogue. TV and Radio. Traditional viewers are not the same as twenty years ago and the people watching TV on TV sets or other devices is decreasing rapidly. The panel observed that viewership on traditional TV had dropped, but questioned whether this has affected business revenues or not. The panel said that there is still a role for traditional media to play and expand its services. The advantage of traditional media is that it is not very costly to the audience and viewers. Also, there are 1.2 billion people still not connected with internet who rely on traditional media to access information.

Moderator: Mr Aale Raza, Managing Director, Whiteways Systems

Speaker Panel:

- Nigel Fry, Director of Distribution, BBC World Service
- Christian Christiansen, COO, Silver Trak Digital/ DAMsmart
- Jens Fischer, Territory Sales Manager, Signiant
- Bishnu Ram Neupane, Deputy General Manager, Nepal Television
- Sh N Thiagarajan, Additional Director General (South Zone), Prasar Bharati-India
- Dr Riyadh Najm, Chair, ABU Alumni, Saudi Arabia



The panel reiterated that with the advancement of technology, new platforms have emerged and been embraced by the young generation. But, the content for both new and traditional channels might still be the same. Therefore, it is vital for content makers as well as broadcasters to be on that those platforms. It was also observed that within the Asia Pacific Broadcasting Union (ABU) all members do not have the same level of standards in terms of technology. And, while a technology may be of greater value in a particular geographical area, it does not mean that it will be good in all other areas.

At the end of the session the panel concluded that any broadcast media organisation will need to embrace the connected environment as well as maintaining its traditional environment. Opportunities are created to the Public Service Broadcasters to serve differently with new purpose and new content rather than taking this as unfair burden imposed to them in serving diverse audience.

THE HOST PRESENTS | PRASAR BHARATI-INDIA

The afternoon session on 27 November was 'The Host Presents' panel session, hosted by Prasar Bharati, India. The session was attended by more than 50 participants

representing ABU members and non – member organisations from different countries from the world. Moderator and Chair of the session was Mrs Anuradha Agarwal, Additional Director General, NABM, India. The topics were as diverse as ranging from Technological & Managerial aspect of broadcasting to capacity building of its human resources and catering digital content for audience consumption. It discussed the broadcasting experiences and developments of Prasar Bharati over the past 100 years. The future plans of Prasar Bharati were also discussed during this session.

The topic and panel of speakers included:

- D2M with demonstration by S Vadivazagan, DDG (Innovation), Prasar Bharati and Prashant Maru, Sankhya Lab
- Content production for digital medium by Samir Kumar, head (PBNS)
- Modern broadcast technologies and AIR future plan by Atul Gupta, ADG (Engineering)
- Innovations in Broadcast Technology and future plan in Doordarshan by DC Shukla, DDG (Technology)
- NABM and its programs for HR development in broadcasting sector by RK Joshi DDG (NABM)



The session stressed the importance of the digital platform to the broadcast technology. The key features of digital broadcasting systems, such as multiple channels per transmitter, quality signal, EWS function etc. were highlighted. It highlighted the different standards digital platform in transmission, such as DRM, IBOC, HD, DAB, D2M, Audio over IP, IP based routing, integration of social media, Podcast OTT and Live streaming. Also, different traditional mediums of transmission and distribution for link connectivity, like Satellite, DTH, Dedicated lease line, OFL, VSAT etc. DRM broadcasting started in India in 2014 in the SW and MW bands and has been made available to about 70% of the population of India. Most car manufacturers in India install DRM receivers in their high-end vehicles.

An interesting presentation took place on the Direct to Mobile (D2M) system, which is a hot topic in the broadcasting field in regard to 5G networks. It included a real time live demonstration of direct to mobile broadcasting with LPLT Broadcast Radio Head (ATSC3.0) and D2M Receiver embedded in a mobile phone. The DD India channel was live aired and received directly over broadcast mode on a mobile without internet connection. A dongle connected tablet may also receive the broadcast signal. Prasar Bharati, in association with the department of telecommunication (DoT) is exploring the feasibility and launching Direct to Mobile technology over 5G in India in the near future. Some features of D2M are low cost and reliability, software encoding, rural area and EWS coverage, data free with D2M, local and regional channels.

A presentation on 'producing content for online platforms' highlighted the fact that to make good content, the producer has to think about the short text, long text, graphics and video and that it should be unique, and from appropriate sources. While uploading content to online platforms, one must consider accessibility, affordability. Also, a relevant platform has to be selected based on target listeners and viewers.

The NABM (National Academy of Broadcasting and Multimedia) training centre conducts training programs in collaboration with International Organisations, such as ABU, AIBD, DW, IABM, BBC, CBA, UNICEF etc.

The session also covered the corporate overview of Prasar Bharati, capacity building, training facilities, digital service and digital platform for studio content production, IT initiatives, OTT, Apps as well as streaming audio via a web portal.

At the Members' Updates session, the audience took note of the new ABU members who joined during 2021-2022; these being:

- Universita Svizzera Italia – Affiliate member – Switzerland
- Canara lighting industries Pvt. Ltd. – Affiliate member – India
- National Radio of Cambodia – Additional Full Member – Cambodia

- Agence Kampuchea Press – Affiliate member – Cambodia
- Special Broadcasting Service – Additional Full Member – Australia
- Pebble Beach Systems Ltd. – Affiliate member – United Kingdom
- Sarawak Media Group – Additional Full Member – Malaysia
- Shekhinah PR Sdn. Bhd. – Affiliate member – Malaysia
- Spacelabs Technology Sdn. Bhd. – Affiliate member – Malaysia

Mr Alexander Zink, on behalf of DRM Consortium, gave a briefing of DRM activities in the world and on the DRM standard, which is an open standard in the AM/FM bands. He informed that the DRM receivers are already installed in almost 5.2 million cars in India.

It was announced that the next TC meeting will be hosted by KBS-Korea and Mr Sung Rae Cho, Director of Technology Management at KBS Technology Division will be the Honorary Vice-Chairman of the ABU Technical Committee, from the host, of the 2023 ABU General Assembly.

Under any other business, TC chairman Mr Hamid Dehghan Nayeri extended special thanks to former ABU staffers, Ms Geraldine Peters and Ms Hamidah Rani for their more than two decades of dedicated and professional service.

CLOSING REMARKS

In conclusion of the 2022 Technical Committee meeting, the TC chairman, Mr Hamid Dehghan Nayeri, reiterated several current issues faced by the broadcasting industries, discussed during the two-day meeting. In addition, the chairman also mentioned D2M as a very ambitious project, which is very interesting to all the ABU members. He stressed the fact that working as a unit, the cyber-attack problem can be solved,

On behalf of Technical Committee, Mr Nayeri thanked all the speakers for their contribution and support to the ABU. Also congratulated Technical Review prizes winners, the ABU Engineering Award winners in different categories. He also encouraged young engineers for their contribution and support in the coming years. Finally, he extended special thanks to the host members Prasar Bharati-Doordarshan and All India Radio team-related government and international organisations as well as all the team members of the ABU.

CONTRIBUTED BY RAPORTEURS

Yashovardhan Sharma, Whiteways Systems, Singapore

Arunima Singh, Prasar Bharati-India

Warren Roberts, VBTC-Vanuatu

Udaya Krishna Shrestha, RNE-Nepal ■

Performance Analysis of Digital Terrestrial Television (DTT) Services in The Central Region of Malaysia

ABSTRACT

Due to the increasing demand of services and content, Quality of Service (QoS) has become an important aspect in the broadcasting industry including Radio Televisyen Malaysia (RTM), especially with the implementation of Digital Terrestrial Television (DTT) in Malaysia. Thus, the performance of DTT in Malaysia should be investigated because there are areas which do not receive coverage due to the variety of terrain, or where some areas receive weak DTT signals. Apart from geological and topographic factors in Malaysia, the selection of DVB-T2 parameters is also an important factor in determining signal strength and coverage. This research has proposed to study the performance analysis of DTT propagation for fixed reception in Malaysia's central region. The Field Strength Measurement (FSM) was set up to evaluate the QoS of DTT signal such as Field Strength (E), Modulation Error Ratio (MER), and Carrier to Noise Ratio (C/N) at specific test points across Malaysia's central region. The FSM was simulated at the designated test points using CHIRplus_BC software to evaluate the performance of Single Frequency Network (SFN) with three locations of transmitter. It can be concluded that the coverage of DTT is reduced with the increase in the distance of the measurement area to the transmitter. The findings also show that the field strength value obtained from FSM and simulation was comparable.

KEYWORDS

DTT, DVB-T2, QoS, fixed reception, Field Strength, MER, C/N, SFN, Modulation, FEC, CHIRplus_BC simulation

INTRODUCTION

A. RESEARCH BACKGROUNDS

Digital terrestrial television (DTT) is a terrestrial television technology in which land-based (terrestrial) television station's broadcast the television content in digital format via radio waves to television in consumers' residences. Compared to the previous, analogue television, DTT is a significant technical development that essentially replaces the analogue system, in common use since the middle of the 20th century.

The perks of shifting to DTT include effective usage of limited radio spectrum capacity, the availability of more television channels, better quality videos, and potentially lower operating costs for broadcasters. Different countries have adopted various standards for digital broadcasting.

The Digital Video Broadcasting - Second Generation Terrestrial (DVB-T2) standard has been chosen as the

standard to substitute the analogue TV system in the growing demand for services and content by RTM as one of Content Application Service Provider (CASP) and has forced the DTT Central Integrated Infrastructure Provider (CIIP) in Malaysia to meet the QoS criteria while providing high bit rate information security and error protection. Fig. 1 illustrates the Diagram of DTT services in Malaysia.

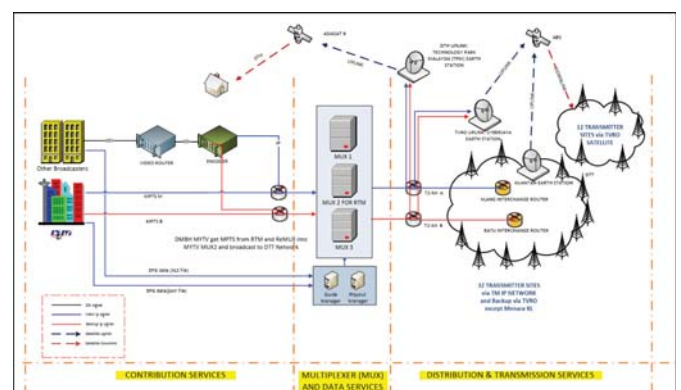
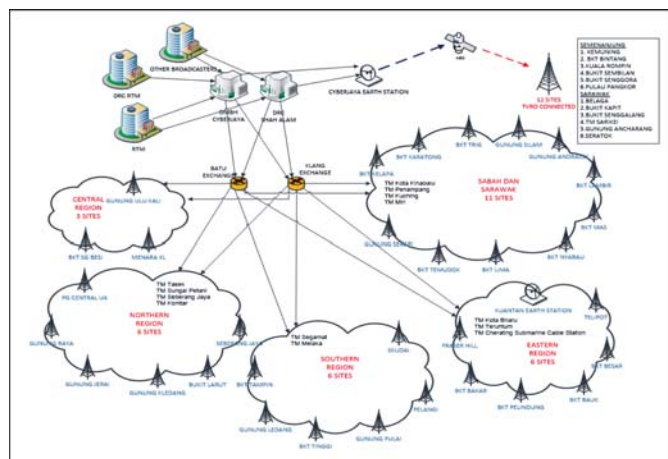


Fig. 1: DTT services in Malaysia

FEATURE ARTICLE 2

In Selangor, 23 locations were identified as receiving weak DTT signals or no coverage. MYTV designates these areas as non-coverage areas and allows the residents to receive DTH instead of DTT. The DTH coverage information can be accessed through website www.mytvbroadcasting.my. Although the populated coverage is 95.3%, some areas received weak signals due to Malaysia's terrain. In addition to the effects of geological and landscape profiles in Malaysia, the selection of DVB-T2 transmission parameters is very important for good reception of the received signal. The QoS parameters that can be related to the operational of DVB-T2 transmission through measurement are Modulation Error Rate (MER), Bit Error Rate (BER), Carrier to Noise Ratio (C/N), Field Strength, and coverage range [3].



The objectives of this study are:

- To measure the Quality of Services (QoS) of DTT Single Frequency Network (SFN) signals in the designated test points for fixed reception by performing the Field Strength Measurement (FSM).
- To simulate the FSM at the designated test points using CHIRplus_BC software in order to obtain the coverage range.

The first edition of the DVB-T2 standard (ETSI EN 302 755 V1.1.1) was based on a DVB blue-book released by ETSI in September 2009 [4]. In launching the second generation, the goal of DVB was to incorporate the advances accomplished in signal processing after the first digital standards emerged in 1993. Spectral efficiency is becoming more important for DTT because some spectrum previously allocated for TV broadcasting is now being re-allocated to mobile communications systems, particularly 4G LTE [5]. Simultaneously, TV-quality levels are improving, and high-definition TV (HDTV) is a must for individuals who own large flat-screen displays. This high bandwidth demand streaming content should be able to provide digital broadcasting. DVB-T2 was developed to satisfy these criteria, increasing spectral performance and robustness in a modular way. It is possible to cover a range of reception situations for the same system by selecting the best available configuration choices.

Compared with the already successful DVB-T standard, the DVB-T2 specification incorporates the latest modulation and Forward Error Correction (FEC) development to increase the bit-rate capacity and improve signal robustness [4]. FEC code rate parameter defines the ratio between the number of data bits received and the total number transmitted. The higher the code rate the better error correction, increasing the robustness of the signal but decreasing the capacity. When compared to the DVB-T standard, which uses Reed-Solomon and convolutional coding, DVB-T2 introduces two additional code rates; Low-Density-Parity-Check (LDPC) and Bose-Chaudhuri-Hocquenghem (BCH)[4]. In DVB-T2, the additional modulation scheme 256-QAM is available. The choice of modulation determines the bit rate (capacity), but it also has a significant impact upon the system's robustness; higher order modulation schemes that offer more capacity are more fragile [4].

DVB-T2 also utilises Single Frequency Networks (SFN), which uses the same channel frequency for all transmitters in the network. In an SFN Network the required coverage is provided through the use of multiple transmitters operating on the same frequency and carrying the same programmes [5]. The issues that need to be considered for broadcasting in SFN transmission are to make sure that all the transmitters are transmitting the same data using the same frequency and are transmitting at the same time [6]. When deploying the SFN, delay adjustment is performed by fitting the launching time of each transmitter, so that the time difference of the incoming signals within the reception area falls into the Guard Interval (GI) duration [7]. The aim of SFN is spectrum efficiency. When compared to a Multi Frequency Network, SFN can exhibit network gain, where signals from several transmitters contribute to a higher received signal level and improved coverage [8]. *Fig. 3* shows the concept of an SFN network.

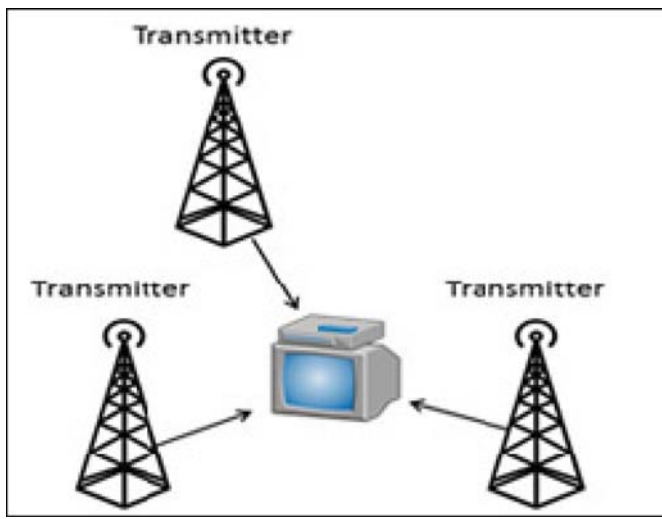


Fig. 3: Single Frequency Network (SFN)

METHODOLOGY

A. FIELD STRENGTH MEASUREMENT (FSM)

To conduct the Field Strength Measurement (FSM) of DTT propagation in central region of Malaysia requires several steps as shown in Fig. 4. The first step is to identify the test point of FSM in the central region. The second step is to perform Field Strength Measurement (FSM) at the designated test points. The data collected from the FSM were Field Strength (E), MER and C/N. The results obtained from FSM were compared with the results obtained from the CHIRplus_BC simulation.

The measurement tools used to perform the FSM are Field Strength Meter Promax Ranger Neo+, and Antenna Maspro Denkoh which is used as the antenna receiver. The antenna was raised 10 metres above ground level to ensure signal reception was optimised for a fixed reception method. Fig. 5 shows the FSM setup.

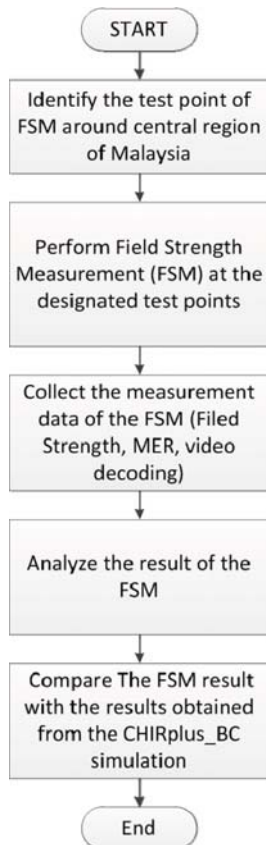


Fig. 4: Flow Chart of the FSM



Fig. 5: Field Strength Measurement (FSM) Setup

B. MEASUREMENT PARAMETERS

1) Field Strength (E)

Field Strength measures the power over the entire bandwidth of the channel. It is formed by the vector addition of the directly received signal component and reflections due to obstructions in the field [16]. Coverage area means a certain area is regarded as being covered by DVB-T/T2, when the median field strength for the particular receiving situation at a specified height above ground (often 10 m) [12]. The minimum median equivalent field strength (Emed) DVB-T2 8 MHz system at 650 MHz is 56 dBμV/m [13]. The antenna factor is used to calculate the field strength from the antenna output level. The calculation formula of field strength at the antenna is as follows:

$$E = U + K \text{ (dB}\mu\text{V/m)} \quad (1)$$

$$U = P_s + 120 + 10 \log(Z_i) \text{ (dB}\mu\text{V)} \quad (2)$$

$$P_s = C/N + P_n \text{ (dBW)} \quad (3)$$

$$P_n = F + 10 \log(k T_o B) \text{ (dBW)} \quad (4)$$

where, U is the measured antenna output voltage, K is the antenna factor, P_s is the receiver signal input power, Z_i is the receiver input impedance (75 Ω), C/N is the carrier to noise ratio required by the system, P_n is the receiver noise input power, F is the receiver noise figure, B is the receiver noise bandwidth, k is Boltzmann's Constant = 1.38×10^{-23} Ws/K, and T_o is absolute temperature = 290 K

The antenna factor depends on frequency and gain according to the following formula:

$$K = 20 \log(f) - G_i - 29.774 \quad (5)$$

where f is the channel frequency and G_i is the antenna gain relative to an isotropic radiator.

2) Modulation Error Ratio (MER)

The modulation error ratio (MER) represents the ratio between the average power of the DVB-T2 constellation signal and the average noise power of the signal constellation. The sum of the squares of the magnitudes of the ideal symbol vectors (I_j , Q_j) is divided by the sum of the squares of the magnitudes of the symbol error vectors (δI_j , δQ_j) [3]. The result, expressed as a power ratio in dB, is defined as the Modulation Error Ratio (MER) and given by the formula:

$$MER = 10 \times \log_{10} \left\{ \frac{\sum_{j=1}^N (I_j^2 + Q_j^2)}{\sum_{j=1}^N (\delta I_j^2 + \delta Q_j^2)} \right\} \quad (6)$$

An error vector (δI_j , δQ_j) is determined as distance between ideal and measured position of received symbol. In other words, a received vector (I_j , Q_j) is the sum of ideal vector (I_j , Q_j) [12] and error vector as shown in Fig. 6.

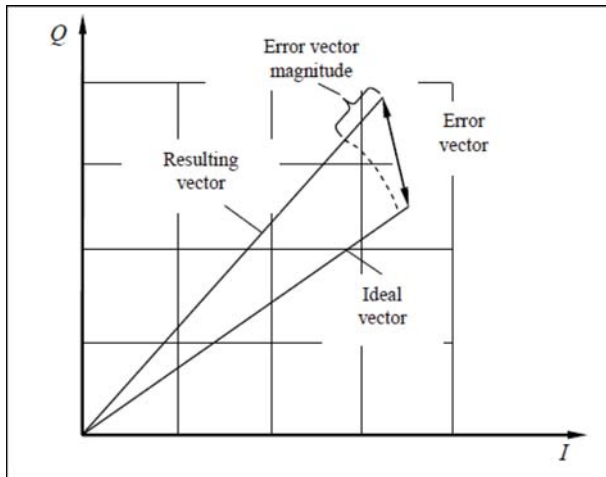


Fig. 6: Error vector calculation [12]

3) Carrier To Noise Ratio (C/N)

The Carrier-to-noise ratio (C/N) is a ratio of the strength of the received carrier to the strength of the received noise. High C/N ratios provide greater reception quality and communications accuracy and reliability. The minimum C/N required by DVB-T2 system with 8 MHz bandwidth at 650 MHz is 20 dB [13]. The carrier-to-noise ratio, C/N, in dB is given by the formula:

$$C/N = 10 \log_{10} (P_c/P_n) \text{ dB} \quad (7)$$

where P_c is the carrier strength in μW and P_n is the noise level in μW .

C. STUDY AREA

This study focused on Malaysia's central region in the area of Klang Valley, Selangor, and some areas in Pahang with the coverage of 19,800 km². 111 test points were set up in this area. These test points involved populated areas such as residential areas, schools, mosques, petrol stations, multi-purpose hall stadiums, villages and rural areas. Fig. 7 shows the study area and the test point locations.

The DTT signal received was from three transmitters, which were Menara KL transmitter (3.15289, 101.70382), Gunung Ulu Kali transmitter (3.42775, 101.78899) and Bukit Sungai Besi transmitter (3.07031, 101.72949). These transmitters were set to transmit as a single frequency network (SFN).

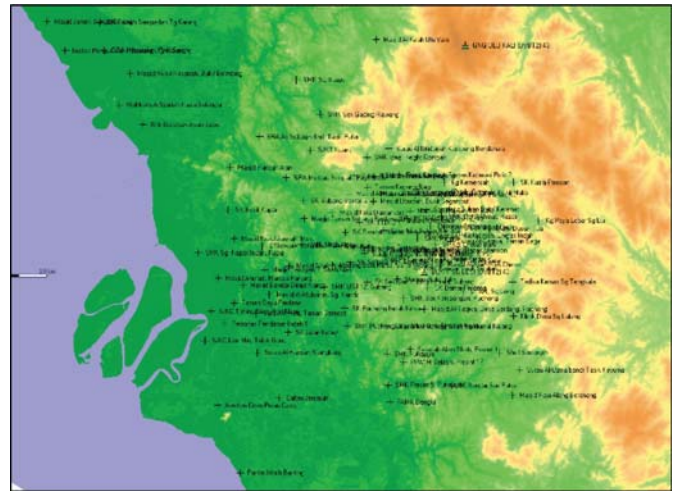


Fig. 7: Study area and 111 test points set in test point databased CHIRplus_BC

D. DVB-T2 PARAMETER SET UP IN CHIRPLUS_BC SOFTWARE

The parameters as shown in Table II were configured in the CHIRplus_BC software.

TABLE II : CURRENT DVB-T2 STANDARD PARAMETERS IN MALAYSIA [14]

III. DVB-T2 Parameters for UHF CH 43 (650MHz)	
IV. Channels	V. UHF CH 43 (650 MHz)
VI. Bandwidth	VII. 8 MHz
VIII. Modulation	IX. COFDM
X. Carrier Modulation	XI. 256-QAM
XII. FEC Code Rate	XIII. 2/3
XIV. Guard Interval	XV. 19/256
XVI. FFT Size	XVII. 32k Extended
XVIII. Pilot Pattern	XIX. PP2

Broadcasting network planning involves setting of the transmitter parameters in order to provide good QoS in the intended coverage area. The parameters for the three transmitters were configured into the CHIRplus_BC working database as shown in **Table III**.

