**Doc T-24/1**

# TC PROGRAMME
**Venue: Connie-II Hall**

## SATURDAY | 19 OCTOBER

### TC PROCEEDINGS

09:00–09:30 **Welcome address by the Chairman, Technical Committee**
**Masashi Kamei**, Chairman, ABU Technical Committee and Senior Research Engineer, NHK STRL-Japan

**Welcome address from the Host**
**Mahmut Hilmi Önger**, Head of the Archive Department, TRT-Türkiye

**Opening Address by ABU Secretary-General**
**Ahmed Nadeem**, Secretary-General, ABU

### ABU ENGINEERING AWARDS 2024

09:30-10:15 **Announcement of Winners of the Annual ABU Engineering Award and Technical Review Prizes 2024**

10:15-10:45 *Tea, coffee & networking*

### KEYNOTE PRESENTATION

10:45-11:45 **Michael McEwen,** Media Consultant, Advisor to the ATSC,
*Technology Choices in the Ever Changing Environment*

### TC PROCEEDINGS

11:45-12:30 **Confirm Agenda and TC-2024 Proceedings and appointment of Rapporteurs**

**ABU Technology Activity Report**

***Bureau Proposals*** –

- *"Recommendation on Assess WRC-27 Agenda Items Related to Broadcasters in the Asia-Pacific Region"*

12:30 - 14:00 *Networking lunch*

### INVITED PRESENTATIONS – Part 1
### Advancements in Broadcasting Technology & Standards

14:00-15:00 Moderator: **Masashi Kamei**, Chairman, ABU Technical Committeer, NHK STRL-Japan

**Lindsay Cornell,** Principal Systems Architect, BBC and Chairman, WorldDAB Technical Committee

**Alexander Zink,** Vice Chairman DRM Consortium and Chief Business Development Manager, Fraunhofer II

**Mei Jianping,** Director of the Data Application Department, Technology Bureau of the China Media Group

## THE HOST PRESENTS | TRT

15:00-16:00 Moderator: **Kazim Pektaş**, Chief Engineer, TRT-Türkiye,

**Dr. Ruhi TAŞ**, Deputy Director of Information Technologies, TRT, Türkiye

*The Opportunities of AI in Broadcasting*.

**Soud Hyder,** Deputy Director; Strategy & Audience, TRT, Türkiye

***End of TC Meeting Day 1***

# SUNDAY | 20 OCTOBER

## TOPIC AREA REPORTS

09:00-10:30 **Production**
**Kazim Pektaş**, Chief Engineer, TRT-Türkiye

**Transmission**
**Dr Hirokazu Kamoda**, NHK-Japan

**Spectrum**
**Dr Li Leilei**, Professor, Academy of Broadcasting Planning, NRTA-China

**Training & Services**
**Prakash Veer**, Deputy Director General, NABM, Prasar Bharati-India

10:30-11:00 *Tea, coffee & networking*

## Panel: AI in Broadcasting Workflows: Should We Fear Being Replaced?

11:00-12:30 Moderator: Dr Veysel Binbay

*Panellist:*
**Dr. Ruhi TAŞ,** Deputy Director of Information Technologies

**Dr. Mohieddin Moradi**, Director of R&D, IRIB, Iran

**Ir. Ts. Ahmad Shafiq Mirza Bin Mansor**, Senior Engineer, RTM, Malaysia

**Mr. Bishnu Ram Neupane**, DGM, NTV, Nepal

**Mr Leung Chi Wah**, Head/Engineering, RTHK, Hong Kong-China

**Soud Hyder,** Deputy Director; Strategy & Audience, TRT, Türkiye

12:30 - 14:00 *Networking lunch*

## INVITED PRESENTATIONS – Part 2
## Advancements in Broadcasting Technology & Standards

14:00-15:30 Moderator: **Kazim Pektaş**, Chief Engineer, TRT-Türkiye

**Dr Peter Siebert,** Adcom Member & VP, IEEE Broadcast Technology Society

**Dr Mohieddin Moradi,** Director of R&D, IRIB, Iran

**Masashi Kamei**, Chairman, ABU TC, and Senior Research Engineer, NHK STRL-Japan

**Michael McEwen,** Media Consultant, Advisor to the ATSC

## MEMBERS' UPDATES & CLOSING

15:30-16:30 **Members' Updates**
New members and Updates from Sister Unions & Intl Organisations

**Information Exchange and Status Reports**

16:30-17:30 **Future Meetings**

**ABU DBS 2025, Kuala Lumpur, 24 – 27 February 2025**

**Leroy Zhang**, Global Marketing Manager, NRTA, China, Introducing CCBN event

**Appointment of Honorary Vice-Chairman from the host of the 2025 ABU General Assembly**

**Closing remarks by TC Chairman**

***End of TC Meeting***

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# AGENDA

## Day 1 | Saturday 19 October

1. Opening Session

    1.1 Welcome address by Chairman, ABU Technical Committee
    1.2 Welcome address by host, TRT-Türkiye
    1.3 Opening address by ABU Secretary-General

2. Announcement and Presentation of the 2024 ABU Technical Review Prizes and Engineering Awards

3. Keynote Presentation

4. Confirm Agenda and TC-2024 Proceedings and Appointment of Rapporteurs

5. ABU Technology Activity Report

6. Bureau Proposals

7. Invited Presentations – Part 1: Advancements in Broadcasting Technology & Standards

8. The Host Presents

## Day 2 | Sunday 20 October

9. Report from Topic Area Chairmen

10. Panel Session: AI in Broadcasting Workflows: Should We Fear Being Replaced?

11. Invited Presentations – Part 2: Advancements in Broadcasting Technology & Standards

12. Members' Updates

13. Information Exchange and Status Reports

14. Future Meetings

15. Appointment of Honorary Vice-Chairman from the host of the 2025 ABU General Assembly

16. Closing

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## ABU TECHNOLOGY

# LIST OF DOCUMENTS

| Doc No | Source | Title of the Document |
|---|---|---|
| T-24/1 | ABU TD | Programme |
| T-24/2 | ABU TD | Agenda |
| T-24/3 | ABU TD | List of Documents |
| T-24/4 | ABU TD | TD Activity Report |
| T-24/5 | ABU TD | Report on the Mid-year Meeting of the Technical Bureau |
| T-24/6 | TA-P | Topic Chairman's Report – Production |
| T-24/7 | TA-T | Topic Chairman's Report – Distribution |
| T-24/8 | TA-TS | Topic Chairman's Report – Training & Services |
| T-24/9 | TA-S | Topic Chairman's Report – Spectrum |
| T-24/10 | ABU TB | Bureau Proposals – Technical Bureau Recommendation on WRC |
| T-24/12-1 | ABU TB | Appointment of Topic Area Chair – Distribution |
| T-24/12-2 | ABU TB | Appointment of Topic Area Chair – Training & Services |
| T-24/12-3 | ABU TB | Terms of Reference – Topic Areas and Projects |
| T-24/13 | ABU TD | Calendar of Events |
| T-24/14 | ABU TD | List of Delegates |
| **T-23/20** | **STATUS REPORTS** | |
| T-24/20-1 | Nation Broadcasting Services of Thailand – Thailand | |
| T-24/20-2 | Vanuatu Broadcasting & Television Corporation – Vanuatu | |
| T-24/20-3 | Radio Television Hong Kong – Hong Kong, China | |
| T-24/20-4 | Radio Broadcasting Service, Radio Nepal – Nepal | |
| T-24/20-5 | Japan Broadcasting Corporation – Japan | |
| T-24/20-6 | Turkish Radio and Television Corporation – Türkiye | |
| T-24/20-7 | Television Broadcasts Limited – Hong Kong, China | |
| T-24/20-8 | Mediacorp Pte Ltd – Singapore | |
| T-24/20-9 | Korean Broadcasting System – Korea | |
| T-24/20-10 | Sri Lanka Rupavahini Corporation – Sri Lanka | |

| Doc No | Source | Title of the Document |
|---|---|---|
| | ***PRESENTATIONS*** | |
| **T-24/30** | **THE HOST PRESENTS** | |
| T-24/30-1 | TRT-Türkiye | The Opportunities of AI in Broadcasting |
| T-24/30-2 | TRT-Türkiye | 5 Things We learnt Using AI |
| **T-24/31** | **PANELLIST SESSION** | |
| | AI in Broadcasting Workflows: Should We Fear Being Replaced? | |
| **T-24/32** | **Part 1 \| Advancements in Broadcasting Technology & Standards** | |
| T-24/32-1 | WorldDAB | DAB+ Update |
| T-24/32-2 | DRM | DRM Technology Update |
| T-24/32-3 | China Media Group | 5G-based UHDTVHDTV Contribution |
| **T-24/33** | **Part 2 \| Advancements in Broadcasting Technology & Standards** | |
| T-24/33-1 | IEEE BTS | Charting the Evolution: Exploring Digital Video Broadcasting Standards from Past to Future A Play in 3 Acts |
| T-24/33-2 | IRIB-Iran | AI Opportunities in Content Production, Management and Consumption.<br>A Novel Approach for Broadcasting 208 Local TV Channels for the Parliamentary Election |
| T-24/33-3 | NHK STRL-Japan | Progress and R&D of Transmission Technologies for Satellite Broadcasting in Japan |
| T-24/33-4 | ATSC | A Review of a Next Generation Transmission Standard, ATSC 3.0 |
| **T-23/34** | **OPENING & CLOSING SESSIONS** | |
| T-24/34-1 | NHK-Japan | Welcome Address – Mr Masashi Kamei, Chairman, ABU Technical Committee and Senior Research Engineer, NHK STRL-Japan |
| T-24/34-2 | TRT-Türkiye | Welcome Address from the Host – Mahmut Hilmi Önger, Head of the Archive Department, TRT-Türkiye |
| T-24/34-3 | ABU | Address by ABU Secretary-General, Mr Ahmed Nadeem |
| T-24/34-4 | NHK-Japan | Closing Address – Mr Masashi Kamei, Chairman, ABU Technical Committee and Senior Research Engineer, NHK STRL-Japan |

Doc T-24/4

# ABU Technology Activity Report for Technical Committee Meeting 2024

A brief report of activities organised by ABU Technology is given below since the TC2023 meeting last October. The report looks into three areas; the first part is on Capacity Building Activities; the second part is on International Cooperation and Contributions, and the third part is the publications and the other projects.

## 1. Capacity Building Activities

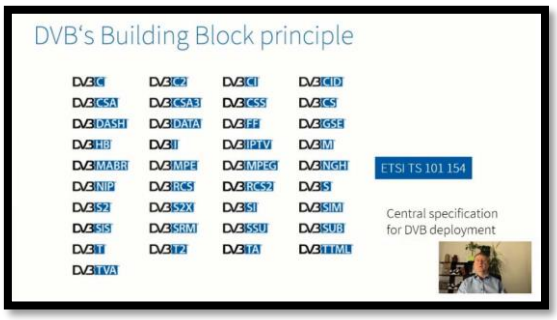
### Webinar on ICDN And Data Clean Rooms in Media Industry:

ABU Technology organized a webinar session on 21 September, Thursday. The webinar session discussed on diverse and important technical areas focused to ICDN.VIDEO such as data clean room for secure media collaboration; client data platform for redefining data sharing in the post-cookies era; digital media room which is a theatre-style box for collaborative viewing.
The session was presented by a panel of speakers led by Dr Ahmad Moradi from Netstairs/VYPA and other panellists joined were M Vijjayandran from VYPA, Pattrik Ting from K Media in Malaysia and Dr Francis Teo, an AI Architect from Singapore. Over Ninety 90 participants attended the
webinar. They spanned from 30 countries from Asia-Pacific and elsewhere representing about sixty 60 organizations.



### Webinar on Unlocking the Future of Video – Adding Next Generation Video Codecs to The DVB Toolbox:

Asia-Pacific Broadcasting Union (ABU), in cooperation with IEEE Broadcast Technology Society, organised a webinar on Unlocking the Future of Video: Adding Next Generation Video Codecs to the DVB toolbox at 21st November. Jan Outters, Director of Technology & Standards at Ateme, was the focal presenter in the session that was moderated by Dr Peter Siebert who is Vice President at the IEEE Broadcast Technology Society. Over hundred fifteen (115) participants attended the webinar. They spanned from 39 countries from Asia-Pacific and elsewhere representing about sixty-five (65) organizations.

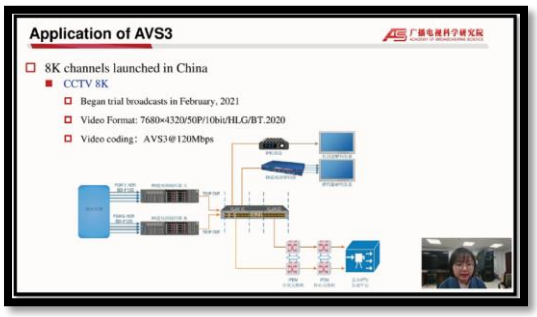




**ABU – DRM webinar on Delivering emergency Warnings with DRM:**

The Asia-Pacific Broadcasting Union (ABU), in cooperation with DRM Consortium, organised a webinar on 'Delivering Emergency Warnings with DRM'. The webinar was streamed live on February 7, Wednesday. Around 70 participants representing over 58 organisations from 26 countries in the Asia-Pacific, Arab region, Europe and elsewhere attended the event. Speakers' line-up from DRM Consortium included Ruxandra Obreja, Alexander Zink, Radu P. Obreja and Yogendra Pal. They discussed Emergency Warning Functionality (EWF) of DRM Digital Radio for enhancing disaster response and communication. Members and colleagues are eager to travel and join such workshops again. The ABU TD plans to organise another face-to-face workshop in the coming months.


**Webinar on Third generation AVS video coding standard (AVS3) - features and applications:**

On 9 April 2024, the Asia Pacific Broadcasting Union hosted a webinar titled "Third Generation AVS Video Coding Standard (AVS3): Features and Applications", presented by Ms Zhou Yun, Senior Engineer at the Academy of Broadcasting Science, NRTA-China. The session provided an in-depth exploration of AVS3, highlighting its features, applications, and the advancements it brings to video coding technology. Around 60 participants representing over 35 organisations from 24 countries attended the event. The presentation provided an overview of the evolution of video coding standards, both internationally and within China. International standards such as MPEG and ITU-T's H.264 and H.265 were mentioned alongside China's own AVS standards. Zhou highlighted the continuous efforts of the AVS working group in China, which has developed AVS1, AVS2, and now AVS3 over the past two decades


**ABU and NRTA seminar at 30th CCBN celebration:**

The ABU seminar, titled “Trendsetters in the Media Industry: Next-Gen A/V Codecs, AI Tools, and Virtual Production”, was a dynamic gathering of industry pioneers held on Thursday, 25 April, at the Buffer Room Multifunction Hall in the Shougang Exhibition and Convention Center, Beijing. Hosted by the National Radio and Television Administration (NRTA) and the AsiaPacific Broadcasting Union (ABU) Technical Bureau, this event was part of the 30th anniversary celebrations of the China Content Broadcasting Network Exhibition 2024 (CCBN).



## 2. International Cooperation and Partnership

**A24 GLOBAL COORDINATION CONFERENCE:**

From January 15 to 19, 2024, the Asia-Pacific Broadcasting Union (ABU) hosted the A24 Global Coordination Conference in partnership with the High Frequency Coordination Conference (**HFCC**) and the Arab States Broadcasting Union (ASBU) at the Royale Chulan Kuala Lumpur. ABU member representatives from esteemed organizations such as LPP Radio Republik Indonesia, Turkish Radio Television, Nippon Hoso Kyokai, and other organisation including Radio Miami International, the U.S. Agency for Global Media, Reach Beyond Australia, Vatican Radio, Broadcast Belgium, and THALES, among others, gathered to lend their expertise. Their mission was to harmonise shortwave frequency schedules for the impending summer season, ensuring seamless communication across continents. About 60 delegates, representing a staggering 90 percent of shortwave frequencies used for global broadcasting, attended the week-long dialogue. Their collective wisdom and shared vision promise to shape the future of broadcasting, transcending borders and bridging cultures. The B24 Conference will be held in Tashkent, Uzbekistan from August 26 to 30, 2024.


**DAB+ digital radio: Technical workshop on new developments in DAB+ systems Webinar series:**

The Asia-Pacific Broadcasting Union (ABU), in partnership with the Arab States Broadcasting Union (ASBU) and WorldDAB, organised a Technical Workshop on DAB+ Digital Radio from 23 to 25 July 2024. Conducted as a three-day webinar series, the workshop focused on the latest advancements in DAB+ systems. It aimed to update broadcasters and media professionals on recent developments, covering various topics such as the business case for DAB+, technical updates, system features, headend systems, transmission, and the complexities of building out the DAB+ network.


## 3. Technical Advisory Services

**VOV Vietnam's Radio Digital Future -Workshop:**

The Asia-Pacific Broadcasting Union (ABU) has partnered with Voice of Vietnam (VOV) to advance digital transformation in radio broadcasting. This collaboration was highlighted by a workshop on 12 July 2024, during the 16th National Radio Festival in Thanh Hoa, Vietnam, where ABU provided technical advice at VOV's request.

ABU showcased its commitment through expert presentations. Dr Veysel Binbay, Director of ABU Technology, led a session on "Technicalities in Content Delivery Platforms", discussing the role of AI and Big Data in modernising content delivery. He highlighted automation, machine learning, and data analytics tools such as Avid, Verizone and TVU for improving audience engagement and streamlining operations. Demonstrations included AI-powered multilingual capabilities for delivering content in languages such as Italian, French, Japanese and Malay.

Malaysia's RTM, represented by Mr Ahmad Shafi q Mirza Mansor, presented the Arkib Digital Berita (ADiB) system. This digital archive manages news content from 14 states and integrates a Media Asset Management (MAM) system with a fi le-based workflow and Production Asset Management (PAM) system. Launched in 2021, ADiB aims to preserve and enhance the accessibility of news content across platforms using AI services for face and object recognition and audio-to-text transcription.

Australia's ABC, represented by Mr Matt O'Sullivan, highlighted their AI-driven converged newsroom strategy. This approach optimises content production and distribution across various platforms, streamlining newsroom operations for more efficient content management and delivery in a fast-paced media environment.

NHK World Media, represented by Mr Chimaki Shimura, showcased their AI-powered global services. NHK demonstrated AI-translated multilingual subtitles for live streams in nine languages and AI-generated voice reading services for emergency news and regular broadcasts, supporting up to 19 languages.

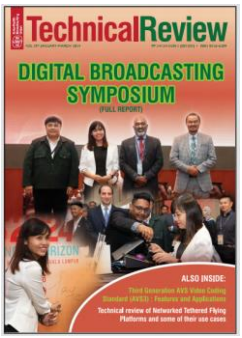
## 4. Digital Broadcasting Symposium 2024

The 2024 ABU Digital Broadcasting Symposium was held from 4-7 March 2024 at the Royale Chulan Kuala Lumpur. This symposium, aptly themed 'Navigating AI Horizon' is organised once a year by ABU. This year's DBS is the twentieth in the series. Prior to the conference, a workshop by Integriti Padu Sdn Bhd (IPSB) was held in the morning of March 4 followed by a DAB+ workshop in the afternoon. The 3-day conference, 2 masterclass sessions, 8 workshops, together with roughly 50 exhibition booths, provided the unique opportunity for attendees to have access to information on various aspects of broadcasting ranging from terrestrial to IP. There were around 1000 participants, 300 organisations from over 50 countries who attended this years DBS.


## 5. Publications

**Technical Review:**

We have published four issues of Technical Review as usual within current period from last year's annual TC meeting as shown below:



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**Technical Bureau Mid-Year Meeting 2024**
**23 & 24 April 2024 | Beijing, China**

The ABU Technical Department has organised the ABU Technical Bureau Mid-Year Meeting on 23rd to 24th April at Hualuxe Beijing Xinan Hotel in China. Hosted by RTPRC (NRTA), the meeting was conducted in hybrid mode.

Mr. Masashi Kamei of NHK-Japan, Chairman of the ABU Technical Committee was chaired the meeting, joined by Vice-Chairman, MR Sheng Zhifan of RTPRC (NRTA) – China. The meeting was attended by representatives from NHK–Japan, PB-India, Mediacorp-Singapore, and IRIB-Iran. Remote participants joined from VOV Vietnam, RTM Malaysia, NTV Nepal, PB India, KBS Korea, and Phoenix Hong Kong, China.

The meeting was started with opening remarks by ABU Secretary-General Mr Ahmed Nadeem with his overview on the comprehensive three-year plans crafted for the technical bureau. He also focusing in the initiatives aimed at enhancing members' activities within the organisation. The broader strategic plans for ABU, emphasising the streamlining od the General Assembly for improved efficiency and effectiveness was elaborated by him during his opening remarks.

The meeting commenced with the introduction of the new Technical Bureau members, followed by updates on various projects from their respective organisations. Followed by updates from all members on the current situation, this information sharing exercise proved beneficial to members, allowing them to learn from experiences by others and appreciate the situation of other members. Dr Veysel Binbay, Director of ABU Technology was led and present the activity report to the bureau members. Amongst the items presented was a review of TB tasks and actions, which included updates on different activities, one of which was the DBS2024.

The discussion about DBS continued emphasising on the strategies to enhance involvement and input from TB members. Dr Veysel Binbay provide insight into ABU's initiatives to establish something new and special session tailored for TB members at the upcoming DBS event. Furthermore, various approaches for addressing vacant TB seats were explored during the discussion.

Then, the meeting continues significantly discussing on the topic revolved around a questionnaire that had been provided by the Chairman. This questionnaire was circulated prior to the bureau meeting, aimed to gather insights on the practices of TV and radio broadcasting within each respective organisation. It served as a valuable platform for sharing experiences and engaging in discussions regarding the variations in organisational practices.

Study Topic Areas report has been presented by designated chairperson for each topic. Mr P. Das from PB-India on Training & Services, Mr Yuji Nagata from NHK-Japan on Distribution, and Dr Li Leilei from RTPRC (NRTA) – China on Spectrum, though Dr. Li was not in attendance.

Before the meeting adjourned, the members reviewed and discussed the schedule for the upcoming annual Technical Bureau and Technical Committee meetings. These important meetings are scheduled to take place during the General Assembly, which is set to be held in the vibrant city of Istanbul, Türkiye, in the month of October. The meeting concluded with the Director of ABU Technology extending heartfelt thanks to the hosts and attendees for their valuable contributions and active participation.

**Doc T-24/6**

# REPORT OF TOPIC CHAIRMAN
# PRODUCTION TOPIC AREA

**Topic Chairman** : **Kazim PEKTAS – TRT-Türkiye**
**Period of Report** : **April 2024 to October 2024**
**Date of Report** : **20 October, 2024**

## Reports from Project Managers in Topic on Production

A total of four projects are under the Production Topic Area, as below.

1. **Ultra High Definition TV and Advanced Immersive Sensory Media Systems P/UHDAISM**
2. **Systems for people with special needs P/SN**
3. **IT -based Production System and file-based workflows P/ITPS**
4. **Big Data, Personalisation and Artificial Intelligence P/BDAI**

For this reporting period we received one contribution from Mr. Tomiyama, project manager of **Ultra High Definition TV and Advanced Immersive Sensory Media Systems** P/UHDAISM from NHK STRL.

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## Ultra High Definition TV and Advanced Immersive Sensory Media Systems (P/UHDAISM)

### 1. Volumetric Data Acquisition by Meta Studio

To have the viewers watch contents from arbitrary viewpoints on various displays including 3D and/or head-mounted displays, NHK STRL is making studies on acquiring/rendering 3D models of subjects.

The depth of the subject from multiple viewpoints are estimated using the subject's silhouette in the images. By integrating the depths, the system reconstructs the 3D model which can be viewed from any viewpoint. The consequent errors and defects were compensated by the AI.

Various visual effects can be applied to the created 3D model, such as lighting variations and properties of reflection, resulting in a high-quality, heterogeneous footage that can be viewed from any viewpoint. For example, the model was moved to an outdoor setting and blended with an evening scenic backdrop.

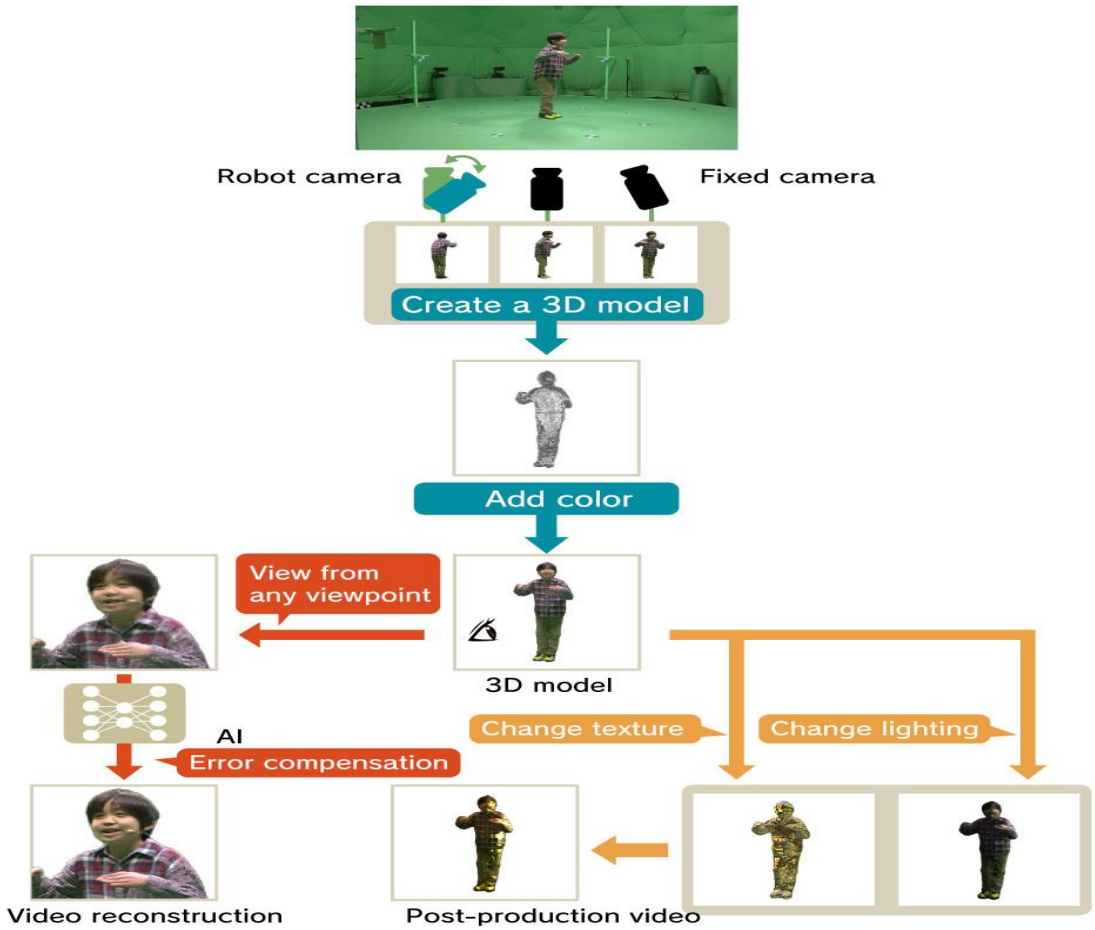



Figure 1. How does the Meta Studio work?

