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Union

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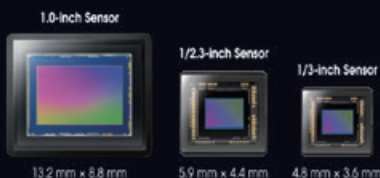


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Cover:
ABU Technical Committee meets in Istanbul, Turkey



Asia-Pacific Broadcasting Union

TECHNICAL REVIEW

From the Editor's Desk



This issue of ABU Technology's *Technical Review* carries three articles on technology. An article contributed by KBS addresses 'Real-time 3D Sign Language Avatar Animation from DTV Closed Captions.' An important case study contributed by DDI on 'Experiences of Evolution of digital terrestrial television in India,' addresses Technical Aspects of digital broadcast implementation. The 'Audio Description Trials in TRT' article briefly explains trials carried out to provide audio description and audio captions for the blind or visually impaired, and closed captioning and signing for the deaf. Participation and activities carried out in relation to spectrum issues are presented in preparation for WRC-15.

As is customary, the host of this year's TC and other meetings, TRT presents its profile. The Technical Review also features an interview with Dr Zeki ÇİFTÇİ, Deputy Director General, of the Turkish Radio Television Corporation. A schedule of 2015 ABU annual meetings is included for reference.

Reports on ABU Technology activities feature the ASEAN Broadcasting Regulation Forum 2015 held in Bangkok, the ABU 2015 Tashkent Forum and the Pacific Media Partnership Conference-2015 in Apia, Samoa.

This year's technology webinars drew over 800 participant-sessions during 48 sessions. There is also an article on the 'Sony Study Tour' by the winner of the developing broadcasters' award.



The Asia-Pacific Broadcasting Union (ABU) is a professional union of broadcasting organisations in the Asia-Pacific area which aims to co-ordinate and promote the development of radio, television and allied services in the region. It is non-governmental, non-political and non-commercial.

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Experiences of Evolution of Digital Terrestrial Television in India

by **M.S. Duhan, DDG (E)**

Directorate General, Doordarshan, New Delhi

abstract

Doordarshan, which was started with an experimental transmission from Delhi on 15th September 1959, occupies a unique place in the electronic media landscape of India. The existing 1412 analogue TV Transmitters (with powers ranging from 10 W to 30 kW), serve about 90% of the Indian population. Constrained by limited frequency capacity, the analogue terrestrial television platform needed a new & more efficient transmission system to meet the demands of the future and to allow for the launch of new services and Doordarshan approved schemes to install 67 DVB-T2 Transmitters. This article discusses the journey of digitalisation and Terrestrial TV in India, RF Signal Synthesis and the challenges and opportunities thereof.

Digitalisation of Terrestrial Networks

After finalisation of the DVB-T standard for digital terrestrial broadcasting in the country in 2001 Doordarshan launched a pilot project, with transmitters of 5 kW Average Power each, at metropolitan cities; namely Delhi, Chennai, Kolkata and Mumbai. The five Doordarshan Channels were relayed on DVB-T Transmitters.

This project was primarily to gain experience in the field of digital terrestrial transmission technology. The Delhi transmitter was later enabled to relay 16 programme channels on mobile phone, using DVB-H technology. It was a successful demonstration of the technology.

Doordarshan has adopted 2nd generation DVB-Technology for terrestrial Transmission. Further upgrade of DVB Standard ETSI EN 302 755 V1.3.1 (T2-Lite) has provided more robustness and flexibility for Mobile TV and T2 Radio, along with transmission of HDTV programmes.

To achieve DTT coverage equivalent to that of the existing 1412 analogue transmitters in India, 230 HPTs and 400 LPTs, besides some gap fillers, would be needed. The implementation of an approved 67 DTTs has been split in phases to reap the benefits of all innovations, particularly detailed changes made to the physical layer features, to optimise performance to match the propagation characteristics of the frequency channel using multiple physical layer pipes (mPLP). India has implemented two multiplexes at Delhi, Mumbai, Chennai and Kolkata and single multiplexes at all other locations. So far private broadcasters do not have permission to install DTV Transmitters.

Milestones in implementations of the projects:

1. Tower Strengthening

New antennas were procured and these were mounted on top of the towers. A load analysis and modeling of the tower forces was carried out, considering the updated wind zone of the city concerned. Towers were modeled using SAP14 software. Extra tower members were added to the towers and the thickness of some members was increased. A new interface structure between the tower tops and the bases of DTT antenna were installed and vertical gaps of at least 1000mm was kept between the Band III and Band IV antenna panels. Panels of the existing Band III antennas on one face had to be removed for the



mounting of derricks on the tower. Derricks, pulleys and physical manpower were used to haul up the antenna at all locations. 20kW antennas, along with 5" diameter RF feeder cables were installed, along with support structures on the tops of the towers.