TABLE III : TRANSMITTER PARAMETERS FOR SIMULATION

Transmitter Parameters			
Transmitter	ERP (dBW)	Height (m)	Freq (MHz)
Menara KL	51	543	650
Ulu Kali	50	1786	650
Sungai Besi	50	291	650

RESULT AND ANALYSIS

The results of 111 test points of Field Strength Measurement (FSM) and simulation from CHIRplus_BC are introduced in this section. The results obtained were analyzed and compared.

A. FSM RESULTS

1) Field Strength (E)

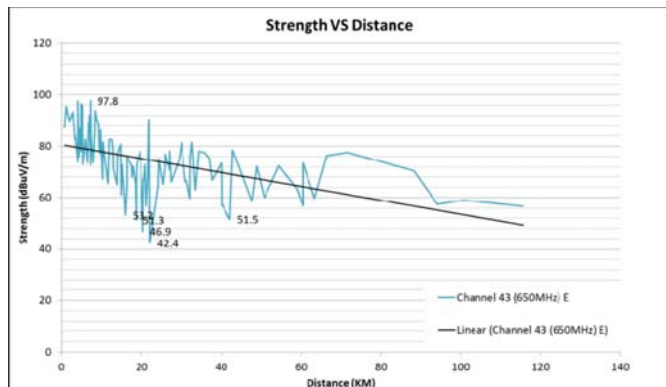


Fig. 8: Field Strength Vs Distance at 111 FSM test points

Fig. 8 shows the field strength of the received signal. It is observed that when the distance increases, the signal strength is reduced. The highest field strength is 97.8 dBμV/m at a distance of 7.1 km from the nearest transmitter, Bukit Sungai Besi. Five test point locations were identified as receiving signal strengths of less than 56 dBμV/m. which is the minimum threshold. The locations were Kg. Paya Lebar, Sg. Lui, SK Kuala Pomson, Masjid Al-Makmur, Felda Gedangsa, Masjid Nurul Husna, Felda Sg. Tengi Selatan and Tadika KEMAS Sg. Tekala. The lowest signal strength is 42.4 dBμV/m, at a distance of 22.1 km from the nearest transmitter, which is Bukit Sungai Besi. It can also be concluded that even when the distance between the transmitter and the area is short, the field strength can be low. This is due to the obstructions and signal reflections caused by hilly terrain, plantation trees, or tall buildings around the measurement area.

2) Modulation Error Ratio (MER)

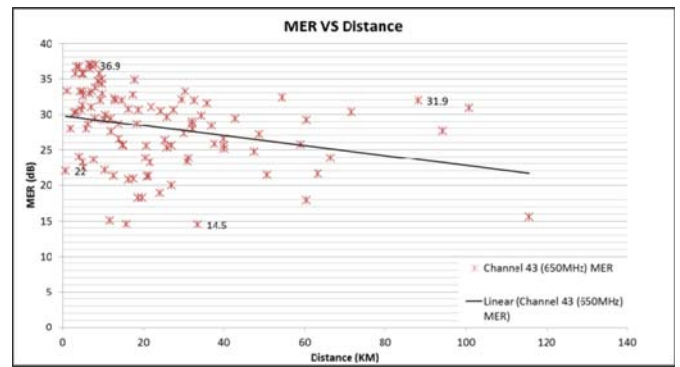


Fig. 9: MER Vs Distance

The result of MER is presented in Fig. 9. It is demonstrated that as the distance increases, the MER decreases. The highest MER is 36.9 dB from the test point location with a distance of 7.1 km from the nearest transmitter, Bukit Sungai Besi. The MER reading for five test point locations cannot be obtained and the video channel could not decode the signal. There were cases where the MER reading obtained were higher from the test point located farthest from the transmitter. For instance, at the test point, where the distance to the transmitter was 88 km, the MER was 31.9 dB, while at the test point of 0.75 km, the MER was 22.4 dB. This is because the location of the distant test point had no interference or obstruction from hills and tall buildings, unlike the area closer to the transmitter. Transmission delay time caused by obstruction will cause noise power of signal modulation to increase. The noise power changes when phase (I) and amplitude (Q) of QAM modulation is shifted. The longer the delay time, the higher the noise power, contributing to lower MER readings.

3) Carrier-To-Noise ratio (C/N)

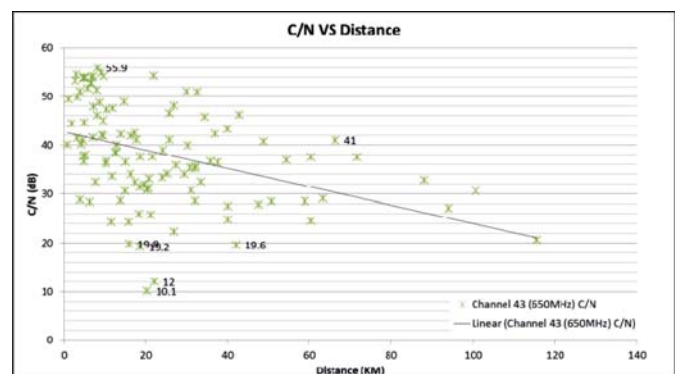


Fig. 10: C/N Vs Distance

Fig. 10 shows the result of C/N. The C/N decreased as the distance decreases. The highest C/N is 55.9 dB at a distance of 8.2 km from the nearest transmitter, Bukit Sungai Besi. There are five test point locations with C/N less than 20 dB. There are also cases where the C/N obtained from the test point farthest from the transmitter is higher than the C/N obtained from the test site near to the transmitter. For example, the C/N of 10.1 dB was measured at the test location where

the distance to the transmitter was 20.3 km, while the C/N was 41 dB at the test point where the distance to the transmitter was 66 km. This is because of the obstruction and interference cause by hills and tall buildings at the test point even though the distance to the transmitter was closer.

B. CHIRPLUS_BC SIMULATION RESULTS

In this section, the field strength simulation results obtained from the three transmitters, Menara KL, Gunung Ulu Kali and Bukit Sungai Besi were analysed using scatter graph to observe the correlation between the received signal strength and the distance from the transmitter. Then, the received signal strength readings obtained from the FSM were compared to the simulation results and analysed.

1) Field Strength from Menara KL Transmitter

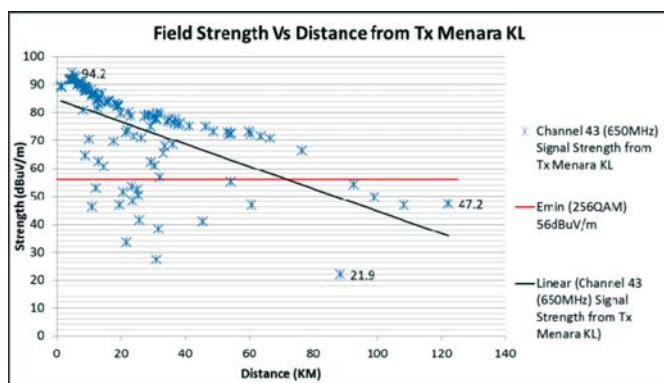


Fig. 11: Simulation of Field Strength Vs Distance from Menara KL Transmitter

Fig. 11 shows the field strength simulation results. A scatter graph was plotted to see the relationship between the received signal strength and the distance of 111 test points to the Menara KL transmitter. It is demonstrated that when the distance increases, the signal strength reduces. The highest strength is 94.2 dB μ V/m at a measurement distance of 4.62 km. Out of 111 test points, 95 had signal strength greater than 56 dB μ V/m of the minimum thresholds, resulting in 89.2% coverage. The lowest strength is 21.9 dB μ V/m at 88.4 km distance from Menara KL. Lower signal coverage will however be supported by higher signal transmitted from the other two transmitters. This being one of the advantages of SFN in DVB-T2 transmission. There were some test point locations where the strength was very low even though the distance to the transmitter was less. This was due to the obstruction and interference caused by the hilly terrain and tall buildings in this measurement area.

Fig. 12 shows the simulation of the coverage area from the Menara KL transmitter. The transmission of the DTT signal from the Menara KL transmitter focuses on the urban areas with high population density in the Klang Valley. The signal from Menara KL could not however cover the state of Pahang and the north of Selangor. This being due to the distance of the transmitter as well as obstruction from the hilly area of the Banjaran

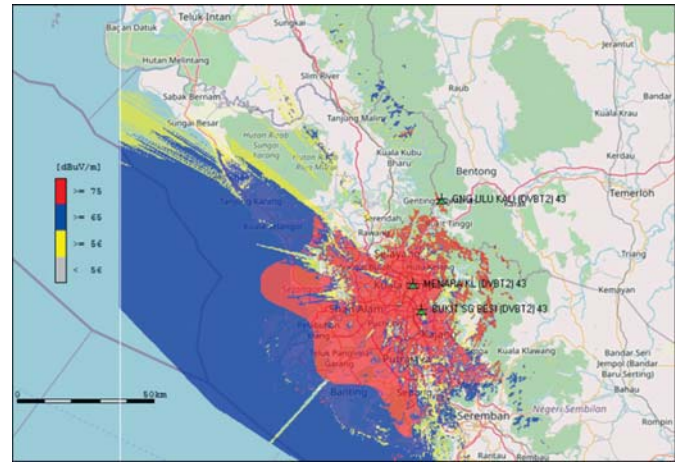


Fig. 12: Simulation of coverage area from Menara KL Transmitter

Titiwangsa, which is the longest range in Peninsular Malaysia. The Menara KL transmitter works as part of an SFN network. Thus, contributing to the increase in signal gain and further improvement in coverage around the central region of Malaysia, especially in urban areas.

2) Field Strength from Gunung Ulu kali Transmitter

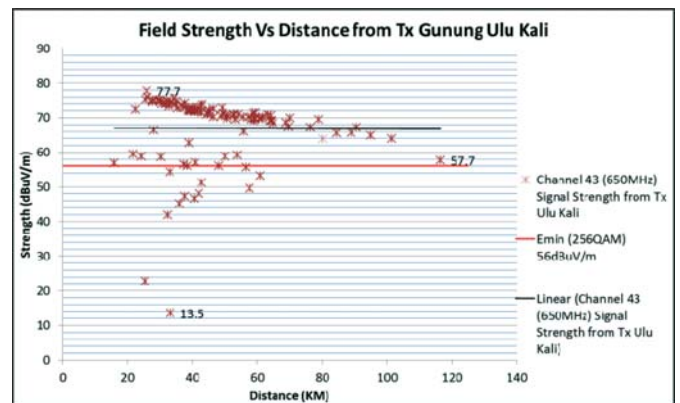


Fig. 13: Simulation of Field Strength Vs Distance from Gunung Ulu Kali Transmitter

Fig. 13 shows the simulation result of the received signal strength of the 111 test points from the Gunung Ulu Kali transmitter. It is shown that when the distance increases, the signal strength is slightly reduced. The highest strength is 77.7 dB μ V/m at a measurement distance of 25.9 km. Out of 111 test points, 99 had signal strength greater than the 56 dB μ V/m minimum threshold, resulting in 89.2% coverage. The lowest was 13.5 dB μ V/m at a location 33.17 km from the Gunung Ulu Kali transmitter. It is observed that six test points which were located more than 80 kilometers from the transmitter still received excellent signal strength, greater than 65 dB μ V/m, demonstrating that the Gunung Ulu Kali transmitter could transmit DTT signals over a relatively long distances due to the location of the transmitter in a mountainous area, thus reducing the probability of obstruction.

Fig. 14 shows the coverage area of the Gunung Ulu Kali transmitter. The transmission of the DTT signal from the Gunung Ulu Kali transmitter provides a very

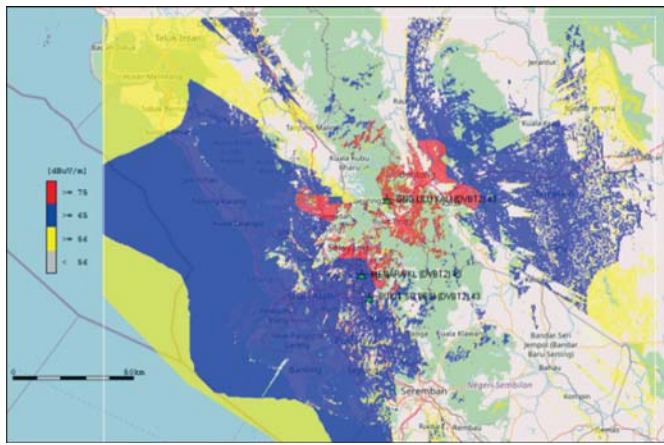


Fig. 14: Simulation of coverage area from Gunung Ulu Kali Transmitter

long transmission range, covering most areas in the central region of Malaysia, including some area in the state of Pahang excluding the hilly range. Transmission from Gunung Ulu Kali transmitter could also reach the north and south of Selangor, which is not covered by Menara KL and Bukit Sungai Besi transmitters. This shows that Gunung Ulu Kali transmitter could transmit DTT signals over relatively long distance due to the position of the transmitter which is installed in a mountainous area. The Gunung Ulu Kali transmitter also works within an SFN. It contributes to the increase in signal gain and further improves coverage around the central region of Malaysia.

3) Field Strength from Bukit Sg. Besi Transmitter

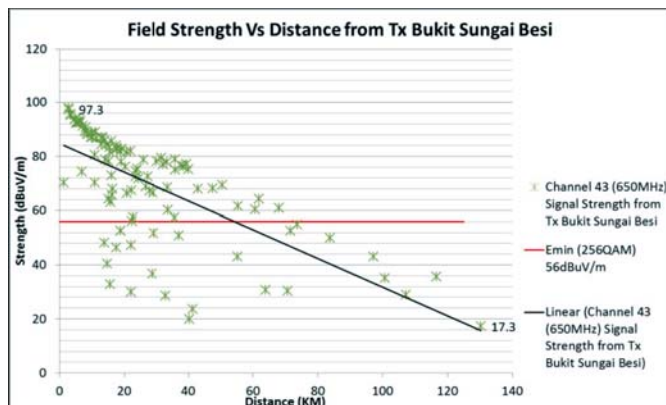


Fig. 15: Simulation of Field Strength Vs Distance from Bukit Sungai Besi Transmitter

Fig. 15 shows the simulation result of received signal strength from the 111 test points to the Bukit Sungai Besi transmitter. The trend line shows that as the distance to the transmitter increases, the signal strength decreases. At a distance of 2.88 km, the strongest signal is 97.3 dBuV/m. Out of 111 test points, only 87 had a signal strength greater than the 56 dBuV/m minimum threshold, resulting in 78.4% coverage. The received signal strength drops to 17.3 dBuV/m at a distance of 130.35 km from the transmitter. Even though the distance of test location to the transmitter is near, there were some test point locations where the signal strength was very low. This is due to the mountainous terrain and the density of tall buildings obstructing and interfering the signal at this location. The height of this transmitter is only 291 metres, which is the lowest among all the transmitters. resulting in small coverage.

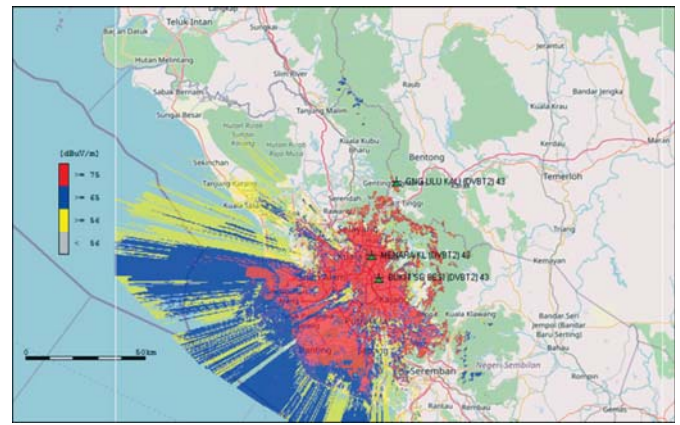


Fig. 16: Simulation of coverage area from Tx Bukit Sungai Besi

Fig. 16 is the coverage area of the Bukit Sungai Besi transmitter. The transmission of the DTT signal from the Bukit Sungai Besi transmitter is also targeted for the high-density urban area in Klang Valley. Apart from improving coverage of the urban area, Bukit Sungai Besi transmitter provides DTT signal to affected areas if the Menara KL transmitter is faulty. The signal from the Menara KL could not cover Pahang and north of Selangor. This is due to the distance of the Bukit Sungai Besi transmitter and the hills that run across the Banjaran Titiwangsa, which is Peninsular Malaysia's longest range.

4) Comparison of Actual FSM and Simulation

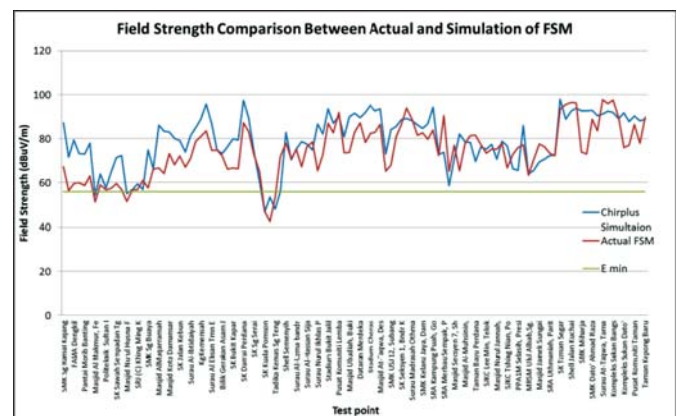


Fig. 17: Comparison of field strength value between FSM and CHIRplus_BC simulation

The comparison of the field strength value obtained from the FSM and simulation is shown in Fig. 17. From this graph, it is found that the measured field strength and the simulation value is within the same range, although there were slight deviations. It indicates the measurement accuracy of the FSM. The difference in the field strength readings between the FSM and simulation may be due to the transmitter parameters set up in the CHIRplus_BC database, such as ERP, or the antenna pattern, not being equivalent to the actual transmitter. In addition, obstructions and interference from tall building and hilly terrain in the measurement area can cause the field strength value of FSM to be lower than the simulation. However, five test point locations which show the lowest Field Strength readings, less than the threshold of 56 dBuV/m remained the same for both FSM and simulated results. The location of the test points were Kg. Paya Lebar, Sg. Lui, SK Kuala Pomson, Masjid Al-Makmur, Felda Gedangsa, Masjid

Nurul Husna, Felda Sg. Tenggi Selatan and Tadika KEMAS Sg. Tekala. The results of this simulation also show that the overall coverage at the test points reached 95.5, indicating that with the SFN function, all three transmitters have successfully increased the coverage of the central region of Malaysia.

CONCLUSION

It can be concluded that the objectives of this study have been achieved. The FSM performed on 111 test points in the central region of Malaysia shows that there were areas which are not covered by DTT particularly the areas that are close to hills and ranges due to geographical terrain factors. In addition, the coverage of DTT is reduced with the increase in the distance of the measurement area to the transmitter. Furthermore, obstruction from tall buildings and hills in the measurement area also caused the DTT coverage to deteriorate. Simulation of coverage area conducted for three transmitters; Menara KL, Gunung Ulu Kali and Bukit Sungai Besi, demonstrated the DTT transmission performance of these three transmitters. The advantage of the Single Frequency Network (SFN) approach for DVB-T2 transmission is shown in this simulation, where the three transmitters provide good coverage across the central region of Malaysia. SFN can exhibit network gain, where signals from the three transmitters contribute to a higher received signal level and improved coverage of the region. Moreover, the field strength results obtained from the FSM and the simulation is almost in the same range, although there are slight deviations. It indicates the measurement accuracy of the FSM.

RECOMMENDATIONS

There are several recommendations to improve this study:

- The performance analysis can be extended to other areas that are recorded to have a low percentage of coverage due to geographical factors, such as the rural areas of Sabah and Sarawak. It can also be extended to the whole country of Malaysia.
- In future, the analysis of indoor and mobile reception of DVB-T2 propagation can be considered because until now, it has never been studied in Malaysia.

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TRANSMISSION TOPIC AREA

Topic Chairman : Kenichi MURAYAMA (NHK)
Period of Report : December 2021 to November 2022
Date of Report : 26 November 2022

INTRODUCTION

The transmission topic area comprises five projects. Matters concerning digital terrestrial television broadcasting, digital satellite broadcasting, digital sound broadcasting and relative frequency planning are studied or investigated by these projects. This topic area also covers research on IBB and OTT, including platforms and standards, etc.

This document has been submitted for the Technical Committee Annual meeting.

1. FREQUENCY PLANNING FOR DIGITAL BROADCASTING(T/FPDB)

Project Manager:

Ms Momoko Suyama (NHK, Japan)

Co-project Manager:

Mr Yuen Man (TVB, Hong Kong, China)

Mr Rajeev Kumar (DDI, India)

Reports from the project managers and the contributor are as follows:

- 1.1 ITU-R text related to DTTB coverage and frequency planning
- 1.2 Latest ASO situations in the region
- 1.3 Latest topics over frequency policies in the world

1.1 ITU-R TEXT RELATED TO DTTB COVERAGE AND FREQUENCY PLANNING

1.1.1 Recommendations

(<http://www.itu.int/rec/R-REC-BT/en>)

- BT.1306 "Error correction, data framing, modulation and emission methods for digital terrestrial television broadcasting"
- BT.1368 "Planning criteria, including protection ratios, for digital terrestrial television services in the VHF/UHF bands"
- BT.1877 "Error-correction, data framing, modulation and emission methods for second generation of digital terrestrial television broadcasting systems"
- BT.1895 "Protection criteria for terrestrial broadcasting systems"
- BT.2033 "Planning criteria, including protection ratios, for second generation of digital terrestrial television broadcasting systems in the VHF/UHF bands"
- BT.2036 "Characteristics of a reference receiving system for frequency planning of digital terrestrial television systems"
- BT.2052-1 Planning criteria for terrestrial multimedia broadcasting for mobile reception using handheld receivers in VHF/UHF bands

- BT.2136 "Assessing interference into digital terrestrial television broadcasting from other services by means of Monte Carlo simulation"
- BT.2144 "Guidance for the introduction of new DTTB systems, technologies and applications in the broadcasting service"

1.1.2 Reports

(<http://www.itu.int/pub/R-REP-BT/en>)

- BT.2035 "Guidelines and techniques for the evaluation of digital terrestrial television broadcasting systems, including assessment of their coverage areas"
- BT.2140 "Transition from analogue to digital terrestrial broadcasting"
- BT.2209 "Calculation model for SFN reception and reference receiver characteristics of ISDB-T system"
- BT.2265 "Guidelines for the assessment of interference into the broadcasting service"
- BT.2294 "Construction technique of DTTB relay station network for ISDB-T"
- BT.2295 "Digital terrestrial broadcasting systems"
- BT.2302 "Spectrum requirements for terrestrial television broadcasting in the UHF frequency band in Region 1 and the Islamic Republic of Iran"
- BT.2343 "Collection of field trials of UHDTV over DTT networks"
- BT.2386-3 Digital terrestrial broadcasting: Design and implementation of single frequency networks (SFN)
- BT.2468-1 Guidance for selection of system parameters and implementation of second generation DTTB systems
- BT.2470 "Use of Monte Carlo simulation to model interference to DTTB"
- BT.2485 "Advanced network planning and transmission methods for enhancements of digital terrestrial television broadcasting"

1.1.3 Handbook

(<https://www.itu.int/pub/R-HDB-63>)

"Handbook on Digital Terrestrial Television Broadcasting networks and systems implementation"

1.2. LATEST ASO SITUATIONS IN THE REGION

The wider Western region in Fiji implemented a smooth transition to digital transmission from analogue television services in July 3, 2022. The switch from analogue to digital television in Fiji's Northern Division also started in September 2022 and is expected to take up to two months to complete.

