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Cover:
TRT hosts ABU Technical Committee Meeting in Istanbul
Maiden's Tower (Kız Kulesi), Istanbul



Asia-Pacific Broadcasting Union

TECHNICAL REVIEW

From the Editor's Desk



This issue of *Technical Review* of ABU Technology carries a summary report from this year's Technical Committee (TC) Meetings. A number of papers addressing relevant issues for broadcasters are presented in the areas of hybrid broadcasting, digital terrestrial transmission, an automatic sign language generation system and facility upgrading to enable high definition and spectrum for future broadcasting.

IBC and InterBEE reports provided by the fellowship recipients highlight the technology discussions at IBC2015 and InterBEE2015 Conference and Exhibitions held in Amsterdam and Tokyo respectively.

This issue also contains activity reports on training which Technology Department has carried out and features our participation at the WorldDAB General Assembly.

Technical Review also summarises the Technical Committee Meetings and awards presented during TC meetings.



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Automatic Generation System of Japanese Sign Language (JSL) with CG Animation of Fixed Pattern Weather Information

by Nobuyuki HIRUMA, Makiko AZUMA, Tsubasa UCHIDA,
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abstract

NHK has been studying technologies for automatically generating machine translation of weather information announcements from Japanese to Japanese Sign Language (JSL) with CG animation, to increase the number of TV services for deaf people. The CG animation defines a high quality 3D human model of hands, fingers, and facial expressions, and it controls the model using motion capture data obtained from a real human signer. While the current state of the natural language machine translation technology is not yet satisfactory, we have developed a practical prototype system that generates high quality information on fixed pattern weather, utilising the language resources we built in the process of the machine translation research. In this report we first describe the outline of the research project, then, we explain the achievement of the prototype of a system for automatically generating sign language animation from formal messages in XML format issued by the Japan Meteorological Agency (JMA).

Introduction and Background

The understanding that sign language (in our case, Japanese Sign Language, JSL) is a different language to the vocal language spoken in a corresponding country or area (in our case, Japanese) is now widely accepted, as seen in the UN Convention on the Rights of Persons with Disabilities. Sign language is the first language for people who are deaf from birth. Therefore, expectations for services in sign language are increasing.

However, keeping sign language interpreters on stand-by at broadcasting stations 24 hours a day is difficult. To deal with this situation, NHK aims to use sign language CG animation systems in broadcasting emergency weather information as a step in expanding our sign language broadcasting services.

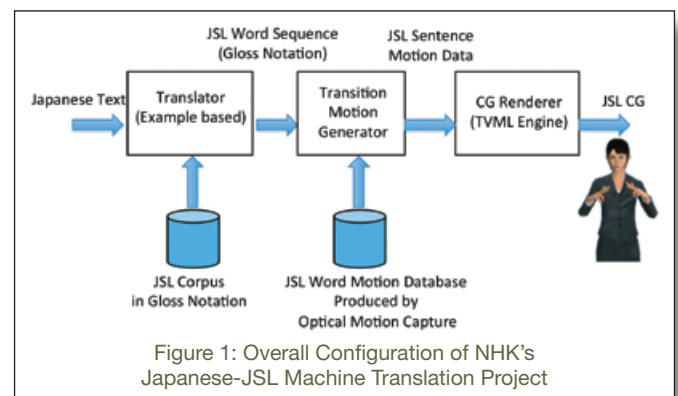
In this report, we first describe the outline of the research project; then, we explain our achievement, which is a practical prototype of a system for automatically generating sign language animation from formal messages in XML format.

Outline of the Project¹⁾

The goal of our project was to develop a natural language translation technology that can translate input Japanese

weather information texts into JSL CG animation clips. As mentioned, because JSL and Japanese have different grammatical structures, simple word-by-word permutation is not at all appropriate for translation. Because the grammatical structure of JSL has not been elucidated at present, rule-based translation methods could not be used in the translation. Therefore, we have been carrying out research on machine translation technology, mainly utilising example-based methods based on a sign language corpus.

To achieve this goal, we are working on developing prototype systems that are based on the configuration shown in Figure 1.



First, the input texts are converted into sign language word sequences written in gloss notation³⁾ referring to one of the

language resources, which is a large database of example pairs of a Japanese text and a sign language word sequence, or the corpus. Secondly, according to the word order of the sequence, the motion data on each sign language word stored in the other sign language resource, the lexicon, are compiled to express the movement of a virtual human character. Finally, based on the movement information, the CG animation clip corresponding to the input Japanese text is made and displayed by the rendering engine. For the rendering engine, we adopted the TV programme Making Language (TVML) system²⁾, which is a scripting language developed by NHK to describe full TV programmes.

Sign Language Resources

We have built the following databases as the language resources mentioned in the previous section.

First, we have so far collected corpus data with around 90,000 pairs of a Japanese sentence versus a sign language word sequence in gloss notation³⁾. We are continuing to collect data from signed weather broadcasts to enrich the corpus and to increase translation accuracy because the current size of the corpus is not yet sufficient for good quality translation.

Second, the motion data of each sign language word were recorded using an optical motion capture system and stored in the BVH⁴⁾ format (Figure 2). Thus far, we have captured motions for around 7000 words.



Figure 2: Optical Motion Capture and Bone Structure of CG Character for JSL

CG character postures are computed based on the bone structure and BVH format data. The BVH format indicates the values for the angles of each joint, and smooth transition movements between two words is made using linear interpolation of the BVH angular values of the words.

BVH files and character models are designated using TV Programme Making Language (TVML), a programming language developed at NHK.

A Japanese-JSL bilingual dictionary system⁵⁾ based on the lexicon data has been made available to the public to ask for opinions from a wide audience, including native signers regarding the sign language CG quality.

Automatic Sign Language CG Generation based on Fixed Pattern Weather Information

NHK is carrying out the aforementioned Japanese-JSL machine translation project. At this point, however, the system cannot be used in practical services because the translation accuracy is still insufficient. From our research results to date, we are testing systems that have the potential for practical use.

We have created a prototype of a video system for generating sign language CG for previously recorded fixed phrases generated from input weather forecasts⁶⁾. Although translation of sentences other than fixed sentences is not possible, the system has the potential for making accurate flash reports on weather information.

The system can read coded weather forecasts distributed by the Japan Meteorological Agency, JMA, in XML format⁷⁾ and convey that through animated characters using sign language. It automatically generates and updates the sign language animation based on the latest weather forecast it receives through the Internet.

The schematic diagram of the prototype is shown in Figure 3.

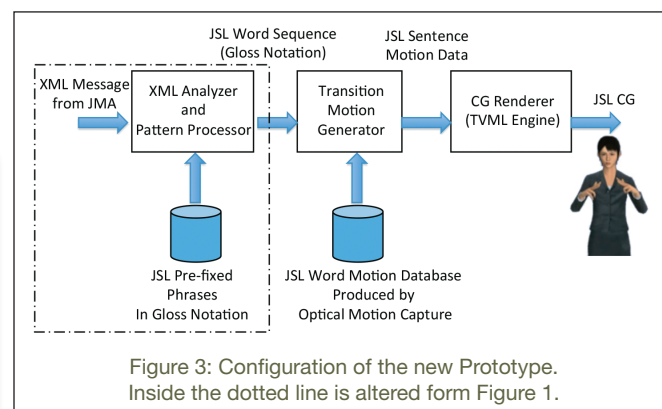


Figure 3: Configuration of the new Prototype. Inside the dotted line is altered form Figure 1.

With the help of deaf volunteers and sign language interpreters, we have created a database of templates that corresponds to weather forecast codes distributed by the Japan Meteorological Agency. The system receives the code, inserts the relevant information into the expression templates, and automatically generates appropriate sign language animations (Figure 4).

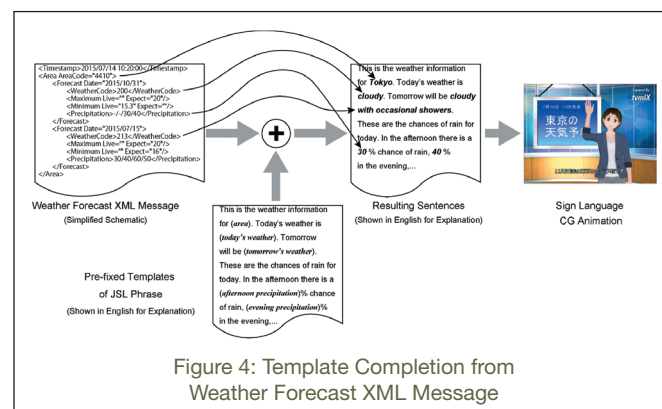


Figure 4: Template Completion from Weather Forecast XML Message

In addition to simple template completion, we introduced a programme for advanced language processing, which analyzes incoming weather information and automatically revises the words or phrases accordingly, to generate more natural expressions. For example, if the incoming code indicates that it will rain today and tomorrow, the system will generate an animation that says “It will rain today and continue to rain tomorrow” instead of “It will rain today. It will rain tomorrow.”

Conclusion and Future Works

Although we have not yet performed systematic assessments of the quality of the CG animation generated by the new prototype system, according to casual interviews with native signers, we have received very positive responses. We are now planning to adapt this technology to one of our web services.

Because our final goal is to establish natural language translation techniques from Japanese to sign language CG, we will continue bettering the translation accuracy

and CG quality. One of our current challenges is reducing the unnaturalness of CG character images. Among these challenges, the insufficiency of the facial expressions in CG characters should be addressed. Therefore, we are carrying out research to portray facial expressions naturally, utilising more advanced CG technology.

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Shuichi Umeda received M.E. degree from Nara Institute of Science and Technology in 1997. After having been in charge of CG production in a broadcasting station, he joined NHK Science & Technology Research Laboratories in 2009. There he researched characteristics of the human visual system, and has been developing a practical CG generator for Japanese Sign Language.

**Taro Miyazaki**

Taro Miyazaki received B.E. and M.E. degrees in Information Science from Tokyo Institute of Technology in 2004 and 2006, respectively. After his graduation, he joined NHK and has been working at the Science and Technology Research Laboratories since 2011. His research interests include machine translation, information retrieval and data mining.

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Naoto Kato, Ph.D., joined NHK in 1988. He has been engaged in research on Natural Language Processing, especially on Machine Translation in NHK Science and Technology Research Laboratories (STRL). In 1994-1997 and 2004-2006, he was a visiting researcher at Advanced Telecommunications Research Institute International Laboratories and is now a Senior Research Engineer in NHK STRL.

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Broadcasting Technology Research Scheme for ABU 2016

As part of our ABU activities in 2016, NHK is providing the following program for young researchers from ABU member broadcasters and organizations to conduct research at NHK STRL (Science and Technology Research Laboratories; <http://www.nhk.or.jp/strl/index-e.html>). Applicants must be young engineers and researchers who are able to conduct R&D on broadcasting technology at NHK STRL through their stay in Japan for a period of at least three months to one year.

We have the pleasure to announce its application details in the following web site.

http://www.abu.org.my/Technical-@-R_-%E2%97%98-D.aspx

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Global Strategy Division, NHK WORLD Department
Attn: Toshiaki Hara (hara.t-fi@nhk.or.jp)
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File-based Closed Captioning System without Captioning Delay

by YunHyoung Kim, SungHee Han, SungWoo Choi, ByungHee Jung
KBS (Korean Broadcasting System), Korea

abstract

There have been complaints about the time delay between closed captions and dialogue on TV occurring due to live stenography. The problem can be solved if captions are generated beforehand, but it is practically impossible to enforce pre-production for all broadcast programmes. To cope with it, we propose a new file-based closed captioning system based on speech recognition and audio-fingerprinting. The system aims at rerun episodes with pre-prepared caption files produced by live stenography at the first-run, thereby containing delayed captions. To match the delayed captions with the dialogue, the system adjusts timelines of the captions based on automatic speech recognition. When it comes to rebroadcasting, since there would be video editing in the rerun episodes, the system finds differences between the rerun and the first-run by comparing their audio-fingerprints and generates new closed caption files. The proposed system has been implemented and applied in KBS (Korean Broadcasting System).

1. Introduction

Closed captioning is a process to provide text information of a broadcasting programme, especially related to audio, in order to help people with hearing problems. It mainly represents the dialogue of actors in the programme, though it is possible to describe other audio elements.

Closed captioning has been provided for many years since its first broadcasting in 1973[1]. Because many countries enact legislation to provide closed captions with broadcast content, a closed captioning system is an essential system for content providers. In Korea, revisions on the laws related to the handicapped in 2010 require terrestrial broadcasting companies to provide closed captions for every programme until 2013, and general programme providers 70% of their contents until 2016[2]. As a result, it is hard to watch DTV programs without closed captions in Korea.

Closed captions are generally generated by live stenography, performed by skilled stenographers watching broadcasting programmes. Therefore, there are irregular timing delays on the closed captions which do not match the dialogue of the programmes due to broadcast and stenography time delay. In order to get rid of the delays, the programmes should be produced before going on-air, to give time for stenography, but it is practically impossible to do so.

As an alternative plan, we focus on re-run programs, for which we already have closed caption files from first-run stenography. We applied speech recognition and audio-fingerprinting technologies to reduce captioning delays in

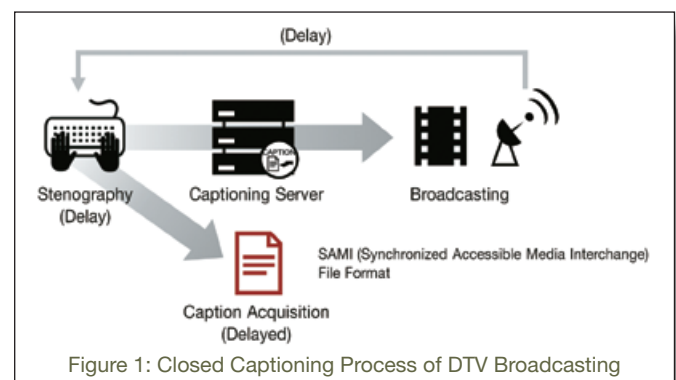
the first-run caption files, and developed a file-based closed captioning system which delivers time-adjusted captions to the broadcast programmes.

We introduce the technical achievements on Chapter 2 and 3, and explain trial application of our system into a real-world broadcasting system in Chapter 4. We summarise and conclude this paper on Chapter 5.

2. Post Processing with Speech Recognition

2.1 Closed Caption Acquisition at First-run

As described above, closed captions for broadcast programmes are usually generated by live stenography. Figure 1 shows the process of ordinary closed captioning for DTV



broadcasting. The closed captions from the stenography are captured and saved as a SAMI (Synchronized Accessible Media Interchange)[3] caption file format. Since there are delays in broadcasting and stenography, resulting closed caption files also contains delayed captions.

2.2 Closed Captioning Timing Adjustment based on Speech Recognition

For closed captioning timing adjustment, we use WiseSync, which is proposed in [4]. It is a system that realigns timing of closed captions according to dialogue they represent. It first makes a speech recognition dictionary using words in a caption file in order to raise the accuracy of speech recognition. It then sequentially generates an exact timing for each word in the file, based on the computed time stamps. Figure 2 shows the process of timing adjustment.

