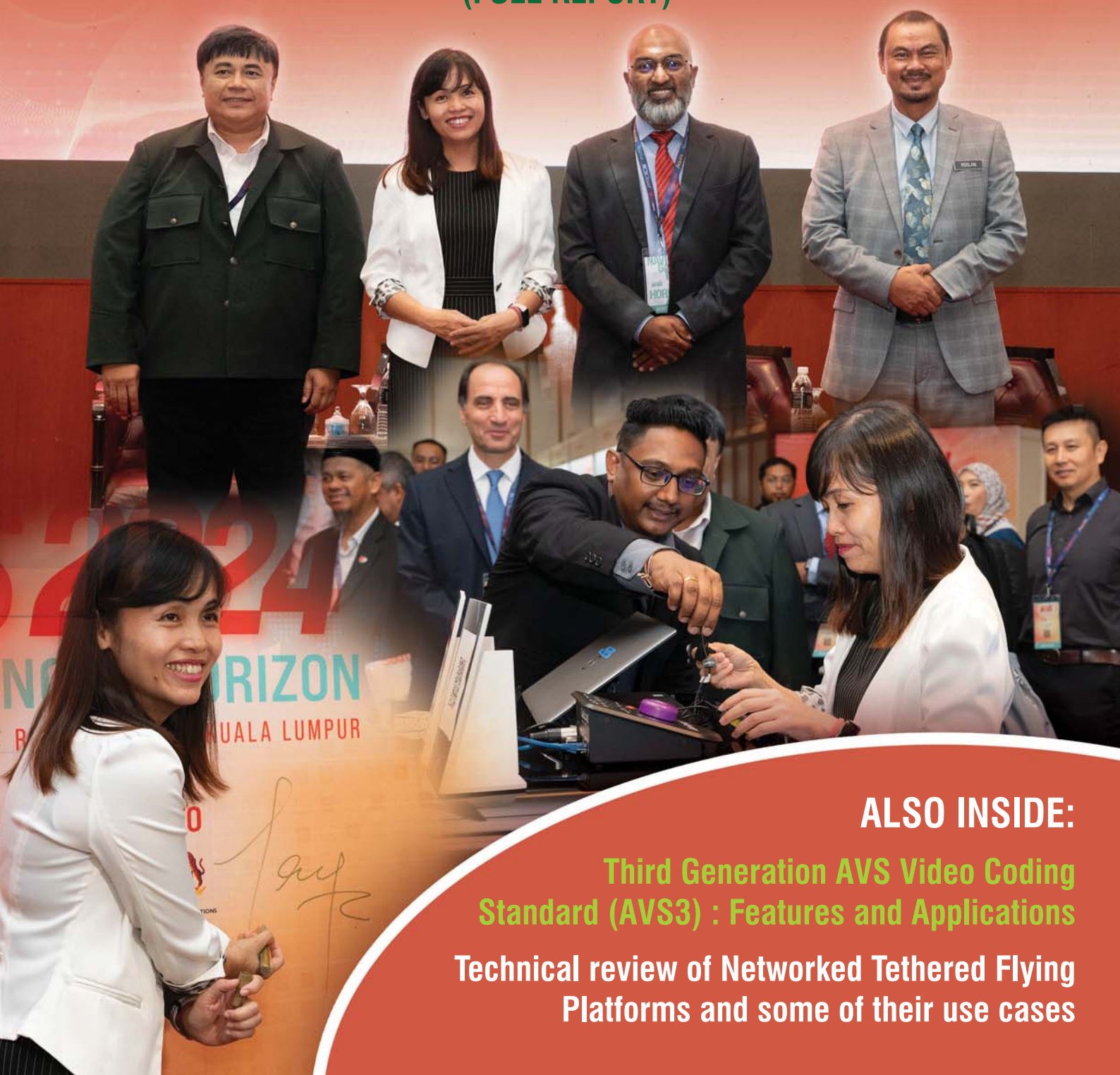


DIGITAL BROADCASTING SYMPOSIUM (FULL REPORT)



ALSO INSIDE:

**Third Generation AVS Video Coding
Standard (AVS3) : Features and Applications**

**Technical review of Networked Tethered Flying
Platforms and some of their use cases**

DIGITAL BROADCASTING SYMPOSIUM

The 2024 ABU Digital Broadcasting Symposium was held from 4-7 March 2024 at the Royale Chulan Kuala Lumpur. This symposium, aptly themed 'Navigating AI Horizon' is organised once a year by ABU. This year's DBS is the twentieth in the series. Prior to the conference, a workshop by Integriti Padu Sdn Bhd (IPSB) was held in the morning of March 4 followed by a DAB+ workshop in the afternoon. The 3-day conference, 2 masterclass sessions, 8 workshops, together with exhibition booths, provided the unique opportunity for attendees to have access to information on various aspects of broadcasting ranging from terrestrial to IP.



ADVANCEMENTS IN BROADCASTING TECHNOLOGIES AND STANDARDS

The first session was moderated by **Masahi Kamei**, Japan Broadcasting Corporation (NHK) and the panelists were **Emily Dubs**, DVB Project; **Dr Peter Siebert**, IEEE BTS; **Ryo Yasuoka**, NHK and **Lindsay Cornell**, the British Broadcasting Corporation (BBC). They elaborated on the developments of the various

broadcast/telecommunication technologies over the recent years and the improvements achieved.

The core DAB standard and modulation technology remains unchanged with the first DAB+ services going on air almost 15 years ago. DAB+ products are reliable, energy-efficient and there are more than 100 million DAB receivers in daily use worldwide. The Service

and Programme Information (SPI) specification consists of two parts namely the Metadata Description in XML and the Transport and Binary Encoding.

The Hybrid Digital Radio XML Specification has been further updated to improve the handling of metadata in more languages. Phonemes and aliases for service names can be provided to allow



voice assistants to correctly interpret colloquialisms for radio stations. There is clearer guidance on how to identify and use metadata in different languages. The Transportation and Binary Encoding Specification has been made clearer by restructuring to make it more usable. There are clearer explanations for encoding and decoding and examples have been extended and updated.

Following severe flooding in 2021, German authorities and broadcasters discussed the role of DAB+ in future emergency warning systems. The key issues were that the emergencies did not generally have the same alert area as a DAB ensemble coverage area; using the existing alarm announcement signaling has legacy implications, and random sleep timing

will lead to some lost audio at the start of an announcement. Hence, the DAB+ Task Force responded by creating a novel location coding system which is globally applicable and lightweight with high coding efficiency. A new EWS signaling has been defined which identifies the participating groups, stage of alertness, importance and location. The universal location coding system can be used anywhere in the world and does not rely on national or regional location systems. The system has high coding efficiency, simple algorithmic determination and is applicable to low-cost devices.