1.3 LATEST TOPICS RELATING TO FREQUENCY POLICIES IN THE WORLD

The regulator BTRC in Bangladesh awarded 190 MHz of mid-band spectrum for a total of BDT 106 billion (€1,13 billion) in March 2022. All four of the country's national mobile operators acquired licences.

South Africa's mobile network operators Vodacom, MTN, Rain, Telkom, Cell C and Liquid Telecom all obtained spectrum licenses in March 2022.

The Belgian regulator BIPT has announced the winners of its 5G auction in June 2022. Spectrum licences were available in the 700 MHz, 1800 MHz, 2.1 GHz and 3.6 GHz bands. The auction raised a total of €1.2 billion.

India's biggest ever spectrum auction ended in August 2022, with bids upwards of Rs 1.5 lakh crore coming in after seven days of bidding spread over 40 rounds. A total of 51.2 GHz of spectrum was sold, of the total 72 GHz that was up for grabs – close to 71%.

The reports for T/FPDB are attached as **Annex 1**.

2. NEXT GENERATION TERRESTRIAL BROADCASTING (T/NGTB)

Project Manager:

Mr Akihiko Sato (NHK, Japan)

Co-project Manager:

Dr Jeon Sungho (KBS, Korea)

Mr Chen Delin (ABS, China)

Mr Halil Us (TRT, Turkey)

Mr M S Duhan (DDI, India)

Mr Rajesh Meena (India)

Mr A K Mangalgi (DDI, India)

Mr Zhang Yu (ABS/China)

Mrs Xiao Jingting (ABS, China)

Reports from the project managers and the contributor are as follows:

- 2.1 Investigate efforts toward the realisation of next-generation terrestrial broadcasting in Japan
- 2.2 Development of ATSC 3.0 & 5G-Broadcast Transmission Technique in the Republic of Korea

2.1 INVESTIGATE EFFORTS TOWARD THE REALISATION OF NEXT-GENERATION TERRESTRIAL BROADCASTING IN JAPAN

Next-generation digital terrestrial television broadcasting will be dominated by UHD TV applications. UHD TV broadcasts consist of a huge amount of data and therefore require large-capacity transmission paths.

Japan is conducting research on large-capacity transmission technology for next-generation digital terrestrial broadcasting systems that will provide large-volume content services such as 8K. In order to transmit the 8K signal, which has a resolution 16 times greater than HDTV, it will be essential to utilise new technologies that expand transmission capacity, such as higher order modulation (4096-QAM), orthogonal frequency-division multiplexing (OFDM), and dual-polarised multiple-input multiple-output (MIMO).

This experiment establishes parameters for maximising transmission capacity. However, in actual implementation, these parameters will have to be decided taking budget, the transmission network, the receiving environment, and other factors into account.

2.2. DEVELOPMENT OF ATSC 3.0 & 5G-BROADCAST TRANSMISSION TECHNIQUE IN THE REPUBLIC OF KOREA

KBS continued to develop ATSC 3.0 standard transmission and reception technology, and successfully launched the first domestic 5G-Broadcast test radio wave based on the 3GPP Release 16/17 standard. All developments are being done by the 'KBS Gyeonggi Gamaksan UHD TV Experiment Station'.

The reports for T/NGTB are attached as **Annex 2**.

3. INTEGRATED BROADCAST-BROADBAND AND OTT (T/IBBOTT)

Project Manager:

Dr Go Ohtake (NHK, Japan)

Co-project Manager:

Ms Momoko Suyama (NHK, Japan)

Dr Yuto Komatsu (NHK, Japan)

Dr Shinya Abe (NHK, Japan)

Mrs Zhang Dingjing (ABS, China)

Zhang Yu (ABS, China)

Xiang Wei (ABS, China)

He Jing (ABS, China)

Wang Lei (ABS, China)

Mr A. K. Mangalgi (DDI, India)

Mr A K Srivastava (India)

Reports from the project managers and the contributor are as follows.

- 3.1 Standardisation of Integrated Broadcast-Broadband System in Japan

3.2 Studies in ITU-R

3.3 Studies in ITU-T

3.4 Cyber Security in USA

This clause describes recent updates on IBB and OTT standards and related technologies identified and studied by this project. And it also describes a recent update on standards and technologies for information security for broadcasting services and cyber security in the broadcasting industry for protecting the broadcasting systems.

3.1 STANDARDISATION OF INTEGRATED BROADCAST-BROADBAND SYSTEM IN JAPAN

IPTV Forum Japan standardises specifications of Hybridcast in Japan. The technical specification of Hybridcast is composed of two technical standards and an operational guideline, listed below, and the latest versions were published in November 2020.

- IPTVFI STD-0010 'Integrated Broadcast-Broadband System Specification', version 2.3
- IPTVFI STD-0011 'HTML5 Browser Specification', version 2.6
- IPTVFI STD-0013 'Hybridcast Operational Guideline', version 2.9

3.2 STUDIES IN ITU-R

ITU-R WP6B is working on the study of IBB systems. The working party is now studying harmonisation of IBB systems by making comparisons of Hybridcast (Japan), HbbTV2.0 (Europe), TOPSmedia (South Korea) and Ginga (Brazil).

3.3 STUDIES IN ITU-T

ITU-T SG9 is also working on the study of the IBB system applied to Cable Digital TV. At the meeting held in November 2018 in Bogota, Colombia, the Study Group started work to revise the IBB system Recommendation (ITU-T Recommendation J.207 "Specification for integrated broadcast and broadband digital television application control framework") to add the function of device collaboration with companion devices in Hybridcast.

The group also consented to new Recommendation ITU-T J.208 "Harmonisation of Integrated Broadcast-Broadband DTV application control framework" at its November 2020 meeting. The recommendation was created based on Report ITU-R BT.2067, which defines methods to harmonise IBB systems by identifying commonalities across the IBB systems.

3.4 CYBER SECURITY IN USA

Sinclair Broadcast Group, which has 185 television stations in 86 markets, became the target of a ransomware attack that disrupted operations at several television stations on Friday, October 15th, 2021.

Ransomware hackers often launch their attacks at

the beginning of weekends assuming that victims will be short-staffed. Sinclair began investigating on the Saturday and by Sunday had discovered that several of its servers and workstations had been encrypted with ransomware. Hackers also took unspecified data. Shares traded down nearly 3% as a result.

The reports for T/IBBOTT are attached as **Annex 3**

4. SATELLITE BROADCASTING (T/SB)

Project Manager:

Dr Masashi Kamei (NHK, Japan)

Co-project Manager:

Mr KK Rao (India)

TBD (TRT, Turkey)

TBD (IRIB, Iran)

Reports from the project managers and the contributor are as follows:

- 4.1 ITU-R documents related to satellite broadcasting systems
- 4.2 Latest topics on satellite broadcasting

This clause describes technologies of the latest satellite systems for UHD TV broadcasting and specifications of the latest satellite broadcasting systems. And it also describes the latest topics on advanced satellite broadcasting technologies using Ka-band, etc.

4.1 ITU-R DOCUMENTS RELATED TO SATELLITE BROADCASTING SYSTEMS

4.1.1 Radio Regulations

ARTICLE 23 Section 2 "Broadcasting-satellite services"

APPENDIX 30 "Provisions for all services and associated Plans and List for the broadcasting-satellite service in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2)"

APPENDIX 30A "Provisions and associated Plans and List for feeder links for the broadcasting-satellite service (11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3) in the frequency bands 14.5-14.8 GHz and 17.3-18.1 GHz in Regions 1 and 3, and 17.3-17.8 GHz in Region 2"

RESOLUTION 506 "Use by space stations in the broadcasting-satellite service operating in the 12 GHz frequency bands allocated to the broadcasting-satellite service of the geostationary-satellite orbit and no other"

RESOLUTION 507 "Establishment of agreements and associated plans for the broadcasting-satellite service"

RESOLUTION 528 "Introduction of the broadcasting-

satellite service (sound) systems and complementary terrestrial broadcasting in the frequency bands allocated to these services within the range 1-3 GHz."

RESOLUTION 536 "Operation of broadcasting satellites serving other countries."

RESOLUTION 548 "Application of the grouping concept in Appendices 30 and 30A in Regions 1 and 3"

RESOLUTION 552 "Long-term access to and development in the frequency band 21.4-22 GHz in Regions 1 and 3"

RESOLUTION 553 "Additional regulatory measures for broadcasting-satellite networks in the frequency band and 21.4-22 GHz in Regions 1 and 3 for the enhancement of equitable access to this frequency band"

RESOLUTION 554 "Application of pfd masks to coordination under No. 9.7 for broadcasting-satellite service networks in the band 21.4-22 GHz in Regions 1 and 3"

RESOLUTION 555 "Additional regulatory provisions for broadcasting-satellite service networks in the frequency band 21.4-22 GHz in Regions 1 and 3 for the enhancement of equitable access to this frequency band"

RESOLUTION 557 "Consideration of possible revision of Annex 7 to Appendix 30 of the Radio Regulations"

4.1.2 Recommendations

(<https://www.itu.int/rec/R-REC-BO/en>)

BO.1213 "Reference receiving Earth station antenna pattern for the broadcasting-satellite service in the 11.7-12.75 GHz band"

BO.1408 "Transmission system for advanced multimedia services provided by integrated services digital broadcasting in a broadcasting-satellite channel"

BO.1516 "Digital multiprogramme television systems for use by satellites operating in the 11/12 GHz frequency range"

BO.1659 "Mitigation techniques for rain attenuation for broadcasting-satellite service systems in frequency bands between 17.3 GHz and 42.5 GHz"

BO.1696 "Methodologies for determining the availability performance for digital multi-programme BSS systems, and their associated feeder links operating in the planned bands"

BO.1724 "Interactive satellite broadcasting systems (television, sound and data)"

BO.1774 "Use of satellite and terrestrial broadcast infrastructures for public warning, disaster mitigation and relief"

BO.1784 "Digital satellite broadcasting system with flexible configuration (television, sound and data)"

BO.1900 "Reference receive earth station antenna pattern for the broadcasting-satellite service in the band 21.4-22 GHz in Regions 1 and 3"

BO.2063 "Alternative BSS earth station antenna radiation pattern for 12 GHz BSS bands with effective apertures in the range 55-75 cm"

BO.2098 "Transmission system for UHDTV satellite broadcasting"

4.1.3 Reports

(<https://www.itu.int/pub/R-REP-BO/en>)

BO.2007 "Considerations for the introduction of broadcasting-satellite service of high-definition television and ultra-high-definition television systems in the band 21.4-22 GHz"

BO.2071 "Broadcasting-satellite service system parameters between 17.3 GHz and 42.5 GHz and associated feeder links"

BO.2101 "Digital satellite broadcasting system (television, sound and data) with flexible configuration"

BO.2102 "Multiple-feed BSS receiving antennas"

BO.2397 "Satellite transmission for UHDTV satellite broadcasting"

4.2 LATEST TOPICS ON SATELLITE BROADCASTING

4.2.1 Update of Report ITU-R BO.2397 "Satellite transmission for UHDTV satellite broadcasting"

Report ITU-R BO.2397 "Satellite transmission for UHDTV satellite broadcasting" was updated at the ITU-R Study Group 4 meeting in September 2022. It reflects the latest developments of UHDTV satellite broadcasting in Japan, dealing with satellite transmission techniques for APSK modulation signals to improve link margin by considering a trade-off between the output power and the transmission performance of TWTA.

The reports for T/SB are attached as **Annex 4**

5. DIGITAL SOUND BROADCASTING SYSTEM (T/DSBS)

Project Manager:

Mr Shabib Hyder (AIR, India)

Co-project Manager:

TBD (IRIB, Iran)

TBD (RRI, Indonesia)

TBD (TRT, Turkey)

There are no updates on T/DSBS as of now.

The Full report is available at this [LINK](#). ■

TRAINING & SERVICES TOPIC AREA

Topic Chairman : P Das (Prasar Bharati)
Period of Report : December 2021 to November 2022
Date of Report : 26 November 2022

Development in broadcast media is quite fast and a lot of innovations and new technologies are being introduced at a rapid pace. Diversified technologies, a wide variety of equipment and innovative services, etc., increase training demands in many fields. Under such a scenario and with limited resources, ABU Technology Division has been facing a tough challenge to meet the training needs of its member countries.

The Training & Services Topic Area plays an important role in developing technical skills and knowledge of ABU members. Under this Topic Area the following project topics have been identified:

- i) Technical Training Priorities and Members Requirements (TS/TTPMR)
- ii) Skill Development Programme for Managerial, and Occupational Safety (TS/ SDPMOS)
- iii) Technical Skill Building and Knowledge Sharing (TS/TSBKS) OR High-Tech Exposure & Knowledge Sharing (TS/TEKS)

The TOR has already defined tasks and deliverables under each project topics. Most of these tasks are continuous in nature and are to be carried out periodically. ABU Technology Division has been working on these tasks continuously. The outcome in respect of each task during the period December 2021 to November 2022 has been consolidated and enclosed as **Annexure-1**.

Within limited available time and resources, it may not be feasible to address all the tasks and deliverables. In order to achieve a realistic target, the following deliverables are proposed to be undertaken in the next year:

PROJECT TOPIC	DELIVERABLES
1. Technical Training Priorities and Members Requirements TS/TTPMR	1. Database of training academies and training programmes offered by them 2. Database of Production/ Broadcast Technology/ equipment used by Members 3. Database of Resource Persons along with Topics
2. Skill Development Programme for Managerial, and Occupational Safety TS/ SDPMOS	1. Find out Standard Operating Procedures (SOP) and best practice methods adopted by members on different situations and work environment in general 2. develop standard code of conduct and work ethics information manual 3. Develop a disaster recovery and response manual that can be used in technical areas
3. Technical Skill Building and Knowledge Sharing TS/TSBKS OR High-Tech Exposure & Knowledge Sharing TS/TEKS	1. MoU with Industry Partners 2. Guidelines for staff exchange programme 3. Members' Information Exchange platform

However, tasks/deliverables, which are routine in nature will be carried out on regular basis.

It has been noticed that no "Project Manager" has been nominated for Project Topics under this Topic Area. Participation of more Project Managers and Co-Project Managers may help achieving the deliverables in a timely fashion.

ACTION TAKEN REPORT FOR THE PERIOD (DECEMBER 2021 TO NOVEMBER 2022):

1. TECHNICAL TRAINING PRIORITIES AND MEMBERS REQUIREMENTS (TS/TTPMR)

SL NO.	TASKS	ACTION TAKEN REPORT/PRESENT STATUS
i.	Conduct surveys periodically to understand the requirements and priority areas of members	ABU Technology Division completed Survey on Members' Requirements - Prioritising Technical Activities (Survey Period: 8-22 October 2021). Discussed the outcome last year- vide Doc TBA-21/4 and activities being conducted since then as below: Webinar series on member innovations (5 episodes between 14 December 2021 to 29 April 2022) Online Workshop on Interactive Media Services (7-9 February 2022) Virtual Forum on Cybersecurity & Media (24-25 May 2022) Workshop on Cloud Technologies for Media Services (25-27 July 2022) Webinar series on IP Workflows and Remote Production (20-22 September 2022) Webinar Series on Satellite Systems and Solutions (12-13 October 2022) Webinar Series on Archiving and Media Asset Management (1-4 November 2022)
ii.	Identify requirement of Technical Advisory Services for Members	Action on TAS missions: Invitation sent on 13 April 2022 to all members to submit proposals/ requirements for TAS assistance. Nine (9) members submitted request. TAS mission Completed in: 1. VOV-Vietnam (by providing Expert to deliver online Presentation on 4 August 2022) TAS mission under process in respect of: 2. Kiribati Hope Radio 3. NBC-Papua New Guinea
iii.	Work with ABU Media Academy (AMA) to develop: - curriculum-based training - a certification system with different levels - effective monitoring and assessing methods to evaluate how beneficial the training workshops/seminars	Technical training undertaken by ABU Technology Division with AMA: - Level 2 Certification Course on Engineering Fundamentals completed in (11 April - 20 June 2022) - Certificates issued to 58 successful participants after evaluation out of 92 enrolled
iv.	Collaborate with AMA and other established Media Training Academies	Following collaborative courses undertaken with other institutes: ABU is partnering with Arab Sates Broadcasting Union (ASBU) to conduct following events. - Workshop on Satellite Transmission (DVB-S) from 09-13 October 2023 - A webinar on Digital Audio Transmission (TDAB) from 23 - 25 May 2023

2. SKILL DEVELOPMENT PROGRAMME FOR MANAGERIAL, AND OCCUPATIONAL SAFETY (TS/SDPMOS)

SL NO.	TASKS	ACTION TAKEN REPORT/PRESENT STATUS
i.	Identify and develop training programmes for non-technical, managerial, financial and occupational safety and skills enhancement	AMA conducts few such courses for ABU members. Following courses were conducted during this year: - Seminar on Trust in Media, - HEC Authentic Leadership Course, - Broadcasters & educators working together on Global Media & Information Literacy (approx. 180 participated this year in those three courses listed below)
ii.	Conduct surveys to study members requirements on these areas such as General management, Health & Safety considerations	No updates.
iii.	Explore the best possible ways of delivery of such training and good practice methods within the industry	No updates.

3. TECHNICAL SKILL BUILDING AND KNOWLEDGE SHARING (TS/TSBKS)

SL NO.	TASKS	ACTION TAKEN REPORT/PRESENT STATUS
i.	Work with industry partners and international events to identify applicable training opportunities available in broadcasting field e.g.: ITU, IABM, SMPTE etc.	- Continuous partnership ongoing every year with international event organizers such as BES (India), Broadcast Asia, KOBA Korea, Inter BEE Japan, IMTC Iran and IBC. - Partnership with ITU for Asia Pacific ITU events.
ii.	Explore and develop a staff exchange or short-term attachment programme among members. Explore easy ways how redundant or excess equipment from members can be acquired and utilised by other members who can use them.	Draft Guidelines in progress.
iii.	Explore easy ways how redundant or excess equipment from members can be acquired and utilised by other members who can use them. ■	No updates.

SPECTRUM TOPIC AREA

Chairperson : Dr Li Lei Lei (NRTA)
Period of Report : December 2019 to November 2022
Date of Report : November 2022

INTRODUCTION ABOUT SCOPE OF THE WORK:

This report is on the Topic Area Spectrum Issues which include related WRC-23 Agenda items concerning broadcasting services and ABU spectrum issues.

Project Topic 1 : to consider identification of the frequency bands 3300-3400 MHz, 3600-3800 MHz, 6425-7025 MHz, 7025-7125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 245 (WRC-19) (WRC-23 AI 1.2)
Project Manager : [TBD]
Co-Project Manager :
Time Period : November 2019 to November 2022

The following tasks were considered for this project:

1. Follow developments of studies in WP 5D to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

This report was provided by Mr Zhong Shenghong.

PRELIMINARY VIEWS ON WRC-23 AI 1.2

Australia's objective is to encourage improvements in IMT capabilities and economies of scale through increased spectrum efficiency and harmonisation, subject to coexistence with other services to which the frequency bands are allocated on a primary basis (and in adjacent bands, as appropriate), being technically feasible. Australia will consider the outcome of studies in developing its position on this agenda item. Australia supports the protection of existing primary services.

Lao P.D.R supports sharing and compatibility studies of ITU-R in accordance with Resolution 245 (WRC-19) toward identification the frequency band 7025-7125 MHz to achieve global harmonised frequency bands for IMT while ensuring the protection of incumbent services within the framework of ITU-R.

New Zealand has an interest in the development of new IMT use in the bands being studied for mid band capacity, noting that only the 7025-7125 MHz frequency band is included or study for Region 3 (as a global identification), New Zealand supports studies on this agenda item with a view to enabling new systems in the bands, where appropriate.

The Republic of Korea is of the preliminary view that the protection of existing primary services in the 7025-7125 MHz band as well as other services operating in the adjacent bands, as appropriate, should be ensured and any additional constraints should not be imposed on the existing primary services allocated in the 6 GHz band, in any potential decisions made at WRC-23. Regarding other frequency bands for Region 1 and Region 2, WRC-23 decisions shall in no way adversely affect Region 3 frequency allocations and existing and future uses of the relevant frequency bands.

Japan supports conducting sharing and compatibility studies in ITU-R in accordance with Resolution 245 (WRC-19). Considering the results of studies, Japan supports global identification of the frequency band 7025-7125 MHz for the terrestrial component of IMT without imposing additional regulatory or technical constraints on incumbent services, provided that sharing and compatibility between IMT and those services in the frequency band are considered to be feasible.

China supports global identification of 7025-7125 MHz for IMT with the appropriate regulatory and technical conditions if any (protecting incumbent services) within the framework of ITU-R.

The Islamic Republic of Iran is of the preliminary view that the protection of existing services in the 7025-7125 MHz band as well as other services operating in the adjacent bands shall be ensured in such way that the services shall in no way be adversely affected by any potential decisions made at WRC-23. Due to long border to Region 1 countries, the Islamic Republic of Iran is of the view that:

- a) any possible IMT identification in WRC-23 in the frequency band 6425-7025 MHz shall protect Region 3 services within this frequency band and shall in no way be adversely affected by any potential decisions made at WRC-23.
- b) the amendment of Radio Regulations Article 5 footnotes under the frequency band 3300-3400 MHz should not undermine and reduce the degree of protection and ease the conditions of the protection of these services within this frequency band. Moreover, the protection of C band uplink of Appendix 30B, as a worldwide treaty, shall be fully ensured.

Project Topic 2 : to consider primary allocation of the band 3 600 3 800 MHz to mobile service within Region 1 and take appropriate regulatory actions, in accordance with Resolution 246 (WRC 19) (WRC-23 AI 1.3)

Project Manager : [TBD]

Co-Project Manager :

Time Period : November 2019 to November 2022

The following tasks were considered for this project:

1. Follow developments of studies in WP 5A to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

This report was provided by Mr Zhong Shenghong.

PRELIMINARY VIEWS ON WRC-23 AI 1.3

Australia supports harmonisation of international spectrum use. Australia notes that this is a Region 1 issue and does not have a position on this agenda item. ITU-R studies including adjacent band services in accordance with Resolution 246 (WRC-19) may assist to inform a decision on allocation of the 3.6-3.8 GHz band to the mobile, except aeronautical mobile, service on a primary basis within Region 1.

New Zealand notes that this is a Region 1 issue and that Region 3 has an existing primary allocation to the mobile service in the 3600-3800 MHz frequency band. New Zealand supports harmonisation in this band and notes that Region 3 countries have deployed stations in the mobile service in the 3600-3800 MHz frequency band.

Japan supports ongoing sharing and compatibility studies in ITU-R in accordance with Resolution 246 (WRC-19), which would be a basis to consider the primary allocation to the mobile service in the band 3600-3800 MHz in Region 1 at WRC-23.

The Islamic Republic has no objection on possible primary allocation of the frequency band 3600-3800 MHz to the mobile service within Region 1, however, any discussions on this agenda item shall not be confused with the discussions being followed/carried out under Agenda Item 1.2. Moreover, this Administration is of the strong view that such primary allocation for mobile service, needs to fully protect the services/system to which the band is allocated/in operation.

Project Topic 3 : to consider, in accordance with Resolution 247 (WRC 19), the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level (WRC-23 AI 1.4)

Project Manager : [TBD]

Co-Project Manager :

Time Period : November 2019 to November 2022

The following tasks were considered for this project:

1. Follow developments of studies in WP 5D to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

This report was provided by Mr Li Leilei.

PRELIMINARY VIEWS ON WRC-23 AI 1.4

At present, most countries supported the development study of AI 1.4, but the candidate frequency band is not decided.

Japan, South Africa and Brazil support AI 1.4 and fully promote the process of this AI.

Australia supports harmonisation of international spectrum use. Australia notes that this is a Region 1 issue and does not have a position on this agenda item. ITU-R studies including adjacent band services in accordance with Resolution 246 (WRC-19) may assist to inform a decision on allocation of the 3.6-3.8 GHz band to the mobile, except aeronautical mobile, service on a primary basis within Region 1.

