

Technical Review

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Radio Televisyen Malaysia (RTM) Broadcast
Facilities and Service**

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Live Event Production** (Page 2)

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Cover: ABU

from The Editor

Welcome to the 301st issue of Technical Review! As we reflect on the dynamic first quarter of 2025, this edition offers a compelling snapshot of the technological innovations and industry dialogues reshaping the broadcasting landscape. From groundbreaking infrastructure projects to paradigm-shifting consumer technologies, this issue encapsulates the rapid evolution of our field – and the opportunities it presents.

The centerpiece of this edition is our comprehensive post-event coverage of the Digital Broadcasting Symposium (DBS2025), ABU's premier annual gathering that brought together industry leaders, engineers, and innovators last February. Under the visionary theme "Personal-casting: Interactive Broadcasting, Tailored for You", the symposium served as a launchpad for transformative discussions about the next era of media consumption.

Building on this future-focused narrative, we present Part 2 of our 5G Network Slicing deep-dive, documenting RTM's pioneering implementation for broadcast services. This installment goes beyond technical specifications to reveal how 5G's ultra-low latency and network segmentation are innovating live production workflows.

Equally transformative is our coverage of the VYPA-NETSTAIRS webinar, which unveiled how next-gen AI-integrated TV sets are redefining the living room experience. These will not be just "smart" TVs – they will be context-aware media hubs with conversational AI, predictive content curation, and seamless smart home integration, fundamentally changing how audiences discover and interact with content.

For our radio specialists, we have included a detailed case study on Thailand's digital radio network frequency planning – a masterclass in balancing spectral efficiency with real-world terrain challenges. Meanwhile, our regular segments (NAR, DU, ET) provide concise yet comprehensive updates on regional developments, emerging standards, and the latest broadcast hardware innovations.

As you explore this edition, you will notice a common thread: the convergence of cutting-edge engineering and human-centric design is no longer speculative – it is the baseline for competitive broadcasting. I want to extend my deepest appreciation to our members and our global network of contributors, whose expertise makes Technical Review an indispensable resource, and to our readers who challenge us to maintain the highest standards.

Here's to another quarter of pushing boundaries, together.

Warm regards,
Dr Veyssel Binbay
veyssel@abu.org.my

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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PROOF-OF-CONCEPT (POC) PUBLIC 5G NETWORK SLICING TECHNOLOGY FOR RADIO TELEVISYEN MALAYSIA (RTM) BROADCAST FACILITIES AND SERVICE

PART 2 : EXECUTION - BENEFITS OF 5G FOR LIVE EVENT PRODUCTION

INTRODUCTION

5G is set to radically transform live broadcast production, offering unprecedented capabilities that will reshape the industry. As one of the key broadcast transformation trends, 5G is recognized as the technology with the potential to have the greatest impact. A global survey of over 650 broadcast professionals revealed that 68% agree 5G will fundamentally change the way broadcast television is produced (Haivision Survey, 2022)¹. This shift promises to introduce new efficiencies, higher-quality broadcasts, and more flexible production environments, revolutionizing live event production workflows due to several key benefits that 5G brings:

1. **Higher Bandwidth:** 5G offers significantly higher data transfer rates, which can support high-quality video streams, including 4K and even 8K resolutions.
2. **Low Latency:** The ultra-low latency of 5G networks allows for real-time broadcasting and remote production, making live events smoother and more reliable.
3. **Network Slicing:** This feature allows broadcasters to create dedicated virtual networks tailored to specific needs, ensuring consistent performance and reliability.
4. **Enhance Mobility:** 5G enables more flexible and mobile production setups, reducing the need for extensive on-site equipment and allowing for more dynamic and spontaneous broadcasting.

LIVE BROADCAST PRODUCTION BEFORE 5G

From Satellite Contribution to Bonded Cellular

The traditional method of using satellites for live video transmission is costly and requires a significant amount of equipment. This approach is suitable for large events with substantial budgets but is not feasible for smaller events and single-camera field journalism.

In the late 2000s, IP technology emerged as an alternative to satellite uplinks, allowing large events to adopt remote production models. The Secure Reliable Transport (SRT) protocol, developed in 2012 and made open source in 2017, has significantly reduced the cost of remote production by enabling the transmission of live video over the internet.

The Secure Reliable Transport (SRT) protocol was developed in 2012 to provide reliable, low-latency transport of video streams over the public internet. It was made available to the open-source community in 2017 and has since been widely adopted by vendors and broadcasters. SRT has made remote production more affordable and practical for smaller events by using portable video encoders to transmit live video over the internet.

In the 2010s, bonded cellular technology was introduced for portable camera scenarios like outdoor sporting events and live newsgathering. This technology utilized 3G mobile networks, despite their limited upload bandwidth of typically no more than 2Mbps. However, the bandwidth could be increased by combining several 3G signals together. When 4G emerged, the bandwidth

significantly increased with upload speeds of 5 Mbps or even higher, reaching up to 50 Mbps using the latest LTE technology. With the rollout of 5G services, bandwidth availability has doubled, promising even greater data throughputs in the future.

Bonded cellular technology, introduced in the 2010s alongside 3G networks and later advanced with 4G and 5G, allows for high-quality live video transmission by aggregating bandwidth across multiple mobile network links. This technology not only supports high bitrates but also offers network redundancy and accessibility, ensuring continuous transmission and minimizing disruptions.

CURRENT STATE AND EVOLUTION OF 5G

Immediate and Upcoming Benefits for Broadcasters
The deployment of 5G in Malaysia is taking place in two distinct phases. The first phase, known as non-standalone architecture (NSA), integrates 5G base stations with existing network infrastructure, enabling a gradual introduction of 5G services. This phase already brings significant improvements in bandwidth, allowing broadcasters to transmit high-quality live video, including 4K UHD content, with enhanced reliability.

As 5G coverage expands further, the transition to standalone architecture (SA) began, where 5G networks operate independently, unlocking the full potential of 5G technology. This shift enables faster speeds, ultra-low latency, and advanced capabilities, revolutionizing live broadcasting and real-time production workflows.

In Malaysia, the 5G rollout has achieved substantial progress, with more than 80% of the populated area already covered. This coverage delivers higher data rates and more stable connections, supporting more efficient and scalable live event production throughout the country.

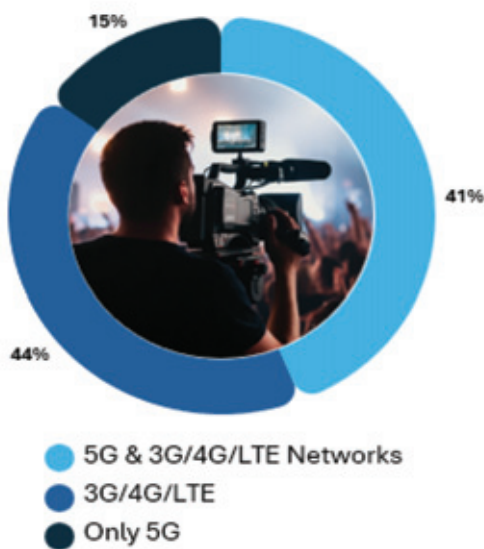


Figure 01: Cellular transport live video for contribution

Most of today's 5G networks are operating in NSA mode with 5G base stations attached to existing 4G LTE core

networking infrastructure. This initial hybrid approach enables broadcast contribution video to be transmitted over mid band microwave frequencies with double the amount of bandwidth and end-to-end latencies below 200ms -- essential capabilities for return feeds.

5G Core Network



Figure 02: 5G cores are based on virtualized network functions (VNF) that can be supported by cloud platforms or common off-the-shelf (COTS) datacenter hardware.

NETWORK SLICING WITH QOS

Network Slicing with High Bandwidth and Low Latency 5G Services for Broadcasters.

5G Standalone (SA) offers several key differentiators for broadcasters compared to Non-Standalone (NSA) deployments:

- 1. Full 5G Capabilities:** 5G SA provides the complete suite of 5G features, including enhanced Mobile Broadband (eMBB), Ultra-Reliable Low-Latency Communication (URLLC), and massive Machine-Type Communications (mMTC). This allows the broadcaster to deliver high-quality, low-latency live streams and support new interactive media experiences.
- 2. Network Slicing:** with 5G SA, broadcasters can leverage network slicing to create a dedicated virtual network tailored to specific broadcasting needs. This ensures consistent performance and QoS for different types of content such as live sports, news, or events.
- 3. Improved Efficiency:** 5G SA operates on a cloud-native, service-based architecture, which enhances network efficiency and flexibility. This is particularly beneficial for broadcasters who need to dynamically scale their services based on demand.
- 4. Enhanced Security:** The standalone architecture allows for better isolation of network slices, providing enhanced security for sensitive broadcast content.
- 5. Future-Proofing:** 5G SA is designed to support future advancements and new use cases, ensuring that broadcasters can continue to innovate and offer cutting-edge services as technology evolves.

The critical component for broadcasters is to have differentiated services that are able to guarantee the throughput (uplink/downlink), ultra-low latency, secured and reliable connectivity. This requirement can be delivered via 5G Standalone (SA) capability which is network slicing with Quality of Service (QoS). The network slicing enables the creation of multiple virtual networks, or "slices", that run on the same physical 5G infrastructure, each tailored to meet specific needs.

Unlike traditional approaches that rely on costly dedicated fiber or private IP networks, 5G network slicing provides a flexible and scalable solution. Broadcast production teams can benefit from the same level of performance

as those legacy systems, but without the associated infrastructure expenses or physical limitations. Whether it's a large-scale sporting event or a smaller production, network slicing allows for customized performance levels to meet the unique requirements of each broadcast. The cost is further optimised by leveraging existing 5G infrastructures.

With 5G SA, network slicing ensures that broadcasters have a dedicated, isolated slice of the network, unaffected by other users or services. This isolation is particularly crucial for live event production, where reliability and performance guarantees are essential. The result is an agile setup that is less costly and easier to implement than traditional solutions relying on OB vans and satellite links, offering performance even in densely populated areas.

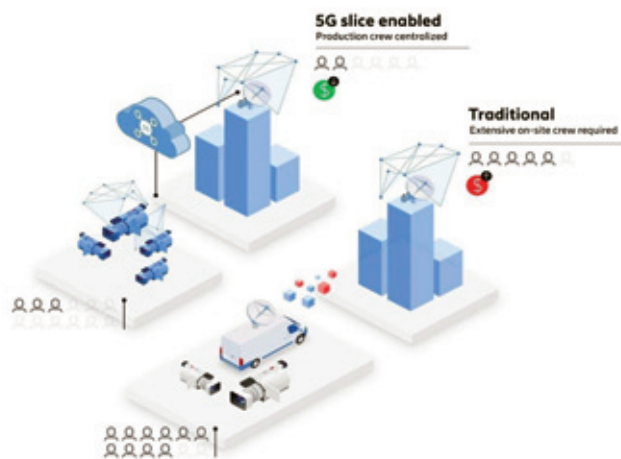


Figure 03: Final Solution Design

SECURITY AND NETWORK SLICING

Network slicing also introduces several security key benefits that enhance overall security posture of the network and services that run through it. Due to each slice operating as a separate virtual network, broadcasters benefit from the customisation of the network security features tailored based on the needs of the broadcast by providing encryption, user authentication, and access control. This level of isolation minimizes the risk of cyberattacks and ensures that critical media content is protected. Each of the slices created within the network operates independently and does not interfere with one another.

Additionally, network slices can be continuously monitored, with specific security policies applied to detect and respond to potential threats in real time. This ensures that live broadcasts maintain uninterrupted service, even in high-risk environments.

Though primarily focused on providing guaranteed uplink speed and reliability, the potential of network slicing extends across various broadcaster sub-segments. Digital National Berhad (DNB) identifies the greatest opportunities for slicing in sectors like news, smaller sports events, and tier three (3) broadcasters, such as vloggers and independent content creators. This is due to several key advantages:

1. Guaranteed high-quality uplink transmission – Broadcasters can achieve reliable, high-performance video transmission without needing traditional OB vans, satellite links, or large on-site teams.
2. Cost efficiency and simplicity – With solutions like slice-on-a-SIM, broadcasters benefit from lower operational costs and easier setup, making it more accessible for smaller productions. This is additional on top of leveraging the existing 5G network infrastructure.
3. Indoor broadcasting and support for new devices – Network slicing supports diverse environments, allowing broadcasters to operate indoors and integrate innovative devices like drones for unique production angles.
4. Compact and lightweight equipment – With slicing, broadcasters can work with more portable, lightweight camera setups, opening new possibilities for covering smaller events and enabling vloggers to expand their production capabilities.

PROOF-OF-CONCEPT ENGAGEMENT FOR 67TH MALAYSIA INDEPENDENCE DAY CELEBRATION

Radio Televisyen Malaysia (RTM) has partnered with Digital Nasional Berhad (DNB) and Ericsson Malaysia Sdn Bhd to initiate a Proof of Concept for 5G Broadcasting via Network Slicing, marking a first for Southeast Asia. Through this unique initiative, DNB is committed to delivering optimal solutions for 5G Network Slicing tailored for live broadcasting, collaborating with esteemed technology partners to bring this vision to life.



1.	Ericsson	Principal 5G Network Technology Partner	RAN & Core
2.	Cradlepoint	5G Device Technology Partner	5G Industrial Router
3.	Teltonika	5G Device Technology Partner	5G Industrial Router

Selection of Event

The Merdeka Day Parade in Putrajaya on August 31, 2024, has been chosen for this trial. This event provides a challenging environment due to the high network demand caused by the large crowd and extensive use of radio frequency facilities for protocol, security, and other purposes. It also offers an opportunity to measure the readiness of 5G networks as an alternative to the IP Fiber Network currently used by RTM for remote broadcasting.

PROOF-OF CONCEPT OBJECTIVES

The primary objectives of this PoC are:

1. To evaluate the readiness of RTM's broadcast facilities for integrating 5G network slicing technology in 5G mid-band sub-6 GHz.
2. To conduct functionality tests on critical broadcasting components: Audio TV Production, Video TV Production, Duplex Inter-communication, Video Monitoring, and Broadcast Equipment Remote Control.
3. To evaluate the Quality of Service (QoS) of the 5G network slicing in terms of network stability, upload

and download speeds, and data transfer efficiency. QoS is an important metric indicating the level of satisfaction of the consumers.

- 4. To measure the latency and response times between local and remote sites.
- 5. To ensure compliance with SMPTE, ITU-R standards, and recommended practices by manufacturers.

POC EXECUTION PLAN



5G NETWORK SCOPE FOR POC

Event	Sambutan Hari Kebangsaan 2024	
Date	31 st August 2024	
Location	Dataran Putrajaya (Wisma Tani Rooftop & OB Trailer)	Angkasapuri
Pre-Requisite	5G Stand Alone (SA)	5G Stand Alone (SA)
Slicing	Yes	Yes
RTM In-bound/Out-bound requirement	30 Mbps/30 Mbps	30 Mbps/30 Mbps
Spectrum	3500 – 3600MHz	3400 – 3500MHz
RTM R&R	1. 2 x PTZ Broadcast camera 2. 1x Handset (For Mobile Journalism) 3. 1 x Transmitter	4. 1x Transceiver
DNB R&R	1. RAN (include slice) 2. 5G SA Core 3. 2x SA SIM 4. 4x 5G SA Router 5. Monitoring 6. 5x Public Fixed IP (Audio / Video / Monitoring / Intercom / Remote) 7. Engineering Services 8. CAT6 Cable (Tx 5G Router)	1. RAN (include slice) 2. 5G SA Core 3. 1x SA SIM 4. 2x 5G SA Router 5. Monitoring 6. 5x Public Fixed IP (Audio / Video / Monitoring / Intercom / Remote) 7. Engineering Services 8. CAT6 Cable (Tx 5G Router)

Table 1 : Requirements and Roles Responsibilities

End to End Network Solution Design

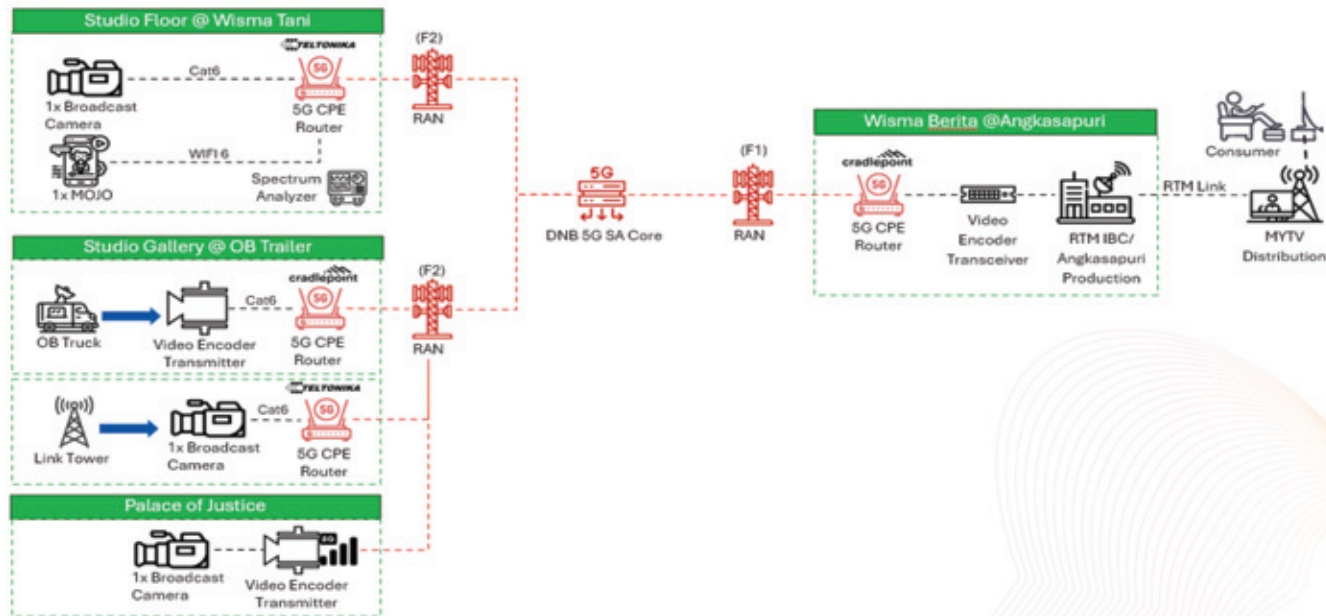


Figure above illustrates the end-to-end solution architecture for RTM's broadcast proof of concept (POC). As outlined in table 1, the setup involves three distinct locations, each housing different broadcasting facilities that communicate with one another via the 5G network:

1. A static camera mounted atop Block 4G1 of Bangunan Wisma Tani, Putrajaya.
2. A MOJO moving around Block 4G1 of Bangunan Wisma Tani, Putrajaya.
3. A static camera mounted atop Link Tower, stationed on Jalabn P3C, Putrajaya.
4. A static camera mounted atop Palace of Justice, Putrajaya.
5. A Studio Gallery within an Outside Broadcast (OB) Truck, stationed on Jalan P3C, Putrajaya.
6. Broadcast facilities at Wisma Berita, Angkasapuri.

The solution enables QoS control, ensuring optimal performance and reliable broadcasting over DNB's 5G SA core. The solution encompasses the following key components:

1. **End-to-End RAN and Core Slicing:** Establishment of a broadcast slice across RAN and core networks to ensure seamless broadcasting.
2. **Core Provisioning for Static IP:** Core network provisioning a new Data Network Name (DNN) to accommodate static public IP requirements.
3. **5G SIM Card Provisioning:** Provision DNB white-label SIMs configured with 5QI=7 and assigned static public IP.
4. **CPE Provisioning:** Setup and configuration of three CPE units, including service port mapping and forwarding, to ensure seamless end-to-end broadcast service connectivity over 5G.
5. **5G Network Performance KPI Monitoring:** Tracking RAN and Core performance to ensure service availability, quality, reliability, and proactive issue detection.

By leveraging advanced 5G technologies such as network slicing and QoS control, the setup aims to ensure consistent, high-quality broadcasting capabilities across the specified locations in Angkasapuri and Putrajaya.

IP Solution Design

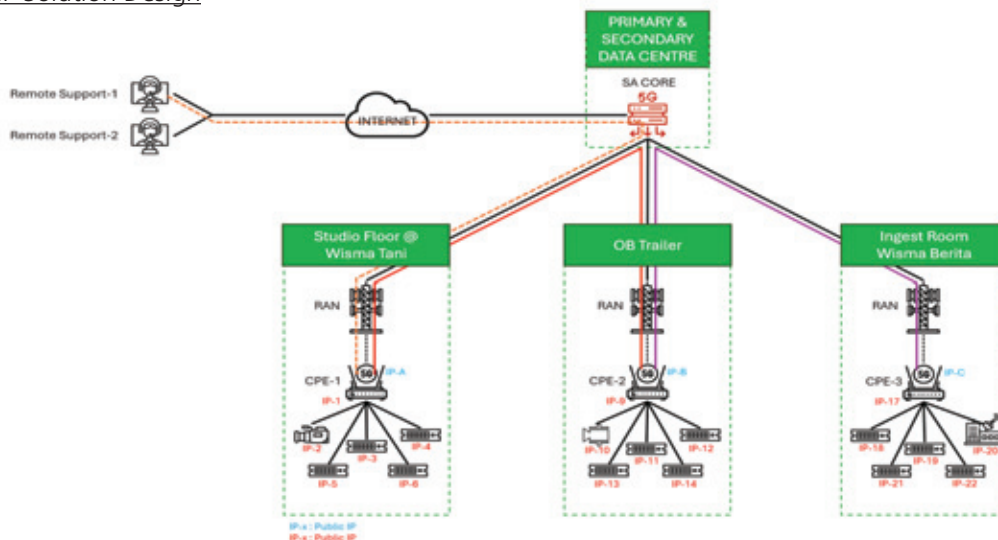


Figure 05: IP Solution Design as agreed by RTM

To address the broadcast facilities' communication needs as illustrated:

1. **5G Data Service Connectivity:** Each CPE will connect to the 5G Data Service, which will assign a static public IP address. This ensures consistent and reliable network access.
2. **Static Private IP Allocation:** Each broadcast device will be allocated a static private IP address from a local subnet within the CPE configuration. This private IP ensures stable internal network identification and communication.
3. **IP Address Translation:** The CPE will use its public IP address in place of the broadcast device's private IP address. This replacement ensures that external systems and services recognize the broadcast devices by its CPE public IP.
4. **External Identification through Service Port:** Broadcast devices will be identifiable from the external network using the CPE's public IP address combined with a unique service port number assigned to each device. This setup facilitates precise and secure access to each broadcast device for remote management and monitoring.

Test Phase

The phases of this PoC are:

1. Phase 1: Laboratory demonstration

To demonstrate use case/remote live production in a controlled environment with test equipment.

Execution

Date: 12 August 2024

Location: Level 1, Wisma Berita, Angkasapuri

5G Radio Access Network Site Selected to provide 5G Network Slicing Service



Figure 06: 5G RAN Sites Servicing Ingest Room, Wisma Berita Angkasapuri

Tests conducted:

a. Network Connectivity Test

1. Ping Test	PASS
2. Port Forwarding Test	PASS
3. Speed Test	PASS

b. Functionality Test

1. Audio Signal (Receive & Production Gallery) - 20dB Consistency	PASS
2. Video Signal (Receive & Production Gallery) - 75% Consistency (no color loss)	PASS
3. Intercom (Duplex Communication @ Production Gallery)	PASS
4. SRT Monitoring (Receive @ Std. Floor Remote Area)	PASS
5. RVF Monitoring (Receive @ Std. Floor Remote Area)	PASS
PTZ Camera Control (Response from Production Gallery towards Std. Floor Remote Area)	PASS
6. Tally Light Switcher (Response from Production Gallery towards Std. Floor Remote Area)	PASS

c. Network Latency Test

1. Network Stability	PASS
Uplink / Downlink Speed	
2. - Downlink: 187.05Mbps	PASS
- Uplink: 28.17Mbps	
3. Inbound / Outbound Packet Data - @5000 / 0% Loss	PASS
4. Throughput	PASS
5. 5G Spectrum Analyzer (To be included in actual day)	PASS

d. Latency Test

• Still Bar Color Video

1. Video Signal HD 1080i50 (0.3s / 5Mbps)	PASS
2. Video Signal HD 1080i50 (0.3s / 8Mbps)	PASS
3. Video Signal HD 1080i50 (0.3s / 10Mbps)	PASS
4. Video Signal HD 1080i50 (0.3s / 10.24Mbps)	PASS

• Moving Object Video

1. Video Signal HD 1080i50 (0.3s / 5Mbps)	PASS
2. Video Signal HD 1080i50 (0.35s / 5Mbps)	PASS
3. Video Signal HD 1080i50 (0.45s / 5Mbps)	PASS
4. Video Signal HD 1080i50 (0.3s / 8Mbps)	FAIL
5. Video Signal HD 1080i50 (0.4s / 8Mbps)	FAIL
6. Video Signal HD 1080i50 (0.45s / 8Mbps)	PASS
7. Video Signal HD 1080i50 (0.45s / 10Mbps)	PASS
8. Video Signal HD 1080i50 (0.45s / 10.24Mbps)	PASS

Summary:

For the Latency Test, we found out that the network is stable on:

1. Still Bar Color Video - 0.3s is the suitable threshold
2. Moving Object Video - 0.45s is the suitable threshold

DNB has proven that the 5G Network Slicing Technology through the 5G Routers that is connected to RTM's Network and Equipment (TVU Transmitter + TVU Transceiver, SRT, Intercom, and PTZ Controller) has fulfilled the following criteria:

1. Delay 0.45s
2. Throughput of 5Mbps/ 8Mbps/ 10Mbps/ 10.24Mbps
3. Throughput consistency

2. Phase 2: On-site PoC test

To demonstrate transmitter coverage and use case/ remote live production from the actual 5G Broadcast transmission site between 15 to 27 August 2024.