## 2. Volumetric Video Production Support System

The development of Meta Studio, which produces photorealistic volumetric videos using multi-viewpoint cameras to acquire the 3D shape and reflection properties of the subject, is conducted. Here is the introduction of volumetric monitors and a technology that renders videos in real time.

- Volumetric monitor that presents visual information to support the performers

For easier cooperation of performers in different place or time, a send-back monitor has been developed. It displays co-performers' images in real time, while switching the viewpoint of the images based on the pose information of the (co-)performers appropriately.

- Interactive display of volumetric videos by real-time rendering processing

A high-speed processing technology that renders a variety of information, such as shapes and reflection properties, in real time has been developed so that it is possible to render and display images depending on virtual viewpoints on a variety of devices.

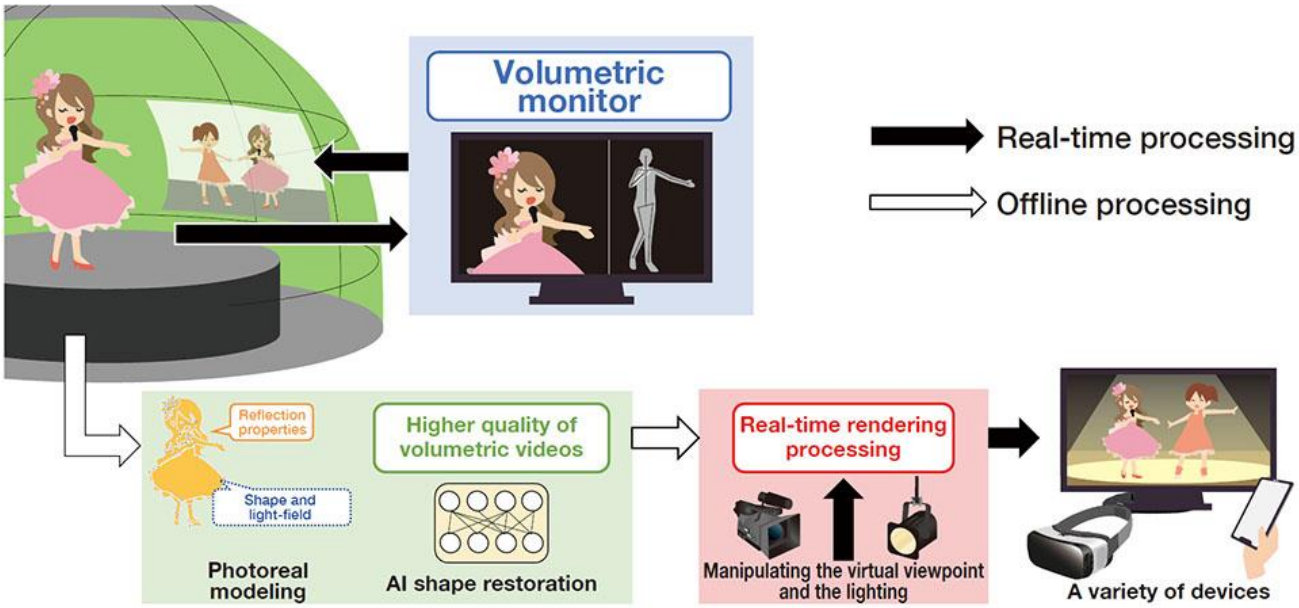



Figure 2. Volumetric video production system, Meta Studio

**Doc T-24/7**

# REPORT OF TOPIC CHAIRMAN DISTRIBUTION TOPIC AREA

| | | |
|---|---|---|
| **Topic Chairman** | **:** | **Hirokazu Kamoda (NHK)** |
| **Period of Report** | **:** | **November 2023 to September 2024** |
| **Date of Report** | **:** | **30 September 2024** |

## Introduction

Distribution topic area comprises four projects. The matters concerning digital terrestrial television broadcasting, digital satellite broadcasting, and digital sound broadcasting are studied or investigated by these projects. This topic area also covers research on IBB and OTT, including platforms and standards, etc.

## 1. Next Generation Terrestrial Broadcasting (D/NGTB)

Project Manager: **Dr. Shingo Asakura** (NHK, Japan)
Co-project Manager: **Dr. Jeon Sungho** (KBS, Korea),
**Mr. Chen Delin** (ABS, China),
**Mr. Halil Us** (TRT, Turkey),
**Mr. M S Duhan** (DDI, India)
**Mr. Rajesh Meena** (India)
**Mr. A K Mangalgi**(DDI, India)
**Mr. Zhang Yu** (ABS, China)
**Mrs. Xiao Jingting** (ABS, China)

Reports from the project manager and the contributors are as follows.

1.1 Efforts Toward the Realization of Next Generation Terrestrial Broadcasting in Japan
1.2 Development of ATSC 3.0 & 5G-Broadcbast Transmission Techniques in the Republic of Korea
1.3 Other Topics on Next Generation Terrestrial Broadcasting

The reports for D/NGTB are attached as Annex 1.

## 2. Integrated Broadcast-Broadband and OTT (D/IBBOTT)

Project Manager: **Dr. Go OHTAKE (NHK, Japan)**
Co-project Manager: **Mr. A. K. Mangalgi (DDI, India)**
**Mr. R.P. Joshi**
**Dr. Hirokazu Kamoda (NHK, Japan)**
**Mr. Hiroki Endo (NHK, Japan)**
**Mrs. Zhang Dingjing (ABS, China)**
**Zhang Yu (ABS, China)**
**Zhang Wei (ABS, China)**
**He Jing (ABS, China)**
**Wang Lei (ABS, China)**

Reports from the project manager and the contributors are as follows.

2.1 Standardization of Integrated Broadcast-Broadband System in Japan
2.2 Studies in ITU-R
2.3 Studies in ITU-T
2.4 Topics on Cybersecurity

The reports for D/IBBOTT are attached as Annex 2.

## 3. Satellite Broadcasting (D/SB)

Project Manager: **Mr. Masashi Kamei (NHK, Japan)**
Co-project Manager: **TBD**

Reports from the project manager and the contributors are as follows.

3.1 ITU-R Documents Related to Satellite Broadcasting Systems
3.2 Latest Topics on Satellite Broadcasting

The reports for D/SB are attached as Annex 3.

# Annex 1

## Project: Next Generation Terrestrial Broadcasting (D/NGTB)

Project Manager: **Dr. Shingo Asakura** (NHK, Japan)

Co-project Manager: **Dr. Jeon Sungho** (KBS, Korea)

**Mr. Chen Delin** (SARFT, China)

**Mr. Halil US** (TRT, Turkey)

**Mr. M S Duhan** (DDI, India)

**Mr. Zhang Yu** (ABS, China)

**Mrs. Xiao Jingting** (ABS, China)

**Mr. Rajesh Meena** (India)

**Mr. A K Mangalgi** (India)

### 1.1 Efforts toward the Realization of Next Generation Terrestrial Broadcasting in Japan

#### 1.1.1 Introduction

An advanced digital terrestrial TV broadcasting system (Advanced ISDB-T) has been developed in Japan. Advanced ISDB-T inherits the segment structure of Integrated Services Digital Broadcasting-Terrestrial (ISDB-T), which can simultaneously provide services for mobile reception and fixed reception in one channel. Advanced ISDB-T also uses low-density parity-check (LDPC) code for forward error correction and also has a low coding rate. Therefore, it is possible to use transmission parameters with a required C/N that is 10 dB smaller than that of current broadcasting for mobile reception in Japan.

ISDB-T mobile reception services in Japan are widely used in car receivers. However, it may not be possible to receive signals correctly in areas far from the transmitting station or in areas where the field strength is low, such as behind buildings or under elevated roads. In broadcasting, retransmission is not used as in communications. Therefore, if the reception is not correct, the video content and audio content will be interrupted. This leads to a decrease in the viewer's desire to watch content. To provide uninterrupted mobile reception, a scheme for transmitting audio content independently by using highly robust transmission parameters is evaluated. The reason for transmitting only audio content using highly robust transmission parameters is that discomfort would be alleviated even if the video was interrupted and the content could be conveyed through audio content. Furthermore, the amount of information in audio content is only a few percent of the total signal, but the amount of information in video content is the majority of the total signal. Therefore, when video content is transmitted using highly robust transmission parameters, a larger transmission band is required.

This report describes the results of field experiments evaluating the reception performance when audio content was transmitted using the most robust transmission parameters in Advanced ISDB-T. Using a large-scale experimental station with a transmission power of 1 kW,

measurements were carried out in a wide area including various reception environments such as urban areas and expressways.

### 1.1.2 Overview

#### 1.1.2.1 Features of Advanced ISDB-T

The segment structures of ISDB-T and Advanced ISDB-T are shown in Figure 1. In ISDB-T, the transmission bandwidth in one channel is divided into 13 segments; the central segment is used for mobile reception services, and the other 12 segments are used for fixed reception service. In Advanced ISDB-T, the transmission bandwidth in one channel is divided into 35 segments; the central 9 segments are called "partial reception band." The number of segments for mobile services in the partial reception band can be up to 9 segments (a narrow-band receiver can receive only 9 segments for partial reception).

Table 1 lists the transmission parameters of Advanced ISDB-T and ISDB-T. To increase the transmission capacity, transmission parameters, such as occupied bandwidth, fast Fourier transform (FFT) size, and carrier modulation scheme, forward error correction of Advanced ISDB-T are modified from those of ISDB-T. Advanced ISDB-T system has a new signal frame structure that enables bandwidth to be flexibly allocated to multiple services for different reception scenarios, such as fixed reception and mobile reception, compared with ISDB-T. The following are documents to help you get more information about Advanced ISDB-T:

- A Study on the Transmission System of an Advanced ISDB-T
  https://ieeexplore.ieee.org/document/8971915
  This report describes an overview of the transmission system for a next-generation DTTB called Advanced ISDB-T and its basic transmission performance.

- Transmission System Design of UHD-1/4K and UHD-2/8K Terrestrial Television Broadcasting and its Performance Proof by Large-Scaled Field Experiments
  SMPTE Motion Imaging Journal, Vol.129, No.6, pp.35-42, Jul. 2020.
  This paper presents the concept and specifications of the proposed system. The verification results of a computer simulation, and laboratory and large-scale field experiments are also described.

- Fixed Reception Performance of FDM-based Transmission System for Advanced ISDB-T
  https://www.set.org.br/ijbe/ed6/Artigo1.pdf
  This paper provides a BICM selection guideline based on the simulation results for fixed reception scenarios toward the practical application of Advanced ISDB-T.

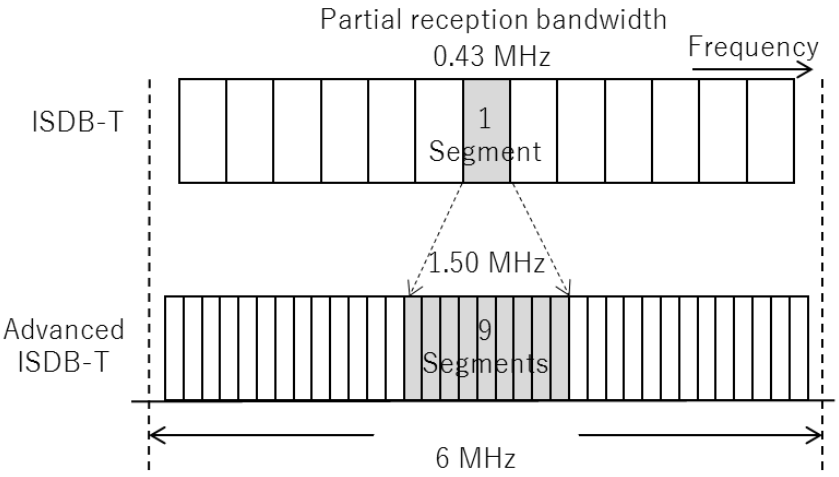



Fig. 1. Segment structure of ISDB-T and Advanced ISDB-T

TABLE I. Transmittion Parameters

| | Advanced ISDB-T | | | ISDB-T | | |
|---|---|---|---|---|---|---|
| Channel bandwidth | 6 MHz | | | 6 MHz | | |
| Occupied bandwidth | 5.83 MHz | | | 5.57 MHz | | |
| FFT sample frequency | 512/81 = 6.320… MHz | | | 512/63 = 8.126… MHz | | |
| FFT size | 8,192 (8k) | 16,384 (16k) | 32,768 (32k) | 2,048 (2k) | 4,096 (4k) | 8,192 (8k) |
| Useful OFDM symbol duration | 1,296 μs | 2,592 μs | 5,184 μs | 252 μs | 504 μs | 1,008 μs |
| Total number of carriers | 7,561 | 15,121 | 30,241 | 1,405 | 2,809 | 5,617 |
| SP ratio | 33.3 %, 16.7 %, 8.3 %, 4.2 %, 2.1 % | | | 8.3 % | | |
| GI ratio | 1/4, 1/8, 1/16, 1/32, 1/64, 800/$N_{FFT}$※1, 1600/$N_{FFT}$※1 | | | 1/4, 1/8, 1/16, 1/32 | | |
| Carrier modulation scheme | QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM<br>QPSK gives a uniform constellation.<br>16 to 4,096 QAM give a non-uniform constellation. | | | QPSK, 16QAM, 64QAM | | |
| Inner code (coding rate) | LDPC code (2/16 - 14 /16) | | | Convolutional code (1/2, 2/3, 3/4, 5/6, 7/8) | | |
| Outer code | BCH code | | | RS code | | |

※1: $N_{FFT}$ represents the FFT size.

#### 1.1.2.2 Transmission Scheme for Highly Robust Mobile Reception

Figure 2 shows transmission block diagram of the transmission encoding process. As mentioned above, Advanced ISDB-T consists of 35 segments, and hierarchical transmission is possible in units of segments. Services for different reception scenarios, such as mobile reception and fixed reception, are distinguished at the layer levels such as A and B. Furthermore, each layer can be divided into sub-layers with one-third of a segments as a unit. Content such as video content and audio content can be distinguished at sub-layers levels such as A1 and A2. Figure 2 also shows an example in which the layer for mobile reception (layer A) is configured into two sub-layers, one for audio content (sub-layer A1) and one for video content (sub-layer A2). The carrier modulation scheme and LDPC coding rate, which are transmission parameters related to robustness, can be set for each sub-layer. Therefore, audio content (sub-layer A1) can be transmitted using more robustly parameters than that for video content (sub-layer A2). On the other hand, transmission delays between the two sub-layers need to be matched for synchronizing video content and audio content. Therefore, the time interleaving, which is a transmission parameter related to delay, is common between sub-layers.

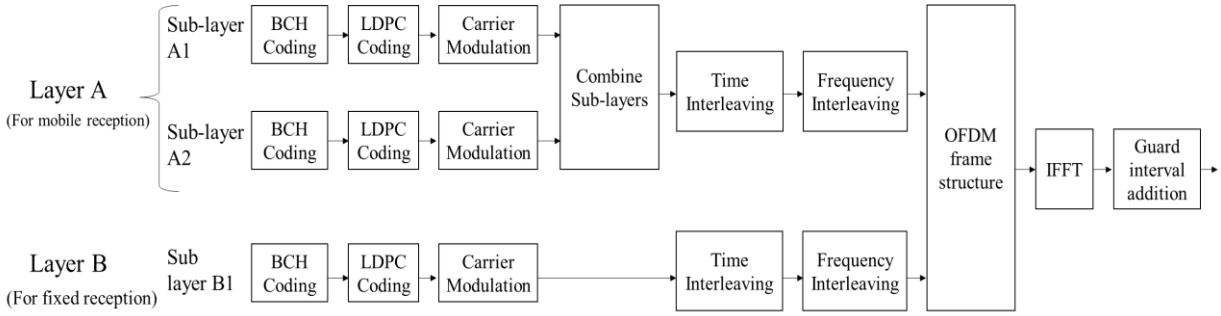



Fig. 2. Transmission block diagram

### 1.1.3 Field experiments

#### 1.1.3.1 Overview

To evaluate the mobile reception performance of Advanced ISDB-T, field experiments were conducted using the Shiba experimental station in Tokyo. The radio waves from the experimental station were received in a moving measurement vehicle. Table II summarizes the specifications of the experimental station, and Table III shows the transmission parameters of the field experiments.

The evaluation was conducted assuming a service that uses two sub-layers for mobile reception, providing highly robust audio content services on sub-layer A1 and video content services on sub-layer A2. For sub-layer A1, the most robust transmission parameters in Advanced ISDB-T were used. For sub-layer A2, the transmission parameters of the required C/N, which are equivalent to the operated parameter for mobile reception in ISDB-T, were used. In this experiment, the transmission performances only for the mobile reception layer was evaluated. That is, the characteristics of the fixed reception layer were not evaluated.

The reception system diagram for the receivers installed on the measurement vehicle is shown in Figure 3. Omnidirectional antennas were used for receiving. The antenna gain was -2.3 dBd and the height above the ground was approximately 2 m. Although the figure 3 shows a reception system with a single receiving antenna, diversity reception using four receiving antennas was also evaluated. Also, the packet error rate (PER) per second was measured. A packet indicates a block of forward error correction. Errors in the packet were detected by parity check of the BCH code. Furthermore, information on the location and speed of the measurement vehicle obtained from GPS and the field strength were measured simultaneously. Here, one second's worth of measured data is called a sample. Samples that taken in the measurement vehicle when it was stationary, such as at traffic lights, were excluded from the measurement data. The total number of effective samples was about 53,613. The driving distance was about 550 km. Figure 4 shows the measurement route and the field strengths on the route. The route included highways and urban areas. The dashed line in the figure indicates contour of the calculated field strength. Figures 5 shows the distribution of field strength and moving speed. The maximum moving speed was 100 km/h.

TABLE II. Specifications of experimental station

| | |
|---|---|
| Tx site | Shiba (Minato-ku, Tokyo) |
| Tx channel (Center frequency) | UHF 28ch in Japan (563.142857 MHz) |
| Tx power | 1.0 kW |
| Polarization | Horizontal |
| Tx antenna height | 280 m above sea level |

TABLE III. Transmission parameters of field experiments

| | Mobile reception | | Fixed reception |
|---|---|---|---|
| | Sub-layer A1 | Sub-layer A2 | Layer B |
| FFT size | 16384 | | |
| Useful OFDM symbol duration | 2592 μs | | |
| GI ratio | 800 / 16384 | | |
| Number of segments | 2 | 4 | 29 |
| Carrier modulation | QPSK | 16QAM-NUC | 256QAM-NUC |
| LDPC code rate | 2/16 | 7/16 | 12/16 |
| Time interleave length | 584 ms | | 282 ms |
| SP ratio | 8.3 % | | 4.2 % |
| Transmission capacity | 69 kbps | 982 kbps | 25.6 Mbps |
| Assuming content | Audio | Video + Audio | Video + Audio |

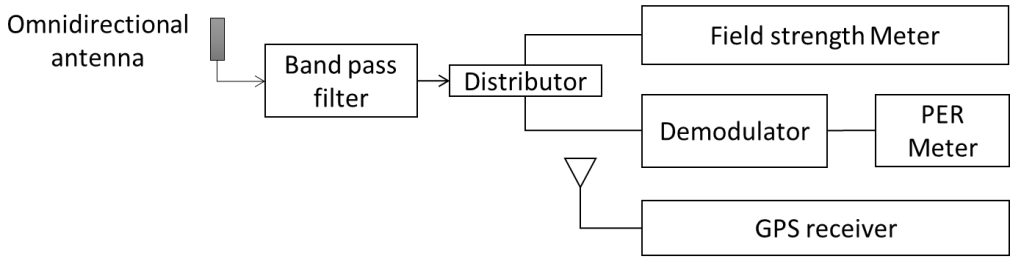



Fig. 3. Reception system diagram for the receivers

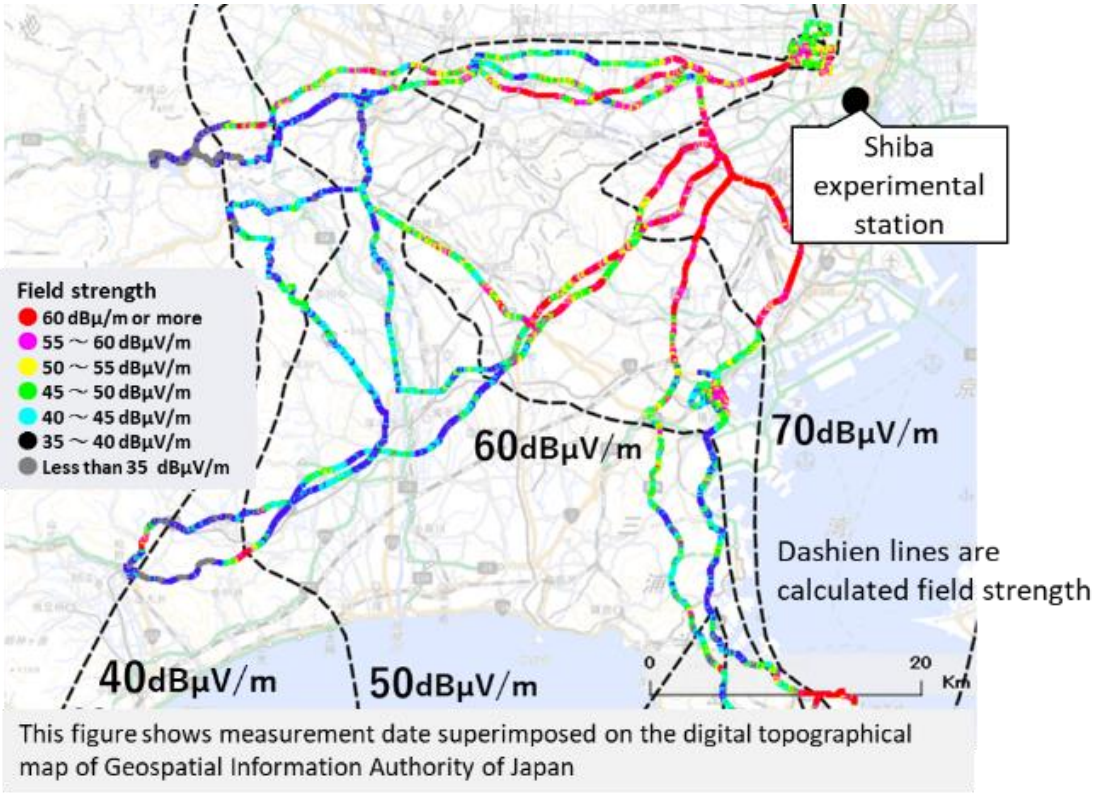
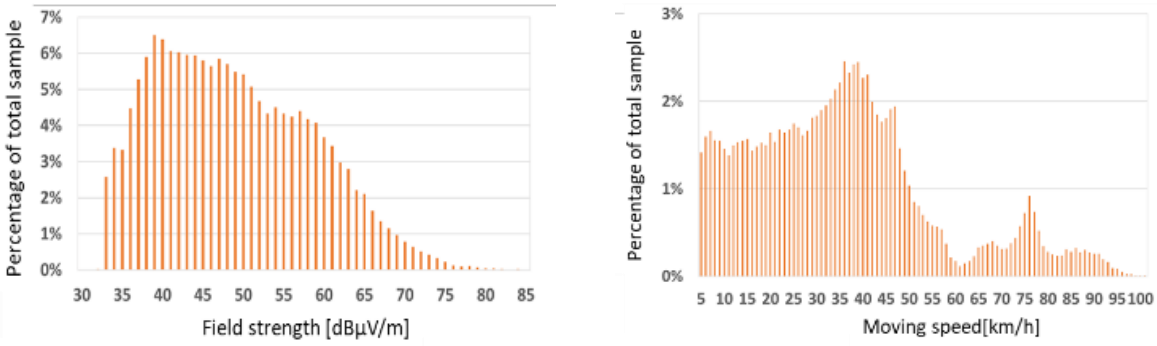



Fig. 4. Measurement route and field strength on the route




(a) Field strength (b) Moving speed

Fig. 5. Distribution of field strength and moving speed

### 1.1.3.2 Results of reception succeeded or failed

Figure 6 shows whether the reception succeeded or failed on the route. Reception succeeded indicates that the packet contains no error. The blue plot in the figure is the area where reception failed on sub-layer A2, but reception succeeded on sub-layer A1, indicating the area where audio content reception could continue. The results confirm that only sub-layer A1 can be received in areas where the calculated field strength is less than 60 dBμV/m, which is relatively far from the experimental station. As for the measurement results in urban areas, Figure 7 shows the results around Shinjuku Station and Yokohama Station. The results confirm that, excluding tunnels, there are many areas where only the sub-layer A1 can be received, even in urban areas with many high-rise buildings.