Thailand supports the ongoing ITU-R studies for establishing a new globally or regionally harmonised regulatory framework for HIBS with a view to providing flexibility of spectrum usage for HIBS in certain frequency bands below 2.7 GHz already identified for IMT referred to in Resolution

247 (WRC-19), while ensuring protection of the existing primary services, to which the frequency band is allocated and in the adjacent frequency bands, without imposing any additional technical or regulatory constraints in their deployment including other IMT uses, existing systems and the planned development of primary services.

Indonesia is of the view to support the sharing and compatibility studies by ITU-R on certain frequency bands below 2.7 GHz already identified for IMT to be used by HIBS as provisioned by Resolution 247 (WRC-19) by ensuring the protection to the incumbent services, to which the frequency band is allocated on the primary basis.

The Republic of Korea is of the preliminary view that considering the growing demand for access to mobile broadband, HIBS has been considered as an approach for providing broadband connectivity and telecommunication services with minimal network infrastructure.

However, existing and future uses of the relevant frequency bands under this agenda item including ground-based IMT systems should be protected based on the results of sharing and compatibility studies without imposing any additional technical or regulatory constraints in their deployment.

China supports ITU-R studies being conducted in accordance with Resolution 247 (WRC-19). China supports the consideration of the identification of HIBS, provided that the protection of the existing services are ensured, to which the frequency band is allocated on a primary basis, without imposing any additional technical or regulatory constraints in their deployment.

The Islamic Republic of Iran is of the view that existing services allocated in the frequency bands considered under this agenda item and the adjacent bands, particularly, when neighbouring countries use terrestrial IMT base stations and mobile stations, shall be protected based on sharing and compatibility studies, with no additional technical or regulatory constraints on those existing uses and planned development.

APT members support the ongoing ITU-R studies for establishing a new globally or regionally harmonised regulatory framework for HIBS with a view to providing flexibility of spectrum usage for HIBS in certain frequency bands below 2.7 GHz already identified for IMT referred to in

Resolution 247 (WRC-19), while ensuring protection of the existing services, to which the frequency band is allocated on a primary basis, and adjacent bands, as appropriate, without adversely affecting in their deployment including other IMT uses, existing systems and the planned development of primary services.

ASMG members are of the view that it is important to protect the primary services in the frequency band and the necessary services within the adjacent frequency band in order to ensure the feasibility of coordination with neighbouring countries. Continue to study spectrum requirements without placing additional restrictions on IMT.

ATU members support the research of AI 1.4 and are of the view that the primary services within the adjacent frequency band should be protected. Based on the research results, ATU members support a coordinated global/regional division of HIBS frequency band, or the addition of the corresponding country name to the existing footnotes of RR.

CEPT members – no decision.

RCC members consider that, based on the results of the compatibility study, it is necessary to identify HIBS in the frequency bands referred to in Resolution 247 (WRC-19), while protecting existing primary services within the same and adjacent frequency bands.

Project Topic 4 : to review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz in Region 1 on the basis of the review in accordance with Resolution 235 (WRC 15)(WRC-23 AI 1.5)

Project Manager : [TBD]

Co-Project Manager :

Time Period : November 2019 to November 2022

The following tasks were considered for this project:

1. Follow developments of study results on WRC-23 AI 1.5 conducted in ITU-R TG 6/1.
2. Possible impact on broadcasting service in Asia-Pacific Area.

This report was provided by Dr Li Leilei.

PRELIMINARY VIEWS ON WRC-23 AI 1.5

ASMG supports WRC-23 AI 1.5. ASMG members place emphasis on the protection of existing services and systems, especially the broadcasting service, and not affecting it, and to study the possibility of allocating the band (470-694 MHz) or part of it to the mobile service and identifying it for applications of IMT by interested administrations.

RCC members are opposed to WRC-23 AI 1.5 changing the rules and conditions of 470-694 MHz band in Zone 1 due to the wide application of existing services.

CEPT members support a complete and comprehensive overview of the existing usage and evaluation of spectrum needs of the existing services within the frequency band 470-960 MHz in Region 1 as a basis for further work on Agenda Item 1.5.

CEPT is of the view that any consideration of possible regulatory action(s) in the band 470-694 MHz requires a full account of the results and impact of sharing studies

including a thorough analysis. In line with Resolution 235 (WRC-15), CEPT acknowledges and supports that no regulatory action is required in the band 694-960 MHz.

CEPT is of the view that the primary allocation of the 470-862 MHz band to the broadcasting service in Region 1 shall remain, in order to enable the protection and development of incumbent usage of the broadcasting service.

CEPT is of the view that any possible regulatory action by WRC-23 in the band 470-694 MHz shall not be in conflict with any provision of the GE-06 Agreement.

CEPT is of the view that this agenda item seeks the long-term balance between meeting various national requirements and the challenges of effective cross-border coordination between the existing services and various services/applications wishing to access spectrum, including applications of the mobile service.

CEPT supports the continuation and development of the

incumbent usage by PMSE (SAP/SAB) (in accordance with existing RR No. 5.296). CEPT supports the protection of the radioastronomy service within the frequency band 606-614 MHz to ensure its continued operation. CEPT is of the view that any decision on regulatory action(s) in the band 470-694 MHz at the WRC-23 shall consider regulatory action to protect RAS, considering RR 5.149.

CEPT is currently of the view that no changes are necessary concerning RR No. 5.291A addressing the operation of wind profiler radars.

APT members are of the view that conclusions to be reached on Agenda Item 1.5 are a Region 1 issue and WRC-23 decisions shall in no way adversely affect Region 3 frequency allocations and existing and future use of the relevant frequency band or subject to any changes to procedural or regulatory provisions.

A position of ATU members on this agenda item would be developed once studies have sufficiently progressed in accordance with Resolution 235 (WRC-15).

Project Topic 5 : **to review Appendix 27 of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernised HF systems, in accordance with Resolution 429 (WRC 19) (WRC-23 AI 1.9)**

Project Manager : [TBD]

Co-Project Manager :

Time Period : **November 2019 to November 2022**

PRELIMINARY VIEWS ON WRC-23 AI 1.9

APT members support studies with a view to identify any necessary modifications to RR. Appendix 27 to accommodate wideband HF technologies for the aeronautical mobile (route) service (AM(R)S) between 2850 and 22000 kHz in accordance with Resolution 429 (WRC-19) with the need to avoid harmful interference to primary services in the same and adjacent bands, in particular existing AM(R)S HF systems. APT members are of the view that there are differing wideband HF technologies and are of the view that changes to RR. Appendix 27 should allow new digital wideband HF systems taking into account technology neutrality. APT members are also of the view that the implementation of new wideband AM(R)S HF systems require necessary coordination through ICAO given their role in organising HF aeronautical channel plans in flight information regions.

ASMG members support the accommodation of digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route).

ATU members support the ITU-R technical and regulatory studies to identify the necessary modifications to RR appendix 27, in order to accommodate digital technologies that are supposed to improve the HF communication systems and enhance aviation safety-of-life applications, provided that:

- The new proposed HF systems should coexist with existing analogue voice and data communication systems and operate in accordance with the ICAO international Standards and Recommended Practices and procedures.
- Protection of in band and adjacent band services shall be ensured.

CEPT supports the modification of the Appendix 27 of RR that would allow new digital wideband HF systems including aggregating contiguous and/or not contiguous channels, if retained, while ensuring: the protection of other primary services operating in band and in adjacent frequency bands, and coexistence with existing aeronautical analogue voice and data HF systems.

Project Topic 6 : **Co conduct, and complete in time for WRC 23, studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands, in accordance with Resolution 656 (Rev.WRC 19) (WRC-23 AI 1.12)**

Project Manager : [TBD]

Co-Project Manager :

Time Period : **Nov 2019 to Nov 2022**

The following tasks were considered for this project:

1. Follow developments of study results on WRC-23 AI 1.12 conducted in ITU-R WP 7C.
2. Possible impact on broadcasting services.

This report was provided by Dr Leilei Li.

PRELIMINARY VIEWS ON WRC-23 AI 1.12

APT members are of the view that a new secondary allocation could be supported for the Earth exploration-

satellite service (active) for spaceborne radar sounders within the range of frequencies around 45 MHz if ITU-R studies show that the protection of in-band and adjacent band

incumbent services could be ensured while not imposing any additional restrictions onto those services.

ASMG members support technical and regulatory studies under this agenda item for a possible new secondary allocation to the Earth Exploration Satellite Service (Active) for space-based radar sounding systems in the frequency range of about 45 MHz, while ensuring the protection of existing services in the 40-50 MHz band and in adjacent bands.

RCC members support conducting studies for a new secondary allocation to the Earth exploration-satellite (active) service within the range of frequencies around 45 MHz.

ATU members support the ITU-R technical and regulatory studies to satisfy the invite under Resolution 656, while ensuring the protection of incumbent services in the frequency band 40-50 MHz and in the adjacent bands, noting that, the scientific objectives of this application have significant global humanitarian benefits to the understanding of the environmental changes and climatic evolutions.

Project Topic 7 : In accordance with Resolution 657 (Rev.WRC 19), review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services (WRC-23 AI 9.1a)

Project Manager : [TBD]

Co-Project Manager :

Time Period : November 2019 to November 2022

The following tasks were considered for this project:

1. Follow developments of study results on WRC-23 AI 9.1a) conducted in ITU-R WP 7C.
2. Possible impact on broadcasting services.

Reported prepared by: Dr Li Leilei.

PRELIMINARY VIEWS ON WRC-23 AI 9.1A

APT members support ITU-R studies relating to the identification of space weather sensors, their technical and operational characteristics, spectrum requirements and appropriate radio service designations with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services.

ASMG members to follow-up the studies to identify priority bands that provide critical data for recognition and protection of space weather systems and to develop appropriate definitions in the Radio Regulations (RR)

used by space weather sensors without imposing any additional restrictions on existing services.

ATU members support the recognition and protection of the application given the importance of space weather system in human welfare and national security while ensuring that services, in the identified Broadcasting, Broadcasting and

Fixed satellites, Radio Astronomy and other incumbent service are protected.

CEPT members support the following definition for space weather: information relating to the characteristics of natural phenomena occurring in space and in high atmosphere that impact Earth's environment and human activities.

CEPT also supports the:

- Identification of priority frequency bands used for providing data critical for space weather forecasting/ warnings and that will require protection;
- Recognition in the Radio Regulations of space weather sensors;
- Determination of the appropriate service(s) in line with the space weather definition.

In addition, CEPT supports the new agenda item for WRC-27 in line with the preliminary agenda approved by WRC-19 (agenda item 2.6) under WRC-23 agenda item 10.

Project Topic 8 : Study the use of International Mobile Telecommunication system for fixed wireless broadband in the frequency bands allocated to the fixed services on primary basis, in accordance with Resolution 175 (WRC 19)(WRC-23 Agenda Item 9.1 c)

Project Manager : [TBD]

Co- Project Manager :

Time Period : November 2019 to November 2022

The following tasks were considered for this project:

1. Follow developments of study results on WRC-23 AI 9.1c) conducted in ITU-R WP 5A
2. Possible impact on broadcasting services.

This report was provided by Dr Li Leilei.

PRELIMINARY VIEWS ON WRC-23 AGENDA ITEM 9.1 C

APT members support the modification of existing or, if required, the development of new ITU-R Recommendations, Reports and/or Handbooks as a result of these studies. Some APT Members are of the view that the term “fixed wireless broadband” is understood to mean fixed wireless access supporting broadband applications using IMT technology. Some APT Members are of the view that the term “fixed wireless broadband” is a short form for the term “broadband fixed wireless system” defined in Recommendation ITU-R F.592, which support a range of applications such as access and core network transport.

ASMG members recommend that studies of the frequency bands for using IMT systems for fixed wireless broadband in the frequency bands allocated to the fixed service on a primary basis, place emphasis on protecting existing services. Also, studying the update of the current recommendations in the ITU with the possibility of preparing a new recommendation and that the bands be identified for the use of these systems in the frequency bands allocated on a primary basis to the fixed service.

In addition, studying technologies and applications of fixed wireless broadband within the uses of IMT systems and related concepts.

ATU members consider that, as a matter of principle, the protection of incumbent services operating in the same or in adjacent frequency bands need to be ensured.

CEPT members oppose any changes to the RR in response to WRC-23 Agenda item 9.1c. CEPT members consider that discussions on fixed wireless broadband applications using IMT technologies as well as other technologies should take place in ITU-R WPs 5A and 5C to avoid fragmentation of work and to ensure efficient working within ITU-R.

RCC members consider that any decision on usage of IMT systems in the frequency bands allocated to the fixed service on a primary basis is subject to: compliance of such usage to the fixed wireless broadband communication requirements; protection of services operating in the same or adjacent frequency bands.

The Full report is available at this [LINK](#). ■



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2022 ABU ENGINEERING AWARDS

The Engineering Awards consist of the **ABU Broadcast Engineering Excellence Award**, the **ABU Engineering Industry Excellence Award**, the **ABU Broadcast Engineering Award on SDGs Implementation**, and the **ABU Developing Broadcasters' Excellence Award**.

In 2022, the ABU received a total of 15 nominations for the awards. The ABU Engineering Awards were judged by two panels of judges. Mr Sunil chaired the Broadcast Engineering and Developing Broadcasters' awards panel and Mr Hamid D Nayeri chaired the Engineering Industry and SDGs Implementation awards panel. The panel members are Mr Masashi Kamei, NHK-Japan; Mr Kazim Pektas, TRT-Turkiye; Ms Dajin Jeong, KBS-Korea; Dr Fintan Mc Kiernan, Ideal Systems; Mr Charles Sevier, Dell EMC; Mr Asaad Sameer Bagharib, Thinking Tub Media; Mrs Putri Joliana Yaacob, RTM-Malaysia; Mr Naoki Kashimura, Ikegami-Japan; Mr Peter Bruce, Harmonic, APAC, and Mr Alexander Zink, Fraunhofer-Germany.

KOBA

The sponsor of the 2022 ABU Engineering Award on SDGs Implementation is KOBA. We highly appreciate their support. Our thanks also to KBS for initiating the sponsorship.

The **ABU Broadcast Engineering Award on SDGs Implementation** recognises outstanding contributions in developing, implementing and/or promoting Sustainable Development Goals and green technology in the broadcasting industry. In 2022 there were three joint winners of the ABU Broadcast Engineering Award on SDGs Implementation, namely NHK-Japan, All India Radio & Doordarshan-India, and RTPRC-China.

Nippon Hoso Kyokai (Japan Broadcasting Corporation) won the award for the innovative development of online broadcast



Mr Kenichiro Nagano of NHK-Japan for The ABU Broadcast Engineering Award on SDGs Implementation.



Mr R B Ram of All India Radio & Doordarshan for The ABU Broadcast Engineering Award on SDGs Implementation.

service using the AI Multi-Language technology to reduce the inequality between people from different countries. All India Radio & Doordarshan, Dibrugarh Prasara Bharati – India received the award for establishing broadcasting infrastructure within the AIR-Dibrugarh using energy-efficient systems while promoting and preserving existing environment & ecosystem. Meanwhile, The Radio, Film & TV Design and Research Institute, RTPRC-China, won the award for leading the development of Oriental Movie Metropolis



The Radio, Film & TV Design and Research Institute RTPRC-China for The ABU Broadcast Engineering Award on SDGs Implementation.

while focusing on the ecological & environmental protection, energy conservation, and other sustainable development methods.

Mr Hamid D Nayeri, ABU Technical Committee and Bureau Chairman, presented the award to Mr Kenichiro Nagano of NHK-Japan. Mr Hamid also presented the award to Mr R B Ram, DDG (E) of All India Radio & Doordarshan and to Mr Frederico Do Rosario of TDM-Macau-China.

The **ABU Engineering Industry Excellence Award**, which recognises the most outstanding engineering contribution made by an individual to the broadcasting industry in the region, was awarded to **Ms Qiao Xiaoyan**, President of Wasu Media Holding Co., Ltd., RTPRC-China Broadcasting for her distinguished leadership and breakthrough innovation in developing interactive TV for Smart Home & Smart City implementation towards realisation of "Digital China" and "Digitalisation Reform". Dr Javad Mottaghi, Secretary General of ABU presented the award and we invited a representative to receive the award on behalf of Ms Qiao Xiaoyan.

The **ABU Broadcast Engineering Excellence Award**, which recognises contributions of an outstanding nature in 2022 ABU Engineering Awards made by an individual in a broadcasting organization was awarded to **Mr Cui Jianwei**, Member of the Director's Office Meeting of CMG Technology Bureau; Former Deputy Director of CCTV Technology Production Centre of CMG Technology Bureau, China Media Group for his outstanding innovation in the implementation of a new development strategy promoting new technologies such as 4K/8K, 5G & AI. Mr Hamid Nayeri, ABU TC Chairman, presented the award to Mr Frederico Do Rosario of TDM-Macau-China who accepted the award on behalf of Mr Cui Jianwei.

The **ABU Developing Broadcasters' Excellence Award**, which is for contributions of an outstanding nature in broadcast engineering made by an individual in a developing broadcasting organisation, was awarded to **Mr Udaya Krishna Shrestha**, Chief Engineering department (Production and IT) of Radio Broadcasting Service Nepal (RNE), for his outstanding contribution to the implementation



Ms Qiao Xiaoyan of Wasu Media Holding Co., Ltd., RTPRC-China for The ABU Engineering Industry Excellence Award.



Mr Cui Jianwei of China Media Group for The ABU Broadcast Engineering Excellence Award



Mr Udaya Krishna Shrestha of Radio Broadcasting Service Nepal for The ABU Developing Broadcasters' Excellence Award.

of digital audio archiving system, expansion of FM transmission and his work towards digitalisation of radio in Nepal. Mr Hamid Dehghan Nayeri, Chairman, ABU Technical Committee presented the award to Mr Udaya Krishna Shrestha.

The **ABU Technical Review Prizes** were awarded for articles contributed to the Technical Review from October 2021 to September 2022. The prizes were judged by the ABU Technical Committee Chairman and Vice-Chairmen. Three prizes were presented, each from the categories of Practical Implementation, Research and Case Studies.

The winner for the Best Article on Practical Implementation was **Fatemeh Fallahi** of IRIB-Iran for the article titled *How can DVB-I help broadcasters to get prepared for future?*, which appeared in the October-December 2021 issue.

The Best Article on Research was awarded to **Javad Mardanpour Bogar, Mohammad Reza Noorifard, Mohammad Behdadfar** of IRIB-Iran for the article titled *A Resource Allocation Metric for Multimedia Content in LTE Network* which appeared in the April-June 2022 issue.

The winner of the Best Article on Case Studies is **Ts. Ahmad Shafiq Mirza bin Mansor** of RTM-Malaysia for the article titled *High Definition (HD) News Digital Archive, Revolutionary Broadcast Technology Towards Effectiveness Future Demand*. The article appeared in the July-September 2022 issue.

Mr Masashi Kamei, Vice Chairman ABU Technical Committee and Senior Research Engineer, Science and Technology Research Laboratories, NHK, presented the certificates to Mr Reza Naderi of IRIB-Iran, to Mr. Khosronejad of IRIB-Iran and to Dr Veysel Binbay from the ABU Secretariat representing RTM-Malaysia respectively. ■



Fatemeh Fallahi of Islamic Republic of Iran Broadcasting for The ABU Technical Review Prize – Practical Implementation.



Javad Mardanpour Bogar, Mohammad Reza Noorifard, Mohammad Behdadfar of Islamic Republic of Iran Broadcasting for Technical Review Prize – Research.



Ts. Ahmad Shafiq Mirza bin Mansor of Radio Televisyen Malaysia for The ABU Technical Review Prize – Case Studies.

Webinar Series on

IP Workflows and Remote Production for Broadcasters

 **ABU Technology Webinar**

webinar series on

IP Workflows and Remote Production for Broadcasters

20 - 22 September 2022

join us from 20 to 22 Sept @ 3pm KL/SIN time

Between 20-22 September 2022, ABU Technology organised a Webinar Series on IP Workflows and Remote Production for Broadcasters. The event was attended by over 550 participants in the three days. They represented from fifty-nine (59) countries from Asia, Europe and elsewhere.

Experts and speakers from IRIB-Iran, TVU Networks, AEQ, Skyline Communications, DVB and Harmonic Inc. presented the latest technical solutions and industry updates on IP-based systems, including Remote production. Highlights of the topics discussed over the three days were, Standards and industry specifications for All-IP Infrastructure; Remote Production Workflows; ST2110 & ST2022-6 SDN orchestration; IP-centric Solutions; IP in Production & Playout, etc. The presenters illustrated their talks with real time demonstration of typical industry solutions & applications of IP-based Workflows.

ABUTechnologyWebinar

The
Speaker

Session#1: IP Fundamentals and Standards for All-IP Infrastructure

Dr Mohieddin Moradi received his Ph.D. degree in Electronic engineering and is an assistant professor at IRIB University. He is also working in the production technology affairs of the IRIB R&D department. His specialty is designing studios and OB systems, video and digital image processing, video coding, artificial intelligence, and fuzzy control systems.



**Dr Mohieddin
Moradi**

Senior Researcher,
IRIB R&D

The first day of the series covered OSI and TCP/IP models and details of different globally available standards. The Open System Interconnection (OSI) model is the main backbone and reference protocol for all types of data communications via digital networks. Its architecture consists of seven layers, and each layer at the receiving end device talks with that at the sender's end through unique protocols. Protocols at application layer are HTTP, FTP, SMTP etc.; at presentation layer are different compression/encryption protocols; at session layer are RTP, SDP, SIP, P2P etc.; TCP/UDP at transport layer; IPv4/IPv6, ICMP, IGMP at network layer; Ethernet protocol at data link layer; and finally, technologies used in wired and wireless media such as RS232, UTP, DSL, ATM etc. at the physical layer. On the other hand, the TCP/IP model consists of 5 layers only and TCP/IP protocol suite are the same as used for application, transport, network, data Link and physical layers in the OSI model.

Hypertext Transfer Protocol (HTTP) governs the way a web server and a web client interact. It is a set of rules for exchanging text, graphic images, sound, video, and other multimedia files on the web. Real Time Protocol (RTP) is a protocol for the transport of real time data, including audio and video over multicast or unicast network services. It provides end to end transport for real time data over datagram network Transmission Control Protocol (TCP) manages the individual conversations and it enables reliable communication between processes running on separate hosts and provides reliable, acknowledged transmissions that confirm successful delivery. Internet Protocol (IP) is responsible for delivering messages from the sender to the receiver and receives message segments from the transport layer, packages messages into packets, and addresses packets for end-to-end delivery over a network. Ethernet protocol is responsible for the delivery of messages from one network interface card (NIC) to another NIC on the same Ethernet LAN. Ethernet and WLAN defines the rules

for wiring and signalling standards of the wired and wireless access media. During transmission and reception, the payload data are encapsulated & decapsulated and take different forms at each layer namely as segment/datagram in transport layer, as packet in network layer, as frame in datalink layer and as bits in physical layer. During sending, they are padded with header or footer from top to bottom layer and correspondingly while being extracted at the receiving end, these are unpacked sequentially from bottom to top ultimately to be recovered at the application layer as the original data.

There are several standards organisations, standards and industry specifications for implementing All-IP infrastructure and to enable Audio and Video over IP. Enabling media networking solutions, the VSF is an international association comprised of service providers, users and manufacturers dedicated to interoperability, quality metrics, education for media networking technologies. The Society of Motion Picture and Television Engineers, SMPTE, is a global professional association of engineers, technologists, and executives working in the media and entertainment industry. The Audio Engineering Society (AES) is a professional body for engineers, scientists, other individuals with an interest or involvement in the professional audio industry. The European Broadcasting Union (EBU) is an alliance of public service media organisations in Europe. AIMS (Alliance for IP Media Solutions) is established to speed adoption of the work of these organisations with regard to IP interoperability. Advanced Media Workflow Association (AMWA) developed NMOS specifications related to networked media for professional applications.