Execution

Date: 19 August 2024

Location: (Putrajaya) Wisma Tani Rooftop / OB Trailer (Jalan P3C)

5G Radio Access Network Site Selected to provide 5G Network Slicing Service



Figure 07: 2 5G RAN Sites Servicing Site for Wisma Tani and OB Trailer

Tests conducted:

a. Cellular Walktest

- (Putrajaya) Wisma Tani
- (Putrajaya) OB Trailer
- (W.P.Kuala Lumpur) Ingest Room, Wisma Berita, Angkasapuri

b. Network Connectivity Test

1. Speed Test PASS
 - i. (Putrajaya) Wisma Tani :
 - Average DL: 410.31Mbps
 - Average UL: 158.75Mbps
 - ii. (Putrajaya) OB :
 - Average DL: 291.83Mbps
 - Average UL: 59.16Mbps
 - iii. (W.P.Kuala Lumpur) Ingest Room, Wisma Berita Angkasapuri:
 - Average DL: 187.3 Mbps
 - Average UL: 103.2Mbps

c. Network Congestion Simulation

- Congestion Simulation on 3500 – 3600MHz (F2) was done to ensure Use Case is protected during congestion

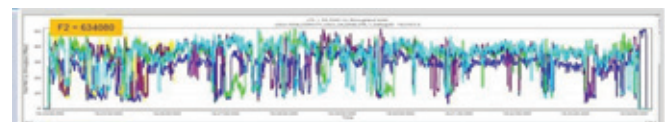


Figure 08: Network Congestion Simulation

	Congestion Before Use Case Activated	Congestion After Use Case Activated
Wisma Tani	PASS	PASS
OB Trailer	PASS	PASS

Table 01: Network Congestion Simulation Result

- During congestion Camera Feeds was able to be transmitted.

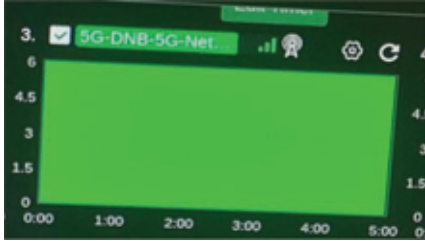


Figure 09: No interference or issue was detected on Broadcast Transmission during congestion simulation

3. Phase 3: On-site PoC actual

To perform PoC on use cases for 5G Broadcast during the identified event on date: August 31, 2024

DNB actively monitored the network usage and health during the length of the event and has the following findings:

Congestion

- Network Congestion on 3500MHz – 3600MHz started its build-up from 6:20 AM where consumer / normal users (through the MNO network) are having difficulties in sending and receiving application-based messages (Whatsapp / Telegram etc.)
- During the congestion period, DNB's Network Slicing feature successfully protected RTMs Use Case usage channel which preserved the agreed throughput.

Network Traffic Usage

- Wisma Tani
 - UL Throughput varying between 8Mbps to 40Mbps/ Traffic was less than 1Gbps
 - DL Throughput varying between 15Mbps to 50Mbps/ Traffic was less than 1Gbps

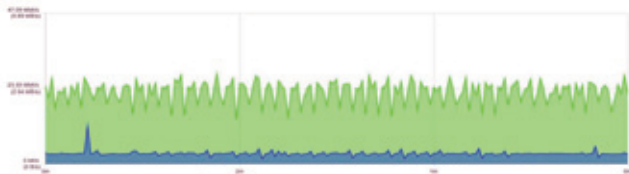


Figure 10: PTZ Camera Network Activity



Figure 11: PTZ Camera with Mojo Network Activity

- OB Trailer
 - UL Throughput varying between 12Mbps to 52Mbps / Traffic was less than 1Gbps
 - DL Throughput varying between 17Mbps to 90Mbps / Traffic was less than 1Gbps

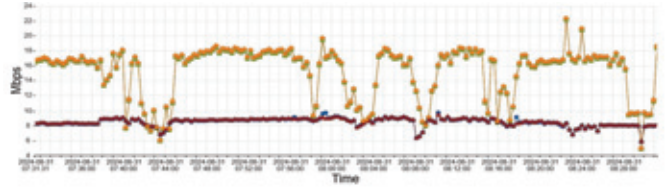


Figure 12: Palace of Justice Video Feed + Wisma Tani Video Feed + Video Feed to Ingest Room

- Ingest Room, Wisma Berita
 - UL Throughput varying between 16Mbps to 150Mbps / Traffic was less than 1Gbps
 - DL Throughput varying between 130Mbps to 500Mbps / Traffic was less than 1Gbps

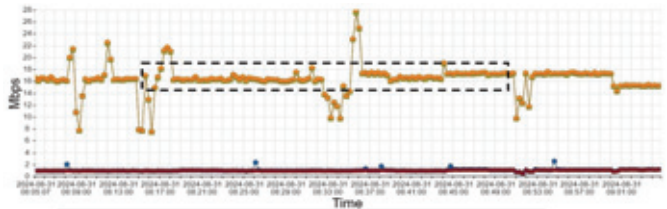


Figure 13: Ingest Room, Wisma Berita, Angkasapuri

5G Network Interference

Monitoring of DNBs deployed a band of 3490MHz to 3610MHz using a spectrum analyzer starting from 6:30 AM to 10:45 AM.

- Wisma Tani
 - Some network interference was detected throughout the event due to Wireless Network Jammers being deployed as shown in the figure below:

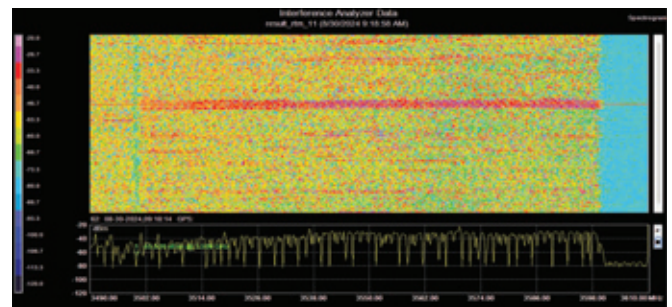


Figure 14: Network Interference Detected Due to Wireless Network Jammer Activation

- The network interference occurred sparsely with a maximum duration of 1 minute and sometimes in a sequence of 1 minute.
- During the interference, we have noticed a complete drop in network availability to 0. Network recovery after the interference was around 500ms.

- OB Trailer
 - Some network interference was detected throughout the event due to Wireless Network Jammers being deployed as shown in the figure below:



Figure 15: Network Interference Detected Due to Wireless Network Jammer Activation (courtesy of RTM)

5G Core Monitoring

- 1. Alarm monitoring on the 5GC nodes (especially PCC and PCG) for any critical/major alarm that has service degradation to ongoing PDU session.
- 2. Resource utilization (CPU, Memory) monitoring
- 3. Perform health check on the PCC and PCG during the monitoring period

Contingency Plan

Wisma Tani & OB Truck & Wisma Berita							
#	Item	Risk	Due to	Impact	Preparation	Scope	Response
1	5G Router	Equipment Malfunction	1. Overheating 2. Power Surge 3. Physical Damage	This event may interrupt connectivity from 5G Industrial Router to OB Truck	A spare (1x) 5G Industrial Router (of different Make and Model) is provided as backup on site	DNB	To swiftly and affectively swap the 5G Industrial Routers Downtime expected: (1-3 Minutes)
2	Cat6 Cable from TVU Transmitter to 5G Industrial Router)	Cable Malfunction	1. Connector issue 2. Physical Damage	This event may interrupt connectivity from TVU Transmitter to 5G Industrial Router	A spare (1x 10 meters) Cat6 Cable is provided	DNB	To swiftly and affectively swap the Cat6 Cable Downtime expected: (1-3 Minutes)
3	Power supply to 5G Industrial Router	Power Failure	1. Overheating 2. Physical Damage	This event may interrupt connectivity from TVU Transmitter to 5G Industrial Router to OB Truck	1 Unit of uninterruptable power supply (UPS) with 400-500watts capacity will be provided and connected to 5G Industrial Router	DNB	UPS will be automatically activated if there is a power issue to sustain power supply Downtime expected: (4-10ms)
4	5G Network	5G Network Failure	1. Servicing site down due to: a) Power failure b) Fiber cut	Connectivity will be partially unavailable	Additional sites has been activated to support the use case	DNB	Automatically switch servicing site case
			c) Network Change request d) Hardware / Software Update		A freeze request for servicing site has been issued		No activities will be carried out to Servicing Sites
			e) 5G Core Failure		A second 5G Core is made available		Switch 5G Core

Table 02: DNB 5G Core Monitoring

RTM's Feedback and Test Results

Target Scope Achieved (As per RTM's Report)

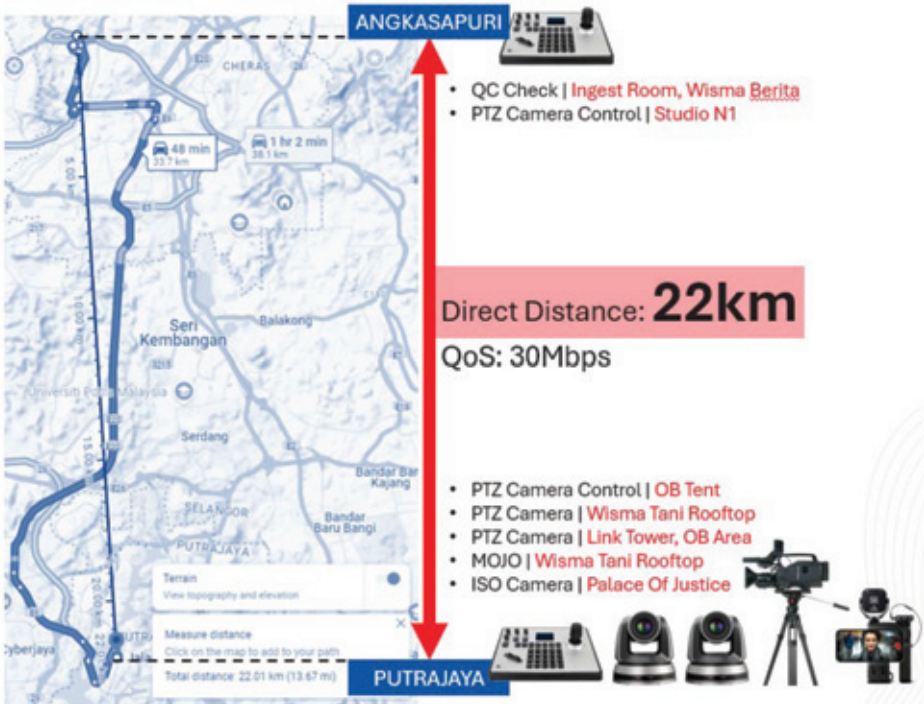


Illustration 16: Illustrated Target Scope Achieved during Merdeka Event (Reillustrated from RTM)

RTM Measurement Tools and Personnel

1. Baseband Broadcast QC
2. Command Centre, TX Source and Destination Source Transceiver
3. Advance Data Transfer and Bonding Monitoring Control
4. Competent RTM Broadcast Personnel in Specific Core Expertise
 - i. Baseband
 - ii. Network
 - iii. Maintenance
 - iv. Broadcast QC



Result 1 | Link Tower (Technical Report Courtesy of RTM)

PTZ Camera, SRT IP Signal HD 1080i50 + DNB 5G CPE

- 1. Bitrate: 8Mbps, Delay: 0.2s
- 2. Broadcast Facility Functionality : **PASS**
- 3. MNO's Congestion : **NOT AFFECTED**
- 4. Security Jammer Activation : **AFFECTED**
- 5. Baseband Broadcast QC Check : **PASS**



QScan report from file: EVS-01092024 PTZ OB-CamA.mxf

Date:	09/02/24 17:54:30
Project:	RTM 5G DNB Qscan
Used templates:	RTM HD Video No Scan
Filename:	EVS-01092024 PTZ OB-CamA.mxf
Path:	Xsan Qscan:\EVS-01092024 PTZ OB-CamA.mxf
Time of Analysis:	00:01:50
Version:	QScan 3.8.2.5457 AS11 1.0.2 PSE 1.1.0

Status: analyzed

0(0)0(0)0(0)

PASS

File Info									
Container	File Size	Format Profile	Format Version	Timecode					
mxmf	842 MB (883400396 B)	OP-1a	1.2	16:01:01:02	0	0	0		

Program 1									
Status									
analyzed							0	0	0

Stream 1									
Codec Name	Duration	Resolution	Frame Rate	Bit Rate	Display Aspect Ratio	Coded Aspect Ratio	Pixel Format		
MPEG-2 video	00:01:57	1920x1080	(25.00:1)	50000000	16:9(1.78:1)	1:1(1.00:1)	yuv422p	0	0
Ch. 0		0(0)			0(0)		0(0)		

Stream 2									
Codec Name	Duration	Channels	Sample Rate	Bit Rate					
PCM signed 24-bit little-endian	00:01:57	1	48000	1152000				0	0
Ch. 1		0(0)		0(0)			0(0)		

Stream 3									
Codec Name	Duration	Channels	Sample Rate	Bit Rate					
PCM signed 24-bit little-endian	00:01:57	1	48000	1152000				0	0
Ch. 2		0(0)		0(0)			0(0)		

Stream 4									
Codec Name	Duration	Channels	Sample Rate	Bit Rate					
PCM signed 24-bit little-endian	00:01:57	1	48000	1152000				0	0
Ch. 3		0(0)		0(0)			0(0)		

Stream 5									
Codec Name	Duration	Channels	Sample Rate	Bit Rate					

Table 17: QScan Report for Link Tower (Courtesy of RTM)

Result 2 | Wisma Tani Rooftop (Technical Report Courtesy of RTM)

PTZ Camera, Baseband HD 1090i50 + TVU One + DNB 5G CPE

- 1. Bitrate: 8Mbps, Delay: 0.45s
- 2. Broadcast Facility Functionality : **PASS**
- 3. MNO's Congestion : **NOT AFFECTED**
- 4. Security Jammer Activation : **AFFECTED**
- 5. Baseband Broadcast QC Check : **PASS**



QScan report from file: EVS-01092024 PTZ WISMA TANI-CamA.mxf

Date:	09/02/24 17:56:36
Project:	RTM 5G DNB Qscan
Used templates:	RTM HD Video No Scan
Filename:	EVS-01092024 PTZ WISMA TANI-CamA.mxf
Path:	Xsan Qscan:\EVS-01092024 PTZ WISMA TANI-CamA.mxf
Time of Analysis:	00:02:05
Version:	QScan 3.8.2.5457 AS11 1.0.2 PSE 1.1.0

Status: analyzed		
0(0)	0(0)	0(0)

PASS

File Info								
Container	File Size	Format Profile	Format Version	Timecode				
mxmf	862 MB (903660748 B)	OP-1a	1.2	16:07:19:19	0	0	0	

Program 1								
Status								
analyzed						0	0	0

Stream 1										
Codec Name	Duration	Resolution	Frame Rate	Bit Rate	Display Aspect Ratio	Coded Aspect Ratio	Pixel Format			
MPEG-2 video	00:02:00	1920x1080	(25.00:1)	50000000	16:9(1.78:1)	1:1(1.00:1)	yuv422p	0	0	0
Ch. 0		0(0)		0(0)		0(0)				

Stream 2										
Codec Name	Duration	Channels	Sample Rate	Bit Rate						
PCM signed 24-bit little-endian	00:02:00	1	48000	1152000				0	0	0
Ch. 1		0(0)		0(0)		0(0)				

Stream 3										
Codec Name	Duration	Channels	Sample Rate	Bit Rate						
PCM signed 24-bit little-endian	00:02:00	1	48000	1152000				0	0	0
Ch. 2		0(0)		0(0)		0(0)				

Stream 4										
Codec Name	Duration	Channels	Sample Rate	Bit Rate						
PCM signed 24-bit little-endian	00:02:00	1	48000	1152000				0	0	0
Ch. 3		0(0)		0(0)		0(0)				

Stream 5										
Codec Name	Duration	Channels	Sample Rate	Bit Rate						

Table 18: QScan Report for Wisma Tani Rooftop (Courtesy of RTM)

Result 3 | ISO Palace Of Justice Rooftop (Technical Report
Courtesy of RTM)

ISO Camera Feed, Baseband HD 1090i50 + TVU One + DNB
5G CPE

- 1. Broadcast Facility Functionality : **PASS**
- 2. MNO's Congestion : **NOT AFFECTED**
- 3. Security Jammer Activation : **AFFECTED**
- 4. Baseband Broadcast QC Check : **PASS**



QScan report from file: EVS-01092024 POJ-CamA.mxf

Date:	09/02/24 17:52:36
Project:	RTM 5G DNB Qscan
Used templates:	RTM HD Video No Scan
Filename:	EVS-01092024 POJ-CamA.mxf
Path:	Xsan Qscan:\EVS-01092024 POJ-CamA.mxf
Time of Analysis:	00:02:19
Version:	QScan 3.8.2.5457 AS11 1.0.2 PSE 1.1.0

Status: analyzed

0(0) 0(0) 0(0)

PASS

File Info

Container	File Size	Format Profile	Format Version	Timecode			
mxr	860 MB (901889228 B)	OP-1a	1.2	16:04:15:24	0	0	0

Program 1

Status

analyzed 0 0 0

Stream 1

Codec Name	Duration	Resolution	Frame Rate	Bit Rate	Display Aspect Ratio	Coded Aspect Ratio	Pixel Format			
MPEG-2 video	00:01:59	1920x1080	(25.00:1)	50000000	16:9(1.78:1)	1:1(1.00:1)	yuv422p	0	0	0
Ch. 0		0(0)			0(0)		0(0)			

Stream 2

Codec Name	Duration	Channels	Sample Rate	Bit Rate			
PCM signed 24-bit little-endian	00:01:59	1	48000	1152000	0	0	0
Ch. 1		0(0)		0(0)		0(0)	

Stream 3

Codec Name	Duration	Channels	Sample Rate	Bit Rate			
PCM signed 24-bit little-endian	00:01:59	1	48000	1152000	0	0	0
Ch. 2		0(0)		0(0)		0(0)	

Stream 4

Codec Name	Duration	Channels	Sample Rate	Bit Rate			
PCM signed 24-bit little-endian	00:01:59	1	48000	1152000	0	0	0
Ch. 3		0(0)		0(0)		0(0)	

Stream 5

Codec Name	Duration	Channels	Sample Rate	Bit Rate
------------	----------	----------	-------------	----------

Table 19: QScan Report for Palace of Justice Rooftop (Courtesy of RTM)

Result 4 | Wisma Tani Rooftop (Technical Report Courtesy of RTM)

Mobile Journalism Kit (MOJO) : ISO
Smartphone Feed + TVU Anywhere APP + DNB 5G CPE
WiFi

Bitrate: 5Mbps, Delay: 0.5s

Only for Air-Show Performance (9:00AM – 9:30AM)

- 1. Broadcast Facility Functionality : **PASS**
- 2. MNO's Congestion : **NOT AFFECTED**
- 3. Security Jammer Activation : **AFFECTED**
- 4. Baseband Broadcast QC Check : **PASS**



QScan report from file: EVS-AIRSHOW 5G 5 MINS-CamA.mxf																			
QScan																			
Date:	09/02/24 18:00:50																		
Project:	RTM 5G DNB Qscan																		
Used templates:	RTM HD Video No Scan																		
Filename:	EVS-AIRSHOW 5G 5 MINS-CamA.mxf																		
Path:	Xsan Qscan:\EVS-AIRSHOW 5G 5 MINS-CamA.mxf																		
Time of Analysis:	00:04:09																		
Version:	QScan 3.8.2.5457 AS11 1.0.2 PSE 1.1.0																		
		Status: analyzed																	
		0(0)			0(0)			0(0)											
PASS																			
File Info																			
Container	File Size	Format Profile	Format Version	Timecode															
mx	2153 MB (2258027440 B)	OP-1a	1.2	09:06:30:10	0	0	0												
Program 1																			
Status																			
analyzed																			
0																			
Stream 1																			
Codec Name	Duration	Resolution	Frame Rate	Bit Rate	Display Aspect Ratio	Coded Aspect Ratio	Pixel Format												
MPEG-2 video	00:05:00	1920x1080	(25.00:1)	50000000	16:9(1.78:1)	1:1(1.00:1)	yuv422p	0	0	0									
Ch. 0		0(0)			0(0)		0(0)												
Stream 2																			
Codec Name	Duration	Channels	Sample Rate	Bit Rate															
PCM signed 24-bit little-endian	00:05:00	1	48000	1152000															
Ch. 1		0(0)			0(0)		0(0)												
Stream 3																			
Codec Name	Duration	Channels	Sample Rate	Bit Rate															
PCM signed 24-bit little-endian	00:05:00	1	48000	1152000															
Ch. 2		0(0)			0(0)		0(0)												
Stream 4																			
Codec Name	Duration	Channels	Sample Rate	Bit Rate															
PCM signed 24-bit little-endian	00:05:00	1	48000	1152000															
Ch. 3		0(0)			0(0)		0(0)												
Stream 5																			
Codec Name	Duration	Channels	Sample Rate	Bit Rate															

Table 20: QScan Report for Wisma Tani Rooftop – Mobile Journalism (Courtesy of RTM)

LEARNING

The key learnings from the RTM Broadcast Proof of Concept (POC) using 5G Network Slicing:

1. **Seamless 5G Integration for Broadcasting:** The POC demonstrated that 5G technology, particularly with standalone architecture (SA), provides a viable and efficient solution for live broadcasting. The deployment of a dedicated network slice ensured consistent performance, and secured connectivity for high-quality video streams without the need for traditional, expensive equipment like OB vans or satellite uplinks.
2. **Network Slicing for Service Differentiation:** One of the most significant learnings was the ability to customize network performance based on specific broadcast needs. The 5G network slice dedicated to broadcasting can maintain high-quality performance with guaranteed bandwidth and low latency, without interference from consumer or other traffic.
3. **Scalability and Flexibility:** The POC highlighted the flexibility of 5G-enabled broadcasting solutions. By using portable 5G-enabled devices such as Customer Premises Equipment (CPE) and 5G SIM cards, the setup can be easily scaled or adapted to various types of events, ranging from large-scale national celebrations like Hari Merdeka to smaller, localized productions.
4. **Enhanced Mobility and Reduced Costs:** By leveraging existing 5G infrastructure, 5G SA feature slicing and mobile connectivity eliminated the need for costly, cumbersome infrastructure like satellite trucks. This mobile-first approach reduced operational costs while allowing broadcasters to operate in more dynamic and mobile environments, including in remote areas.
5. **Reliable Performance with QoS Controlled:** QoS controlled ensured that throughput remained consistent, allowing for uninterrupted live streaming, even during periods of network congestion. This demonstrated the potential for 5G to meet the demands of live event broadcasting where reliability is critical. Isolation of traffic of broadcaster and also premium viewers traffic can be created ensuring both having seamless experience in delivering content and viewing content.
6. **Security Posture and Isolation:** The POC illustrated the enhanced security benefits of network slicing. The dedicated broadcast slice provided isolation from other

network slices, reducing the risk of interference or unauthorized access to the broadcast stream. This also highlighted the potential for secure and resilient broadcasts in high-profile or mission-critical events.

7. **Simplified Setup and Ease of Use:** The ability to deploy a 5G broadcast solution using SIM cards and CPEs simplified the setup process significantly compared to traditional methods. This ease of use makes it possible for broadcasters with smaller teams or fewer resources to manage live broadcasts effectively.
8. **Future Potential with New Technologies:** The successful POC highlighted the future potential for integrating emerging technologies such as drone broadcasting and AI-powered camera systems into the 5G ecosystem. This opens new opportunities for innovation in the broadcasting industry, particularly for smaller or niche broadcasters.

These learnings from the RTM 5G Broadcast POC will help shape future live broadcasting strategies, making live productions more flexible, cost-effective, and secure.

CONCLUSION

- Utilizing existing 5G infrastructure can isolate and provide secure connectivity for broadcasters and eMBB users. This reduces significantly in deploying the services on the go based on the demand needs.
- By utilizing Network Slicing and Quality of Service (QoS) features, DNB successfully achieved consistent throughput rates of 5Mbps, 8Mbps, and 10Mbps, with an average delay of 0.45 seconds, demonstrating reliable performance throughout the POC.
- One of the key observations is that the dedicated network slice for RTM ensured uninterrupted live broadcast transmission throughout the event, even amidst a crowded and congested network, which affected some OTT communication services.
- In conclusion, the RTM Broadcast trial was a significant success, validating the effectiveness of 5G Network Slicing for live event broadcasting.

NEXT STEP

To design a technical solution to respond to future Wireless Network Jamming issues.

AUTHORS DNB AND RTM,



Muhammad Nur Fairuz Bin Ilias is an Assistant Manager at Digital Nasional Berhad. A 5g enthusiast and advocate with 15 years in Telecommunication Technologies, he has extensive experience in wired, wireless and cellular networks including important

roles in multiple 5G Demonstration Projects, specializing in telecommunications engineering, solution integration, end-to-end solution architecture, and project management.



Ahmad Shahie Bin Sobry is the Head of Business Delivery and Technology Strategy at Digital Nasional Berhad with 15 years in the Telecommunication Industry with deep understanding and expertise in solution architecture, program management and as a system integrator for complex end-to-end network solutions.