2. Spectrum Planning and Experiments in existing Transmitters

Doordarshan has planned for digitalisation of its network in the UHF band using Multiple Frequency Networks (MFN) at national level and Single Frequency Networks (SFN) at regional and local levels. In areas without cover low power gap fillers in SFN are planned, following detailed signal surveys.



The 5 kW UHF DVB-H Transmitter in Delhi was converted into T2 Lite for experimental purposes by replacing the NEC Modulator with a DVB-T2 Modulator and Gateway. It provided T2 (base) and T2 lite RF signals. T2 lite signals with configuration in QPSK, 1/3, 8k, PP4 were tested. The signal was checked using a dongle with a mobile phone and it was found satisfactory up to around 25Km from the transmitter site. The signal was very good along the route, despite an overhead metro track and high-rise buildings on the way. Similarly, one 500 W UHF analogue TV Transmitter was also tested for use on DVB-T2 by change to a T2 Modulator. The DVB-T2 Modulator and its results have been very encouraging. Existing analogue transmitters can also be upgraded for use DTT Transmission.

3. Transmitter Power, Frequency & Tower Heights at 4 Metro Cities

The DVB-T2 services in 4 Metro cities are very significant in terms of population served by them. About 86 millions of population will be served by these transmitters. The detail is as below:

City	Transmitter Power	Channel/Frequency	DTT Antenna position on Tower	Coverage Area (Sq Km)	Population
Delhi	6 kW	Ch. 29/538 MHz	235 M	15155	30000819
Chennai	6 kW	Ch 26/ 514 MHz	175 M	14983	11119970
Mumbai	6 kW	Ch 27/ 522 MHz	300 M	17680	17522097
Kolkata	6 kW	Ch 25/ 506	175 M	12665	27763803

4. Training & Seminars

Training of staff is the essence for the success of new technology. Therefore two weeks training on DVB-T2 Transmitter and compression equipment was provided in Delhi and one-day training was provided for operational staff at each of four metropolitan sites. This was interactive and proved to be useful in understanding the technology and various configurations of the system.

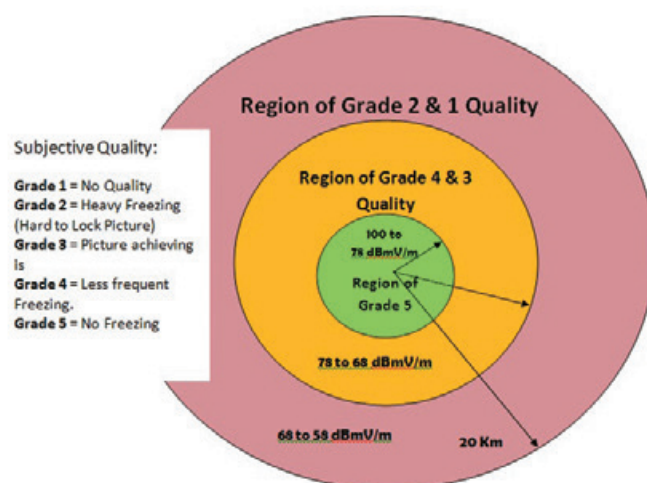
Three Seminars were organised during past 3 years to educate and familiarise the Engineers and Programme Staff with DVB-T2 technology. These are tabulated as below:

S. No.	Period	Organisers	Remarks
1	4th to 6th Dec. 2012	DVB-DDI-ABU	DVB-T2 Implementation Workshop
2	27th & 28th May 2013	Doordarshan	DVB-T2 Technology and Business models
3	24th July 2014	Doordarshan	Seminar-cum-Exhibition on receiving devices for DVB-T2/T2 Lite

5. Edification from Earlier Projects: The Signal Synthesis of DVB-T/ T2/T2Lite

A. DVB-H Transmitter:

Transmission Parameters are: 5 kW DVB-H Transmitter with Antenna at 100 M Tower, Channel 26(514 MHz), Video format: QCIF (352x144), Frame rate: 15fps, Video data rate: 384 kbps, Audio data rate:



64 kbps, Modulation: QPSK, 16 QAM, Mode: 8K, FEC: ½ Guard Interval (GI): 1/8, MPE-FEC. 25%. The summary of results for DVB-H Transmitter is as below:

- i. With QPSK modulation, very good reception was observed up to 6Km. The reception quality was observed to be perfect up to 5 Km but with intermittent freezing of signal from 5Km to 12Km.
- ii. With 16QAM modulation, very good reception quality was observed up to 3 Km. The reception quality was good with intermittent freezing of signal from 3Km to 6Km. Beyond 6Km, the reception quality was highly inconsistent.
- iii. A threshold value of C/N was about 20dB and 24dB for QPSK and 16 QAM Modulation respectively. The probability of good reception above 20dB C/N is almost 100% with QPSK modulation. While the probability of reception above 24dB C/N is almost 100% with 16 QAM modulation.