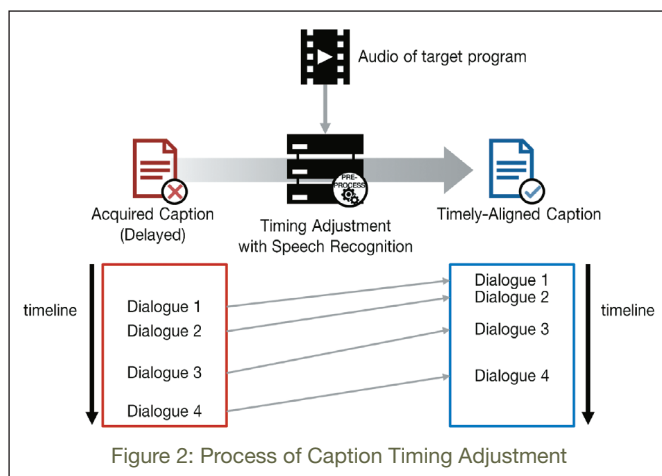


Figure 2: Process of Caption Timing Adjustment

3. File-based Closed Captioning System

3.1 Captioning based on Caption Files

File-based closed captioning system is closely related to an APC (Automatic Programme Control) system, which exactly controls overall process of programme broadcasting according to TV programme schedule. The captioning system receives command messages from the APC system such as “ready for file-based captioning”, “start captioning”, “stop captioning”, and etc. The system sends to the APC system a list of programmes that it could caption based on caption files.

```

<SAMI>
<HEAD>
<TITLE> 역사저널 그날
(Produced by KBS Caption Recording
System)
</TITLE>
</HEAD>
<BODY>
<SYNC Start=9081> <P Class=KRCC>
계 획 했 는 데 1794년 에 착 수 하 서 1796년 에
<SYNC Start=2298077> <P Class=KRCC>
<SYNC Start=2299002> <P Class=KRCC>
완 성 이 되 거 든 요.
<SYNC Start=2307021> <P Class=KRCC>
그 건 결 국 그 당 시 에 새 로 운 공 법.
<SYNC Start=2309002> <P Class=KRCC>
거 중 기 라 든 가 농 로 를 사 용 했 고 또 벽 돌 을
<SYNC Start=10006> <P Class=KRCC>
<SYNC Start=2309027> <P Class=KRCC>
이 용 을 했 고 요.
<SYNC Start=10037> <P Class=KRCC>
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또 하 나 의 공 사 가 단 축 된 원 인 으 로 는 급
<SYNC Start=25081> <P Class=KRCC>
<SYNC Start=2311052> <P Class=KRCC>
료 를 지 불 해 요.
-사극만큼 재미있는 신개념 역사 토크쇼

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Figure 3: An Example of a Caption File

Since caption files are saved as SAMI format, the system reads and parses caption messages according to the format. It sends caption messages in accordance with timing information described in <SYNC> blocks of caption files. Our system supports various foreign languages such as English, Chinese, Thai, and Bahasa Malaysia.

3.2 Caption Readjustment on Rerun Programs

After the process of timing adjustment, based on speech recognition, we are ready to reuse time-aligned captions for rerun programs. However, there can be a problem on rerun programmes; video editing. Generally, it is assumed that rerun programmes are often edited to be shorter, thereby making it impossible to use adjusted captions directly. To cope with this, we introduce an analysis module based on audio-fingerprinting.

This computes audio-fingerprints for both the first-run programme, which is used for the timing adjustment, and the re-run programme, which would be edited. Then it finds differences between them, and adjusts the first-run caption file according to the differences. Because it is assumed that there is no additional cut on re-run programmes, it is sufficient to find removed cuts on the first-run video.

The system computes audio-fingerprints with 5 seconds duration, overlapped by a 500 millisecond interval. For each audio-fingerprint of the first-run programme the module finds it among audio-fingerprints of the re-run programme to find removed video cuts. If there is no matched audio-fingerprint, it represents there is an edit.

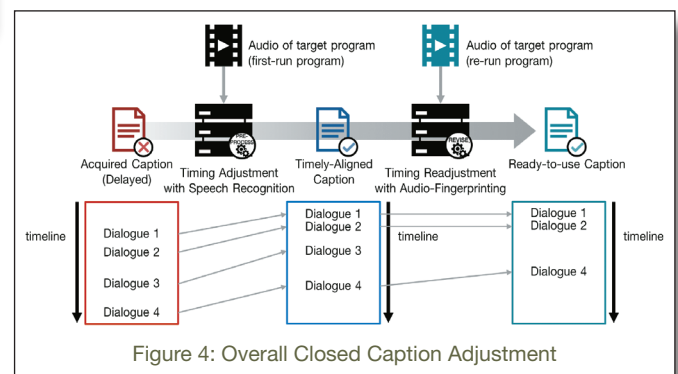


Figure 4: Overall Closed Caption Adjustment

Figure 4 shows the process of overall closed captioning timing adjustment. The figure assumes a situation that video cuts containing “dialogue3” are removed from the first-run programme due to video editing. By comparing audio-fingerprints of the first-run programme and the re-run programme, it finds positions of the edits, and reflects it to the timely-aligned captions so as to produce ready-to-use caption for the re-run programme.

3.3 Considerations on Reliability

Reliability is the most important thing that file-based closed captioning system should guarantee. Since the system is related to several broadcasting systems such as an APC system, a video archive, and a metadata management system, it should secure communication channels with those systems and handle irregular situations. Also, there is the involvement

of managers across the closed captioning process, so it should tolerate malfunctions caused by mistakes.

We developed a fail-over system and introduced retry policy to cope with various situations [5]. When there is a problem regarding caption readjustment, the system records it and retries after a specific period.

4. Trial Application

We applied our system in a real-world broadcast system in KBS (Korean Broadcasting System). Since our system aims to provide timely aligned closed captions for re-run programs without stenography, we applied the system during “Hiatus” period which has more re-run programme schedules than usual period. During the trial period (From 20th to 31st, June, 2015), 67 programmes out of 249 in a week were re-run programmes.

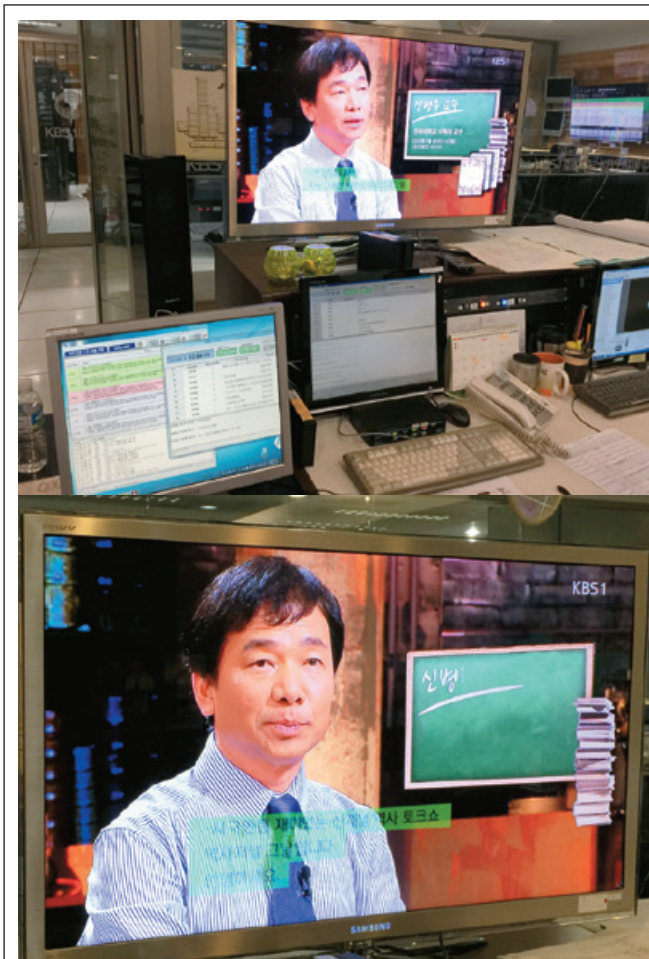


Figure 5: Application of Our System into a Master Control Room in KBS

Closed captions of re-run programmes are successfully adjusted, and are delivered through DTV except for a case that closed captions for the first-run is not available. This case happens because the first-run of the re-run programmes were broadcast before 2010, when storing captions as a file was started.

5. Summary and Future Work

In this paper, we introduced file-based closed captioning system without captioning delay for re-run programmes. The system depends on two technologies: speech recognition and audio-fingerprinting. Speech recognition is used for adjusting the timing of closed captions acquired by capturing stenography during the first-run broadcast. Audio-fingerprinting is utilised for finding video edits in the re-run programs, compared to the first-run. Closed captions are readjusted in accordance with those edits found, and are ready-to-use for captioning. The system communicates with several broadcasting systems, especially with an APC system. The APC system controls it based on the broadcast schedule, if there is a closed caption file that can be used for captioning.

As explained in Chapter 4, our system has been applied to the real-world broadcasting system, and shows good results. Even though it cannot be applied to the broadcast system immediately because of difficulty of handling breaking news which may be inserted suddenly during broadcasting re-run programs, we expect it to be used as soon as practicable, and gradually reduce the cost for stenography.

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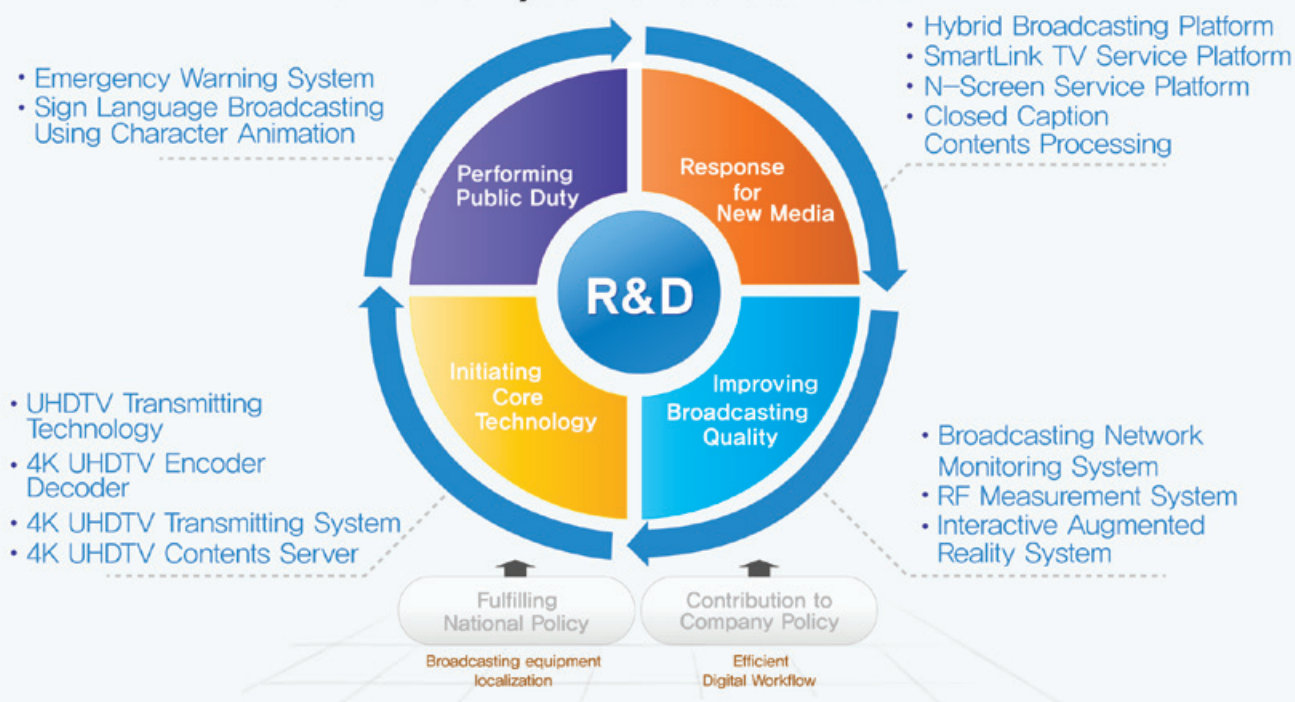


ByungHee Jung

Byunghee Jung is a deputy director of Smart Content Platform research team in BTRI (Broadcast Technical Research Institute). She received a Ph.D. and M.S. degree in electrical engineering and computer science from KAIST (Korea Advanced Institute of Science and Technology) in 2006 and 1996 respectively. Since she joined KBS in 1996, she has worked on IT/network-based production, online multimedia services, and multimedia analysis and retrieval. She has authored over 80 papers and articles about the interesting issues in her work. She is currently a co-project manager of the P/RTA Project of ABU and also a member of editorial committee of the journal of Korea Society of Broadcasting Engineers and HCI Korea Conference. Dr. Jung received a Best Article Award from ABU (Asia Broadcasting Union) in 2006.



“ We will show you the Future of KBS! ”



From Smart Cards to Multiscreen



What happens when content and audience connect is an everyday magic. More than 350 digital TV operators in over 85 countries rely on us to sustain that magic by protecting their content and revenue.

The unified content security head-end Conax Contego™ provides pay-TV operators with a future-proof and flexible platform to introduce new services. Conax Contego™ is a sophisticated, modular and fully scalable content security solution that supports any business model for any TV operation and a multitude of consumer devices; tablets, smartphones, CAM, PC/MAC and STBs, with or without smart cards. All consumer devices are pre-integrated and easily managed in the highly intuitive user interface in Conax Contego™.

At Conax we work hard to innovate so that consumers can experience everyday magic; on any device, anytime, anywhere. So let the magic begin!

securing content - sustaining magic

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Technical Committee Meeting

Opening Session

Welcome address by Mr Masakazu Iwaki, the Chairman of ABU Technical Committee

Mr Iwaki expressed appreciation for the attendance of members for the 2015 ABU Technical Committee meeting. He stated that the meeting would address various topics and give the member an opportunity to actively participate in the two-day meeting. Mr Iwaki also looked forward to the keynote presentation on 'How the EBU deals with Technology Challenges and Opportunities Public Broadcasters', to be delivered by Dr Egon Verharen.



Mr Masakazu Iwaki

Welcome address by Dr Zeki CIFTCI, the Deputy Director General, TRT-Turkey



Dr Zeki CIFTCI

Dr Zeki CIFTCI welcomed the guests to Istanbul, a city with a great historic and cultural heritage. TRT was established in 1964 and its first television broadcast was on 31 January 1968. To date TRT had 14 television channels and currently utilises 11 satellites, about 5,000 terrestrial transmitters and a cable network to broadcast county-wide and internationally. TRT started Hybrid TV and 4K test broadcasts in 2015. TRT undertakes research, planning, installation, operation and maintenance in broadcasting. Finally Dr Zeki expressed sincere appreciation to Dr Amal Punchihewa, Mr Masakazu Iwaki and colleagues from ABU Technology for their efforts in organising the General Assembly and Technical Committee Meeting in Turkey.

Address by Dr Javad Mottaghi, the Secretary-General, ABU

Dr Javad Mottaghi welcomed everyone to the Technical Committee meetings. He mentioned that the meetings would address a wide range of topics including Next Generation Broadcasting, Integrated Broadcast Broadband (IBB), Standards and Services. The deliberations would enable members to find their way in the rapidly advancing media industry. ABU Technology had been contributing to ABU members through in-country and regional workshops, seminars and digital broadcast symposia etc. in a remarkable way. The ABU membership had increased from 192 in 2010 to 281 in 2015. This was the result of new approach of the ABU to be more service-oriented, member-oriented and forward looking.



Dr Javad Mottaghi

Director's Report

Dr Amal Punchihewa, Director of ABU Technology

The Director's report covered ABU Technology activities from Nov 2014 to Oct 2015. It outlined key events and addressed the challenges faced by members.

Dr Amal Punchihewa also mentioned events support, new and regional activities, international cooperation, sponsors, ABU Engineering Award and lastly expressed a farewell to Kyaw, who returned to Yangon in March 2015

Bureau Proposals

Mr Masakazu Iwaki, Chairman of ABU Technical Committee

Mr Iwaki raised two recommendations.

1. Recommendation 1/2015 – Second Generation Emergency Warning Broadcasting System (EWBS 2.0)
2. Recommendation 2/2015 – Character Set for Digital Radio with Special Emphasis on Emergency Warning Broadcasting.

Technological Inspirations

The following topics were presented:-

Broadcasting Technologies Towards 2020 and Beyond – 'Evolution of Broadcast Media in Japan especially in 2016 8K Super Hi-Vision and 2030 Integral 3D television.

By Mr Tomohiro Saito, Executive Research Engineer, NHK Japan



Mr Tomohiro Saito



Mr Dae Hoon, CHOI



Dr Peter Siebert



Mr ZOU Feng

TVUT-KBS 2nd Screen Service Platform

By Mr Dae Hoon, CHOI, Research Engineer, Technical Research Institute, Korean Broadcasting System

Next Generation Broadcasting; Advances from DVB Perspective by Dr Peter Siebert, Executive Director, DVB

Introduction of China Digital Radio (CDR) System

Presenter ZOU Feng, President of the Academy of Broadcasting Science (ABS), SAPPRFT, China

Strategic Issues

The latest Development and Trends in Integrated Broadcast-Broadband (IBB) Technologies & Services and Standardisation Activities, NHK

Presented by: Mr Masaru Takechi, Senior Research Engineer, IBB Systems Research Division, NHK Science & Technology Research Lab, NHK-Japan



Mr Masaru Takechi

Mr Takechi explained that IBB systems were different from TV+Web. In IBB systems, there would be an application

life cycle providing synchronisation with the progress of a TV programme, giving an integrated experience to the viewer. He highlighted that Over-The-Top (OTT) services, delivered over the Internet, could be implemented in association with IBB services and would not take eyeballs away from the broadcast platform.

NHK Archiving System; Lessons for other Broadcasters

Presented by: Mr Nobu Yamashita, Senior Manager, NHK-Japan

Mr Yamashita started his presentation by sharing a video to show NHK's archiving initiatives. NHK had more than 600,000 hours of news and programmes on films and tapes. The new storage facilities would be capable of storing 1.2 million hours of footage and could be expandable. He shared that NHK was debating an image retrieval system to reduce time for searching content using various technologies such as "image recognition" and "Speech-To-Text." These only being possible with file-based systems.



Mr Nobu Yamashita

Spectrum Update – Where do we stand prior to WRC-15?

Presented by: Mr Peter MacAvock, Head of Media Delivery and Services, EBU



Mr Peter MacAvock

Mr MacAvock started the presentation by giving some background information on spectrum usage. He explained that the World Radio Conference (WRC) was held once every 4 years and this year, in particular, would be an important year for broadcasters with regards to spectrum allocation. Various administrations felt that broadband was needed to connect people, in particular, mobile Broadband connectivity in rural areas. Due to the scarce spectrum availability, administrations considered that broadcast spectrum should be given up for mobile BB. In Region 1, at least 224 MHz of spectrum was allocated for DTT as it was the predominant platform.

Dr Amal echoed Peter's recommendation and reiterated ABU's "no-change" position in WRC-15 on three aspects:

- 1) Of the 50 countries in the Asia Pacific region, 63% supported "no-change" mostly from region 3,
- 2) The ABU supports the EBU's efforts and continues to lobby for members to support "no-change",
- 3) To actively request members to continue to support "no-change"

Digital Broadcasting Transition and the ITU DSO Database