DVB has focused heavily on IP-centric solutions to facilitate broadcasters' migrations to IP-based platforms and allowed them to build on an

integrated broadcast/IP/5G ecosystem. 5G Media Streaming (5GMS) allows 5G networks to be used by third parties for media delivery over unicast, providing opportunities for collaboration beyond merely acting as a bit pipe. DVB-I supports both 5G Broadcast & 5G Media Streaming, and DVB-I service is offered simultaneously over broadcast & unicast.

'DVB-I over 5G' allows LTE-based and NR-based 5G networks to carry services with standardised TV-friendly service layer facilitating commercial success. The seamless use of either 5G NR or 5G Broadcast offers new opportunities for content monetization or mobile networks optimizations.

The combination of heterogeneous





networks such as DVB broadcast, DVB-DASH or DVB-NIP together with 5G networks, enables deployment scenarios where networks can complement each other for their own strengths.

EFFICIENT MEDIA WORKFLOWS WITH AI & CLOUD SOLUTIONS

The moderator was **Kumaran Subramaniam**, the Tun Abdul Razak Broadcasting and Information Institute (IPPTAR), Malaysia withadcastingthe panellists comprising **Fintan Mc Kiernan**, Ideal Systems; **Samuel Bogoch**, Axle AI; **Joe Chu**, Nautel; **Subodh Aggarwal**, TVU Networks, and **Hiroyasu Nagata**, the Japan Broadcasting Corporation (NHK).

Advanced ISDB-T system is IP based, achieves high efficiency with new technologies and offers a wide range

of bitrate/robustness, as well as a hierarchical transmission scheme. The video and audio layer consists of VVC (Versatile Video Coding) and MPEG-H 3D Audio, allowing viewing services to be customised for individual preferences. The Transport layer consists of MPEG 2 Media Transport (MMT) which provides a service for tuner-less device and personalised service such as Integrated broadcast and broadband (IBB). IBB services can provide various services regardless of the delivery path, including synchronised viewing of broadcasting and VR/AR.

Advanced ISDB-T system provides flexibility as either Frequency Division Multiplexing (FDM) and Time Division Multiplexing (TDM) or both can be used. It has low latency transmission for emergency information and

Single Frequency Network can be operated for spectral efficiency. The channel bandwidth width has been extended to 6 MHz, FFT size extended to 32K and the performance in mobile reception has been improved by an extension of partial reception bandwidth. The Forward Error Correction (FEC) consists of Low-Density Parity Check (LDPC) codes concatenated with Bose Chaudhuri Hocquenghem (BCH) codes, allowing Quasi Error Free operation close to the Shannon limit. The modulation order has been increased to 4096 QAM to cater for UHDTV transmission.

HD Radio turns analog FM channel into digital quality, where the receiver first plays analog FM then blends to HD. HD Radio operates on the main FM spot frequency where the In Band On Channel (IBOC) signal





occupies 400 kHz and is compatible with standard 200 kHz FM channel allocations. Three audio channels are added and only about 5% power in each IBOC sideband is typically transmitted from one transmitter resulting in high efficiency.

DRM FM adds 3 additional audio channels, operates on dedicated spot frequency, and requires 100 kHz bandwidth. It can simulcast the analog FM channel which requires 300 kHz bandwidth, and the digital component can be placed on both sides of the analog FM. DRM is compatible with existing FM allocations and provides better efficiency.

An FM Station has a single audio source, STL link, audio processor and one analog FM modulator and transmitter. Present FM transmitters do not support digital radio today and need to be upgraded. The digital transmitter must support external digital modulator input, or internal digital modulator and comply with HD

Radio and DRM FM specification.

SUSTAINABLE TECHNOLOGIES AND MEDIA BUSINESS ECOSYSTEMS

The session was moderated by **Dr Peter Siebert**, IEEE BTS and the panelists were **Datuk Suhaimi Suleiman**, Radio Televisyen Malaysia (RTM); **Dusan Statelov**, Maindata; **Dr Kiatanantha Lounkaew**, Thammasat University; **Yan Yi**, Radio and Television of the People's Republic of China (RTPRC); **Mohd Shamsul Izuan**, Malaysian Communications and Multimedia Commission (MCMC) and **Hubert Czaja**, Germany. China has developed strategies to upgrade traditional broadcasting services by pushing forward innovative media convergence and forming new synergies for industrial development. The achievements were a smart broadcasting network, a more diversified new ecosystem of broadcasting media and high-quality development of the traditional broadcasting industry.

The Intelligent Recommended Channel (IRC) offers richer program content, simplifies viewing operations and provides more customised content services. The 5G High tech Video Multi-Scene Applications Lab focuses on R&D of tools and software with independent IPR for efficient and secure digital media production and dissemination as well as multi-model intelligent interactive video production. The global AI Governance Initiative proposed by China is a people-centered approach in developing AI. It is an open, fair, and effective global governance mechanism for AI as it puts ethics with multi-level collaboration.

SFN boost and Dynamic Broadcast are two technologies that dramatically enhance satellite broadcast signal delivery. SFN Boost is a cutting-edge solution for significant reduction up to 98% of satellite bandwidth used to feed terrestrial TV transmitters operating in Single Frequency Networks (SFN) mode. It offers single satellite transmission to both





terrestrial TV transmitters (DTT) and satellite home users (DTH). This results in cost-effective delivery of regional TV content to terrestrial TV networks and cost-effective insertion of regional advertisements and Emergency Warning System (EWS). SFN Boost also gives broadcasters the option to choose between centralised and distributed architecture. The distributed solution is compliant with DVB-SIS standard ETSI, while the centralised, on the other hand, follows proprietary solution. The centralised version uses a patented method that performs in-depth content analysis across multiple layers and compresses duplicated packets. The centralised architecture complements and enhances the DVB-SIS standard by offering additional features. For example, it does not rely on GPS synchronisation, which meets the need for critical infrastructure independence.

Dynamic Broadcast introduces a better way of handling TV interruptions due to weather factors. When transmitting a signal throughout a year, signal strength and capacity are dynamically adjusted according to current weather conditions. Dynamic Broadcast improves TV signal availability in bad weather conditions, thanks to the dynamic adjustments of the strength of TV signal. Furthermore, Dynamic Broadcast provides 30% – 80% additional capacity (Mbps) out of

the same frequency band (MHz), whether satellite or terrestrial, and thus opens new revenue streams for TV broadcasters.