SMPTE's ST-2022 suite take payloads from specialised electrical interfaces and puts them on IP using RTP. Here, the electrical interfaces are ASI and SDI. ST 2022-6 is the SDI over RTP standard. Real-time Transport Protocol (RTP) is a protocol for the transport of real time data, including

audio and video over multicast or unicast network services. RTP provides time stamping, sequence numbering, and other mechanisms to take care of timing issues. Through these mechanisms, RTP provides end-to-end transport for real time data over datagram network. SMPTE 2022-6 is the most common uncompressed video format. It contains all the elements of current SDI video, audio and data must be embedded before being packetized. For audio processing, the audio must be de-embedded and then re-embedded. SMPTE ST 2022-7 is used for seamless protection of ST 2022 IP Datagrams.

SMPTE ST-2110 suite can be thought of as interfacing much like baseband SDI in broadcast, satellite and cable facilities. Here all the signals are carried separately. Video, audio and data are all separate streams using RTP. For audio processing, the audio is simply picked up, processed and sent outbound that this doesn't require an inherent embedding and de-embedding. SMPTE ST-2059 describes a specific media based PTP profile required to use PTP based equipment in the professional broadcast and media industry. In traditional SDI systems, the video and audio signals are synchronised to a continuous reference source and delay blocks are added to correct for lip sync errors. In packetised IP systems, the packets experience different delays through a network resulting in disruption of the packet sequence. The data must be continually time stamped for re-alignment downstream to allow realignment of the data types at the receiving host. So, PTP (Precision-Timing-Protocol) is used for synchronisation here. The goal of the PTP timing system

is to synchronise all the clocks such that the absolute time difference between any two clocks (i.e., their accuracy) is within a specified limit.

NMOS is a family of open specifications that enable interoperability between media devices on an IP infrastructure. Among several specifications, main parts are discovery and registration, device connection management and SDP. Session Description Protocol (SDP) describes the contents of the multicast transmission such as IP address, audio type, video type & resolution. The broadcast controller is the overall policy control point for all media endpoints and sessions. For example, IS-06 NMOS network control enables a broadcast controller to modify and view network. It lets broadcast control applications manage what happens on the network itself. The network controller abstracts the details of the network from the broadcast controller and provides an API for all required network services. The API interfaces the broadcast controller and the network controller to modify and view network. In media service management and orchestration part, the Orchestrator glues the entire operation together and sets up the workflows, such as multiple possible connections, edge equipment control, bandwidth control, redundancy, security, enabling virtualisation etc. The standard to enable Audio over IP (AoIP) is AES67 that enables high performance audio over IP streaming interoperability between the various IP based audio networking products currently available based on existing standards such as Dante, Livewire, QLAN and Ravenna.

CLOUD REMOTE PRODUCTION - TVU NETWORKS

ABUTechnologyWebinar

The Speaker

Session#2:
Cloud-based Remote Production

Subodh is working as a Sr. Director Solutions SAMEA/APAC at TVU Networks. He started my journey in the Broadcast industry 13 years ago when we started first with an IP based contribution from a remote location in India. Over the decade, the changes were perpetually seen in the Broadcast industry where IP was used only for acquisition and now the entire workflow of broadcast industry is moving towards cloud be it a contribution, production or distribution.



Subodh
Aggarwal

Sr-Director Solutions
APAC/SAMEA,
TVU Networks

The session covered ways of moving to the Cloud along with a live demonstration of how the TVU Cloud based solution works. TVU media supply chain covers live video acquisition/ transmission over IP, indexing/metadata automation, remote solution & cloud production, global live video distribution over IP, control and management. TVU

Networks has its product range for, get & connect, create, share & deliver with third party integrations.

Remote cloud production components & solutions used are TVU partyline for cloud collaboration, TVU producer for cloud-based production, TVU remote commentator for

event commentary from anywhere. By connecting all these components, a new way of production in the cloud will be available. Any type of feed or input such as RTMP, SRT, NDI, SDI, ST2110 etc may be taken using any medium. These sources and data may be tagged or indexed using media mind's AI functions and after editing using any TVU cloud tools, they are distributed to any destinations.

To make the production simpler and even operated by talent as an operator, micro services are used. Different micro applications deployed are user definable interfaces on demand, contextual data driven operations, orchestrated

distributed productions, intuitive control and customized user experiences. The speaker illustrated remote production solutions such as TVU partyline, TVU producer, TVU remote commentator with real-time demonstration of different functionality and features. The presenter mentioned a number of cases of customers who used TVU solutions such as in SEA Games 2022, different international games league draws, Grammy Awards premier ceremonies, AIMS music festival etc. TVU Networks has provided simple, scalable and cost-efficient IP and Cloud solutions to 3000 plus TV stations for over 15 years in the M&E industry.

REMOTE PRODUCTION IN RADIO

ABU Technology Webinar

The Speakers

**Session #3:
Remote
Production in
Radio**

Roberto is has a degree in Telecommunications Engineering. He became a part of the Team of AEQ as KROMA merged into the Company. After 11 years programming microprocessors, configuring and testing systems at KROMA's R&D department, Mr. Tejero provides an excellent support to AEQ's Sales department, assisting with the assessment of customers needs and the definition and verification of new products, tests, demonstrations, system configuration and assistance during system start-up and training.



Roberto Tejero
Product Manager,
AEQ

With business education background. Antonio has been 20 years working in export business. The most of these 20 years at AEQ working as sales engineer and having the possibility of serving radio clients worldwide like IRIB, AIR, BBC, RRI. Being a radio fan, he could not imagine a better job to live that helping all the radio stations in the world to grow



Antonio Perez
Sales Manager – APAC, AEQ

AEQ has been developing, manufacturing and selling audio and video equipment, automation and production systems for TV and Radio Stations. Recently, AEQ launched Xpeak, a matrixless intercom system, ready for remote production, the Forum Lite Console and the Digital Audio Console Atrium. The atrium manages up to 1000 audio channels, up to more than 90 motorised faders. AEQ supported the 2022 Beijing Olympics and also the Paralympics.

Remote Production enables creating audio-visual content through advanced communications systems, avoiding moving some of the personnel and equipment. The basic requirement is to maintain quality while broadcasting an event without technicians, commenting on an event from an "off tube" booth having the announcers in their homes, controlling studio equipment from home and monitoring a broadcast from home.

From anywhere, you will be able to operate, to take in and deliver audio, and produce, once you have necessary systems to transport audio and control, even with a reliable low speed connection. Just choose the best place for the equipment and best place for the operators. The speaker gave the example that Spanish radio stations are being

broadcast and maintained from London. Also, production in the cloud is possible these days, beyond the place where the operators and the signals are, with rented processing capacity that takes over the work.

Today, any equipment that manages the audio in a radio production centre, that supports remote control, including communications, is good for remote production, including audiocoders, phone-in and talk-show systems, audio mixing consoles, audio matrices, commentary systems, intercom systems, PC based play-out automation systems and more. Remote production had already been a part of TV for a few years and the pandemic brought it to radio to relocate equipment to your place of choice and even turn your living room into a radio studio.

AEQ developed TALENT, a portable IP codec that, installed at the announcer's home, communicates to a counterpart at the radio station that connects to a line input of the mixing console. It transmits high quality audio to the studio by means of an IP connection, to facilitate radio from anywhere. To receive the microphone outputs at the station AEQ has a range of software-controlled IP audiocoders namely Phoenix MERCURY, Phoenix VENUS 3 and Phoenix STRATOS.

In addition to these, there are diverse models of AEQ brand Audio Mixing Consoles, ATRIUM, FORUM SPLIT and FORUM Lite and CAPITOL. These are modular consoles managing a designated number of audio inputs and outputs. Forum IP Lite completes the list. These digital consoles of the Capitol, Forum and Atrium families have the Virtual option, allowing you to install an application on a PC or tablet that replicates the complete control surface of the console. Also the Screen option to allow complete monitoring of the console.

Likewise, Systel IP provides communication between locations for IP voice and control data. Along with IP telephone terminals and a broadcast telephone system

Systel IP, it may even be operated remotely. Olympia 3's virtual commentary control unit application is designed up for remote production and is a commentary unit with IP connectivity. Xpeak is an intercom for coordination and easy remote connection with HD Voice audio quality.

Thus, different advantages can be realised with this range of equipment for remote production, such as system expansion available via cloud, same user panel work in several locations and peer-to-peer operation with flexibility, Bluetooth and USB connectivity for headsets and external connections and low bit rate connectivity are possible.

ST2110 AND ST2022-6 SDN ORCHESTRATION ACROSS A HYBRID CISCO AND ARISTA MEDIA NETWORK

ABUTechnologyWebinar

The Speaker

Session#4:
ST2110&ST2022-6SDNOrchestration
acrossaHybridCiscoandAristaMediaNetwork

Thomas Gunkel is the Global Market Director Broadcast for Skyline Communications and is responsible for the broadcast customers within the company. With more than 15 years of experience in product marketing, solution design, and engineering of broadcast and video solutions for broadcasters, network providers and service providers, he joined Skyline Communications in April 2017.

Previously he has held several technical and sales positions at Imagine Communications, Harris Broadcast and EVS. Thomas holds a master's degree in media technology from the Stuttgart Technology University of Applied Sciences.



Thomas Gunkel

Global Market Director
Broadcast,
Skyline Communications

This session looked into a case study on IP Matrix Project at Italian state-owned telecommunications and broadcast company, Rai Way, that was more of a digital transformation project rather than just replacing SDI infrastructure with IP setup. The project flow had a milestone map to replace SDI infrastructure and manage IP transport of video, audio & data signals across multiple sites in Milan, Rome. Those were interconnected by fibre with DWDM connections. The customer preferred to go for multi-vendor systems with switch fabric and edge devices. The requirement was for multi service network options catering multi format content in ST2110 & 2022 compressed and uncompressed streams and dealing with mix of SDI, ASI, AES stream as well. This could run multiple channels in SD, HD, 3G, UHD resolutions. The infrastructure was basically a single converged & capacity constrained network with geo-redundant datacentre and multiple headend. People in different cities had to be working with redundant operations. A flexible solution was delivered that would evolve continuously in future.

At the backbone, the SDN Orchestration in the assigned project takes account of different standards, best practices,

guidelines along management, control plane and data planes. Daffern industry players provide required technologies and functions/software. The customers should take through a multi-layer approach with inner layer elements mainly core infrastructure & functions such as signal switching, media edge devices, switch fabric etc. The outer layer component on transformational technology takes account of secure onboarding, planned maintenance, workflow templates, service provisioning, plan & schedule, resource management, anomaly detection, service monitoring etc. For software management, the project should consider timeline, budget etc.

The service architecture deployed at Rai Way included SDI to uncompressed IP signal at the output of Studio in contribution end that undergo compression for distribution with ASI and IP compressed signals. The network consisted spine-leaf structure with Arista and Cisco systems.

The infrastructure discovery & provisioning part included several flows for automatic scanning and detection of resources, for managed creation of objects, for upload of

software images to managed elements and for automated upload / download of element configurations.

Automated Deployment is carried out using different tools for configuration items, connectivity detection, full SDN control over hybrid Arista & Cisco network. Then, for SDN service orchestration all available resources are grouped and managed first before proceeding to profile management to define group of parameters that acts as mediation layer between a function and underlying hardware. Hereafter, service modelling is done to manage different templates that are format independent e.g. SDI, IP, ASI. The next phase is service orchestration in a life cycle.

The ultimate operational requirements should satisfy SDI-like signal switching and complete set of main, backup &

disaster recovery services in a single click, provisioned with different important functions such as virtual signal groups, full service connect, single flow connect, service dashboards, signal probing, network monitoring, disaster recovery workflows etc.

The project had different learning demands on Technology and Project management. Cisco and Arista fabrics & media edge devices behaved differently, all teams needed to deal with new devices & changing APIs, properly managed lab system was a must to test all details and constantly evolve the system. Likewise, one could not underestimate the importance of easy-to-use user interfaces & control surfaces, close relationship to all parties involved once the project is complete, and importantly complex projects could only be managed agile & DevOps style.

NEW IP-CENTRIC SOLUTIONS FOR A TIME OF TRANSITION

ABUTechnologyWebinar

The Speaker

**Session#5:
DVB's new IP-centric solutions
for a time of transition**

As Head of Technology for the DVB Project, Emily leads on the organization's technical and standardization activities, represents DVB around the world at conferences and tradeshows, and supports its modules and working groups. She has more than 20 years' experience in digital media technology, both in traditional broadcasting and in broadband-based delivery.



Emily Dubs
Head of Technology,
DVB Project

This session looked at phased migrations to IP across Europe and challenges facing them, different forms of DTT migrations paths, and how DVB helping industry to move from hermetic silos to a truly converged media ecosystem. An Ofcom survey showed that cost per viewer hour across IP based channels is dropping slowly while that across DTT channels in Nordic countries, UK and Germany still stays high.

Different migration paths to IP must coexist across markets such as tower by tower migration in low population density areas and channel per channel migration for channels with low audience. Different forms of hybrid networks usage will remain long-term and the right tools are needed for successful migration journeys.

Broadcast and broadband used to be hermetic silos in the past, but gradually DVB-I and DVB-NIP are enabling migration from hermetic silos to a truly converged media ecosystem. DVB brings broadcast-like experience to broadband with DVB AVC for improved interoperability, DASH bringing optimised

streaming format, MABR for Broadcast-like scalability & reliability while DVB-I helps in Harmonised Service Discovery for unified interfaces & broadcast-like user interface. DVB Native IP bridges broadcast & broadband on the transport layer, while DVB-I bridges broadcast & broadband on the user side.

DVB-NIP was published in February 2022 as DVB Bluebook A180, with related updates. The long-term vision is to have a converged media delivery ecosystem enabling TV platform unifications and thus the delivery of OTT via broadcast means. NIP is leveraging existing DVB solutions, including satellite. Likewise, DVB-I defines the mechanisms for the discovery of service lists and to retrieve EPG over the internet. DVB-DASH is the optimised streaming format defined for the delivery of DVB services over the internet. DVB-I offers a common service layer across networks such as T2, S2, 5G, DASH or Native IP. Also, it allows enhanced offerings and smooth IP migrations. Some broadcasters in Germany, Italy and Iran have initiated DVB-I public trials and pilots.

ABUTechnologyWebinar

The Speaker

Session #6: IP in Production and Playout

As product manager for Harmonic, Jamie White is part of the product development and design team for the company's production and playout business. Previously, Jamie worked as a global solution architect for Harmonic's playout business and as a senior systems/pre-sales engineer. He has more than 35 years of experience working in the broadcast industry, including at the BBC, an independent television station, and at Avid in customer support, installations and presales.



Jamie White
Product Manager,
Production – Playout & Storage,
Harmonic Inc

This session looked at high level production & Playout, IP workflows, and challenges facing the industry. Moving to IP has gained momentum albeit with a slow start. Transition to IP is getting smoother with interoperability amongst a lot of available standards. To see what IP has got that SDI has not, some key points have to be considered in terms of Data Centre, Scale, and Future that make IP so desirable.

While IP for multi signal with dynamic routing, asynchronous timing and any to any connection, SDI carries single signal with static and point to point connection. For the same volume of Data delivery, One GbE IP cable is enough vs many cables required in SDI mode. IP requires simplified cabling, simpler installation & maintenance and the same IP switches can be used for media and general data. Newer switches can prioritise real time media streams.

Scalability in terms of speed, bandwidth and cost choices, ethernet sees improvement over time and is dynamic in upgrading & adding channels. COTS Hardware and Cloud-based adaption are evolving in markets that are IP-based.

IP technology is best understood with diverse protocols, control and workflows. SMPTE 2022-6 supports signals that are simply SDI but encapsulated in an IP stream and still uses the full bandwidth of SDI. SMPTE 2110 comprises multiple independent audio, video, data streams. It requires external timing to maintain synchronisation and allows different streams to be

combined or used separately without de-embedding as in ST 2022-6. NDI is another Protocol for video-over-IP transport as an alternative to SMPTE-2110 that is bidirectional, low latency, frame-accurate, compressed etc. Multicast is a good fit for live uncompressed IP media.

Control part allows connecting devices that need to dynamically route streams via automation and control systems. NMOS supports this with Discovery and Connection Control features using AWMA defined specifications such as IS-04 & IS-05. In terms of workflows, whether in production & playout functions at any studios and in news studios, all IP infrastructure is preferred where all broadcast and control equipment are connected to a network switch, and it serves multiple applications from acquisition, production & playout to delivery and monitoring.

The road to IP inputs/outputs requires planning for components such as budget, interoperability, training etc. That poses challenges in terms of cost, integration, monitoring trouble shooting & diagnostics, Hybrid workflows and skilled personnel. Number and bandwidth of streams will dictate backbone, switches and cabling required. IP workflows present a cross understanding with traditional video/audio world and the IT world. Similarly, some devices may still be SDI so require older workflows or SDI to IP convertors. When you are planning to refresh your equipment, it's worth buying IP-ready equipment, SDI/IP hybrid equipment, and equipment that is interoperable. ■

Webinar Series on

Satellite Systems and Solutions for Broadcasters

12 -13 October 2022



ABU Technology Webinar Series

Satellite Systems and Solutions for Broadcasters
ABU Technology Webinar Series
12 - 13 October 2022



Join us from 12 to 13 October @3pm KL/SIN time

ABUTechnologyWebinar

The Speaker

Satellite Communication Fundamentals





Sumeet Goyal
Deputy Director-General,
Prasar Bharati, India

By **Sumeet Goyal**, Deputy Director General, NABM Delhi, India.

A satellite is a small object that revolves around larger one; Communication refers to the exchange (sharing) of information between two or more entities; When communication takes place between any two earth stations through a satellite, then it is referred to as 'satellite communication'. There are various types of orbits for satellites: Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and Geo-stationary orbit (GEO).

Low Earth Orbit; occurs at a height of around 160 to 2000km. It has much shorter orbital periods (around one and a half hours) and shorter signal propagation delays (0.5 to 7ms). It is highly suited to communication applications, with better signal to noise ratio (S/N). With shorter propagation paths, the power required for signal transmission is also less. However, due to a shorter orbital period (90-120mins), the satellite remains over a particular ground station for only a short time.

Medium Earth Orbit; occurs at a height of approximately 10,000 to 20,000 Km and has an orbital period of 6 to 12 hours. The satellite stays over a particular region of earth for a longer time and the transmission distance and propagation delays (33-66ms) are greater than those for LEO satellites. Ten or more of satellites are needed for 24-hour coverage. LEO satellites are mainly used for communication and navigation applications (GPS being one such application).

In geo-Stationary Earth Orbit the satellite has a circular orbit above the equator, at a height of about 35,800 Km, and the orbital period is about 24hrs, rotating with,

and therefore stationary with respect to the earth's west to east rotation. Advantages of GEO are that, area of coverage is more than that of terrestrial systems; almost all regions of the earth can be covered; with the exception of polar regions $>77^\circ$, transmission cost is independent of coverage area, and there are more bandwidth and broadcasting possibilities.

Earth Segment Subsystems consist of **transmitting & receiving earth stations**; steerable **antennas** and **tracking subsystems**.

Space Segment consists of an **Altitude and Orbit Control (AOC) subsystem** (rocket motors); a **telemetry subsystem** (which monitors pressure, temperature, status etc., of various subsystems); a **tracking subsystem** (which knows the position of the satellite and its current orbit, through telemetry downlink); a **command subsystem** (which sends correction signals to AOC and switches on and off other subsystems. A **transponder** (which provides the connecting link between transmitting and receiving antennas, amplifies the received input signals and translates frequencies.

Multiple Access techniques enable satellites to receive or send signals between different stations simultaneously without any interference between them. The following are the three types of multiple access techniques.

- FDMA (Frequency Division Multiple Access)
- TDMA (Time Division Multiple Access)
- CDMA (Code Division Multiple Access)

ABUTechnologyWebinar

The Speaker

Satellite Broadcasting Technologies in Japan

Masashi Kamei, ABU Technical Committee Vice-Chairman and Senior Research Engineer, NHK Science & Technology Research Laboratories. Masashi Kamei joined NHK in 1997 and currently belongs to Science & Technology Research Laboratories. His research field is satellite broadcasting system. He is the vice-chairman of ABU Technical committee since 2018.



Masashi Kamei
Senior Research Engineer,
NHK STRL, Japan

By **Masashi Kamei**, Senior Research Engineer, NHK Science & Technology Research Laboratories, NHK, Japan.

ISDB-S System (Overview): In Japan, regular **HDTV** via 12GHz-band digital satellite broadcasting nationwide started in **2000**, with the following parameters: Symbol rate: 28.86 Mbaud; Roll-off filter: 0.35; Modulation scheme: BPSK, QPSK, TC8PS; Forward error correction: Reed-Solomon (204,188); Convolutional code: (1/2, 2/3, 3/4, 5/6, 7/8); Multiplex: Time Division Multiplex (TDM); Control signal: Transmission and Multiplexing Configuration Control (TMCC). Regular **UHDTV** via 12GHz-band digital satellite broadcasting nationwide started in **2018** with the following parameters: Symbol rate: 33.7561 Mbaud; Roll-off filter: L 0.03; Modulation scheme: p/2-BPSK, QPSK, 8PSK, 16APSK, 32APSK; Forward error correction: BCH (65535, 65343), LDPC (1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 7/9, 4/5, 5/6, 7/8, 9/10); Multiplex: Time Division Multiplex (TDM); Control signal: Transmission and Multiplexing Configuration Control (TMCC).

There are ongoing R&D processes on 21GHz-band satellite broadcasting systems in Japan.

Comparison of 12GHz and 21GHz bands:

Item	12GHz band	21GHz band
Bandwidth	500 MHz (11.7-12.2 GHz)	600 MHz (21.4-22.0 GHz)
Channel BW	38.36 MHz	-
Power flux density	117.9dB (W/m ² ·MHz) (103.6dB (W/m ² ·27MHz))	105.0dB (W/m ² ·MHz)
Rain attenuation	Medium	High
Satellite operators	Many	Few

The R&D processes are ongoing for 21GHz-band satellite broadcasting include both rain attenuation compensation and high-capacity transmission. Most Asian countries have to consider severe rain attenuation in the 21GHz band compared to the 12GHz band. The approach to compensating rain attenuation is to increase satellite EIRP in high rain attenuation areas while keeping nominal EIRP in other areas. For this purpose, 21GHz-band array-fed Antennas are being used. The results show the feasibility of variable radiation patterns by on-board array-fed reflector antennas.

The BSAT-4a satellite launched in September 2017 uses 300MHz-class transponders to evaluate wideband transmission performance. NHK STRL has developed wideband modulators and demodulators with the following parameters; Symbol rate: 250Mbaud; Roll-off factor: 0.1; FEC: LDPC and BCH.

Experiments show the feasibility of high-capacity transmission via 21GHz-band broadcasting satellite with:

- QPSK(3/4): 360Mbps, Req. C/N 5.4dB
- 8PSK(3/4): 540Mbps, Req. C/N 10.7dB ■

Webinar Series on

Archiving and Media Asset Management

1 -4 November 2022



ABU Technology Webinar

Archiving & Media Asset Management

1 - 4 November 2022

ABU Technology organised a webinar series on archiving and media asset management from 1st to 4th November 2022. The event was attended by a total of 534 participants over four days. These joined from 45 countries, representing 100 ABU member & non-member organisations from Asia, Europe and elsewhere.

Experts representing Whiteways Systems, Benchmark Broadcast Systems, IPSB Technology, AWS, Arista, Qumulo, Archiware, Archive TV, and DAMsmart shared their insights and experience. Also, expert engineers from ABU Members, RTM-Malaysia and TRT-Turkey, provided broadcaster perspectives on their in-house experiences in the digitising and management of audio/video archives.