Presented by: Mr Istvan Bozsoki, Head of Spectrum and Broadcasting Division, Telecommunication Development Bureau (BDT), ITU

Mr Bozsoki spoke about activities and assistance for countries transitioning from analogue to digital terrestrial TV broadcasting, especially in the Asia-Pacific region. ITU began preparing



Mr Istvan Bozsoki

guidelines for countries planning to switch to digital terrestrial as early as 2008 and in African countries in 2010. He further shared that ITU provided a roadmap for countries, conducting workshops and finalisation of DTT plans, including frequency planning.

Media Landscape for Arab Region

Presented by: Dr Riyadh Kamal Najm, Media Expert, ABSU



Dr Riyadh Kamal Najm

Dr Riyadh shared the global media consumption statistics from GlobalWebIndex Report 2015, especially the comparison of traditional and online TV viewership, with most ASEAN countries making the top of the list.

Ultra HD – Is the Market Ready?

Presented by: Mr Markus Fritz, Director Commercial Development & Marketing, Eutelsat



Mr Markus Fritz

Mr Fritz presented the market overview of UHD and shared that there would be more than 800 UHD channels in the next 10 years with a forecast CAGR of about 50%, mainly driven by North America, followed by Asia. He added that the market of UHD content is expected to grow, especially with on demand content providers like Netflix joining the market and more to come in the OTT platform.

The Future of Digital Terrestrial Broadcasting in Turkey



Prof Dr Mehmet Kesim

Presented by: Prof Dr Mehmet Kesim, Open Education Faculty, Distance Education Department, Anadolu University, Turkey

Prof. Kesim shared that Turkey had adopted the DVB-T2 standard with HEVC video coding technology with 16 metropolitan cities planned as portable indoor and the rest as portable outdoor. He also shared that frequency spectrum usage of radio and TV services was regulated by RTUK.

DSO in Thailand

Presented by: Ms Supinya Klangnarong, Commissioner, NBTC Thailand



Ms Supinya Klangnarong

Ms Supinya informed that NBTC was an independent state regulatory body, responsible for radio frequency assignment and the regulation of broadcasting and telecommunication services. She gave a short introduction to Thailand's DTT services where DTT licences were given to 3 categories namely, Public Service, Community and Commercial. She added that efforts had also been put into providing a subsidy programme where coupons were given out to help all households to purchase digital Set-Top box or iDTVs worth THB 690.

At the end of the presentation, Dr Amal noted that Thailand was one of the ABU members that supported the "no change" proposal put forth to WRC-15.

Keynote Presentation

How the EBU deals with Technology Challenges and Opportunities for Public Broadcasters

Dr Egon Verharen, NPO (The Netherlands), Chair, EBU Technical Committee presented a thorough overview of the EBU Technical Committee's work programme and the new landscape of media in Europe, and especially in the Netherlands, where NPO is based. He talked about the challenges of creating content for ever larger living room screens whilst at the same time for small second screens. He also discussed the new players in the media space such as the likes of Netflix, telecom operators and consumer electronics manufacturers who are increasingly collaborating to control content production, aggregation and distribution. He also outlined some of the EBU groups that are dealing with the future challenges.



Dr Egon Verharen

Technology Debate: Future Media Delivery will be only on IP

The session was moderated by Dr Amal Punchihewa, Director ABU Technology.



Mr Ahmet Akin Kurucu



Ms Ruxandra Obreja



Mr Jorn Jensen

The debate team comprised Mr Masakazu Iwaki, NHK-Japan, TC Chairman, Mr Masaru Takechi, NHK-Japan, Mr Ahmet Akin Kurucu, TRT-Turkey, Ms Ruxandra Obreja, DRM, Dr Peter Siebert, DVB, Mr Jorn Jensen, World DAB, Mr Hamid Dehghan Nayeri, IRIB-Iran, Mr Peter Mac Avock, EBU

Dr Amal introduced the panel. He asked the audience about their home broadband and whether they subscribed to an OTT service. The result was that not too many had this. The debate concerned the move from traditional distribution to IP based delivery.

Hamid from IRIB said that new technologies come, but previous technologies remain too. So new platforms come with additional features, but many people were still happy with the existing TV features. So, traditional services would remain, but with increased quality, like HD, UHD, etc.

Jorn from NRK said that he had a few hats as past president of World DAB, and senior guy in NRK, the Norwegian PSB. NRK had 3 TV channels and 15 radio channels and all are available over IP. But broadcast remained important and really IP was a partner of broadcast delivery, providing new things, like on-demand content. This combination is called hybrid, and this gives the best of both worlds – control of costs for mass distribution, but also personalised access to offer more.

Amal asked who thought getting content via IP was free for the user. Only one person thought it was free.

Ruxandra asked how many had succeeded to connect to WiFi in the room. Not so many had.

The BBC has a global audience, radio, TV, online of 240m with 130m for radio. Interestingly, 90m are on short wave – so despite the hype about IP, many people still use very traditional media. And what about hybrid? It is definitely the popular word right now, and it offers a lot. But broadcasting, especially digital broadcasting, offers a lot too. We hear that IP is modern and broadcast is of the last century, but we need to be realistic about our audiences.

Peter MacAvock said that to serve our current audiences, broadcast was the best way to do it. So why were we debating IP? Well, many people had personal media devices, so things were changing. The EBU thought that secondary TV sets were disappearing from European homes, being replaced by tablets. And to reach those tablets we needed IP capability. Having broadcast radio in smartphones, etc, would be great, but hard to achieve.

Takechi-san said that we had discussed costs and capabilities of IP, but also we needed to look at the user experience. What were their expectations and how did we meet them? On a smartphone you needed an app, you needed updates, and you needed to tap to get the content. With a TV, you just switched on. Simple; the same as DVD rental vs online video. So in the IP world we needed to make it very simple for people to get the content they want. We needed to work out how to build our services, and then how to present them and offer them to our viewers.

Peter Siebert said that he represented an organisation that mainly developed and promoted broadcast platforms - cable, satellite and terrestrial, but also some IP. So there were two flavours - IP over DVB: often DVB-S2 carrying IP data; and DVB over IP: as IPTV standards. DVB members were of the opinion that Transport Stream was still the best way to send content, but ATSC in their version 3.0 had replaced TS with an IP only stack. In his personal opinion, this was not the most efficient way. Overall, broadcast was in almost 100% of homes, whereas even in the most developed markets, broadband was only at around 60%. There were many reasons: costs, capability to deal with computers and tablets, etc.

Amal said we needed to take advantage of this debate in deciding what we do in the future.

Iwaki-san summarised the panel discussion, concentrating on applying the debate to the ABU region, with all its diversity. Keeping the broadcast brand was very important: young people first chose the application, then the content i.e. Netflix, or YouTube, or whatever. But TV audiences chose the brand directly. We needed to keep our brands to keep our support amongst the public. Over IP, we did not have direct connection to our audiences, so we could be pushed out. So a very important conclusion was that we needed to keep our spectrum in order to keep our brand.

Production Mrs Hanife Sayilir, TRT-Turkey, Transmission Dr Narichika



Mrs Hanife Sayilir



Dr Narichika Hamaguchi

Mr Tharaka Mohotty

Mrs Zhu Yunyi

Hamaguchi, NHK-Japan, Training & Services Mr Tharaka Mohotty, MTV-Sri Lanka and Spectrum Mrs Zhu Yunyi, RTPRC-China presented a Summary from Topic Area

The following speakers presented what is New in Study Groups

1. Spectrum – WRC-15 to WRC-19 – Mrs Zhu Yunyi, RTPRC-China and Dr Narichika Hamaguchi, NHK-Japan
2. API – Mr Masaru Takechi, NHK-Japan
3. HDR – Dr Narichika Hamaguchi, NHK-Japan
4. EWS – Features for Future EWS – Dr Peter Siebert, DVB

The Host Presents: TRT-Turkey

This special topic was moderated by Mrs. Hanife Sayilir, the Chief Engineer from Studio Planning Department of TRT. Four topics were presented by the following TRT representatives as per the following summary:-



Mr Turkey Okan Salman

Mr Ozgur Cosar

Mr Ruhi TAŞ

- (i) Digital Archives: Outgest and Ingest Methods
Presented by Mr Turkey Okan Salman, Senior Engineer of Archiving Department in TRT
- (ii) EWS Studies
Presented by Mr Ozgur Cosar, Chief Engineer of TRT R&D Department
- (iii) Hybrid TV
Presented by Mr Ruhi TAŞ, Manager, Information Technologies Department of TRT
- (iv) Audio Description
Presented by Mr Ahmet Akin Kurucu, Chief Engineer in Studio Planning Department of TRT

New Recommendations & Decisions

The following recommendations were approved:

- Recommendation 1: Second Generation Emergency Broadcasting System (EWBS 2.0)
- Recommendation 2: Character Set for Digital Radio with Special Emphasis on Emergency Broadcasting

New in Study Group

(i) Character Set for Digital Radio

Presented by Mr Lindsay Cornell, BBC.

Mr Cornell first introduced the concept of Digital Radio. He then stressed the importance of knowing the essential and common characters to be displayed in order to minimise the cost of character display. Defining the EBU Latin based character set, he indicated that it was important to identify the gaps and requirement of new characters and additional languages. He concluded the presentation by illustrating issues from other regions.



Mr Lindsay Cornell

(ii) Update on EWS and Character Set for Digital Radio ABU Survey

Presented by Mr Ahmed Nadeem, Head of Studio Technology and Training

Mr Nadeem presented the survey results on requirements for a Second Generation EWBS and Character Set for Digital Radio. He extracted some of the survey questions and illustrated with charts. He also summarised other recommendations and suggestions. He concluded the presentation with the need to continue the survey and determine how to move forward.

(iii) Updates in Digital Broadcasting: Receivers for DRM Digital Radio

Presented by Ms Ruxandra Obreja, Chair of DRM.

Ms Obreja first gave a brief introduction of DRM organisation. She then introduced various features of DRM such as the efficiencies offered to the listeners and the EWB. She also quoted the differences between AM/FM and DRM in terms of features of EWB as well as demonstrated how EWBS worked.

(iv) DAB Update

Presented by Mr Jorn Erik Jensen, representative from WorldDAB.

Mr Jensen first introduced DAB members with geographical coverage in AsiaPac, Middle East, South Africa and Europe. He mentioned some recent development such as FM switch-off in Norway in 2017. Summarising benefits for listeners, he shared market statistics on the sales of DAB Radio Receivers and receivers' readiness in mobile phone and new cars.

Useful to know:

This session was moderated by the Vice Chairman, Mr Tharaka Gajaba Mohotty.

1. New members

Mr Mohotty announced the new members who had joined since 2014 and expressed his warm welcome.

2. Sister Unions & International Organisations

Mr Mohotty called upon the representatives from each organisation to have a brief talk.

(i) EBU

Mr Peter MacAvock presented a short video demonstrating how DVB Satellite link works and how the content has been shifted from mobile phone to TV using the example of hybrid TV.

(ii) DRM

Mr Alexander Zink from DRM stressed the importance of creating minimum receiver requirement and the building up of the database for transmission signal for manufacturers and broadcasters.



Mr Alexander Zink

(iii) AIBD

Mr Rabi K C introduced the AIBD and the difference between the activities conducted by AIBD and ABU. He also mentioned the joint workshop events to be held with ABU. Finally he mentioned some of the upcoming activities and the Asia Media Summit 2015.



Mr Rabi K C

(iv) ITU

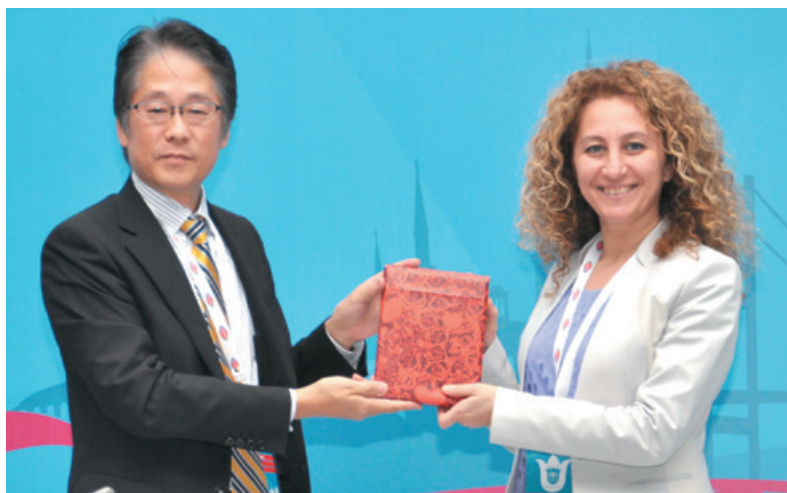
Mr Istvan Bozsoki mentioned the role of ITU in maintaining close connection to the Region. He particularly recommended various ITU documents on guidelines, case studies and spectrum issues which are country specific.



The ABU Technology Department thanks Mr Yuen Man of TVB-Hong Kong, Mr Calvin Lim of MDA-Singapore, Mr Lindsay Cornell of the BBC-UK and Mr C W Leung of RTHK-Hong Kong for their contributions as rapporteurs of the TC meeting.

Appointment of

TC Honorary Vice Chairman 2016 and Record of Thanks



Mr Sunarya Ruslan, Chairman of the Supervisory Board of Radio Republik Indonesia and member of the ABU Technical Bureau, was appointed the Honorary Vice-Chairman for 2016. Mr Sunarya thanked and addressed the Committee in welcoming all members to Jakarta for the 2016 meeting.

The TC Chairman, Mr Masakazu Iwaki, thanked Ms Kiyem Erdal, the 2015 Honorary Vice-Chairman, for her excellent work in ensuring the smooth running of the 2015 Technical Committee Meeting.

Mr Iwaki then presented a token of appreciation to Ms Erdal.

Technical Bureau Meeting



The annual Technical Bureau meeting was held a day before the Technical Committee meetings. The proposed ABU Digital Strategy was discussed extensively by the Bureau members.

The recommendations proposed to the Technical Committee were:

Recommendation 1/2015

Second Generation Emergency Warning Broadcasting System (EWBS 2.0)

Recommendation 2/2015

Character Set for Digital Radio with Special Emphasis on Emergency Warning Broadcasting





Progress, collaboration and growth

WORLD
DAB
Digital Audio Broadcasting

DAB+ digital radio is progressing around the world.

- DAB+ is well established in Australia
- The Asia Pacific, Arab States and South Africa have started trials
- In Europe:
 - Norway leads with Digital Switchover in 2017
 - Switzerland planning Digital Switchover in 2020-24