Ir. Ts. Ahmad Shafiq Mirza Bin Mansor is the Assistant Director at the Technical Facilities Section, News and Current Affairs Division, RTM. With a BEng (Hons) in Electronic Engineering from MMU and an MBA from

UUM, he has extensive experience in broadcasting, including roles at RTM and the Asia-Pacific Broadcast Union. His expertise spans broadcast engineering, system integration, and technical facilities management for both domestic and international events.



Ts. Tarmimi bin Sahad holds a BEng in Electronics and Telecommunications Engineering and an MSc in Information and Telecommunications. With 22 years of experience at RTM, including 14 years in TV production, he has developed extensive expertise in the field. Currently, he serves as the Deputy Director of Outside Broadcast TV, where he oversees and manages the operations of live television broadcasts.



Engr. Mazlina binti Mohd Yusoff is the Chief Assistant Director at the Strategic Planning Section, RTM, Malaysia. With a Master's in Engineering (Communication & Computer) from UKM and a BEng (Hons) in Electronics, she has extensive experience in IT, OTT platforms, and broadcasting. Her roles have spanned strategic planning, engineering training, and media technology, with a focus on aligning broadcasting initiatives with national objectives. ■

ABU-VYPA-NETSTAIRS WEBINAR – AI TV: THE FUTURE OF TELEVISION!



AI TV - The Future of Television !

AI TV revolution is not just about watching TV;
It's about living it !

23rd January 2025 | 15:00 MYT (Malaysia Time)

The television industry is transforming with advancements in AI, Web 3.0, and smart devices like Google Home. These innovations are reshaping content interaction, program distribution, and the rise of user-generated content (UGC) and interactive OTT (iOTT) services. AI, Web 3.0, and smart devices are driving seamless experiences across digital platforms, broadcasts, and virtual venues.

NETSTAIRS.COM |   
TECHNOLOGY WEBINAR

Dr Ahmad Moradi

CEO @ NETSTAIRS



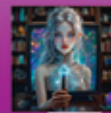
On 23 January 2025, 95 participants from 16 ABU member organizations across more than 15 countries attended a compelling webinar on the future of television. The session, titled "AI TV: The Future of Television", featured Dr Ahmad Moradi, CEO of NETSTAIRS, as the presenter and was moderated by

M. Vijjay, CEO of VYPA.

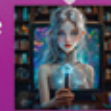
Organized by ABU Technology in collaboration with VYPA and NETSTAIRS, the webinar explored the transformative potential of artificial intelligence (AI) in revolutionizing the television industry. Discussions



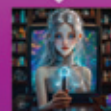
AI TV is built on iCDN.AI Envisioned by AHMAD MORADI and developed by NETSTAIRS AI Streaming as the foundation of the next generation of how we interact with TV.



Powered by AI Streaming with global patent delivering Real-Time Broadcast, Collaboration, & Communications as AI TV backbone.



NETSTAIRS iOTT and iCDN shall be the backbone for AI TV interactive gaming, content, streaming and yes, Your Favorite Sports, eSports, Celebrity, or even you as the TV's Human Avatar.





focused on AI advancements, the importance of collaboration and adaptation, and the critical need for digital security in an era increasingly shaped by AI and the Internet of Things (IoT).

THE FUTURE OF TV: FOUR POSSIBLE SCENARIOS

Dr Moradi began by analyzing how the television and video industry may evolve by 2030. Researchers have outlined four potential scenarios for the industry's future:

Universal Supermarket

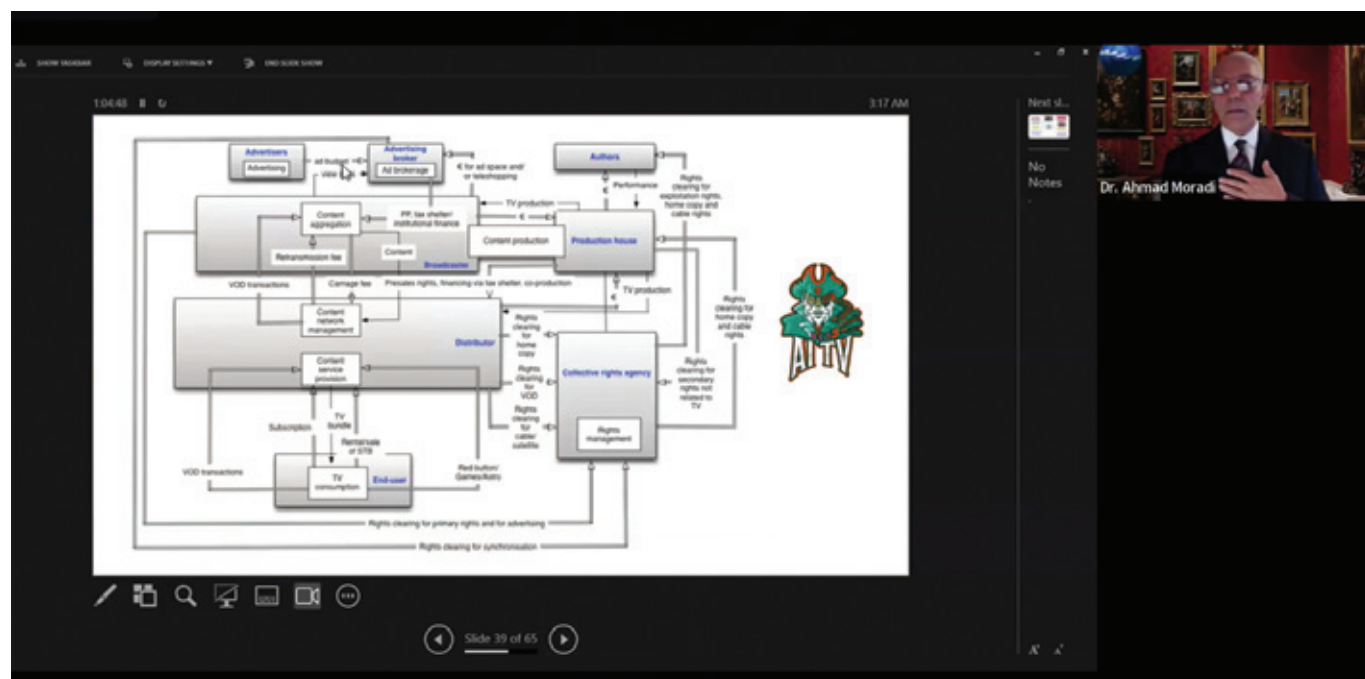
In this scenario, a few global digital platforms dominate the TV and video market, taking over aggregation and distribution roles from national broadcasters. These platforms control every step of the value chain – much like supermarkets offering a broad range of services under one umbrella.

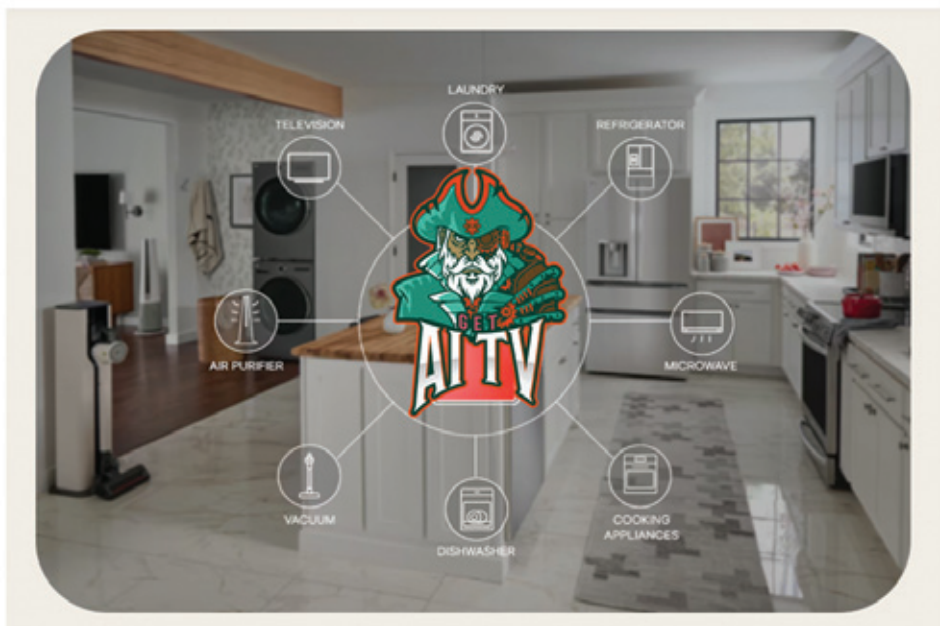
Content Endgame

Here, content emerges as the primary differentiator in the video market, while technologies such as distribution, search, and recommendation become commoditized. Major content owners with global reach invest heavily in blockbuster productions, benefiting from economies of scale. Meanwhile, smaller producers struggle to survive, leading to a reduction in content variety but a general increase in the quality of global productions.

Revenge of the Broadcaster

In this scenario, national broadcasters successfully undergo digital transformation and re-establish themselves as competitive players in the TV and video ecosystem. They evolve into digital platforms with direct customer relationships, offering on-demand content and excelling in targeted advertising and personalized recommendations.





Global digital platforms coexist with national broadcasters, creating a balance between locally produced quality content and globally distributed productions.

Lost in Diversity

This scenario envisions a highly diverse TV and video ecosystem with no dominant players. Consumers enjoy access to numerous distribution platforms, an expansive range of content, and constant market innovation. Demand for national content remains strong, fostering widespread partnerships between global and local players. A clear distinction between content production and distribution defines this landscape, resulting in a broad and dynamic media environment.

AI-DRIVEN INNOVATION IN TELEVISION

Dr Moradi also introduced the development of human avatar technology, with potential applications in knowledge sharing, education, and commerce. Developed in partnership with Google and LG, this technology enables interactive content delivery and integrates large language models for enhanced user engagement.

He further shared his vision of AI transforming television into a hub for information and family bonding. AI-powered TV can foster shared experiences that bring families together, offering interactive channels and personalized content previously unimaginable.

The discussion also highlighted AI's capacity to enhance content delivery and connectivity across multiple devices. AI TV is compatible with mobile devices, PCs, and laptops, ensuring a seamless experience for users accessing content on the go. With integrated branding features, broadcasters can offer personalized apps that extend TV content across platforms – maintaining mobility while reinforcing brand identity.

AI AND THE FUTURE OF CONTENT SECURITY

A key concern in the evolving AI-driven television landscape is content security and rights management. Dr. Moradi emphasized the importance of building trust within the supply chain, ensuring that broadcasters and content creators retain control over their assets. With AI-backed rights management systems, broadcasters can safeguard content ownership and enable proper monetization.

The session concluded with an outlook on the future of AI in the television industry, underscoring its role in enhancing user experiences, securing content distribution, and opening new revenue streams for broadcasters. As AI continues to reshape the media landscape, industry players must adapt and embrace these technological advancements to remain competitive in the ever-evolving digital era. ■



AI TV - The Future of Television !

AI TV revolution is not just about watching TV; It's about living it !

TECHNOLOGY WEBINAR | 23rd January 2025 | 15:00 MYT (Malaysia Time) | [NETSTAIRS.COM](https://www.netstairs.com) |    



DIGITAL BROADCAST SYMPOSIUM 2025

DBS2025
ABU DIGITAL BROADCASTING SYMPOSIUM

PERSONAL-CAST: INTERACTIVE BROADCASTING, TAILORED FOR YOU

24 - 27 FEBRUARY 2025 • WYNDHAM ACMAR HOTEL

The 2025 ABU Digital Broadcast Symposium was held from February 24 to 27, 2025, at the Wyndham Acmar Hotel in Klang. This symposium, aptly themed “Personal-cast: Interactive Broadcasting, Tailored for You”, is organized annually by the ABU and is the twenty-first in the series. Prior to the main conference, two workshops by Integriti Padu Sdn Bhd (IPSB) were held on the morning of February 24, 2025, followed by a DAB+ workshop in the afternoon. The three-day conference included three masterclass sessions and seven workshops, along with exhibit booths, providing a unique opportunity for attendees to access information on various aspects of broadcasting, ranging from terrestrial to IP.





PERSONALISATION AND AI IN BROADCASTING CONTENT CREATION

The first session was moderated by **Masashi Kamei** from NHK, and the panelists were **Ng Kam Man** from RTHK, Hong Kong-China; **Edward Ng** from Phoenix Satellite Television Co. Ltd., Hong Kong-China; and **Greg Armshaw** from Brightcove Inc. They elaborated on the developments in personalisation and AI over recent years and the improvements achieved. RTHK utilizes several AI presenters named Aida, Vitamin, and Tin Kam. Aida hosts weather reports, delivering forecasts and temperature trends. Vitamin introduces medical knowledge in a radio-on-TV health program, while Tin Kam explains the traditional 24

Chinese solar terms to the audience. The benefits of using AI presenters include consistency, reliability, cost efficiency, and 24/7 availability. AI can deliver news and information with a consistent tone and style, reducing variability that may occur with human presenters due to mood or fatigue. AI presenters can provide updates and information at any time, ensuring continuity by operating around the clock. Additionally, they help save costs associated with human labor and scheduling.

AI video restoration tools are cost-effective, deliver improved content quality, enhance viewer experience, and preserve cultural heritage. Automating the restoration process saves time and reduces labor costs

compared to manual restoration methods. AI can enhance old footage by creating new pixels, which helps to upscale, de-noise, and sharpen video quality. By upgrading video quality to 4K and 8K, AI tools provide a clearer and more enjoyable viewing experience, leading to greater audience satisfaction and engagement. These tools are invaluable for preserving valuable video archives, ensuring they remain accessible for future generations.

Speech-to-text AI provides transcription efficiency, searchability, and cost-effectiveness. AI can transcribe spoken content quickly and accurately, saving time and making the transcription process more efficient for news and



programming. By turning spoken language into written text, AI makes it easy to index and search through transcribed content. Automating transcription speeds up the process and reduces the need for human transcribers, which saves money and enhances workflow efficiency.

Automated transcription and translation AI deliver accurate transcriptions and multilingual translation. AI provides accurate transcriptions for recorded content and translates content into multiple languages while preserving the original speaker's voice and emotions through voice cloning. The impact is that it allows us to share content in multiple languages, helping us connect with diverse audiences more cost-effectively. Inclusivity is enhanced in broadcasting, making content available to a broader range of viewers.

Normally, creating animation and special effects requires 1 to 2 weeks of preparation. With AI tools, this period can be reduced to 3-4 days. However, AI-generated images and animations may not always meet expectations, resulting in multiple prompt modifications. It takes about 90 minutes to create subtitles for a 60-minute program. In contrast, AI tools can reduce this period to about 5-10 minutes, although proofreading is necessary for generating the subtitles.

NEXT-GEN MEDIA DISTRIBUTION

The moderator was **Sharad Sadhu**, Media Specialist, with the panelists comprising **Emily Dubs** from the DVB Project; **Paul Christmas** from Caton Technology Asia; **Dr Peter Siebert** from the IEEE Broadcast Technology Society; and **Lindsay Cornell** from BBC Technology and Media Operations. The IEEE

(Institute of Electrical and Electronics Engineers) BTS (Broadcast Technology Society) is an international membership organization open to everyone in the broadcast technology industry and allied fields. The BTS mission is to serve the needs of its members, enhance their professional knowledge by keeping them informed of the latest research results and industry trends, and provide enriching educational and networking opportunities. BTS is committed to the advancement of the Broadcast Technology industry throughout the world by holding seminars, educational courses, and tutorial sessions.

New video codecs are driving the industry, and the most popular solution for DTT broadcast is H.264/AVC, while only 6 DTT systems use HEVC. A codec lifecycle consists of four phases categorized as standardization, implementation, adoption, and application. The first three phases will take 10 to 15 years, and only then will the codec be on the market. As a result, the industry will have to invest without a clear return on investment for 7 to 10 years.

H.267 is a next-generation video compression standard that aims to improve upon H.266, also known as Versatile Video Coding (VVC). H.267 is expected to be finalized between July and October 2028, but there will not be any significant deployment until 2034–2036. Proposed timelines and requirements for H267 include a 40% bitrate reduction compared to VVC (Main 10) for 4K and higher

PERSONAL-CAST: INTERACTIVE BROADCASTING, TAILORED FOR YOU



resolutions while maintaining similar subjective quality. The Enhanced Compression Model (ECM) has already demonstrated over 25% bitrate savings in random access configurations, with up to 40% gains for screen content. Subjective evaluations confirm these gains, highlighting strong performance in both expert and naïve viewer assessments. The codec is designed for diverse applications, including mobile streaming, live broadcasting, immersive VR/AR, cloud gaming, and AI-generated content. It targets efficient real-time decoding

and scalable encoder complexity, supporting resolutions up to 8Kx4K and frame rates up to 240 fps. It emphasizes flexible support for stereoscopic 3D, multi-view content, wide color gamut, and high dynamic range.

Several companies are already developing AI-native codecs that abandon the legacy of block-based architectures entirely. These solutions may not deliver dramatically better compression ratios than H.267 on paper, but they can be instantly deployed via neural processing

units (NPU) already embedded in billions of devices. There is no need for dedicated hardware decoders or a long wait for chipset refresh cycles. As NPUs become ubiquitous, the frictionless deployment of AI-driven codecs could leapfrog H.267's theoretical gains with real-world efficiency, scalability, and time-to-market advantages. Hence, AI may be a game changer for video coding, but it is too early to tell.

DVB has focused heavily on IP-centric solutions to facilitate broadcasters' migrations to IP-based platforms, allowing them to build on an integrated broadcast/IP/5G ecosystem. 5G Media Streaming (5GMS) enables 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 and 5G Media Streaming, with DVB-I services offered simultaneously over broadcast and unicast.

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



INNOVATION IN MEDIA MANAGEMENT AND AI INTEGRATION

The moderator was **Aale Raza** from Whiteways, with the panel comprising **Christian Christiansen** from Silver Trak Digital / DAMsmart; **James Gibson** from Ortana Media Group; **Nusrat Lovely** from Axle AI; **Bhavik Vyas** from Disk Archive Corporation; and **Amiruddin bin Jemaat** from Radio TV Malaysia. Film and TV archive and preservation face several challenges. There is increasing demand driven by growth in production, leading to massive file sizes due to higher resolutions. Films are scanned in ultra-high definition

for re-purposing, and content may be locked into unplayable data tapes. Therefore, it is wise to migrate to future-proof 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 storage in the cloud is unaffordable and impractical for media, while data tape storage is perceived as the only low-cost medium. However, the reality is that tape has many hidden costs and is difficult to manage effectively.

Robotic tape libraries also face several challenges. They can be considered low-density storage with a large physical footprint. A 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 optimize tape-to-drive contention are major issues. Unmanaged contention in cloud tape limits suitability for archiving, as the first-come, first-served principle results in 5-10 hours of latency. Studies indicate that tape libraries have the highest lifetime cost due to mandatory tape migration, service costs, environmental factors, and other hidden costs. The Linear Tape-

Open (LTO) tape duopoly has already caused supply issues, and a future tape drive monopoly could pose a threat.

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

TCODE is a system designed to optimize media submission, quality control, scheduling, and reporting for Radio TV Malaysia. The objective of TCODE was to enhance operational efficiency by integrating seamlessly with media asset management (MAM) and facilitating collaboration among production teams and government agencies. RTM faced challenges from manual media delivery, slow processing times, QC bottlenecks, data loss, and versioning issues. TCODE improved the situation with automated media submissions, faster turnaround times, and direct integration with the MAM system. TCODE can be optimized for system



enhancement, user support, and performance monitoring. System enhancement improves server stability to reduce downtime, implements real-time upload progress monitoring, and enhances workflow automation. User support includes regular training and establishing a faster and more efficient technical support team. Performance monitoring involves periodic system audits and implementing continuous user feedback loops.

INNOVATIVE MEDIA SOLUTIONS: DEPLOYMENT AND DEVELOPMENT

The session was moderated by **Priyankara Lanumodarage** from MTV Channel, Sri Lanka. The panelists included **Micheal Low** from RCS Malaysia, **Wendell Lonergan** from Nautel, **Sharad Sadhu**, a media specialist, and **Dr Ahmad Moradi** from NETSTAIRS. D2M (Direct to Mobile) is a new type of broadcasting service that addresses mobile phones directly in broadcasting mode. Mobile





phones receive broadcasts and render content on their screens and speakers. It is a viable concept as the broadcasts potentially target a large population of mobile phone users. The requirements include mobile phones with direct broadcasting receive capability, video and audio processing software, and battery power for longer periods of usage.

Platforms such as ATSC 3.0 and DVB-I, which can carry multimedia products, video, and audio, are being considered. D2M transmissions require High-Power High-Tower (HPHT) for providing coverage signals and Low-Power Low-Tower (LPLT) for mobility and indoor coverage. Since mobile screen sizes are small, they only require a very low bit rate for video. Therefore, a significant 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 contemplating replacing its entire terrestrial TV and DTV with D2M. According to industry sources, front-end technology and chipsets are currently available. The adoption by phone manufacturers depends on market demand. The frequency spectrum to be selected is less than 694 MHz (for broadcasting) and greater than 700 MHz (for mobile bands).

Collaboration between broadcasters and mobile operators, who control the mobile market, is necessary. 5G delivers multimedia content in broadcasting mode, where 5G serves as a basic layer while the broadcast transmission represents the physical layer. The 5G platform enables mobile devices to receive 5G broadcast services with SIM-less

devices. Direct access to mobile phones and TV sets using SIM-less devices boosts the consumer population. Delivery via RF broadcast does not require mobile connectivity, and the technology has been thoroughly tested in Europe.

Many countries have 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.

ADVANCEMENT IN BROADCASTING TOOLS & TECHNOLOGIES

The moderator was **Dr Peter Siebert** from the IEEE Broadcast Technology Society, with panelists comprising **Onur Göker** from TRT-Türkiye, **Ajeet Khare** from Canara Lighting Industries, **Aale Raza** from Whiteways Systems, and **Yi Ci Low** from ARRI. The world of broadcast lighting has undergone a remarkable transformation over the past few decades. With advancements in LED technology and color-tunable lighting, studios now have greater control over illumination, making broadcasts more visually dynamic. As one of South Asia's leading manufacturers in studio lighting, the integration of cutting-edge research and development has enabled the creation of versatile lighting solutions tailored to the needs of modern production environments.





One of the key developments in broadcast lighting is the introduction of tunable color temperature features. In the past, studios relied on multiple fixtures or external gels to achieve different lighting effects. Today, advanced CCT (Correlated Color Temperature) tunable fixtures allow seamless adjustments from warm to cool lighting within a single fixture. This not only enhances creative flexibility but also reduces the need for additional accessories, leading to cost savings.

RGBW technology has also revolutionized studio lighting by providing an extensive color spectrum that enables filmmakers and broadcasters to fine-tune the mood of their scenes. Whether creating a natural daylight ambiance or dramatic colored effects, RGBW lighting offers precise control over hue, saturation, and intensity. Special effects, such as fire, thunder, or police sirens, further expand the possibilities, allowing for immersive storytelling without relying

heavily on post-production editing.

The integration of multi-chip LED modules has significantly improved color mixing, ensuring that colors blend smoothly without harsh transitions. This is particularly beneficial in live broadcasts, where lighting consistency is crucial. With built-in photometry labs and research-driven innovation, manufacturers have refined their lighting solutions to meet the highest industry standards. Additionally, ISO certifications ensure that these products adhere to strict quality and environmental guidelines. Another major benefit of modern broadcast lighting is its adaptability to different shooting conditions. Many fixtures now support compatibility with various control systems, making it easier for production teams to adjust settings on the go. Whether in a television studio, at a live event, or on a film set, the ability to fine-tune lighting with a simple button press enhances efficiency and reduces production time.

Beyond technical advancements, well-designed lighting plays a crucial role in audience engagement. Proper lighting improves on-screen visuals, enhances subject clarity, and influences the overall mood of a production. By offering tunable lights with full control over color temperature and spectrum, broadcasters can ensure that their content appears polished and professional, ultimately attracting and retaining viewers.

The evolution of broadcast lighting has brought about a new era of efficiency, creativity, and flexibility. With tunable CCT and RGBW capabilities, modern fixtures provide unparalleled control over lighting conditions, ensuring that every production achieves the desired visual impact. As technology continues to advance, lighting manufacturers will further refine their solutions, enabling broadcasters to push the boundaries of storytelling and visual excellence.



ADVANCEMENT IN BROADCASTING STANDARDS & TECHNOLOGIES

The session was moderated by **Otto bin Md Tahir @ Othman**, (TRAXX FM, RTM), and the panelists included **Ruxandra Obreja** and **Alexander Zink**, from DRM, **Guillaume Mascot** from SHURE, and **Padarabinda Das**, former Prasar Bharati. Digital Radio Mondiale (DRM) is a mature technology that has been tested and deployed in many countries. A single digital transmitter can output numerous streams, and both mobile and stationary reception is available. Significant power savings are well documented, with reductions of about 75-90% compared to analogue FM. Broadcasters have varying goals, which include increased content, new revenue, and the addition of emergency warning systems. However, 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 within a single transmitter by reusing existing infrastructure, allowing for 12-18 audio services per FM band transmitter with higher coverage.

DRM reduces the energy required for AM transmissions in both the medium wave (MW) and shortwave (SW)

bands. DRM transmissions eliminate the need for a carrier frequency, allowing all energy to be used for transmitting information, which means power is not wasted. The average power for digital transmission is up to 66% lower than that for analogue transmission. Digital signals have a greater crest factor, resulting in lower requirements for receiver field strength. Additionally, DRM's error correction ensures crystal-clear stereo sound until the signal is lost.