Figure 8 summarizes the fluctuations in field strength and the reception succeeded or failed for each sub-layer when driving inside a tunnel close to the experimental station, where the effects of highly robust audio content transmission were noticeable. The field strength was decreased by more than 10 dB inside the tunnel due to shielding, and whereas errors caused reception to be interrupted on sub-layer A2, reception continued sub-layer A1.

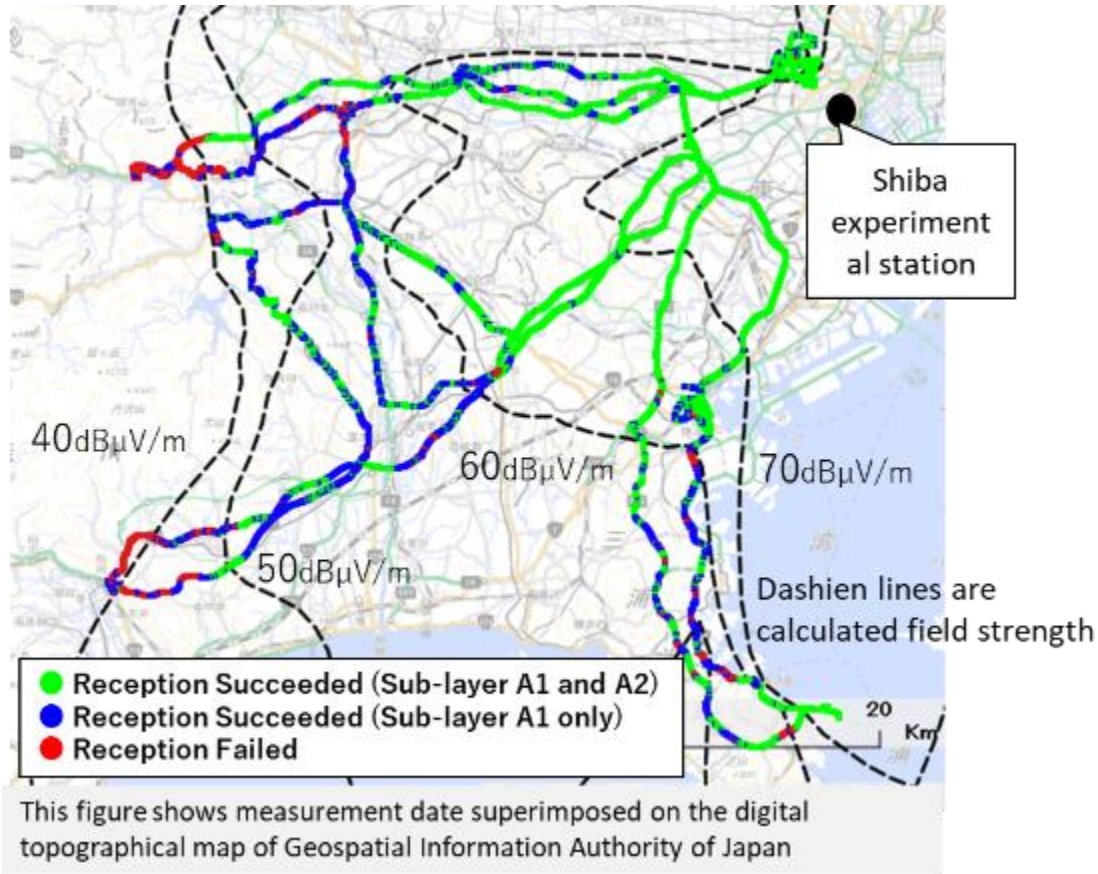
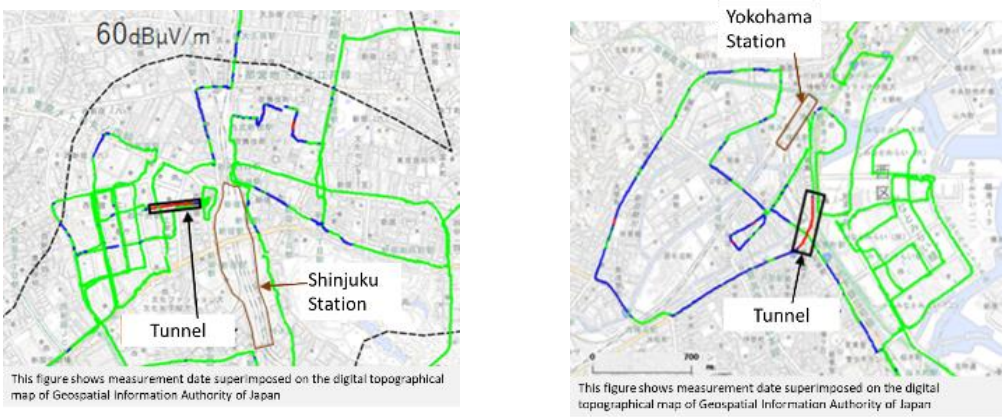



Fig. 6. Reception succeeded or failed for each sub-layer




(a) Around Shinjuku Station. (b) Around Yokohama Station.

Fig. 7. Reception succeeded or failed for each sub-layer (urban areas)

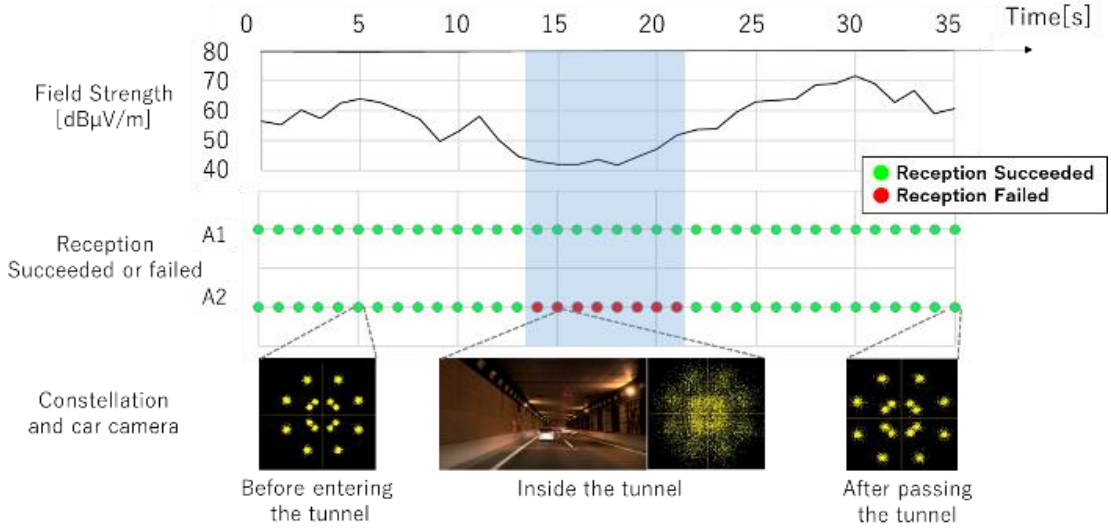



Fig. 8. Fluctuations in field strength and reception succeeded or failed for each sub-layer

### 1.1.3.3 Evaluation of required field strength

Figure 9 is a stacked bar graph showing the distribution of field strengths in Figure 5 with colors indicating whether reception succeeded or failed. As shown, there were many samples where only sub-layer A1 could be received at low field strengths of 35 to 50 dBμV/m. Errors occurred in each sub-layer even when the field strength was relatively high. This is because if there is poor reception in a tunnel, it takes a certain amount of time to establish synchronization after passing through it.

Figure 10 plots the correct reception rate versus field strength. Here, the correct reception rate has the total number of samples for each field strength in the denominator and the number of correct reception samples in the numerator. The required field strength was set to achieve a correct reception rate of 95%. Comparing the required field strengths, it can be seen that sub-layer A1 is 11.0 dB lower than the sub-layer A2.

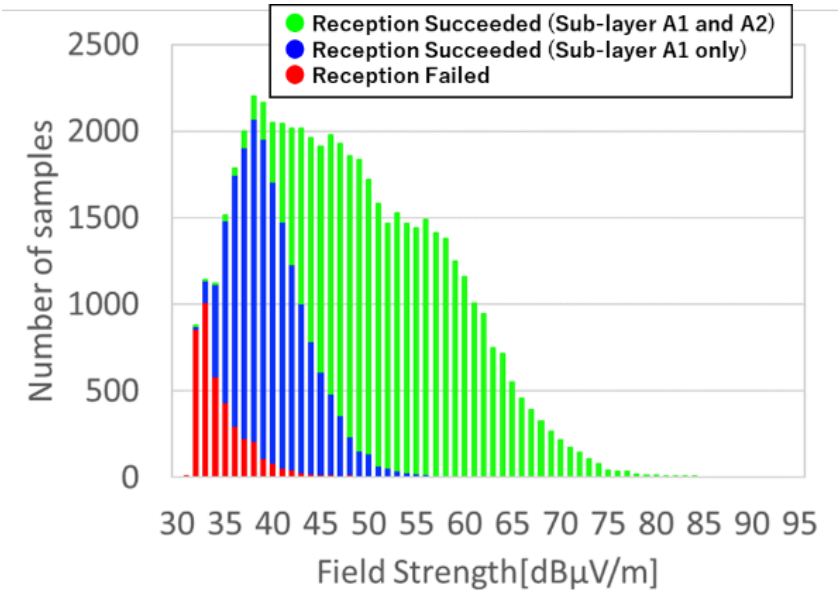



Fig. 9. Reception succeeded or failed for each field strength

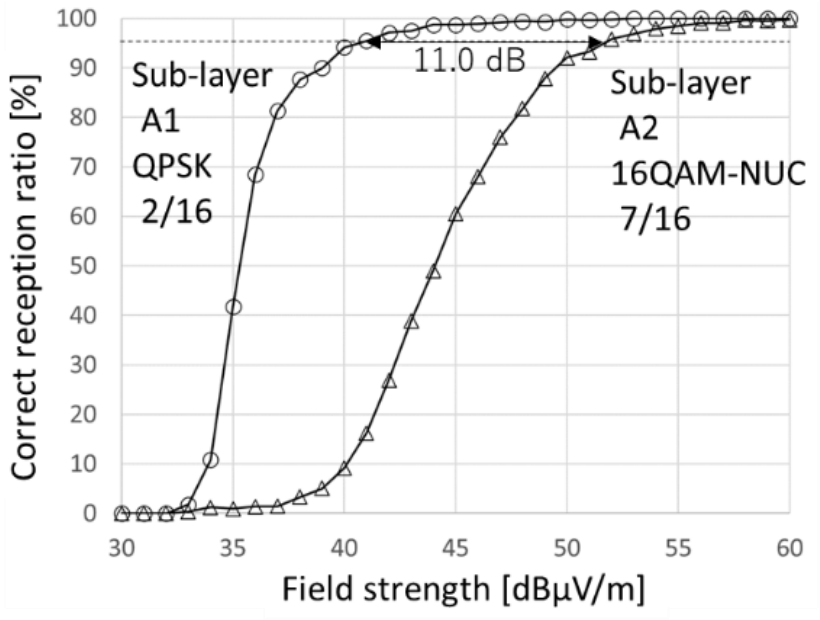



Fig. 10. Correct reception rate versus field strength.

### 1.1.3.4 Evaluation of coverage area ratio

This section also describes the results of diversity reception. The case of diversity reception, the required field strength is lower than the received field strength that can be measured with the reception system for this filed experiment. Therefore, areas were divided based on the calculated field strength and the coverage area ratio within each area was evaluated.

The calculated field strength at a receiving antenna height of 10 m was divided into 10 dB steps from 30 to 70 dBμV/m, and the coverage area ratio was calculated for each sample

included within the range. The measurement route was divided up into 20-m sections, and the sections where correct reception was possible were calculated as the coverage area ratio. Sections that contained error samples were defined as reception failures. Table IV shows the resulting coverage area ratios. Based on the results with a single receiving antenna, the coverage area ratio of sub-layer A1 was more than 50% higher than that of sub-layer A2 in area where the calculated field strength was 40 to 60. Therefore, reception using four receiving antennas made it possible to further improve the coverage area ratio with a lower field strength.

TABLE IV. Results of coverage area ratio

| Areas | Range of calculated field strength [ dBμV/m] | 1 antenna | | 4 antennas | |
|---|---|---|---|---|---|
| | | Sub-layer A1 | Sub-layer A2 | Sub-layer A1 | Sub-layer A2 |
| (a) | 30 - 40 | 14 % | 0 % | 33 % | 0 % |
| (b) | 40 - 50 | 79 % | 29 % | 89 % | 65 % |
| (c) | 50 - 60 | 89 % | 33 % | 96 % | 72 % |
| (d) | 60 - 70 | 98 % | 79 % | 98 % | 95 % |
| (e) | 70 - 80 | 100 % | 99 % | 100 % | 100 % |

### 1.1.4 Conclusion

The mobile reception performance of Advanced ISDB-T was evaluated in field experiments. In order to verify a mobile reception service that can continue to receive audio content even when reception quality deteriorates, more robust transmission parameters were used for audio content transmissions than for video content. Sub-layer A1 used the most robust transmission parameters in Advanced ISDB-T, and sub-layer A2 used transmission parameters with a required C/N equivalent to that of current broadcasting. Measurements were made in a wide area including urban areas and highways using a large-scale experimental station with a transmission output of 1 kW. The coverage area ratio of sub-layer A1 where the calculated field strength is 50 to 60 dBμV/m was 89%, an improvement of 56% compared with sub-layer A2. In urban areas with many high-rise buildings, there were many areas where reception succeeded only on sub-layer A1, thereby confirming the effectiveness of robust audio content transmission.

This article was modified from the paper that was published in the proceedings of IEEE Vehicular Technology Conference (VTC) 2024-Fall.

H. Miyasaka, T. Takeuchi and M. Okano: "Field Experiments on Highly Robust Mobile Reception for Advanced ISDB-T," in Proc. IEEE Vehicular Technology Conference (VTC) 2024-Fall, Oct. 2024.

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## 1.2 Development of ATSC 3.0 & 5G-Broadcbast Transmission Techniques in the Republic of Korea

Since December 2020, government-funded research projects aimed at developing innovative services based on ATSC 3.0 technology have been conducted, as outlined in the 'Policy Measures to Activate Terrestrial UHD Broadcasting' announced by the Ministry of Science and ICT and the Korea Communications Commission. These projects focus on three key areas: demonstrating the convergence of broadcasting and telecommunications, developing and demonstrating various technologies for mobile service reception, and developing 8K-UHD broadcasting technologies.

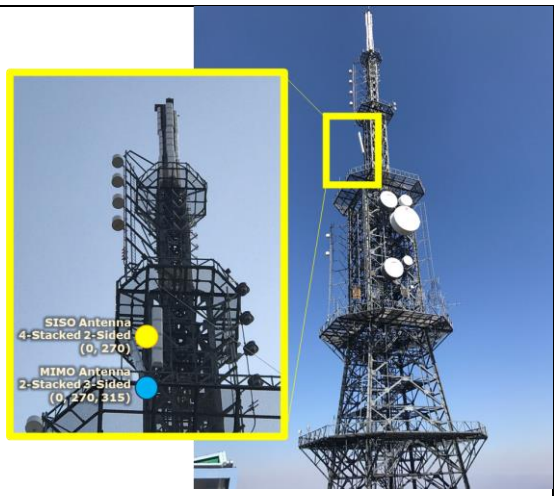
| **Project Title** | **Research Period** | **Research Objectives** |
|---|---|---|
| Development of Integrated Transmission Technology for 5G and Terrestrial Broadcasting (ATSC 3.0) | April 2019 - December 2023 | Development of a technology that simultaneously transmits fixed reception channels (ATSC 3.0 standard) and mobile reception channels (5G-FeMBMS standard) within a terrestrial UHD broadcast channel using time-division multiplexing (TDM). |
| Development of Terrestrial 8K Media Broadcast Transmission and Reception Technology | April 2022 - December 2026 | Development of a transmission and reception system capable of delivering 8K-UHD media over terrestrial broadcast networks, supporting up to 200 Mbps, by utilizing 'channel bonding' and 'multi-antenna' technologies. |
| Development of ATSC 3.0 Mobile Broadcasting Receiver Chip | April 2023 - December 2026 | Development and implementation of a high-performance, high-sensitivity mobile broadcast receiver chip supporting ATSC 3.0 standards. The chip will utilize multiple receive antennas and be integrated into a commercial-grade in-vehicle set-top box. |

Since November 2020, when the KBS Gyeonggi Gamgaksan ATSC 3.0 Experimental Station was authorized, transmitters developed through government-funded research projects have been installed in stages at the station. Through high-power field tests, the projects have continuously verified and improved the performance of individual outputs. In June 2023, a seminar was held at the Bukgamgak Experimental Station and its coverage area (Jeokseong-myeon, Paju-si) with the participation of the ATSC President, Madeleine Noland, engineers from the three major Korean broadcasters (KBS, MBC, and SBS), and ETRI researchers. The seminar confirmed that Korea is indeed a global leader in ATSC 3.0 technology development.

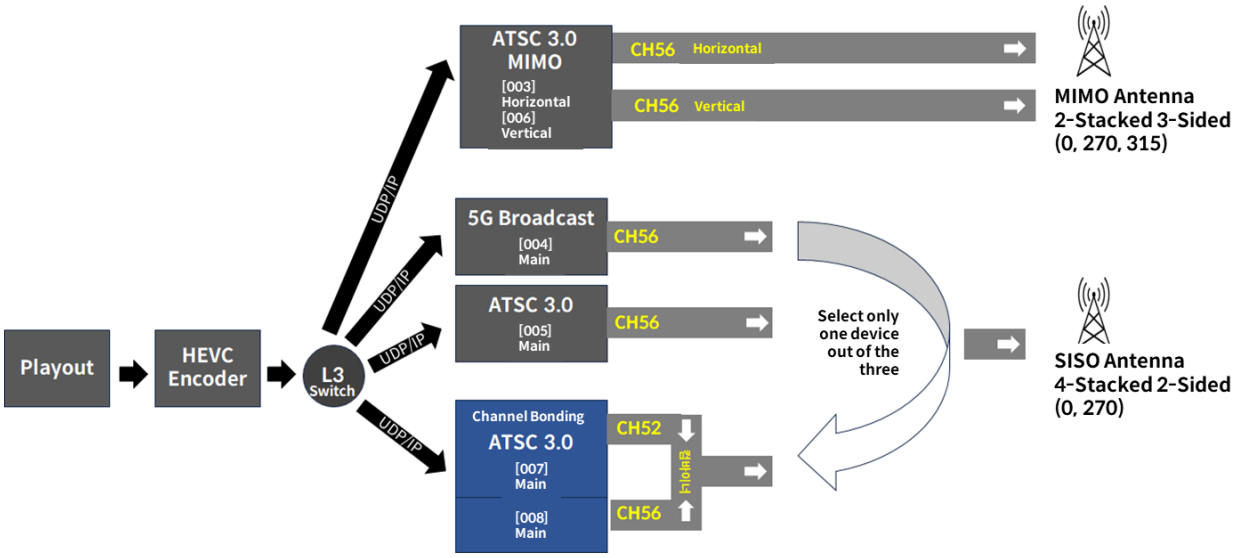
### 1.2.1 Deployment and utilization of transmitters at the experimental station

| Project Title | Equipment and Configuration |
|---|---|
| Integrated Transmission for 5G and ATSC 3.0 | Unit #4 for 5G Broadcast and Unit #5 for ATSC 3.0; transmitters combined using time-division multiplexing (TDM) for a total output power of 900W. |
| Development of Terrestrial 8K Media Broadcast Transmission and Reception Technology | Units #3 and #6 (horizontal and vertical polarization); a single transmitter is used for both horizontal and vertical polarization with 300W MIMO transmission.<br><br>Units #7 and #8 (horizontal channels 56 and 52) are used for channel bonding with a total power of 300W. |
| Development of ATSC 3.0 Mobile Broadcasting Receiver Chip | Unit #5 (ATSC 3.0); to enhance mobile reception performance, a 'diversity reception' technique utilizing up to four receive antennas is planned for verification. |


Installation of ATSC 3.0 SISO and MIMO, Channel Bonding, and 5G-Broadcast Transmitters




Antenna installation on a transmission tower: SISO (top) and MIMO (bottom)



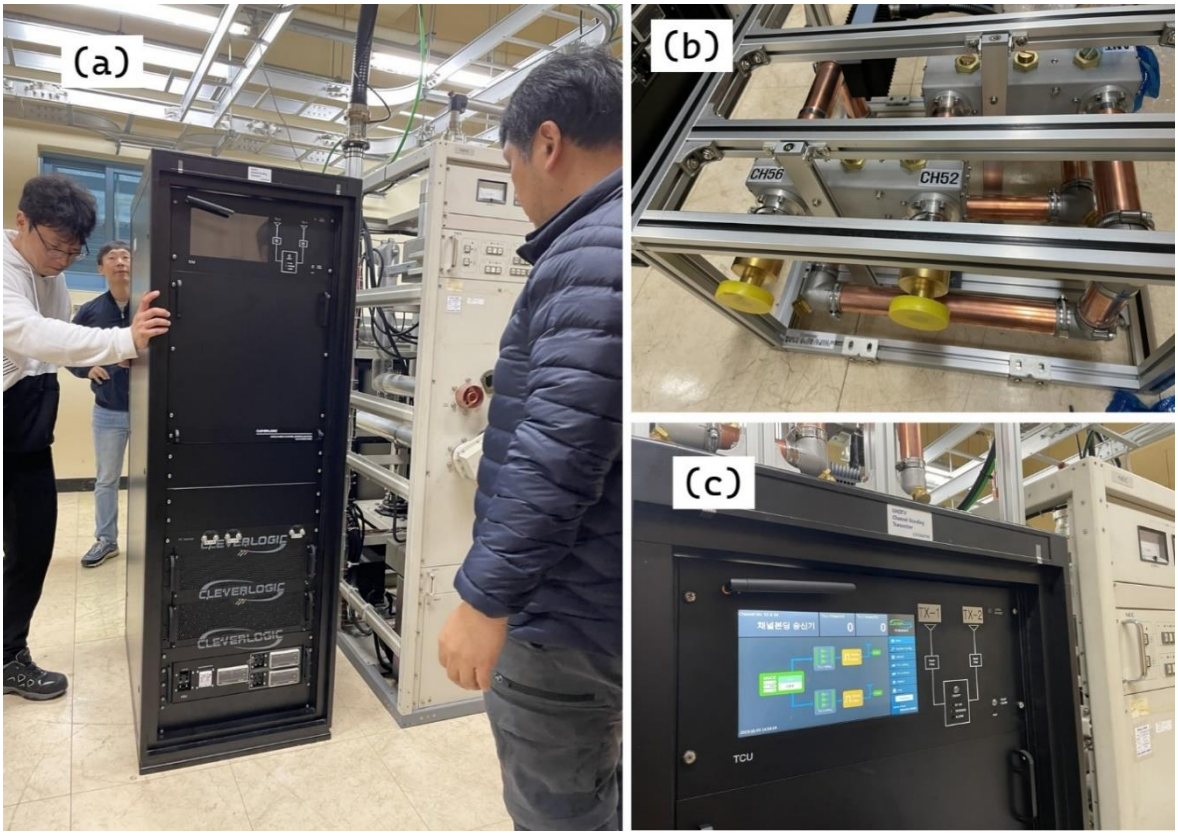

### 1.2.2 Verification of Direct Reception Following Installation of ATSC 3.0 Channel Bonding Transmitters (Units 7 and 8)

ATSC 3.0 channel bonding transmitters were installed, along with a channel combiner for CH52 and CH56 channels. A U-LINK was manually configured to transmit signals through an existing four-element, two-stacked, horizontally polarized antenna.

(a) Transportation and installation of ATSC 3.0 standard-compliant channel bonding transmitters.

(b) Custom fabrication of a stretched line combiner capable of combining CH52 and CH56 channels.

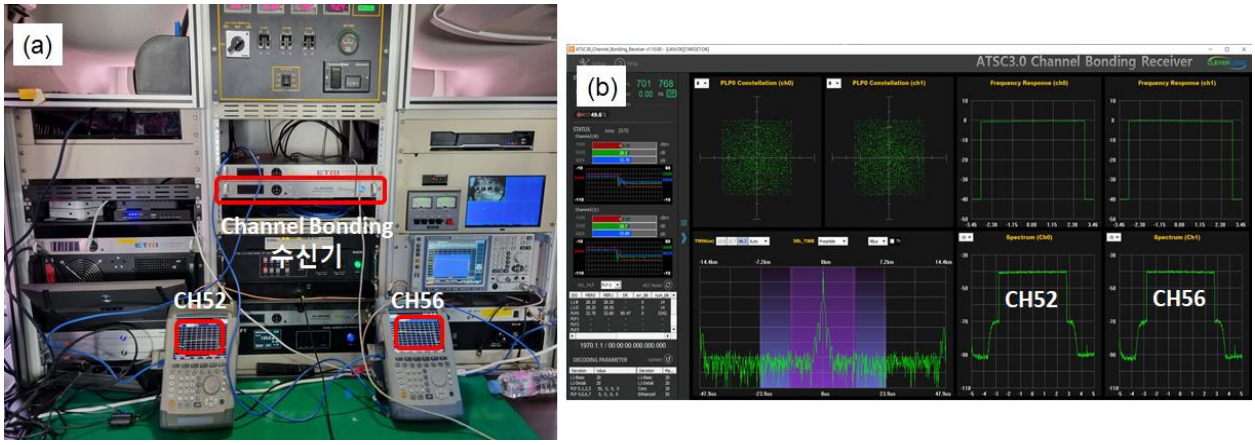
(c) Power activation of the transmitter connected to the U-LINK (prior to a test transmission at a rated output power of 400 W).