 - Solid progress in Germany
 - Early steps in Poland
- Over 400 DAB+ receivers available
- More than 30 car manufacturers are fitting DAB+



405 million
people covered by DAB/DAB+

1,620
DAB services
on air worldwide



DAB/DAB+ coverage near
FM footprint – reaching
99%
of the population in some markets

 **Australia:** DAB+ launched July 2009

 **Hong Kong:** DAB+ launch 2011

 **Malaysia:** DAB+ trials on air

 **S Korea:** interest in DAB+

 **China:** DAB in Beijing & Shanghai

 **Indonesia:** DAB+ trials on air

 **NZ:** DAB+ trial on air Auckland

 **Thailand:** DAB+ trial 2016

 **Vietnam:** DAB+ trial 2013

In Asia Pacific, 40% of Australians in major capital cities have access to a DAB digital radio. DAB+ launched in Hong Kong in 2011 and several markets, including Thailand, Malaysia, Indonesia and Vietnam are now planning for DAB+.

From trial to switchover, WorldDAB can support the transition from analogue to digital radio. Contact us for assistance with:

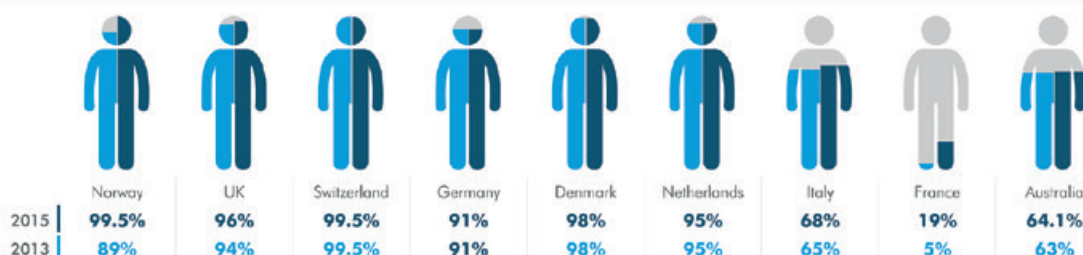
- Workshops
- On-air demonstrations
- Technical expertise
- Regulation & licencing
- Network design and roll-out
- Content production
- Receivers

e: projectoffice@worldddab.org

t: +44 (0) 207 010 0740



Total DAB/DAB+ network coverage in advanced digital markets (% of population) 2013 vs 2015



Sources: Digitalradio Norge (Norway), Digital Radio UK (UK), MCDT (Switzerland), WDR (Germany), Teracom (Denmark), Digital Radio NL (Netherlands), digitalradio.it (Italy), TDF (France), Commercial Radio Australia (Australia)

ABU Engineering & Technical Awards 2015



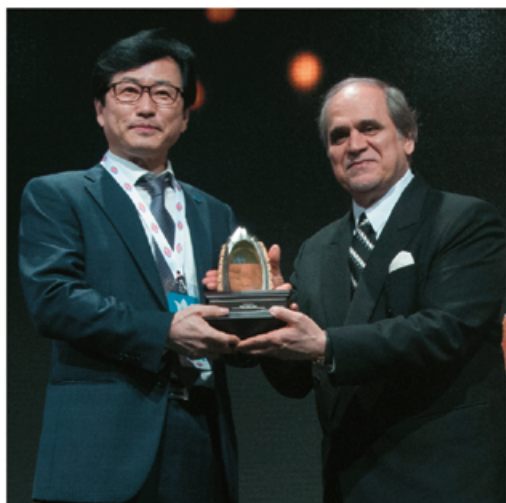
Dr Javad Mottaghi, ABU Secretary-General, presenting the award to Ms Lim Soh Kwang of RTB-Brunei.



The winner of the 2015 **ABU Developing Broadcasters' Excellence Award** was Ms Lim Soh Kwang, Superintendent Engineer (Head of Technical Services) of Radio Television Brunei.

Ms Lim Soh Kwang of Radio Television Brunei won the ABU Developing Broadcasters' Excellence Award for her outstanding role in setting up a digital archiving media asset management system.

Ms Lim established a dedicated archive section and played a major role in digital migration initiatives, as well as initiating and managing other major engineering projects.



Dr Javad Mottaghi, ABU Secretary-General, presenting the award to Mr Seok Doo, KIM of KBS-Korea.

The winner of the 2015 **ABU Broadcast Engineering Excellence Award** was Mr Seok Doo, KIM, Executive Managing Director, Technology, Korean Broadcasting System.

Mr Seok Doo, KIM won the ABU Broadcast Engineering Excellence Award 2015 for strengthening the terrestrial broadcasting platform and for his contributions to next generation broadcasting development. Among other achievements, Mr KIM established the KBS Broadcasting Equipment Certification Center, constructed a file-based radio production/transmission system, and developed a real-time TV participation service. Mr KIM also carried out the world's first terrestrial 4K UHD live broadcasting.



Mr Masakazu Iwaki of NHK-Japan and ABU Technical Committee Chairman, presenting the award to Mr Zou Feng of the Academy of Broadcasting Science, People's Republic of China.

The winner of the 2015 **ABU Engineering Industry Excellence Award** was Mr Zou Feng, President of the Academy of Broadcasting Science, People's Republic of China.

Mr Zou Feng of the Academy of Broadcasting Science, SAPPRFT-China, won the ABU Engineering Industry Excellence Award 2015 for his outstanding contributions to both the Chinese digital radio industry and terrestrial digital television. Mr Zou Feng has led the research and rollout of the China Digital Radio (CDR) system since 2007. He was also involved in the research work on testing, coverage and frequency planning of the terrestrial digital TV.

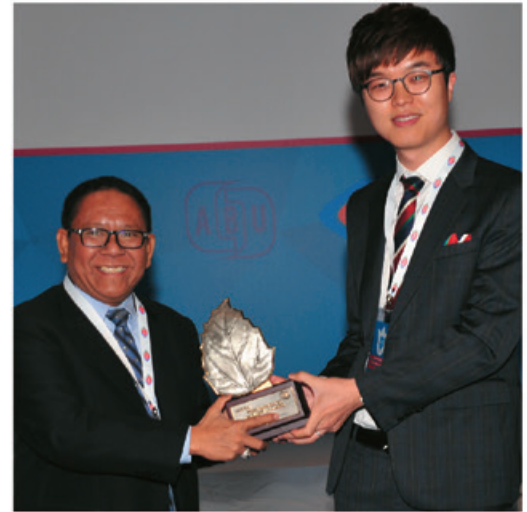


The 2015 winner of the **ABU Green Broadcast Engineering Award** was Radio Republik Indonesia.

Radio Republik Indonesia won the ABU Green Broadcast Engineering Award 2015 for using simple, low-cost technology in launching RRIPlay, an ICT product application. RRIPlay uses an IP VPN network that already existed, along with the existing computer in the studio and facilities that have long been used for RRI's network infrastructure.



The **ABU Green Broadcast Engineering Award** is sponsored by KOBA.



Mr Doohyung Kang of KBS-Korea and representing the KOBA, the sponsor of the award, presenting the award to Mr Mohammad



Ms Kiymet Erdal of TRT-Turkey and ABU Honorary Vice Chairman presenting the award to Mr S C Panda, of DD-India who accepted the award on behalf of the author, Mr M S Duhan.

The winner of the **Best Article Award** for 2015 is Doordarshan-India for the article titled Experiences of Evolution of Digital Terrestrial Television in India authored by Mr M S Duhan.



The **First Commended Article Prize** has been awarded to Korean Broadcasting System for the article titled Real-time 3D Sign Language Avatar Animation from DTV Closed Captions authored by Mr Juhyun Oh, Mr Byungsun Kim, Mr Kisung Yang and Mr Sungchoon Park.



Juhyun Oh



Byungsun Kim



Kisung Park



Sungchoon Park



Mr Hamid Dehghan Nayeri of IRIB-Iran and ABU Technical Committee Vice-Chairman presented the certificates for both the First and Second Commended Article prizes to Mr Dae Hoon, Choi of KBS-Korea who accepted on behalf of

The **Second Commended Article Prize** has been awarded to Korean Broadcasting System for the article titled Terrestrial 4K UHD Live Broadcasting of Sports Events authored by Mr Injoon Cho, Mr Byungsun Kim, Mr Sangjin Hahm, Mr Sanghun Kim and Mr Sungho Jeon.



Injoon Cho



Byungsoon Kim



Sangjin Hahm

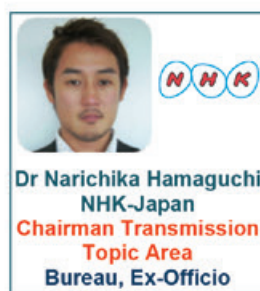
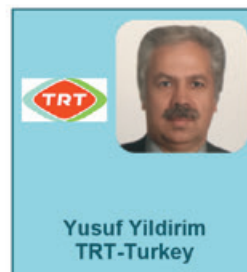
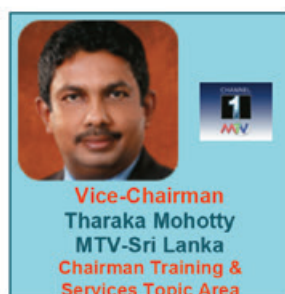
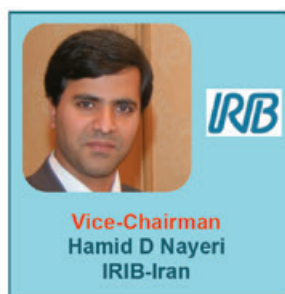


Sanghun Kim



Sungho Jeon

ABU TECHNICAL BUREAU 2014/2016



ABU DIGITAL BROADCASTING SYMPOSIUM 2016

INNOVATING DIGITAL CONNECTIONS

29 February-3 March 2016, Hotel Istana Kuala Lumpur

The Symposium provides a **platform to share expertise and experiences,** network with like-minded colleagues, showcase and

embrace advancing technologies and today's content approach. The event provides international and regional exposure to our members and industry partners.



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EXHIBITION



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To join the exhibition and for sponsorship opportunities kindly contact: dbs@abu.org.my

The ABU's Digital Broadcasting Symposium 2016 – Join the Experience from 29 February



The next Digital Broadcasting Symposium (DBS2016) will take place from the 29th of February to the 3rd of March 2016 at the Istana Hotel in Kuala Lumpur.

The symposium aims to stimulate thinking among delegates, on business and technology strategies that will safeguard and grow radio and television services in this highly competitive connected era. It will provide a platform to share expertise and experience, to network with like-minded colleagues, to showcase and embrace advancing technologies and today's approach to content. The iconic ABU DBS event provides international and regional exposure to our members and industry partners.



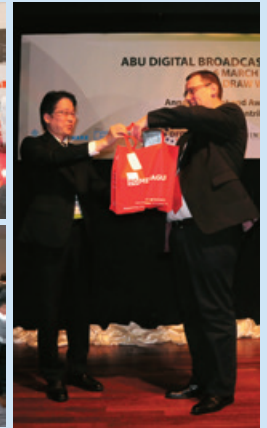
With the theme *"Innovating Digital Connections"*, DBS2016 will reveal how the integration of media and communication technologies is helping to bring further innovation, improve efficiency, increase reach, create new revenue streams and drive development of creative content; bringing more choice for the audience and benefits to the industry as a whole.

This is the 12th digital broadcasting symposium organised by the ABU, an annual event that has gained a prominent position in the industry calendar. This is a composite event, with an industry exhibition, international conference and

focussed workshops that attract broadcasters and media professionals from around the world.

The DBS2016 programme is set to address:

- Multiplatform delivery of radio and TV content in the future
- Integrated media and communication environment
- Content delivery networks and services
- Immersive audio and video experiences
- Maturing delivery platforms like OTT
- Effective interaction and second screen experience through IBB technology
- Workflow efficiency through cloud-based systems
- Digitalisation of audio video archives



These are just some of the many topics the DBS will explore.

The ABU DBS symposiums facilitate learning, gathering of information and sharing experiences through conferences, workshops and exhibitions. The conference sessions introduce new and advanced technologies, share experiences, discuss how the industry is developing and look at what's new on the horizon. The workshops provide the chance to learn and understand more about the application and implementation of new technologies through practical examples and user case scenarios presented by experts. The industry exhibition, showcasing technologies and solutions by major industry players, offers the opportunity to see and work with new equipment, explore the new features and the chance to discuss with the manufacturers and solution providers on the visitors' specific requirements. Whether it be new technologies or enhancing and improving the application of older technology, the DBS definitely provides the necessary information and guidance to reach the desired solution.

For further information and to join the symposium please visit www.abu.org.my/dbsymposium or contact us by email at dbs@abu.org.my



All India Radio Hybrid TV – Broadcast and Broadband Together

abstract

Hybrid TV or Hybrid Broadcast Broadband TV (HbbTV) provides high quality linear TV and a best effort on-demand TV experience. This combines the advantages of broadband, for delivering individual choice of on-demand content, with the efficiency of broadcasting for homogeneous, live, quality TV, available simultaneously to a large audience. This new ecosystem benefits broadcasters, TV platforms, telecom operators and consumer electronics manufacturers.

This paper presents a brief account of HbbTV; explaining the various advantages it offers, system overview, technical concept and the working of hybrid terminal & other supported services.



by Meenakshi Singhvi
Deputy Director (Engg.),
All India Radio, Vadodara

Introduction

There has been continuous progress in traditional linear TV broadcast services in recent years. The boom in HD channels is constantly improving the quality of TV services, and Ultra High Definition Television is the next milestone in this market. However, another important development throughout the world in recent years, is the exponential, large scale growth of non-linear, on demand media services.

Now the fundamental issue that broadcasters are facing is how to deliver the full range of their services, both linear and non-linear, to the shared environment as well as to the personal environment. Access to non-linear services requires a return channel for interactivity. Truly non-linear services have already been introduced on broadband networks to be received on PCs, tablet computers and mobile phones.

Hence, the need for intuitive and unified interfaces has become vital to deal with this abundance of content from different sources and consumed through different networks and devices. Commonly required functionalities need to be embedded in one unique, user friendly, device interface.

The foregoing has led to the development of hybrid broadcast-broadband TV, which combines entertainment delivered via broadcast and broadband to consumers on a single flat-panel screen using connected TVs and set-top boxes.

What is HbbTV

HbbTV allows access to both broadcast digital content and internet multimedia content (including internet Live TV and Catch up TV) through one interface. It combines

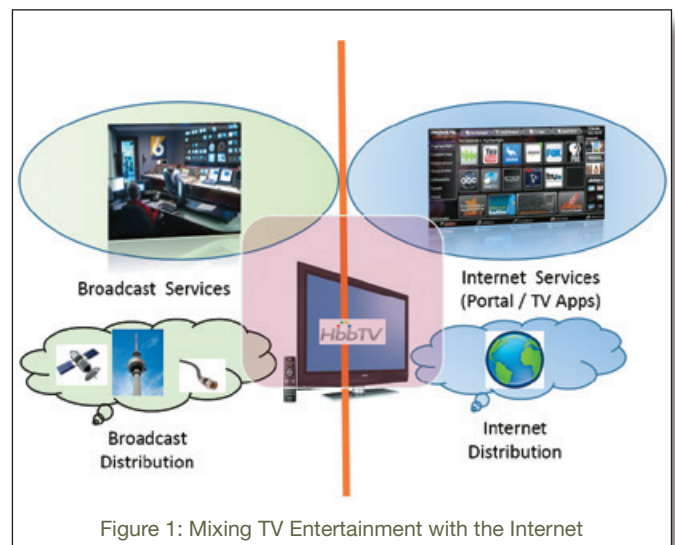


Figure 1: Mixing TV Entertainment with the Internet

a consumer's broadband connection with existing free-to-air broadcasts over a compatible STB or television set to provide targeted advertising, social networking opportunities and VOD capabilities. The Hybrid broadcast broadband TV specification improves the video user experience by enabling interactive services such as catch-up TV, video on demand, interactive advertising, personalisation, voting, games and social networking, as well as programme-related services such as digital text and electronic programme guides.

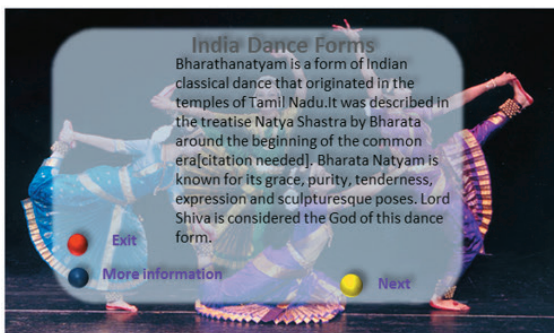
HbbTV enhances viewing experience, by providing a new world of information. We can access additional information about a programme we are watching, or can actively participate in the programme. When turning on or switching programmes, a brief fade-in informs us that such additional information is available via the red button function.



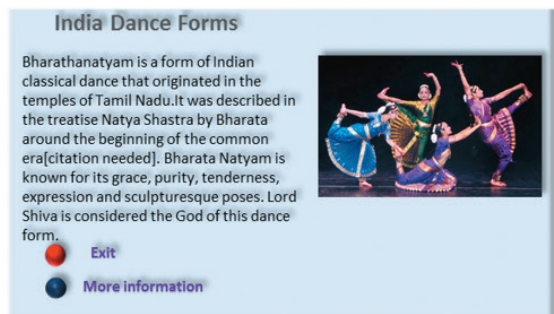
Conventional TV



TV with visual prompt of information -Red Button



TV with information overlaid



Information with video audio or Picture inset



Just Information (without A/V)

Figure 5: Typical range of programme types perceived by end users

Data comes in from the internet via the Broadband Interface. This is Non-Linear A/V Content (Content on demand), Application Data and the AIT Data. The *Internet Protocol Processing* processes all this data. Then the AIT Data is sent to the Application Manager, the Application Data is sent to the Runtime Environment and the Non-Linear A/V Content is sent to the Media Player.

The Runtime Environment consists of the Application Manager and Browser. The browser is used for showing all the applications to the user.

Three different types of HbbTV applications can be distinguished. The red button on a remote control is used as a means of accessing interactive services from a television channel.

- I. Broadcast-independent (access via an app portal/data delivered via Internet)
- II. Broadcast-related application over broadcast (access bound to TV service/ data delivered via broadcast)
- III. Broadcast-related application from Internet (access bound to TV service/ data delivered via Internet)

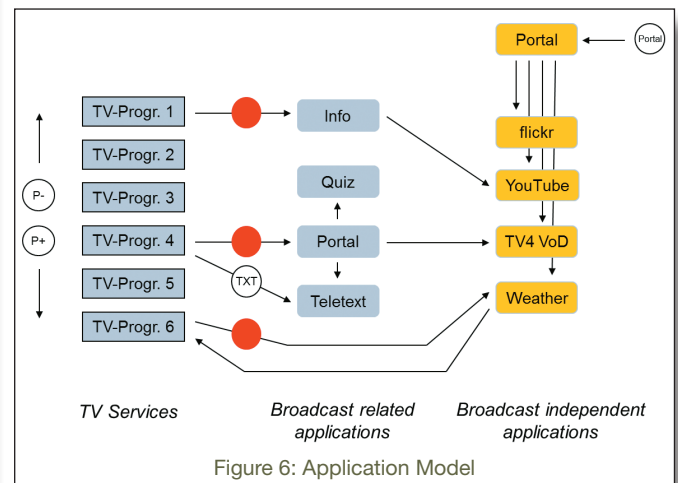


Figure 6: Application Model

Supported Services

HbbTV gives the broadcasters and programme producers a lot of options to create extra and interactive content for their broadcasts. Sport matches can be provided with extra statistics, talk shows can get extra video content and games can get an interactive element.