DRM provides an Emergency Warning System, wherein the alarm signal triggered by authorities is picked up by all running DRM receivers from the current DRM service and switched to emergency broadcasts. Inactive receivers may switch on automatically, resulting in all DRM receivers presenting the audio content of the emergency program. Furthermore, DRM receivers with text screens display detailed information and instructions via Journaline and text headlines.

Over 900 million Indians can receive DRM broadcasts from 37 DRM medium wave transmitters and four shortwave transmitters operating in simulcast and pure DRM mode. Additionally, six more high-power MW transmitters are likely to begin regular transmission. As of October 2024, there are more than 7 million cars with line-fit DRM in India. Other

countries adopting DRM include Pakistan, Nepal, South Africa, China, and Indonesia. The DRM Multimedia Player is available for receiving digital radio broadcasts on smartphones, tablets, or PC receivers. The software can also be used with professional receivers.

Program-Making and Special Events (PMSE) devices – including wireless microphones, in-ear monitoring systems, talk-back systems, and wireless video cameras – are essential components of any country's cultural and creative industry. Spectrum is a critical resource for reliable and secure content production. Demand for PMSE applications is increasing, driven by traditional audiences, mobile phone consumption, and new delivery platforms. However, available spectrum resources are decreasing, benefiting other users who rely on content created using PMSE to enhance their commercial offerings. The IMT/mobile sector seeks to acquire more spectrum currently used by broadcasters. Broadcasters and PMSE have always coexisted well, with broadcasters being heavy users of PMSE. Therefore, the PMSE sector is looking to collaborate with the broadcasting sector in all forums at regional and national levels to ensure long-term access to the UHF band (470-694 MHz) to meet the growing demand for creative content.





STREAMLINING WORKFLOWS FOR THE DIGITAL FUTURE; EFFICIENCY & SECURITY

The session was moderated by **Onur Göker** from TRT – Türkiye, and the panelists were **İbrahim Cihan Şengün** from TRT – Türkiye, **William Wong** from RTHK – China, **Frederik Sandbrink** from Deutsche Welle, and **Ts. Finlayson Anak Ludan** from RTM. The media industry is undergoing a rapid transformation with the integration of artificial intelligence (AI), revolutionizing content creation, distribution, and audience engagement. Traditional broadcasting is evolving, incorporating AI-powered tools to enhance efficiency, personalisation, and interactivity. Broadcasters worldwide are leveraging AI to streamline workflows, automate processes, and provide more engaging experiences for their audiences. This shift marks a new era of digital media innovation, where AI-driven solutions redefine how information is produced and consumed.

One of the most significant AI-driven advancements in broadcasting is real-time transcription and multilingual translation. Broadcasters like TRT have integrated AI-powered captioning services, allowing live events and TV shows to be accessible to a global audience in multiple languages. These tools not only improve accessibility but also ensure that

news and entertainment content can reach diverse demographics without language barriers, enhancing inclusivity.

AI is also revolutionizing video and audio production through automated editing and voice cloning. AI-driven video editors can transcribe, analyze, and archive content autonomously, reducing the need for human intervention. Additionally, AI-powered voice cloning is being used in radio broadcasting, enabling the continuous publication of audio content with synthetic yet natural-sounding voices. These innovations improve efficiency, allowing media companies to produce high-quality content at a faster pace.

Another key area where AI is making an impact is in content recommendation and personalisation. AI-supported news recommender systems analyze user preferences and viewing habits to deliver tailored content. Platforms like Galaxy 34 are integrating AI with gamification and virtual reality to create interactive and immersive digital experiences, engaging users in new and dynamic ways. This personalisation ensures that audiences receive content that is most relevant and interesting to them.

With the rise of AI-generated media, ensuring authenticity and trust in digital content has become a priority. Initiatives like C2PA (Coalition for Content Provenance and Authenticity)

aim to establish verification standards for digital media. AI tools can now analyze and verify content credentials, preventing misinformation and ensuring that audiences receive accurate and trustworthy information. Cryptographic signing and content authentication mechanisms help media organizations maintain credibility in the digital age.

Despite these advancements, challenges remain in AI adoption within the media. Ensuring that traditional audiences embrace AI-driven experiences, addressing technical limitations, and maintaining content relevance are key hurdles. However, solutions such as user education campaigns, adaptive AI models that learn audience preferences, and continuous innovation through updates and enhancements are helping to overcome these challenges.

AI is reshaping the future of media, offering unprecedented opportunities for efficiency, accessibility, and engagement. As broadcasters continue to integrate AI into their workflows, they must also ensure ethical considerations, transparency, and authenticity in content creation. The digital transformation through AI is not just about automation; it is about creating richer, more immersive, and personalised experiences that redefine how audiences interact with

media in the modern world.

HYBRID MEDIA ECOSYSTEMS – IP & TRADITIONAL BROADCASTING

The session was moderated by **Dr Mohieddin Moradi** from IRIB University, Iran, and the panelists included **Datuk Suhaimi Sulaiman** from RTM, **Naveendran Murthy** from Skyline Communication, **Nick Piggott** from RadioDNS, **Masumi Konno** from NHK, and **Dr Seyed Hossein Alavi Soltani** from IRIB Iran. The broadcasting industry is undergoing a massive transformation, with digital technologies reshaping how content is produced, transmitted, and consumed. Hybrid broadcasting, which integrates traditional radio and television broadcasting with internet-based (IP) services, has opened up new possibilities while also introducing challenges. From AI-driven newsrooms to hybrid radio and cloud-based production, the industry is adapting to rapid technological evolution. However, with these advancements come critical security concerns that must be addressed to ensure the integrity and reliability of broadcast systems.

One of the key trends in this evolution is the use of AI in broadcasting. Organizations such as RTM are leveraging AI for tasks like news presentation, translation, transcribing, and archiving. AI is also being

explored for newsroom management, predictive analysis of audience engagement, and even micro-content creation, such as short dramas and concerts. These applications highlight the growing role of automation in reducing manual workloads and increasing efficiency. However, as AI becomes more integrated into broadcasting workflows, the industry must ensure that the technology remains ethical, unbiased, and secure from potential misuse.

Another significant advancement is the hybridization of broadcast and IP-based services. Hybrid radio, championed by initiatives like RadioDNS, seamlessly integrates traditional radio transmissions with internet-based enhancements, allowing for richer metadata, visual content, and interactive experiences. This convergence ensures that broadcasting remains relevant in the digital era, especially in connected cars and smart home environments. Open standards play a crucial role in making hybrid radio scalable and cost-effective while preventing fragmentation across platforms. Hybrid broadcasting environments, however, come with operational complexities. As media functions become software-based, cloud-driven, and more dynamic, broadcasters require end-to-end visibility across their infrastructure. This has led to the

adoption of service-aware monitoring, DevOps methodologies, and automation tools to ensure seamless operation. Additionally, broadcasters must shift toward a collaborative approach, as no single engineer or department can manage these intricate systems alone. The ability to detect issues proactively through AI-driven monitoring can help prevent service disruptions and ensure high-quality content delivery.

Security has become a critical concern in the broadcasting industry, with cyber threats targeting audio and video IT equipment. Vulnerabilities in broadcast systems can be exploited through weak authentication, outdated software, and insecure default settings. Recent cyberattacks on broadcasters highlight the need for robust security measures, including penetration testing, network segmentation, and regular updates to prevent unauthorized access. Furthermore, open-source broadcasting solutions, while offering flexibility and transparency, require proper security management to mitigate risks associated with software dependencies.

NHK's innovative approach to hybrid transmission demonstrates how broadcasters can enhance streaming stability by combining IP networks with satellite links. The



SKYip system, developed by NHK, merges the advantages of both technologies, ensuring resilient transmission even in challenging conditions. Cloud-based workflows also enable remote collaboration, allowing editors and journalists to work from different locations without being confined to traditional studios. AI-driven tools, such as automatic multilingual transcription and video summarization, further streamline news production

Ultimately, the future of broadcasting lies in balancing innovation and security. While new technologies enhance efficiency and engagement, they must be implemented with careful planning to avoid operational and cybersecurity pitfalls. Broadcasters must adopt a proactive approach and invest in continuous security audits, AI-driven automation, and open, scalable standards. As the industry transitions toward a fully digital and cloud-based ecosystem, collaboration across stakeholders will be essential to maintaining trust, reliability, and creative freedom in broadcasting.



ELEVATING WOMEN IN BROADCAST TECHNOLOGY: STRATEGIES FOR INCLUSION & LEADERSHIP

The moderator was **Nargiza Numanova** from ABU, and the panelists were **Mardhiah Nasir** from IPSB Technology, **Bernie O'Neill** from

World DAB, **Ritika Pratap** from FBC, Fiji, and **Nusrat Lovely** from Axle AI. Women in broadcast technology have long faced challenges, but their resilience and innovation continue to shape the industry. From overcoming gender biases to leading major technological advancements, their

contributions are undeniable. This session explored the inspiring journeys of women in this field, drawing insights from real-life experiences and global initiatives aimed at fostering inclusivity.

The panelists opened by sharing

their personal journeys and the motivations that led them to pursue careers in broadcasting technology. Each panelist reflected on the initial obstacles they faced entering a field that was, at the time, largely considered suitable only for men. However, these barriers did not deter them from chasing their dreams and forging successful careers.

Mardhiah Nasir, a mother and a senior leader at IPSB Technology, emphasized that women can indeed excel in leadership roles within the broadcast industry. She highlighted that her goal is not to prove superiority over men but to demonstrate the unique strengths and perspectives that both men and women bring to an organization. Her approach focuses on embracing these differences to create a more dynamic and effective workplace.

From Fiji, Ritika Pratap shared how the launch of FBC TV News 12 years ago challenged the perception that journalism was solely a male profession. She highlighted the significance of having capable women in high-profile roles, noting how the newsroom's female anchor became a role model for young women, inspiring many to pursue careers in journalism.

Mentorship emerged as a key theme throughout the session. Nusrat Lovely underlined its role as a cornerstone for both personal and professional development, especially for women entering the industry. She noted that a lack of confidence often holds women back and that building social networks and connections is a crucial first step toward unlocking their full potential.

Bernie O'Neill added that women in leadership positions are often closely observed, and maintaining professionalism is essential. She stressed that women may not always realize the extent of their influence within an organization, and that by embracing this, they can drive meaningful change and inspire others.

The story of Emily Dubs, Head of Technology at DVB Project, highlights the power of perseverance. Coming from a non-technical background, she pursued her passion for science and mathematics, overcoming

societal expectations. Her journey from hardware design engineering to strategic marketing illustrates how women can thrive in male-dominated fields by leveraging their unique skills and perspectives.

Despite challenges, Emily's story shows that being a woman was never the core issue; rather, it was about proving competence and adapting to new environments. She found herself in roles where she was the only woman, yet she was valued for her contributions. Her global experiences – from Japan to Venezuela – demonstrate that technical expertise and a thirst for learning can break barriers across cultures.

Beyond individual success stories, Chrissie Tucker, Chair of the Diversity and Inclusion Task Group, shared how institutional efforts play a crucial role in promoting gender equality in broadcast technology. Organizations like the Asia-Pacific Broadcasting Union (ABU) and UNESCO have implemented strategic initiatives to ensure diversity and inclusion in media. The ABU Diversity and Inclusion Media Action Plan (2021–2025) aims to increase female representation, leadership opportunities, and workplace equity. One of the key strategies for fostering inclusion is mentorship. Programs such as the ABU Media Mentoring Program provide women with career guidance and networking opportunities, addressing the leadership gap in media technology. Similarly, diversity awards recognize outstanding contributions, encouraging media organizations to prioritize gender equality in employment and content.

To create lasting change, industries must move beyond tokenism and embrace equitable opportunities for women. This includes addressing gender pay gaps, developing inclusive workplace cultures, and ensuring that women have a seat at decision-making tables. Leadership frameworks that incorporate diversity and sustainable policies can help bridge the gender gap in broadcast technology.

The future of women in broadcast technology looks promising, thanks to the dedication of pioneers and the collective efforts of global

organizations. By continuing to challenge stereotypes, investing in inclusive policies, and supporting emerging female leaders, the industry can become a true reflection of the diverse society it serves. The journey is far from over, but the progress made so far is paving the way for a more equitable future.

ADVANCES IN CLOUD WORKFLOWS AND REMOTE TOOLS FOR MEDIA PRODUCTION

The moderator was **Fintan Mc Kiernan**, Ideal Systems, with the panellist comprising **Subodh Aggarwal**, TVU; **Dylan Van Dyke**, VIZRT; **Neil Anderson**, Codemill and **Mariano L. Monteverde**, Skylark Technology. The media and entertainment industry are undergoing a massive transformation, shifting from traditional broadcasting models to cloud-based, remote production workflows. This transition is fueled by the need for efficiency, cost reduction, and the ability to deliver high-quality content across multiple platforms. Companies like TVU Networks, Vizrt, Codemill, and Skylark are at the forefront of this revolution, providing innovative tools that redefine live production and content distribution.

Cloud technology has emerged as a game-changer in broadcasting, enabling seamless live production and remote collaboration. Solutions like TVU Producer and TVU Search empower broadcasters to create and distribute content efficiently with minimal infrastructure. These tools eliminate the need for expensive on-site equipment by leveraging cloud computing for real-time editing, graphics, and automation. Similarly, Vizrt's IP-driven workflows and automation tools have enabled broadcasters like GB News UK and Sky News Australia to optimize their production capabilities while maintaining a high level of quality.

The media supply chain is another critical component of digital transformation. Traditionally, broadcasters relied on rigid workflows and legacy systems that required significant manual intervention. However, companies like Codemill are streamlining media management by introducing automated cloud-based workflows. These solutions



ensure that content is ingested, processed, and distributed efficiently across various platforms, including linear TV, video-on-demand (VOD), and streaming services. By reducing human error and increasing scalability, media supply chains are becoming more agile and cost-effective.

The rise of adaptive streaming and programmatic advertising has further reshaped content monetization strategies. With the adoption of technologies like SCTE 223, broadcasters can integrate server-side ad insertion (SSAI) and dynamic ad targeting, maximizing revenue opportunities. Skylark's approach to automated ad insertion and fast-channel playout ensures that broadcasters can capitalize on digital advertising trends while maintaining seamless content delivery. This shift is particularly important as digital video advertising is expected to surpass traditional TV advertising in the coming years.

Another significant trend is the expansion of remote production capabilities. Broadcasters are increasingly relying on decentralized teams, utilizing tools such as TVU Remote Commentator and Vizrt's automated control rooms. These innovations allow producers and commentators to contribute to live

events from anywhere in the world, reducing the need for extensive travel and on-site infrastructure. As demonstrated by Seven Australia's newsroom overhaul, adopting cloud-based production workflows enhances efficiency and lowers operational costs.

Artificial intelligence (AI) and machine learning (ML) are also playing a crucial role in optimizing media workflows. AI-driven transcription, face recognition, and automated metadata tagging improve content searchability and repurposing. Codemill's AI-powered solutions enable broadcasters to automate quality control, content categorization, and ad placement, reducing manual effort and speeding up production cycles. As AI technology continues to advance, its integration into broadcasting workflows will further enhance efficiency and content personalisation.

Looking ahead, the future of broadcasting lies in interoperability and open APIs. As media companies adopt cloud-first strategies, the ability to integrate various tools and platforms seamlessly will be essential. Open API ecosystems, such as those offered by TVU Networks and Codemill, provide broadcasters with the flexibility to customize their workflows according to their specific

needs. This level of interoperability ensures that broadcasters are not locked into proprietary solutions and can easily adapt to emerging industry trends.

The transformation of the media and entertainment industry is well underway, driven by the adoption of cloud technology, automation, and AI-powered workflows. As broadcasters continue to embrace digital-first approaches, the focus will remain on efficiency, scalability, and audience engagement. Companies leading this shift are paving the way for a more dynamic and accessible media landscape, where content can be created, distributed, and monetized more effectively than ever before.



SUSTAINABILITY AND EFFICIENCY IN BROADCASTING

The moderator was **Andrew Davies** from ABU, with the panellists comprising **Dr Les Sabel** from S-Comm Technologies, **WorldDAB**, **Dr Mohieddin Moradi** from IRIB University in Iran, and **Bernardus Satriyo Dharmanto** from TVRI Indonesia. Indonesia, an archipelagic nation located within the Pacific Ring of Fire, is highly prone to natural disasters such as earthquakes, tsunamis, and volcanic eruptions. Given this vulnerability, it is critical to have an effective early warning system to mitigate risks and protect human lives. In response, the Indonesian government, in collaboration with various agencies and organizations, has developed advanced disaster preparedness strategies, incorporating digital broadcasting technologies and emergency response systems.

A key initiative in this effort is the Disaster Prevention Information System (DPIS), a collaborative project between the Ministry of Communications and Digital, NTT Data, and TVRI Indonesia. DPIS leverages DVB-T2 digital television networks to transmit crucial disaster information to government agencies, media outlets, and the public. This system enhances the speed and accuracy of early warnings, ensuring that communities receive alerts in real-time and can take immediate action.

Indonesia has experienced multiple major disasters over the past three decades, with tsunami-prone areas concentrated along the west and

south coasts of Sumatra, the south coast of Java, and coastal regions of Sulawesi, Maluku, and Papua. Between 1990 and 2020, the country recorded nearly 20 tsunami events, including catastrophic incidents such as the 2004 Aceh tsunami and the 2018 Palu tsunami. These disasters demonstrated the urgent need for a reliable and widespread alert system to minimize casualties. TVRI, Indonesia's national broadcaster, plays a pivotal role in the country's disaster preparedness strategy. With 178 digital transmission stations covering 147 service areas, TVRI has the largest DVB-T2 network in Indonesia, reaching over 73.82% of the population. Once the Digital Broadcasting System (DBS) expansion is complete, TVRI will increase its coverage further with 321 transmission stations across 225 service areas, ensuring that disaster alerts can reach even the most remote locations.

The DPIS system operates by receiving alerts from the Meteorology, Climatology, and Geophysics Agency and transmitting them to local and national authorities, media channels, and the public. Warnings are broadcast directly to smart TVs and set-top boxes, ensuring accessibility even during network outages. The system categorizes alerts into three levels: Waspada (Alert), Siaga (Standby), and Awas (Warning), each triggering different responses, including visual pop-ups, sirens, and automatic broadcast interruptions to deliver life-saving information.

One of the major advantages of using digital television for disaster alerts is its resilience compared to mobile networks, which often become congested or fail during emergencies. DVB-T2 broadcasting provides uninterrupted coverage and ensures that disaster warnings are delivered instantly and reliably. Additionally, the system includes real-time monitoring capabilities, allowing authorities to track transmission effectiveness and take corrective actions if necessary. In addition to digital broadcasting, Indonesia is also strengthening its overall disaster management framework by improving inter-agency coordination, enhancing response infrastructure, and leveraging technological innovations. Organizations such as the National Disaster Management Agency, Regional Disaster Management Agency, and Center for Volcanology and Geological Disaster Mitigation are working together to integrate satellite communication, social media platforms, and citizen journalism into the country's disaster response system.

As Indonesia continues to develop and modernize its disaster preparedness capabilities, the integration of digital broadcasting technology, emergency response systems, and inter-agency collaboration marks a significant step forward. By leveraging DVB-T2 networks, real-time alert mechanisms, and national broadcasting infrastructure, the country aims to enhance public safety, minimize casualties, and build a more resilient society in the face of natural disasters. ■



INDUSTRY DEBATE - THE COST OF KNOWING YOU: PERSONALISATION AND THE PRIVACY PARADOX



The session was moderated by **Mardhiah Nasir**, IPSB Technology and the panelists were **Fintan Mc Kiernan**, Ideal Systems, **Aale Raza**, Whiteways Systems, **Ir. Ts. Ahmad Shafiq Mirza bin Mansor**, RTM-Malaysia; **Mariano L. Monteverde**, Skylark Technology - Hong Kong and **Onur Göker**, TRT- Türkiye. In today's digital world, the way audiences consume media has changed dramatically. The rise of mobile devices, streaming services, and AI-driven recommendations has shifted the landscape from traditional broadcasting to highly personalized content delivery. While this personalization improves user experience, it also raises concerns about privacy, data security, and ethical data use. Broadcasters now face the challenge of competing with global tech giants while maintaining

audience trust.

Traditional broadcasting followed a one-size-fits-all model, where the same content was aired for all viewers. This approach worked for decades, but with the rise of the internet and smart devices, consumers now expect content tailored to their interests. Streaming platforms and social media networks have capitalized on this expectation by using data analytics and AI to recommend content, keeping users engaged for longer periods. Broadcasters must now embrace personalization to stay relevant in an industry where competition is fiercer than ever.

Personalization relies on collecting vast amounts of user data, including viewing history, browsing

behavior, and engagement metrics. AI-powered recommendation engines analyze this data to deliver content that aligns with individual preferences. However, while social media and tech companies have been refining their data-driven strategies for over a decade, many broadcasters still struggle to develop their own algorithms. This gap makes it difficult for traditional media companies to compete in an environment where attention is the most valuable currency.

Despite the benefits of personalized content, concerns over data privacy remain a significant issue. Many consumers worry about how their personal information is collected, stored, and shared. Some willingly share their data in exchange for better recommendations, while

others remain cautious about tracking and potential misuse. Broadcasters must address these concerns by implementing transparent data policies, ensuring security, and providing users with the ability to control their personal information.

A major reason why tech giants dominate personalization is their use of sophisticated AI algorithms. Companies like Google, Facebook, and TikTok track user behavior across multiple platforms, allowing them to predict preferences with incredible accuracy. Broadcasters, on the other hand, have traditionally relied on third-party data rather than developing their own machine-learning models. To compete effectively, they must invest in AI-driven content curation and audience segmentation tools to provide a more tailored viewing experience.

Advertising has long been the primary revenue source for broadcasters, but digital ad spending has shifted dramatically toward platforms that offer precise audience targeting. Social media networks allow advertisers to deliver highly relevant ads to specific user groups, maximizing engagement and conversions. In contrast, traditional broadcasters often rely on broad demographic targeting, which is less effective. By leveraging AI for dynamic ad insertion and personalized marketing strategies, broadcasters can reclaim a share of the advertising market and improve monetization.

Beyond recommendations and advertising, AI is also transforming content creation. News organizations

are increasingly using AI to automate repetitive tasks like transcription, summarization, and metadata tagging. This allows journalists to focus on investigative reporting and in-depth storytelling. However, there are concerns about AI replacing human creativity and the reliability of AI-generated content. The key is to use AI as an assistive tool that enhances, rather than replaces, human-driven journalism and media production.

As AI becomes more embedded in broadcasting, regulatory frameworks must evolve to ensure ethical data use and protect consumer rights. Some regions, such as the European Union, have introduced stricter data protection laws, while others are still defining their policies. Broadcasters must navigate these regulations while ensuring that their AI-driven strategies remain transparent and fair. Giving users more control over their data and ensuring ethical algorithmic decision-making will be crucial in maintaining public trust.

Despite the clear advantages of personalization, many broadcasters are hesitant to embrace AI-driven strategies due to legacy infrastructure and resistance to change. The transition to digital-first broadcasting requires significant investment in technology, skilled personnel, and organizational restructuring. Broadcasters must shift their mindset from simply distributing content to actively engaging with their audiences in a more personalized way. The longer they delay this transition, the harder it will be to catch up with more tech-savvy competitors.



The future of broadcasting depends on finding the right balance between personalization and privacy. AI-driven content strategies can enhance user engagement, increase content discoverability, and generate higher revenues, but ethical considerations must remain at the forefront. Broadcasters that prioritize transparency, invest in AI technology, and develop responsible data-driven strategies will be better positioned to thrive in the evolving digital media landscape. By embracing AI while maintaining trust, they can continue to deliver meaningful and personalized content to audiences worldwide. ■



DBS WORKSHOP

INTEGRITI PADU SDN BHD (IPSB): THE PARADOX OF CHOICE: HOW TECHNOLOGY MOVED FROM SCARCITY TO ABUNDANCE



The explosion of digital content has created a paradox: while users now have more choices than ever, too many options can lead to decision paralysis, dissatisfaction, and anxiety. Broadcasters, on the other hand, must navigate a complex ecosystem of content distribution, audience fragmentation, and monetization challenges. Striking a balance between abundance and simplicity is key to creating a seamless viewing experience while ensuring profitability

for media companies.