THE FUTURE OF ARCHIVING CHALLENGE OF BEING ON PREMISE OR CLOUD – IPSB/ AWS/ ARISTA/ QUMULO

ABU Technology Webinar

**The Future of Archiving:
Challenge of Being on Premise or Cloud**

The Speakers:

Speaker	Company	Role
Mardhiah Nasir	IPSB Technology	Executive Director, Moderator
Michael Lok	Arista Networks Inc.	Regional Director, Enterprise & Channels (ASEAN)
C Y Tan	Qumulo	Senior Systems Engineer
Shazli Mansor bin Mohd Ghazali	AWS	Public Sector Solutions Architect

The session took a deep dive into archive solutions with a panel of speakers from industry. **IPSB Technology** has workflow solutions for ingesting, processing, storing and broadcasting and monetising this transformation. With thirty plus Petabytes of cloud storage and working globally on around 200 projects with global partners, **Qumulo** empowers customers to store, manage and curate their data anywhere and forever. The company has been named a leader in Gartner Magic quadrant for distributed file systems and object storage. It has software defined storage, HPE hardware platform, and AWS public Cloud. Its customers utilise rendering VFX, postproduction and archiving in media workflows. **Arista** has been providing high speed switching, an open programmable switching fabric. In M&E industry, and adopts cognitive network with sensors, real time data recording experience inference engine and AI Ops. Its architecture is both in Cloud and on-premise with built in security, troubleshooting, provisioning. It has a portfolio of WIFI products, leaf & spine switches. **AWS** manages infrastructures, services to M&E (Monitoring and Evaluation) customers and solutions for reinventing content production, media supply chain, broadcast, direct to consumer & streaming and analytics.

A survey shows 40% of time is spent in just finding material, so, a centralised storage and cloud option is feasible. Options for broadcasters are either on-premise, collocated data centres around regions, or in the public cloud, to allow them to manage content rather than infrastructure.

Success stories on storage and archiving included projects in leveraging cloud, such as use of hybrid cloud, running ops in cloud for workflows, bridging On prem & Cloud. Anthem Sports, a TV production & multimedia company, deployed Qumulo Scale to simplify workflow and ease of scalability on data infrastructure and growing data. It has productivity

boost, improved performance, efficient analytics, and consolidation to give single file data platform.

Arista supports M&E companies with file-based workflows-editing, rendering, transcoding, storage etc.- Also, real time broadcast with uncompressed, live with quality SDN systems and Streaming OTT with CDN, compresses, any device anytime. If network performance is not enough, data is lost while live streaming. Arista switches support uncompressed, powerful networks with buffering, resiliency, high speed storage and big workstation connectivity via UTP. Broadcast workstreams require low latency, multicast, AVB mode, in HD- SDI over IP. In CDN, switching uses deep buffers to ease stress on local servers and quick response time to receivers. With storage getting bigger, impact on networks, in transport and network layers, has escalated.

AWS provides IAAS and media archive economics -pay as you go- with no need of provision for redundancy. It offers many other services: easier to use archives with self-service admin; SDKs for integration; no LTO tape format; reduced archive risk with durability and security avoids risks of physical media handling mechanism; speed agility for optimising and focus on your core business. S3 is AWS's basic storage solution and lately S3 Glacier is introduced for long-lived archive data with instant retrieval.

Future outlook on archiving will be gradual adoption of high-res video format; even larger file sizes, more reliable storage; faster storing & retrieving; demand for high-speed storage; swift control of content; reliable networking infrastructure; ultra-low latency switching; dynamic customers experiences, requiring agile infrastructure; applying data science to archive analysis, all while maintaining minimal cost.

ABU ABUTechnologyWebinar

The Speaker

Planning a Media Archive: Proven Steps + New Perspectives

As a former scientist at the University of Munich, author of many publications and multimedia pioneer, Dr Marc has an extremely broad background reaching from medical informatics to media informatics, from UI to storage. At Archiware he is in charge of international business development and strategic alliances.

Dr Marc M Batschkus
Director of Business Development & Marketing

Archiware

The purpose of an archive essentially means freeing up space on production storage, preserving media and productions for long-term use, re-use, reference and monetising of media. What it does not represent is isolated hard disks or video tapes on shelves and media without metadata. The archive is the memory of an organisation.

Building an archive needs clear consideration of planning, implementation, and operation with a set of guiding principles. These principles require you to start immediately, however small the step, by getting people involved & demonstrating archival benefits. Start with modest metadata, clear documentation, and test your archive and restore as per in-house principles you set in advance.

Planning includes what to archive and identifying who will archive and use it. Setting metadata schema and systems for digitisation, data security and redundancy and outlining step by step workflow and operations are essential. Maintenance and update of the installed system are equally important, with measures for cross media migration. Ensure a complete workflow stays in the same codec from editing to archiving. It needs long-term perspective and needs to fit in with prescribed workflow and processes. Many codecs may no longer be supported in the years to come.

Digitisation of analogue audio/video tapes is a project on its own. It is advised to separate it from the archive project. Archiving existing files first and ramping up backlog or previously digitised files are recommended. For data security and redundancy, there are different levels of security, such as keeping redundant media or cloning them in LTO Tapes with off-site storage. For durability, media storage at specified temperature and humidity is recommended.

Standard workflow and operations consist of operating systems, hardware, software, infrastructure, interfaces,

network, source and target storage, off-site location, logistics etc. Storage analytics is the new and trending perspective to estimate future storage capacity, its expansion and cost analysis. For example, Dataintell is a company working on storage analytics. Another planning step is the maintenance and updates of archival systems. Regular maintenance of hardware, updates of software and firmware, and timely migration to future media generations e.g., latest LTO versions. All these should be logged, requiring documentation and time.

The implementation phase includes building & setup, implementing metadata schema, carrying test runs of the installed archive, metadata, search and restore. Of course, all these actions need to be documented. An example of archive setup implementation is the Archiware P5 Archive system. The client setup runs and is connected on all platforms: Mac/Windows/Linux etc. It contains setup assistants to work on P5, Cloud, Disk, LTO tape.

Archiware offers P5 data mover for universal migration and storage flexibility on either media and also with MAM-like features. It is a provider of ABC solutions: Archive, Backup and Cloning/Replication in one solution and offers P5 free 30-day trial to broadcasters and media houses.

Archive to Tape may offer long & proven shelf life, security in cloned media, off-site storage, low price per TB, and improved performance up to 400MB/s throughput per drive. There are multiple vendors of tapes in the market & tapes find worldwide use in corporations. Another important component in archiving is the MAM Integration which is far better than a stand-alone archive.

ABU ABU Technology Webinar

The Speakers:

ADiB:
RTM's Revolutionary News Archive

Ts. Ahmad Shafiq Mirza bin Mansor
Assistant Director of the News Management Centre
RTM, Malaysia

Mardhiah Nasir
Executive Director
IPSB Technology

The session gave an understanding of RTM Malaysia's news, current workflows, areas of improvement and completeness of the system. RTM has national and regional news channel aired and distributed via terrestrial TV & Radio and social channels including in YouTube. It has a number of operations centres in 14 states including Sarawak, Sabah, islands of Langkawi and Labuan. Its archive consists of historical documents and records of government and its production media is on different formats and media such as LTO Tape, XDCAM disk, External HDD etc. These have now been stored in a file-based archive.

As for the current workflow, all regional stations are required to ingest and edit their own media source before contributing those final content to various selective news slots that have been scheduled at RTM news channel base. Once it is published, all raw media from single camera production, Non-Linear Editing Machine and External Hard Disk need to be purged to make more room for fresh news content. Each single camera records the content to P2 card for ingesting into non-linear editing (NLE) machines. Only the final edited version is stored in the archive and aired via playout server. Same media removable drive is being used for production and media storage depend on NLE storage capacity.

The main problem was recognised when RTM needed to reproduce the content. Metadata management within media archives and retrieval needed to be improvised based on current issues. A task force performed a survey and three core issues were found: Lack of Physical Central Storage, no specific personnel to manage the media ingest and storage, plus inability to search and retrieve the ingested media footage. In order to address these problems, standardisation of archive media material e.g., ITU, SMPTE have been chosen to obtain the most effective quality and the media house format for News Archive. These are: hi-res 1080i50 ProRes 422 codec, hi-res 1080p50 AVC intra 100 codec, lo-res 1080i50 H.264 codec.

Another step to redesign of media movement workflow,

different storage scheme is advised: media to retrieve within 1 year (storage to near line archive), from 1 to 5-year media retrieval (storage from near line archive storage to cold storage archive); for more than 5-years media retrieval (media from cold storage archive to RTM central archive). To obtain efficiency in media management, artificial intelligence (AI) and machine learning (ML) technology is being deployed. It is expected to address audio to text transcription, face recognition, and object (tag) recognition. As there are two types of media format; namely high-resolution video and low-resolution video, the RTM system includes low-resolution storage in cloud media archiving (myGov cloud), whilst high-resolution storage will remain on-premise.

Suggested for completing and fulfilling the existing archival system are network monitoring (NMS), data migration and multiplatform user operational. NMS may generate consistent monitoring of system health to the best level Quality of Services (QoS) and notifies any critical issues, either from the network or system. Media migration is crucial for existing media to be at the ready-to use state once the system is in place.

RTM has been partnering with IPSB technology in the ADiB project which it is a revolutionary news archive. IPSB provided solutions for end-to-end infrastructure workflow from digitisation & data archiving to postproduction with graphical and video rendering. Centralised storage policies for all states are provided depending on the data movement from its origination date. The end-to-end MAM workflow orchestrator provided tools to design better & custom workflows, orchestrating the key elements processes, integration with current system and monitoring & resolving issues quickly. Axle ai's AI engine offered powerful search engine with ease of use and user controls that included speech to text transcription, facial and object recognition. The result was impactful in terms of cost and operation optimisation, content accessible anywhere anytime, less manual intervention required, reducing errors and effective media sync sharing & collaboration.



ABU ABU Technology Webinar

The Speakers:

**Preserving your valuable content:
Digitize, Restore, Archive, and
Secure the past, present, and future.**

 Aale Raza Director WHITEWAYS SYSTEMS	 Sudhanshu Gupta Sr. Manager Design WHITEWAYS SYSTEMS	 Yashovardhan Sharma Sr. Manager Sales WHITEWAYS SYSTEMS
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The speaker panel from Whiteways Systems walked through the key workflow steps that broadcasters and media companies should follow in approaching the archiving process. They shared their experiences and learning from projects executed in the past. Preserving valuable media content of a historical and legacy nature requires digitisation, restoration and archiving that secures the past, present and future.

Before starting the digitisation and archival process, some calculations and decisions have to be made, such as profiling the stock of media tapes (e.g. numbers, types, content & its condition), labelling them, desired archival file format, equipment to be used, metadata format, workflow layout, a storage space for final archived products.

The archival workflow basically takes you through these steps: Preparation & Physical Restoration, Ingesting, creating metadata, transcoding, quality check, software restoration, finishing & upgrading, storage & access and, finally, archiving. Tapes are inspected, tagged and if required, treated using physical restoration techniques. The tape content is ingested via the ingest system and manually checked for any issues. Initial metadata will be created for each and every ingested raw clip. The clips will then be passed onto the transcoder for transcoding into the house format. Metadata will be entered into the MAM system. Then, quality check is performed and, where needed, software restoration, and cleaning processes. A further quality check assesses the need for colour correction. The clip will be sent to the finishing software for colour correction and finishing, if necessary. The finished clips, then, are stored on the server, managed and sent to archival system.

At the preparation stage, tapes are tagged and their information noted. They are then inspected for damage, and taken to cleaning, baking and further treatment. Output of the player connected to an ingest system, contents may

be recorded, stored on a NAS storage. Metadata structure is carefully considered, as per company policy to ease search and retrieve of clips. Transcoding checks that ingested clips are in house format, and if any file is not in house format, it will be transcoded. Quality check of problematic clips is done manually, or by machine, or both and sent to cleaning and colour correction. Acceptable quality media will be sent directly for storage and archive.

Automatic or interactive restoration enables the reviewing of the images and sets a range of adjustments, based on experience, for a number of automatic processes via a software-based restoration process. Finishing touches are important to enhance the experience of the viewer or listener. For storage and access, calculations should be made to not only accommodate the old content, but to house future content. A workflow should be arranged to allow the access only to people with authorised access. An archiving system is chosen with an appropriate medium, such as disk, LTO, Cloud-based etc.

A reference case study was highlighted to the online audience, that involved Whiteways in the digitisation, archive and disaster recovery at a broadcast station. A careful requirement analysis was carried out to confirm that the management were willing to digitise and archive the Radio and Television tapes. Many tapes were untagged and searching for a clip had been an uphill task. Some of the clips were of national importance and subject to access by authorised persons only. Eventually, a project plan was clearly formulated and executed in a number of phases; first for housing Infrastructure (site, electrical, internet, communication etc.) and then peripheral equipment Installation (racks, testing, dry run, training and handover). The archival project was divided into four stages: Digitisation of the tapes; Tagging and Archiving the content; Creating a disaster recovery site, and training & support.



Archive TV group has three subsidiaries, Cite de Memoire being one of them, specialising in archiving of heritage projects. It provides services for physical assessment, restoration of video, film and audio assets films with HD, 2K, 4K scanning, colour grading, indexing, keywording and digitisation, at customer site, or at their studio. Services include audio-visual and film heritage preservation, physical storage, inventory and rationalisation of collections, legal copyright analysis. Also, Digital Asset Management and enhancement of audio-visual heritage.

Key targets of the TV and radio broadcast industry, in connection with archiving of content, are to improve media production process, digital asset management, sharing of content between business units, AV digitisation on & off premise, distribution of content to multichannel, indexing localisation subtitling, broadcast quality control and migrating to digital workflow.

To plan your goals, cost analysis is essential, while balancing your revenue lines for different components of the archiving work. A range of unit cost estimates shall be carried out depending on your work, for comprehensive inventory of physical tapes, tape preparation, audio/ video digitization, Speech to Text AI keywording, qualified librarian manpower etc.

The session also looked at few case studies and lessons learned. A study in Tunisia included quantitative analysis of content, technology and carriers from an inventory between 1963 and 2022. Along the timeline, the purpose and content of recordings differed. Technology shifts in recording were noticed from cassettes, quarter inch tapes to CDs, file servers etc. Content archives were not in order and some tapes were missing, with no metadata.

Another case study was that of M6 Video Bank. A web portal was launched, offering a B2B monetisation service of M6 content, displaying the richness of different collections to professional audiences on a single web platform. It was a customised service for audio-visual business users with an alternative source for French images and responsive content matching the needs of broadcasters and producers.

It has offered matchless audio-visual archives from 1987 to date and has a 20,000 digitised hour portfolio, with diverse selection of 10,000 assets online. It is user friendly with an editorial home page to discover images using various search keys to select footages and with easy and quick browsing of content with results presented by theme.

The third study was that at Tony Comiti Productions, a press agency where a journalist, Alain Debos, initiated, created and grew the archive management system for the production house. It was the work executed between 1993 and 2022 where 3400 reports & documentaries were digitized & preserved in high resolution.

These were clearly indexed, chaptered per sequences and shared online in low resolution for availability to broadcast, post-production, social medias. To an independent production company and press agency, it is game changing for internal production and post-production team, as they can reach our legacy video contents at one click.

THE PATH TOWARDS MASS DIGITISATION OF LEGACY AV CONTENT AND THEIR CHALLENGES – DAMSMART AND BENCHMARK

ABU ABU Technology Webinar

The Speakers:

The Path towards Mass Digitization of Legacy AV content & their Challenges

Matt Ashe
Regional Manager
Benchmark Broadcast Systems

Nathan
Vice President of Sales (Asia)
DAMsmart & Silver Trak Digital

The session was a joint presentation of Benchmark and DAMsmart. DAMsmart is the leading specialist audio-visual digitisation agency in the APAC region with over 16 years of experience, and proven track record in handling digitisation of National AV projects.

Benchmark, with its over 25 years of experience in the broadcast industry, shared one of the case studies in its project portfolio. A TV channel in India, Zee Network, developed a central repository to provide access across all stations. It has 10 years of legacy media, with tens of thousands of content hours. Handling LTO tapes, with the conditions of the tapes, took a long time to complete the digitisation process.

Digital Media asset management can be a small process of digitising content for use across one facility or multiple locations for an organisation. With the end of life for many of the old tape formats and even celluloid film, companies must digitise their archives to preserve the content for future monetisation.

The entire ecosystem of archiving consists of several stages' such as; Physical repair & preservation, Digitisation, Digital restoration, Content preparation, Archiving and Media Assets Management.

It is internationally acknowledged by Archive bodies that the Year 2025 is the deadline for all forms of analogue AV legacy content to be digitised, failing which they can never be digitised. This is for two reasons, firstly, people who know how to handle tape-based content and secondly, necessary legacy players may not be easily available in the market.

For a successful legacy archiving ecosystem, key things to be considered are:

- To curate and carry out interventive conservation on

existing archives content.

- To harvest, enrich and migrate their related technical & descriptive metadata to the chosen archiving platform.
- To address and overcome digitisation & restoration challenges.
- To re-purpose outputs to a myriad of delivery packages.
- For a MAM to not only automate the archiving workflows but to also track manpower & processes.

MAM is a core part of archiving which must carry a comprehensive data model, associating analogue and digital assets with their related Metadata. Such data models need technical and intellectual data fields to be filled in.

When we go through the processes of digitisation, restoration, content preparation etc., a number of challenges may be faced along the path. These are to follow a standard security & compliance model, to architect archival infra & workflows implementation into existing environment, ability to handle very high capacity ingest, to exhibit a proven track record in successfully handling digitisation of National AV projects and having a reserve of Legacy playback devices, together with knowledgeable manpower to digitise AV content. Likewise, ability to collect information around tape conditions and treatments, to maintain very tight process control for driving a range of highly automated workflows, to maintain full flexibility around encoding parameters, to provide tight integration with automated file based QC and manual QC processes, to provide online access of browsing and viewing with multi-tenanted rights assignment, to provide secure online pre-approvals and to provide client notifications of the production processes.

Critical Success Factors in archiving are, to name a few, – support for all magnetic video and audio formats, comprehensive reporting of baseband metrics and digital file analysis, best practice quality control workflows,

accumulation of long obsolete replay machines and spare parts, data Migration from and to all known platforms, secured pre-approval of digitised and restored content etc. The participants were taken through visual clips of mass scale digitisation of various Tape Formats: 1- inch /2-inch Video, Betacam and, importantly, robotic video digitisation. Interventive types of physical restoration process by a few broadcasters was illustrated, showing deteriorated files and tapes, different artifacts inherent and, subsequently, comparison of tape quality before and after restoration. Of course, some of these materials were digitised, restored, graded, upscaled & aspect ratio converted.

For national archives and for some broadcasters, most essential practices include steps like, acquisition to identify and acquire content for the collection, accession to bring the content into the collection, curation to catalogue the content, preservation to ensure the content is preserved for future use and is stored in the correct manner, creation of digital renditions of the content, access makes the content accessible. Typical legacy archival digitisation content ecosystem is understood to be the process workflows of film cleaning & restoration, film scanning & digitisation, restoration, grading, transcoding, mastering, highly secure cloud-based collaboration & content delivery platform for playout, retrieval & access.

TECHNOLOGICAL CHALLENGES IN DIGITAL ARCHIVING – THE STORY OF TRT’S DIGITAL ARCHIVE

ABU ABU Technology Webinar

The Speaker:

Technological Challenges in Digital Archiving - The story of TRT's Digital Archive Renewal

Mehmet Erinç BAŞAR
Chief Engineer
Department of Media Operations and Restoration
TRT, TÜRKİYE

TRT started using digital archive system, Ardendo MAM with LTO 4 Tapes, in 2004. It was upgraded to Tedial MAM & LTO 5/ LTO 6 tapes in 2011. The renewal process of all archive hardware and Tedial MAM upgrade to LTO 9 tapes was still in progress in 2022. There are several technical challenges for operating and upgrading the current archive system that TRT are dealing with successfully. Some typical examples are: The system should delete the hi-res files from buffer disks (IBM 5100) after transferring them successfully to the tape libraries, but, from time to time, the system fails to delete them. Log files of the services running on three main servers sometimes reached up to 50 GB (each) causing the servers to crash.

In regard to planning its new archive system TRT is considering using Interoperable Master Format (IMF, SMPTE ST 2067) due to several advantages. It can create multiple CPL's (Composition Play Lists), multiple OPL's (Output Profile Lists). OPL provides a table of contents and transcoding instructions like data rate, resolution, watermarking, codec, and bit rate. Also, it allows a single collection of content to be transformed into multiple versions; Airline

edit, commercial black insertions/removals, different length versions, different language, graphics for customers, some special cuts to meet local moral expectations (such as nudity and/or profanity). Saves storage space since you don't need to keep all different versions (main and supplemental files are enough). It allows cloud service delivery – Send master file once, send the supplemental files as you need for other versions.

The main components of TRT's New Digital Archive System in planning, will be:

- New version of current MAM & HSM
- 2 identical tape libraries. (8 LTO9 drives and 16 PB capacity per tape library. Each can grow up to 27PB without any rack installation)
- 2 PB NAS storage (For proxies and Hi-res material media operations)
- Support for IMF workflows (will be implemented after the software upgrade)
- And possible usage of AI technology. ■

News from The ABU Region

INDONESIAN GOVERNMENT SHUTS ANALOGUE TV BROADCAST BUT SOME NETWORKS REMAIN DEFIANT

The Indonesian government has recently launched a complete switch from analogue television to digital but several broadcasters have continued to air on analogue channels. During the countdown ceremony to mark the switch to digital broadcast only, Communication and IT Minister Johnny Gerard Plate revealed that some networks remained defiant.

The minister said the migration to digital services is “a historical step” that Indonesia can finally enter the digital broadcasting era. The government regulation on postal, broadcast and telecommunication services issued last year obliges all 25 television networks to switch to digital, but it stops short of providing sanctions to those who fail to follow.

MNC Group, one of the country's biggest media companies, has urged the government to delay the switch because there are still millions of poor families who can't afford digital TV sets and still rely on their old TVs.

Indonesia's digital switchover has come a bit late compared with neighbouring countries, due to many delays in the process. Malaysia and Singapore completed the transition in 2019, while Thailand and Vietnam followed suit in 2020. Indonesia began the first phase of the transition in April.

The government has prepared around 6.7 million digital TV converter boxes to be distributed to poor families who don't have TV sets with digital capability, but

residents in nearly 300 districts and towns may not be able to get digital services immediately due to telecommunication infrastructural constraints in the sprawling archipelago. [[jakartaglobe.id](#)]

MALAYSIA OPENS MEDIA CITY COMPLEX

Malaysia now has its own media city complex, with impressive infrastructure to emulate the success of Hollywood or BBC studios. Angkasapuri Kota Media in Kuala Lumpur, opened on 26 October by caretaker Prime Minister Datuk Seri Ismail Sabri Yaakob, is equipped with high-tech infrastructure, including a central archive for broadcasting material. Mr Sabri said the project would help elevate the centre to become the hub of broadcasting. Similar projects that house various broadcasting companies under one roof have been carried out in Dubai, Manchester, Singapore and Sydney.

The project kicked off in Dec 2016 with the aim of providing sophisticated broadcasting infrastructure in line with the government's plans to develop digital television broadcasting services. A total of RM860 million (US\$182 million) was pumped into the construction of the building, which covers offices and technical space within an area of 62,027 square metres.

It contains 18 floors of office space, a 1,000-person capacity auditorium, music and TV studios, a multi-storey car park, a plaza and an outdoor garage. [[ABU News](#)]

ALL INDIA RADIO UPGRADES STATIONS WITH AEQ

AEQ and its partner in India, Falcon Technologies, have won a

major tender for the supply and installation of 100 consoles to All India Radio. All India Radio (AIR), officially known since 1957 as Akashvani, is the national public radio broadcaster of India and is a division of Prasar Bharati. It was established in 1936.

AEQ has been awarded the project to supply digital consoles for three types of studios, all of them with IP connectivity based on Dante technology in more than 33 different cities throughout India. The first studio, the transmission one, was designed based on the CAPITOL IP 12 TT desktop console with Dante connectivity, with 12 faders, 4 microphones, 4 AES/EBU inputs and outputs, 12 analogue inputs and 8 outputs, control and paging monitoring and 16 Dante bidirectional channels. 35 consoles were supplied and installed and an additional one was supplied as a spare.