HbbTV provides many services like Video on Demand, Catch Up, Start Over, Games etc. Information services like News, Weather, Sport, eGovernment, and EPG are also being provided. Many commercial services like Advertising, T-Shopping, TV portal are also popular.

Conclusion

The momentum and enthusiasm for HbbTV is growing very fast. Know-how related to HTML and JavaScript is widely and readily available and can easily be employed for the development of HbbTV applications. Existing online services can readily be adapted to the TV screen.



HbbTV provides an exceptional viewing experience that connects the desires of broadcasters, manufacturers and service providers. It offers the chance for viewers to move between a mass audience programming and personalised experience without having to leave the comfort of their living room. As new features and services continue to push the boundaries of TV innovation, interest will grow and HbbTV will soon become a global standard.

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Ms Meenakshi Singhvi received her Engineering degree (with Honours) in Electronics & communications from MBM Engineering College of Jodhpur, India in 1997. She one of the 1997 batch IB(E)S Officer, who joined All India Radio in the year 1999 and she is presently working as Deputy Director (Engg) at AIR, Vadodara. She has worked at various FM and MW installations and has professional experience of 16 years in the field of broadcasting. Ms Singhvi was awarded the Akashvani Annual Award in Technical Excellence for “Tuning of FM combiners” and the BES award for best technical innovation in “Audio Noise Reduction Techniques”. She has written various articles which have been published in National and International magazines. She is also a council member of Broadcast Engineering Society, New Delhi and member of the editorial board of the BES Review, broadcast publication.



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The Latest News

from EBU Technology & Innovation

by **Shannon Frame**

Technical Editions Manager (EBU)

Broadcasters play a much wider role in fostering communities than ever before. As media technologies continue to develop and new applications become popular, audiences expect broadcasters to provide their content on a multitude of different platforms and devices. Being able to access the content with “no strings attached” or using a single sign on is a must.

This year’s EBU Developers’ Conference (DevCon) encouraged delegates to look at how they can apply the open source ethos in their organizations. Taking a closer look at cross-platform authentication, personalization and how to build amazing reactive interfaces, delegates had the unique opportunity to learn more about how to face the complex world of multiple platforms, devices and an increasingly global workforce.

In the lead up to the ITU’s World Radiocommunication Conference (WRC-15), high level delegates gathered at this year’s EBU Forecast event to discuss the challenges and opportunities that broadcasters face. After several weeks of debate, the European Broadcasting Union (EBU) welcomed the landmark decision by the ITU’s World Radiocommunication Conference (WRC-15) on the use of the UHF band.

Representatives of over 150 governments took the decision that UHF spectrum will remain exclusively allocated to terrestrial TV services in ITU “Region 1”* well into the next decade. Delegates reached this conclusion after deliberations over whether the lower UHF frequency band



(470-694 MHz) should be retained for broadcasting only or also allocated to mobile broadband.

Our Members have also been busy. The first of a two-part series, focusing on the Dutch Public Broadcaster NPO’s signing avatar is featured in the latest tech-i magazine. The Norwegian Broadcasting Corporation’s (NRK) Orgio Project is also highlighted as well as many other key topics.

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Digital Terrestrial Television in Thailand: Technical Aspects

by Supatrasit Suansook

Senior Engineer, Office of the National Broadcasting and Telecommunications Commission



Introduction

In Thailand, the National Broadcasting and Telecommunications Commission (NBTC) is playing an important role in promoting and implementing the transition from analogue to digital terrestrial television. In 2012, the transition roadmap was developed and DVB-T2 was selected as a national standard for digital terrestrial television (DTT). The technical specifications for DTT transmission, DTT receivers, as well as the first frequency plan were then developed. In 2013, NBTC and broadcasters conducted a field trial for DTT in Bangkok area to fine tune a suitable parameter set - a key driver to the new frequency plan, aiming for a coverage target as stipulated in the roadmap. Since then, NBTC has been reviewing and updating relevant technical specifications and the frequency plan, as well as developing DTT technical guidelines.

Key Technologies and Technical Parameters for DVB-T2

The key technologies and requirements for digital terrestrial television are as follows;

Table 1:

Key technologies and requirements for DTT in Thailand

Items	Specifications/Requirements
DTTB Transmission	DVB-T2
Resolution	SD and HD - SD – Standard Definition (576i) - HD – High Definition (1080i or 720p)
Video Compression	MPEG-4 AVC/H.264 (supports subtitling system)
Audio Compression	MPEG-4 HE AACv2 Stereo is minimum requirement
Conditional Access	No conditional access (free-to-air)
Number of Multiplexes	6
Number of Programmes	48

In 2013, a field trial was conducted in Bangkok Metropolitan Area to determine a suitable parameter set. The parameter set was selected considering a trade-off between signal robustness and available bitrates.

- Robustness: ability to plan a network to meet the coverage requirement of 95% households with fixed rooftop reception, plus portable indoor reception in major municipalities.

- Bitrates: ability to deliver 48 digital TV programmes (at least 10 HD programmes and 38 SD programmes) with 6 multiplexes.

Table 2 shows the DVB-T2 parameter set for Thailand. This parameter set is mandatory for network operators because the parameters provide certain characteristics, critical to frequency planning.

Table 2:

DVB-T2 parameter set for Thailand (Mandatory)

Parameters	Values
FFT size	16k extended
Guard Interval	19/128
Modulation	64-QAM
Code rate	3/5

The above parameter set can provide approximately 22 Mbps/multiplex, therefore, NBTC developed four possible options for multiplex composition:

- Option 1: 12 SD services (available for the multiplex for community services only)
- Option 2: 1 HD and 9 SD services
- Option 3: 2 HD and 6 SD services (being used in 4 multiplexes)
- Option 4: 3 HD and 3 SD services (being used in 1 multiplex)

Capacity Management

In 2014-2015, the NBTC established a working group to develop technical guidelines for digital terrestrial television. In addition to the mandatory parameter set, these technical guidelines provide recommendations to network operators to use certain parameters and to manage the multiplex capacity in accordance with the chosen multiplex option, as shown in Figure 1 and Table 3.

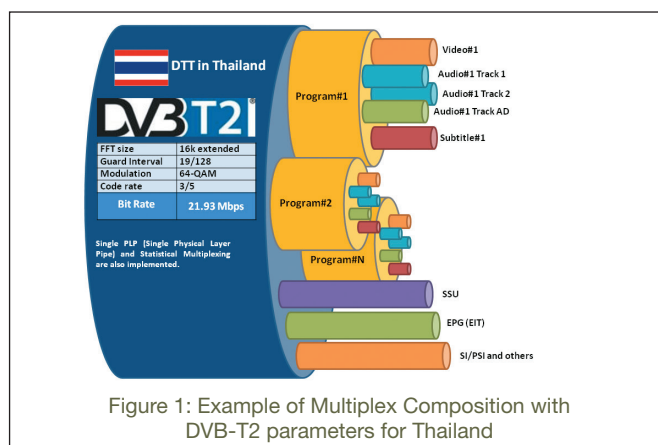


Figure 1: Example of Multiplex Composition with DVB-T2 parameters for Thailand

Table 3:
Recommended Parameters and Multiplex Capacity Management

DVB-T2 Parameters: 16k ext., GI 19/128, PP2, 64-QAM, CR 3/5, L1Post:QPSK Time Interleave Depth = 81.71 ms.	Total Bit Rate 21.930 Mbps			
ITEMS	Option 1	Option 2	Option 3	Option 4
Number of HD Channels	0	1	2	3
Number of SD Channels	12	9	6	3
TOTAL CHANNELS	12	10	8	6
BIT RATE	(kbps)			
Video Bit Rate (Pool Bit Rate with Statistical Multiplexing) • SD Bit Rate (min-max) = 0.75-2.5 Mbps • HD Bit Rate (min-max) = 2-7 Mbps	18400	18700	19000	19000
Audio Bit Rate (70 kbps per one stereo, 2 tracks per channel)	1680	1400	1120	840
Audio Description (35 kbps per one stereo, 1 track per channel)	420	350	280	210
Subtitles (100 kbps per channel)	1200	1000	800	600
SI (EIT) or EPG	300	300	300	300
SI (PMT) (25.75 kbps per channel)	309	257.5	206	154.5
SI (others) = 64 kbps	64	64	64	64
TOTAL PAYLOAD	22373	22071.5	21770	21168.5
Reserved for SSU and others	-443*	-141.5*	160	761.5

* The negative values imply that it is not feasible to provide all supplementary services (i.e. audio description, subtitle, SSU) at the same time.

Current TV Programmes and Multiplex Loading

The auction for commercial TV programmes took place in December 2013 and licenses were given to 24 commercial TV programmes (7 HD programmes and 17 SD programmes). In addition, 3 public TV programmes were permitted to be broadcast in HD format during the simulcast period. In 2015, NBTC granted one additional license to 1 public TV programme (Parliament TV). Nowadays, Thailand has 28 digital TV programmes (10 HD programmes and 18 SD programmes) transmitted by 5 multiplexes. The relationship between TV programmes and current multiplex loading is shown in Figure 2.

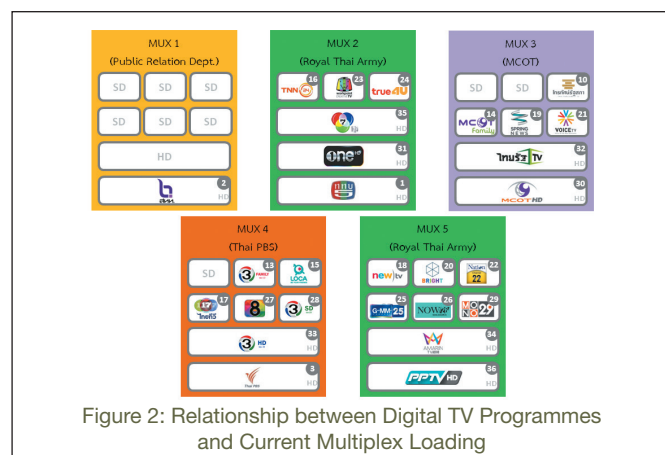


Figure 2: Relationship between Digital TV Programmes and Current Multiplex Loading

Frequency Planning

NBTC collaborated with the International Telecommunications Union (ITU) to conduct a frequency plan for DTT. This project completed the detailed planning for 39 main sites and 132 additional sites in February 2014 and February 2015, respectively. The third edition of the DTT frequency plan was officially published in August 2015. The summary of the DTT frequency plan is shown in Table 4 below:

Table 4:
Summary of DTT Frequency Plan for Thailand

No	Items	Description
1	Frequency range	510 – 790 MHz
2	Channel bandwidth	8 MHz (CH26-60)
3	Number of multiplexes	• 5 multiplexes before Analogue Switch-Off • 6 multiplexes after Analogue Switch-Off • The 6th Multiplex is reserved for community TV
4	Number of service areas	39 service areas
5	Number of planned sites	39 main sites and 132 additional sites
6	Coverage target	95% of households (fixed rooftop reception)

NBTC and ITU categorise the station type into 4 types (M, A1, A2, and A3). The description of each type and the coverage of DTT in Thailand are shown in Figure 3.

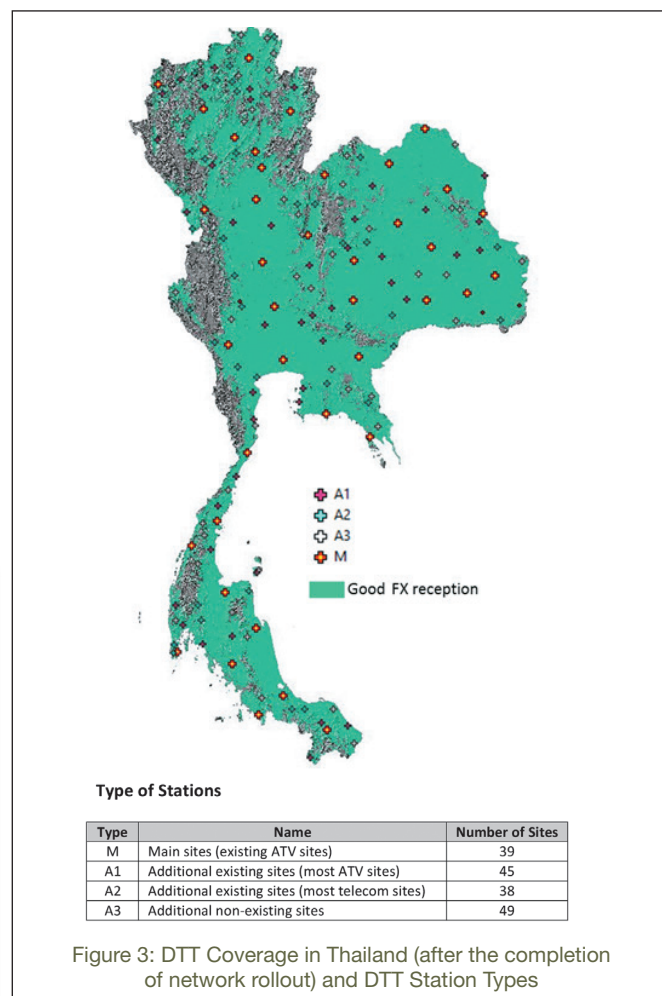


Figure 3: DTT Coverage in Thailand (after the completion of network rollout) and DTT Station Types

According to license conditions, the network operators will implement their networks to reach 95% of households within four years. The network deployment schedule was jointly developed by NBTC and network operators. The deployment schedule is shown in Table 5.

Table 5:
DTT Network Deployment Schedule and Current Status

Phase	Duration	Rollout Obligation	Rollout Plan	Status**
1	April 2014 – June 2014	50% Households	11 M sites and 1 A1 site	Completed
2	June 2014 – June 2015	80% Households	+28 M sites and 7 A1 sites	Completed
3	June 2015 – June 2016	90% Households	+37 A1 sites	Ongoing
4	June 2016 – June 2017	95% Households	+38 A2 sites and 49 A3 sites	Reviewing

**As of December 2015.

Conclusion

NBTC has completed several sets of technical regulations and recommendations to ensure the reliability and the performance of the DTT network. Currently, the DTT coverage is able to reach approximately 80% of households, delivering 28 digital TV programmes. In 2017, NBTC expects to have the DTT network covering up to 95% households and delivering 48 digital TV programmes.

In addition to the technical parameters and capacity/frequency planning, NBTC has recently launched a DTT coverage checking application, based on the result of frequency planning, in 3 platforms; Android OS, iOS, and web-based (please visit: <http://dtvservicearea.nbtc.go.th>). NBTC also developed an EPG server to facilitate both service providers and network operators in order to prepare centralised EPG information, which can be used for cross-carried EPG. Progress is being made and development is ongoing in the hope that this will lead to improved technical regulations and guidelines for the industry and to benefits for Thai viewers.

author

Supatrasit Suansook

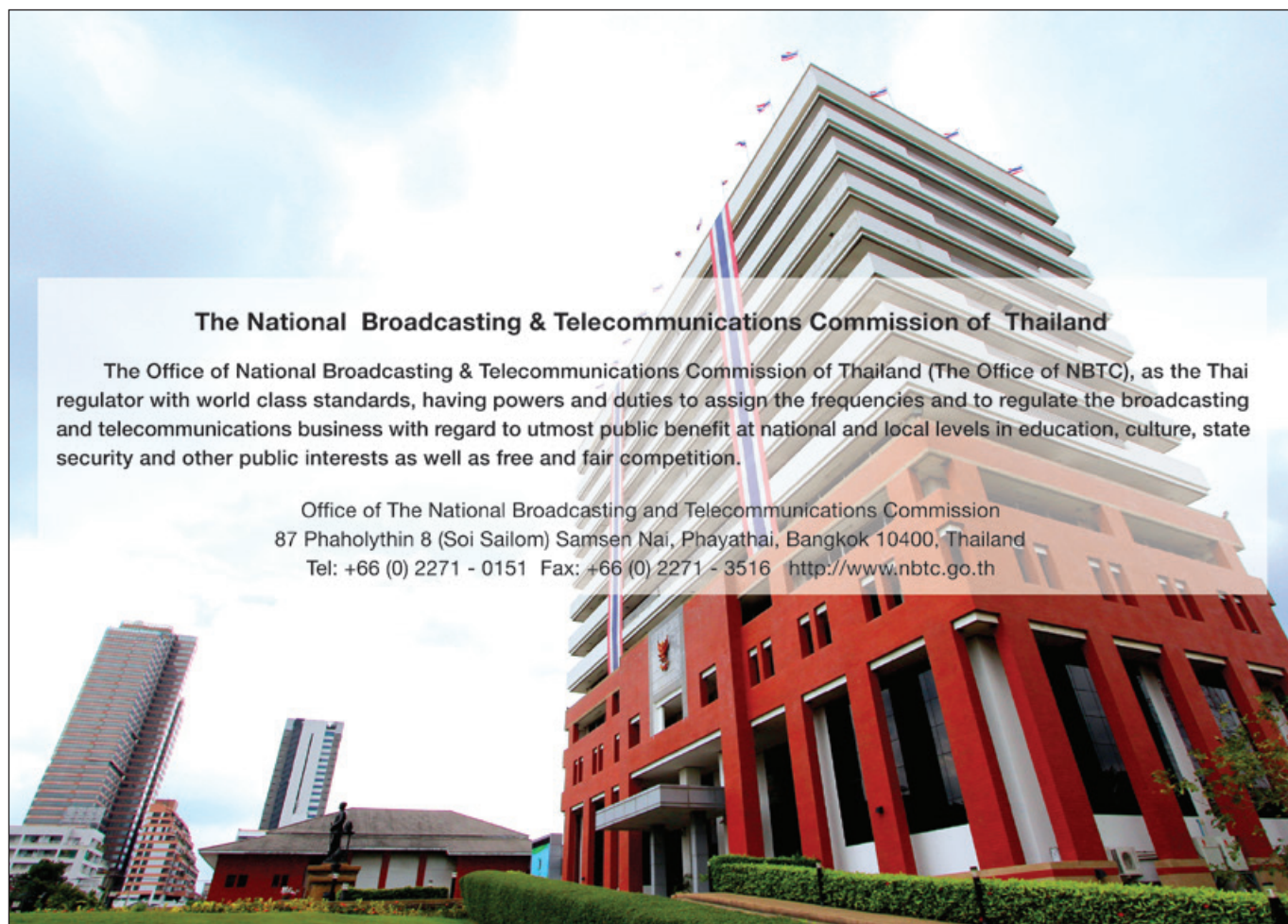
Supatrasit Suansook is an ABU Technical Liaison Officer from NBTC. He received his B.Eng. (Honours) in Electrical Engineering from Chulalongkorn University (Thailand) and an M.Sc. in Telecommunications from the University of Maryland at College Park (USA). He has experience in the telecom and broadcast sectors. Mr. Supatrasit has been involved in broadcasting sector since 2011. Currently, he is a senior engineer in the Broadcasting Technology and Engineering Bureau of NBTC. He is responsible for technical regulations/policy for digital terrestrial television, including technical specifications, frequency planning, and spectrum management/coordination of broadcasting services. He has also been working actively, since 2012, in the NBTC Technical Working Group on Digital Terrestrial Television.



The National Broadcasting & Telecommunications Commission of Thailand

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Inter BEE 2015 Report

By **Hamid D. Nayeri**

Senior Engineer, IRIB, ABU Vice Chairman, Technical Committee,

The International Broadcast Equipment Exhibition was a 3-day event held from 18th to 20th November, 2015 at the Makuhari Messe in Chiba, Japan. This event showcased products from Telecom Products & Equipment, Media & Advertising industries etc. in the Media & Advertising, Telecom Products & Equipment industries.

This year's Inter BEE was the 51th exhibition. Inter Bee was held for the first time in 1965, as a trade show for broadcasting equipment.

During the intervening years Inter BEE has become a major world trade show for broadcasting, and if we compare it with similar events around the world it can be considered equal to the exhibition held by NAB in the United States and IBC in Europe.

As for the scale of this year's exhibition, there were a record number of 996 companies and organisations (including those from 31 overseas countries and regional areas) and 1,780 booths. The event, held on a larger scale than ever before, occupied all six Exhibition Halls in Makuhari Messe.