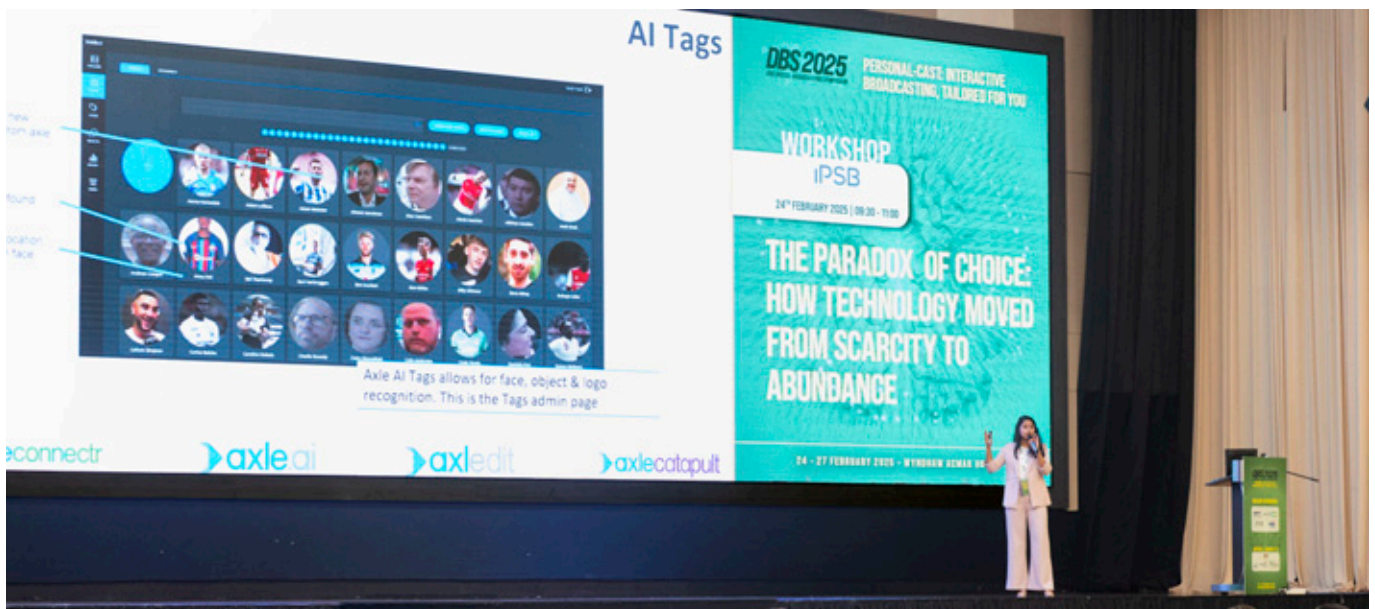
For viewers, the vast array of content across streaming platforms, social media, and traditional television can be overwhelming. Instead of enhancing user satisfaction, excessive options often make it harder to choose. To address this, platforms must leverage individual preferences and viewing history to provide personalised recommendations. AI-powered recommendation engines, effective content management systems, and workflow automation can significantly improve content discovery and ease decision-making.

Broadcasters face a different set of challenges. They must sift through content overload while selecting the right distribution channels – linear TV, OTT, and digital platforms – to maximize audience reach. Additionally, they must integrate new technologies without disrupting existing workflows, maintain cost efficiency, and navigate audience segmentation across Millennials, Gen Z, and Gen Alpha. The complexity of monetization models, including FAST (Free Ad-Supported TV), SVOD (Subscription Video on Demand), AVOD (Ad-Supported Video on Demand), and TVOD (Transactional Video on Demand), further complicates their strategy.

To stay competitive, broadcasters need to embrace a structured approach to technology adoption. This includes understanding client needs, integrating best-in-class solutions, and optimizing production and distribution workflows. Investing in managed services for ongoing support and staying ahead of industry trends ensures long-term adaptability. Future-proofing operations is crucial, as emerging technologies continue to shape content consumption habits.

On the user side, simplifying content discovery is essential for engagement and retention. By implementing AI-driven recommendations and better content categorization, platforms can reduce friction in the decision-making process. The key is to make content choices feel intuitive rather than overwhelming, ensuring that viewers find what they enjoy without unnecessary effort. A seamless user experience translates to increased satisfaction and loyalty.

The rise of digital media has led to exponential content growth, more media choices, and complex content management needs. While this abundance presents challenges, it also creates opportunities for innovation. The integration of AI, data analytics, and smart workflow automation can transform content overload





into an advantage, making media consumption more personalised and efficient.

Ultimately, the future of digital media lies in striking the right balance between content abundance and accessibility. Broadcasters and platforms that prioritize intelligent content curation, streamlined workflows, and effective monetization strategies will thrive in this evolving landscape. By leveraging technology strategically, the media industry can turn the paradox of choice into a competitive advantage, ensuring both user satisfaction and business success.

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 similar to cable, satellite, or traditional TV. FAST TV content can be viewed on virtually any device at no cost; the only trade-off is that the user has to watch commercials.



INTEGRITI PADU SDN BHD (IPSB): SUSTAINABILITY IN BROADCASTING: NAVIGATING THE NEXT DECADE

This 2nd IPSB Workshop was an event designed to explore the evolving landscape of media broadcasting, digital advertising, and regulatory adaptation. The workshop brought together prominent panelists and experts to share their insights on technology trends, market dynamics, and strategies for sustainable growth in a rapidly changing environment.

The workshop set the stage by examining Malaysia's dynamic advertising market. Over the past decade, internet advertising has grown at an unprecedented pace – a trend that was accelerated by the global pandemic. In Malaysia, digital ad spend has soared, particularly on platforms like Facebook, which remains a dominant force across ASEAN markets. With Facebook commanding a significant portion of the digital ad revenue, small to medium enterprises (SMEs) play a crucial role in sustaining this growth. Industry estimates suggest that Malaysian SMEs contribute a substantial share to the platform's online revenue, highlighting the importance of digital ecosystems that support local businesses while harnessing global reach.

One of the central themes of the



workshop was the challenge of aligning global technology platforms with local regulatory frameworks. Panel discussions emphasized the need for a tailored approach where global technology providers adjust their services to meet the diverse legal and regulatory requirements of each market. Experts debated how regulators like the MCMC are continually adapting policies to keep pace with technological innovation. This dynamic regulatory landscape is crucial not only for compliance but also for fostering an environment where technological advancements can thrive while protecting consumer interests and promoting fair competition.

As traditional media consumption continues to shift toward digital

and OTT (Over-The-Top) platforms, broadcasters are seeking innovative monetization strategies. The workshop shed light on a spectrum of solutions, ranging from live dynamic ad insertion to personalised OTT channels. A key discussion focused on the technical nuances of ad insertion – comparing server-side and client-side approaches. While server-side ad insertion offers advantages such as improved viewer experience and better ad-blocker circumvention, it requires sophisticated integration with digital ad management systems. The discussion underscored the need for strategies that not only maximize revenue but also deliver a seamless user experience.

In addition to addressing market and regulatory challenges, the workshop





explored the role of technology in achieving sustainability goals. With growing concerns about energy consumption and carbon emissions, innovations such as audience-aware streaming and optimized encoding techniques were presented as viable solutions for greener video delivery. These technologies promise to reduce the carbon footprint of media distribution while maintaining high-quality service for end-users – a critical balance in an era where environmental responsibility is increasingly intertwined with business success.

The workshop was not just a forum

for discussion – it also offered interactive elements designed to engage the audience. With live panel discussions, fireside chats, and even a lucky draw, the event fostered an environment where industry stakeholders could exchange ideas and build valuable connections. The panelists offered forward-thinking investment advice, urging stakeholders to embrace technological change and invest in innovations that drive both market expansion and sustainable practices.

The workshop served as a microcosm

of the broader transformation underway in media broadcasting. By blending data-driven insights with strategic discussions on regulatory adaptation and technological innovation, the workshop highlighted the challenges and opportunities facing the industry today. As digital advertising continues to evolve and regulatory frameworks adapt to new realities, industry leaders are poised to steer the future of broadcasting toward a more integrated, sustainable, and engaging digital ecosystem.

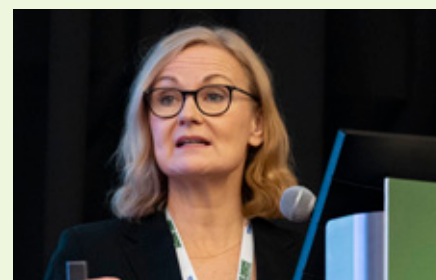
WORLDDAB WORKSHOP: INNOVATIONS IN IMPLEMENTING DAB+: SAFETY AND EFFICIENCY

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, with 96% of new cars equipped with DAB receivers to comply with mandatory standards from 2022. Interest in DAB is growing worldwide, with activities in South Africa, Tunisia, and the Middle East.

The National Broadcasting and Telecommunication Commission (NBTC) commissioned the T-DAB+ project to provide mobile and indoor coverage in Thailand. The requirements included National, Regional, and Local networks, where the National Network was originally intended as a national Single Frequency Network (SFN).



However, this approach proved to be difficult due to SFN self-interference caused by 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 include the same infrastructure for all layers (1 National, 10 Regional, and 34 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.

High-efficiency transmitters are the cornerstone of a low Total Cost of Ownership (TCO), although many other factors are equally important. The 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 repairability, 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 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 PAs with efficiency over 50%. In the case of the cooling system, 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+ transmitters to save on total cost of ownership.

The DAB+ Automatic Safety Alert (ASA) system is designed to overcome the problems associated with traditional alarms. Alerts are filtered geographically so that only those

affected are alerted. An effective emergency warning system must reach as many of the affected people as possible. With ASA, “switched off” radios, as well as radios tuned to other services, respond. ASA uses location coding so that only those affected are alerted, and everyone else is undisturbed. ASA radios synchronize to real time so that all sleeping ASA radios check for alerts at the same instant every minute. This means that when broadcasters align their audio message to the minute’s edge, all affected radios will play the entire alert message. Therefore, the checking takes about 1 second, ensuring that the batteries last a long time. Due to the “heartbeat”, the radio also knows whether the ASA ensemble it monitoring is still operating. If no heartbeat is detected when the radio checks for alerts, it must select another ASA ensemble before going back to sleep.

New features for car receivers are continually being developed, utilizing a hybrid approach with DAB+ and IP. These features include station selection by logo and voice control, alternative audio and images, and targeted content. There is an increasing range of domestic receiver products featuring color screens, and prices continue to decline.

DRM – ONE STANDARD FOR ALL FREQUENCIES AND NEEDS



DRM (Digital Radio Mondiale) is a global ITU standard for terrestrial digital radio that enables coverage for all scenarios within the broadcast

bands of AM and FM/VHF. It can broadcast on a single AM/FM frequency and deliver up to three audio services and multimedia content. Digital-only or simulcast operation is possible alongside AM or FM analog signals. It offers stereo and 5.1 surround sound with excellent audio quality. The coverage area is robust, supporting single frequency networks (SFN). Additionally, an emergency warning system allows for station switchover, and audio and text information can be presented during natural disasters.

Journaline is an advanced text service for digital radio that works on all classes of radio sets. It requires just a one-time setup with no editorial effort, bringing internet content directly to the radio. Journaline enhances listener engagement, triggers listener interaction, and opens up additional revenue sources. DRM is the only digital standard for all

AM bands, providing FM-like sound quality with large area coverage without fading or crackling. Some DRM medium-wave band transmitters are capable of simulcasting both DRM and analog broadcasts within a 20 kHz bandwidth. DRM is also available for local coverage in all VHF bands. Significant cost savings of between 50% to 90% can be realized, making DRM an environmentally friendly and energy-efficient option.

DRM offers a transition path for established FM networks by fitting into the current FM plan. DRM transmissions can be placed between existing FM stations without any interference. Digital FM radio generates additional revenue from the Journaline media service, which enables targeted ad placement and interactivity. Cost savings can also be achieved from the distribution infrastructure, as a single nationwide digital FM network can replace up to

three analog FM networks.

During emergencies, broadcast TV and radio send warnings as “crawl text” and/or audio. Online media use their capabilities to help alert authorities in sending warnings to the population via the internet at no charge. Various governments have public alerting systems that need to be integrated for effective warning dissemination. The **Common Alerting Protocol (CAP)** is a simple yet comprehensive format for exchanging all-hazard emergency alerts and public warnings across various networks. Hazards can include weather events, fires, earthquakes, volcanoes, and landslides. Media channels may include television, radio, telephone systems, and highway signs.

In a complex or evolving emergency, multiple trusted authorities often have separate responsibilities. These authorities include technical agencies and civic authorities with overlapping jurisdictions. CAP helps ensure that all trusted authorities communicate key information coherently. The official alerting authority can be the national meteorological or hydrological service, emergency management agency, or any other organization authorized to issue alerts. Aggregators and other intermediaries



may lack direct knowledge needed to distinguish an authoritative source of alert messages. This knowledge gap becomes critical as alerting utilizes extensive public networks. The International Register of Alerting Authorities addresses this gap by ensuring that each entry confirms a particular alerting source as authoritative, including its typical hazard types and alerting areas.

CAP serves as a universal adapter for alerts, making it quicker and easier to issue them. By using CAP, posting a single message can trigger most alerting methods instead of sending multiple messages across different systems. In a complex emergency,

various types of information must be assimilated from numerous sources at a broad range of scales. Sharing alert information is significantly simplified with CAP. The public should receive alerts intended for them while ensuring they do not miss important notifications. CAP data features enable custom messaging and automated translation for individuals with special needs or language barriers. With CAP, alerts can be disseminated in seconds, which is critical during sudden events such as earthquakes and tornadoes. CAP alerts can reach landline and cellular telephones as well as radio and television sets.

FRAUNHOFER IIS: MAXIMIZING STREAMING EFFICIENCY AND COST SAVINGS WITH XHE-AAC

xHE-AAC is the latest generation of the AAC audio codec family. Overall, AAC is now present in about ten billion devices, being a required part of iOS, Android, FireOS, and Windows products. It is used by Netflix and is natively supported in the latest Apple, Android, and Amazon operating systems and products. Fraunhofer's xHE-AAC implementation has recently been licensed to Microsoft.

xHE-AAC combines speech and audio coding into one unified system and enables consumers to enjoy uninterrupted streaming with all types of content—such as movies, music, audiobooks, or podcasts. The codec's usable bit rate range for stereo services spans from 12 kbit/s to 500 kbit/s, allowing for seamless switching between those rates. Combined with



seamless bitrate adaptation using DASH and HLS, this helps video and audio streaming providers overcome network bandwidth constraints, thereby facilitating an enhanced, more reliable consumer experience. This bit rate flexibility improves the reliability

of streaming services: listeners will enjoy continuous playback even under challenging network conditions. Since xHE-AAC includes dedicated speech coding tools, speech quality can be greatly improved at lower bit rates compared to legacy codecs.

The reduced bit demand of xHE-AAC can also help reduce bandwidth costs. These characteristics make xHE-AAC the ideal codec for mixed-content applications with limited transmission capacity, such as mobile audio and video streaming or digital radio. The mandatory MPEG-D DRC metadata provides loudness and dynamic range control for xHE-AAC, allowing content to play at a consistent volume and delivering the best possible user experience in any listening environment and on any device. This enables consumers to better understand dialogue, for instance, while watching a movie in a noisy environment.

xHE-AAC has been a mandatory audio codec for Digital Radio Mondiale



(DRM) since 2013. Digital radio broadcasters also benefit from a simplified codec configuration process where all relevant quality parameters are automatically optimized by the

encoder, as well as the ability to deliver a wider selection of audio programs thanks to xHE-AAC's high coding efficiency. xHE-AAC is included in the AAC Patent License.

THE PILLARS OF NEXT-GEN MEDIA DELIVERY: DVB NATIVE IP, DVB-I & TARGETED ADVERTISING



The main focus of DVB is on IP-centric solutions to handle migrations to IP-based platforms and to allow stakeholders to build on a converged 5G/IP/broadcast ecosystem. Broadcasters must assemble the right tools to transform this challenge into a new wave of opportunities. DVB Multicast Adaptive Bit Rate (DVB-MABR) enriches broadband with the scalability of broadcast, delivering live and on-demand adaptive streaming media to a large



audience in a highly efficient and scalable way by leveraging IP multicast for media object delivery. Unicast streaming has the ability to adapt to network conditions as a means of delivering media on any type of access network. It can reuse existing network technologies that deliver other Internet services, especially HTTP and Content Delivery Networks. Dynamic bitrate adaptation allows the streaming session to degrade gracefully as network conditions worsen and to recover as they improve. When there is demand for the same linear media stream at the same time by a large audience, the number of simultaneous connections to the infrastructure carrying the same media payloads results in a high degree of redundancy, which can

be mitigated by the use of multicast packet replication.

DVB Native IP (DVB-NIP) facilitates the integration of OTT and broadcast technologies into an efficient and contemporary IP media distribution solution. DVB-NIP brings TV to smartphones by leveraging existing broadband and broadcast infrastructure. With DVB-NIP and DVB-I, existing DVB networks are part of the converged broadcast/broadband future. Present infrastructure can be used to connect people in rural areas or to offer new services in public areas using legacy devices. Live OTT is served with a broadcast-quality signal regardless of the number of devices that are connected simultaneously. Using DVB-



broadcast and broadband operated 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 worlds. DVB-I can reach a wider audience 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 optimized network usage.

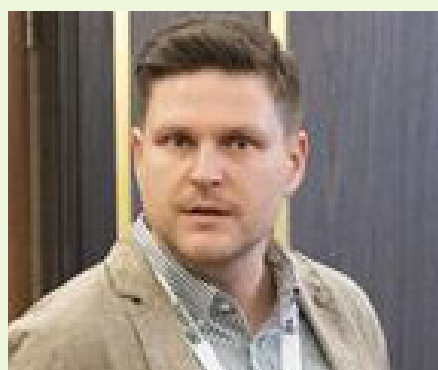
The DVB Single Illumination Satellite (DVB-SIS) standard provides a solution for DVB-T2 terrestrial broadcasters using satellite to deliver signals to terrestrial transmitters in MFN or SFN configurations. DVB-SIS enables 98% satellite capacity savings for each additional DTT multiplex and permits regional advertisement as well as emergency warning signals. France Télévisions has selected Eutelsat to transmit UHD signals on both terrestrial and satellite networks using the new DVB-SIS (Single Illumination System) transmission technology standard. These signals are distributed to terrestrial transmitters across the French territory, as well as via DTH through the Fransat platform.

NIP via satellite, OTT service providers can reduce infrastructure costs and extend market reach. DVB-I over 5G enables a future combination with 5G broadcast for new devices and in

areas that offer 5G coverage.

DVB-I is an Internet-centric media delivery system and is not a broadcast system based on IP. In the past,

SUSTAINABILITY IN STREAMING: PRACTICAL STRATEGIES FOR THE MEDIA INDUSTRY



The rapid expansion of digital content and platforms has created both opportunities and challenges for users and broadcasters alike. On one hand, technology has enabled highly

personalised viewing experiences, allowing users to discover content tailored to their interests. However, the sheer volume of choices can lead to decision paralysis, dissatisfaction, and even anxiety. This paradox of choice presents a significant hurdle in ensuring a seamless and enjoyable media consumption experience. For broadcasters, managing the vast array of content and platforms has become increasingly complex. They must navigate content curation, format selection, and distribution strategies to effectively reach their target audiences. Traditional linear broadcasting now competes with over-the-top (OTT) platforms, forcing media companies to make strategic decisions about where and how to distribute their content. The challenge

is further compounded by the rapid evolution of audience preferences across different generations, from Millennials to Gen Alpha. Integrating new technologies while maintaining existing infrastructure is another major concern. Production workflows must now balance cloud-based and on-premise solutions, ensuring seamless transitions without disrupting operations. Additionally, broadcasters must carefully manage budget constraints, striking a balance between capital expenditures (CapEx) and operational expenditures (OpEx) while investing in innovative solutions that drive long-term returns. Monetization strategies have also evolved significantly in the face of changing consumption habits. Subscription-based (SVOD),



advertising-supported (AVOD), and transactional (TVOD) models all present unique advantages and challenges. Broadcasters must determine the most effective approach to generate revenue while maintaining viewer engagement and satisfaction. The competition for audience attention is fierce, making data-driven decision-making more critical than ever.

To overcome the paradox of choice, broadcasters can leverage AI-powered recommendation engines and content management systems. By collecting and analyzing viewer data, they can create accurate user profiles and

personalise content recommendations. Workflow automation further enhances efficiency, ensuring that relevant content reaches the right audience at the right time. These strategies help mitigate the overwhelming nature of content overload while improving the overall user experience.

Successfully integrating technology requires a thoughtful approach that includes consultation, workflow optimization, and managed services. Broadcasters must carefully select and integrate the best technologies from various vendors, ensuring interoperability and long-term

sustainability. Future-proofing strategies are essential to adapt to emerging trends, such as artificial intelligence, interactive media, and evolving consumer behaviours.

Ultimately, while the exponential growth of content and technological advancements presents challenges, it also creates new opportunities for innovation. By embracing data-driven strategies, automation, and personalised content delivery, broadcasters can thrive in an increasingly complex media landscape. The key lies in making technology work for them rather than being overwhelmed by its rapid progression.



UNESCO – ABU REGIONAL WORKSHOP BROADCASTING FOR ALL: FOCUS ON DIVERSITY AND INCLUSION IN MEDIA

The media landscape across Asia and the Pacific is undergoing a significant transformation, thanks to a strategic alliance between UNESCO and the Asia-Pacific Broadcasting Union (ABU). Their collaborative project aims to elevate women's roles in broadcast technology by embedding gender equality, diversity, and inclusion into media organizational policies. Through a multi-pronged approach of capacity building, policy reform, and leadership development, the initiative hopes to foster a more inclusive media environment where diverse voices are heard and represented at all levels.

Central to this initiative is the ABU Diversity and Inclusion Media Action Plan 2021–2025. With its foundational objectives to promote an inclusive culture, ensure diverse representation in employment, and reflect community diversity in media content, the plan serves as a roadmap for broadcasters. It emphasizes leadership, strategic planning, and targeted communication as key focus areas. This structured framework is already guiding national broadcasters in countries such as Bangladesh, Indonesia, Nepal, and Vanuatu to implement gender-sensitive reforms in both internal operations and external programming.

A significant driving force behind the campaign is the ABU Diversity and

Inclusion Task Group. Comprising twelve members from nine countries, this consultative body operates under the oversight of the ABU Secretary-General. Alongside this group, a growing cohort of ABU Champions of Diversity & Inclusion work tirelessly to raise awareness and champion reforms in member organizations. The collaborative model ensures both top-down policy alignment and grassroots engagement, amplifying the program's impact across varying cultural contexts.

In support of strategic implementation, the initiative launched “The Way Forward” – a four-part training module tailored to guide broadcasters through leadership development, policy creation, positive workplace culture building, and content diversification. These modules are not only practical but also customizable, ensuring that they resonate with the operational realities of diverse media houses across the region. The strategic alignment with corporate goals and the emphasis on performance indicators for senior executives underscore the seriousness of the commitment.

Mentorship plays a pivotal role in nurturing emerging talent. The ABU Media Mentoring Program 2024, supported by the USAGM, connects up-and-coming women in journalism, content, digital, and tech roles with seasoned professionals. By focusing on structured mentor-mentee relationships, the program seeks to bridge the gender gap in leadership by offering guidance, skill-building opportunities, and crucial visibility to future female leaders. This hands-on approach complements the larger institutional reforms being advocated.

Recognizing efforts is equally vital to sustaining momentum. The ABU Diversity and Inclusion Media Awards 2024 celebrate media organizations that excel in promoting equality and inclusion. With financial support for awardees to reinvest in their internal programs, the awards highlight best practices and inspire others to emulate success. These incentives further validate the importance





of workplace equity and keep the dialogue active within the media industry.

Ultimately, the partnership between UNESCO and ABU represents more than policy – it embodies a cultural shift in media. With comprehensive guidelines, committed leadership, and empowered stakeholders, the project sets a compelling precedent for inclusive media reform. As Dr. Md Jahangir Alam of Bangladesh

Television aptly put it, “Our vision is clear: to create an organisational culture that celebrates diversity in all its forms”. The journey is ambitious, but the foundations laid today promise a more equitable media landscape for future generations. ■

DBS MASTERCLASS

IRIB – TECHNIQUES FOR HIGH QUALITY VIDEO PRODUCTION IN BROADCASTING



High Dynamic Range (HDR) video technology represents a transformative shift in visual media, delivering significantly enhanced image quality through improvements in brightness, contrast, and colour range. Unlike Standard Dynamic Range (SDR), HDR can display brighter highlights, deeper shadows, and a wider gamut of colors, creating more immersive and lifelike viewing experiences. The move toward HDR in digital broadcasting has become increasingly relevant, especially with the rise of Ultra-High Definition (UHD) and the growing demands

for cinematic visuals in home entertainment systems.

At the core of HDR is the interplay between multiple elements such as spatial resolution, bit depth, frame rate, and color space. While higher spatial resolutions like UHD and 8K improve sharpness, HDR focuses more on tonal and chromatic depth. Standards such as BT.2020 and Rec.2100 have been established to support HDR broadcasting, expanding color gamut and luminance values far beyond the legacy Rec.709 standard.

This combination enables creators to deliver more nuanced visual storytelling.

Two predominant HDR systems are in use today: Perceptual Quantizer (PQ) and Hybrid Log-Gamma (HLG). PQ is a display-referred system, meaning it is calibrated for specific display brightness (e.g., 1000 nits, 2000 nits), providing precise tone mapping but requiring metadata for proper playback. In contrast, HLG is scene-referred, making it more compatible with existing broadcast workflows and more adaptive across various display types without metadata dependence.

A critical concept in HDR production is the use of Opto-Electronic Transfer Functions (OETF) and Electro-Optical Transfer Functions (EOTF). These mathematical models define how light captured by cameras is encoded into digital signals and subsequently translated back into light by displays. PQ and HLG each utilize unique OETF and EOTF curves to ensure the intended visual experience is



preserved across the production and distribution pipeline.

Metadata plays a vital role in HDR, especially for PQ-based content. Static metadata, such as Mastering Display Color Volume (MDCV), MaxCLL, and MaxFALL, describe the characteristics of the display used during mastering and the light levels in the content. Dynamic metadata goes a step further, allowing frame-by-frame adjustments for optimal display performance, enabling content to be more faithfully rendered across a variety of screens with different capabilities.

Tone mapping and inverse tone mapping are key processes when converting between HDR and SDR content. These transformations adjust luminance values to maintain

visual consistency, allowing HDR content to be viewed acceptably on SDR displays and vice versa. While this process cannot fully replicate the HDR experience on SDR devices, it ensures compatibility and accessibility for a broader audience.