Through direct RF reception using an ATSC 3.0 channel bonding receiver installed in a field test vehicle, simultaneous reception of CH52 and CH56 channels was verified using two spectrum analyzers and a dedicated ATSC 3.0 channel bonding receiver.

(a) A field test vehicle equipped with an ATSC 3.0 standard-compliant channel bonding receiver was used for internal measurements.

(b) Simultaneous direct reception of CH52 and CH56 channels was confirmed using two spectrum analyzers and a dedicated ATSC 3.0 channel bonding receiver.



### 1.2.3 Performance Evaluation of Integrated ATSC 3.0 and 5G-Broadcast Physical Layer Transmissions by Field Measurement Campaign

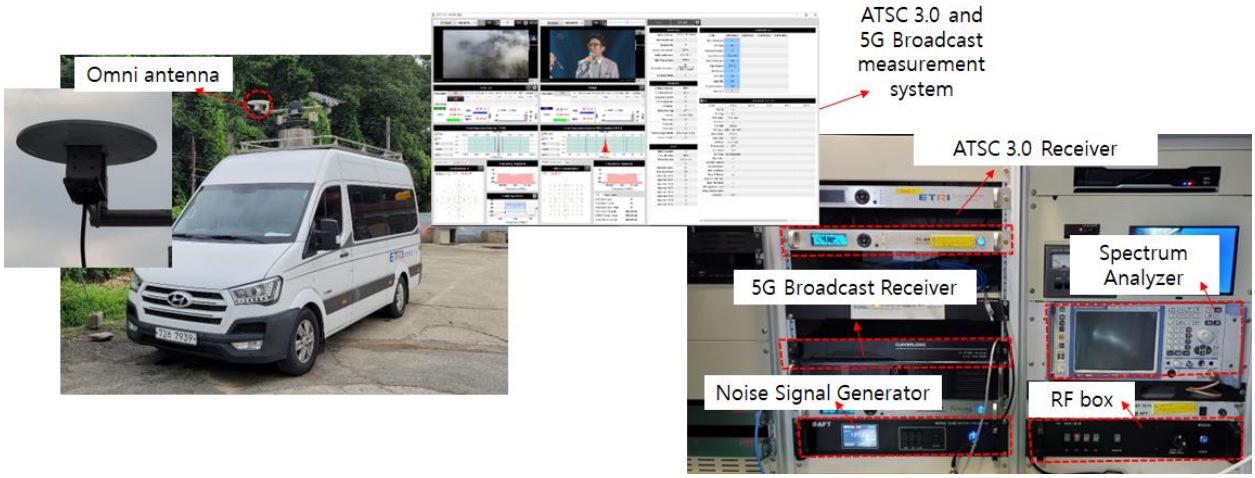
#### 1.2.3.1 Field Test Measurement Vehicle and Transmission Parameter Configuration

To evaluate the reception performance of integrated ATSC 3.0 and 5G-Broadcast physical layers, field tests were conducted using a dedicated measurement vehicle. The following configuration was employed:

- Transmission:
    - A time division multiplexing (TDM) scheme was utilized to transmit signals from ATSC 3.0 transmitter (Unit#5) and 5G-Broadcast transmitter (Unit#6) operating in the licensed 768 MHz frequency band with a 6 MHz bandwidth, adhering to respective standards.
- Reception:
    - An omnidirectional antenna was installed on the measurement vehicle to receive signals directly from the experimental station. A professional receiver equipped with signal analysis capabilities was also installed for in-depth analysis.
    - To ensure a fair and objective comparison of the performance of different physical layer standards, detailed transmission parameters were configured as shown in [Table] under identical data rate conditions. Specifically, Configurations #1 and #2 were set to 5 Mbps and 8 Mbps, respectively.

| **ATSC 3.0 Configuration** | | | |
|---|---|---|---|
| Resource | Bandwidth | 6 MHz | |
| | Time resource | 50% (200msec) | |
| Payload OFDM parameters | FFT size | 8192 | |
| | Guard interval | GI6_1536(222.22us) | |
| | Subcarrier spacing | 0.844 kHz | |
| | Pilot pattern | SP4_2 | |
| | Time interleaver | CTI with a depth of 1024 | |
| | Frequency interleaver | On | |
| Payload Encoding parameters | **Configuration** | **#1** | **#2** |
| | Outer code | 7/15 LDPC(64800) | 10/15 LDPC(64800) |
| | Constellation | 64-NUC | 64-NUC |
| | Data rate | 5.77 Mbps | 8.23 Mbps |

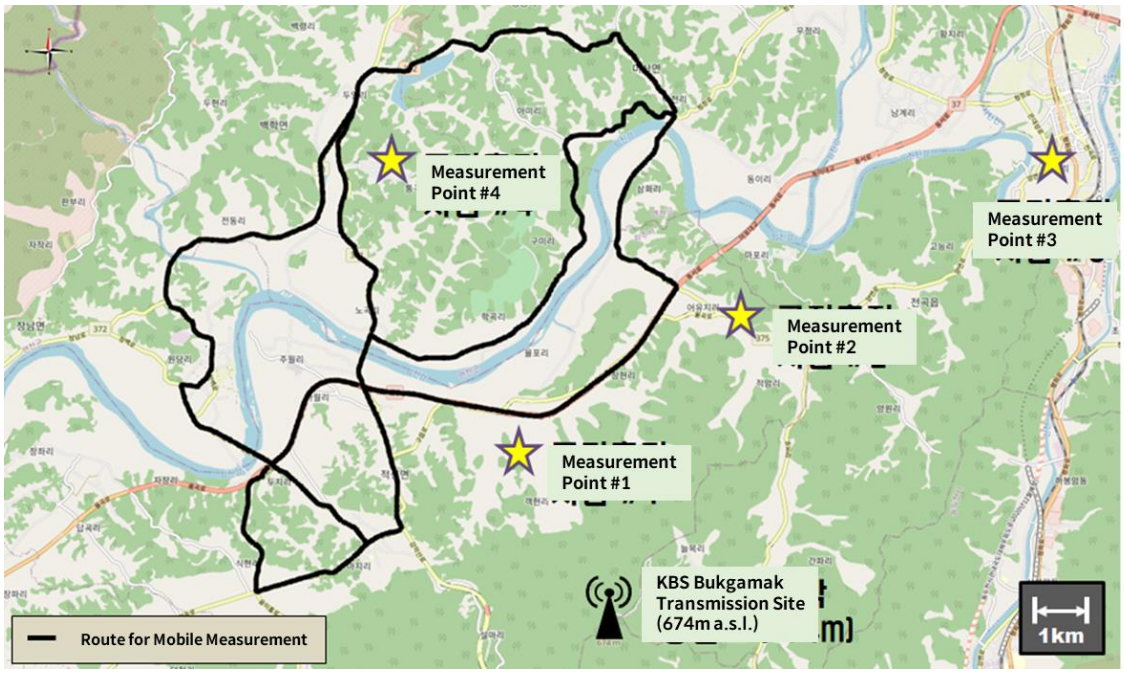
| 5G Broadcast Configuration | | | |
|---|---|---|---|
| Resource | Bandwidth | 6 MHz (30RBs) | |
| | Time resource | 50% (200msec) | |
| Payload OFDM parameters | FFT size | 12288 | |
| | Guard interval | 200 us | |
| | Pilot pattern | SP3_2 | |
| | Subcarrier spacing | 1.25 kHz | |
| Payload Encoding parameters | **Configuration** | **#1** | **#2** |
| | MCS index | 19 | 24 |
| | Code rate | 0.498 | 0.764 |
| | Constellation | 64-QAM | 64-QAM |
| | Data rate | 5.21 Mbps | 8.00 Mbps |




### 1.2.3.2 Field Test Results: Fixed and Mobile Measurements of ATSC 3.0 and 5G-Broadcast Convergence Transmission

#### 1.2.3.2.1 Fixed Measurement Results

- Measurement Points: Four reception points were selected, considering direct reception environments such as Line-of-Sight (LoS) availability and multipath conditions based on terrain profile analysis.
- Measurement Range: The entire physical layer signal was measured, including data transmission channels and control channels.




- Measurement Criteria: The ToV (Threshold of Visibility) was defined as the CNR required to achieve a BLER = $10^{-4}$. ToV is the minimum signal quality metric for satisfactory viewing [BT.2252].

  ** ToV CNR refers to the minimum ratio of received signal strength to noise required for satisfactory viewing. Therefore, a lower ToV CNR value indicates that satisfactory viewing is possible even in a poorer reception environment. When comparing systems, a lower required ToV value indicates that the system has a comparative advantage.*

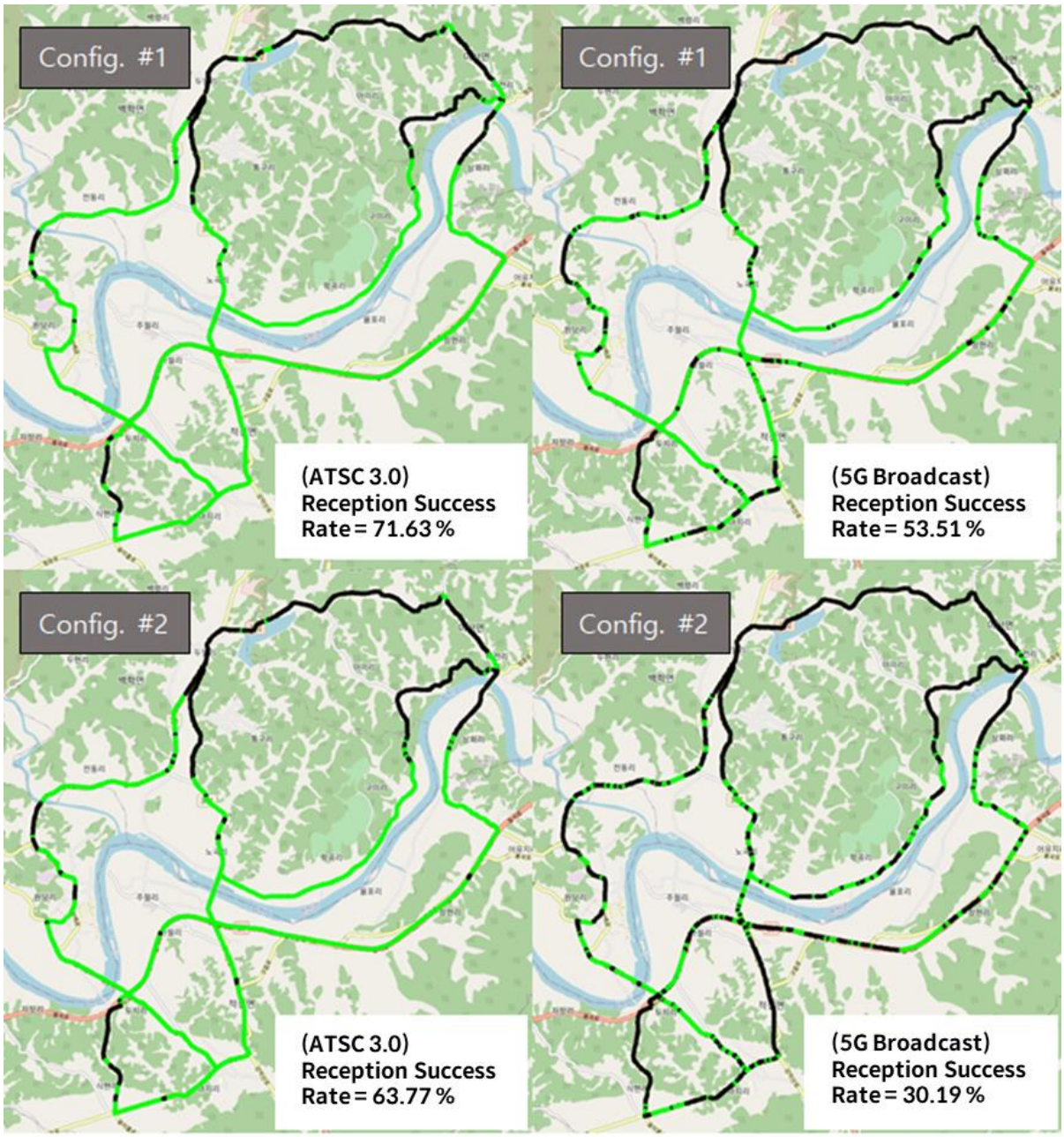
- Results: The received field strength (dBm) and ToV CNR (dB) for each standard were measured at each fixed measurement point.

| Configuration | Measurement Point | Received Field Strength (dBm) | ATSC 3.0 ToV (dB) | 5G Broadcast ToV (dB) | Performance Difference (dB) | Average Performance Difference (dB) |
|---|---|---|---|---|---|---|
| #1 | #1 | -48.28 | 9.75 | 11.39 | 1.64 | 1.85 (excluding #4) |
| | #2 | -75.26 | 11.93 | 13.41 | 1.48 | |
| | #3 | -78.59 | 11.71 | 14.15 | 2.44 | |
| | #4 | -86.24 | 12.18 | No Reception | ∞ | |
| #2 | #1 | -48.04 | 14.57 | 18.59 | 4.02 | 3.67 (excluding #3 & #4) |
| | #2 | -74.80 | 16.96 | 20.27 | 3.31 | |
| | #3 | -78.38 | 15.63 | No Reception | ∞ | |
| | #4 | -86.70 | No Reception | No Reception | n/a | |

#### 1.2.3.2.2 Mobile Measurement Results

Mobile measurements were conducted by repeatedly traversing the same route within the broadcasting area of the experimental station at a constant speed. Thanks to time-division multiplexing, measurements for each standard were conducted simultaneously.

- Result 1: Reception Success Rate For each reception point, locations where signals were successfully received were marked in green on the map, and locations where reception failed were marked in black.
    - [Configuration #1] ATSC 3.0 achieved a reception success rate of 71.63%, while 5G Broadcast achieved 53.51%.
        - For 5G Broadcast, reception failures were observed even in open areas with line-of-sight.
    - [Configuration #2] ATSC 3.0 achieved a reception success rate of 63.77%, while 5G Broadcast achieved 30.19%.
        - For 5G Broadcast, reception failures were scattered throughout the entire measurement route.



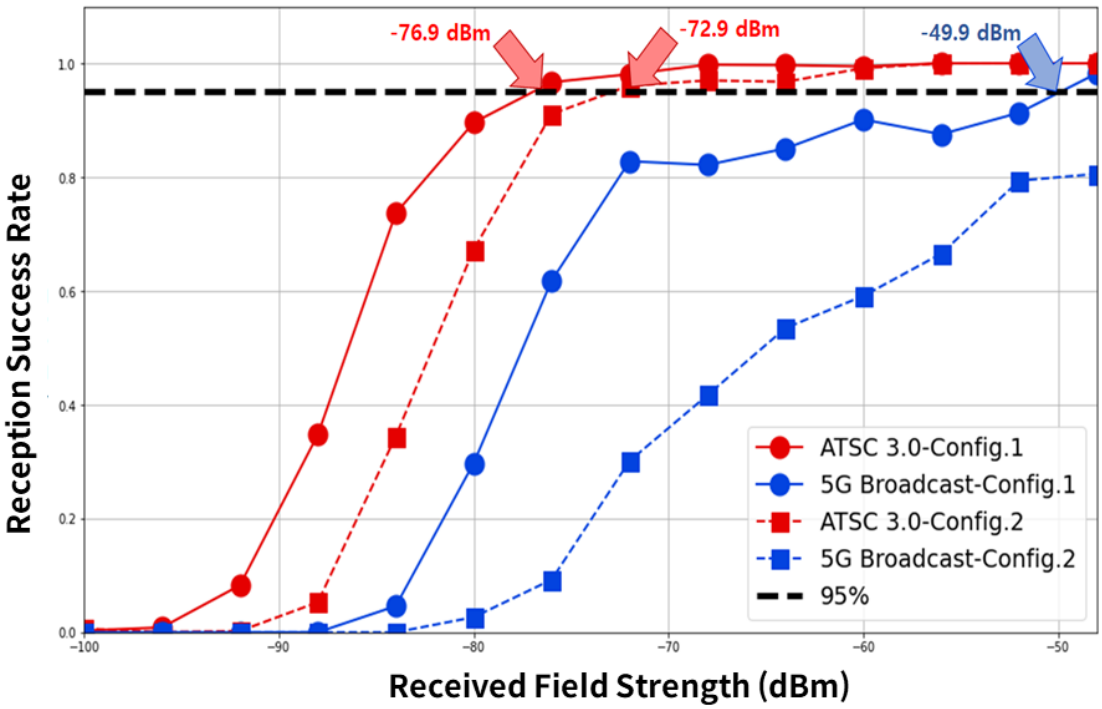

- Result 2: ESR5 Raw data collected from the mobile measurements was processed into an Erroneous Second Ratio 5 (ESR5) curve, representing the received field strength required to guarantee a 95% reception success rate.

  ** ESR5, as defined in ITU-R BT.1368 and BT.2215, represents the ratio of seconds with at least one uncorrectable packet error within a 20-second interval, with a threshold of 5%. ESR is a commonly used metric for evaluating the long-term, average reception performance of terrestrial broadcast systems in mobile environments. By extending the observation interval, a more precise and reliable assessment of the transmission quality can be achieved.*

  - [Configuration #1] ATSC 3.0: -76.9 dBm, 5G Broadcast: -49.9 dBm, a difference of 27 dB.

- For 5G Broadcast, reception failures were observed even in open areas with line-of-sight.

- [Configuration #2] ATSC 3.0: -72.9 dBm, 5G Broadcast: Mobile reception could not be guaranteed.
  - For 5G Broadcast, reception failures were scattered throughout the tire measurement route.



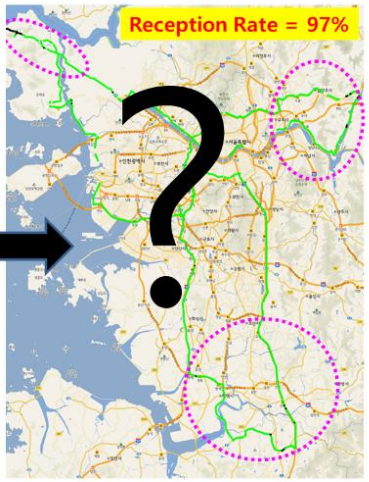

### 1.2.4 Development of a New ATSC 3.0 Mobile Reception Measurement Vehicle (Unit 5) and Verification of Basic Reception Performance

The existing Solati-based measurement vehicle, while capable of installing UHDTV, had limitations in terms of mobility due to its large size. To enhance mobility, a new Carnival measurement vehicle was developed. Comparison tests and improvements of ATSC 3.0 reception performance are currently underway using the Bukgamak experimental station.

**Vehicle Targeted Transparent Taping Antenna**
(Supporting VHF and UHF)


- New Test Van -

Commercialized
Vehicle Receiver




4

## 1.3 Other Topics on Next Generation Terrestrial Broadcasting

ATSC 3.0, which is a new standard of terrestrial broadcasting developed by the Advanced Television Systems Committee, is promoted for many countries. In the United States, broadcasters are working together to bring ATSC 3.0 to audiences across the country, currently targeting markets that will reach more than 80% of the public. In the Republic of Korea, Ultra High-Definition (UHD) TV broadcasting services using ATSC 3.0 were launched in May 2017, and now reach more than 80% of the South Korean population.

The latest status about ATSC 3.0 and its deployments in various countries are available on the website.

https://www.atsc.org/nextgen-tv/deployments/

In Brazil, preparations are underway for the next-generation digital terrestrial television broadcasting system, called TV 3.0. In 2020, The SBTVD Forum released a Call for Proposals, inviting any interested organizations to submit their candidate technologies for the system components or sub-components. It announced that the studies will be completed by the end of 2024.

https://forumsbtvd.org.br/tv3_0/

Regarding 5G Broadcast, the Republic of Korea conducted experiments as detailed earlier in Section 1.2. Another notable event was a demonstration by Télédiffusion de France (TDF), which delivered linear live TV and radio services over 5G Broadcast in three cities, Paris, Nantes, and Bordeaux, during Paris Olympic Games.

https://www.tvbeurope.com/media-delivery/a-new-era-of-broadcasting-at-the-olympic-games

# Annex 2

## Project: Integrated Broadcast-Broadband and OTT (D/IBBOTT)

Project Manager: **Dr. Go OHTAKE** (NHK, Japan)
Co-project Manager: **Mr. A. K. Mangalgi** (DDI, India)
**Mr. R.P. Joshi**
**Dr. Hirokazu Kamoda** (NHK, Japan)
**Mr. Hiroki Endo** (NHK, Japan)
**Mrs. Zhang Dingjing** (ABS, China)
**Zhang Yu** (ABS, China)
**Zhang Wei** (ABS, China)
**He Jing** (ABS, China)
**Wang Lei** (ABS, China)

### 2. Status report

This annex describes recent updates on IBB and OTT standards and related technologies identified and studied by this project. It also describes recent update on standards and technologies of information security for broadcasting services and cybersecurity in broadcasting industry for protecting the broadcasting systems.

### 2.1 Standardization of Integrated Broadcast-Broadband System in Japan

IPTV Forum Japan standardizes specifications of Hybridcast in Japan. Technical specification of Hybridcast is composed of two technical standards and an operational guideline listed below and the latest versions are published in January 2022.

- IPTVFJ STD-0010 'Integrated Broadcast-Broadband System Specification', version 2.4
- IPTVFJ STD-0011 'HTML5 Browser Specification', version 2.7
- IPTVFJ STD-0013 'Hybridcast Operational Guideline', version 2.10

In the revision in November 2020 several new features were added to the Hybridcast technical specifications. Major updates are as follows:

- Addition of the new application type named "Broadcast-independent managed application"
  An application of this type runs in the state that no broadcast channel is being tuned so that service providers can offer application services regardless of their broadcasting area.
- Enhancement to the streaming video playback function
  The CMAF[*1] is added as a supported container format of streaming video, including low-latency playback features. Support for stream event delivery mechanisms such as an 'event message' (emsg) box and an 'Event' XML element of MPEG DASH[*2] are also added.

- Enhancement to the companion device function
  UHDTV broadcasting services, i.e. 4K and 8K satellite broadcasting in Japan, are added to the available channels for tuning from a companion device.
- Addition of the three-dimensional audio codec support
  The enhanced AC-3[*3] is added to the available audio codecs for video streaming.

*1 ISO/IEC 23000-19 "Multimedia application format (MPEG-A) — Part 19: Common media application format (CMAF) for segmented media".
*2 ISO/IEC 23009-1 "Dynamic adaptive streaming over HTTP (DASH) — Part 1: Media presentation description and segment formats".
*3 ETSI TS 102 366 "Digital Audio Compression (AC-3, Enhanced AC-3) Standard".

In the revision in January 2022, several features related to terminated VOD services were deleted from the Hybridcast technical specifications.

## 2.2 Studies in ITU-R

ITU-R WP6B is working for the study on IBB systems. The working party is now studying on harmonization of IBB systems by making comparison of Hybridcast (Japan), HbbTV2.0 (Europe), TOPSmedia (South Korea) and Ginga (Brazil).
At the meeting held in April 2019 in Geneva, the working party developed the comparison of application life-cycle and application transition of the IBB systems, and revised Report ITU-R BT.2267 "Integrated broadcast-broadband systems" to add a new part on the harmonization of Integrated Broadcast-Broadband (IBB) systems' applications. To allow the exchange of services covered by the IBB systems and to deploy these services in an area where other systems are used, it is important to harmonize the IBB systems, to ensure compatibility with the IBB applications and interoperability across systems.
At the meeting, the working party revised Report ITU-R BT.2342 to replace information on TTML Text and Image Profiles for Internet Media Subtitles and Captions 1.0 (IMSC1.0) with the updated IMSC1.1 and to update a list of current EBU specifications pertinent to the content of the Report.

At the meeting held in July 2019 in Geneva, the working party revised Report BT.2267 to add the companion application to execute the application on a receiver. The working party also developed the new use cases of IBB system which provides object-based sound services via MPEG-DASH streams.
The working party also developed the global platform. The working party revised Report ITU-R BT.2400 "Usage scenarios, requirements and technical elements of a global platform for the broadcasting service" to add the specific reference to the ATSC 3.0 standard and some examples to show its Internet Protocol-based capabilities to integrate broadcast and broadband services. New digital terrestrial transmission standards such as

the ATSC 3.0 system can help effectuate a converged broadcast and broadband platform, which is an important aspect of a global platform for broadcasting services.

At the meeting held in October 2020, the working party revised Recommendation ITU-R BT.2075 "Integrated broadcast-broadband system" to update an application execution mechanism of Hybridcast, with which a companion device sends a command to a receiver to tune to a designated channel and launch a Hybridcast application.

At the meeting held in March 2021, the working party prepared a revised draft report of Recommendation BT.2075 by adding information regarding commonality among IBB systems and equivalency of their functions as described in Report BT.2267 Part 3. The working party also prepared a draft revision to report BT.2267 on IBB systems to align with Recommendation ITU-T J.208 on harmonization of applications between IBB systems.