Inter BEE this year was successful in presenting the latest developments in broadcast technology: including equipment such as cameras, video tape recorders, measuring equipment. Also on show were the latest developments of various media and technologies such as satellite broadcasting and high-definition TV, driven by digital switchovers world-wide. Also evident was the ever-closer integration with IT communication technologies. So, apart from the latest innovations, characterised by the rapid introduction of 4K and 8K, ultra-high-resolution technologies, was evidence of the interdependent and simultaneous changes in basic technologies, infrastructures, and video-viewing environments.

Inter BEE 2015 had a very important message: That broadcast and communication media were going through a period of huge convergence. A transformation brought about mostly by:

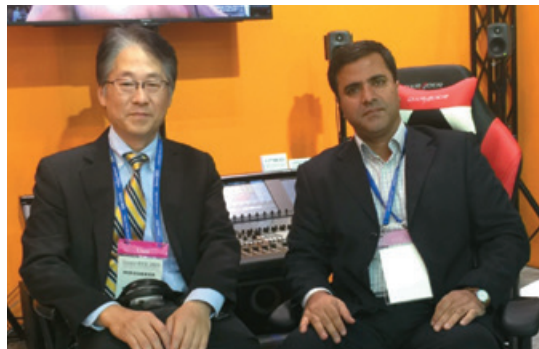
- the 4K and 8K ultra-high-definition technologies,
- the increase in spatial information,
- high-frame-rate (HFR) data transmission capabilities,
- the increased ability to display colour by storing a wider range of colour values (ITU Rec. BT.2020),
- and the ability to simultaneously capture contrasting levels of luminosity through the expansion of dynamic range (HDR).

The increase in data volume has been accompanied by the development of highly efficient coding technologies, enabling improved compression and good image quality, which in turn has provided the basis for transition to increasingly file-based and IP-based production, distribution, and transmission systems.

In parallel with the exhibition, at the International Conference Hall, various conferences and seminars were held. The opening ceremony of the 51st Inter BEE took place at the entrance lobby where representatives from the main sponsors, JEITA, and others, jointly presented their opening remarks. During the ceremony, large displays that had been set up on the left and right of the main stage, showed video clips using 4K and 8K Ultra-High-Definition technologies, which were the highlight of this year's show. The Ultra-High-Definition 8K clips featured a Wimbledon tennis broadcast by NHK. All the videos were very impressive.

After the opening ceremony and in parallel to the exhibition there were important keynote speeches in the International Conference Hall.

- The first was titled "A 2015 roadmap for future 4K and 8K projects" and was given by Deputy Director-General from the Ministry of Internal Affairs and Communications who talked about Japan's policies for next-generation broadcasting with the subtitle, "The latest developments in Japan's broadcasting policy."
- Next up was Chief Engineer Hamada from NHK, who gave his presentation on "The future of 8K in broadcasting and its application beyond broadcasting." He referred to the many preparations being made for 8K test broadcasts planned to start in time for the 2020 Tokyo



Olympic Games. Also referred to were expectations of the potential contribution to other industries, by developments in the broadcasting industry, in particular the extension of the highly advanced features of 8K technology to areas as diverse as medicine, film, digital signage and advertising, public viewing, and museums.

- Several presentations dealt with the latest progress in 4K broadcasting and distribution: "Our operations in 4K broadcasting," by SKY Perfect JSAT; "Deployment of 4K IPTV service through Hikari TV" by NTT Plala; and "4K technology in cable TV" by Jupiter Telecommunications.
- "A roadmap for 4K and 8K: what lies beyond them," was presented by the NexTV-Forum Executive Director, who described some challenges and issues that could be encountered further into the future. He also talked about various technical developments in more detail: wide colour gamut, high-dynamic-range imaging (HDR), development of highly efficient compression technology (HEVC) for superb image quality. Also, fast post-production and low-cost archiving for more efficient production.

In the second day of Inter BEE, two parallel programmes, the video Symposium and the Audio Symposium, were held. The Video Symposium was arranged around the central theme of "New trends in content production: the impact of big-data visualisation." Highlighting that the utilisation of big data had enabled video applications.

There were a number of topics on big themes that related to the present and future of broadcast media. This report focuses on the important themes below:

8K and latest developments

For sports, wildlife, and nature documentaries 8K would offer a super-realistic, immersive experience, and 8K technology was very prominent at this year's Inter BEE show. With plans to broadcast the 2020 Tokyo Olympics in 8K, Japanese manufacturers were teaming up with broadcasters to make this a reality. While 8K might still be quite a long way off for broadcasters outside Japan, we will slowly start to see more and more 8K-capable cameras and displays coming onto the market in the near future.

While famous companies, had new 8K camera products on display at their booths, there also was the dramatic increase in the number of 8K displays, throughout Inter BEE. The degree of resolution was so high that if someone stood close enough they would get the illusion that things were coming out of the screen. This was accompanied by 22 point surround sound.

The industry's first fully capable video quality analysis system for 8K resolution was presented at Inter BEE; a system which enables users to measure and analyze the quality of 8K uncompressed video using perceptual metrics and side by side visual comparison on a single monitor.

Inter BEE, which has been held over half a century since 1965, is organised into four exhibit categories: "Video and Broadcast Equipment," "Professional Audio Equipment," Professional Lighting equipment" and "ICT/Cross Media."

The event is the subject of extreme interest from inside and outside Japan as a comprehensive international media exhibition that leads the relevant industries by revealing the new trends in the media business.

In conclusion, I wish to express my sincere thanks to ABU and JEITA for providing me with the valuable opportunity to attend this major event.



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IBC 2015 RAI AMSTERDAM



by Azhar Rahmat
Sistem Televisyen Malaysia Berhad (TV3)

Attending IBC 2015 was an honour for me. Not just to represent ABU, but also my organisation, TV3 Malaysia. It was a very exciting moment when I was assigned to attend IBC 2015. This was my first time in Europe and joining the conferences and exhibitions was really a big opportunity for me to be exposed to more of the world of broadcasting technology. There are so many new cutting edge technologies that offer broadcasters, not just the satisfaction and quality of content delivery, but also multiple platforms and multimedia which will achieve a more interactive content viewing experience.

I spent most of my time there attending conferences related to my job scope as well as those on other topics to broaden my knowledge. From my personal perspective, there were four major and popular topics highlighted during the IBC 2015 conferences:

1. UHD implementation – standardisation and benefits
2. Cloud Implementation – MAM based cloud, post-production, cloud based transcoding
3. Video over IP – replacing the current SDI technology
4. Over the top (OTT)

Over and above most of the topics being discussed, were two subjects that particularly caught my attention. They were Cloud Implementation and Video over IP.

Cloud implementations are getting huge, and are no longer just for online storage. Many applications have started to exploit cloud technology, and those include the broadcasting environment.

Cloud technology seemingly has no limitation, where it now allows virtualisation and more workflows including editing, archiving and playout solution to be created through it. Content creators will no longer require a variety of different devices to be deployed in the broadcaster's premises, just for the sake of transmitting and content delivery.

The greatest advantage of the cloud is that it is now available anywhere there is an Internet connection and it no longer requires editors

to stay in one place or at the office. All editing can be done immediately, on-the-fly.

The cloud is now considered as one of the Media Assets Management (MAM) platforms. Broadcasters will no longer have to afford expensive equipment and hire specialists, just for the sake of owning independent private MAM. Media management can be managed from anywhere, originated from many places but centralised in one location, that is, in the cloud.

I was mesmerized by the various implementations of this technology as it appears we need no longer depend on complex and complicated designs in order to meet one simple objective, which is to transmit content to the viewer. Various other cloud implementations are currently being implemented, or still in the early stages, such as cloud-based encoding and transcoding, cloud-based video workflow virtualization, cloud-powered video services, cloud-computing, etc.

However, there are still many things that need serious consideration before cloud exploitation enters the broadcasting environment as a permanent solution.

Internet and cloud security are still at the top of a priority list that must concern everyone whenever cloud technology is implemented. Many cloud service providers can only offer 'best practice' security, but are unable to give 100% guarantees that they will never be hacked by anyone, as nowadays hackers are becoming more expert in easily penetrating high security networks. However, this will not stop professional editors or content providers from using the technology as it is so cost effective and flexible.



"The IP Infrastructure Revolution" talk, chaired by Niall Duffy from SONY

If security was the main and only concern, cloud implementation could never be an option for broadcasters. Migration from analogue to digital transmission has evolved in terms of how video and audio is transported. The combination of IT technology with traditional broadcast technology has led to the creation of video over IP, which will soon replace current SDI technology.

By reusing and adapting the capability of SDI digital, all video and audio content can now be transferred and transmitted through standard network cables, using IP. This technology was quite new to me as it is very much an IT-based standard protocol.

We will soon no longer have to afford or design complex architectures, but instead use the IT infrastructure for transmission.

However, during "The IP Infrastructure Revolution" talk, chaired by Niall Duffy from SONY, video over IP can be considered as new, to broadcasters, few of whom have chosen the technology as an option for media delivery. Several panel members did not see this as a best practice. Lost signals might be untraceable when everything is transmitted via IP, compared to SDI where everything is straightforward and lost signals are easy to trace back, it being only a matter of point A to point B. Live video programmes such as

football matches, news, live feeds, etc. are unsuitable for implementation in an IP environment. The lack of equipment to measure white balance, colour gamut, vector waveforms etc., via video over IP, have made broadcasters decide to wait until the technology is adequate for them to use.

It is claimed by hardware developers that video over IP can deliver high quality pictures with less image quality loss and better performance. This technology will be widely used by broadcasters around the world soon or later, as the world is now migrating from engineering based to IT based technology. Like it or not, the technology will help us a lot in simplifying the existing designs and workflows and also change our mindsets towards the new way of transmitting. I am really thankful, to have been selected to attend this world wide conference; not just to be exposed to new things, but also to gain new ideas and a clearer picture of what is going on in the world of broadcasting.

Affordability, complexity, effortless workflows, cutting edge technologies, will be our main objective in future, when it comes to new deployment and implementation. We must embrace the new technology, as it is moving faster than we might think. No matter how broad or narrow the industry is, broadcast engineering will still have a good future and I am very optimistic about it.

WRC-15 Spectrum for Future Broadcasting

by **Dr AMAL Punchihewa**
Director Technology & Innovation

Akira Negishi, K.KAMBARA & K. Tsuda
NHK

What is Spectrum?

Spectrum, or radio spectrum in our context, is the range of electromagnetic radio frequencies used to transmit data wirelessly. It is a limited, natural and scarce resource. It is an indispensable resource for many industries, including broadcasting and radio. The amount of usable spectrum is limited, despite there being a steady increase in demand. Therefore, it is important for broadcasters and regulators to continue to work together to ensure that radio spectrum is carefully managed and used efficiently in order to meet as much of the future demand as possible.

The spectrum is divided into different bands, which are then allocated to one or more services, such as digital terrestrial television (DTT) - where the signal is received through a television aerial. Digital Terrestrial Television (DTT) broadcasting requires spectrum, preferably in the UHF band because of its technical properties. Other services, such as mobile internet can use and already uses higher frequencies. Public broadcasters rely on DTT as the most effective means of delivering television programmes to large audiences. This ensures that every citizen has access to free-to-air TV.

What is WRC?

Every three to four years, a World Radiocommunication Conference (WRC) is held to consider revisions to the ITU Radio Regulations, an international treaty which determines the use of the radiofrequency spectrum, including the regional and global harmonisation of spectrum.

It is the job of WRC to review, and, if necessary, revise the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits. Revisions are made on the basis of an agenda determined by the ITU Council, which takes into account recommendations made by previous world radiocommunication conferences.