Camera acquisition for HDR requires precise exposure control and monitoring. Tools like waveform monitors, false color displays, and exposure markers are used to align image capture with HDR standards. Reference levels, such as 18% grey and 90% diffuse white, are critical for ensuring consistency in exposure and color grading. Devices like the SpyderCube are commonly used to calibrate these reference points during production.

Another important aspect of HDR

production is handling highlights – regions of the image brighter than the reference white. HDR allows for more accurate rendering of these specular highlights and emissive objects, which can be several times brighter than diffuse white. Properly managing these elements is essential for preserving detail and realism in bright areas of the image.

Signal range management is also essential in HDR workflows. Broadcast systems often use “narrow range” digital signals to avoid clipping and maintain signal integrity during processing and compression. Understanding the acceptable digital code values for different bit depths (e.g., 10-bit or 12-bit) ensures that colour and luminance data is preserved from camera to viewer display.

As HDR continues to evolve, it presents both challenges and opportunities for broadcasters and content creators. From mastering and metadata generation to camera acquisition and signal transmission, each step requires new tools, standards, and best practices. However, the result is a dramatic improvement in viewer experience – one that mirrors the vividness and depth of the real world more closely than ever before.



ABU – GLOBAL PODCAST TRENDS AND TOOLS



focusing on dialogue, interviews, and storytelling. This accessibility and informality help podcasts attract a broad, loyal audience.

Podcasts are moving away from seasonal formats toward “always-on” publishing models. This allows creators to build sustained engagement with their listeners. Popular genres include news, true crime, comedy, and cultural commentary, reflecting society’s evolving interests. Additionally, live podcast events are gaining traction globally, turning audio into immersive, community-driven experiences.



Language plays a crucial role in podcast reach. With podcasts being distributed across platforms like YouTube, Spotify, and Apple Podcasts, creators have unprecedented global access. Translation and adaptation efforts are helping podcasters break language barriers, allowing stories to resonate with diverse audiences and cultures. This expands the potential for impact beyond borders.



Another major trend is the rise of video podcasts. Around 30% of U.S. podcast listeners watch podcast videos, signaling a shift in consumption habits. Platforms like YouTube are capitalizing on this, encouraging creators to adopt visual elements in their storytelling. This hybrid format boosts discoverability and enhances engagement by offering a more dynamic user experience.

Podcasting has become a powerful and widely adopted medium, reaching over 540 million listeners worldwide. Its growth is especially evident in countries like Indonesia, where audio storytelling resonates deeply with the population. In the United States, nearly half of the population aged 12 and older listens to podcasts at least once a month. With global ad spending on podcasts estimated to hit \$4 billion in 2024, it is clear that podcasting is not just a trend – it is a booming industry.

Unlike traditional radio, podcasting offers an on-demand experience. It is intimate, flexible, and doesn’t conform to broadcast schedules or

rigid time slots. Listeners actively choose what to hear, often drawn to niche topics that radio might overlook. This creates space for authentic, deep-dive conversations. Because podcasts can be edited extensively before release, they often feature higher audio quality and tighter storytelling.

While both podcasts and audiobooks are on-demand audio experiences, they serve different purposes. Audiobooks are typically lengthy narrations of existing books, often requiring several hours. In contrast, podcasts tend to be shorter, more casual, and frequently updated. They are often free and host-driven,

Technology continues to streamline podcast production. Tools like Descript, Podcastle, Kapwing, and Auphonic enable creators to record, edit, and publish content more efficiently. Collaboration platforms, real-time editing, and AI-driven enhancements are making podcasting more accessible than ever. As these tools evolve, they will empower more voices and ensure that the future of podcasting remains diverse, innovative, and globally connected. ■



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FREQUENCY PLANNING FOR DIGITAL RADIO NETWORK IN THAILAND

INTRODUCTION

In 2023, Office of the NBTC and Thammasat University Research and Consultancy Institute carried out a project titled “Survey of Demand for Radio Services, Cost Assessment, and Development of Investment Models for Digital Radio Broadcasting Services in Thailand,” which included technical analysis and frequency planning for the DAB+ network in Thailand. Experts from Progira (Mats Ek) and S-Comm Technologies (Dr. Les Sabel) contributed to the technical aspects of the project, working alongside the team from the Broadcasting Technology and Engineering Bureau, Office of the NBTC.

In the frequency planning process, an attempt was made to divide Thailand into 77 allotment areas based on the administrative boundaries (77 provinces). However, these allotment areas would have been too small, limiting spectrum efficiency. Taking into account several factors of each province such as area size, economy, culture, and dialect, the decision was made to divide the country into 10 regions with 34 allotment areas. Each allotment area consists of either a single province or a group of provinces (with a maximum of 6 provinces).

After the completion of the project, the output on frequency planning was considered for developing the NBTC Notification on DAB+ Frequency Plan. This plan underwent drafting, public hearing, and approval processes before being published in the Government Gazette on 11 October 2024. The scopes of DAB+ Frequency Plan are as follows:

- Frequency range: 174 – 230 MHz (frequency block 5A to 12C)
- Frequency plan for future assignment: Allotment plan (indication of frequency blocks to be assigned to each area)
- System: DAB+ Audio with MPEG-4 HE AAC v2 Frequency Planning

During the planning phase, frequency blocks were allocated to each allotment area, and iterative calculations were performed to assess interference and compatibility. In the calculation process, several factors were considered, including the limitation of 12C block (due to its domestic use until 2026), cross-border agreements, and the frequency channels used in neighboring countries. As a result, the allotment plan was finalized with 5-6 frequency blocks assigned to each allotment area. The first two

frequency blocks of each area are adjacent and reserved for national or large regional networks, with mandatory infrastructure sharing to prevent interference. Additionally, the following ERP recommendations have been made:

1. A maximum of 10 kW ERP for large city areas
2. A maximum of 4 kW ERP for other areas
3. A maximum of 1 kW ERP for gap fillers or stations located near the borders of the allotment areas

The frequency allotment plan for DAB+ in Thailand is shown in **Table 1** and **Figure 1**.

Table 1: Frequency allotment plan for DAB+ in Thailand (Table)

Region	Allotment Area	Frequency Blocks					
		1	2	3	4	5	6
R01	R01-1	5A	5B	5D	6C	8C	9C
	R02						
R02	R02-1	11A	11B	11D	5C	8D	11C
	R02-2	10A	10B	10D	8A	8B	7C
	R02-3	7A	7B	7D	5A	6C	5D
R03	R03-1	6A	6B	6D	9A	11C	9D
	R03-2	10A	10B	10D	6C	8C	-
	R03-3	5A	5B	5D	7A	10C	7D
	R03-4	8A	8B	8D	12A	12B	12D
	R03-5	5A	5B	5D	7A	7B	7D
R04	R04-1	8A	11B	8D	12A	12B	12D
	R04-2	7C	8B	9C	5A	5B	5D
	R04-3	12A	12B	12D	7A	7B	7D
	R04-4	11A	11B	11D	5C	7C	10C
R05	R05-1	9B	7A	8A	11A	10C	11D
	R05-2	5A	5B	5D	6C	7B	7D
	R05-3	6A	6B	6D	11C	8C	7C
	R05-4	6A	6B	6D	12A	11C	12D
	R05-5	8A	8B	8D	5C	11B	11D
R06	R06-1	6A	6B	6D	8A	8B	8D
	R06-2	7A	7B	7D	9A	9B	9D
	R06-3	11A	11B	11D	5C	10C	-
	R06-4	5A	5B	5D	9C	6C	-
	R06-5	10A	10B	10D	12A	12B	12D
R07	R07-1	8A	8B	8D	10A	10B	10D
	R07-2	12A	12B	12D	11C	7C	-
	R07-3	7A	7B	7D	11A	11B	11D
	R07-4	5A	5B	5D	6C	8C	9C
R08	R08-1	10A	10B	10D	11C	8A	8D
	R08-2	6A	6B	6D	9A	9C	11B
	R08-3	10C	8B	8C	6C	5C	11D
	R08-4	5A	5B	5D	7C	9C	11C
R09	R09-1	6A	6B	6D	9A	9C	12A
	R09-2	7A	7B	7D	9B	9D	12B
R10	R10-1	6A	6B	6D	9A	9B	9D

The map displays Myanmar divided into 20 regions, each labeled with a code (R01-1 to R10-4) and colored according to its climate zone. The regions are distributed as follows:

- North (Yellow):** R05-4, R05-2, R05-1, R05-3, R05-5
- Central (Purple):** R06-4, R06-5, R06-2, R06-3, R06-1, R06-2, R06-3, R07-1, R07-2, R07-3, R07-4
- East (Pink):** R03-5, R03-4, R03-3, R03-1, R03-2, R04-4, R04-3, R04-2, R04-1
- South (Green):** R08-1, R08-2, R08-3, R08-4, R09-2, R09-1
- West (Blue):** R02-1, R02-2, R02-3

Geographical features and neighboring areas include:

- Countries:** LAOS, CAMBODIA, Thailand, Myanmar, Aceh.
- Cities:** Nay Pyi Taw, Yangon, Vientiane, Phnom Penh.
- Bodies of Water:** Gulf of Thailand, Andaman Sea.
- Other Labels:** R01-1, R02-1, R02-2, R02-3, R03-1, R03-2, R03-3, R03-4, R03-5, R04-1, R04-2, R04-3, R04-4, R05-1, R05-2, R05-3, R05-4, R05-5, R06-1, R06-2, R06-3, R06-4, R06-5, R07-1, R07-2, R07-3, R07-4, R08-1, R08-2, R08-3, R08-4, R09-1, R09-2, R10-1.

An example of interference assessment for 10D block in allotment area R02-2 is shown in **Figure 2** and is further detailed in all the cases shown in **Table 3**.

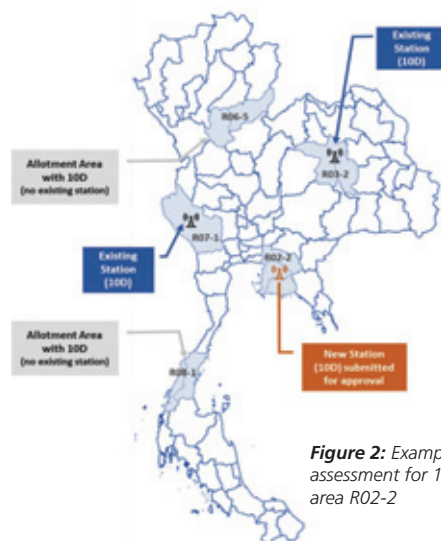


Figure 2: Example of interference assessment for 10D block in allotment area R02-2

Coverage Prediction	Interference Assessment
- The minimum field strength for mobile reception is 42.84 dBμV/m at 200 MHz and 1.5 meters above ground level. - The reference propagation model is Recommendation ITU-R P.1546, CRC Predict, or an equivalent terrain-based model. - For SFN, the reference coverage area is derived from 99% of locations and 95% of the time. - For other cases, the reference coverage area is derived from 99% of locations and 99% of the time.	- The reference coverage area may be larger than the service area; however, it shall not cause interference to other service areas. If any possible interference, it will be permitted only if accepted by the affected network operators. - To prevent interference to future stations, the maximum permissible field strength at the border of another allotment area using the same frequency block is 26 dBμV/m. In SFN, the cumulative field strength will be used for the assessment. - In case of potential interference, the network operator shall revise the technical characteristics of the stations and resubmit for approval. - The field strength of wanted station is calculated from 50% of the time and 50% of the location, and the field strength of unwanted station is calculated from 1% of the time and 50% of the location.

FEATURE ARTICLE 2

Table 3: Details of all the cases for interference assessment

Cases	Criteria
(1) New station and existing stations using the same frequency block	New station shall not cause interference to existing stations, particularly within the service areas of those stations.
(2) New station and another allotment areas with the same frequency block (no existing station)	Field strength of new station shall not exceed 26 dBµV/m at the border of another allotment areas.
(3) New station and adjacent service areas	If the reference coverage area of a new station located within a specific service area overlaps with adjacent service areas, coordination will be required.

CAPACITY PLANNING

The net bit rate of DAB+ ensemble is 1152 kbps, and a study on capacity planning for the DAB+ network in Thailand recommends 64 kbps per DAB+ channel. Based on this, one ensemble can accommodate 18 channels. However, the bit rate per channel is not specified in the NBTC Notification and remains flexible for future licensing processes. For instance, some broadcasters may require a higher bit rate, such as 128 kbps, for high-quality audio, while some others may opt for a lower bit rate, such as 48 kbps or 32 kbps.

CONCLUSIONS

According to the law, radio services in Thailand are categorized into three levels: national, regional, and local. This frequency allotment plan has been prepared for all three levels of radio services, but the bit rate per audio channel is not specified in the technical regulations. This allows for flexibility to accommodate future licensing schemes, which will be determined later this year. Although there is flexibility, it still take into account the quality of signal, coverage area and interference prevention.

In addition to the frequency allotment plan for DAB+, the NBTC Notifications on the technical standards for DAB+ transmitters and receivers have been published in the Government Gazette. All relevant NBTC Notifications (in Thai) can be downloaded from the website (<https://broadcast.nbtc.go.th>). The next step for NBTC is the licensing process, which is expected to begin at the end of 2025 or in 2026.

AUTHOR



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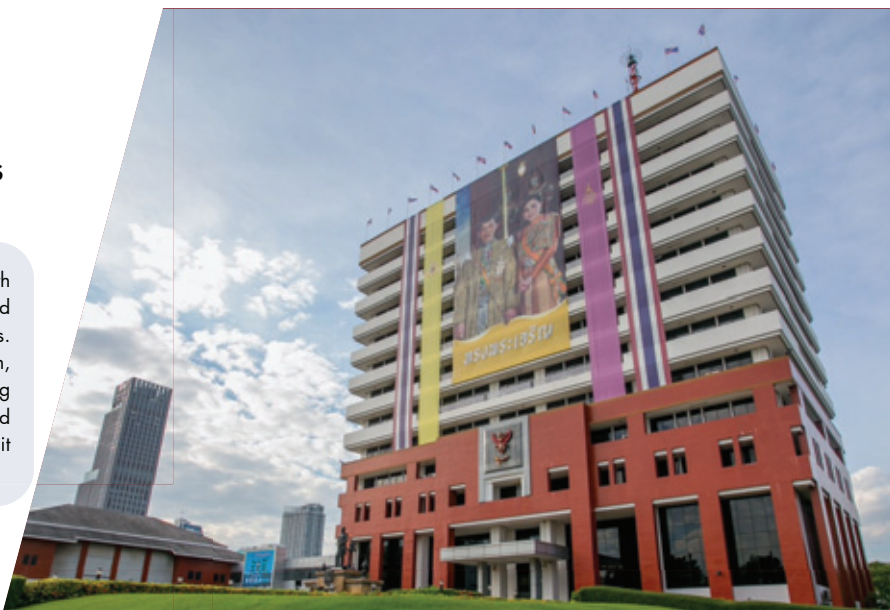
Supatrasit Suansook is a Director of Television Engineering Division, Broadcasting Technology and Engineering Bureau, Office of the National Broadcasting and Telecommunications Commission (NBTC), Thailand. He holds a Senior Professional Electrical Engineer License (Communication) from The Council of Engineers Thailand.

Mr Supatrasit has experience in both telecommunications and broadcasting sectors. He has been involved in broadcasting industry since 2011, which was the beginning of transition to digital television in Thailand. He is responsible for developing technical regulations (technical specification and frequency planning) and technical policy of digital terrestrial television. He worked in the 700 MHz re-stacking project during 2019-2021. In 2020-2022, he conducted the feasibility study on 4K technology in Thailand. Recently, in 2023-2024, he collaborated with consultants from Thammasat University and overseas partners to conduct the network design and frequency planning for DAB+ network in Thailand. He also developed the NBTC Notification on DAB+ Frequency Plan, published in October 2024. ■



THE NATIONAL BROADCASTING AND TELECOMMUNICATIONS COMMISSION (NBTC) OF THE KINGDOM OF THAILAND

The NBTC is a national independent organization, tasked with overseeing frequency spectrum allocation and management, licensing and regulating of broadcasting, television and telecommunications services. Other responsibilities include standardization, promoting fair competition, consumer protection, safeguarding public rights and freedoms and fostering universal service obligations. The Office of the National Broadcasting and Telecommunications Commission (ONBTC) serves as the administrative unit supporting the NBTC operations.



HFCC A25 GLOBAL COORDINATION CONFERENCE

The A25 Global Coordination Conference was held at the Bab Al Qasr Hotel in Abu Dhabi from February 10-14, 2025. It served as the global coordination event for the A25 broadcast season. Hosted by the Arab States Broadcasting Union (ASBU), the conference was organized in collaboration with the High Frequency Coordination Conference (HFCC) and the Asia-Pacific Broadcasting Union (ABU).

The meeting brought together approximately 60 delegates from over 35 organizations across 24 countries. Notable ABU member organizations in attendance included China Media Group, Jordan Radio and Television Corporation, and Qatar Media Corporation. Other participating entities included Broadcast Belgium, the U.S. Agency for Global Media, Vatican Radio, THALES, and CML Microcircuits Ltd., among others.

Throughout the week, participants engaged in discussions emphasizing the enduring relevance of shortwave radio and recent advancements in broadcasting technologies. A special celebration of World Radio Day also took place during the conference. Key agenda items included finalizing the A25 operational schedule, reports from working and discussion groups, and updates on financial

matters. The deadlines for the submission of A25 requirement data and the final operational schedule were confirmed. During the Group of Experts (GOE) meeting, participants reviewed HF broadcasting activities at the ITU-R and encouraged members to contribute to the ongoing revision of relevant recommendations and resolutions.

Membership updates included the addition of Radio Horizon as a new full member, while Radio for Peace International and Rockpower formally resigned.

Looking ahead, the B25 Global Coordination Conference is scheduled to take place in Prague, Czech Republic, from August 25–29, 2025, with a submission deadline for requirements set for July 21, 2025. Details regarding the A26 conference will be announced at a later date.

The World Radio Day celebration featured contributions from UNESCO and the ITU Radiocommunication Bureau, underscoring the global significance of radio.

Beyond the formal agenda, the conference provided valuable networking opportunities and recognized excellence within the broadcasting community. The Oldrich Cip Award was presented to Ken Lingwood in honor of his outstanding contributions to shortwave broadcasting and the HFCC. Although unable to attend in person, Mr. Lingwood expressed his heartfelt thanks via Zoom. The award was accepted on his behalf by Greg Teague, who will return it to Australia.

In summary, the HFCC A25 Plenary not only achieved its coordination goals for the upcoming broadcast season but also celebrated the individuals and innovations shaping the future of global radio broadcasting. ■



News from The ABU Region

CENTRAL TENN. PBS, PMVG, VENDORS COLLABORATE ON ATSC 3.0-BASED SIGN-LANGUAGE WARNINGS

PBS station WCTE and the Public Media Venture Group (PMVG) convened in Cookeville this month to advance an initiative utilizing ATSC 3.0 technology to integrate American Sign Language (ASL) services into emergency alert systems. This effort builds upon a previous project launched in December, which introduced real-time Spanish-language closed caption translation. Both initiatives leverage PMVG's NextGen TV (ATSC 3.0) station in Cookeville to enhance accessibility and ensure that critical emergency information reaches all community members, particularly those who are deaf or hearing-impaired.

The ASL initiative is a collaborative effort involving WCTE, PMVG, DigiCAP, and EQ4ALL. It is supported by a memorandum of understanding between PMVG and EQ4ALL, which emphasizes a shared commitment to enhancing accessibility and emergency alert technology. The project was formally discussed during a meeting held at the Putnam County Emergency Management Agency, hosted by WCTE President and CEO Avery Hutchins and Putnam County EMA Director Brandon Smith. Attendees included project leaders, station engineers, emergency management professionals, accessibility specialists, and local government officials, including the mayors of Cookeville and Putnam County. Participants expressed strong support for the initiative and agreed to continue their efforts in testing and deployment.

During the meeting, DigiCAP Senior Vice President Joonyoung Park

presented the company's cloud-based NextGen TV "broadcast app" technology. This system seamlessly integrates with existing emergency alert infrastructure, reinforcing the advantages of broadcasting for emergency communications. Park emphasized that television's extensive coverage, combined with the resilience of broadcast sites, makes it an effective platform for disseminating emergency alerts. He also noted that ATSC 3.0 technology enhances these capabilities by incorporating intelligent and accessible features.

EQ4ALL Co-CEO Kevin Lee showcased human avatar technology designed to deliver emergency alerts in American Sign Language (ASL) across multiple platforms. These avatars not only convey critical messages through sign language but also guide viewers to reliable local resources for additional information. This initiative marks a significant advancement in making emergency communication more inclusive and accessible for individuals who are deaf and hard-of-hearing individuals. [\[TV Tech\]](#)

NEW SPEECH RECOGNITION TECHNOLOGY FOR DISCERNING OVERLAPPING VOICES

STRL is advancing research in speech recognition technology to facilitate closed captioning for a greater number of live broadcast programs. This technology converts human speech into text by utilizing models trained on extensive audio and annotated data. However, accurately recognizing overlapping voices in multi-speaker conversations remains challenging, leading to lower accuracy compared to single-speaker recognition. To address this issue, innovative methods are required for captioning talk shows and similar programs.

Conventional Methods and Challenges

A common approach to enhancing recognition accuracy for overlapping voices involves training speech recognition models with auxiliary information, which aids in associating speakers with their respective speech (see Fig. 2). However, because this auxiliary information must be prepared separately, often through additional recordings, its applicability is limited.

A New Learning Method

A novel method has been developed to train speech recognition models on overlapping voices without the need for auxiliary information. This approach allows the model to simultaneously transcribe speech for each speaker while employing the CTC*2 technique to establish speaker-character associations. Figure 3 illustrates a speech recognition model utilizing this method, in which the Transcription Module references the CTC Module to ensure accurate speaker annotations.

Experiments utilizing pseudo-conversational audio data featuring overlapping voices have demonstrated that this method achieves recognition accuracy comparable to traditional approaches. By harnessing this technology, highly accurate models can be trained using authentic conversational audio without the need for supplementary auxiliary information.

Moving forward, STRL aims to further improve recognition accuracy by training models using program audio datasets.

Example input

Speaker 1: "How are you?"
Speaker 2: "I'm fine."

Recognition example

Speaker 1: "How are" _____
Speaker 2: _____ "fine."

Unable to correctly recognize overlapping voice segments

Figure 1: Challenges of speech recognition for conversations involving multiple speakers

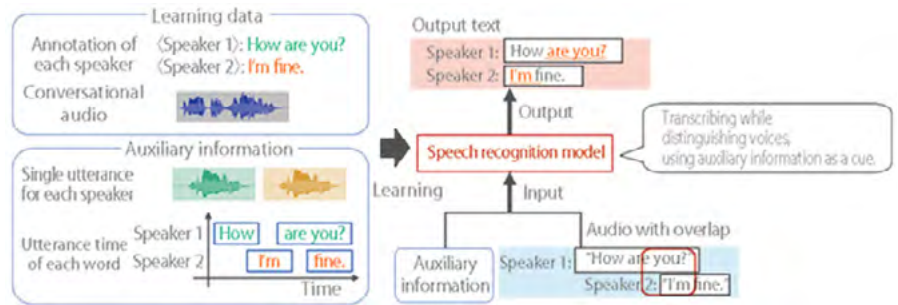


Figure 2: Learning behavior of conventional methods

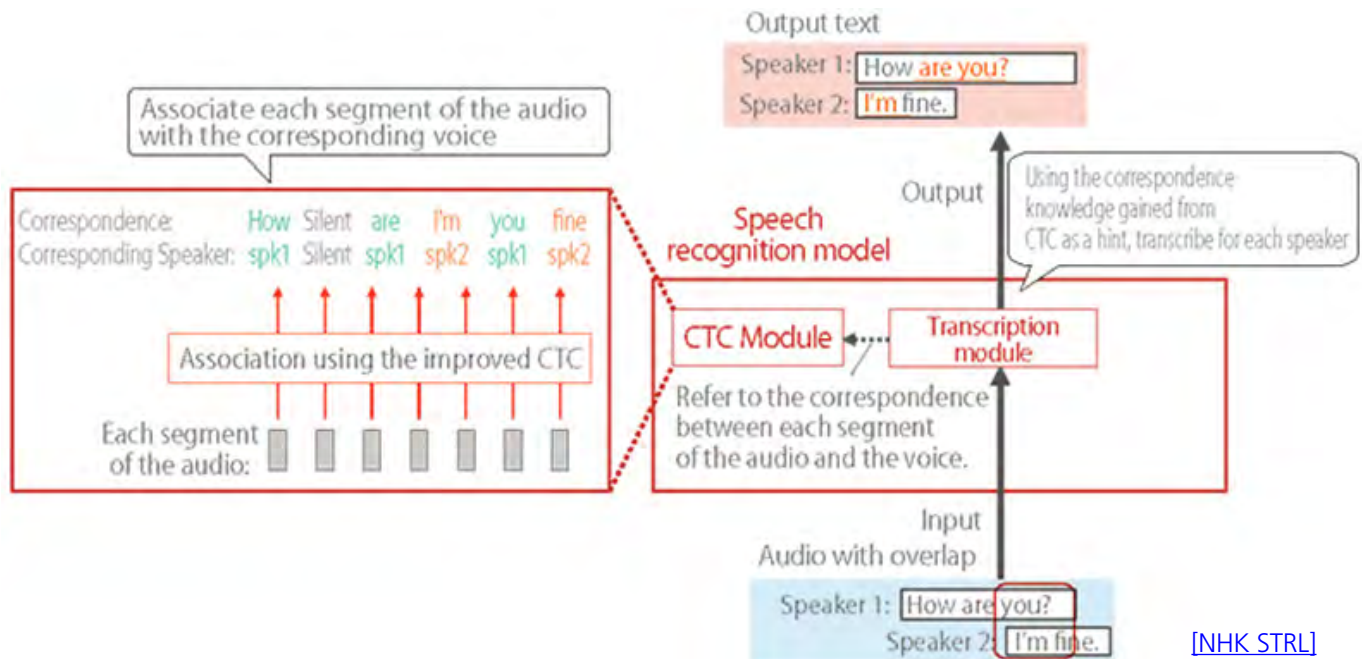


Figure 3: Learning behavior of this technology

RADIO TELEVISYEN MALAYSIA (RTM) LAUNCHES METAVERSE PLATFORM

Radio Television Malaysia (RTM) has adopted Metaverse technology to expand its broadcasting reach and enhance listener engagement. By integrating 34 RTM radio stations into a virtual environment, the platform allows users to interact with each other and their digital surroundings through avatars.