The second one, “Switching”, was developed based on the CAPITOL IP8 TT desktop console with Dante connectivity, with 8 faders, 4 microphones, 4 AES/EBU inputs and outputs, 12 analogue inputs and 4 analogue outputs, control and paging monitoring and 16 Dante bidirectional channels. 32 consoles were supplied and installed and an additional one was supplied as a spare.

The third one, “Dubbing”, is based on the CAPITOL IP12 TT desktop console with Dante connectivity, with 12 faders, 4 microphones, 4 AES/EBU inputs and outputs, 12 analogue inputs and 8 outputs, control and paging monitoring and 16 bidirectional Dante channels. An AEQ Netbox 4MH AoIP terminal with capacity for 4 additional microphones and 4 stereo headphone outputs was added to each console. 32 consoles were supplied and installed and an additional one was supplied as a spare. [[content+technology](#)]

NHK EXHIBITS AT IBC2022, EUROPE'S LARGEST BROADCASTING AND MEDIA TECHNOLOGY TRADE SHOW

NHK exhibited its latest research and development results at IBC2022, held in Amsterdam (the Netherlands) September 9 to 12.

At the NHK stand, it introduced innovations including coding technology to efficiently compress multiple videos of different resolutions such as 2K, 4K, and 8K; technology allowing AR (augmented reality) content to be viewed from free viewpoint; technology to generate sign language CG animation from news scripts; and the light field head-mounted display for viewing natural 3D VR (virtual reality) images. The response was positive, with visitors commenting on the ability to recreate high-definition 8K video with small amounts of data and the incredibly stable AR display, and several research institutes showing an interest in collaborating or sharing information with NHK.

NHK will continue to actively communicate NHK's research and development results, deepen mutual understanding and cooperation with research institutes in other countries, and contribute to the development of media technology. [\[NHK STRL\]](#)

ENCOMPASS CARRIED OUT A SUCCESSFUL ONE-OFF BROADCAST FROM UK TO INDIA

Encompass Digital Media ran a one-off transmission from its site in Woofferton, UK, on Friday 4th of November. This electronic music broadcast targeted the whole of India, around 5,000 miles as the crow flies to the centre of the country. This might be the longest distance Encompass has covered with its DRM transmissions.

Before the actual broadcast, several tests were run using different frequencies, antennas and power combinations. The final test to confirm final set-up was a great success as the audio could be recorded from a KiwiSDR online

receiver located in New Delhi. The SNR of 20dB was measured in New Delhi and 23.9dB in Bangalore, which proves the power of shortwave radio and how DRM and its excellent sound, even in shortwave, can travel such long distances.

It used xHE-AAC codec with DRM Mode B, transmitting at 125kW from Woofferton. The audio was accompanied by ancillary data including a slideshow image of the album cover art. The test was a success. [\[DRM\]](#)

PNG NATIONAL BROADCASTING CORPORATION LOOKS TO ADVANCE BROADCASTING CAPABILITIES WITH INDONESIA

The National Broadcasting Corporation is looking to the Republic of Indonesia to advance its broadcasting capabilities. Managing Director of NBC, Kora Nou met with executives of Indonesian government television and radio stations to start the process towards a Memorandum of Understanding.

The move to look towards Indonesia is in line with the Government's intention to look to PNG's closest neighbour for economic opportunities. Mr. Nou said PNG and Indonesia share a land border and it was only fitting for NBC to engage with the South East Asia's fastest growing economy to engage and share expertise. He said his visit to Televisi Republik Indonesia - TVRI and Republik Radio Indonesia is the start of the process towards developing the MOU.

The MOU, in its draft stage, looks at five key areas among them capacity building, exchange programme, content gathering and sharing, transmission and studio equipment procurement and supply. The NBC Managing Director is optimistic the MOU once completed and signed will greatly assist NBC in its endeavour to modernise its broadcast capabilities. [\[onepng.com\]](#)

EBU PUSHES FOR EUROPEAN MEDIA DATA SPACE

Since joining the Gaia-X project last

year, the EBU has been promoting the creation of trusted media data spaces to enable sovereign exchange of content and data. The EBU and Gaia-X recently published a position paper, authored by the EBU and the vertical ecosystem group for media within Gaia-X, calling for the creation of a data space for the European media and creative industry sector.

Relying on core building blocks under development by various organisations in Europe, such as Gaia-X, such a data space would allow the media industry to improve data flows and digital rights management in the production chain, get better insights on user needs and preferences, increase findability of media content, innovate around new data-driven technologies, and create new business opportunities while guaranteeing data sovereignty. Using standard core elements for the media data space would also foster collaboration with other industries such as automotive, mobility and tourism.

The position paper sets out use cases that could be implemented within a trusted media data space and defines key building blocks required to support them. It also lists a number of existing data-sharing initiatives in Europe that could be made interoperable to achieve a 'federation' of data-sharing solutions as a kick start for the creation of a media data space. The position paper was based on feedback gathered during 2022 from EBU Members and relevant actors across the industry. The EBU is now driving the creation of a consortium to answer the call for the deployment of a media data space under the EU's Digital Europe programme. [\[EBU TECH\]](#)

BOOST FOR AM BROADCASTING IN NZ'S NORTHLAND REGION

Situated on the northwest tip of New Zealand's north island, and home to the historically significant Waitangi Treaty Grounds, the Northland region is to receive a funding boost to strengthen its AM

broadcasting infrastructure.

New Zealand's Minister of Broadcasting and Media, Willie Jackson, and Minister for Emergency Management, Kieran McAnulty, have announced a NZD\$1.48 million package to fund the repair and replacement of three transmission masts in Northland to ensure AM radio can stay on air in the region.

This funding will secure the reinstatement of the Waipapakauri mast, which services Far North communities, and replace the masts at Ōtaika and Ōhaeawai which are on their last legs. This will ensure that Northland communities retain their access to AM transmission in areas that are not serviced by FM frequencies. RNZ has already completed work to reinstate the Waipapakauri mast, which went back on air. [\[content+technology\]](#)

SEVEN NETWORK TAPS IMAGINE TO SHAPE CONVERGED TV TRADING DETAILS

In support of its strategy to help local advertisers and agencies with faster, more effective and easier buying across digital and broadcast screens, Seven Network Australia has partnered with Imagine Communications as part of a fully automated and optimised total TV trading solution.

The new infrastructure at Australia's leading commercial network broadcast is fundamentally designed to enable the company, its agencies and partners to streamline processes; deliver better return on investment by maximising leading audiences; and accelerate the growth of cross-screen trading.

Core to the new solution is Imagine's LandmarkSales ad management platform and dynamic ad placement engine and yield optimiser for linear TV, GamePlan. Landmark Sales is designed to enable broadcasters to better manage linear sales across an increasingly diverse advertising ecosystem through sophisticated pitch-to-pay workflow automation.

It allows users to maximise revenue and control operational costs across linear, on-demand and linear addressable through efficient use of inventory, business data insights and a suite of automated tools.

GamePlan has helped media companies transition to the dynamic trading of spots to achieve significant additional revenue from more efficient use of inventory, while removing a substantial amount of the manual workload involved in trading linear TV. It enables a hybrid operation that supports manual spot placement in premium inventory and automated placement of everything else. The latest evolution of the software uses AWS cloud, allowing media companies to perform multiple optimisation runs in parallel, scaling ad operations and revenue. [\[rapiddtvnews\]](#)

INTER BEE 2022 ATTRACTS 26,901 VISITORS TO MAKUHARI MESSE

The Japan Electronics and Information Technology Industries Association announced that Inter BEE 2022, a comprehensive media event held at Makuhari Messe for three days from November 16 to 18 2022 has concluded. The Makuhari Messe venue which had 810 exhibitors and 1,391 booths, attracted 26,901 visitors. The next Inter BEE 2023 is scheduled to be held at Makuhari Messe for three days from November 15 to 17, 2023.

Inter BEE is widely recognised by industry professionals as one of Japan's largest comprehensive media events, bringing together not only professionals related to audio, video, broadcasting, communications, lighting, and distribution, but also technicians, creators, and stakeholders in the media and entertainment industries. Inter BEE, now in its 57th year, continues to move in step with the development of broadcast media, and with "content" at its core, providing a business space that encompasses all aspects of content creation (production), delivery

(transmission), and reception (experience). [\[Inter BEE\]](#)

SBS RADIO PURSUES CROSS-PLATFORM FOCUS TO BECOME SBS AUDIO

SBS Australia has announced that, in 2023, its radio offering will become SBS Audio to reflect its full cross-platform offering across more than 60 different languages.

Speaking at SBS's 2023 Upfront, David Hua, SBS's Director, Audio Language Content, said radio would always be an important part of SBS and that the change from SBS Radio to SBS Audio next year reflects the ongoing success in transforming into a cross-platform audio provider, covering broadcast radio, live streaming, digital publishing and podcasting. Hua noted the unique position SBS Audio has in the Australian media landscape because of its distinctive content and its connection to Australian communities.

SBS Audio serves the more than 5.5 million Australians who speak a language other than English at home, as well as providing content in English, and for those learning a new language. [\[content+technology\]](#)

GERMAN PLANS FOR DAB+ EMERGENCY ALERTS

Digitalradio Deutschland is advancing an effort to add emergency alerts to DAB+. Although the effort is beginning in Germany, the association aims to seek international standardisation of public warning messages and functions.

The public warning effort brings together broadcasters, media institutions and network operators, as well as equipment manufacturers, to develop the public warning system. The association is projecting a two-to three-year time frame for implementation, including the development of the system and international standardisation.

Digitalradio Deutschland pointed

to recent natural disasters, such as the severe flooding in the Ahr Valley and parts of Upper Bavaria in 2021, as well as the “tense international situation” surrounding the war in Ukraine, in explaining why a standardised public warning system for DAB+ is needed.

The DAB+ standard already includes an emergency warning feature – Alarm Announcement Switching – that can redirect DAB+ receivers to play out a predefined radio service in the event of an emergency. Once the emergency situation subsides, AAS is deactivated, and receivers return to their previously selected service. [\[Radioworld\]](#)

TELSTRA AND MEDIALINKS CELEBRATE TEN YEARS OF DVN PARTNERSHIP

This year's InterBEE show in Japan has played host to Japanese broadcast technology company Medialinks celebrating 10 years of operational and technological innovation in partnership with Telstra Corporation, a global telecommunications and technology company, for their Digital Video Network (DVN) platform deployed across Australia. Medialinks' IP-based broadcast Network infrastructure was chosen by Telstra 10 years ago to form the backbone of Australia's permanent and itinerant Broadcast Network.

Telstra's DVN is one of the largest single broadcast networks in the world. Medialinks technology is deployed in over 600 locations across the country giving broadcasters the ability to deliver live and uninterrupted 4K broadcasts for sporting events, live to air news services and other broadcast services with multi redundancy and security. [\[content+technology\]](#)

NORWAY'S TV 2, TELENOR TAP NEVION FOR NEW SPORTS PRODUCTION SYSTEM

Virtualised media production solution provider Nevion has announced that Norwegian broadcaster TV 2 and telecom service provider Telenor will be

building a ground-breaking sport production ecosystem using Nevion solutions, products and services.

The ecosystem involves over 60 venues and multiple simultaneous games as well as the fact that TV 2 is contracting several production companies to produce the content. Using the system, all games are to be produced remotely, with TV 2 producing the final program to be aired – effectively making this a distributed production, with centralised production hubs. TV 2 can also produce other events directly, from the venues or new locations.

TV 2 has contracted Telenor to build the WAN infrastructure needed to achieve these objectives and provide it as a service to them. Telenor, together with Nevion and TV 2, is now creating the remote-production solution linking venues, production companies and the broadcaster itself. The solution is based on Nevion's software-defined media node, Virtuoso; its SDN media fabric, eMerge; and its media orchestration platform, VideolPath, the companies reported.

In addition, Nevion is providing a full range of professional and support services, including consultancy, infrastructure design, device configuration, device integration, setup of the orchestration system, testing and troubleshooting. [\[TV Technology\]](#)

LIVE 4K FROM INTERNATIONAL TRADE FAIR STREAMED NON-STOP FOR 6 DAYS

TVU Networks continued its streak of successful live transmissions, announcing its TVU Nano 5G router delivered a total of six days (80 hours) of non-stop, live 4K video from the China International Fair for Trade in Services (CIFTIS) in Shougang Park in Beijing. International trade in services has a multitude of changing global rules to navigate, not to mention changing technology.

Organisers set up a 4K PTZ camera to provide live footage

from the Trade Fair. Real-time coverage of caterpillar-to-butterfly transformations as well as panoramic shots of the area's unique landscape were broadcast each day.

The compact router created a reliable, high-bandwidth network for the transmission of the live 4K signals to the media. Over 80-hours of live 4K video were broadcast from Shougang Park over China media platforms including CCTV News, Xinhua News Agency, BTV Beijing Satellite TV, and as well as social media sites. [\[content+technology\]](#)

FIFA+: REDEFINING THE FIFA DIGITAL FAN EXPERIENCE FOR FIFA WORLD CUP QATAR 2022™

FIFA+, the official digital destination of football fandom that launched earlier, is now set to redefine the way in which fans – all over the world – enjoy the FIFA World Cup, as it rolls out its full tournament offering in 11 languages ahead of kick off on 20th November.

Throughout the global event, FIFA+ will become the official companion experience of the FIFA World Cup Qatar 2022™, with a reimagined global FIFA app and web platform, available across select connected devices, and becoming the all-in-one destination for FIFA World Cup fans.

Built to ensure fans have a complete tournament experience, FIFA+ also compliments the tournament's broadcasters – helping fans find their favourite team's live games through the 'Where to Watch' feature and sharing behind-the-scenes and original content created throughout.

The completely free platform, which launched with a slate of original content, in-depth archive, and extensive live coverage, is transforming ahead of the tournament to welcome a host of new, immersive, and engaging features that will provide a truly game-changing experience for fans around the world. [\[fifa.com\]](#) ■

DIGITAL BROADCASTING Updates

MULTIPLEXING METHOD FOR ADVANCED TERRESTRIAL BROADCASTING

NHK STRL is researching and developing advanced terrestrial broadcast technologies for next-generation terrestrial television broadcasting.

Multiplexing is a technology that brings together information composed of programmes and services including video, audio, programme guides, and applications, and transmits it as a single signal format. Digital terrestrial television broadcasting uses MPEG-2 TS (Transport Stream), whereas the newer 4K/8K satellite broadcasting uses the MMT (MPEG Media Transport) multiplexing method. As part of the advanced terrestrial broadcasting project, NHK is exploring technologies to provide services in the same way, through broadcasting and communication.

The CMAF/MMT multiplexing method that is currently on investigation uses CMAF, the media format shared by online video streaming services, multiplexed by MMT and transmitted by

broadcast. CMAF, standardised by the MPEG, is adopted in streaming technologies widely used by online video services. It also takes into account important requirements such as content protection functions.

NHK STRL is working on research and development of a transmission system and a receiving system for programme content using the CMAF/MMT format. The software transmission system currently under development can transmit content in the common CMAF by both broadcast and unicast communication, so it will allow various services to be provided by combining broadcast and unicast communication.

The home gateway, being developed as a receiving system, has functions to receive content transmitted by both broadcasting and unicast communication. Content received via broadcasting can be kept in CMAF and sent to a smartphone without a broadcast tuner, allowing broadcast programs to be viewed in the same way as online video services. Broadcasters will be able to implement viewing services in a more flexible way using apps provided by broadcasters, allowing them to diversify the services that they provide.

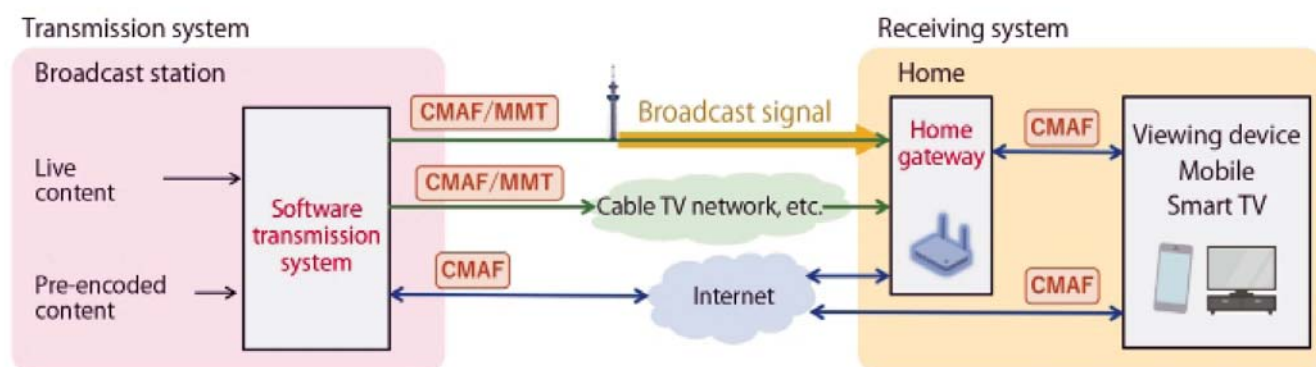
This should reduce costs for broadcasters by having a single development workflow for broadcast and online services, while viewers will benefit from more personalised services. [\[NHK STRL\]](#)

DRM EDUCATION PROJECT TEST TRANSMISSIONS SUCCESSFULLY ENABLED BY RFMONDIAL

As part of a DRM Consortium distance learning project promoted by several of its key members and industry partners, BBC and Encompass have been transmitting DRM for testing the distribution of audio, text and graphics in parts of the world where the internet is not available.

The latest test broadcast has been transmitted via a shortwave RIZ transmitter in the UK. In order to allow DRM to perform at the highest level, RFmondial has upgraded it by using the RFmondial's DRM Exciter LVe. The upgrade of the RIZ transmitter was necessary, as the RIZ company has ceased trading and spare parts are no longer available.

RFmondial's latest developments include a fully digital broadcast exciter, tuneable within the longwave, mediumwave and shortwave frequency bands as well as in VHF. Together with the skilled experts at Encompass's Woofferton transmitting station in UK, RFmondial integrated the RIZ control system into its exciter and fine-tuned the development so that both the requirements of DRM are met, and also those of pure analogue and simulcast transmissions. The final confirmation of the installation has been made during the successful second public test of the DRM education project in August when it was demonstrated that DRM is a suitable distribution platform for audio, text, graphics needed for



distance education in parts of the world without internet access.

After the successful installation at Woofferton, BBC and Encompass are planning to upgrade other transmitters using the RFmondial's broadcast exciter. This can be used not only for RIZ transmitters, but also for any other transmitter manufacturers including Transradio, Thomson, and Continental Electronics. [DRM]

EUROPEAN UHF STUDY POINTS TO CONTINUED NEED FOR DEDICATED DTT AND PSME SPECTRUM

A new study published by the European Commission supports the EBU position that there should not be any change in the way that UHF spectrum is allocated in Europe. The study makes clear that both digital terrestrial television (DTT) and wireless audio equipment for programme making and special events (PMSE) will continue to require the sub-700 MHz spectrum currently used.

Carried out by LStelcom and VVA, the study reveals a wide range of views across EU member states, with different trends and contexts in each country. For this very reason, however, there is little scope for consensus on any large change to the current approach. Indeed, a majority of member states indicated that they do not have sufficient information to comment on the likelihood of additional sub-1 GHz spectrum being required for mobile services. [EBU]

DVB WORKS TOWARDS IMPROVED HANDLING OF ACCESSIBILITY FEATURES IN HBBTV

The DVB Project has published a set of Commercial Requirements for the extension and revision of some core DVB specifications to support better signalling of accessibility services. The work relates specifically to the HbbTV Accessibility Framework.

The Commercial Requirements, published as DVB BlueBook C102, will guide technical work to update the existing DVB-SI, DVB-I and DVB-DASH specifications. The aim is to ensure that the availability of accessibility features is clearly signalled in all DVB services, to facilitate easy use of such services by end users.

The initiative was triggered by recent work within the HbbTV Association on an "Accessibility Framework". The framework has been created in a context where the operating systems of TV sets have an increasing range of accessibility options, although with inconsistencies across brands and models, while HbbTV also has a comprehensive accessibility toolkit.

The HbbTV Accessibility Framework is designed to enable apps and TV sets to have a constructive dialogue between them to decide which will take responsibility for realising a feature. It also allows rich settings data from the TV settings menus to be available to HbbTV apps.

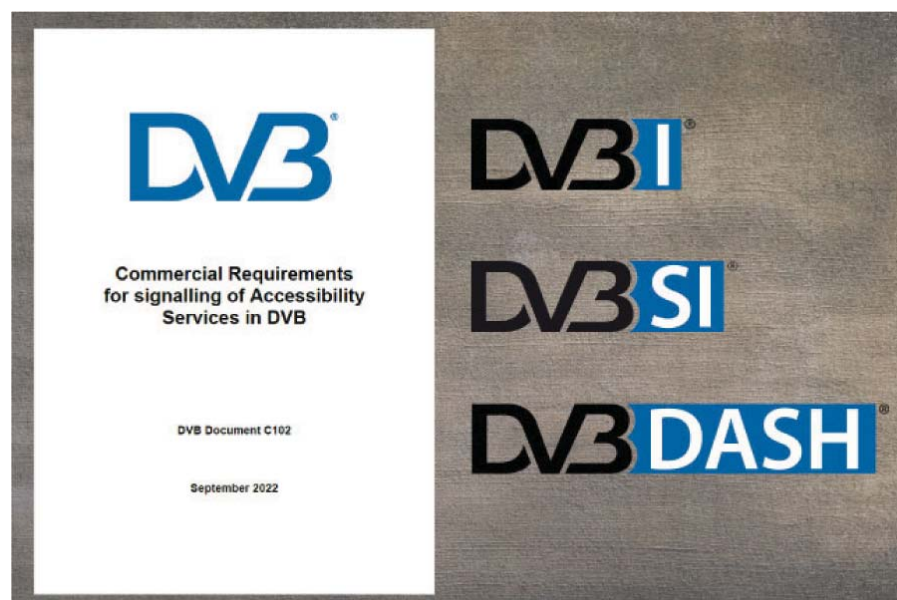
DVB's forthcoming work will focus on enabling the signalling to viewers of the availability of additional accessibility services, provided within the related HbbTV app. Their availability would be shown when navigating a DVB-SI or DVB-I based channel list or EPG, with the signalling applying to linear services delivered over

both broadcast and DVB-DASH streaming.

The work also aims to enable greater consistency of accessibility services across broadcaster streamed video-on-demand (HbbTV) services, streamed linear services (DVB-DASH), and traditional broadcast services, including consideration of any opportunity to achieve consistency of approach with the HbbTV Accessibility Framework for service provisioning based on terminal capabilities and user preferences. [DVB]

ECONOMICS, ENVIRONMENT AND EMERGENCIES LEAD THE WAY FOR DAB+ DEVELOPMENT

Three E's – economics, environment and emergencies – will drive the case for DAB+ adoption, said WorldDAB President, Patrick Hannon, opening the organisation's 2022 annual Summit in London. DAB+ offers lower costs of distribution than FM, coupled with lower energy requirements, and greater resilience in emergencies, especially out of home, said Hannon. It's essential to protect the core benefits of broadcast radio – it's free to air, universal and reliable in emergencies. DAB+ is key to securing this, he added. This was supported in keynote sessions, with Shuja Khan, CEO of UK communications infrastructure company Arqiva, arguing that governments need to safeguard



broadcast services – not just in the short term but to 2040 and beyond. Innovative new DAB+ services from around the world were highlighted at the Summit. Speakers emphasised the need for continued collaboration between the radio and automotive sectors, to ensure radio's continued dominance of in-car audio, and to optimise the experience for listeners.