The general scope of the agenda of world radiocommunication conferences is established four to six years in advance, with a final agenda set by the ITU Council, with the concurrence of a majority of member states, two years before the conference.

Under the terms of the ITU Constitution, a WRC can; revise the Radio Regulations and any associated frequency assignment and allotment plans; address any radiocommunication matter of worldwide character; instruct the Radio Regulations Board and the Radiocommunication Bureau, and review their activities; and determine questions for study by the Radiocommunication Assembly and its study groups, in preparation for future Radiocommunication Conferences.

On the basis of contributions from administrations, the Special Committee, the Radiocommunication Study Groups, and other sources (as per Article 19 of the Convention (Geneva, 1992)) concerning the regulatory, technical, operational and procedural matters to be considered by world and regional radiocommunication

conferences, the Conference Preparatory Meeting (CPM) prepares a consolidated report to be used in support of the work of such conferences.

What are the outcomes from WRC-15 which impact Region 3?

The World Radiocommunication Conference agreed on a compromise document that sees the 470–694 MHz band protected for broadcasters in ITU Region 1 (Africa, Middle East and Europe), while allowing several countries from other regions to use at least part of the 470–698 MHz band for IMT.

Now that we have certainty of access to spectrum, the broadcasting industry can complete the transition to fully digital television broadcasting. According to the agreement, the band will be studied again in Region 1 as part of the WRC-23 study cycle.

This issue caused some disagreement during WRC-15 as the “no change” common proposals agreed by most regions were vigorously opposed by the USA, which is holding an auction of spectrum in part of the band in March 2016.

According to the compromise agreement, the band will remain under its current global broadcasting allocation, along with its current co-primary allocation and secondary allocations to fixed and mobile in Regions 3 (Asia) and 2 (the Americas) respectively. However, the band will be identified for IMT across a range of countries in Regions 2 and 3. In Region 2 the countries are the Bahamas, Barbados, Canada, the USA and Mexico. Belize and Colombia will identify a sub-band for IMT (614–698 MHz).

Discussions on which countries would have a footnote on IMT identification in Region 3 were much less conclusive. India, Pakistan and Papua New Guinea intended to join the footnote but had to withdraw due to opposition from neighbouring administrations.

In the end, this means the entire 470–698 MHz range will be identified for IMT in Micronesia, the Solomon Islands, Tuvalu and Vanuatu. Additionally, Bangladesh, the Maldives, and New Zealand will identify the 610–698 MHz band.

There are no footnotes for administrations in Region 1, because administrations interested in identifying IMT for this band were dissuaded from doing so during informal regional coordination meetings. No such consensus could have been reached in Region 3, on the grounds that the Asian Common Proposal was for “no change”.

The result was welcomed by the European Broadcasting Union (EBU), which has been campaigning to keep the status quo so that it can protect Europe's digital terrestrial television (DTT) platforms. DTT is also currently replacing analogue broadcasting in many African administrations.

With the outcome of WRC-15, regarding spectrum for broadcasting, the broadcasting industry can now complete the transition to fully digital television broadcasting.



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Second Workshop on Engineering Fundamentals for Broadcasters



The second Regional Workshop on Engineering Fundamentals for Broadcasters was held in Kuala Lumpur from 30 November to 4 December 2015. The workshop was the outcome of requests from members and deliberations within the ABU Technical Committee and the Technical Bureau on the need for basic engineering training for young engineers. This was the second event in a series that began in 2014 and has been planned to run annually, due to the huge demand for capacity building and training of new engineers within the membership.

This year's workshop was jointly organised by the ABU and the Asia-Pacific Institute for Broadcasting Development (AIBD) to impart basic engineering and technical concepts to upcoming and young engineers who recently started their careers in broadcasting. The workshop attracted 33 engineers and technical staff from 16 organisations representing 12 countries.

The 5-day workshop focused on some of the fundamentals of audio and video systems, a look at historical developments, and how early engineers devised the techniques and applications that helped to shape the media industry we

have today. It covered The building blocks of audio and video capture, how initial process and differences between types of capture devices used and also addressed basic analogue audio and video systems and how the analogue systems worked within the broadcast chain from acquisition to delivery. The need for going digital was discussed, together with the means by which analogue to digital conversion is achieved. The digital audio and video systems used in the broadcast chain were then explained.

The workshop also looked at some of the more advanced current technologies including the benefits of integration of information technology systems within the broadcast chain, and how operational efficiency is achieved through digital processes. Some of the other topics covered include the different digital audio and video standards used around the world, together with their implementation and deployment. Participants were also given a look at new media platforms and advanced next-generation technologies.

There being a pressing need for this type of training, ABU Technology in collaboration with AIBD, has plans to further enhance and continue this series of workshops to help members by addressing the needs of the future generation of broadcast engineers. The planning process for the next event, scheduled for November 2016, has already been initiated.



ABU Participation in the WorldDAB General Assembly 2015



The General Assembly of WorldDAB, the global industry forum for digital radio, promoting DAB, DAB+, as digital radio broadcasting standards, was held in London from 3rd to 4th November 2015. The ABU made its contribution during the opening session, to an international audience of over 200 radio experts. The theme of the GA was "A vision for the future of radio". During the two days, two Ministers, from the UK and Germany, in their Keynote speeches to the General Assembly, emphasised their commitment to digital radio and the importance of working together to accelerate the growth of DAB in Europe.

The ABU emphasised the need for hybrid radio, where broadcast radio over-the-air (OTA) is complemented by over-the-broadband (OTB) delivery of additional, on-demand audio and multimedia content. Hybrid could also offer catch up services and additional information for radio programmes on-air. Almost all the speakers,

especially public radio broadcasters, agreed to the vision of the ABU for digital radio.

Ms Joan Warner, CEO of Commercial Radio Australia (CRA) and Colonel Dr Natee Sukonrat, Vice Chairman of the National Broadcasting and Telecommunications Commission (NBTC) of Thailand, and Chairman of the National Broadcasting Commission, made presentations providing an update of DAB+ deployments and plans in their respective countries. The Chairman of WorldDAB Asia-Pacific, Ms Joan Warner, presented an update from the WorldDAB perspective. For the third time, WorldDAB will be the principal sponsor of the ABU Digital Broadcasting Symposium, DBS-2016, to be held in Kuala Lumpur from 29th February to 3rd March 2016. ABU is also planning to organise a workshop in Bangkok on DAB+ with NBTC and WorldDAB during 2016.

Delegates also had opportunity to network and arrange meetings as well as to explore the exhibition area, where organisations across the broadcasting industry showcased their products and services.



New Members

Affiliate Member

MYTV Broadcasting Sdn Bhd, Malaysia – (28.9.15)

MYTV Broadcasting Sdn Bhd (MYTV) is a private limited company incorporated in Kuala Lumpur, Malaysia on 7 April 2010. MYTV is a common integrated infrastructure provider of digital terrestrial television service in Malaysia. They are responsible for setting up the end-to-end infrastructure to facilitate the migration of television broadcasting service from the current analogue to the digital terrestrial network.

Under this national project, the DTT infrastructure and network facilities that MYTV will be responsible to develop include a digital multimedia hub and a network of high, medium and low-powered digital TV transmitters that are capable of carrying up to 39 SD or 13 HD digital TV channels initially. At the end of the migration exercise, it is expected that 75% Portable Indoor ("PI") and 25% Fixed Rooftop ("FRT") coverage would be available in Malaysia.

As part of DTT migration process, MYTV is committed to provide free channel capacities to incumbent broadcasters/CASPs until 98% of DTT coverage is achieved during simulcast, which is the period when both analogue and digital signals are transmitted to Malaysian homes.

MYTV is part of the National Digital Taskforce and the Broadcasters' Alliance, the latter being a group formed by free-to-air broadcasters in Malaysia for the purpose of the DTT migration. Within the Alliance, MYTV has been tasked to educate the Malaysian public on the DTT migration, which includes engagement with local leaders and government.

Fasaha Consultants / Investments Limited, Nigeria – (6.10.15)

Fasaha Consultants / Investments Limited is a private limited liability company incorporated in Abuja, Nigeria on 27 August 1998. They provide consultancy and logistics services. Their services include:

- Management consultancy in the areas of print, electronic and social media;
- General management training;
- Capacity building for media practitioners particularly producers, presenters, editors, script writers, reporters, studio engineers, transmitter engineers/technologists, etc.;
- General logistics support for the media industry such as spare-parts, equipment, etc.;
- Financial, auditing, taxation advisory services; advertising and public relations services, etc.

Fasaha Consultants / Investments' founder is Mr Abubakar B. Jijiwa, MFR, who is a renowned international broadcaster, executive, management trainer, motivational speaker, certified accountant, tax professional, advertising and public relations practitioner, etc.

The organisation seeks to work with relevant bodies such as the World Bank, European Union (EU), African Union of Broadcasting (AUB), Asia-Pacific Broadcasting Institute for broadcasting Development (AIBD), Southern African Broadcasting Association (SABA), Commonwealth Broadcasting Association (CBA), Broadcasting Organisations of Nigeria (BON), etc., in partnership in the areas of training and capacity building.

Courseline Training Centre, Philippines – (8.10.15)

Courseline Training Centre was originally registered as Courseline Training Centre for Teachers on 16 June 1996 in the Province of Cagayan in the Philippines. Due to the expansion of services being provided not only to teachers but to other government and private agencies as well, it was later renamed Courseline Training Centre (CTC).

CTC works closely with the Department of Education and other government agencies by providing their services in organising conferences, symposiums, forums, seminars, workshops, galleries and study tours related to communications and broadcasting.

CTC's vision is that it envisions the centre becoming one of Asia's best campus in education and training in the field of journalism and broadcasting, print and digitalisation, which will support the Department of Education and other agencies in all areas of academic life-long learning.

CTC's mission is to provide and offer to school managers and teachers:

1. Training that will equip the School Managers in the formulation of strategies and techniques that will make the teaching-learning scenarios friendly and up-to-date;
2. Scholarships through continuing education in the field of journalism and mass media;
3. Courses in layout and other matters related to printing;
4. Training in other subject matters;
5. Services through the Adopt-the-School programme;
6. Sponsorship through study tours

News

from the ABU Region

Panasonic to Trial P2 Cast Cloud-Based News Production

Panasonic will be inviting APAC broadcasters to trial its P2 Cast cloud-based news production system and expects to commence the trials in early 2016.

P2 Cast is designed to meet the demands of a rapid news cycle and dramatically increase the speed of delivery of high quality news content to air. Since P2 Cast is a cloud based network service that utilises IP infrastructure, news workflow is streamlined, leaving camera operators free to concentrate on getting the perfect shot.

A major P2 Cast advantage is its ability, via the cloud, to move low bit rate, yet high-quality, proxy video off a camcorder in the field. This allows either the camera operator or newsroom editors to quickly create a video sequence of the desired clips, and then automatically pull back only the original high-quality and high bit rate video selected for air from the camera.

(info.panasonic.com)

Tata Sky Expands Global News Channel Offerings

Tata Sky, one of DTH (Direct To Homes) player in India, has launched Channel NewsAsia International on its platform. The pan-Asian channel is now available to subscribers on channel number 535.

Ranked among the top three most preferred English news channel in Asia, Channel NewsAsia International's launch on Tata Sky will enable the channel to reach over 14 million households in India. The channel was established in March 1999 by MediaCorp, the leading media organisation headquartered in Singapore and is an English language Asian TV News channel. It is now available in over 58 million households across 27 territories in Asia. It offers news every hour on the hour, business programmes, current affairs, documentaries and lifestyle programmes, showcasing Asia from within Asia.