RTM Radio Program Division Director, Saifuzzaman Yusop, emphasized the organization's commitment to innovation, highlighting that the adoption of Metaverse technology will solidify RTM's position as a leader in Malaysian radio broadcasting. He noted that this initiative would enable RTM stations to broadcast from any location in the future. The RTM Metaverse integrates

virtual reality (VR), augmented reality (AR), blockchain technology, and

artificial intelligence (AI) to deliver an immersive experience. Furthermore, RTM radio remains dedicated to its mission of educating the public, particularly regarding climate change, by raising awareness and promoting preparedness for potential disasters. [\[Berita RTM\]](#)

MEASAT PARTNERS WITH SPACESAIL TO ADVANCE LEO SATELLITE SERVICES

MEASAT Global Berhad (MEASAT), Malaysia's leading satellite solutions provider, has signed a Memorandum of Understanding (MoU) with Shanghai Spacesail Technologies Co. Ltd. (SPACESAIL) to explore potential collaborations in satellite broadband and emerging technologies. The MoU, which was exchanged in Shanghai, was represented by MEASAT's Chief Operating Officer, Yau Chyong Lim, and SPACESAIL's President, Dr. Jason Zheng.

The agreement centers on integrating SPACESAIL's Low Earth Orbit (LEO)

broadband services, specifically its Thousand Sails mega constellation, with MEASAT's Geostationary Orbit (GSO) satellites. Furthermore, the collaboration will explore Direct-to-Device (D2D) communications, satellite-based Internet of Things (IoT) services, Earth Observation (EO) capabilities, and a joint study on Q/V-band high-frequency transmission to mitigate rain fade. Malaysia's Communications Minister, YB Fahmi Fadzil, emphasized the importance of this partnership in the context of Malaysia-China diplomatic relations, highlighting its potential to foster technological advancement and stimulate economic growth. As Malaysia chairs ASEAN in 2024, this collaboration also underscores the nation's technological leadership in the region.

Yau Chyong Lim articulated MEASAT's commitment to utilizing a multi-orbit satellite network to bridge digital divides and enhance connectivity, particularly in remote areas. Dr.

Jason Zheng highlighted SPACESAIL's objective of expanding global broadband access and advancing satellite technology through close collaboration with MEASAT and Malaysian authorities. SPACESAIL's Thousand Sails mega-constellation has successfully launched 72 satellites, with plans to expand to over 15,000. This initiative aims to deliver low-latency, high-speed, and reliable satellite broadband services globally. [\[MEASAT News\]](#)

KBS ENHANCES FLAGSHIP OB VAN WITH LAWO'S IP-BASED AUDIO

Korean Broadcasting System (KBS) has modernized its HDTV-4 outside broadcast (OB) van by incorporating IP-based audio solutions from Lawo, thereby enhancing its live production capabilities. This upgrade, carried out by the systems integrator Dongyang Digital (DYD), significantly improves flexibility, performance, and efficiency for high-end event coverage.

The HDTV-4, KBS's largest OB vehicle equipped with a 16-camera setup, has undergone a comprehensive overhaul of its audio infrastructure. The station replaced its legacy equipment with a Lawo mc²56 Audio Production Console, an A__UHD Core audio engine, a Power Core Gateway, and an A__stage64 stagebox, seamlessly integrating these components with its existing systems.

Choelho Park, which oversees sound management in the HDTV-4, emphasized the necessity for adaptability, as each production demands customized configurations. The mc²56 console, engineered for high-pressure environments, supports SMPTE ST 2110, AES67, and Ravenna, ensuring seamless integration into KBS's IP-based ecosystem. Given KBS's diverse production portfolio – including sports, concerts, and entertainment – the upgraded system efficiently manages a variety of audio signals. The mc²56 console facilitates seamless handling of both external and internal sources, ensuring high-quality output across different broadcast formats. KBS selected Lawo for its reliability, stability, and compatibility with the van's spatial constraints, as well as its integration with the VSM control system. Jung-Yeoul Lee from DYD emphasized that this upgrade equips KBS with a

future-proof audio setup, allowing for greater creative flexibility in content production. [\[APB News\]](#)

SAUDI BROADCASTING AUTHORITY PREQUALIFIES FIRMS FOR TV AND RADIO TOWERS PPP

The Saudi Broadcasting Authority (SBA), in collaboration with the National Centre for Privatisation & PPP (NCP), has prequalified three consortia and one company for a significant Public-Private Partnership (PPP) project aimed at modernizing and expanding the Kingdom's TV and radio infrastructure.

The project will involve the development and operation of SBA's broadcasting towers across 143 locations under a 25-year Rehabilitate-Finance-Operate-Maintain-Transfer (RFOMT) contract. The prequalified entities include:

- Consortium of Alfanar Company and Albabtain Leblanc Company
- Haji Abdullah Alireza & Co Ltd (HAACO)
- Consortium of MADA International Holding and Tawal
- Consortium of Technical Links Services, Mawarid, Mediagates, TDF, and Rai Way

The Expression of Interest (EOI) notice for the project was issued in June 2024, marking a significant step in the Kingdom's efforts to improve its broadcasting infrastructure through collaboration with the private sector. [\[ABU News\]](#)

EDITSHARE TRANSFORMS MEDIA PRIMA'S NEWSROOM FOR GREATER EFFICIENCY

EditShare has played a pivotal role in transforming Media Prima's newsroom by implementing an integrated workflow solution designed to enhance speed, efficiency, and scalability. Media Prima, Malaysia's largest integrated media company, manages multiple television networks, digital platforms, and print publications, serving a vast audience every day.

This newsroom upgrade, executed in collaboration with Octopus Newsroom and Imagine Communications, was led by the systems integrator ACE Identity. The transformation focuses on EditShare's EFS 450 High Availability storage system, which

offers scalable, high-performance shared storage, and EditShare FLOW, an asset management platform that enhances content access and collaboration. Imagine Communications enables seamless playout, while Octopus Newsroom improves editorial planning and story management. The newsroom now operates in full HD, supporting both file-based and baseband ingest. Journalists can edit stories within Octopus Newsroom using EditShare's sequence-based tools before finalizing content in Adobe Premiere Pro via EditShare FLOW's integration. The final output is managed through Imagine Communications' infrastructure, ensuring smooth on-air delivery.

ACE Identity's expertise in broadcast solutions was instrumental in integrating these technologies into a cohesive system. EditShare emphasized its commitment to open media workflows, highlighting its collaboration with industry leaders to deliver flexible and scalable solutions tailored to Media Prima's needs. [\[C+T\]](#)

FIJIAN BROADCASTING CORPORATION LEADS IN DISASTER RESILIENCE

The Fijian Broadcasting Corporation (FBC) officially presented its Resilience Action Plan to Kamal Kishore, the Special Representative of the Secretary-General for Disaster Risk Reduction. This milestone makes FBC the first broadcaster in the South Pacific to develop a comprehensive disaster preparedness and response plan. The handover occurred at FBC headquarters during a roundtable discussion as part of Kishore's visit to Fiji.

This initiative follows the Pacific Media Partnership Conference held in Suva, where members of the Asia-Pacific Broadcasting Union emphasized the significance of disaster preparedness within the media sector. FBC's efforts align with the United Nations Office for Disaster Risk Reduction's (UNDRR) objective of promoting cross-sectoral collaboration in disaster risk reduction.

Kishore emphasized the crucial role of broadcasters during disasters, noting that FBC's plan guarantees the ongoing dissemination of early warning messages to at-

risk communities. He highlighted the importance of broadcaster preparedness, as the ability to deliver warnings can be hindered during extreme events. FBC's plan was developed following its participation in the "Media Saving Lives" initiative organized by UNDRR and the World Broadcasting Union in 2021. This initiative involved 35 FBC staff members from various departments and was informed by lessons learned from Cyclone Winston in 2016, which severely disrupted FBC's operations due to extensive flooding. After thorough consultations, the plan became operational in late 2024, establishing FBC as a leader in disaster resilience among Small Island Developing States.

The plan emphasizes four key areas: Leadership & Development, Media Awareness Content, Stakeholder Engagement, and Safety & Sustainability. It establishes a permanent Resilience Committee and an Incident Management Team, along with contingency broadcast stations and emergency schedules. FBC's leadership emphasized how the plan improves operational sustainability and public safety through staff training, infrastructure protection, and the delivery of emergency content. This initiative supports broader disaster resilience efforts in the Pacific, contributing to the strategic objectives of UNDRR and the UN Secretary-General's Early Warnings for All Initiative. [\[UNDRR\]](#)

RADIO NEPAL AND NEPAL TELEVISION MERGE AS PUBLIC SERVICE BROADCASTING NEPAL

Nepal has officially launched its public service broadcasting system with the merger of Radio Nepal and Nepal Television into a single entity, Public Service Broadcasting Nepal (PSBN). This milestone follows the enactment of the Public Service Broadcasting Act, which aims to create a more integrated and efficient broadcasting framework.

Dr Mahendra Bista has been appointed as the Executive Chairman of the PSBN Board of Directors. With extensive experience in journalism and media leadership, he is expected to steer the organization's growth and enhance its influence. The legislation, which has been in development for

two decades, was initially inspired by global public broadcasting models such as the BBC and NHK. However, the final bill does not provide full autonomy, as a government-led council under the Minister for Communications and Information Technology will oversee policy decisions.

PSBN will operate under a three-member board, which will include a government-appointed chairperson, a first-class officer from the ministry, and a female representative. The Executive Chairperson will be selected through a public application and interview process for a four-year term. Additionally, the new agency will have an independent fund to manage grants and revenue. [\[Radioinfo\]](#)

VOV AND CMG STRENGTHEN MEDIA COOPERATION IN THE DIGITAL ERA

Vietnam's Voice of Vietnam (VOV) and China Media Group (CMG) have strengthened their media cooperation following a recent working session in Beijing between VOV Vice President Pham Manh Hung and CMG Deputy Editor-in-Chief Fan Yun. During the meeting, Hung emphasized Vietnam's ongoing efforts to streamline its organizational structure, including the restructuring of media agencies. He highlighted the importance of exchanging development strategies in the digital era to strengthen the roles of VOV and CMG as key media organizations, leveraging technology to enhance their influence.

Fan reaffirmed CMG's commitment to its long-standing partnership with VOV and expressed interest in extending their cooperation agreement. He outlined potential collaboration opportunities for the 2025 Year of Vietnam-China Humanistic Exchange, which include journalist exchanges, joint news coverage of major events, and the sharing of expertise in digital media and AI applications. Both parties concurred that enhanced cooperation would effectively convey the evolving narratives of Vietnam and China. Hung emphasized VOV's commitment to highlighting China's achievements while also encouraging CMG to broaden its coverage of Vietnam's development for the Chinese audience.

Discussions also addressed digital transformation in radio and television broadcasting, as well as the opportunities and challenges presented by artificial intelligence in traditional media. Both organizations committed to sharing their experiences in adopting new technologies for content production and distribution, thereby further strengthening bilateral media collaboration. [\[VOV\]](#)

TVU NETWORKS CELEBRATES 20 YEARS OF INNOVATION AT NAB 2025

TVU Networks, a leading developer of live video production and cloud-based media solutions, is celebrating its 20th anniversary at NAB Show 2025. Since its establishment in 2005, the company has revolutionized live video production by leveraging IP-based technology, mobile connectivity, and cloud services. This innovation enables broadcasters and content creators to deliver high-quality live video without the constraints of traditional infrastructure.

At NAB 2025, TVU will unveil a groundbreaking innovation designed to reduce the costs associated with cloud-based live workflows, further solidifying its commitment to delivering scalable and efficient media solutions. Attendees are invited to visit TVU's booth (#W2120) in the West Hall to explore these advancements and enhance their cloud-based operations. TVU will also showcase new applications recently integrated into its cloud platform, including a media analyzer, scan conversion, and SCTE services, along with AI-powered features designed to enhance productivity. Additionally, TVU MediaHub, an advanced cloud routing solution launched in 2024, returns with expanded features after playing a key role in significant cloud productions, such as the BBC's extensive election coverage and France Télévisions' disaster recovery solution for the 2024 Games in Paris.

Founder and CEO Paul Shen emphasized that TVU's innovations are driven by customer and industry needs, highlighting the company's commitment to shaping the future of live production through collaboration. [\[C+T\]](#) ■

DIGITAL BROADCASTING *Updates*

ATSC STANDARDS UPDATE: A/345, "VVC VIDEO," FINALIZED

The document A/345 outlines the video coding constraints for ITU-T Rec. H.266 | International Standard ISO/IEC 23090-3 ("VVC") when utilized for video compression in the ATSC 3.0 Digital Television System. Other video coding technologies within the ATSC 3.0 system are addressed in separate ATSC standards. A/300, "ATSC 3.0 System," provides references to the relevant video coding technology documents, while the signaling of the video compression technology in use is specified in A/331, "Signaling, Delivery, Synchronization, and Error Protection."

Key features of A/345 include:

- VVC Main 10 Profile, aligned with MPEG CMAF, with additional constraints.
- Support for VVC Levels up to 6.1, enabling Ultra HD resolutions (4K up to 120fps and 8K up to 60fps).
- Optional High Dynamic Range (HDR) support, including PQ, HLG, static HDR metadata, and dynamic HDR metadata solutions such as DM App #1, DM App #4, and SL-HDR1.
- Optional Spatial Scalability, utilizing the Multilayer VVC Media Profile and aligned with CMAF.
- Optional scalability with LCEVC, also aligned with CMAF.
- Optional support for AFD and Bar Data allows for aspect ratios beyond 16:9, including 9:16 "portrait mode."
- Optional use of full-range video.

Earlier versions of A/345 were released as a Candidate Standard, a designation assigned to documents that have undergone extensive review by a Specialist Group. The transition to Candidate Standard serves as an invitation for external implementation and technical feedback. During this phase, the Specialist Group is tasked with gathering implementation experiences and defining expectations for deployment. [\[ATSC\]](#)

HIGH-QUALITY 360-DEGREE IMAGING TECHNOLOGY

Science & Technology Research Laboratories (STRL) is advancing research in immersive media by leveraging 360-degree video as an evolution of traditional 2D video, with the aim of redefining the media experience. This research seeks to transition from passive viewing to an interactive medium, allowing viewers to fully engage with high-quality 360-degree imagery that transcends conventional television.

To achieve immersive media, STRL has developed a prototype high-quality 360-degree camera and recording system that can capture spherical 360-degree images at an impressive 30K pixel resolution through the integration of multiple camera units.

Challenges in Capturing 360-Degree Video

Capturing and displaying high-quality 360-degree video necessitates a 30K × 15K pixel video format. However, there has yet to be a single-shot acquisition method compatible with this resolution. Traditionally, spherical images have been produced by stitching together footage from multiple cameras, a process that is prone to misalignment.

To overcome these challenges, a high-quality 360-degree camera was designed based on three key criteria:

1. The ability to capture omnidirectional images at 30K × 15K resolution.
2. The capability to maintain broadcast-quality resolution across the entire image.
3. A reduction in stitching points and misalignments can be achieved by minimizing the distance between the principal points of the lenses.

Camera Design, Prototyping, and Capturing Experiments

The prototype camera (Fig. 1, left) was developed through an iterative design process that included the selection and layout optimization of the layout for the element cameras. The final design features a pentagonal prism layout with six element cameras: five 9K × 7K cameras arranged horizontally and one zenith-facing camera. This configuration reduces stitching points to five between the horizontal cameras and one between the zenith camera and each horizontal unit.

To further minimize misalignment, the horizontally arranged cameras utilize bent-type lenses and are positioned at an angle, which reduces the distance between the principal points to approximately 6 cm.

The recording equipment (Fig. 1, right) was designed to manage the significant data output from each elemental camera. Each camera is connected to a workstation via Ethernet with a transmission bandwidth of 100 Gb. Figure 2 illustrates an example of footage captured with the prototype, demonstrating that the camera successfully meets the three specified requirements. Its compact design also enables use with specialized equipment, such as cranes, and allows for mobile capturing from cruise ships and other moving platforms.

Future research will concentrate on refining capture techniques to enhance immersive media experiences further.

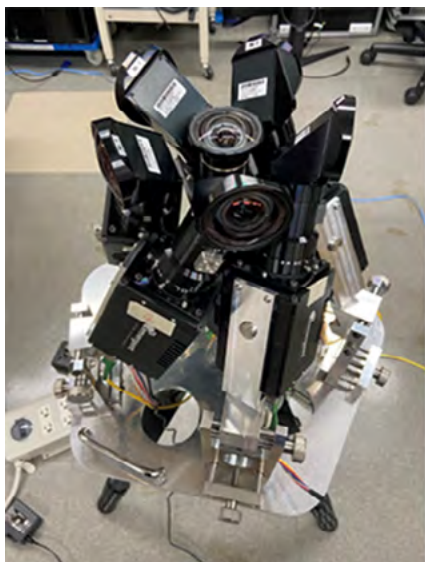


Figure 1: Prototype high-quality 360-degree camera (left) and recording equipment (right)



Figure 2: Example of video acquired during the capturing experiment (Hotel Europe)

[\[NHK STRL\]](#)

CLOUDFLARE FIRST MAJOR CDN TO IMPLEMENT CONTENT CREDENTIALS

Cloudflare, Inc., a leading connectivity cloud company, has introduced a one-click solution for content creators and publishers to seamlessly preserve the digital history of images. This feature tracks key details such as image creation, authorship, edits, and resizing across the Cloudflare network. By embedding a digital "nutrition label," referred to as Content Credentials, directly into an image, creators can receive proper credit for their work, while consumers can easily verify its origin and any modifications made.

Content Credentials is built on the standards established by the Coalition for Content Provenance and Authenticity (C2PA), an open technical framework that allows publishers, creators, and consumers to trace the origins of media. Furthermore, Cloudflare has become a member of the Content Authenticity Initiative (CAI), an Adobe-led global community of over 4,000 members that work to

establish Content Credentials as the standard for media provenance and authenticity.

While the Internet enables instant photo sharing, verifying an image's authenticity remains a challenge, especially with the rise of generative AI, which makes it easier than ever to create realistic but deceptive images. Whether it involves a viral celebrity endorsement or an alleged UFO sighting, determining whether an image was captured by a camera or generated by AI is essential for informed decision-making.

"The future of the Internet depends on trust and authenticity," stated Matthew Prince, co-founder and CEO of Cloudflare. "By integrating Content Credentials across our global network, we can assist media and news organizations in verifying authenticity and maintaining ownership of their work, regardless of where it travels online. This initiative is not merely about securing individual images; it is about providing publishers with the tools necessary to uphold trust in the

age of AI."

Andy Parsons, Senior Director of Content Authenticity at Adobe, emphasized Cloudflare's role in enhancing content integrity: "Cloudflare's implementation of Content Credentials is a significant advancement, ensuring that these trust signals are consistently available at the edge. As generative AI and deepfakes become increasingly prevalent, this solution helps users to engage confidently with digital content while allowing creators to maintain proper attribution."

Cloudflare Images users can now enable the "Preserve Content Credentials" option with a single click, ensuring that secure metadata remains intact across the global Cloudflare network. Any image resized or modified using Cloudflare Images will have those transformations recorded using public key cryptography. Viewers and downloaders can then verify the image's digital history using Adobe's Content Authenticity Inspect tool.

[\[Content+Technology\]](#)

DRM MEMBERS INTRODUCE UNIQUE DIGITAL MULTI-STANDARD SUPPORT MODULE

RF2Digital and Elements Innovation, both members of the DRM (Digital Radio Mondiale) Consortium, have successfully developed a next-generation radio module that supports multiple digital broadcasting standards.

The new module is available in two configurations: one that supports DRM/DAB/FM/AM and the other that supports DRM/CDR/FM/AM. This development represents a significant advancement in digital radio technology. CDR, or Chinese Digital Radio, along with DRM, is expected to be the adopted standard for digital radio broadcasting in China.

A key feature of this next-generation radio module is its comprehensive support for DRM Band III, making it an ideal solution for markets such as Indonesia, China, South Africa, and other regions considering the adoption of various digital radio standards. Designed for flexibility in evolving broadcasting environments,



the module is highly competitive in the global digital radio market. It supports both analog and digital audio outputs, delivering exceptional sound quality. Its compact design facilitates integration into a wide range of consumer electronic products, including in-vehicle infotainment systems, home radios, and portable audio devices.

The module's tuner technology is constructed entirely from automotive-grade components, ensuring exceptional reception performance. This advanced technology facilitates stable and reliable radio reception, even in challenging signal conditions, making it an excellent choice for both automotive applications and high-performance audio systems.

With this new module, RF2Digital and Elements Innovation aim to strengthen their presence in the digital radio market. Moving forward, the companies plan to continue developing innovative radio solutions, expand collaborations with global broadcasters and OEM manufacturers, and contribute to the advancement of next-generation radio technology. [\[DRM\]](#)

BRIGHTCOVE LAUNCHES AI CONTENT SUITE, TO ENHANCE CONTENT CREATION AND PRODUCTION FOR CUSTOMERS

Brightcove has officially launched its AI Content Suite following a successful customer pilot program in 2024. This innovative suite introduces AI-powered tools designed to enhance the impact of video content,

improve business productivity, and streamline content creation for greater audience engagement.

The AI Content Suite includes three essential capabilities: content creation, metadata optimization, and translation. These features automate video production, enabling content creators to maximize their reach without incurring additional workload.

"The AI Content Suite is a powerful tool for anyone looking to enhance the impact of their video content without increasing their workload," said Scott Levine, Chief Product Officer at Brightcove. "Embedded within our video platform, the suite seamlessly enables a video creation multiplier effect without the need for external tools".

Key features of the Brightcove AI Content Suite include:

- **Automated content creation:** Quickly converts long-form content into short-form clips, highlight reels, and themed chapters, thereby enhancing engagement across various platforms.
- **Format adaptation:** Converts horizontal videos into vertical formats to optimize content for mobile devices and social media platforms.
- **Metadata enhancement:** Auto-generates titles, tags, and descriptions to enhance discoverability and engage the audience effectively.
- **Translation capabilities:** Expand global reach with AI-powered translation into multiple languages (coming soon).

Developed in close collaboration with customers, the AI Content Suite addresses industry demands for enhanced audience engagement and improved efficiency in video content production.

"The AI Content Suite transformed our clip and trailer production process. What used to take hours now takes only minutes, significantly reducing costs and allowing us to focus more on creativity and strategy", said Remi Brunier, Director of Product and UX

at STV, Scotland's leading peak-time channel.

Brightcove plans to expand its AI Suite by introducing future features, including text-to-video capabilities, as well as AI-driven interactivity, personalization, and recommendations. These enhancements aim to further engage audiences and foster loyalty.

Committed to security and the ethical use of AI, Brightcove ensures that all AI Content Suite tools are supported by its robust security framework and AI Pledge. This guarantees that customer content and personal data will never be used to train AI models without explicit consent. [\[Brightcove\]](#)

OPEN BROADCAST SYSTEMS LAUNCHES 5G ASSIST TO ENHANCE REMOTE PRODUCTION OVER PUBLIC INTERNET

Open Broadcast Systems, a leader in low-latency video encoding and decoding, has introduced 5G Assist, an innovative solution designed to enhance the reliability and performance of remote production workflows over public internet connections.

5G Assist utilizes a secondary network, such as 5G or Starlink, to enhance the primary internet connection by facilitating additional packet recovery processes. This supplementary pathway improves data integrity and helps mitigate packet loss, a common challenge when relying on shared internet resources. Consequently, this leads to a significant reduction in latency and increased reliability for live and remote production environments.

"Using the public internet for remote production offers clear benefits in flexibility and cost", said Kieran Kunhya, Founder and CEO of Open Broadcast Systems. "However, the inherent instability of public networks can result in packet loss, which compromises video quality. 5G Assist changes the industry by offering broadcasters a hybrid solution – merging the affordability and flexibility of public internet with the performance and low latency that professional remote productions require".

5G Assist is now available as part of Open Broadcast Systems' suite of low-latency, software-based encoders and decoders. This addition simplifies the process for broadcasters to deliver high-quality video over any network, including less reliable public internet infrastructure. [\[Newscaststudio\]](#)

EBU R 168: SAFEGUARDING CONFIDENTIALITY WITH INFORMATION CLASSIFICATION IN MEDIA COMPANIES

The EBU's Media Cybersecurity working group has released guidance to assist media companies in classifying data, enhancing information management, and protecting critical assets from theft and leakage. As the use of AI in organizations continues to grow, implementing systematic data protection measures has become increasingly vital. EBU R 168 offers a classification framework based on the potential damage caused by data misuse and is available free of charge to EBU members and system vendors.