At the meeting held in September 2022, the working party revised Recommendation ITU-R BT.2075 "Integrated broadcast-broadband system" and Report BT.2267 "Integrated broadcast-broadband systems" to add a Broadcast-independent managed application, which is an application that can be launched when broadcast services are not selected but is still authenticated by broadcasters.

### 2.3 Studies in ITU-T

ITU-T SG9 is also working for the study on IBB system applied to Cable Digital TV. At the meeting held in November 2018 in Bogota, Colombia, the Study Group started to revise IBB system Recommendation (Recommendation ITU-T J.207 "Specification for integrated broadcast and broadband digital television application control framework") to add the function of device collaboration with companion devices in Hybridcast. Recommendation J.207 is a twin of IBB system Recommendations in ITU; Recommendation ITU-R BT.2075 is another twin on this topic. Therefore, the Study Group continues to revise the Recommendation J.207 in line with the revision of Recommendation ITU-R BT.2075. The Study Group is studying smart TV operating systems for hybrid cable Digital TV services including IBB DTV services provided by cable television operators and third-party providers. At the Bogota meeting, the Study Group made progress the work of the architecture of smart TV operating system. The Study Group consented to the Recommendation of "The functional requirements of smart TV operating system" as Recommendation ITU-T J.1201.

At the meeting held in June 2019 in Geneve, the Study Group consented to Recommendation J.207 to add the function of device collaboration in Hybridcast. The Study Group also made progress the work of drafting new Recommendation "Harmonization of Integrated Broadcast-Broadband DTV application control framework".

As for the smart TV operating system, the Study Group consented to the Recommendation of "The architecture of smart TV operating system" as Recommendation ITU-T J.1202. In addition, the Study Group has begun developing a new Recommendation for the specification of smart TV operating systems.

At the meeting held in November 2023, the Study Group reached the AAP consent for the draft new Recommendation ITU-T J.1206. It has been approved and is now part of the set of already approved Recommendations as follows:

- J.1201: Functional requirements of a smart TV operating system
- J.1202: The architecture of a smart TV operating system
- J.1203: The specification of a smart TV operating system
- J.1204: The security framework of a smart TV operating system
- J.1205: The hardware abstract layer application programming interface of a smart TV operating system
- J.1206: The application programming interface of a smart TV operating system

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

## 2.4 Topics on Cybersecurity

### 2.4.1 EBU Cybersecurity Recommendation Updated

EBU R143 (CYBERSECURITY RECOMMENDATION FOR MEDIA VENDORS' SYSTEMS, SOFTWARE & SERVICES) is a set of guidelines developed by the EBU to assist audiovisual media organizations in safeguarding their digital assets and infrastructure from cyber threats. It was first released in 2016 and has been updated frequently to address the ever-changing challenges and technologies related to cybersecurity.

The most recent update was published in March 2024 to include the cybersecurity requirements of SaaS (Software as a Service). This underscores the evolving landscape of cybersecurity threats and the increasing reliance on cloud-based services within the broadcasting industry. The updated recommendation includes an additional list of cybersecurity requirements for SaaS Products, including strong access management, data protection, security monitoring and incident remediation. EBU recommends that broadcasters engaged in tenders use it as a basis to set minimal system acceptance levels in their purchasing processes.

Source: https://tech.ebu.ch/publications/r143

### 2.4.2 Recent Incidents at Media Organizations

(a) Television Niigata Network

Television Niigata Network Co., Ltd, in Japan announced on March 13 in 2024 that there was a cyberattack on the internal network of the company.

According to the press release, it was confirmed on March 11 that the data on the internal drives of several terminals and servers connected to the internal network were encrypted and not working properly. Subsequently, an investigation team led by internal system personnel was set up to investigate the damage, and it was determined that this was caused by an external cyberattack. Although no leakage of personal information due to this cyberattack has been confirmed within the scope of the investigation, it has also been confirmed that there was no expansion of the attack from the internal network to the external network. The affected terminals and servers were mainly for information systems and program production, and the cyberattack had no impact on broadcasting.

Source: https://www.teny.co.jp/info/20240313/20240313_001.pdf

(b) Newfoundland Broadcasting Company

The Newfoundland Broadcasting Company, ltd., owners and operators of NTV and OZFM in Canada, was hit by a cyberattack in May 2024.

The company says the attack has not hampered on-air operations at NTV nor at its radio station, OZFM. A company statement says it has confirmed that the perpetrators accessed parts of its systems and were threatening to post data belonging to the company online. The Play ransomware group claimed responsibility for the attack, and its site on the dark web says it stole private data including budget and payroll information and client documents from NTV. The group's frequently asked questions page says that it typically encrypts data belonging to its victims so they can no longer access it, and that it will only release it and delete its copies of the stolen information if it receives a payment.

Source: https://ntv.ca/newfoundland-broadcasting-co-victim-of-cyberattack/
https://www.cbc.ca/news/canada/newfoundland-labrador/ntv-cyberattack-1.7220261

(c) KADOKAWA

KADOKAWA, a major publishing company in Japan, announced that it had confirmed that a cyberattack in June 2024 leaked the personal information of approximately 250,000 people, including business partners and employees of its subsidiary. The servers at the data center of a group company of KADOKAWA suffered a system failure due to a cyberattack by ransomware, a computer virus that demands a ransom payment.

The cause of this incident is still unknown, but it is assumed that employee account information was stolen through “phishing” and other methods, and the internal network was infiltrated.

KADOKAWA’s video-sharing site, “Niconico,” that had been unavailable due to the cyberattack, resumed service for the first time in approximately two months on August 5. According to Dwango, the site's operator, a new system was built, and security measures were strengthened in order to resume the service. As of August 5, KADOKAWA was also working on the restoration of its publishing business system and expected to be able to publish almost the same number of copies as usual from mid-August onward.

Source: https://www.kadokawa.co.jp/topics/12088/
https://www3.nhk.or.jp/news/html/20240805/k10014537911000.html

# Annex 3

## Project: Satellite Broadcasting (D/SB)

Project Manager: **Mr. Masashi KAMEI** (NHK, Japan)
Co-project Manager: **TBD**

### 3.0 Objectives

This annex describes technologies on the latest satellite systems for UHDTV broadcasting and specifications of the latest satellite broadcasting systems. It also describes the latest topics on advanced satellite broadcasting technologies using Ka-band, etc.

### 3.1 ITU-R Documents Related to Satellite Broadcasting Systems

#### 3.1.1 Radio Regulations

ARTICLE 23 Section 2 "Broadcasting-satellite services"

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

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

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

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

RESOLUTION 528 "Introduction of the broadcasting-satellite service (sound) systems and complementary terrestrial broadcasting in the frequency bands allocated to these services within the range 1-3 GHz."

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

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

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

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

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

and 3”

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

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

### 3.1.2 Recommendations (https://www.itu.int/rec/R-REC-BO/en)

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

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

BO.1443 “Reference BSS earth station antenna patterns for use in interference assessment involving non-GSO satellites in frequency bands covered by RR Appendix 30”

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

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

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

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

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

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

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

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

BO.2098 “Transmission system for UHDTV satellite broadcasting”

### 3.1.3 Reports (https://www.itu.int/pub/R-REP-BO/en)

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

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

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

configuration”

BO.2102 “Multiple-feed BSS receiving antennas”

BO.2397 “Satellite transmission for UHDTV satellite broadcasting”

BO.2497 “Characteristics and effectiveness of frequency sharing criteria for the broadcasting-satellite service in Regions 1 and 3 subject to RR Appendix 30”

## 3.2 Latest Topics on Satellite Broadcasting

### 3.2.1 Development of Layered Division Multiplex Transmission for Satellite Broadcasting

NHK STRL is developing a satellite broadcasting system with layered division multiplex (LDM) that multiplexes multiple modulation signals in the same channel with different power levels with the aim of providing services with flexibility in accordance with changes in the receiving environment due to rain attenuation, etc. as a next-generation satellite broadcasting system. The LDM transmission consists of an upper layer (UL) with high power and a lower layer (LL) with low power, and it enables signals to be transmitted with different bitrates and robustness in the same channel. It is useful for broadcasters to maintain broadcasting services provided by UL signal with a robust transmission parameter during heavy rainfall.

NHK STRL has developed an LDM-based modulator and demodulator for satellite broadcasting in the 21-GHz band. The 21-GHz-band satellite broadcasting allocated to the frequency band of 21.4–22.0 GHz in ITU-R Regions 1 and 3 is expected to be utilized as transmission channels for new broadcasting services with large capacity. Then, two 300-MHz-class wideband transponders are assumed in the 21-GHz band and a wideband LDM-based modulator and demodulator with the nominal symbol rate of 250 Mbaud were developed shown in Fig. 4-1.


Modulator Demodulator Spectrum

Figure 4-1 Wideband LDM-based modulator and demodulator

Versatile Video Coding (VVC), the latest standard in video coding technology, enables multi-layer coding for efficiently encoding multiple videos. It can encode low-resolution and high-resolution videos together, with the former as a base layer (BL) and the latter as an enhancement layer (EL). This enables spatial scalability, i.e., low-resolution image decoding by partial reception and high-resolution video decoding by full reception. Using this function to decode the required part of the bitstream makes it possible to display at a resolution suitable for each receiver. When considering 8K resolution video coding, it can obtain the BL that includes information for 4K resolution and the EL that includes

information for 8K resolution based on the prediction with BL.

An advanced satellite broadcasting system in which the BL with 4K resolution and EL with 8K resolution in multi-layer coding of VVC are assigned to the UL and LL of the LDM transmission, is effective as a countermeasure for degradation of receiving condition due to rainfall as explained in Fig. 4-2. Programs with 8K resolution are normally shown by receiving both the UL and LL correctly, while programs with 4K resolutions can be shown during heavy rainfall by correctly receiving only the UL.

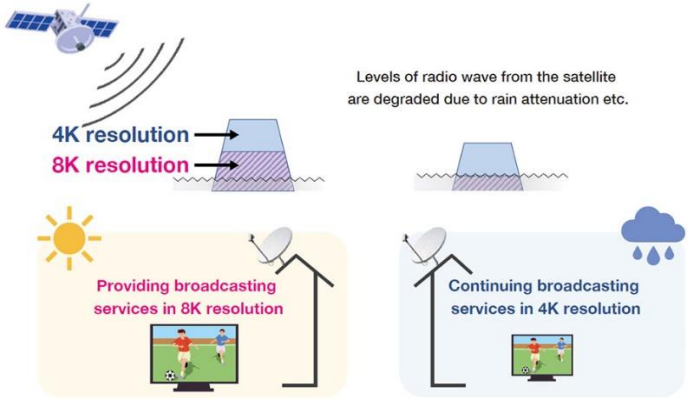
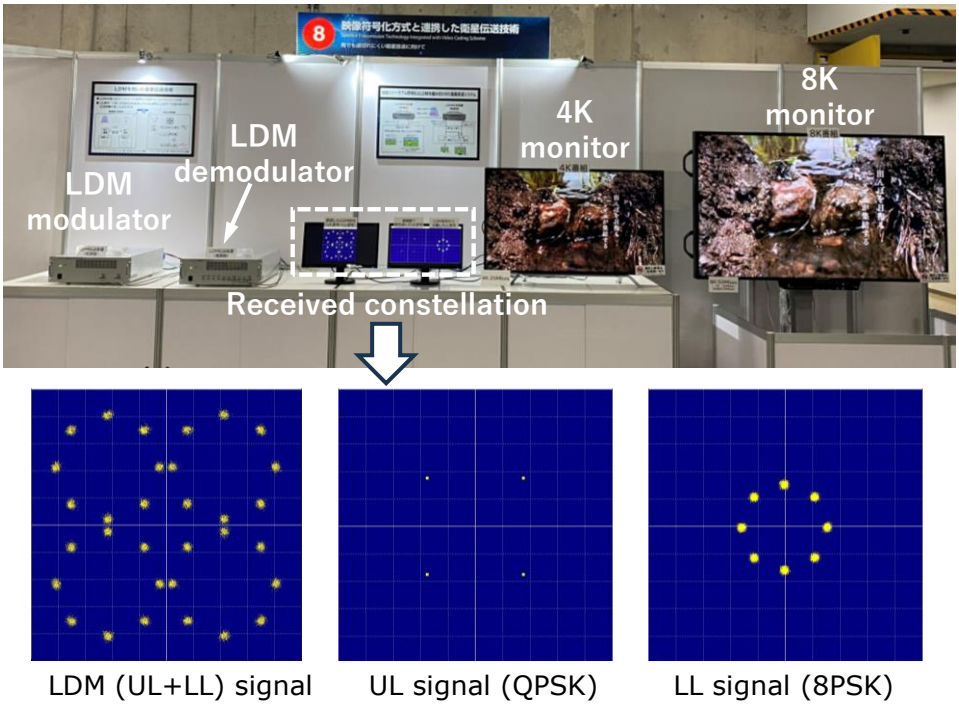



Figure 4-2 Image of advanced satellite broadcasting system for 8K program with LDM transmission and multi-layer coding of VVC

NHK STRL examined its indoor demonstration at NHK STRL Open House 2024 shown in Fig. 4-3. The modulation scheme of the UL and LL signals were set to QPSK and 8PSK, respectively.




LDM (UL+LL) signal UL signal (QPSK) LL signal (8PSK)

Figure 4-3 Indoor demonstration at NHK STRL Open House 2024

**Doc T-24/8**

**ABU Technical Committee Meeting**
**19-20 October 2024, Türkiye**

**TOPIC AREA: Training & Services**
**Topic Chairman's Report for the period May-Oct 2024**

1. The broadcasting landscape is constantly evolving, fuelled by technological advancements and a heightened emphasis on sustainable practices. Artificial Intelligence (AI) has emerged as a transformative force in the industry, offering a range of applications that enhance efficiency, personalize content, and streamline production processes. In addition, broadcasting is becoming increasingly immersive through technologies such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). Live events, sports, and entertainment can now be experienced in a more interactive and engaging way. These immersive technologies are also enhancing advertising efforts by creating captivating and interactive campaigns.

2. As new technologies emerge, industry professionals must continually update their skills to remain relevant. The shift from traditional broadcasting to digital platforms, the rise of streaming services/OTT, the adoption of 4K/8K technologies, integration of AI based applications, etc. are driving the need for training in the latest tools and techniques.

3. Moreover, the increasing demand for diverse and localized content has heightened the need for trained professionals who understand the cultural nuances and preferences of different markets within the Asia-Pacific region. This necessitates specialized training programs to develop skills in content creation, adaptation, and localization.

4. The expansion of the broadcasting sector further contributes to the demand for skilled personnel. As more channels, platforms, and production houses emerge, there is a growing need for a competent workforce to meet the demands of a competitive and evolving market. This imposes a significant challenge for the ABU Technology Division in addressing the training needs of its members, given the region's diverse adoption of technological innovations.

5. The Training & Services Topic Area plays a crucial role in assisting the ABU Technology Division in developing the technical skills and knowledge of ABU members through various approaches such as collaborations, MoUs, industry involvement, process streamlining, and understanding members' needs. To address these needs, the Topic Area has identified the following project topics:

i) Technical Training Priorities and Members' Requirements (TS/TTPMR)

ii) Skill Development Programme for Managerial and Occupational Safety (TS/SDPMOS)

iii) Technical Skill Building and Knowledge Sharing (TS/TSBKS) or High-Tech Exposure & Knowledge Sharing (TS/TEKS)

Some of the tasks and deliverables under these projects are routine and are being carried out periodically. The ABU Technology Division has been consistently working on these tasks on a regular basis.

6. The status of project topics including Action Taken Report (ATR) in respect of each project during the period May 2024 to Oct 2024 has been consolidated and given below:

**a) Technical Training Priorities and Members Requirements (TS/TTPMR)**

| | **TASKS** | **Action Taken Report/Present Status** |
|---|---|---|
| i. | Conduct surveys periodically to understand the requirements and priority areas of members | ABU Technology Division conducts the survey every 2 to 3 years.<br>The last survey was conducted during 8-22 October 2021. Based on the survey inputs the training requirements have been shortlisted and prioritised.<br><br>However, the subsequent survey is long overdue and ABU TD may take up this task on priority and may complete it by early 2025. |
| ii. | Identify requirement of Technical Advisory Services for Members | Status of ABU TAS missions :<br>- TAS mission with VOV: ABU Technology has planned a technical advisory service for the Vietnamese broadcaster related to building its National Online Radio platform. A workshop was conducted on 12.7.2024 during Vietnam National Radio Festival to help overcome |

| | | |
|---|---|---|
| | | challenges from the digital transformation and to support building the platform for the broadcaster. Experts from NHK - Japan and RTM - Malaysia shared international experiences on the application of digital transformation and Artificial Intelligence (AI) in program production & distribution.<br><br>However, ABU TD may extend more such TAS missions as members immensely benefit from such initiatives. |
| iii. | Joint activities with ABU Media Academy (AMA) | Over the course of the year, Media Academy organized a total of 43 online and offline training sessions. Among these, following two workshops focused on technology updates conducted:<br><br>- Exploring TVU's Remote Production Solutions – Subodh Aggarwal (TVU) |
| iv. | Collaborate with other established Media Training Academies | Details of collaborated training activities undertaken/ in pipeline :<br>i) Academy of Broadcasting Science (ABS) NRTA-China and ABU Media Academy conducted 'Third Generation AVS Video Coding Standard (AVS3): Features and Applications' on 9th April 2024 benefiting about 60 participants representing over 35 ABU Member and non-member organizations.<br>ii) A Technical Workshop on DAB+ Digital Radio from 23 - 25 July 2023 was conducted by ASBU and WorldDAB and hosted by ABU Technology benefiting about 259 participants, among them, 73 participants represented from 30 ABU Member organisations.<br>iii) ABU-IPPTAR Workshop on Cloud Services and Remote Tools for Broadcaster is scheduled to be held from 26-28 November 2024 in Angkasapuri, Kuala Lumpur in partnership with IPPTAR. |

**b) Skill Development Programme for Managerial, and Occupational Safety (TS/ SDPMOS)**

| | TASKS | Action Taken Report/Present Status |
|---|---|---|
| i | Identify and develop training programmes for non-technical, managerial, financial and occupational safety and skills enhancement | Details of non-technical training programmes completed and ongoing this year as a series through AMA:<br>- Are being planned. |

**c) Technical Skill Building and Knowledge Sharing (TS/TSBKS)**

| | TASKS | Action Taken Report/Present Status |
|---|---|---|
| i | Work with industry partners and international events to identify applicable training opportunities available in broadcasting field eg: ITU, IABM, SMPTE etc. | i) Several Workshops organised during the DBS2024 jointly with international standard bodies/ Industry partners.<br>ii) Status on partnership with international organizers related to training:<br>- A MoU signed with Korea Radio Promotion Association (RAPA) during GA in Seoul for Korean Government ODA assistance to ABU Members. Bangladesh Betar and VBTC, Vanuatu selected for the 2025-2026 ODA assistance. Official Letter of Intention for Cooperation and 'Project Concept Paper' from the selected ABU Members to be prepared and communicated to Line ministry in South Korea. |

7. In addition to above, Tasks and deliverables, which are routine in nature, are being carried out on regular basis. Further, ABU Technology organised various webinars and physical workshop since last GA and the activities will be covered in **TD Director's Technical Activity Report** for presentation at the TBM/ TC meeting.

8. Following activities are proposed to be undertaken during November 2024 - October 2025:

| | PROJECT TOPIC | DELIVERABLES |
|---|---|---|
| i | Technical Training Priorities and Members Requirements TS/TTPMR | a) Survey for Technical Training Needs<br>b) Database of training academies and training programmes offered by them.<br>c) Database of Production/ B'cast Technology / equipment used by Members.<br>d) Implementation of more TAS missions |
| ii | Skill Development Programme for Managerial, and Occupational Safety TS/ SDPMOS | a) Development of standard code of conduct and work ethics information manual<br>b) Development a disaster recovery and response manual that can be used in technical areas |
| III | Technical Skill Building and Knowledge Sharing TS/TSBKS | a) More MoU with Industry Partners.<br>b) Creation of Members' Information Exchange platform |

9. Project Managers and Co-Project Managers may be requested to contribute for Project Topics under this Topic Area. Their active participation and contribution may help achieving the targets and deliverables timely.

Padarabinda Das
Topic Chairman – Training & Services

**Doc T-24/9**

# REPORT OF TOPIC CHAIRMAN SPECTRUM TOPIC AREA

**Chairperson:** **Dr. Li Leilei (NRTA)**
**Period of Report:** **Nov. 2023 to Sept.2024**
**Date of Report :** **Sept.2024**

**Introduction about scope of the work:**

This report is on the Topic Area Spectrum Issues which including the related WRC-27 Agenda items concerning broadcasting service and ABU spectrum issues.

**Project Topic 1:** **To consider a possible new primary allocation to the fixed-satellite service (space-toEarth) in the frequency band 17.3-17.7 GHz and a possible new primary allocation to the broadcasting-satellite service (space-to-Earth) in the frequency band 17.3-17.8 GHz in Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and to consider equivalent power flux-density limits to be applied in Regions 1 and 3 to nongeostationary-satellite systems in the fixed-satellite service (space-to-Earth) in the frequency band 17.3-17.7 GHz, in accordance with Resolution 726 (WRC-23); (WRC-27 AI 1.4)**

**Project Manager:**
**Co- Project Manager:** **Mr. Rajeev Kumar**
**Time Period:** **Nov. 2023 to Sept.2024**

**The following tasks were considered for this project:**
1. Follow developments of studies in WP 4A to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

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This report was provided by Dr. Li Leilei

## 1 Background

Working Party 4A has been identified as a "Responsible group" for WRC-27 agenda item 1.4. The first meeting has already been held. The meeting drafted the working plan, the main elements of the agenda item working document, the main elements of the agenda item CPM draft working document and the liaison statement. The tasks of Working Party 4A are shown as follows:

1.studies on sharing and compatibility between the FSS (space-to-Earth), the BSS (space-to-Earth) and the FSS (Earth-to-space) designated by No. 5.516 in order to consider a possible new primary allocation to the FSS (space-to-Earth) in the frequency band 17.3-17.7 GHz for Region 3 and to the BSS (space-to-Earth) in the frequency band 17.3-17.8 GHz for Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and without adversely affecting the existing allocations to the FSS (Earth-to-space) designated by No. 5.516, including assignments to the BSS feeder links contained in Appendix 30A.

2.consideration of the applicability of Region 2 non-GSO FSS epfd limits (see noting e)) pertaining to the frequency band 17.3-17.7 GHz to Regions 1 and 3, so as to ensure the protection of GSO networks.

## 2 Preliminary views

If this agenda item can promote the new satellite broadcasting service in the 17.3-17.8 GHz band, it will greatly benefit the live satellite service in the Asia-Pacific region. The new spectrum will lay the foundation for business development and also facilitate more flexible transponders for subsequent live satellite systems. Therefore, it is necessary to pay attention to the positions and viewpoints of relevant countries in the world, carry out relevant compatibility analysis in a timely manner, and study the strategies and positions of participating in corresponding international conferences.

**Project Topic 2:** **to consider technical and regulatory measures for fixed-satellite service satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands, in accordance with Resolution 131 (WRC-23) (WRC-27 AI 1.6)**

**Project Manager:**
**Co- Project Manager:** **Mr. Rajeev Kumar**
**Time Period:** **Nov. 2023 to Sept.2024**

**The following tasks were considered for this project:**
1. Follow developments of studies in WP 4A to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

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This report was provided by Dr. Li Leilei

**1 Background**
Working Party 4A has been identified as a "Responsible group" for WRC-27 agenda item 1.6. The first meeting has already been held. No technical study is planned under this agenda item, as no output document has been produced.The task of Working Party 4A is to study the technical and regulatory measures for FSS satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-to-space), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), or portions thereof, for equitable access, while ensuring the protection of existing primary services to which the band is allocated in the same and adjacent bands, taking into account the specific needs of developing countries:

- without adversely affecting those services, specifically the operation of the satellite networks and systems in the bands.
- without changing measures to protect terrestrial services from unacceptable interference.

**2 Preliminary views**
This agenda item involves the allocations of satellite broadcasting service and terrestrial broadcasting service in the 40.5-42.5GHz band, so it is necessary to pay attention to the positions and views of relevant countries in the international community.

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**Project Topic 3:** **to consider appropriate regulatory actions to update Appendix 26 to the Radio Regulations in support of aeronautical mobile (OR) high frequency modernization, in accordance with Resolution 411 (WRC-23)(WRC-27 AI 1.9)**

**Project Manager:**
**Co- Project Manager:** **Mr. Rajeev Kumar**
**Time Period:** **Nov. 2023 to Sept.2024**

**The following tasks were considered for this project:**
1. Follow developments of studies in WP 5B to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

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This report was provided by Dr. Li Leilei

**1 Background**
Working Party 5B has been identified as a "Responsible group" for WRC-27 agenda item 1.9. The first meeting has already been held. The meeting drafted the working plan and liaison statement. The tasks of Working Party 5B are shown as follows:

1.studies on the introduction of new technologies that enhance performance, including, but not limited to, new classes of emission, wideband systems (see recognizing c), d) and e)), etc., to the aeronautical mobile (OR) service systems in the frequency ranges considered in Appendix 26.

2.in order to undertake resolves to invite ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference 1, the definition of the relevant technical and operational characteristics and conduct sharing and compatibility studies with existing aeronautical mobile (OR) service systems and with other incumbent services that are allocated on a primary basis in the same or adjacent frequency bands.

3.based on ITU Radiocommunication Sector (ITU-R) studies, the identification of any potential modifications to Appendix 26, without modifying the existing area allotments in recognizing f), and while taking into account that the current use of the narrowband systems shall remain unchanged and shall not be impacted nor precluded by the revision of Appendix 26.

**2 Preliminary views**

This agenda item does not involve broadcasting service for the time being.