Beyond news and current affairs programmes, viewers of Channel NewsAsia International can enjoy the channel's popular travel and lifestyle shows. With the introduction of Channel NewsAsia International, Tata Sky has now expanded its bouquet of news channels to 96, which include 14 English news channels, 22 Hindi news channels and 57 regional news channels.

(exchange4media)

Broadcasting Library for Bangladeshi Community Radio Stations

A community broadcasting library is being set up as an essential part of 16 community radio station in Bangladesh.

Around 1000 rural broadcasters will directly benefit from the library. Each library acts as a knowledge centre to radio practitioners, development activists, volunteers and the community people around the station areas with support from European Union, Free Press Unlimited and Bangladesh NGOs Network for Radio and Communication (BNNRC).

The library will help community broadcasters, trainers and volunteers to gain more knowledge and skill. As a home-based knowledge source, the library contributes in improving the existing management and programme production quality of radio managers and producers which at the same time will positively influence the knowledge and skill of the future broadcasters.

Under the initiative, BNNRC has provided one book shelf and a set of books to each of the station. The library has included a set of books published by BNNRC on the topics like right to information, how to ensure participation and sustainability of a radio station, effective programme making (using formats like development drama), financial management and capacity strengthening of radio practitioners etc.

(radioworld)

Indonesia's TVRI Expands with Etere

Indonesian state broadcaster TVRI has added an ingest station based on Etere's MTX technology consisting of 8 channels.

Ingest is a critical process of any production and broadcast workflow. Errors committed in this stage are always costly and time consuming for a company. Etere Ingest software is designed to improve the ingest process of any broadcasting and media company by capturing in real-time SD/HD media from virtually any video source, broadcast stream, FTP and IP stream. Etere Ingest enables users to capture media from all common feeds into a cloud storage and apply to it any required workflow.

Etere MTX is a comprehensive playout automation system with a built-in video server which exploits Matrox's architecture and the performance of dedicated hardware to deliver cost-effective, high performance solutions to broadcast facilities. Etere MTX provides TVRI with master control room automation, graphics, built-in video servers, programming including secondary events as logos, crawls, audio/video router switching and transitions, all these, under a fully redundant and flexible approach. Etere MTX simplifies the overall TVRI system management, giving the broadcaster an SD/HD ingest and playout system with graphics and proxy file creation in real-time. The solution functions under a fully workflow-based way which the customer can customise to fit its needs.

(radiotvlink)

Digital Broadcasting Update

1. SMPTE® Publishes Study Group Report on High-Dynamic-Range (HDR) Imaging Ecosystem

The Society of Motion Picture and Television Engineers® (SMPTE®) has announced the publication of the SMPTE study group (SG) report on the high-dynamic-range (HDR) imaging ecosystem. The work of 170 top international experts, the SMPTE SG report summarises an extensive discussion on the implementation of HDR in professional media workflows and addresses key questions that will arise for industry members as they move forward in taking advantage of HDR technology. The report also offers recommendations for further HDR standardisation efforts by the SMPTE and other organisations.



The SMPTE SG report on the HDR ecosystem provides consensus guidance on HDR terms and definitions and presents detailed and useful information on HDR technologies that, up to this point, has not been readily available to the media industry. The report acknowledges that although HDR technologies, both proprietary and standardised, are available today and can already be implemented for non-real-time workflows, challenges remain in live or real-time applications. It further recognises that implementation of HDR will be complex and affect many systems in a professional media workflow. The report catalogues HDR technologies, examines issues in both live and non-live HDR workflows, and describes the role of HDR metadata. Finally, it recommends industry harmonisation regarding HDR technologies and parameters, stressing the importance of standardising new technologies related to HDR and of updating current standards to enable HDR.

(SMPTE)

2. ITU Approves Standards for Advanced Audio Broadcasting Technology

The ITU membership unanimously approved open standards, Recommendation ITU-R BS.2088-0, aimed at delivering advanced sound for broadcasting services, creating a listening experience that is closer to real life.



The new global standards will facilitate the production and exchange of advanced audio files by allowing a single file to carry a complete audio programme containing audio samples as well as metadata for any combination of object, channel and scene-based audio. The new file format was developed based on the existing and widely used RIFF/

WAV file format in order to facilitate its application and implementation.

Future technical capabilities for audio will also allow viewers to select their own menu of services. They will be able to decide on and adjust the level of immersive sound in their living rooms, creating dynamic sound imaging. These features become possible with 'object based coding', which will allow viewers to personalise their viewing and listening experience 'at the point of consumption'. This could include setting language and dialogue levels and selecting different aspects or sections of programming, which could also bring added benefits for people with disabilities.

(ITU)

3. Smart Coding Technology to Reduce Video Surveillance Bandwidth and Storage

Encoding Advancements Improve Standard H.264 Video Streams Generating Significantly Lower Bit Rates While Maintaining High Image Quality

Panasonic has released Smart Coding, a new technology that enhances the encoding algorithm in standard H.264 video streams, yielding up to a 70 percent improvement in bandwidth reduction.

Available as a firmware upgrade to all new generation Panasonic 3, 5 and 6 Series Models, the technology effectively lessens the bandwidth demand and the amount of storage needed for surveillance video images while maintaining high picture quality and full compliance with the H.264 standard.

Smart Coding technology employs a variety of advanced noise reduction processes and algorithm advancements, including Frequency Divided Filter (FDF); 3-D Multi-Process Noise Reduction (3D-MNR) and Group of Picture (GOP) Control to achieve a lower bit rate for images without degrading the captured and transmitted video stream.

More specifically, FDF and 3D-MNR act to reduce both fine picture noise and video-grain generated under low illumination improving picture quality before compression. GOP Control removes unnecessary information in a scene, which results in a lower bit rate.

Together, these features can effectively provide a substantial bit rate reduction (the number of bits per second that can be transmitted along a digital network) in the recorded video without a loss in image quality.

(Panasonic)

Equipment Trends

4K/60p H.265/HEVC Encoder

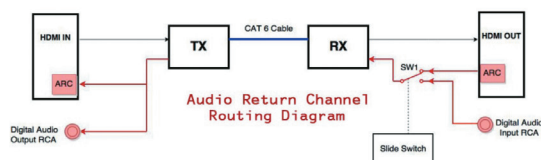


NTT Electronics Corporation (NTT Electronics) has developed HHC11000, a UHD (Ultra High Definition) 4K/60p 4:2:2 chroma sampling support, H.265/HEVC real-time encoder. This product will be available in March 2016.

The new product supports Main 4:2:2 10 profile, which is the high quality video standard for professional use in HEVC, and allows high-quality real time distribution of 4K UHD video. The built-in high quality HEVC single chip LSI capable of taking full advantage of the HEVC compression performance has enabled downsizing and low power consumption, which have been difficult to achieve with conventional high-performance general-purpose processors and other devices. It also supports the HD video format, which is the mainstream broadcasting format at present, making it possible to distribute HD video as well as 4K video.

(Businesswire)

HDMI + USB + LAN extension with HDBaseT 2.0



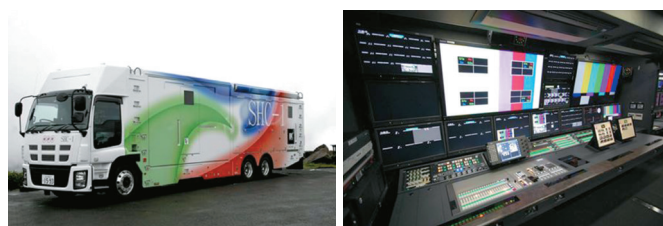
Hall Research has introduced the UH2X-P1 extender utilising the new HDBaseT 2.0 standard to extend uncompressed HDMI, USB 2.0, Ethernet, RS232, IR, and PoE over a single CAT5e/6 cable. Fully compliant with HDBaseT specifications, the devices are designed to work with all other certified HDBaseT 1.0 and 2.0 products. For example, the UH2X-P1 transmitter can be connected to displays with native HDBaseT inputs such as Panasonic's Digital Link equipped projectors.

The plug-n-play extender supports all PC and HDTV resolutions including 4K (UHD) and can extend video

along with IR, RS232, USB, and IP using a single run of CAT5e/6 cable up to 100m (330 ft). The PoH/PoE compliant extender includes a power supply that plugs to the transmitter end. The receiver gets its power through the Cat6 cable per IEEE802.3af standard as required by HDBaseT Alliance. The receiver includes an integrated 2-port USB 2.0 Hub, making it perfect for remote KVM applications. The USB extension is transparent to the PC Host and requires no drivers or software.

(Hallresearch)

The World's First 8K Outside Broadcast(OB) Vehicle



Ikegami announces the completion of the world's first 8K OB production vehicle. The new vehicle is designed to operate as a complete mobile 8K broadcast production facility capable of producing television of unsurpassed picture quality, complete with 22.2 channel surround sound.

In Japan, the road map for 8K broadcasting announced by the Ministry of Internal Affairs & Communications specifies that trial broadcast transmissions will be conducted in 2016. Regular 8K broadcast services are planned to begin in 2018.

Many elements of 8K television production infrastructure are much larger in size, power consumption and number of cables than their HDTV equivalent. This is because 8K broadcasting production captures 16 times more image information than HDTV. Organising an 8K OB vehicle is therefore much more challenging than designing and producing traditional OB vehicles.

The 8K OB vehicle produced by Ikegami delivers extremely high quality and high reliability in a compact size. The vehicle's specifications allow operation not only in Japan but worldwide so it can be operated for global sporting events such as the Olympic Games. It can be expanded to accommodate additional equipment as and when required. The 8K OB vehicle was delivered to NHK in September 2015. Its role will be to allow television audiences to experience the full reality of live events from wherever they choose to view.

(Ikegami)

Workshop on

On-line Training Methods and Applications of Radio-in-a-Box

ABU Technology organised a two-day training workshop in Kuala Lumpur from 26 to 27 November for one of its newest members, the Course-line Training Center (CTC) of the Philippines. The workshop was organised in cooperation with CTC and with the support of the Department of Education in Region 2 of the Philippines.

Over 50 high-school teachers from the Cagayan province attended the workshop, which had the theme "Skills for the Future: I Lead...". This was designed as a practical hands-on workshop with participants being trained in using the ABU's Radio-In-A-Box (RiB) utility for developing educational programmes. The training looked at how to use the RiB to record audio content, how to edit programmes and broadcast them using the RiB's built-in production and delivery system, via FM. The RiB is a portable FM Radio station, with production and transmission features, designed and developed by the ABU for use in disaster mitigation situations and community radio applications.

The two-day workshop also looked at how to setup on-line classrooms over the internet for delivery of training material and getting feedback from students. This included hands-on sessions on how to setup and run online webinars using free and low-cost tools available in the market. Online delivery of training content and courses is now becoming very common in the region, as it allows many to enjoy the benefits of learning in their own free time.

Courseline Training Center (CTC) works closely with the Department of Education and other government agencies in the Philippines by providing services in organising conferences, symposiums, forums, seminars, workshops, galleries and study tours related to communication and broadcasting.



Personalities & Posts

Changes in the ABU Technical Bureau



Mr Kachan Kannika
NBT-Thailand

Mr Chumporn Krua-Khwan, Executive Director, Engineering Support and Development Bureau of the National Broadcasting Services of Thailand, retired in September 2015. Mr Krua-Khwan was replaced by Mr Kachan Kannika who will now represent NBT on the ABU Technical Bureau.



Mr Doo-Hyung Kang
KBS-Korea

Mr Doo-Hyung KANG, ABU Technical Liaison Officer, Technology Management, Korean Broadcasting System, has replaced Mr Robin Kim, Myung Nam representing KBS on the ABU Technical Bureau.



Mr Yusuf Yildirim
TRT-Turkey

Mr Yusuf Yildirim, Head of Studios and Programme Contribution Systems Department has replaced Mr Raşit BAŞTAŞ on the ABU Technical Bureau.



Mr Chumporn Krua-Khwan



Mr Robin Kim



Mr Raşit BAŞTAŞ

We wish to thank Mr Chumporn Krua-Khwan, Mr Robin Kim, Myung Nam and Mr Raşit BAŞTAŞ for their contributions to the Bureau and extend a warm welcome to Mr Kachan Kannika, Mr Doo-Hyung Kang and to Mr Yusuf Yildirim.

ABU Staff of the Year

Siva Kumar Rajagopal

Siva Kumar Rajagopal Naidoo, ABU Manager, ICT Services was named ABU Staff of the Year at an ABU gathering held in early December 2015. Siva joined the ABU in January 2009 and has been steadily enhancing the IT services to better serve the Secretariat and ABU members. The award was presented to Siva by the ABU Secretary-General, Dr Javad Mottaghi.

Siva shares the award with Premila Manvi, Manager-Regulatory, Legal & IP Services.



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