AI TOOLS & SECURITY IN MEDIA INDUSTRY

The moderator was **Fintan Mc Kiernan**, Ideal Systems with the panellists comprising of **Sean Lee**, Arista; **Dr Ruhi Tas**, TRT and **Tim Xu**, Mediacorp. Traditional help desks often struggle to manage a high volume of support requests, leading to delays in issue resolution. Help desks operate during standard business hours and do not operate around the clock. Manual assignment of support tickets can be time-consuming and prone to errors, leading to delays and inefficiencies. They often deal with a large number of routines, repetitive inquiries that could be addressed more efficiently through automation.

AI-Supported Help Desk refers to a customer support system that leverages artificial intelligence (AI) technologies to enhance and streamline its operations. The integration of AI into a help desk environment aims to improve the efficiency, accuracy, and overall effectiveness of customer service. AI algorithms can analyse incoming support tickets and intelligently route them to the most suitable support agent. AI technologies can handle

routine and repetitive customer queries by providing instant responses or guiding users through step-by-step troubleshooting processes. This automation helps in resolving common issues quickly. Unlike traditional help desks with limited operating hours, an AI Supported Help Desk can get assistance at any time, regardless of time zones or business hours.

AI can contribute to the maintenance and improvement of a comprehensive knowledge base by automatically updating information, ensuring that support agents and customers have access to the most up-to-date solutions. Machine learning is incorporated to adapt and improve over time, based on user interactions and feedback. This helps in continuously refining the support process and optimising responses. AI solutions are designed to handle a high volume of requests efficiently, making them scalable to meet the growing demands of customer support in dynamic business environments. By analysing historical data, AI can predict potential issues. This contributes to a more proactive and preventative approach to support. AI systems can automate routine broadcasting tasks, such as video editing and production, to increase efficiency and reduce manual workload. AI can recommend content based on individual preferences as



well as provide real-time language translation for live broadcasts, enabling a more diverse and global audience to engage with content. AI-powered analytics tools could offer valuable insights into audience behaviours, helping broadcasters make data-driven decisions for content creation and scheduling.

NOVEL MEDIA SOLUTIONS: IMPLEMENTATION AND UPDATES

The session was moderated by **Kazim Pektas**, TRT and the panelists were **Nick Piggot**, RadioDNS; **Michiel Saelen**, Skyline Communication; **Ajeet Khare**, Canara Lighting Industries; **Saifuzzaman Yusop**, RTM and **Zahra Sadat Mortazavi**, Islamic Republic of Iran Broadcasting (IRIB).

DevOps is a new way-of-working that improves value delivery for the customer and enables benefits for both development and operations.

DevOps is a software development methodology that combines software development (Dev) with IT operations (Ops). This fusion aims to shorten the system development life cycle and provide continuous delivery of high-quality software. DevOps focuses on collaboration, automation, measurement, and sharing. DevOps primary goal is to improve the flow from an idea towards value for the customer. It is enabled by an environment in which multidisciplinary teams work collaboratively to continuously deliver high quality

solutions at a faster pace. It increases the frequency and quality of deployments and releases and realises faster time to market. DevOps practices apply four continuous automation cycles throughout software development and operations processes.

The 1st cycle is continuous integration and streamlining of internal development by integrating code into a shared repository several times a day. Each check in is then verified by an automated build, allowing teams to detect problems early in the cycle. The 2nd cycle is continuous testing which is automating and integrating tests into the software delivery chain, and automatically





executing those tests against each build of the code base. The 3rd cycle is continuous delivery which is the process of delivering code that is production ready and is kept in an always releasable state, so it can be deployed to production at any given time based on business needs. The 4th cycle is continuous operations which is proactively managing the solution based on feedback loops, monitoring and telemetry.

DevOps is an ever-evolving field, and staying ahead of emerging trends is crucial for organisations aiming to remain competitive and efficient. The use of AI and Machine Learning (ML) in DevOps is expected to increase. AI can help with predictive analytics, anomaly detection, and automated issue resolution, while ML can improve automation, security, and decision-making in continuous integration and continuous delivery.

Hybrid Radio is the seamless combination of broadcast and IP technologies to create an experience of radio that is better than can be delivered by using either technology in isolation. It delivers audio over broadcast and is reliable, universal as well as free to air. Hybrid Radio enhances radio by using IP in parallel and adding content, metadata, and interactivity.

NEXT-GEN MEDIA DISTRIBUTION AND RECEPTION

The moderator was **Sharad Sadhu**, Media Specialist, India, with the panelists comprising of **Eduard Chizhikov**, Viory; **Dr Les Sabel**, WorldDAB; **Muheki Wasago Aloysius**, UCC, Uganda; **Mats Ek**, Progira; **Richard Lhermite**, ENENSYS Technologies and **Jay Ganesan**, APAC Amagi. Uganda is a landlocked country in east-central Africa, situated north and northwest of Lake Victoria. Uganda Broadcasting Service (UBS) was established & operated as a monopoly before independence in 1962. During 1990 till 2000, market liberalisation took place with private broadcasters being granted licenses. Several radio stations began to stream online, reaching Ugandans in the diaspora. Community radio stations also became prominent, catering to local communities and broadcasting in regional languages. There are 350 Licensed FM Radio Stations providing 95% geographical coverage and 98% population coverage.

The current challenges are the unavailability of FM spectrum, interference in the FM band and Illegal broadcasts. Hence, Uganda considered adopting DAB+, and in 2016 started a feasibility study to assess market readiness. In 2019, DAB+ was implemented with development of a RF Master Plan (2021-2026), and the National Frequency Table of Allocations. A

1.25 kW DAB+ pilot site was set up at Summit View, Kololo, delivering 15 audio channels and providing approximate coverage of 60 Km.

Challenges for DAB+ implementation include the need for substantial upfront investment and cost of compatible DAB+ receivers. There is a predominant use of older motor vehicles with built-in FM radios and the need to cultivate awareness and garner acceptance among the populace. Content innovation and adjustment to digital formats is necessary. Intense competition from existing and emerging online platforms is also another factor. In addition, post-pandemic economic constraints have affected consumer purchasing power.

The National Broadcasting and Telecommunication Commission, NBTC, commissioned the T-DAB+ project to provide mobile and indoor coverage in Thailand. Thammasat University undertook a cost-benefit analysis, market demand and number of services needed. The roll-out plan is to cover 50%, 80%, 90% and 95% of the population.