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| **Project Topic 4:** | **to consider developing power flux-density and equivalent isotropically radiated power limits for inclusion in Article 21 of the Radio Regulations for the fixed-satellite, mobile-satellite and broadcasting-satellite services to protect the fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz, in accordance with Resolution 775 (Rev.WRC-23)(WRC-27 AI 1.10).** |
| **Project Manager:** | **Dr. Li Leilei** |
| **Co- Project Manager:** | |
| **Time Period:** | **Nov. 2023 to Sept.2024** |

**The following tasks were considered for this project:**

1. Follow developments of studies in WP 5C to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting services.

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This report was provided by Dr. Li Leilei

**1 Background**

Working Party 5C has been identified as a "Responsible group" for WRC-27 agenda item 1.10. The first meeting has already been held. The meeting drafted the working plan and liaison statement. The task of Working Party 5C is to complete the appropriate studies to determine power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits to be included in Article 21 for satellite services (fixed-satellite service (FSS), mobile-satellite service (MSS) and broadcasting-satellite service (BSS)) to protect the current and planned fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz.

**2 Preliminary views**

On the one hand, this agenda item will directly study and determine the power flux density and equivalent omnidirectional radiated power of satellite broadcasting services, and at the same time consider the protection of terrestrial broadcasting services. Therefore, it is necessary to pay attention to the positions and viewpoints of relevant countries in the world.

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| **Project Topic 5:** | **to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution 253 (WRC-23)(WRC-27 AI 1.13).** |
| **Project Manager:** | **Dr. Li Leilei** |
| **Co- Project Manager:** | |
| **Time Period:** | **Nov. 2023 to Sept.2024** |

**The following tasks were considered for this project:**

1. Follow developments of studies in WP 4C to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting services.

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This report was provided by Dr. Li Leilei

**1 Background**

Working Party 4C has been identified as a "Responsible group" for WRC-27 agenda item 1.13. The first meeting has already been held. The meeting drafted the working plan and liaison statement. But it was decided to discuss the compiled sharing & compatibility study and MSS parameter document in the next meeting. The tasks of Working Party 4C are shown as follows:

1.studies on possible allocations to the MSS in the frequency range between 694/698 MHz and 2.7 GHz, taking into account the IMT frequency arrangements addressed in the most recent version of Recommendation ITU-R M.1036.

2.studies on spectrum requirements and on technical, operational and regulatory matters related to the implementation of the mobile-satellite service for direct connectivity to the IMT user equipment to complement the terrestrial IMT network coverage.

**2 Preliminary views**

This agenda item will study the new possible allocation of satellite mobile services in the 694/698 MHz-2.7GHz band to achieve direct connection between space radio and IMT user equipment to supplement IMT terrestrial network coverage, involving the allocation of terrestrial broadcasting services in the 694-702MHz band. If approved, the issue will affect several services used by Asia-Pacific countries in this frequency band. Therefore, it is necessary to pay attention to the positions and viewpoints of relevant countries in the world, study the strategies and positions of participating in corresponding international conferences, and prevent the formation of adverse international restrictions on the

development of terrestrial television services in the Asia-Pacific region.

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| **Project Topic 6:** | **to consider regulatory provisions for receive-only space weather sensors and their protection in the Radio Regulations, taking into account the results of ITU Radiocommunication Sector studies, in accordance with Resolution 682 (WRC-23)(WRC-27 AI 1.17).** |
| **Project Manager:** | **Dr. Li Leilei** |
| **Co- Project Manager:** | |
| **Time Period:** | **Nov. 2023 to Sept.2024** |

**The following tasks were considered for this project:**

1. Follow developments of studies in WP 7C to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting services.

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This report was provided by Dr. Li Leilei

**1 Background**

Working Party 7C has been identified as a "Responsible group" for WRC-27 agenda item 1.17. The first meeting has already been held. The meeting drafted the working plan and liaison statement. But it was decided to discuss the compiled sharing & compatibility study and MSS parameter document in the next meeting. The tasks of Working Party 7C are shown as follows:

1.studies on spectrum needs and appropriate protection criteria for receive-only space weather sensors, as well as system characteristics, as appropriate, taking into account noting a).

2.sharing and compatibility studies pertaining to potential new primary allocations to MetAids (space weather) in the following frequency bands for receive-only sensors, taking into account resolves 2:

- 27.5-28.0 MHz;
- 29.7-30.2 MHz;
- 32.2-32.6 MHz;
- 37.5-38.325 MHz;
- 73.0-74.6 MHz;
- 608-614 MHz.

3.studies on possible regulatory provisions of the Radio Regulations to accommodate the possibility for an administration that desires to notify a receive-only space weather sensor station to be included in the Master International Frequency Register.

**2 Preliminary views**

This agenda item relates to the allocation of terrestrial broadcasting services in the 608-614 MHz band, so it is necessary to pay attention to the positions and views of relevant countries in the international community.

**Doc T-24/10**

**RECOMMENDATION 1/2025**

*Assess WRC-27 Agenda Items Related to Broadcasters in the Asia-Pacific Region*

**Considering**

1. that the World Radiocommunication Conference 2027 (WRC-27) agenda includes items that may have impact broadcasting systems in the Asia-Pacific region;
2. that it is essential to ensure the interests of the broadcasting community are adequately represented and reflected during WRC-27 deliberations;
3. that active participation, collaboration, and advocacy among members are crucial for operating broadcasting systems continuously and constructively;

**Noting**

4. that ABU Technical Committee sets up Spectrum Topic Area that regularly follows and reports developments of studies on related WRC Agenda Items in relevant SGs and WPs of ITU-R;
5. that Sister Broadcasting Unions such as WBU, EBU, NABA and so on also follow and contribute developments of studies on related WRC Agenda Items;

**The ABU Technical Committee Recommends**

1. The ABU members should assess WRC-27 Agenda Items whether they have potential impact on their broadcasting systems or not.
2. The ABU members should confirm the information of Spectrum Topic Area report (see Annex) and share findings and updates among members to ensure a unified approach and informed decision-making.
3. The ABU members should work closely and collaborate with national and regional regulatory bodies to represent the interest of broadcasters effectively.
4. The ABU members should also consider the long-term implications of spectrum allocations and advocate for sufficient spectrum to accommodate future broadcasting needs.

**Annex**

**WRC-27 Agenda Items related to Broadcasters**

- **Agenda Item 1.4**

  *Subject:*

  Consideration of a possible new primary allocation to the Fixed-Satellite Service (FSS) and Broadcasting-Satellite Service (BSS) in the 17.3–17.8 GHz frequency band in Region 3.

  *Impact Assessment*:

  Members should assess the potential impact of new FSS and BSS allocations on existing broadcasting services.

  *Interference Prevention*:

  Ensure that any new allocations do not cause harmful interference to current primary services in the same and adjacent frequency bands.

  *Advocacy*:

  Advocate for technical and regulatory measures that protect the interests of satellite broadcasters.

- **Agenda Item 1.9**

  *Subject*:

  Updating Appendix 26 to support aeronautical mobile (OR) high-frequency modernization, specifically in the bands 3900–3950 kHz (Region 3) and 4750–4850 kHz (Region 1).

  *Evaluation and Mitigation*:

  Evaluate the implications of modernizing aeronautical communications on broadcasting services operating in these frequency bands. Propose measures to mitigate potential interference and protect the quality of broadcasting services.

- **Agenda Item 1.13**

  *Subject*:

  Studies on possible new allocations to the Mobile-Satellite Service (MSS) for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment in the 694/698 MHz to 2.7 GHz band.

  *Safeguarding Digital TV*:

  Recognize that the 694–702 MHz band is utilized for digital terrestrial television in some Asia-Pacific countries. Highlight the importance of safeguarding digital TV services from potential interference due to new MSS allocations.

- **Agenda Item 1.17**

  *Subject*:

  Regulatory provisions for receive-only space weather sensors and their protection.

  *Impact Investigation*:

  Investigate the potential impact of space weather sensor operations on digital terrestrial television services. Advocate for regulations that balance the needs of space weather monitoring with the protection of broadcasting services.

- **Agenda Item 1.6**

  *Subject*:

Technical and regulatory measures for FSS networks/systems in higher frequency bands (37.5–51.4 GHz).

*Monitoring for Future Considerations*:

While no immediate action is required, members may choose to monitor developments for future considerations, noting that currently there are no broadcasting systems operating in the affected frequency bands.

- **Agenda Item 1.10**

  *Subject*:

  Developing power flux-density (PFD) and equivalent isotropically radiated power (EIRP) limits in the 71–76 GHz and 81–86 GHz bands.

  *Monitoring for Future Considerations*:

  While no immediate action is required, members may choose to monitor developments for future considerations, noting that currently there are no broadcasting systems operating in the affected frequency bands.

**Doc T-24/12-1**

# Appointment of Topic Area Chair – Distribution Topic Area

Due to recent personnel reassignment within NHK- Japan, the Technical Department received a proposal stating Mr Yuji Nagata's replacement and to consider Dr Hirokazu Kamoda of NHK as the Topic Area Chair – Distribution Topic Area.

In line with the TC ROP Article 6.3, the Technical Department would like to forward this proposal from NHK for the Bureau's approval to appoint Dr Hirokazu Kamoda as Topic Area Chair – Distribution Topic Area. We are confident that he will excel in contributing significantly by participating in the meetings of the Standing Technical Committee and the Bureau, in addition to efficient management of studies in the relevant Topic Area.

We heartily thank Mr Yuji Nagata for serving as the Transmission Topic Chair for successfully discharging his responsibilities during his term in the TC.

Concise bio-data of Dr Hirokazu Kamoda is as follows:

Hirokazu Kamoda received his M.E. from the Tokyo Institute of in 1997 and his Ph.D. from Aoyama Gakuin University in 2011. He joined the Japan Broadcasting Corporation (NHK) in 1997 and has since been involved in numerous research and development projects, including microwave and millimeter-wave devices and systems, phased array antennas, millimeter-wave imaging, and wireless HDTV/4K/8K transmission systems. From 2012 to 2015, he was with the Advanced Telecommunications Research Institute International, working on ambient RF energy harvesting and microwave propagation analyses. After serving in the Planning and Coordination Division of the Science & Technology Research Laboratories and the Corporate Planning Department, he is now a Principal Engineer in the Planning Division of the Engineering Administration Department at NHK. He is a member of IEEE, IEICE, and ITEJ.

**Doc T-24/12-2**

# Appointment of Topic Area Chair – Training & Services Topic Area

Due to recent personnel reassignment within Prasar Bharati – India, the Technical Department received a proposal stating Shri P. Das's replacement and to consider Mr. Prakash Veer of Prasar Bharati as the Topic Area Chair – Training & Services Topic Area.

In line with the TC ROP Article 6.3, the Technical Department would like to forward this proposal from Prasar Bharati for the Bureau's approval to appoint Mr. Prakash Veer as Topic Area Chair – Training & Services Topic Area. We are confident that he will excel in contributing significantly by participating in the meetings of the Standing Technical Committee and the Bureau, in addition to efficient management of studies in the relevant Topic Area.

We heartily thank Shri P. Das for serving as the Transmission Topic Chair for successfully discharging his responsibilities during his term in the TC.

Concise bio-data of Mr. Prakash Veer is as follows:

Shri Prakash Veer is an Indian Broadcasting (Engineer) Service Officer of 1989 batch & currently holding position of Deputy Director General in Prasar Bharati, looking after the Global Outreach and Technical Training activities in Prasar Bharati. He has around 33 years of experience in broadcasting sector.

He has done B.E in Electronics and Communication, M.Tech in Electrical and MBA in Marketing. He has worked in Telecom Regulatory Authority of India (TRAI) for 5 years. He has dealt with the Telecom and Broadcasting policies, regulations in India while working in TRAI.

Shri Veer has worked in almost all areas of Television Broadcasting not limited to technical activities. He made significant contribution in formulating policies of Doorarshan and Akashvani in Prasar Bharati. He has attended various national and international conferences related with telecom and broadcasting sector and have provided significant inputs.

Currently heading the technical wing of training division, he has introduced training on emerging technologies in broadcasting. In addition, the Global Outreach Division of Prasar Bharati under his leadership engages in MoU with foreign broadcasters for exchange of content, co-production etc and training activities, and their executions.

**Doc T-24/12-3**

**ABU Technology**

# TOPIC AREAS AND PROJECTS

**Revised: October 2024**

## TOPIC AREA: PRODUCTION

**Chairman: Mr Kazim Pektas, TRT, kazim.pektas@trt.net.tr**
Secretary: ABU-TD, td@abu.org.my

| | PROJECT TOPIC | TASKS | DELIVERABLES | PROJECT MANAGER |
|---|---|---|---|---|
| **1.** | **Ultra High Definition TV and Advanced Immersive Sensory Media Systems P/UHDAISM (TBD)** | 1. Monitor developments regarding UHDTV, and study its technical specifications.<br>2. Monitor developments regarding advanced immersive sensory media and study its technical specifications.<br>3. Study use cases of advanced immersive sensory media like VR, AR, 360° video, 3D video, audio, and haptic to enhance the audience experience.<br>4. Study the possibility of a programme exchange technology in ABU region. | 1. Report to members on UHDTV developments, including applications and technical aspects.<br>2. Report to members on the latest technologies on advanced immersive sensory media.<br>3. Report to members on use cases on advanced immersive sensory media within broadcast and media organization.<br>4. Contributions to relevant working parties in ITU-R SG6, when necessary.<br>**Time Period: Oct 2024** | **Mr. Kimihiro TOMIYAMA**<br>**tomiyama.k-fk@nhk.or.jp**<br><br>**Co-Project Manager:**<br>**Mr Byung Sun KIM, KBS**<br>bskim2000@kbs.co.kr<br>**Mr Halil Us, TRT**<br>halil.us@trt.net.tr<br>**Zhou Yun, ABS/RTPRC**<br>zhouyun@abs.ac.cn<br>**Hu Xiao, ABS/RTPRC**<br>huxiao@abs.ac.cn<br>**Mr. P.S.Srivastava**<br>pss_18@yahoo.com |
| **2.** | **Systems for people with special needs P/SN** | 1. Study activities related to broadcast service for people with special needs done by other organisations<br>2. Make possible contributions to international forums or organizations if necessary | 1. Report to members outlining broadcast service and systems in place to serve people with special needs<br>2. Contributions to relevant international forums or organizations<br>**Time Period: Oct 2024** | **Ms. Reiko TAKOU**<br>**takou.r-go@nhk.or.jp**<br>**Mr D Birlananth, Prasar Bharati**<br>birlananth@prasarbharati.gov.in<br>**Mr. R.P. Joshi**<br>rpjoshi.delhi@gmail.com<br>**KBS, TBS, RTPRC, TRT** |
| **3.** | **IT -based Production System and file-based workflows P/ITPS** | 1. Study use cases of IT -based programme production systems, which are implemented, or being implemented in broadcasters' facilities.<br>2. Gather the information about operational know-how in total production chain of the systems above.<br>3. Collaborate with P/RTA if necessary, especially in metadata or storage issues.<br>4. Prepare a monograph on IT -based programme production systems if possible. | 1. Report to members outlining use cases of IT-based programme production systems and the information about operational know-how in total production chain of the above systems.<br>2. Monograph on IT -based programme production systems.<br>**Time Period: Oct 2024** | **Mr Okan Salman, TRT**<br>okan.salman@trt.net.tr<br><br>**Co-Project Manager**<br>**Mr Daeyang Kim, KBS**<br>kimdaeyang@kbs.co.kr<br>**Mr Gökhan Tikit, TRT**<br>gokhan.tikit@trt.net.tr<br>**Mr Nguyen Duc Tue, VTV**<br>tuend72@vtv.gov.vn<br><br>**Mr P S Srivastava, DDI**<br>pss_18@yahoo.com<br>**Mr. R.P. Joshi**<br>rpjoshi.delhi@gmail.com<br>**Mr Alireza Abedin, IRIB**<br>a_abedini@irib.ir<br><br>**CCTV/RTPRC;TDM;TVB [Manufacturers]** |

| | PROJECT TOPIC | TASKS | DELIVERABLES | PROJECT MANAGER |
|---|---|---|---|---|
| **4.** | **Big Data, Personalisation and Artificial Intelligence**<br><br>**P/BDAI** | 1. Study use cases of Big Data and technologies like Artificial Intelligence (AI) within broadcasting and media organisations.<br>2. Gather information about how Data analysis is used for personalisation and how it can be utilised by broadcasters.<br>3. Study how AI technologies can be deployed and used within production environment and other related applications for broadcasters. | 1. Report to members on use cases and applications of Big Data and AI within broadcast and media organisations.<br>2. Report on the use of Data analytics for personalisation and to understand audience requirements and preferences.<br><br>**Time Period: Oct 2024** | **Project Manager**<br>**Dr Byunghee Jung, KBS**<br>bhjung@kbs.co.kr<br><br>**Co-Project Manager**<br>**Mr. Taro MIYAZAKI**<br>**miyazaki.t-jw@nhk.or.jp**<br>**Dr Sansung KIM, KBS TRI**<br>sansung@kbs.co.kr<br>**Li xiao, ABS/RTPRC**<br>lix@abs.ac.cn<br>**Zhao Ming, ABS/RTPRC**<br>zhaoming@abs.ac.cn<br>**Zheng Ruidi, ABS/RTPRC**<br>zhengruidi@abs.ac.cn<br>**Ms. Wang Yi, ABP/RTPRC**<br>wangyiamy@abp2003.cn |

## TOPIC AREA: DISTRIBUTION

**Chairman: Dr Hirokazu Kamoda, kamoda.h-ci@nhk.or.jp**
Secretary: ABU-TD, td@abu.org.my

| | PROJECT TOPIC | TASKS | DELIVERABLES | PROJECT MANAGER |
|---|---|---|---|---|
| **1.** | **Next Generation Terrestrial Broadcasting**<br><br>**D/NGTB** | 1. Investigate next generation broadcasting technologies for delivering UHD service.<br>2. Investigate efforts toward the realization of next-generation terrestrial broadcasting.<br>3. Investigate mobile reception of digital broadcasting services.<br>4. Study on TVWS (TV White Spaces).<br>5. Study/follow studies on the development of 5G technology and its broadcast related delivery/contribution and other applications | 1. Preparation of report, including next generation broadcasting technologies.<br>2. Information on efforts toward the realization of next-generation terrestrial broadcasting.<br>3. Preparation of report on mobile broadcasting, including those on broadcasting to handheld/mobile devices.<br>4. Include report on 5G technologies and its developments<br><br>**Time period: Oct 2024** | **Mr Singo Asakura**<br>**asakura.s-ie@nhk.or.jp**<br>**Co-Project Manager:**<br>**Dr Jeon Sungho**<br>jeonsh@kbs.co.kr<br>**Mr Chen Delin, ABS/RTPRC**<br>chendelin@abs.ac.cn<br>**Mr Halil Us, TRT**<br>halil.us@trt.net.tr<br>**Mr. D.P. Singh**<br>dpsingh@prasarbharati.gov.in<br>**Mr Rajesh Meena**<br>meena@prasarbharati.gov.in<br>**Mr A K Mangalgi**<br>amangalgi@yahoo.com<br>**Zhang Yu, ABS/RTPRC**<br>zhangyu@abs.ac.cn<br>**Xiao Jingting, ABS/RTPRC**<br>xiaojingting@abs.ac.cn<br>**KBS** |
| **2.** | **Integrated Broadcast-Broadband and OTT**<br><br>**D/IBBOTT** | 1. Study the specifications of the various Integrated Broadcast-Broadband (IBB) platforms.<br>2. Investigation of developments concerning software standards (APIs, EPGs, subtitle, etc).<br>3. Investigation and consideration on technologies to enhance broadcasting services in various aspects.<br>4. Study on information security for broadcasting services via airwave and/or communication network (Content protection, Conditional access, Digital Rights Management system, etc).<br>5. Study on cyber security in broadcasting industry for protecting the broadcasting systems. | 1. A report on technologies on the various IBB platforms.<br>2. Prepare a requirement of the subtitles in the ABU region.<br>3. Survey of information security for broadcasting services via airwave and/or communication network.<br>4. Survey of cyber security in broadcasting industry for protecting the broadcasting systems.<br><br>**Time period: Oct 2024** | **Dr Go Ohtake, NHK**<br>ohtake.g-fw@nhk.or.jp<br><br>**Co-Project Manager:**<br>**Mr A K Mangalgi**<br>amangalgi@yahoo.com<br>**Mr. R.P. Joshi**<br>rpjoshi.delhi@gmail.com<br>**Dr Hirokazu Kamoda, NHK**<br>kamoda.h-ci@nhk.or.jp<br>**Mr Hiroki Endo, NHK**<br>endou.h-hc@nhk.or.jp<br>**Zhang Dingjing, ABS/RTPRC**<br>zhangdingjing@abs.ac.cn<br>**Zhang Yu, ABS/RTPRC**<br>zhangyu@abs.ac.cn<br>**Zhang Wei, ABS/RTPR**<br>zhangwei@abs.ac.cn<br>**He Jing, ABS/RTPRC**<br>hejing@abs.ac.cn<br>**Wang Lei, ABS/RTPRC**<br>wanglei@abs.ac.cn |
| **3.** | **Satellite Broadcasting D/SB** | 1. Investigate latest satellite broadcasting technologies for delivering UHD service.<br>2. Study the specification of latest satellite broadcasting system.<br>3. Investigate advanced satellite | 1. Report on technologies on the latest satellite systems for UHDTV broadcasting.<br>2. Report on specification of the latest satellite broadcasting systems.<br>3. Survey of the latest topics on advanced satellite | **Mr Masashi Kamei, NHK**<br>kamei.m-kw@nhk.or.jp<br><br>**Co-Project Managers:** |

| | PROJECT TOPIC | TASKS | DELIVERABLES | PROJECT MANAGER |
|---|---|---|---|---|
| | | broadcasting technologies using Ka band, etc. | broadcasting technologies using Ka band, etc<br><br>Time period: **Oct 2024** | **Mr K K Rao**<br>kkrao@prasarbharati.gov.in<br>**TRT**<br>**IRIB** |
| **4.** | **Digital Sound Broadcasting Systems**<br><br>**D/DSBS** | 1. Follow developments in respect of digitally modulated radio transmissions in broadcasting and examine issues related to transition from analogue services to digital applications and implementation.<br>2. Examine issues related to transition from analogue services to digital applications in the FM band.<br>3. Examine implementation in the Medium and Short wave band | 1. An information document on digital radio in all relevant, including relevant information about the ITU-R recommended system(s) and digital receiver developments.<br>2. A report on implementation issues and possibilities.<br><br>**Time period: Oct 2024** | **Project Manager**<br><br>**Co-Project Managers:**<br><br>**IRIB**<br>**RRI**<br>**TRT** |

**TOPIC AREA:** **TRAINING AND SERVICES**
**Chairman:** **Mr. Prakash Veer, Prasar Bharati p.veer@gov.in**
Secretary: ABU-TD, td@abu.org.my

| | PROJECT TOPIC | TASKS | DELIVERABLES | PROJECT MANAGER |
|---|---|---|---|---|
| **1.** | **Technical Training Priorities and Members Requirements TS/TTPMR** | 1. Periodically conduct surveys among members to understand the requirements and priority areas by members and based on these suggest topics for training.<br>2. Identify requirement of Technical Advisory Services for Member organisations<br>3. Work with ABU Media Academy to develop:<br>- curriculum-based training programmes<br>- a certification system with different levels<br>- effective monitoring and assessing methods to evaluate how beneficial the training workshops/seminars have been to members.<br>4. Collaborate with AMA and other established Media Training Academies of members | 1. Survey Report on Member requirements<br>2. List of Priority Areas, Topics and Program Schedule for training<br>3. Certification and Evaluation Template<br>4. Database of training academies and training programmes offered by them<br>5. Databse of Production/ B'cast Technology/ equipment used by Members<br>6. Database of Resource Persons along with Topics,<br><br>**Time period: Oct 2024** | **Project Manager:**<br>**Mr. Prakash Veer, Prasar Bharati**<br>p.veer@gov.in<br><br>**Co-Project Managers:**<br>**Mr. J.B.Roy, Prasar Bharati**<br>jbroy@prasarbharati.gov.in<br>**Mr. Ravinder Kumar, Prasar Bharati**<br>ravinderkumar@prasarbharati.gov.in<br><br>**Contributors:** |
| **2.** | **Skill Development Programme for Managerial, and Occupational Safety TS/ SDPMOS** | 1. Identify and develop training programmes for non-technical, managerial, financial and occupational safety and skills enhancement<br>2. Conduct surveys to study members requirements on these areas such as General management, Health & Safety considerations.<br>3. Explore the best possible ways of delivery of such training and good practice methods within the industry | 1. List of non-technical, managerial, financial Skills courses that can be organised.<br>2. Identify and suggest at least one such topic to be included in the TD training calendar annually based on member requirements<br>3. Find out Standard Operating Procedures (SOP) and best practice methods adopted by members on different situations and work environment in general<br>4. develop standard code of conduct and work ethics information manual<br>5. Develop a disaster recovery and response manual that can be used in technical areas<br><br>**Time period: Oct 2024** | **Project Manager**:<br>**Mr. R.K.Joshi, Prasar Bharati**<br>rkjoshi@prasarbharati.gov.in<br><br>**Co-Project Managers:**<br>**Mr. Ravinder Kumar, Prasar Bharati**<br>ravinderkumar@prasarbharati.gov.in<br>**Dr. D.K. Mazumder, Prasar Bharati**<br>dkmazumder@prasarbharati.gov.in<br>**Mr. Ashok Kr. Panigrahi, Prasar Bharati**<br>akpanigrahi1@prasarbharati.gov.in<br><br>**Contributors:** |
| **3** | **Technical Skill Building and Knowledge Sharing TS/TSBKS**<br><br>**OR**<br>**High-Tech Exposure & Knowledge Sharing TS/TEKS** | 1. Work with industry partners and international events to identify applicable training opportunities available in broadcasting field eg: ITU, IABM, SMPTE etc.<br>2. Explore and develop a staff exchange or short-term attachment programme among members.<br>3. Explore easy ways how redundant or in excess equipment from members can be acquired and utilised by other members who can use them. | 1. MoU with Industry Partners<br>2. Guidelines for staff exchange programme<br>3. Members' Information Exchange platform<br><br>**Time period: Oct 2024** | **Project Manager:**<br>**Mr. K. Murugan , Prasar Bharati**<br>murugan_k@prasarbharati.gov.in<br><br>**Co-Project Managers:**<br>**Mr Devesh Kumar, Prasar Bharati**<br>devesh@prasarbharati.gov.in<br>**Mr. J. B. Roy, Prasar Bharati**<br>jbroy@prasarbharati.gov.in<br><br>**Contributors:** |