Media organizations manage

extensive amounts of sensitive information, including personally identifiable information, business records, media assets, and journalistic research. Unauthorized access to or tampering with such data can lead to legal, technical, and operational risks, compromise critical infrastructure, and even jeopardize the safety of journalists and staff. The increasing prevalence of artificial intelligence further underscores the need for safeguards against data scraping and unintended data ingestion.

EBU R 168 recommends categorizing information based on its potential impact if exposed, in order to ensure appropriate protective measures. The four proposed information classes are:

- **Public:** Data that is already accessible to the public, including published articles and press releases.
- **Restricted:** Less sensitive data that, if leaked, could disrupt operations. Examples include internal reports and workflows. It is recommended to store this data on company-

controlled infrastructure to ensure its protection.

- **Confidential:** Data whose exposure could result in significant harm, such as internal communications or unreleased media content. Protections for this type of data include prohibiting storage on personal devices, implementing encryption both at rest and in transit, and ensuring clear metadata labelling.
- **Strictly Confidential:** Highly sensitive data that, if disclosed, could result in significant legal or business repercussions or pose personal risks to employees. Protective measures include a strict prohibition on storing such data on personal devices, encryption using keys that are unknown to the provider, and clear labeling of metadata.

By implementing this classification system, media organizations can enhance data security and reduce the risks associated with unauthorized access or misuse. [\[EBU News\]](#) ■

How to contribute to the Technical Review

Would you like to contribute an article to the ABU Technical Review?

We welcome submissions from everyone. This is an excellent opportunity to showcase your organisation's work and gain significant exposure.

We are open to a variety of articles, including research papers, details on new technical developments, or any content that will interest TR readers. The Technical Review, our quarterly publication, is distributed to all ABU members, industry partners, and technical staff, as well as international organisations such as the ITU, other broadcasting associations, and universities.

While it primarily targets engineers, it also features general interest news stories. It contains articles on new technologies, developments in broadcasting, member innovations, and other materials of interest to engineers.

Your article can be of any length and written in any style. Should you include photos, please ensure they are high resolution (at least 2 megapixels). Although we cannot offer payment, we do provide a free half-page advertisement for select articles, especially those covering technical research. This advertisement will be placed immediately after your article, giving your organisation extra publicity.

Additionally, articles by ABU members on Case Studies, Research, and Practical Implementations are eligible for the annual ABU Technical Review Prizes, which include a cash prize and a certificate.



You can view previous issues of the Technical Review on the ABU website's main page or directly at: <https://www.abu.org.my/technical-review/>

We look forward to considering your submission. If you need more information, please contact: balqis@abu.org.my

Equipment Trends

LV5600W : WAVEFORM MONITOR



The LV5600W is a precision measurement tool designed to meet all video and audio testing requirements. Incorporating the latest hardware and software enhancements, the 2024 version introduces key new capabilities, including 12G-SDI support, video over IP up to 25G, WebRTC-based remote operation (WebRCT), HDR/SDR conversion using 3D LUT, and false color display functions.

This "True-Hybrid" waveform monitor supports a wide range of formats, including 4K/HD/SD-SDI and UHDTV/HD/SD IP signals, making it ideal for facilities transitioning between traditional and IP-based workflows.

Featuring a 7-inch touchscreen display in a compact 3RU enclosure with a built-in AC power supply, the LV5600W provides intuitive and efficient access to waveform, vector, picture, audio, and eye pattern displays—enabling precise and comprehensive signal analysis. The system also includes detailed status monitoring tools, error logs, and an ANC Data Viewer, providing engineers with everything needed to quickly identify and troubleshoot issues.

The LV5600W supports embedded audio within SDI and IP streams, as well as discrete digital and analog audio inputs. Key audio features include:

- Multi-channel audio level meters
- Lissajous display
- Loudness monitoring
- Audio status and error indicators

Combining a responsive touchscreen with dedicated buttons and knobs, the LV5600W offers a highly flexible user interface. Users can define custom screen layouts, allowing quick access to essential tools and efficient completion of complex measurement and monitoring tasks.

Key Features:

- WebRTC Remote Control (WebRCT)
- True-Hybrid SDI/IP Workflow Support
- 4x IP Multistream Monitoring
- Customizable Display Layouts
- HDR Monitoring and Full Range SDR Support
- TALLY Integration
- Video Noise Meter
- Dolby-Ec Monitoring
- 3D-LUT HDR/SDR Conversion
- Focus Assist (006A)
- False Color Display

[\[Leader\]](#)

BLACKMAGIC AUDIO MONITOR 12G G3: COMPACT POWER FOR BROADCAST AUDIO MONITORING

The Blackmagic Audio Monitor 12G G3 is a compact yet powerful 1RU rack-mount audio monitoring solution built for professional broadcast

environments. Designed to meet the demands of modern hybrid workflows, it features a built-in 10G Ethernet SMPTE-2110 IP input, removing the need for external converters and allowing seamless integration into IP-based systems. This third-generation model delivers high-performance capabilities, including a large precision audio meter with accurate ballistics, a 12G-SDI input for SD, HD, and Ultra HD formats, and a wide range of audio and video input/output options to support diverse signal monitoring needs.

Among its standout features are its compact 1RU design, a stereo speaker system with subwoofers, support for 12G-SDI and HDMI 2.0 output, and the ability to handle a comprehensive range of video standards, including SD, HD, 2K, Ultra HD, and 4K DCI. It is equipped with integrated RGB LED meters capable of displaying VU, PPM, and loudness levels, offering precise audio feedback for engineers and technicians. It also supports analog, digital AES/EBU, and embedded audio inputs, and includes USB-C and Ethernet ports for configuration and firmware updates.

The connectivity options on the device include a single SDI video input and a reclocked SDI video loop output, one HDMI 2.0 output, two XLR and two



RCA Hi-Fi analog audio inputs, an AES/EBU digital audio input via XLR, and a 6.5mm headphone output. For embedded audio, it supports up to 16 channels via SDI and 8 channels via HDMI. The unit also includes a 10Gb/s RJ-45 Ethernet port for IP video input and device management, alongside USB-C for updates.

In terms of video format compatibility, the monitor supports a wide array of standards: SD formats like 525i59.94 NTSC and 625i50 PAL; HD formats including 720p, 1080i, 1080p, and PsF; 2K DCI at 23.98p, 24p, 25p, and their PsF equivalents; Ultra HD at up to 2160p60; and 4K DCI at up to 60 fps. It complies with a wide range of SMPTE standards, such as 2110-20/21/30/40, 2082, and 2084, ensuring compatibility with current industry protocols.

For audio monitoring, the device provides multi-channel metering using 27-segment RGB LED displays with selectable metering options. It offers flexible input support, including both balanced and unbalanced connections, and can display embedded audio from SDI and HDMI sources. A 2.2-inch color LCD screen provides users with at-a-glance input signal formats, audio types, and channel information. The device's control interface includes push buttons and a volume scroll wheel, providing intuitive user operation.

Built for IP video workflows, the Audio Monitor 12G G3 is fully SMPTE-2110 compliant, supporting IGMP v2, PTP v2 (IEEE 1588-2008), and NMOS IS-04 and IS-05 for discovery and control. The monitor also supports peer-to-peer control via mDNS/DNS-SD and features the Blackmagic IP10 codec, enabling conversion from 12G-SDI to 2110 IP video.

Power is supplied through an internal 100-240V AC power unit with typical power usage rated at 55W. It is designed to operate in environments ranging from 0° to 40°C, with a storage tolerance between -20° to 45°C, and relative humidity support from 0% to 90% non-condensing.

[\[Blackmagic\]](#)



DRAGONFLY V 5G: ULTRA-COMPACT HEVC WIRELESS VIDEO TRANSMITTER FOR NEXT-GEN BROADCAST APPLICATIONS

The DragonFly V 5G is a revolutionary miniature wireless video transmitter designed to deliver high-quality, low-latency video in real time from a wide range of portable and point-of-view (POV) camera setups. Developed by Vislink, this compact device incorporates HEVC (H.265) video encoding, 5G and LTE connectivity, and a lightweight design tailored for applications such as UAVs, body-worn cameras, sports broadcasting, surveillance, and electronic news gathering (ENG).

Engineered with portability and efficiency in mind, the DragonFly V 5G weighs just 82 grams and features a minimized form factor with low power consumption, ensuring reduced heat generation and extended battery life. It supports video formats up to 1080p at 50/60 fps, making it a flexible solution compatible with most live broadcast workflows. The transmitter includes options for HD-SDI or HDMI inputs, offering compatibility with a wide array of miniature cameras. Its reliable transmission capabilities, even in crowded or high-interference environments, are enabled by advanced bonding connectivity and support for both public and private 5G networks, in addition to Wi-Fi.

The DragonFly V 5G also provides control and configuration options via RS232 and 2.4 GHz Wi-Fi, allowing for remote setup and monitoring. The device can integrate with OEM platforms via an available MiPi interface, further expanding its adaptability for custom applications.

Key Features:

- Supports 5G, LTE, and Wi-Fi transmission
- HEVC 1080p 50/60 HD encoding with ultra-low latency
- HDMI or HD-SDI camera inputs (based on variant)
- Lightweight at just 82 grams
- Wi-Fi and RS232 control interfaces
- Low power consumption for extended mobile use
- MiPi interface (available on request) for OEM integration

[\[VISLINK\]](#)

MARSHALL CV730-BHN/WHN: POWERFUL 30X UHD PTZ CAMERA FOR IP AND BROADCAST WORKFLOWS

The Marshall CV730-BHN/WHN PTZ camera delivers professional-grade imaging performance with a combination of ultra-high-definition video, versatile connectivity, and AI-powered automation. Designed for broadcast, production, live events, education, government, and worship applications, the CV730 series integrates seamlessly into modern IP-based and hybrid workflows.

At the core of the CV730 is a 9.2 million-pixel Sony UHD sensor (1/1.8") with a square pixel array, capable of capturing crisp 4K images at up to 3840x2160p60 resolution. The camera features an impressive 30x optical zoom (6.5mm to 202mm), starting with a 65° horizontal angle of view (H.AOV), allowing for flexible framing from wide shots to tight close-ups – all with minimal loss in quality.

One of the key enhancements in this camera is its AI-powered Smart Auto-Focus System, which intelligently maintains focus on faces and eyes, ensuring subjects stay sharp even with



movement. The camera also features a pan range of 340° and a tilt range of 120°, with selectable transition speeds from 5° to 300° per second, offering smooth and precise camera control.

For output, the CV730 supports simultaneous 12G-SDI and HDMI 2.0, alongside comprehensive IP streaming options such as Full NDI®, NDI|HX3, NDI|HX2, SRT, and HEVC. This level of compatibility allows for easy integration into a wide range of professional video environments. The camera also supports all standard HD and UHD resolutions, including 1080p, 1080i, and 720p, and frame rates including 59.94, 50, 29.97, and 25 fps.

Low-light performance is a standout feature, with a minimum illumination of 0.05 lux at F1.6 (50IRE), making it suitable for dimly lit venues and evening broadcasts. For audio input, a 3.5mm TRS stereo connector is provided via the I/O cable, supporting both mic and line-level inputs.

The CV730 is powered via a 12V power supply (included) or PoE++, simplifying installation by reducing cable requirements. For enhanced synchronization in multi-camera setups, the camera supports Genlock input via Black Burst or Tri-Level Sync, with optional USB 3.0 workflow for direct integration into PC-based platforms.

Key Features

- 9.2 MP Sony UHD sensor with 1/1.8" square pixel array



30x optical zoom lens (6.5mm–202mm, 65° H.AOV)

- AI-based Smart Auto-Focus for face and eye detection
- 340° pan / 120° tilt with variable speed control (5°–300°/sec)
- UHD (4K) up to 3840x2160p60 and all standard HD formats
- Simultaneous 12G-SDI, HDMI 2.0, and IP output
- Full NDI®, NDI|HX3, HX2, HEVC, SRT, and IP codecs
- Low-light performance down to 0.05 lux
- PoE++ and 12V DC power options
- Mic/Line audio input via 3.5mm TRS
- Genlock support via Black Burst or Tri-Level Sync
- Optional USB 3.0 workflow

Ideal For

- Broadcast & Studio Production
- House of Worship
- Sports and Live Events
- Education and Lecture Capture
- Courtrooms and Government Use
- Stage and Conference Monitoring
- Remote Observation and Confidence Monitoring

[\[Marshall\]](#)

DJI MIC MINI: MINI WIRELESS MICROPHONE



- DJI Mic Mini is a wireless microphone that delivers powerful performance in an ultralight body. It ensures stable transmission of high-quality audio, boasts extended battery life, and offers direct connectivity with products in the DJI OsmoAudio™ ecosystem. Capture rich, detailed sound to elevate your content creation experience. With a simple flip of the case, you're ready to add professional-grade audio to any project.

The DJI Mic Mini Transmitter is compact and ultralight, weighing only 10 g, making it comfortable to wear and discreet. With multiple wearing options – such as magnetic attachment and clip-on – it won't weigh down your collar or flip outward, even on thin T-shirts, ensuring a more polished on-camera appearance.



The compact DJI Mic Mini features an innovative design for effortless storage. The charging case neatly accommodates two transmitters, one receiver, mobile phone adapters, and windscreens. Notably, the windscreens can remain attached to the transmitters when stored. The entire set is both convenient to use and easy to transport.

The DJI Mic Mini supports omnidirectional audio recording, and the receiver can connect with two transmitters simultaneously. Even when capturing multiple sound sources, the mic excels at reproducing detailed, high-quality audio.

It offers two levels of noise cancellation to suit different environments. The Basic level is ideal for quiet indoor settings, reducing background noise from fans, air conditioning, and reverb while

preserving vocal clarity. The system supports both Mono and Stereo (dual-channel) recording. Audio from the two transmitters can be output separately or combined into a single track, providing greater flexibility in post-production.

Audio gain can be quickly adjusted in five levels using the receiver's dial, ensuring convenient and efficient operation. The transmitter and receiver offer maximum operating times of 11.5 and 10.5 hours, respectively. A fully charged case provides approximately 3.6 full recharges, delivering up to 48 hours of total usage – ideal for long shoots, interviews, and other intensive recording scenarios.

The receiver is compatible with cameras, smartphones, computers, and tablets. When connected to a camera via the Camera Audio Cable (3.5mm TRS), it supports synchronized power on/off with the camera. When connected to a smartphone, it enables external playback without needing to unplug and can be powered by the phone. Additionally, when connected to both a smartphone and a power source via the USB-C port, the receiver and smartphone can be charged simultaneously during use. [\[DJI\]](#)

APUTURE STORM XT52

Aputure redefines high-output lighting with the STORM XT52, a groundbreaking 5,200W tunable white point source LED fixture that surpasses industry standards in brightness, color fidelity, and portability. Engineered for professionals in film, broadcast, and high-end production, the STORM XT52 offers an unmatched combination of raw power and refined color science.

The STORM XT52 delivers an astonishing 41,900 lux at 5 meters with a 35° reflector, making it the brightest point source LED fixture on the market. It even exceeds the output of traditional 6,000W HMI fixtures – providing daylight-overpowering intensity with the flexibility and efficiency of LED technology.

At the heart of the STORM XT52 is Aputure's revolutionary BLAIR

light engine, which incorporates Blue, Lime, Amber, Indigo, and Red emitters. This chipset delivers the highest quality tunable white light, with an unmatched CCT range and +/- green adjustment. The addition of indigo emitters boosts the rendering of fluorescing materials, simulating the nuanced behavior of natural daylight and traditional tungstsources.

Beyond white light, the STORM XT52 excels at delivering rich, saturated color. With access to over 70% of the Rec. 2020 color gamut, the fixture provides deep creative control through Limited HSIC+ and x,y coordinate color modes. Whether simulating sunset reds, sodium vapor ambers, or creating nuanced color effects, this fixture eliminates the need for traditional gels, saving time and maximizing flexibility on set.

Despite its incredible power, the STORM XT52 is remarkably compact and portable. The lamp head weighs just 27.7 kg (61 lbs) – light enough for one person to lift and mount on a standard crank stand. The control box, similar in size to a briefcase, weighs only 13 kg (28 lbs), making it highly manageable for field deployment.

Aputure has engineered the STORM XT52 with maximum flexibility in mind. The standard 7.5-meter head cable can be extended up to 45 meters, enabling operators to rig the

lamp head in high or difficult-to-reach locations – such as cherry pickers or rooftops – while keeping control access conveniently grounded. Best of all, the STORM XT52 can run at full brightness using a standard 6,500W generator, making it ideal for both studio and location work.

The Aputure STORM XT52 is more than just a lighting tool; it's a powerful solution for creators who demand the best in brightness, control, and efficiency. Designed to outperform and outclass every other LED point source on the market, the STORM XT52 brings the future of cinematic lighting to life. [\[Aputure\]](#) ■





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DBS TEAM

audience engagement, and streamline operations.

Positioned as a catalyst for this next growth phase, DBS2025 showcased how AI is revolutionizing the entire broadcast value chain, making personalized broadcasting more efficient and impactful. In line with its forward-thinking approach, the symposium introduced a dedicated mobile app that not only provided access to the e-programme but also served as a comprehensive guide featuring speakers, exhibitors, and essential event details. Additionally, the app-enabled delegates to participate in an exclusive lucky draw.

A groundbreaking highlight of DBS2025 was the introduction of AI-driven conference sessions, where an AI avatar generated using HeyGen technology served as the host. This innovative approach not only showcased AI's capabilities in broadcasting but also demonstrated its potential to enhance audience engagement and streamline content delivery.

This year, DBS2025 showcased a robust AV rig, featuring an HP Z640 workstation, multiple video capture cards, Kameha HDMI splitters and switchers, and seven Dell Precision laptops for the presentation setup. Additionally, a range of noteworthy hardware was utilized, including the DataVideo PTZ-140, ezcip HDMI video capture device, and the Logitech Spotlight Presentation Remote. ■



ABU DBS2025 was led by Dr. Veysel Binbay, whose dedication and leadership, along with his team's tireless efforts, were instrumental in ensuring its success. Dr. Veysel conceptualized the theme for DBS2025, "Personal-Cast: Interactive Broadcasting, Tailored for You," to reflect the ongoing growth of AI and its transformative impact on broadcasting.

For the first time, DBS2025 was held at

the Wyndham Acmar Hotel, providing a dynamic platform to explore AI's expanding role in the industry. This year's theme, "Personal-Cast: Interactive Broadcasting, Tailored for You," underscores the shift toward more personalized and interactive broadcasting experiences. As the industry evolves beyond digitalization toward deeper personalization, DBS2025 examined strategies to leverage AI and emerging technologies to create customized content, enhance



Personalities & Posts

NEW TLO FROM MNB



Mr Sukhbayar has been active in the broadcast industry for approximately 15 years. His experience includes working at Media Professional LLC, where he was involved in the live transmission of events such as Mongolian national horse riding. He also played a significant role in introducing and developing live transmission social media services for the Mongolian market.

Media Professional LLC serves as the distributor of the Avivest news-gathering system in Mongolia, providing solutions utilized by several TV stations and the Mongolian Police. Mr. Sukhbayar's work extends to various TV solutions and system integration projects.

Furthermore, he has experience with EVS, including involvement in rental projects. Notably, he contributed to the successful installation of a football VAR (Video Assistant Referee) system for the Mongolian Football Association.

This background demonstrates his involvement in both the technical and implementation aspects of broadcast technology and services within Mongolia.

NEW TLO FROM KBS



Jongwon Oh is a dedicated broadcasting professional who joined the Korean Broadcasting System (KBS) in April 2014 after completing the company's talent development training program. Initially part of the Radio Technology Bureau, he contributed to the design and construction of the new KBS radio system, gaining expertise in audio broadcasting workflows.

In February 2021, he transitioned to the Technology Planning Division, focusing on nationwide transmission planning and spectrum policy coordination. Notably, he played a key role in formulating KBS's frequency strategies in alignment with national spectrum plans.

Since February 2025, Jongwon has worked in the Infrastructure Planning Division, where he focuses on infrastructure strategy and international technical cooperation, serving as the Technical Liaison Officer for KBS in collaboration with the ABU. His international experience includes participating in key events such as HFCC and ITU frequency coordination meetings and supporting IBC operations during the 2015 Gwangju Universiade Games.

To enhance his skills, he holds a Wireless Equipment Engineer License and has completed professional training in IT systems and sound production tools like Pro Tools and Logic Pro.

NEW TLO FROM PBC



Alnaser Albaba is a seasoned broadcast engineer with over a decade of experience in television engineering, media exchange, and live event coordination. Currently serving as the Engineering General Manager at the Palestinian Public Broadcasting Corporation (PBC), he oversees daily production processes, implements new broadcast technologies, and leads major rejuvenation projects.

Alnaser is a key liaison with international media networks such as ASBU, EBU, ARABSAT, and ABU, managing satellite media exchange and space segment bookings. His expertise includes IP streaming technologies and integrating platforms like LIVEU, TVU, and Skype for content delivery.

Previously, he held leadership roles managing large-scale live broadcasts for significant events. His technical skills in SNG and OB operations have ensured the success of high-profile productions.

Beyond broadcasting, Alnaser has experience in project management and technical specification development. He is proficient in cloud-based solutions, sound engineering, video editing, and new media streaming.

NEW DG FROM LNTV



Simmany Keokene is the new General Director of Lao National Television (LNTV), a position she has held since 2025. She holds a Bachelor's Degree in Public Administration from the National Academy of Politics and Public Administration (2011-2012), a Bachelor of Arts in English from the National University of Laos (2006-2007), and a Bachelor's Degree in Literature and Linguistics from the same university (1992-1996).

Keokene has held various leadership roles within the Ministry of Information, Culture, and Tourism, including Acting Director of the Cinema Department and Deputy Director of Cinema. She also served as Director of Film Management and Promotion, overseeing film content and screenings. Earlier in her career, she worked in the Documentary Film Division of the Lao Department of Cinema.

Her contributions to the industry include participating in the creation of Law No. 76/NA on film (2019) and leading significant film festivals like the Luang Prabang and Vientiane Film Festivals. For her efforts, she has received several awards, including Labour Medals and congratulatory certificates.

Through her leadership, Simmany Keokene continues to inspire a new generation of filmmakers and media professionals in Laos.

NEW DG FROM PBS



Dindo Amparo, a veteran journalist, has dedicated over three decades to fearless reporting and impactful storytelling. From Manila's newsrooms to Middle East conflict zones, his work has shaped Philippine media. His commitment to truth earned him leadership roles, awards, and recognition.

Starting at the Philippine Information Agency in 1987, he rose through DZMM Radyo Patrol and ABS-CBN, covering major national and international events. As Middle East Bureau Chief, he highlighted the struggles of overseas Filipino workers and played a key role in rescue missions. His coverage of the 2006 Lebanon war earned him multiple honors, including the Quezon Medalya ng Karangalan in 2011.

Now serving as Director General of the Presidential Broadcast Service, Amparo has transformed Radyo Pilipinas into a digital-first platform, increasing social media engagement by 2,000 percent. He spearheaded the rebranding to "Radyo Pilipinas – Radyo Publiko," boosting its AC Nielsen ranking to No. 4 in Mega Manila. He also modernized news gathering with LiveU Smart and iPhones while expanding AM-FM broadcasting reach.

A Communication Arts graduate from the University of Santo Tomas, Amparo is also skilled in advertising, music, and sports. At 58, he balances family life with his passion for public service. His journey from frontline journalist to media leader exemplifies dedication, innovation, and integrity, shaping Philippine broadcasting for the future.

NEW DG FROM SLRC



Mr Manoj Nadeeshana Amarasingha has been appointed as the Director General of the Sri Lanka Rupavahini Corporation (SLRC). In addition to this role, he serves as the Director of Combined Services (Sri Lanka Administrative Service – Grade 1) at the Ministry of Public Administration, Home Affairs, Provincial Councils, and Local Government.

A seasoned human resource professional, Mr Amarasingha brings over 14 years of experience in the public sector. He holds a Bachelor of Science (Special) degree in Agriculture from the University of Ruhuna and a Master of Business Administration (MBA) from the University of Colombo. His extensive expertise in administrative and human resource management is expected to contribute significantly to the advancement of SLRC.

ABU TECHNOLOGY CALENDAR *of Events*

2025

23 January	Technology Webinar VYPA - NETSTAIRS	Online
10-14 February	HFCC A25 Conference	Abu Dhabi, UAE
24-27 February	21 st ABU Digital Broadcasting Symposium (DBS 2025)	Kuala Lumpur, Malaysia
17 March	Engineering Fundamentals Level 1	Online
16-17 April	ABU Technical Bureau Mid-Year Meeting	Kuala Lumpur, Malaysia
22-25 April	CCBN - ABU NEXUS Event	Beijing, China
6 May	DRM Workshop	Online
13-15 May	CABSAT 2025	Dubai, UAE
27-29 May	Broadcast Asia 2025	Singapore
June	Members Innovation Webinar	Online
15-17 July	WorldDAB-ABU-ASBU Workshop	Online
23-25 July	ABU AI Forum	Online
August	Technical Workshop (Collaboration with IPPTAR)	Kuala Lumpur, Malaysia
September	Members Innovation Webinar	Online
September	ABU Technical Bureau Annual Meeting	Ulaanbaatar, Mongolia
September	ABU Technical Committee Meeting	Ulaanbaatar, Mongolia
September	ABU General Assembly	Ulaanbaatar, Mongolia
September	WBU Technical Committee	Ulaanbaatar, Mongolia
November	Members Innovation Webinar	Online

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