The requirements were for National, Regional and Local networks where the National Network was originally intended as national SFN. However, this approach proved to be difficult because of SFN Self interference due to the size of the network, irregular



transmitter spacing and loss of flexibility. Therefore, the National Network will use different frequencies in different parts of the country.

The advantages are the same infrastructure for all layers (national, regional and local) and more effective frequency allocation. However, the disadvantages are that sub-regions are larger than a province and sufficient frequencies are needed for provincial local transmissions in sub-regions.

AI DRIVEN PERSONALISATION & AD MANAGEMENT

The session was moderated by **Otto**

Othman, RTM and the panellists were **Aale Raza**, Whiteways; **Mardiah Nasir**, IPSB; **Abdul Haleem**, Accedo; **Ashwin Sashital**, Harmonic; **Michele Lai Chin**, Qvest and **Jim Vinh**, Quickplay.

AI has the potential to significantly impact the world of television viewing. AI-driven data mining enables predictions about viewers' preferences and attitudes toward video content. Machine learning algorithms segment viewers based on their habits, allowing for personalized recommendations. AI optimizes video quality for users based on network

speed. For instance, Netflix's smart video compression technology adjusts settings to minimise buffering interruptions. AI also assists in quality assurance by ensuring media content aligns with technical parameters and adheres to local age restrictions and privacy laws. It can identify and remove inappropriate elements from videos, safeguarding viewers and brands.

AI-powered voice assistants enhance convenience in the connected TV environment. Users can control viewing experiences through voice commands, eliminating the need



for traditional remotes. Voice interactions drive personalisation and encourage natural communication with Connected TV devices. AI plays a crucial role in programmatic ad buying and selling. By automating ad placements based on behavioral patterns, it optimises deals between publishers and advertisers. Audience hyper-segmentation using machine learning ensures targeted ad delivery, enhancing overall advertising effectiveness.

AI's capacity to handle massive datasets streamlines outcome prediction and facilitates real-time communication among connected TV ecosystem stakeholders. It frees up human capital to focus on strategic aspects and creative production. AI is revolutionising TV viewership by enhancing content recommendations, optimising streaming quality, enabling voice control, and transforming advertising practices. As technology continues to evolve, AI's impact on the entertainment industry will only grow stronger.

Sora is a text-to-video model developed by OpenAI that can create realistic and imaginative scenes from text instructions. Sora can generate videos up to a minute long, while

maintaining visual quality and adherence to the user's prompt. Sora uses a neural network that can take written descriptions of a scene and turn them into high-definition video clips up to 60 seconds long.

Creating great content used to be the domain of TV stations. The content could be distributed using social media, websites and apps while the power to create content very much belonged to know that ability is being overtaken by AI which will have a huge and potentially irreversible impact on our industry.

AI USE CASES AND INNOVATION IN REMOTE & VIRTUAL PRODUCTION

The moderator was **Aale Raza**, Whiteways and the panellists were **Dr Ahmad Moradi**, VYPA; **Louis Clovis**, Broadcast Elements; **Dr Mohieddin Moradi**, IRIB University and **Ken ichiro Nagano**, NHK World.

Virtual productions (VP) combine physical and virtual filmmaking techniques to create cutting-edge media. The tech artist uses real-time 3D game engines to create photorealistic sets in green screen type studios. The style of shooting is changing and while the cost of

shooting big budget TV commercials is too high. VP demands more with broadcast graphics and brings down the costs of commercial job cost. Extended sets can be created even when the studio is small and there is no need for huge green screen studio. Today's video games systems such as the Unreal Engine 5 can render graphics in real time that are similar to those seen in Hollywood movies and TV shows.

Virtual Production is where the physical and digital worlds meet. It is the ability to mix live footage and computer graphics to get real-time feedback and interaction on set. VP uses technology to join the virtual world with the physical world in real-time. Green screen virtual production has been around for ages, but now, a new shooting method with in-camera VFX using LEDs is beginning to attract attention.

The in-camera VFX method, the camera in the virtual space moves in the same way according to the position information of the camera, and the image projected by the virtual camera is displayed on the LED wall, along with the subject in the foreground. It is a mechanism in which a real camera records in normal



settings. The advantages are that there is no restrictions on location, weather or time, and it is possible to shoot in places that are not realistically possible.

The LED walls encompass the entire set and specifications are based on brightness, scan rate, refresh rate, viewing angle, bit depth, wide color gamut, deep black coating, anti-reflection coating and pixel pitch. If brightness is lower than 1000 nits – therefore, it will not be able to effectively display the self-luminous characteristics of the LED display screen. The number of scans is the ratio between the number of lines that the LED screen drives current scans and lights up in the unit and the total number of lines of the screen module. The smaller the denominator of the scan number, the better the screen performance, and the lower the probability of black lines and horizontal stripes appearing during shooting.

The refresh rate is the speed at which the screen is refreshed. A low refresh rate will cause the image to flicker and shake. The higher the refresh rate, the better the picture effect presented by the camera. Two common refresh rates for LED displays are 1920 Hz regular refresh and 3840 Hz high refresh. The 3840 Hz display can meet most shooting needs. Viewing angle is the maximum angle at which the display can be viewed

without experiencing significant degradation in image quality. The viewing angle of the Led wall for virtual production is preferably above 160°. Direct view LED displays are constructed from a dense matrix of pixels each incorporating an individual red, green and blue LED emitter.

INNOVATIVE WORKFLOWS ACROSS THE MEDIA SUPPLY CHAIN

The moderator was **Lindsay Cornell**, BBC Digital with the panellists comprising of **Dr Simon Keens**, Digital Radio Mondiale (DRM); **Micheal Low**, RCS Malaysia; **Amirah Jaafar Mad Ariff**, RTM; **Sanjay Das**, Cite De Memoire and **Zahedah Farshad**, IRIB.

Digital Radio Mondiale is a mature technology, as it has been tested and deployed in many countries. A single digital transmitter can output numerous streams and both mobile and stationary receptions are available. Broadcasters have varying goals which include increased content, new revenue and adding emergency warning systems. They also face challenges including rural vs urban coverage, mountainous terrain, and operating costs. Previously, 3-5 audio services were available from a digital transmitter operating in the FM band. Digital radio innovation has provided the opportunity to multiplex in a single transmitter by reusing existing infrastructure and

12-18 audio services per FM band transmitter with higher coverage are now available.

DRM reduces the energy required by AM transmissions in both the MW and SW band. DRM transmissions remove the need for a carrier frequency and all energy is used to transmit information which means power is not wasted. Average power for digital transmission is up to 66% lower than for analogue transmission. Digital signals have greater crest factor, resulting in lower requirements of receiver field-strength. In addition, DRM's error correction means crystal clear stereo sound right up until signal is lost.