## TOPIC AREA: SPECTRUM

**Chairperson: Dr Li Leilei, RTPRC, lileilei@abp2003.cn**

Secretary: Veysel Binbay, ABU-TD, veysel@abu.org.my

| | WRC-27 ISSUES | | | |
|---|---|---|---|---|
| | **PROJECT TOPIC** | **TASKS** | **DELIVERABLES** | **PROJECT MANAGER** |
| **1.** | **to consider a possible new primary allocation to the fixed-satellite service (space-toEarth) in the frequency band 17.3-17.7 GHz and a possible new primary allocation to the broadcasting-satellite service (space-to-Earth) in the frequency band 17.3-17.8 GHz in Region 3, while ensuring the protection of existing primary allocations in the same and adjacent frequency bands, and to consider equivalent power flux-density limits to be applied in Regions 1 and 3 to nongeostationary-satellite systems in the fixed-satellite service (space-to-Earth) in the frequency band 17.3-17.7 GHz, in accordance with Resolution 726 (WRC-23);**<br>**(WRC-27 AI 1.4)** | 1. Follow developments of studies in **relevant SGs and WPs of ITU-R** to identify and possible impact on Broadcasting Services.<br>2. Possible impact on broadcasting service in Asia-Pacific Area. | 1. From time to time, circulate among ABU members, relevant information on sharing studies.<br>2. Preparation of ABU contributions to the relevant SGs and WPs of ITU-R, APT and others.<br><br>**Reports: As required.**<br><br>**Time Period: Oct 2024** | **Project Manager**<br><br>**Co-Project Managers:**<br>**Mr. Rajeev Kumar**<br>rajeev00kumar@yahoo.com<br><br>**Contributors:** |
| **2.** | **to consider technical and regulatory measures for fixed-satellite service satellite networks/systems in the frequency bands 37.5-42.5 GHz (space-to-Earth), 42.5-43.5 GHz (Earth-tospace), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) for equitable access to these frequency bands, in accordance with Resolution 131 (WRC-23);**<br>**(WRC-27 AI 1.6)** | 1. Follow developments of studies in **relevant SGs and WPs of ITU-R** to identify and possible impact on Broadcasting Services.<br>2. Possible impact on broadcasting service in Asia-Pacific Area. | 1. From time to time, circulate among ABU members, relevant information on sharing studies.<br>2. Preparation of ABU contributions to the relevant SGs and WPs of ITU-R, APT and others.<br><br>**Reports: As required.**<br><br>**Time Period: Oct 2024** | **Project Manager**<br><br>**Co-Project Managers:**<br>**Mr. Rajendra Kumar**<br>rkumar@prasarbharati.gov.in<br><br>**Contributors:** |

| | WRC-27 ISSUES | | | |
|---|---|---|---|---|
| | **PROJECT TOPIC** | **TASKS** | **DELIVERABLES** | **PROJECT MANAGER** |
| **3.** | **to consider appropriate regulatory actions to update Appendix 26 to the Radio Regulations in support of aeronautical mobile (OR) high frequency modernization, in accordance with Resolution 411 (WRC-23); (WRC-27 AI 1.9)** | 1. Follow developments of study results in **relevant SGs and WPs of ITU-R**<br>2. Possible impact on broadcasting service in Asia-Pacific Area. | 1. From time to time, circulate among ABU members, relevant information on sharing studies.<br>2. Preparation of ABU contributions to the relevant SGs and WPs of ITU-R, APT and others.<br><br>**Reports: As required.**<br><br>**Time Period: Oct 2024** | **Project Manager**<br><br>**Co-Project Managers:**<br>**Mr. Rajeev Kumar**<br>rajeev00kumar@yahoo.com<br><br>**Contributors:** |
| **4** | **to consider developing power flux-density and equivalent isotropically radiated power limits for inclusion in Article 21 of the Radio Regulations for the fixed-satellite, mobile-satellite and broadcasting-satellite services to protect the fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz, in accordance with Resolution 775 (Rev.WRC-23); (WRC-27 AI 1.10)** | 1. Follow developments of study results on **relevant SGs and WPs of ITU-R**<br>2. Possible impact on broadcasting services. | 1. From time to time, circulate among ABU members, relevant information on sharing studies.<br>2. Preparation of ABU contributions to the relevant SGs and WPs of ITU-R, APT and others.<br><br>**Reports: As required.**<br><br>**Time Period: Oct 2024** | **Project Manager:**<br>**Dr. Li Leilei**<br>**lileilei@abp2003.cn**<br><br>**Co-Project Managers:** |
| **5** | **to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution 253 (WRC-23);**<br><br>**(WRC-27 AI 1.13)** | 1. Follow developments of study results on **relevant SGs and WPs of ITU-R**<br>2. Possible impact on broadcasting services. | 1. From time to time, circulate among ABU members, relevant information on sharing studies.<br>2. Preparation of ABU contributions to the relevant SGs and WPs of ITU-R, APT and others.<br><br>**Reports: As required.**<br><br>**Time Period: Oct 2024** | **Project Manager:**<br>**Dr. Li Leilei**<br>**lileilei@abp2003.cn**<br><br>**Co-Project Managers:** |

| | WRC-27 ISSUES | | | |
|---|---|---|---|---|
| | **PROJECT TOPIC** | **TASKS** | **DELIVERABLES** | **PROJECT MANAGER** |
| **6** | **to consider regulatory provisions for receive-only space weather sensors and their protection in the Radio Regulations, taking into account the results of ITU Radiocommunication Sector studies, in accordance with Resolution 682 (WRC-23);**<br><br>**(WRC-27 AI 1.17)** | 1. Follow developments of study results on **relevant SGs and WPs of ITU-R**<br>2. Possible impact on broadcasting services. | 1. From time to time, circulate among ABU members, relevant information on sharing studies.<br>2. Preparation of ABU contributions to the relevant SGs and WPs of ITU-R, APT and others.<br><br>**Reports: As required.**<br><br>**Time Period: Oct 2024** | **Project Manager:**<br>**Dr. Li Leilei**<br>**lileilei@abp2003.cn**<br><br>**Co-Project Managers:** |

Doc T-24/20

# STATUS REPORTS

**Doc T-24/20-1**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | National Broadcasting Services of Thailand (NBT-Thailand) | | |
| Period: | 2023-2024 | Date of Report: | September 17th 2024 |

## PART A

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency
  - In 2023, all radio equipment for three radio frequencies were replaced and upgraded.
  - Equipment allocation will be planned for a 1,000 m² large broadcast studio, including MCR, CAR, and social media support to enable 4K broadcasting. Additionally, there are plans to allocate equipment for other studio sizes, specifically two 400 m² broadcast studios and two smaller 150 m² studios at PRD Media Operation Centre.
  - Equipment were allocated to support live streaming across 69 stations, including provincial public relations departments and the central media department, utilizing 4G/5G network technology.

- New Services/new projects initiated
  - In 2024, plan to replace and upgrade radio equipment for five radio frequencies.
  - Equipment is being allocated for one 400 m² broadcast studio and one smaller 150 m² studio. The equipment allocation for the remaining 400 m² broadcast studio and the other 150 m² studio is planned for next year at PRD Media Operation Centre.
  - Equipment will be allocated to support live streaming at the PRD Media Operation Centre, leveraging 4G/5G network technology.
  - Multimedia Management System Project (Media Asset Management - MAM): This project serves as the central hub for managing media produced by the television stations of the Public Relations Department.

- Research projects
  - NBT-Thailand has successfully completed the implementation of text transmission using the Radio Data System (RDS), as specified by the National Broadcasting and Telecommunications Commission Office.
  - NBT-Thailand is conducting research on Digital Audio Broadcasting (DAB+) technology.

- Internet and Mobile Broadcasting Services
  - NBT-Thailand provides over-the-top (OTT) services under the name "PRDEE" at https://prdee.prd.go.th/.

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | 97% of household | 95.1% of household |
| Programme Channels | | | 79 FM / 25 AM | 1 Nationwide. (NBT2 HD)<br>4 Regional Programs (NBT 11) |
| Studios (Production) | File-based Set-up | R/N/D | | |
| | SDTV | R/N/D | | |
| | HDTV | R/N/D | | 11 Studio Stations (R)<br>1 Studio Station (N) |

| | | | | |
|---|---|---|---|---|
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | |
| Transmission & Delivery | HF | R/N/D | | |
| | MF | R/N/D | | |
| | FM | R/N/D | R | |
| | TV | R/N/D | | Ensure backup coverage for the main station in Bangkok and its surrounding areas. |
| | OTT/IBB/Internet Services | R/N/D | N | |
| | Mobile Services | R/N/D | N | |

R = Replacement/upgrade
N = New
D = Discontinued

## PART B
## CURRENT ACTIVITIES

| | **Activities** | **Area** | **Brief Details:**<br>**1. Objectives**<br>**2. Progress to date** | **Challenges/Problems Faced:**<br>**1. Lack of resources**<br>**2. Lack of know-how**<br>**3. Others (e.g. up-skilling)** | **Solutions Implemented/Type of assistance requirement from ABU** |
|---|---|---|---|---|---|
| **1.** | **Development projects/Upgrading facilities/Training** | Provincial radio station | 1. replace and upgrade radio equipment for five radio frequencies.<br>2. Finished in 2025 | Procurement process | |
| | | Bangkok | 1. Equipment allocation at PRD Media Operation Centre.<br>2. All of studio will finish in 2026 (5 studios) | 1. Adapt to rapid advancements in broadcast technology.<br>2. Procurement process | |
| | | | | | |
| | | | | | |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | | | | |
| | | | | | |
| | | | | | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform** | **Activity 1** | | | |
| | | **Activity 2** | | | |
| | | **Activity 3** | | | |

**Doc T-24/20-2**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | Vanuatu Broadcasting & Television Corporation | | |
| Period: | 2023-2024 | Date of Report: | 20/09/2024 |

## PART A

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency

- Installation of new Radio automation system ''Winmedia''
- Installation of new Server for our TBV programs
- Upgrade of the ON Air for our TV also for our TV Recording Studio

- New Services/new projects initiated
  - Installation of new TV automation system "Winmedia''
  - Digital Terrestrial Network using DVB-T2
  - Installation of new FM installation
  - New Installation of Greenfield MW Transmission site

- Research projects

N/A

- Internet and Mobile Broadcasting Services

N/A

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | 100% | 100% |
| Programme Channels | | | 3 | 1 |
| Studios (Production) | File-based Set-up | R/N/D | Replacement | |
| | SDTV | R/N/D | | Replacement/Upgrade |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | |
| Transmission & Delivery | HF | R/N/D | New | |
| | MF | R/N/D | New | |
| | FM | R/N/D | Replacement | |
| | TV | R/N/D | Replacement | Replacement |
| | OTT/IBB/Internet Services | R/N/D | N/A | N/A |
| | Mobile Services | R/N/D | N/A | N/A |

R = Replacement/upgrade
N = New

## PART B
## CURRENT ACTIVITIES

| | **Activities** | **Area** | **Brief Details:**<br>**1. Objectives**<br>**2. Progress to date** | **Challenges/Problems Faced:**<br>**1. Lack of resources**<br>**2. Lack of know-how**<br>**3. Others (e.g. up-skilling)** | **Solutions Implemented/Type of assistance requirement from ABU** |
|---|---|---|---|---|---|
| **1.** | **Development projects/Upgrading facilities/Training** | -Installation of TV automation software | 1. To automate without physical presence<br>2. 80% completed | 3. Lack of know-how<br>4. Up-skilling | - Funds technical support |
| | | -Installation of DVB-T2 Terrestrial system | 1. To enable quality pictures and sound and also enable viewers to have more channel<br>2. 10% completed | 3. Lack of know-how<br>4. Up-skilling | - Funds technical support |
| | | -Installation of new FM Transmission system | 1. To enable better sound quality and extend the reach<br>2. 5% completed | 3. Lack of resources | - Fund technical support |
| | | -New Greenfield MW transmission | 1. Increase MW to the Northern Part of the country<br>2. 10% completed | - Lack resources | - Fund technical support |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | | | | |
| | | | | | |
| | | | | | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform** | **Activity 1** | webinar | | |
| | | **Activity 2** | On site training | | |
| | | **Activity 3** | workshop | | |

| | **Activities** | **Area** | **Brief Details:**<br>**1. Objectives**<br>**2. Progress to date** | **Challenges/Problems Faced:**<br>**1. Lack of resources**<br>**2. Lack of know-how**<br>**3. Others (e.g. up-skilling)** | **Solutions Implemented/Type of assistance requirement from ABU** |
|---|---|---|---|---|---|
| | | | | | |

**Doc T-24/20-3**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | Radio Television Hong Kong (RTHK) | | |
| Period: | Oct 2023 to Sep 2024 | Date of Report: | 27 Sep 2024 |

## PART A

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency

**- Adoption of AI Technology**

1. Launch of live video transcript generator (trial) using multilingual Automatic Speech Recognition (ASR) AI model and cloud technology
2. Launch of on-demand audio transcript generator (trial) using ASR with "ASK AI" to quick process the transcript
3. Launch of AI Laboratory for the development of AI tools for video and audio production, including motion capture system, LED, avatars and various AI tools
4. Adoption of AI-tailored content system during Olympic Games
5. Adoption of AI-powered sports content technology to create and distribute game highlights and sports content to different RTHK social media platforms during the Olympics automatically

**- Studio Upgrades**

6. Deployment of Video Jockey system and LED backdrop for events production
7. Upgrade of the existing radio news recording studio with video production capability
8. Deployment of XR 4KP studio production with a small LED wall at a commercial building

**- Developments in TV/Radio/New media Production**

9. Deployment of Network Detection and Response (NDR) system in critical broadcast network
10. Replacement of digital audio router for radio central control room
11. Adoption of full frame video camera in classical music video production
12. Deployment of Demodulators and IRD pools for Olympics and Paralympics Games
13. Launch of new DTT programme channel RTHK36 for Olympics and Paralympics Games
14. Adoption of media exchange platform on cloud basis for the exchange of media with external bodies and internal sections
15. Adoption of 4K IP video transmission links between campuses via Metro Ethernet
16. Adoption of global TV network and Content Delivery Network for live contents exchange between broadcasters in HK and production sites at Paris during Olympics Games
17. Trial of 5G transmission for Outside broadcast TV production
18. Deployment of a low latency streaming solution for RTHK TV 32's online services on the RTHK website and mobile platform, specifically for the Olympics and Paralympic events
19. Enhancement of RTHK website and mobile application to incorporate new DTT programme channel
20. Migration of radio content web services from on-premise infrastructure to a cloud platform

- **Enhancements in Transmission**

21. Completion of the migration of DTT transmission service from an old equipment room to the new DTT building at Lamma Island Transmitting Station
22. Expansion of the population coverage of the new FM channel (CNR "The Greater Bay") to 75%
23. Replacement of aged FM transmitter systems at one FM transmitting station and backup power systems at three FM transmitting stations
24. Refurbishment of an aged equipment room at a FM transmitting station for improved operating environment

- New Services/new projects initiated

**- Adoption of AI Technology**

1. Development of AI auto-tagging system for media asset management by ASR and computer vision processing
2. Development of radio programme archive auto generator
3. Adoption of AI technology for subtitle production and automatic summarization
4. Adoption of Container-based software development workflow
5. Enablement of AI tools in video and audio post-production

**- Development of Cloud Technology**

6. Development of Cloud-based Outside Broadcast Production for TV programmes
7. Development of camera to the Cloud and Cloud Editing
8. Development of Disaster Recovery for TV presentation through Cloud service
9. Migration of archiving storage to be cloud based
10. Deployment of cloud rendering farm for animation and graphic production

**- Developments in TV/Radio/New media Production**

11. Upgrade Youth Radio Studio to support short video clips (Shorts/Reels/etc.) production
12. Replacement of Outside Broadcast microwave links to be 4K enabled
13. Replacement of Outside Broadcast vehicle for TV production to be 4K IP based systems
14. Deployment of super slow motion cameras and recording system for TV sports production
15. Deployment of a large scale curved LED wall and cinematic cameras for Extended Reality film production
16. Deployment of automatic workflow for 4K and closed subtitling on RTHK website and mobile applications
17. Enablement of the TV Studios and OBVAN to be 4K ready
18. Enhancement of 4K viewing through Smart TV

- **Enhancements in Transmission**

19. Migration of DTT transmission service from an old equipment room to the new DTT building at Cloudy Hill transmitting station
20. Improvement works for the Remote Monitoring System and Studio-to-Link (STL) System of DTT broadcast networks

- Research projects

1. Research on building up hybrid-cloud architecture
2. Live and on-demand video/audio transcript via Multilingual Automatic Speech Recognition models
3. AI features for quick process on the transcript (e.g. summarization)
4. Accuracy and cost optimization by hybrid cloud for video stream processing engine
5. Multimodal AI architecture
6. Researching on search engine, storage, and database engine such as vector database, unstructured database, Graph database

| |
|---|
| • Internet and Mobile Broadcasting Services<br><br>1. Development of AI chatbot for RTHK website<br>2. Adoption of AI technology for chatbot on website<br>3. Enabling 4K viewing through Smart TV<br>4. Improvement of the SEO performance of the RTHK websites |

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | 99% (AM/FM) | 99% (DTT) |
| Programme Channels | | | 4 (FM)<br>4 (AM) | 6 (DTT, High Definition) |
| Studios (Production) | File-based Set-up | R/N/D | R | |
| | SDTV | R/N/D | | N/A |
| | HDTV | R/N/D | | R |
| | UHDTV | | | N |
| | IP Based Set-up | R/N/D | | N |
| Transmission & Delivery | HF | R/N/D | N/A | |
| | MF | R/N/D | R | |
| | FM | R/N/D | R and N | |
| | TV | R/N/D | N/A | R and N |
| | OTT/IBB/Internet Services | R/N/D | R | R and N |
| | Mobile Services | R/N/D | R | R and N |

R = Replacement/upgrade
N = New
D = Discontinued

**PART B**
**CURRENT ACTIVITIES**

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| 1. | **Development projects/Upgrading facilities/Training** | Migrating archiving system to be Cloud based | Improve the cost-effectiveness on archiving the contents | • Insufficient manpower to manage, monitor and house-keeping for archive contents | • Enable IT-based automation system for management of the systems<br>• Closely cooperated with suppliers and contractors in knowledge sharing |
| | | Enabling Cloud Outside Broadcast TV production | • Minimize the setup cost for production<br>• Enable agility on scale for TV production | • Insufficient technical know-how<br>• Insufficient technical manpower resources for long-term support | • Closely cooperated with suppliers and contractors in knowledge sharing<br>• Intensive training and skill transfer for internal staff |
| | | Enabling AI-subtitling | Improve the efficiency of subtitle production | • Insufficient technical know-how<br>• Insufficient technical manpower resources for long-term support | • Closely cooperated with suppliers and contractors in knowledge sharing<br>• Intensive training and skill transfer for internal staff |
| | | Developing AI auto tagging | • Assist in analysis of video / audio / photo<br>• Develop a smart search engine using natural language on top of traditional keywords search | • Insufficient expertise in providing computer vision processing<br>• Beginner in designing responsive GUI<br>• Beginner in database indexing and data pipeline such as unstructured database, Graph database and vector database | • Arrange data scientists for cases sharing<br>• Arrange successful case sharing<br>• Closely cooperated with suppliers and contractors in knowledge sharing<br>• Intensive training and skill transfer for internal staff |

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| | | | | • Beginner in building up retrieval augmented generation<br>• Insufficient experience in query analysis and data science | |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | ABU Digital Broadcasting Symposium 2024 | Attendance and sharing | | |
| | | ABU Technical Committee Meetings 2024 | Nomination of Engineering Awards, attendance and sharing | | |
| | | ABU webinar series on different technology topics | Audience | | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform** | Provide cases study / sharing on utilizing computer vision processing and complex speech decomposition using AI & Cloud technologies | | | |
| | | Provide sharing sessions for live speech to texts of multiple languages and summarization using AI & Cloud technologies | | | |

**Doc T-24/20-4**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | Ministry of Communication and Information technology, Radio Broadcasting Service, Radio Nepal | | |
| Period: | Till date | Date of Report: | 25.09.2024 |

## PART A

| **Technical Developments during the past year:** |
|---|
| • System upgrades/changes to practices for improved quality/efficiency<br>• Study and Plan for digital platform in operation<br>• Digital audio archiving<br>• Installations of FM relay stations<br>• Start Study on Digital switchover AM/FM and OTT<br>• Digital networking and New Services/new projects<br>• Connectivity on audio link<br>• New studio upgrade and new installation<br>• Internet and Radio Nepal Mobile App (Android and IOS) |
| • Research projects on broadcasting sectors<br>• Project on emergency warning broadcast system via radio |

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | Most of the urban areas | |
| Programme Channels | | | Central one channel and other province channels | |
| Studios (Production) | File-based Set-up | **R**/N/D | Content Sharing Service | |
| | SDTV | R/N/D | | |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | |
| Transmission & Delivery | HF | **R**/N/D | STL link | |
| | MF | **R**/N/D | AM | |
| | FM | R/**N**/D | FM | |
| | TV | R/N/D | | |
| | OTT/IBB/Internet Services | R/**N**/D | Youtube, Tunecore | |
| | Mobile Services | R/**N**/D | Mobile App | |

R = Replacement/upgrade
N = New
D = Discontinued

**PART B**
**CURRENT ACTIVITIES**

| | **Activities** | **Area** | **Brief Details:**<br>**1. Objectives**<br>**2. Progress to date** | **Challenges/Problems Faced:**<br>**1. Lack of resources**<br>**2. Lack of know-how**<br>**3. Others (e.g. up-skilling)** | **Solutions Implemented/Type of assistance requirement from ABU** |
|---|---|---|---|---|---|
| **1.** | **Development projects/Upgrading facilities/Training** | FM Broadcasting | 1. Increase coverage | 1. Lack of resources<br>2. Lack of budget<br>3. Lack of international networking | Radio Nepal is still in an analogue broadcasting the country has plan to switchover in digital broadcasting.<br>Radio Nepal needs support from ABU and other counties technical support for digital broadcasting in Nepal. |
| | | Online Vacancy Management System | 1. Implement an online system to recruit new staff | | |
| | | Multi Media Content Creation | 1. To post in YouTube<br>2. Up skilling | | |
| | | | | | |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | Digital Broadcasting Symposium | Deputy Director technical staff | Most of the time we are not able to participating the event because of the budget. | |
| | | Online Activities | Different level Staffers | | |
| | | | | | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform** | **Activity 1** | Digital Networking | | |
| | | **Activity 2** | Digital switchover | | |
| | | **Activity 3** | AI and ICT | | |

***Submitted by:*** ***Er. Udaya Krishna shrestha***
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**Doc T-24/20-5**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | NHK（Japan Broadcasting Corporation） | | |
| Period: | Sep.2023 - Aug.2024 | Date of Report: | September 30, 2024 |

## PART A

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency

**Objective Evaluation System for 2K Video Quality Transcoded from 4K Source Using Dynamic Thresholds and Statistical Method**

Video files often use compression encoding, which can degrade image quality. Quality assurance is crucial in video production to maintain high standards. Established metrics like PSNR and ITU-T J.144 are used to assess video quality but are limited to comparing images with the same resolution. Therefore, human operators must expend real-time effort on reviewing both 4K and 2K videos during packaging before broadcasting or distribution, lowering the productivity of integrated 4K/2K simal productions.

To address this, we have devised and prototyped an innovative method for the automatic evaluation of 2K video quality transcoded from 4K. Specifically, to enable pixel-by-pixel comparisons between 4K and 2K videos, a spatial two-dimensional filter is employed for predicting reference pixel values for every pixel in the 2K video, derived from multiple pixels in the original 4K video. These predicted reference pixel values were compared with the actual pixel values of the 2K video, thereby enabling the calculation of international standard image quality metrics such as PSNR and the identification of quality anomalies.

Videos with complex spatial and temporal features can degrade image quality metrics, leading to false alarms even with correct resolution conversion. To address this, we adjusted our detection thresholds for quality anomalies, incorporating indicators of complexity. For detecting noise in specific regions of the 2K video, we used small-area PSNR as a metric. However, this metric can degrade in complex scenes, increasing false detections, many of which are imperceptible to humans. To enhance accuracy in such scenarios, we developed a statistical method for detecting quality anomalies.

Accordingly, the automated quality check of 2K content can now match or surpass the accuracy of human previews. This advancement reduces the significant cost and effort associated with traditional human review, resulting in both increased productivity and quality assurance in integrated 4K/2K simal productions.