The annual Summit was held in-person for the first time in three years, in Kings Place in London. It brought together more than 375 delegates online and in-person, from over 60 countries around the world. The Summit is organised by WorldDAB, the global industry forum for DAB digital radio. [\[WorldDAB\]](#)

ESA AND EBU TO BUILD SOLUTIONS FOR EMERGING SATELLITE-ENABLED 5G MEDIA MARKET

The EBU has signed an agreement with ESA, the European Space Agency, to work together on developing solutions that leverage 5G systems and so-called 'edgecasting' to put Europe at the vanguard of media delivery technology.

The aim of the project, titled 5G-EMERGE, is to develop an integrated satellite and terrestrial system based on open standards to enable high-quality content distribution services. Telecommunications satellites will be used to efficiently deliver high-demand content, including streaming of live events, as close as possible to the end user – to the 'edge'. This could be in neighbourhood base stations or even in the users' homes or vehicles. At these network edges, a smart satellite gateway will be able to connect to a regular smartphone, a tablet or a TV set. A consortium of 20 companies from Italy, Luxembourg, the Netherlands, Norway, Sweden and Switzerland will collaborate on developing the distributed edge technology and service-delivery features along with other necessary

enhancements that comply to international standards. The EBU will lead the project, which is funded by ESA. [\[EBU\]](#)

FREQUENCY ALLOCATIONS AND SHARING OF SPECTRUM TOP AGENDA AHEAD OF WORLD RADIOCOMMUNICATION CONFERENCE 2023

Radiocommunication experts from around the world met in Geneva for the second of three interregional workshops to review preparations for the upcoming World Radiocommunication Conference, WRC-23.

Hosted by the International Telecommunication Union (ITU), the workshop held from 29 November through 1 December brought together regulators, regional and international organisations, telecommunications operators, manufacturers, and other experts to review draft solutions for issues on the WRC-23 agenda.

Participants also exchanged preliminary positions reached by Regional Telecommunication Organisations and other entities ahead of the quadrennial global conference.

During the meetings, UN and international agencies, equipment makers, network operators, and other companies and organisations worked on key preparatory issues for WRC-23, set to take place in Dubai, United Arab Emirates, from 20 November to 15 December 2023. A total of 805 participants from 96 administrations attended the workshop. [\[ITU News\]](#)

KENYA ANNOUNCES DIGITAL RADIO FRAMEWORK

The Communications Authority of Kenya released a draft framework for the country's roll-out of DAB+ for digital sound broadcasting. The draft framework positions digital radio as a complementary service, operating alongside analogue radio, and no analogue switch-off date is proposed.

Under the plan's preferred options, the roll-out would focus initially on the phased introduction of national DAB+ services, similar to how the country handled its digital terrestrial television roll out, followed by the introduction of additional local DAB+ multiplexes. Current DTT common carriers and new entrants would be allowed to bid on multiplex licenses.

Alternate scenarios proposed in the draft plan would focus on local multiplexes or rolling out local and national services simultaneously. The CA also is considering only allowing existing DTT carriers to apply for multiplex licenses.

Although the framework focuses on DAB+ as the primary digital radio standard for the country, it left open the door to potential future consideration of DRM for AM services and DRM+ for use on FM in areas where there may not be enough demand to support a full DAB+ multiplex.

The framework was developed by CA in partnership with the Association for Progressive Communication and the Kenya ICT Action Network with support from the United Kingdom's Digital Access Programme. [\[Radioworld\]](#)

ONEWEB LAUNCHES 40 SATELLITES WITH SPACE X

The launch took the total number of OneWeb's satellites in orbit to 502 and was the first of three planned missions SpaceX will conduct for OneWeb. Bharti Enterprises-backed OneWeb is building a constellation of 648 satellites in low Earth orbit to provide internet service.

This launch adds another 40 satellites to OneWeb's 648 LEO satellite fleet, almost 80% of its first-generation constellation that will deliver global wholesale connectivity for its partners. This milestone mission marks OneWeb's first time launching from Florida, where its satellites are also produced by OneWeb Satellites – a

joint venture between OneWeb and Airbus.

The launch will enable the company to significantly expand service and initiate additional connectivity solutions soon for partners across the US, Europe and much of the Middle East and Asia, representing all points north of the 35th parallel. The expansion of the OneWeb fleet will also enable coverage between the South Pole and the 35th parallel south, opening up connectivity services in Southern Australia, South Africa and parts of South America.

OneWeb's connectivity solutions are already active in Alaska, Canada, the UK, Greenland and the wider Arctic area to provide internet connectivity to unserved and underserved rural and remote communities and businesses. [\[asiatechxsg.com\]](https://asiatechxsg.com)

STREAMING, SPORTS STAY STRONG IN OCTOBER AS BROADCAST BUMPED UP

Streaming has made considerable gains through 2022 but the month of October witnessed new broadcast programming having a significant impact on TV viewing, up 2.2% in overall usage compared with September says the latest version of the Nielsen Gauge.

The Gauge provides a monthly macroanalysis of how consumers are accessing content across key television delivery platforms, including broadcast, streaming, cable and other sources. It also includes a breakdown of the major, individual streaming distributors.

After what Nielsen called busy summer of new content across streaming services, viewership share remained largely consistent in October, but there were a few notable upticks in usage from September: Disney+ usage increased 6.8%; Hulu usage increased 5%; YouTube usage increased 8.3%.

The continued introduction of

new content across platforms speaks to how different services are succeeding simultaneously. Specifically, the top five programmes in October per minutes viewed were Dahmer, The Watcher, Hocus Pocus 2, House of The Dragon and Lord of the Rings: Rings of Power. These originated on Netflix, Disney+, HBO Max and Amazon Prime Video. Nielsen noted that engagement with such programming was a key reason for streaming usage rising 35.1% compared with October 2021.

Viewing of linear television MVPD (multichannel video programming distributors) and vMVPDs (virtual multichannel video programming distributors) apps represented 5.7% of total television usage and 15.4% of streaming usage in October. Broadcast and cable content viewed through linear streaming apps also credits its respective category. [\[rapiddtvnews\]](#)

BBC CUTS BACK LOCAL RADIO IN ENGLAND

The BBC's 39 local radio stations across England are the latest to feel the fall out from the January 2022 decision to freeze the license fee that makes up about 74% of the BBC's budget. As with its recently announced cuts to the BBC World Service, the broadcaster's leadership is positioning the changes as part of an organisation-wide effort to create "a modern, digital-led organisation offering even greater value to all audiences."

According to the BBC, the local radio cuts will help reprioritise about £19 million (\$21.9 million) in funding to support a new multimedia news operation for England. This will bring together local online, radio, and television resources, as well as support 11 investigative reporting teams focused on local news and analysis. [\[Radioworld\]](#)

CONCERNS ARISE ABOUT INFLAMMATORY, MISLEADING AD CONTENT SURGE

Research from digital media

measurement, data and analytics software platform provider DoubleVerify (DV), has found that at a time of significant macroeconomic change, concerns are intensifying about inflammatory or polarising content, with a continued shift in the platforms and channels consumers are turning to.

The 2022 Four Fundamental Shifts in Advertising and Media report analysed insights from over 16,600 global consumers in 18 countries and highlighted the dynamic relationships between consumers, digital content and advertising that are arming stakeholders with the insights they need to make well-informed strategic decisions.

Among the key findings were that cost-of-living concerns were driving "stay at home" content consumption, particularly on connected TV (CTV) and social media, with most (55%) consumers now spending more time consuming content daily than they did pre-pandemic.

Attention was fuelling media efficacy: two thirds (66%) of respondents claimed an ad that captures their interest in the first five seconds will make them more likely to pay attention. Trust and shared values foster loyalty, but consumers are quick to judge – consumers are concerned about the spread of mis- and disinformation, and it shows – 61% are even less likely to purchase/use a brand again if they see it advertised beside mis-/disinformation.

Online shopping surges and is bolstered by a contextual approach - 54% of respondents report buying more items online now than pre-pandemic, while 67% are more likely to pay attention to an ad if it's relevant to the content they're viewing, such as reviews or gift ideas. [\[rapiddtvnews\]](#) ■

Equipment Trends

to cyberattacks. Therefore, Xpeak includes advanced security features such as access control rules, security control, and traffic encryption.

<https://aeq.es/xpeak>

FUJINON HZK25-1000MM

FUJIFILM Corporation has developed the broadcast zoom lens "FUJINON HZK25-1000mm" (HZK25-1000mm), which boasts the world's highest*1 40x zoom and the world's longest focal length*1 of 1000mm. The HZK25-1000mm is a box-type broadcast zoom lens in the dual format, supporting two types of large image sensors. It can be mounted on cameras equipped with the Super 35mm sensor or the even larger sensor equivalent to 35mm full frame*2. The lens achieves optical performance which exceeds 4K. It also facilitates the use of cinema cameras which is becoming increasingly common in the broadcast industry, offering cinematic visual expressions such as shallow depth-of-field for beautiful bokeh in live coverage of sporting events and music concerts. The HZK25-1000mm is due to be released in the spring of 2023.

The new HZK25-1000mm is a broadcast zoom lens that uses optical technology, nurtured over many years, to deliver the world's highest 40x zoom and the world's longest focal length of 1000mm. It is designed in the dual format, supporting two types of large sensors. The lens normally works with the Super 35mm sensor, and

AEQ XPEAK DISTRIBUTED GLOBAL INTERCOM SYSTEM

In conventional AV/Media production, the intercom is an essential tool for the technical coordination of everyone involved: Directors, producers, camera operators, presenters, floor managers, Audio and Lighting teams, etc. Remote production is nowadays a standard part of operations. The need to produce Television and Radio minimising the mobilising and remote deployment of technical personnel, has become a fact. It is now required that Production personnel are able to work from different locations, some of them temporary (hotels, stadiums, etc).

Xpeak, is an intercom system that incorporates virtual network technology, through an automatic global interconnection Wizard. The Wizard avoids the difficulties of creating a virtual network and configuring the devices to work on it.

System Equipment

In Xpeak, different hardware or software user panels are interconnected as if they were all part of the same physical

production centre. It doesn't matter whether they are on the same LAN network, or if they are dispersed in different places with access to Internet or to a WAN – they will all connect. You do not have to have a static IP, nor do you need a dynamic DNS, nor do you need to set port forwarding, because each user panel is automatically configured according to the local network of this location. It works immediately in all network environments, even on very restrictive networks. On the other hand, **the system does not need a matrix**: The elements of the system form a network of P2P (peer to peer) devices with Ethernet virtualisation. Further, an intercom system is a mission critical tool that must neither fail nor be vulnerable



also supports a sensor equivalent to 35mm full frame by way of activating the built-in expander*4 to expand the image circle by 1.5 times. It offers the added benefit of maintaining the same angle of view in both sensors.

On the wide-angle side, the lens provides F2.8 aperture, enabling cinematic visual expressions with shallow depth-of-field and resulting beautiful bokeh. The use of large-diameter aspherical lens and fluorite lens*5 controls various forms of aberration thoroughly to achieve optical performance which exceeds 4K.

The lens maintains the operation of broadcast lenses involving zoom demand and focus demand even when mounted on a cinema camera. It can also be used with a variety of existing accessories*6. Furthermore, the lens features an image-stabilisation mechanism based on Fujifilm's unique "ceramic ball roller" system to accurately compensate for on-set vibrations and wind-induced movements for operation stability.

Capable of covering an image circle measuring 28.5mm across the entire zoom range when combined with a camera equipped with a Super 35mm sensor, and covering an image circle measuring 41.3mm across the entire zoom range when combined with a camera equipped with a sensor equivalent to 35mm full frame; Image circle refers to a circular area where light that has passed through the lens forms an image.

The expander can expand the image circle and extend the focal length to the telephoto side. Lens element made of fluorite, which has a characteristically small wavelength dispersion in light refractive indices; It enables optical design with minimal chromatic aberration.

<https://www.fujifilm.com/jp/en/news/hq/8703>



RØDE NT-USB+

The NT-USB+ is a USB microphone that makes capturing studio-quality sound super simple. Building on the legacy of the legendary NT-USB with next-generation features, it excels in a wide variety of applications, from recording music to podcasting and streaming. Delivering pristine audio quality with incredible ease of use and premium features.

Some Key Features are: Studio-grade condenser capsule with tight cardioid polar pattern; high-gain Revolution Preamp™; Powerful APHEX® audio processing accessible via RØDE Connect, RØDE Central and RØDE Reporter; High-power headphone output with zero-latency monitoring and versatile controls; USB-C connectivity with high-resolution analogue-digital conversion; Detachable pop filter and desktop stand included; Class-compliant USB output that works seamlessly with computers, smartphones and tablets (iOS and Android).

The NT-USB+ harnesses the pristine audio quality of a professional condenser microphone and combines it with the convenience of USB connectivity, making it the perfect solution for recording studio sound at home. It features a studio-

grade condenser capsule with a tight cardioid pickup pattern, so your recordings are always rich and focused, and its ultra-low-noise, high-gain Revolution Preamp™ and high-resolution analogue-digital conversion deliver incredibly clear sound. Capturing professional-quality audio with the NT-USB+ is incredibly easy. Simply plug it into your computer, smartphone or tablet and you're ready to go. Want to take your recordings to the next level? The NT-USB+ features powerful internal DSP for adding advanced audio processing and effects to your voice, unlocked with the free RØDE Connect podcasting and streaming software, RØDE Central companion app for desktop and mobile, RØDE Reporter or UNIFY.

<https://rode.com/en/microphones/usb/nt-usb-plus>

BRIGHTLINE, MAKO AND MINNOW, NEW LED PROFILE SPOTLIGHT SERIES

The new Brightline Mako and Minnow fixtures are well suited for a variety of applications, including broadcast studios, production studios, and large and mid-sized presentation rooms. The profile spotlight LEDs offer noise-free, fanless conduction cooling and are available in tunable Variable White



Brightline Minnow Profile Spotlight



Brightline Mako Profile Spotlight

and RGBW (Red, Green, Blue, White) versions. The Mako spotlight uses interchangeable, prime lenses and is designed for longer throws within large rooms or studios. The Minnow covers a shorter throw and is ideal as a key and accent light. Brightline Minnows have a compact zoom lens, enabling precise and continual adjustment to create the desired beam size.

Setting the Mako and Minnow apart from competitive products is the fact that the fixtures are conduction cooled. With conduction cooling, heat is transferred from the COB (Chip On Board) LED to the heat sink and then to the mass of the fixture.

The Mako and Minnow series feature a variable white LED (3200K-6000K) and 95+ CRI tunable white chip. Tunable white applications enable the user to independently control colour temperature. The Mako and

Minnow RGBW models provide full colour spectrum performance and feature a 4-in-1 LED RGBW for the brightest output and boldest colour rendering.

<https://brightlines.com/>

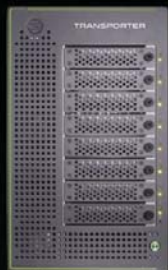
SYMPLYTRANSPORTER, SECURE CONTENT SHUTTLE

SymplyTRANSPORTER is an S3 native portable storage appliance. Featuring state-of-the-art data protection born out of today's complex data workflows, SymplyTRANSPORTER is capable of storing massive amounts of data created at the edge and being used to shuttle that content back to a base location. Designed by Symply and powered by DataCore Periphery software, this breakthrough content shuttle uses a rugged eight bay desktop design with dual 25Gb Ethernet interfaces. This allows companies to quickly and securely transport content from edge locations to their

facilities. SymplyTRANSPORTER can be used either as a standalone device, or with existing in-facility SymplyPERIPHERY or DataCore Swarm clusters. Data can be imported from SymplyTRANSPORTER into a main cluster at the push of a button thanks to the universally unique nature of object storage. Once the data transfer is completed the system can be reset and made ready to go back out on location.

SymplyTRANSPORTER brings enterprise data protection to portable appliances by leveraging object storage with erasure coding technologies. This not only offers data durability way beyond what standard shuttle RAID systems provide, but the system also features a healthcare engine that is constantly checking stored data - guarding against silent forms of data corruption. Using erasure coding recovery from disk failures is exponentially faster than hardware RAID systems, which is especially

SYMPLYTRANSPORTER: A NEW BREED OF SECURE CONTENT SHUTTLE





relevant when considering today's high capacity disks. Traditional RAID systems configured at RAID 6 can take days and even weeks to recover from disk failures, while this process takes only hours with SymplyTRANSPORTER.

In addition, SymplyTRANSPORTER does not use a file system. The disk drives are used raw – no file systems to corrupt, limit performance, or compromise storage efficiency, which means up to 95% of the available hard disk drive capacity can be used to store data. Having no file system and native S3 brings other advantages as well. With no file system it's impossible for SymplyTRANSPORTER to get infected by malware or ransomware - making it almost impervious to attack. Should a SymplyTRANSPORTER be lost or stolen in transit, the data on the system simply cannot be accessed without the secure keys that are required for the S3 buckets where the data is stored.

SymplyTRANSPORTER also supports 256-bit encryption in-flight and

at rest. Encryption can be enabled on a per-bucket basis along with object immutability (or WORM), meaning that once an object is written it cannot be changed. All these features and more make SymplyTRANSPORTER the next generation of edge storage appliances.

What if one SymplyTRANSPORTER is not enough? Well, that's not a problem either. Everyone knows that projects have a tendency to overrun and often generate more data than was originally envisaged. To solve that problem, multiple SymplyTRANSPORTER units can be clustered together at the edge to build a small (or even large) cluster as required. In addition, SymplyTRANSPORTER supports synchronous or asynchronous replication allowing data to be replicated to other S3 buckets, these could be a larger SymplyPERFIERY or Swarm clusters in remote locations, another SymplyTRANSPORTER or even public cloud.

<https://gosymply.com/transporter>

LIVEU MATRIX TRANSCIVER

LiveU Matrix Transceiver is a highly versatile encoder/decoder for sharing and receiving multiple live feeds in a cost-effective rackmount unit. Complementing LiveU Matrix, the transceiver provides a combined contribution and distribution solution that lets you simplify your operations and widen your reach. With built-in flexibility, Matrix Transceiver enables you to choose the optimal combination of sharing and receiving SDI channels dynamically, supporting up to four simultaneous feeds.

Reliable and proven solution

Used by major content providers worldwide, LiveU Matrix ensures mission-critical resiliency, leveraging the LiveU Reliable Transport (LRT™) protocol for high-quality live video distribution.

<https://www.liveu.tv/products/share/matrix> ■

New Members

Affiliate Member



HEC Montréal – Canada

HEC Montréal, founded in 1907, is a French-language university that provides internationally renowned management education and research. It is Canada's oldest business school and the first in North America to hold the prestigious triple accreditation (AACSB, AMBA, and EQUIS). It has ties to the University of Montreal.

The school is deeply rooted in Quebec society and the vibrant and diverse city of Montreal, but it is open to students from all over the world, with over 14,000 students representing 156 countries.

Montreal is also known as the "Best Student City in North America" and the "Sixth Best City in the World" (2019 QS Best Student Cities Ranking).

The school offers 148 French and English programmes, as well as a trilingual (French, English, and Spanish) bachelor's degree in business administration. ■

ABU TECHNOLOGY CALENDAR of Events 2023

5-9 February	A23 Global Shortwave Coordination Conference	Tunis, Tunisia
14 February	Webinar on Disaster Management	Online
16-18 February	27th BES Conference and Expo	New Delhi, India
6-9 March	ABU Digital Broadcasting Symposium 2023	Kuala Lumpur, Malaysia
April	Webinar Series on Member Innovations	Online
May	ABU Technical Bureau Mid-Year Meeting	Kuala Lumpur, Malaysia
23-25 May	ABU-ASBU Webinar on Digital Audio Transmission	Online
16-19 May	KOBA Show	Seoul, Korea
June	Engineering Fundamental Training Course Level 3	Online
6-9 June	BroadcastAsia2023	Singapore
July	Broadcast Archive Systems Workshop	Kuala Lumpur, Malaysia
July	Cloud Technologies Workshop	Kuala Lumpur, Malaysia
August	IP Workflows and Remote Production for Broadcasters Workshop	Kuala Lumpur, Malaysia
September	Webinar Series on Member Innovations	Online
15-18 September	International Broadcasting Convention 2023	Amsterdam
9-13 October	ABU-ASBU Satellite Workshop	Tunis, Tunisia
October/ November	ABU Technical Bureau Annual Meeting	Seoul
October/ November	ABU Technical Committee Meeting	Seoul
October/ November	ABU General Assembly	Seoul
November	Inter BEE 2023	Japan

Personalities & Posts

ABU elected its New Vice-Presidents



From left: Mr Kim Eui-chul (President & CEO of KBS-Korea), Mr Yan Chengsheng (Director General of International Cooperation Department of RTPRC-China), Mr Sunil (Additional Director General & Head of International Relations, Prasar Bharati-India).

On November 30, three new Vice-Presidents were elected at the ABU General Assembly in New Delhi.

Mr Kim Eui-chul, President and CEO of KBS-Korea; **Mr Yan Chengsheng**, Director General of the International Cooperation Department of RTPRC-China; **Mr Sunil**, Additional Director General (Global Outreach); and Head of International Relations, All India Radio, Prasar Bharati are the new Vice-Presidents.

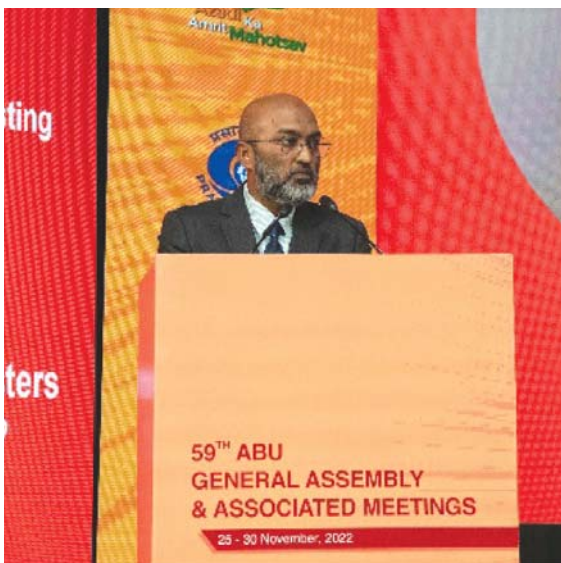
Mr. Kim Eui-chul, the 25th President and CEO of the Korean Broadcasting System, took office on 10 December 2021. Mr Kim has vast experience in news and current affairs production since 1990, when he joined KBS as a journalist. He was in charge of

Investigative News. Before becoming CEO of KBS Business he was Executive Managing Director of News.

Dr. Yan Chengsheng is the Director-General of the National Radio and Television Administration's International Cooperation Department and the President of China Netcasting Services' International Communication Committee. He has long been involved in international radio and television exchanges, as well as policy formulation and implementation. He has done extensive research on international media communication and public diplomacy.

Mr Sunil is the Additional Director General of Prasar Bharati, India's public service broadcaster, which includes Doordarshan India (DDI) and All India Radio (AIR). He currently leads the Technology Division, International Relations, Design and Planning Wings of Terrestrial Transmitters, TV Studios & Satellite Division, Global & Domestic Distribution at the corporate level. He has led the Direct-to-Home (DTH) Division of DDI, the Marketing Division, and the Prasar Bharati Central Archives Division. ■

Ahmed Nadeem appointed ABU Secretary-General



Ahmed Nadeem at the 59th ABU General Assembly, New Delhi, India.

Ahmed Nadeem is set to become the next Secretary-General of Asia-Pacific Broadcasting Union. Mr Nadeem will succeed Dr Javad Mottaghi who will complete his term at the end of March 2023. His new position as Secretary-General will begin on 1 April 2023. He is currently the Director of Technology and Innovation at the ABU.

Mr Nadeem has been with the ABU Technology Department since 2008, and was named Director in May 2018. He is a skilled electronic and information technology engineer with over 25 years of experience in broadcasting and telecommunications.

From 2007 to 2008, he worked as a Project Engineer for LSV Enterprises in Singapore. Prior to that, he was the Head of Engineering at Television Maldives from 1996 to 2007.

Mr Nadeem has a BTEC HND in Electrical and Electronic Engineering from Nottingham Trent University in the United Kingdom and an Honours Degree in Electrical and Electronic Engineering from the University of Hertfordshire in the United Kingdom. ■



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