DRM provides a better Emergency Warning System because the alarm signal triggered by authorities is picked up from current DRM Service by all running DRM receivers and switched to emergency broadcast. Inactive receivers may switch on automatically and as a result, all DRM receivers present the audio content of the emergency programme. In addition, DRM receivers with text screen present detailed information and instructions with Journaline (a text-based data service) and text-headlines.

5G Multicast Broadcast Services (MBS) allows the network to select the most suitable among point-to-multipoint (PTM) or point-to-point (PTP) delivery based on requirements set by either





service providers or network operators and considering concurrent user demand. MBS is the combined streaming of unicast, multicast, broadcast media services (linear, VOD and personal). The choice of PTM or PTP is based on the requirements of the service provider or operator, the number of concurrent user requests and meeting the condition of being a member of the multicast group. Multicast is suitable for popular online television and radio services whereas broadcast is suitable for localised services.

IMMERSIVE MEDIA & NEXT GEN AUDIO-VISUAL TECHNOLOGIES

The moderator was **Dr Mohieddin Moradi**, IRIB R&D with the panellists comprising **Kazuhiro Yamagata**, NHK; **Shunto Yamashita**, NHK; **Toni Fiedler**, Fraunhofer IIS and **Mohamad Reza Hasanabadi**, IRIB.

Digital Audio is based on standards that include MPEG: Mono/Stereo 5.1–3D, 3GPP: Enhanced Voice Services (EVS) and Bluetooth: Low Complexity Communications Codec (LC3). MPEG provides perceived transparent quality at lowest possible bitrate and has evolved from four generations of audio codecs into the latest comprising xHE-AAC and the MPEG-H 3D Audio System. 3GPP EVS is full

band instead of narrow (3.5kHz) and wide (7kHz) band audible bandwidth. It delivers improved transmission error robustness through concealment, and Immersive Voice and Audio Services (IVAS) is under preparation. Bluetooth: LC3 is a High-quality, low-power audio codec with new features including support for hearing aids.

The BBC has documented regular complaints about speech that was difficult to understand. The audience preferred volume difference between dialogue and music & effects depending on personal taste. In 2020, a study by Westdeutscher Rundfunk (WDR) and Fraunhofer IIS showed that 68% of all participants, and 90% of the subjects aged 60 and above, often have problems understanding speech on TV. Most study participants preferred the possibility of switching to a dialogue-enhanced version.

Source Separation, especially dialogue separation and speech enhancement, have been major research topics for decades. Recent developments with artificial intelligence (AI) and deep learning brought significant improvements. Dialogue separation in legacy material is supported by AI and the separated audio elements can be processed with Object Based Audio (OBA) system.

Dialogue separation can be applied to any digital audio format and is suitable for legacy stereo recording. During automatic remixing the separated stems are remixed according to a trained model with MPEG-H interactivity feature. The digital audio processor provides global and time-varying background attenuation, or a combination of both. Dialogue separation knows the sound elements to be separated and remix algorithm knows how the new mix should sound. Automatic Metadata Authoring delivers audio and metadata for an object-based workflow.

Deep-learning-based Dialogue Enhancement is available as library and standalone software for Windows and MacOS. It automatically creates a new audio version with clearer dialogue out of any existing stereo broadcast mix. Dialogue Enhancement is based on a deep neural network, trained with original TV material and can be adapted to various content types including documentaries, sports programmes, and feature films. It allows for manual adjustments, but it is not recommended for processing pure music material.



SUSTAINABLE AND EVOLVING PRACTICES IN MEDIA

The session was moderated by **Emily Dubs**, DVB Project and the panelists were **Sharad Sadhu**, Media Specialist, India; **Satriyo Dharmanto**, Televisi Republik Indonesia (TVRI) and **Richard Lhermite**, ENENSYS Technologies. D2M (Direct to Mobile) is a new type of broadcasting service which addresses mobile phones directly in broadcasting mode. The mobile phones receive broadcasts, renders content on screens and speakers. It is a viable concept as the broadcasts potentially target a huge population of mobile phones. The requirements are that mobile phones must have direct broadcast receiving capability, video and audio processing software and battery power for longer time period usage.

Platforms including ATSC 3.0 and

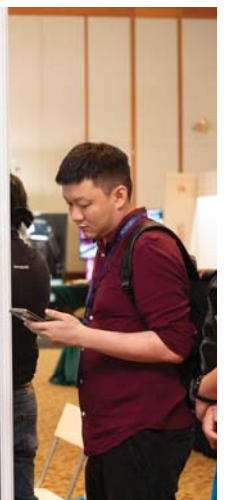
DVB-I that can carry multimedia products, video and audio are being considered. D2M transmissions require High-Power High-Tower (HPHT) and for providing cover signals and Low-Power Low-Tower (LPLT) for mobility and indoor coverage. The mobile screen size is small and only requires a very low bitrate for video. Therefore, a large number of services can be delivered in each DTV spectrum slot. Content and innovation will determine the success or failure of D2M. At least one large country is mooting to replace the entire terrestrial TV, DTV by D2M. According to industry sources, front-end technology and chipsets are currently available. Phone manufacturer take-off relates to market demand. The frequency spectrum to be selected is less than 694 MHz (broadcast) and greater than 700 MHz (mobile bands).

Collaboration between broadcasters and mobile operators who control the mobile market is needed. 5G delivers multimedia content in broadcasting mode where the 5G is the basic layer while the broadcast transmission is the physical layer. 5G platform enables mobile devices to receive 5G broadcast services with SIM-less devices. Direct access to mobile phones and TV sets with SIM-less devices boosts consumer population. Delivery by RF broadcast does not need mobile connectivity and the technology has been thoroughly tested in Europe.

Many countries received sub-700 MHz spectrum for mobile phones and 5G Broadcast transmitters and mobile 5G New Radio could share the same spectrum. Therefore, 5G broadcasts will have RF access to both TVs and mobile phones. ■







DBS2024 INDUSTRY DEBATE – IMPACT OF ARTIFICIAL INTELLIGENCE IN MEDIA, REGULATION & ETHICS

Moderator: **Mardhiah Nasir**, *IPSB Technology*

Panellists: **Sharad Sadhu**, *Media Specialist, India*; **Jade Wang**, *Director of China Media Group*; **Aale Raza**, *Whiteways Systems*; **Fintan Mc Kiernan**, *Ideal Systems* and **Lindsay Cornell**, *BBC Digital*.