- New Services/new projects initiated

**Initiative to Secure Content Reliability — Use of Content Credentials**

The rapid advancement of generative AI, which can create realistic images and audio, has led to the spread of fake news, raising global concerns about the reliability of online content. Broadcasting stations, increasingly using the internet to distribute content, face risks of third parties using generative AI to alter content or spread misinformation under the guise of the station. Additionally, there is a risk that AI-generated media could be unknowingly used in news and programs.

To address these issues, NHK is developing technology to add "provenance information" to pieces of content, indicating when, by whom, and how they were created or edited. In 2022, NHK began exploring the use of provenance information in broadcasting services and joined the international standardization body C2PA in 2023. C2PA specifications involve adding metadata to content, verified through digital signatures, to detect any post-creation alterations.

NHK has developed a new TV video player adhering to C2PA specifications displaying provenance information to help viewers assess content reliability. The player checks for provenance

information and verifies signatures, displaying results to the viewer. If the content lacks provenance information or verification fails, the player alerts the viewer to potential tampering.

Provenance information is also being considered for use in the production process to streamline the verification of media materials, particularly those created with generative AI. NHK is developing software that uses C2PA provenance information to reduce the effort required to verify the authenticity of media materials.

- Research projects

**Sentiment Analysis Technology for the Purpose of Social Media Public Opinion Analysis**

We are working on sentiment analysis technology to improve social media public opinion analysis by accurately recognizing emotions in social media posts.

Since there are many short posts on social media, the existing discriminative models, which uses only the target utterances as input, was unable to demonstrate high recognition performance. A new method combines a database for similar case searches with existing models to improve emotion recognition performance. As a result of experiments for evaluating this proposed method, two of the three datasets commonly used for setting emotion recognition problems showed better recognition performance over the existing method, confirming the effectiveness.

We aim to further enhance recognition performance and implement these technologies in social media public opinion analysis.

https://www.nhk.or.jp/strl/english/publica/giken_dayori/229/5.html

**Sign Language CG Generation Technology for News Content**

We are researching and developing technologies to translate Japanese news scripts into sign language and generate CG animations.

We have developed two technologies to generate a new sign language motion without an additional motion capture system: a method utilizing a diffusion model, which is a generative AI, and a method synthesizing basic movements motion that are already in the dictionary.

In order to more accurately reproduce the shape of the mouth and facial expressions that are important in sign language, a new facial model and a facial expression control technique based on image analysis has been introduced, resulting in greater expressiveness.

By performing image analysis of sign language videos from the “Sign-language News” program, a technology to automatically transcribe sign words according to word order has been developed. This makes it possible to streamline the work of creating a parallel corpus, which has been previously done manually.

A sign language CG production system for breaking news will be developed by 2025, aiming to put sign language CG services into practical use while incorporating opinions of deaf and hard of hearing people.

https://www.nhk.or.jp/strl/english/open2024/tenji/2/index.html

- Internet and Mobile Broadcasting Services

**Live Closed Caption Synchronization System for Internet Distribution**

In live broadcasts such as news programs, closed captions are displayed with a delay relative to the audio. This is because it takes several seconds to tens of seconds of work time to generate captions. Therefore, people with hearing disabilities have difficulty accurately understanding the program or enjoying watching it together with non-disabled people. To address this issue, we have developed a live closed caption synchronization system for internet distribution.

This system takes advantage of the inherent delay of internet distribution of videos, namely the time lag required for encoding processing when generating distribution files. The simultaneous internet distribution of broadcast programs in the “NHK Plus” service has a delay of approximately 30 seconds relative to the broadcast.

This system estimates the actual speaking time by text-matching live closed caption data multiplexed on SDI signals with voice recognition results. By adjusting the display time according to the results, captions can be displayed almost perfectly synchronized with the audio distributed on the internet.

By combining NHK's voice recognition engine and N-gram search algorithm with our unique scoring process that determines the certainty of recognition results, we can correct display times with high accuracy.

| |
|---|
| This system was introduced for the catch-up distribution programs (VOD) in 2020, but we started applying the system to the simultaneous distribution of main nationwide news programs in January 2024. |

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | MF<br>Radio1:99.9%<br>Radio2:99.9%<br>FM:98.0% | Digital Terrestrial:98.2% |
| Programme Channels | | | AM Radio:2<br>FM Radio:1 | Digital terrestrial:2<br>Digital Satellite (HD):1<br>Digital Satellite (UHD):2 |
| Studios (Production) | File-based Set-up | R/N/D | | |
| | SDTV | R/N/D | | |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | |
| Transmission & Delivery | HF | ~~R/N/D~~ | 3 | |
| | MF | ~~R/N/D~~ | Radio1 :281<br>Radio2 :146 | |
| | FM | ~~R/N/D~~ | 532 | |
| | TV | ~~R/N/D~~ | | Digital :2,214 |
| | OTT/IBB/Internet Services | ~~R/N/D~~ | | |
| | Mobile Services | ~~R/N/D~~ | | |

R = Replacement/upgrade
N = New
D = Discontinued

**PART B**
**CURRENT ACTIVITIES**

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| 1. | Development projects/Upgrading facilities/Training | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 2. | Participation in ABU Activities | Area | Level of Participation | Reasons for not participating (though interested) | |
| | | | | | |
| | | | | | |
| | | | | | |
| 3. | Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform | Activity 1 | | | |
| | | Activity 2 | | | |
| | | Activity 3 | | | |

**Doc T-24/20-6**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | TRT | | |
| Period: | 19.10.2023-30.09.2024 | Date of Report: | 30.09.2024 |

**PART A**

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency
  - Radio stations and transmitter systems renewal
  - The Digital Archive System Project - Present 4PB media archive and related database is migrated to and reachable by the new system. Media transfer to LTO-9 tape cartridges is ongoing. System functionalities and user interfaces are being tested. User trainings is being planned.
  - TRT Arabi - TRT Haber (News) - TRT Sport' s PAM System Integration Project - ongoing
  - Branding automation system (VizRT) Hardware Renewal - ongoing
  - Archive System (Diva-Oracle) Renovation and Expansion Project - physical installation has been completed, migration continues
  - Talent Tracking and AR-VR Graphic System Project - installation on TRT World and TRT Sports studios has been completed. The TRT-World AR/VR system will be used for USA election coverage. TRT Sports channel plans to use this system for upcoming UEFA leagues and Turkish Super League match days.
  - Renovation of TRT-Haber (News) Studio Control Room - ongoing
  - Acquisition of Master Control Router and Renovation of Control Rooms - ongoing

- New Services/new projects initiated
  - DAB+ trial broadcast (ongoing)
  - DVB-T2 trial broadcast (ongoing)
  - Tape library technology and the storage capacity of the HSM system for TRT-World / TRT-Arabi channels are renewed to LTO-9 and increased to 7,5PB. HSM software is upgraded to the latest version and present media and database is migrated to and reachable by the renewed system. Media transfer to LTO-9 tape cartridges is ongoing.
  - The construction of a new CAR is ongoing on the Istanbul/Ulus campus to meet the increasing volume and requirements for the installation of the new PAM system and the Tx rooms (TRT-Kids, TRT-Music) that will be moved from Ankara to Istanbul.

  - Research projects
  - TRT-World PAM system will be set up on a new CAR at the end of this year.
  - I-news NRCS automation system will set up on new datacentre after PAM project completed.
  - Branding (VizRT ) version upgrade ( from 3.14 to Version 5 )will be completed after PAM project

- Internet and Mobile Broadcasting Services
  - Tabii (TRT's global streaming platform) – besides English now offering Urdu, Arabic and Spanish language options

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | TRT FM: %99.7 | TRT 1 : %98.4 |

| | | | | |
|---|---|---|---|---|
| | | | TRTRadio1: %93.6<br>TRTNagme: %90.8<br>TRTTurku: %92.3<br>TRTRadioNews: %88.9<br>TRTRadio3: %82.3<br>TRTRadioKurdi: %21.7<br>TRTRadioWorld: %30.59<br>TRTRadioArabia: %21.4 | TRT News: %98.1<br>TRT Sport : %96.8<br>TRT Kinds : %92<br>TRT-Kurdi : %16.1 |
| Programme Channels | | | TRT FM<br>TRT Radio 1<br>TRT Nagme<br>TRT Turku<br>TRT Radio News<br>TRT Radio 3<br>TRT Radio Kurdi<br>TRT Radio World<br>TRT Arabia | TRT 1<br>TRT News<br>TRT Sport<br>TRT Kinds<br>TRT-Kurdi |
| Studios (Production) | File-based Set-up | R/N/D | | |
| | SDTV | R/N/D | | |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | |
| Transmission & Delivery | HF | R/N/D | R | |
| | MF | R/N/D | R | |
| | FM | R/N/D | R | |
| | TV | R/N/D | | R |
| | OTT/IBB/Internet Services | R/N/D | | |
| | Mobile Services | R/N/D | | |

R = Replacement/upgrade
N = New
D = Discontinued

**PART B**
**CURRENT ACTIVITIES**

| | **Activities** | **Area** | **Brief Details:**<br>**1. Objectives**<br>**2. Progress to date** | **Challenges/Problems Faced:**<br>**1. Lack of resources**<br>**2. Lack of know-how**<br>**3. Others (e.g. up-skilling)** | **Solutions Implemented/Type of assistance requirement from ABU** |
|---|---|---|---|---|---|
| **1.** | **Development projects/Upgrading facilities/Training** | Digital Radio (DAB+) | In trial | Waiting the final frequency planning form RTUK.<br>8 radio programmes in Ankara, Istanbul, Izmit and Bursa broadcasting via DAB+. | Having enough knowledge and experience. No technical assistance is needed at this time. |
| | | Digital TV (DVB-T2) | In trial | Waiting the final frequency planning form RTUK.<br>6 SD/3 HD TV programmes and 14 Radio prorammes in Ankara, Istanbul, Izmir, Adana and Bursa broadcasting via DVB-T2. | Having enough knowledge and experience. No technical assistance is needed at this time. |
| | | | | | |
| | | | | | |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | | | | |
| | | | | | |
| | | | | | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities,** | **Activity 1** | | | |
| | | **Activity 2** | | | |

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| | **information exchange platform** | | | | |
| | | **Activity 3** | | | |

**Doc T-24/20-7**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | Television Broadcasts Limited | | |
| Period: | October 2023 to September 2024 | Date of Report: | October 7, 2024 |

## PART A

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency

1. Adoption of Spine and leaf network technology for media network infrastructure
2. Continue the improvement of security measures for content delivery, contribution, and distribution.
3. Continue Central Transcoding Farm facilities enhancement to support and 4K/UHD files conversion.
4. Research of LTO alternatives for deep archive solution.
5. Adoption of Mini Workgroup editing environment for different editing needs.
6. Enhancement of Sobey HDNLE Media Asset Management to a DOCKER platform.
7. Adoption of A.I. Technology to streamline Production / Post Production workflow.
8. Continue SCTE customization for 3rd parties' advertisement systems to insert advertisement for OTT platform.
9. Continue the research of low latency solution for OTT platform.
10. Continue to use A.I. technology to do video de-noising during up-version of SD files to HD.
11. TVB has already deployed loudness control for digital television services in compliance with Hong Kong OFCA's Generic Code of Practice on Television Technical Standards.

- New Services/new projects initiated

1. Deep archive medium migration from LTO-5 to LTO-9 due to EOL
2. Developing a Production Rundown System to streamline data exchange during Production workflow.
3. Launch of an in-house developed Programmes Preview System for Production colleagues.
4. Deployed Cesium grade time and frequency reference for SFN network and MCR.

- Research projects

1. Continue the study of transcoding and cross conversion between SDR and HDR materials.
2. Continue SD HDR and 4K/UHD HDR study.

- Internet and Mobile Broadcasting Services

1. New DTTB technology study

2. 5G HPHT TV study

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | NA | 99% |
| Programme Channels | | | NA | 5 HD |
| Studios (Production) | File-based Set-up | R/N/D | | |
| | SDTV | R/N/D | | |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | NA | |
| Transmission & Delivery | HF | R/N/D | NA | |
| | MF | R/N/D | NA | |
| | FM | R/N/D | NA | |
| | TV | R/N/D | NA | 29 sites |
| | OTT/IBB/Internet Services | R/N/D | NA | |
| | Mobile Services | R/N/D | NA | |

R = Replacement/upgrade
N = New
D = Discontinued

## PART B
## CURRENT ACTIVITIES

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| **1.** | **Development projects/Upgrading facilities/Training** | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | ABU–DRM Webinar on Delivering Emergency Warnings with DRM | Engineer, update and acquire knowledge (On-line) | | |
| | | ABU Webinar - Third Generation AVS Video Coding Standard (AVS3): Features and Applications | Executive & Engineer, update and acquire knowledge (On-line) | | |
| | | Intellectual Property Franchise Management for Film and TV Productions. | Engineer, update and acquire knowledge (On-line) | | |
| | | Webinar - Remote Production Solution | Engineer, update and acquire knowledge (On-line) | | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities,** | **Activity 1** | | | |

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| | **information exchange platform** | **Activity 2** | | | |
| | | **Activity 3** | | | |

**Doc T-24/20-8**

# STATUS REPORT

| Organisation: | Mediacorp Pte Ltd | | |
|---|---|---|---|
| Period: | 1 year | Date of Report: | 16 October 2024 |

## PART A

| **Technical Developments during the past year:** |
|---|
| • System upgrades/changes to practices for improved quality/efficiency<br>  • Kick start on cloud archive.<br>  • Working on cloud TV Playout project (tender stage).<br>  • Working on cloud MAM (discussion with vendor).<br>  • Working on Media IP infrastructure project (tender stage). |
| • New Services/new projects initiated<br>As above. |
| • Research projects<br>Nil |
| • Internet and Mobile Broadcasting Services<br>Nil |

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | 100% | 100% |
| Programme Channels | | | 11 | 6 |
| Studios (Production) | File-based Set-up | R/N/D | | |
| | SDTV | R/N/D | | |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | |
| Transmission & Delivery | HF | R/N/D | | |
| | MF | R/N/D | | |
| | FM | R/N/D | | |
| | TV | R/N/D | | |
| | OTT/IBB/Internet Services | R/N/D | | |
| | Mobile Services | R/N/D | | |

R = Replacement/upgrade
N = New
D = Discontinued

## PART B
## CURRENT ACTIVITIES

| | **Activities** | **Area** | **Brief Details:**<br>**1. Objectives**<br>**2. Progress to date** | **Challenges/Problems Faced:**<br>**1. Lack of resources**<br>**2. Lack of know-how**<br>**3. Others (e.g. up-skilling)** | **Solutions Implemented/Type of assistance requirement from ABU** |
|---|---|---|---|---|---|
| **1.** | **Development projects/Upgrading facilities/Training** | Cloud TV Playout | • To trial cloud TV playout.<br>• Tender process. | • High operating cost.<br>• Unsure of the performance.<br>• Unsure of technical support<br>• etc | The technical/operation issues shall surface when it is implemented. |
| | | Media IP infrastructure project | • To upgrade existing baseband central infrastructure.<br>• Tender process. | • Technology refresh<br>• Lack of baseband router choices | The technical/operation issues shall surface when it is implemented. |
| | | | | | |
| | | | | | |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | Training | Attended DBS<br>Attended AIBD training | NA | |
| | | ABU TB meeting | Attended mid-year meeting in Beijing China. | NA | |
| | | | | | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform** | **Activity 1** | | | |
| | | **Activity 2** | | | |
| | | **Activity 3** | | | |

**Doc T-24/20-9**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | KBS (Korean Broadcasting System) | | |
| Period: | 2023 ~ 2024 | Date of Report: | 16th Oct 2024 |

## PART A

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency

**Expand UHDTV Service area**

KBS has Broadened Microwave Transmission coverage for UHDTV. Especially, KBS conduct the UHDTV Transmission tests in Changwon and Chuncheon. Once the transmission Tests are complete, KBS will broadcast in those areas. KBS will deliver UHD content to most cities in korea. It is beneficial for Korean people to receive UHDTV Broadcasting signal freely.

**Strengthen to receive mobile UHDTV signal**

To improve Microwave UHDTV Reception, KBS develop the Signal reception Technology. Based on signal strength, receiver adjusts the signal rate between UHDTV signals(ATSC 3.0) and Telecommunication signals. This technology will help people to receive TV signal anywhere

**Upgrade Microwave Facilities for infrastructure**

KBS upgrade the microwave transmission equipment(UHDTV, HDTV, FM, DMB etc) for the internal broadcasting infrastructure. KBS also adjust the microwave frequency to comply with the Republic of Korea government's frequency operation policies

**Fulfill the role of Disaster Supervision Broadcaster in korea**

KBS try to strengthen the disaster broadcasting capabilities and deliver disaster information as soon as disaster occur. KBS make a broadcast facility management plan against disaster every year and train the disaster broadcast circumstance at least twice a year to enhance our disaster broadcasting capabilities.

- New Services/new projects initiated

**Build the XR Studio**

In response to the increasing demand for XR content production, KBS establish and operate XR Studio. By establishing the XR studio, KBS can create and deliver magnificent, immersive content to viewers. It is also be environmental-friendly, as it reduces the need for set construction. Accordingly, materials used for making can be reduced.

- Research projects

**Multicam Tracking System using AI Technology (called vVertigo)**

KBS Technology Research Institute develops multi-camera Tracking System (called vVertigo) using AI Technology continuously. Since it launch in 2019, It has been utilized for making Tracking cam in one of our programs “Music bank”. The contents produced using this system are highly favoured by performer’ fans. it has added a new feature that can be used for live broadcasts, enhancing user convenience and overall performance.(called vVertigo Live). KBS already use this system in some content. and KBS continuously develope it to ensure it can be

utilized in various programs in the future.

**Color Restoration using AI Technology**

KBS stores extensive video content archives. And There has been a demand for color Restoration of past black-and-white footage. To effectively address this, KBS develops the system that utilizes AI technology to convert black-and-white videos into color videos

This system has proven to be significantly time-efficient and quality-effective in color-restoring historically significant videos.

**Collecting Viewing Data using AI Technology**

Viewers are increasingly turning to various media, including OTT platforms, to enjoy contents. This tendency heightened the importance of collecting viewer data. KBS utilizes AI technology to gather and analyze viewing data, effectively incorporating it into the production of broadcast programs to create viewer-oriented content.

**Character Generator Development**

KBS Technology Research Institute has a long history in developing and innovating character generators to meet domestic broadcasters demanding requirements. Due to their excellence and versatility, they are prevailing in production sites covering from daily programs to world class events like the Olympic Games.

**Immersive Contents Production Research**

Through the development of a new concept production platform based on AR/VR technology, KBS Technology Research institute conducts research to showcase new next-generation content production technology to viewers. At KOBA 2024, KBS showcase XR technology that allows viewers to expand the screen displayed on the TV by wearing XR glasses. It provide a wider and more immersive viewing experience to viewer.

**Communication Technology Convergence Networks Research**

The Communicaiton Technology convergence network can connect the advantages of ATSC3.0 (TV broadcast) and 5G mobile network to provide viewers with content with optimal quality and seamlessly. By automatically connecting to the 5G network in a fringe area where reception is poor, it is possible to use UHD/FHD/disaster broadcasting/additional services without interruption anywhere.

**UHDTV Single Frequency Network Optimization Research**

UHDTV single-frequency broadcasting network optimization research is researching and developing media service technology to fulfill KBS' public responsibility. KBS Technology Research institute conducts optimization research on UHDTV single frequency broadcasting network to solve the problem of coverage loss in UHDTV broadcasting and to increase the efficiency of transmission infrastructure.

**Viewer Participation Service Development**

KBS Technology Research institute develops a digital service that allows TV viewers to conveniently participate in voting, quizzes, surveys and commenting on the program using smartphone apps while watching TV. And the reaction results of TV viewers are displayed on the on-air screen. I

**Audio/Subtitle Research**

KBS Technology Research institute conducts subtitle synchronization and voice recognition technology research to provide subtitles for hearing-impaired viewers in real-time broadcasting as well as Internet and VOD services

**Emergency Alert Broadcasting Research**

Research on UHD disaster warning service is being conducted to rapidly deliver disaster warning signals not only to TV but also to public places such as outdoor display boards, buses, and subways when emergencies occur.

**Broadcast Network-Based Additional Data Services – Traffic and Positioning**

This research focuses on developing technology to implement various additional services, such as traffic information and precise positioning, through next-generation broadcast networks. It also involves designing optimal data transmission methods suitable for the transmission process.

Providing Accurate Position Service

accurate location information can be applied across various sectors of society. As a public broadcaster, KBS is preparing and developing the services that will allow citizens to access precise location information through its broadcasting network when needed.

- Internet and Mobile Broadcasting Services

**Operating Open Content Archive for Public**

For Public, KBS has launched and operated the Open archive "BADA" (bada.kbs.co.kr). It contains more than 10,000 items ranging from video, audio and images. KBS aims to fulfill our public responsibility as a public service media by sharing the value of our recorded assets with the public. KBS also responds to viewer needs and current trends by returning the copyright of KBS content for public purposes through KBS' Bada. KBS hopes that all released content will be utilized in education, research, and creative fields, fostering a freely creative environment. KBS has a plan to expand a lof of contents in BADA continuously for public responsibility

**Mobile Reception Service**

as part of its efforts to offer the content that viewers want and need. KBS is continuously researching and developing services to provide appropriate content to mobile viewers, including mobile cars, by utilizing the supplementary features of ATSC 3.0, which allows for mobile reception,

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | | |
| Programme Channels | | | | |
| Studios (Production) | File-based Set-up | R/N/D | | |
| | SDTV | R/N/D | | |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | |
| Transmission & Delivery | HF | R/N/D | | |
| | MF | R/N/D | | |
| | FM | R/N/D | | |
| | TV | R/N/D | | |
| | OTT/IBB/Internet Services | R/N/D | | |
| | Mobile Services | R/N/D | | |

R = Replacement/upgrade
N = New

**PART B**
**CURRENT ACTIVITIES**

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| 1. | Development projects/Upgrading facilities/Training | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 2. | Participation in ABU Activities | Area | Level of Participation | Reasons for not participating (though interested) | |
| | | | | | |
| | | | | | |
| | | | | | |
| 3. | Suggestions for New ABU Activities e.g. study topic projects, KBSbinars, workshops, symposiums etc, spectrum activities, information exchange platform | Activity 1 | | | |
| | | Activity 2 | | | |
| | | Activity 3 | | | |

**Doc T-24/20-10**

# STATUS REPORT

| | | | |
|---|---|---|---|
| Organisation: | Sri Lanka Rupavahini (TV) Corporation | | |
| Period: | 01/01/2023 - 15/09/2024 | Date of Report: | 27/09/2024 |

## PART A

**Technical Developments during the past year:**

- System upgrades/changes to practices for improved quality/efficiency
  a) Launched of Rupavahini HD transmission on IPTV Platform
  b) Launched of VHF 06 transmission from main Tx station while operating **adjacent-channels** from same TV location.
  c) Social Media platforms were integrated with Television Programmes to cater new audience and also gather instant feedback from viewers.
  d) Launched new web sites for all three television channels using content promotion-based templates.
- New Services/new projects initiated
  a) Internet Radio
- Research projects
- Internet and Mobile Broadcasting Services
  a) OTT and IPTV based HD broadcasting services project started.

| | | | Radio | Television |
|---|---|---|---|---|
| Coverage % | | | | 80 |
| Programme Channels | | | | 3 |
| Studios (Production) | File-based Set-up | R/N/D | | R |
| | SDTV | R/N/D | | R |
| | HDTV | R/N/D | | |
| | UHDTV | | | |
| | IP Based Set-up | R/N/D | | N |
| Transmission & Delivery | HF | R/N/D | | |
| | MF | R/N/D | | |
| | FM | R/N/D | | |
| | TV | R/N/D | | N |
| | OTT/IBB/Internet Services | R/N/D | | R |
| | Mobile Services | R/N/D | | N |

R = Replacement/upgrade
N = New
D = Discontinued

## PART B
## CURRENT ACTIVITIES

| | Activities | Area | Brief Details:<br>1. Objectives<br>2. Progress to date | Challenges/Problems Faced:<br>1. Lack of resources<br>2. Lack of know-how<br>3. Others (e.g. up-skilling) | Solutions Implemented/Type of assistance requirement from ABU |
|---|---|---|---|---|---|
| **1.** | **Development projects/Upgrading facilities/Training** | Studio Technical infrastructure | To Upgrade the Studio production quality to HD (in progress) | Lack of resources/ funds | Knowledge Experiences and Financial Assistance |
| | | OB Trucks | To facilitate HD production in Outside locations (in progress) | Lack of resources/ funds | Knowledge Experiences and Financial Assistance |
| | | HD Linking and Decoding units | to be linked HD feeds to and from SLRC and to be decode foreign HD and UHD/ 4K / 8K feeds (yet to start) | Lack of resources/ funds | Knowledge Experiences and Financial Assistance |
| **2.** | **Participation in ABU Activities** | **Area** | **Level of Participation** | **Reasons for not participating (though interested)** | |
| | | Webinar Series on unlocking-the-future-of-video | Online participation with the relevant staff | Participated | |
| | | Webinar Series on satellite-transmission | Online participation with the relevant staff | Participated | |
| | | Webinar Series on disaster-management | Online participation with the relevant staff | Participated | |
| **3.** | **Suggestions for New ABU Activities e.g. study topic projects, webinars, workshops, symposiums etc, spectrum activities, information exchange platform** | **Activity 1** | Webinar / Workshop | Workflow design from studio recordings, ingest, editing, archiving to transmission playout for file-based workflow. Introduction for Open-Source software for post production, playouts | |
| | | **Activity 2** | Webinar | Case studies on SD to HD transformation, how to handle mix format transmission with existing materials | |
| | | **Activity 3** | Webinar / Workshop | Virtual Studio Technology With AR, VR and relevant Open-Source software for multi camera Virtual Studio Productions | |