Distinguished group of broadcasters and experts offered insights into the global adoption of AI within the media landscape. They delved into the pros and cons of deploying AI tools within the complex media environment, addressing future consequences and challenges. The panellists emphasised that AI can be exercised responsibly to propel media innovation while upholding ethical standards and regulatory integrity in the digital age.

AI is perceived as new technology and there is resistance to change as well as apprehension that it will take over jobs. Despite this, the media sector remains unfazed by AI, since it has survived technological advancements such as mobile phones. AI is instead expected to generate employment

by requiring human expertise to create avatars, and the audience will value the interactivity. AI can handle low-end repetitive tasks effectively, so only jobs in this industry are impacted.

AI will manage bandwidth, produce content quickly in cloud, and guarantee low latency even for HDTV. However, the solution architect must understand the end-to-end environment and the need to integrate with the legacy system without having silos. Broadcasters need to upskill their workforce by investing in training and development programmes, that help workers acquire the skills needed to effectively use AI, while also maintaining a healthy work-life balance.



Content is being rapidly uploaded onto cloud and made available on social media, Free ad-supported TV (FAST) and other platforms. There is a need to monetise content but searching for information scattered across multiple silos is an immense task.

AI search software uses natural language processing, machine learning algorithms, understands the intent behind each query search and continuously improves relevance of results. It saves individual employees time that would have otherwise been spent trying to track down the

documents, data, or information they need to get their work done.

The BBC has been accumulating content over many years and storing it into its digital archive. Content can be maximised by translating to other languages. The task is immense, and it is not possible to justify the cost using human translators. Fortunately, AI can do this and BBC caveats this by informing the audience that the content was translated by AI.



The BBC has potentially opened its journalism to a mass of people, who might otherwise miss out because they cannot read English. Articles that have previously been copy-and-pasted into translation websites could soon be converted much more easily.

Millions of people use sign language, but the methods of

teaching this complex and subtle skill have not evolved as quickly as written and spoken languages.

Thankfully, artificial intelligence (AI) can translate sign language into text and vice versa, allowing people who are deaf and mute to communicate in real time with people who are not familiar with sign language. ■



DBS WORKSHOP

IPSB WORKSHOP: UNLEASHING THE POWER OF CLOUD AI, DATA-DRIVEN WORKFLOW STRATEGY & MONETISATION IN BROADCASTING



The first session was moderated by **Alia Sarah Zainal Abidin**, IPSB Technology, Malaysia and the panelists were **Mardiah Nasir**, IPSB; **Samuel Bogoch**, Axle AI; and **Jay Ganesan**, Amagi. Data Lifecycle Orchestrator (DaLO) is a platform that unifies the content chain by managing assets, metadata, workflows, and processes across multiple and diverse production and distribution systems. Specially tailored for media workflows, this unique technology platform helps broadcasters and media professionals increase their productivity while providing operational and business visibility.

A central, unified multimedia content catalog manages rich media assets across the organisation enabling seamless collaboration. Workflow specific, task-oriented tools have native access to this central catalogue, facilitating every aspect of content creation, management, and distribution. The platform

brings several important functional enhancements and major technology innovations that augment media operations and create new forward-thinking business models. DaLO uses Artificial Intelligence (AI) across the workflow and hybrid infrastructures with on-premises and cloud deployments.

Enterprise Storage Archiving System (ESAS) is a hybrid cloud storage solution that offers flexible, pay-as-you-go pricing and scalability provision for unlimited growth. It has the ability to increase and decrease storage capacity on demand. ESAS is a combination of simplicity in deployment and management with enterprise-grade protection and security to help broadcasters eliminate silos and consolidate their workloads. ESAS is designed specifically for next-generation apps that demand massive unstructured data storage capacity with economies of scale.

Free Ad-supported Streaming TV (FAST) is increasingly replacing cable TV as the preferred linear content programming experience for audiences worldwide. FAST is a form of streaming that delivers programming like cable, satellite or traditional TV. FAST TV content can be viewed on virtually any device at no cost; the only tradeoff is that the user must watch commercials. ■





WORLDDAB WORKSHOP: SUSTAIN, STRENGTHEN, SUPPORT-DRIVING THE CASE FOR DAB+



The moderator was **Dr Les Sabel**, with the panellists comprising of **Bernie O'Neill**, WorldDAB; **Lindsay Cornell**, Chair, WorldDAB; **Lars-Peder Lundgren**, Paneda; **Oscar Hu**, GatesAir; **Dr Kiatanantha Lounkae**, Thammasat University, Thailand; **Gabriel Kwofie**, National Communications Authority, Ghana; **Muhamad Sujai**, Radio Republik Indonesia and **Christopher Lessnau**, AVT Audio Video Technologies.

DAB+ offers lower costs of distribution than FM, lower energy requirements, and greater resilience in emergencies. DAB+ is established as the core future platform for radio in Europe and 96% of new cars are equipped with DAB receivers to comply with mandatory standards from 2022.

Interest in DAB is growing worldwide with activities in South Africa, Tunisia and Middle East. DAB+ is a green

solution as studies by BBC UK have determined that DAB is 33% more efficient than FM.

High-efficiency transmitters are the cornerstone of low Total Cost of Ownership (TCO), though many other factors are equally important. Selection of a reliable transmitter that will provide cost effective operation throughout the life of the product depends on the major drivers of total cost of ownership which include reparability, modularity, footprint and several other factors.

Total cost of ownership (TCO) is an analysis that places a single value on the complete life cycle of a capital purchase. This value includes every phase of ownership: acquisition, operation, and the softer costs of change management that flow down from acquisition such as documentation and training.

Transmitter efficiency is affected by losses in the Automatic Voltage Regulator (AVR), mask filter and transmission line. Fixed losses occur in the control system and exciters while varying losses occur in the power amplifier (PA), drivers, cooling system and power supplies. Most older designs used Class AB PAs with efficiency in the range of 23% to 33% but new designs use High-Efficiency Doherty PA's with an efficiency over 50%.

In the case of cooling systems, older less efficient transmitters used large high volume and pressure blowers whereas new systems use variable speed fans and pumps and have less heat to remove. Electricity prices have increased worldwide, and we need to go green with high efficiency DAB+ transmitter and save total cost of ownership.



New features for car receivers are continually being developed and hybrid based with DAB+ & IP. They include station selection by logo and voice control, alternative audio and images and targeted content. There is an increasing range of domestic receiver products with the use of colour screens and prices continue to decline. ■



EARLY WARNING FOR ALL - BRIDGING THE LAST-MILE FOR SAVING LIVES



United Nations Office for Disaster Risk Reduction (UNDRR) and World Broadcasting Union (WBU) have jointly launched a project named WBU/UNDRR Global Media Saving Lives Initiative. The multi-activity programme for the Asia Pacific region aims to enhance the capacity of all ABU broadcast members, to ensure the continuity of broadcast services during disasters by making their physical networks resilient.

The broadcasters' services should be linked to their national disaster management authorities. Members should issue timely, accurate and relevant early warning messages by developing up-to-date broadcast emergency plans. ABU members should broadcast mainstream climate change adaptation and disaster prevention in their news, current

affairs, and general programmes. Despite the 20 years of effort by UNDRR, broadcast-delivered emergency warning has not been implemented widely.

Natural emergencies cause severe psychological issues for people who need to be consoled and help reduce trauma by finding surviving family members and relatives. The broadcasters' task for upcoming disasters is to inform the public with utmost speed, and maximum reach to cover all affected people in the areas. All relevant information about post-disaster support and wellness services should be provided with easy accessibility.

Analogue radio fulfils some requirements, but digital radio offers all essential services in all

stages. Digital Radio covers larger areas, reaches people with reliability by sounding the audio alarm and displaying on-screen text information and graphics.

New types of broadcasting are capable of Emergency Warnings Delivery. Both D2M broadcasting (Direct to Mobile) and 5G broadcasting can be much more effective for universal delivery of emergency warning to public, and mobile phones. D2M will access mobile phones directly and carry emergency alerts in various formats such as radio, video, and SMS. 5G Broadcast will address mobile phones directly with more versatile formats for emergency alerts and related services. ■

AI POWERED DIGITAL MEDIA ROOMS - SAFEGUARDING MEDIA CONTENTS AGAINST SCAMS & FRAUD

AI can both be a friend or foe to broadcasters. AI is leveraged for scams as its algorithms can craft convincing phishing emails, deepfakes and synthesize voice. The latest development to counter these threats is the Natural User Interface tool which uses AI. Natural User Interfaces (NUIs) approach has become popular for its ability to reduce the separation between humans and the digital world.

A Natural User Interface is an interface design that uses human behavior to make technology approachable and familiar. Contrary to conventional interfaces where users must adapt to machine-oriented controls, NUIs make attempts to close the gap between human cognition and digital interface, so that machines will be more accessible and friendly to the user.

A Natural User Interface (NUI) is a term that describes an interface design pattern which allows machines to communicate with humans in a humanistic manner that feels or looks familiar and like real life. Unlike the old UIs which used buttons, and menus most, these new ones focus on natural elements of communication such as active hand movements, voice commands, touch, and eye movements.

Using touch, gesture, voice, and biometric inputs, NUIs create immersion and engagement in the users across many applications and industries. Although NUIs have numerous benefits in terms of usability, accessibility, and efficiency, there are some challenges that include accuracy, privacy, feedback, environmental factors, and user adaptation. ■



ALTO: ARCHIVE INNOVATION & GLOBAL STANDARDS FOR DATA PRESERVATION



Film & TV Archive and Preservation faces several challenges. There is an increasing demand for hours driven by growth in production as files are becoming massive driven by higher resolutions. Film is scanned in UHD for re-purposing and content may be locked into unplayable data tapes. Therefore, it is wise to migrate to futureproof media or face obsolescence as video tapes, optical disks and data tapes are all disappearing.

A high proportion of data is at-rest and accessed infrequently, while online spinning-disk storage is expensive to own and operate. Flash Storage cannot replace HDD and is difficult to secure. Disk in cloud is unaffordable and impractical for media whilst data tape storage is perceived as the only low-cost medium. However, the reality is that

tape has many hidden costs, and it is difficult to manage well.

Robotic Tape Libraries also face several challenges. It can be considered as low-density storage with a large physical footprint. High capital outlay is needed to build a clean and humidity-controlled environment with specialist project disciplines. Expensive hierarchical storage management (HSM) and Archive Management requirements to optimise tape to drive contention is the major issue. Unmanaged contention in cloud tape limits suitability for archiving as first-come-first served principal results in 5-10 hours latency. Studies have indicated tape libraries have the highest lifetime cost due to mandatory tape migration, service costs, environmental and other hidden costs. Linear Tape-Open (LTO) Tape

duopoly has already caused supply issues and eventually tape drive monopoly could pose a future threat.

ALTO (The Alternative to LTO) is available in the form of scalable cold storage for infrequently accessed media storage, optimised for the needs of television and film production, preservation and archival. The ALTO Technology is equally applicable for any structured or unstructured data, adapted at the Application Layer for best-of-breed solutions. ALTO replaces outdated data tape libraries and replaces or complements optical or cloud offerings in open, standards-based systems with the lowest lifetime cost of ownership, superior performance and outstanding environmental credentials. ■

REVOLUTIONIZING MEDIA PRODUCTION WITH AI AND AUGMENTED REALITY TOOLS



In the evolving landscape of media production, the integration of augmented reality (AR) and artificial intelligence (AI) tools is revolutionising the way news and visual effects (VFX) are created and delivered.

Augmented reality technologies are reshaping the visual aesthetics of news broadcasts and VFX production. This enables the creation of ultra-realistic visuals that enhance viewer engagement. Russia Today (RT) stands out as a player in this field, leveraging diverse design services within its organisational workflow, including broadcast design, crafted design, and 3D & VFX designs.

These initiatives highlight the growing trend towards integrating AR technologies into newsrooms and production studios, with a focus

on creating immersive and visually-compelling content.

Creative design plays a pivotal role in news production, with a focus on enhancing the visual appeal of news titles, channels, and animations. Similarly, sound design is recognised as equally essential in shaping the overall viewer experience. Maintaining a consistent standard and quality throughout TV news content is essential, with an emphasis on utilising studio lighting, colour selection, and real-time graphics engines to enrich the visual narrative.

The advent of AI and automation technologies has accelerated video production processes, streamlining tasks such as title insertion and news generation. Telegram, a popular messaging platform, has emerged as a key tool for automating workflows

and integrating AI-driven tasks into media production pipelines.

The integration of AI tools into media production workflows has made content creation more convenient and accessible than ever before. Modern tools and diverse platforms offer tailored applications that simplify communication and automate business processes. Telegram bots, in particular, offer a wide range of features for working with videos, images, and AI integration, including comment filtering and speech-to-text conversion. ■

DVB: ADVANCING IP-BASED BROADCAST TECHNOLOGIES



DVB-I is an Internet-centric media delivery system, and it is not a broadcast system based on IP. In the past, broadcast and broadband were operating in silos, but now DVB-I can help deliver DVB's broadcast like experience on broadband. DVB-Native IP is a converged media delivery system where IP based delivery is handled via broadcast, multicast, and unicast networks.

DVB-I underpins the converged ecosystem targeting the full range of devices. It breaks down the barriers between broadcast and broadband words. DVB-I can reach wider audiences and more devices. Common services can be deployed across devices without agreements with manufacturers. DVB-I offers higher interoperability and lower distribution costs due to optimised network usage.

AVS specifications address the commercial needs of China and other markets with a special focus on a user-friendly IPR policy. AVS always strives to improve for 30% to 40% in compression compared to previous generation video standards.

AVS next-generation high-efficiency immersive audio compression methods have now been published. It supports lossy audio coding, 3D Audio and metadata. Digital Video Broadcasting has accepted the AVS3 as one of the next generations of video codec standards in the DVB standard system, aiming to promote the application and development of UHD video industry.

DVB Single Illumination Satellite (DVB-SIS) standard provides a solution for DVB-T2 terrestrial broadcasters using satellite to deliver

signal to terrestrial transmitters either in MFN or SFN. DVB-SIS enables 98% satellite capacity savings for each additional DTT multiplex and permits regional advertisement as well as Emergency Warning signals.

France Television has selected Eutelsat to transmit UHD signals on both terrestrial and satellite networks using the new DVB-SIS (Single Illumination System) transmission technology standard. They will be distributed to terrestrial transmitters across the French territory, as well as DTH via the Fransat platform. ■

USAGE OF ARTIFICIAL INTELLIGENCE IN RADIO STUDIOS AND AUTOMATED SUBTITLING FOR CONTENT CREATORS



The advantages of AI are that it simplifies work processes, reduces turnaround time, and manages stress. Automatic Speech Recognition (ASR) automatically turns audio into timed text in 150 languages. Named entity recognition (NER) is a natural language processing (NLP) method that extracts information from text. NER involves detecting and categorizing important information in text known as named entities.

AI uses different speech-to-text engines, allowing the balance of speed and accuracy in any language. Transcription includes speaker segmentation and advanced punctuation. To achieve the best result, words added to the custom dictionary will be recognised by preference. The result of automatic transcription is displayed in editable form, allowing the editor to review the transcript, to remove or correct words, and adjust punctuation and timing before publishing it.

AI converts audio into high-quality subtitles, saving time and cost of conventional subtitling, and allows the broadcaster to retain the intellectual property rights. Subtitling and localisation services run in the cloud. After uploading the content, subtitles are available for review and post-editing within seconds.



MASTERCLASS: DESIGNING A VIRTUAL PRODUCTION STUDIO BY LED WALL



Virtual production is where the physical and digital worlds meet. It is the ability to mix live footage and computer graphics to get real-time feedback and interaction on set. This is a collaborative process that requires the visual effects department, production designer, camera department, as well as producers, and directors to prepare well in advance. In-camera VFX, also sometimes referred to as on-set virtual production or OSVP is a new methodology for shooting real-time visual effects during a live action film shoot. With this technique, live-action shooting takes place on a huge LED stage or volume, which displays an environment generated by the real-time engine on its walls and ceiling.

LED walls enable the integration of in-camera visual effects (ICVFX), which enhances the creative possibilities of virtual production. With ICVFX, visual effects are generated and displayed in real-time on the LED walls, allowing directors, cinematographers, and VFX artists to make immediate decisions and adjustments during the shoot. This real-time feedback loop empowers creative collaboration and enables more efficient production processes,



resulting in higher quality visual effects and a smoother overall workflow. Generally speaking, the price of purchasing a high-resolution LED display is much higher than that of a green screen. However, the post-production of green screens requires more capital and human input than LED displays, and every event needs to consider this factor, and green screen production is not cheap.

The Virtual Production LED Wall is a high-tech display system that utilises LED technology to create a virtual environment for filmmaking and other media productions. It can create anything from large outdoor

backdrops to entire virtual sets. All scenes can be created without traveling to multiple locations or trying to find locations. ■



MASTERCLASS: EXPLORING THE POTENTIAL OF NEXT-GENERATION PLATFORM SHARING THROUGH ATTRACTIVE SERVICE SCENARIOS

Internet Initiative Japan (IIJ), Japan's largest backbone network, has data centers and network operation centers across Japan. In addition to this, IIJ provides network and system integration operation services in 11 major cities around the world.

As an independent ISP, IIJ has built its backbone using the lines of different carriers to provide high fault tolerance. Connections can be made not only with domestic ISPs and IXs, but with major ISPs in the US, Asia, and Europe. IIJ brings reliable and scalable cloud exchange network services to you through partnerships with most major cloud providers.

IIJ has visualised a project concept to develop a common service platform of NextGen TV for broadcasters in ABU to exchange services. However, matters that need to be clarified

include discovering effective service scenarios, sharing use, marketability, and standardisation.

Disaster information should be shared but each country has their own disaster management system and operation. It is a challenge

sharing information, so that evacuation and other emergency measures can be undertaken.

Meteorological data can be accessed by phones using hybrid connection and medical aid for the victims be made available. ■



DBS2024 TEAM



ABU celebrated its 20th DBS with **Dr Veyssel Binbay** leading the Technology Department as its Director. Dr Veyssel and his team have shown remarkable commitment and hard work in ensuring that the 20th edition of DBS was conducted successfully.

DBS2024 was held at the Royale Chulan Hotel Kuala Lumpur, setting its sights on exploring the theme of “Navigating AI Horizon”. As artificial intelligence continues its exponential growth and profoundly impacts our daily lives, it was only fitting that this transformative subject takes centre stage.

In line with the central theme revolving around AI, a captivating video was unveiled, showcasing Dr Veyssel and his virtual counterpart engaging in a thought-provoking discussion. They discussed the ethical considerations surrounding interactions with AI avatars and the broader implications of AI development. The avatar was developed by the VYPA team, a major sponsor of DBS2024, and the recording was created using Open

Broadcaster Software (OBS Studio), a freely accessible open-source tool.

Delegates were also provided with the DBS2024 e-Programme, a comprehensive guide in the form of a web app. It offered detailed information about the symposium’s layout, including the programmes, speakers, and exhibitors, and served as a handy reference for the delegates.

The conference sessions also became more interactive as Slido, an online Q&A and polling app, allowed the delegates to engage during the presentations.

Among the array of other noteworthy hardware utilised included Blackmagic Design’s ATEM Mini Pro, DataVideo PTZ-140, ezcup HDMI video capture device, and Logitech Spotlight Presentation Remote. ■