• B. DVB-T2 in Delhi:

A 6 kW DVB-T2 Transmitter was tested using various RF Profiles like modes VV3 (256QAM), VV4 (64QAM), VV11 (16QAM) and VV10 (QPSK) was tested with horizontally polarised antenna of gain about 11dB mounted at 235m height and the signal was observed to be very satisfactory around 55Km.

• C. DVB-T2 in Chennai:

Signal survey with field strength meter R&S model EFL-340, with portable TV Receiver and external receiving antenna of 10' height with 6 kW DVB-T2 Transmitter.

It was observed that with external antenna and fixed reception, signal reception at different locations even up to 60Km radius was satisfactory with 1 HD & 4 SD channels with VV003 mode (256 QAM)

• D. DVB - T2 Lite in Delhi with 235m Tower:

Mobile TV reception surveys with DVB-T2 base (QPSK) and T2 Lite were also carried out. Changes in Profile T2-base to T2-Lite were: – Code rate 1/2 to 1/3 – FEC Type Normal (64800) to Short (16200) Max and bitrate decreased from 5.9Mbps to 3.8Mbps. In coverage range, there was marginal improvement,

but with uninterrupted reception in most of the coverage area using T2-Lite compared to T2 Base (QPSK). Satisfactory reception was available up to C/N (Gaussian) 1dB. The coverage area in Delhi using T2-Lite is as shown.

RF Profile for DVB-T2

The tested RF Profile options in Transmitter are as below:-

A. DVB-T2 base for outdoor reception:

The suitable mode for fixed TV reception may be: Constellation: 64 QAM rotated, FEC: ¾, FFT: 32k, G.I: 1/128, Pilot pattern: PP7 (Data capacity @ 33 Mbps) and possible options using MPEQ-4: H.264 for various services are as below:

- 12 SDTV for film, entertainments, news & soap operas
- 2 HDTV + 4 SDTV normal speed action/sport etc.
- 3 HDTV Service – Sport & fast moving, intense action
- 4 HDTV Services – Pure film material
- 8 SDTV for high action & sport video
- 6 SDTV, 2 Mobile TV and 4 Radio Channels

The CODEC efficiency will further improve by 50% and data capacity for programme channels will be doubled using an HEVC: H-265 CODEC. However it requires about 10 times more processing power for encoding compared to MPEG 4, but in view of network saving and making way for more channels, it is wiser to go with HEVC. Encoders and Decoders are available from various manufacturers.

B. DVB-T2 lite for mobile reception:

Constellation: QPSK rotated, FEC: 1/2, FFT: 8k, G.I: 1/8, Pilot pattern: PP2 (Data capacity @3.8 Mbps). Following Programme services are possible, using DVB-T2 –Lite mode and using low resolution inputs of 350-500 Kbps each:

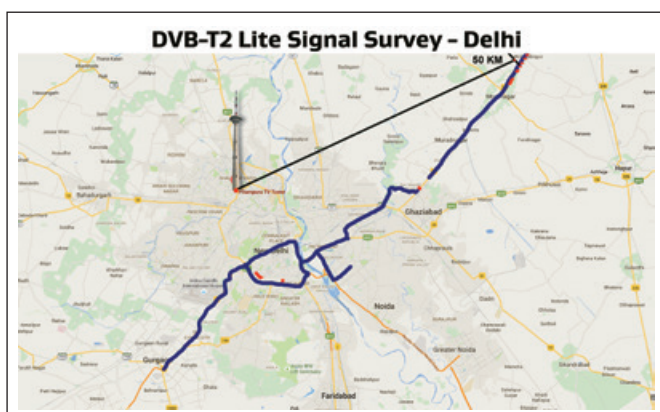
- 7-10 SDTV depending upon programme genre
- 6 SDTV and 10 Radio Channels



With the use of short FEC, robust error correction and reduced time interleaving memory, the TV & Radio programmes can be received on mobile phones satisfactorily and with reduced battery consumption. With HEVC CODECs more channels are possible.

C. Signal Attenuations:

Various attenuations due to height, walls and vehicles etc. were observed and are shown here.





No degradation in reception quality was observed up to speeds of 90Km/h in moving vehicles.

D. Coverage After Complete Digitalisation:

Doordarshan has implemented the first phase of DTTs using 6 kW (rms) power and in future phases DVB-T2 Transmitters with 10 kW (rms) power rating will be procured for better signal reach and indoor reception. The coverage after complete digitalisation will be as follows:

DVB-T2 TxS	% age Area Covered	% age Population Served
630	87%	88%

Strength of DVB-T2

DVB-T2 has a critical role in the overall broadcasting and content ecology of India, which is rich in cultural and linguistic contents. Digital Terrestrial provides flexibility to meet the needs of different television markets like Smartphone, PC and moving vehicles. The biggest future trends concern portability and mobility – watching TV anytime anywhere. DVB-T2 Lite is also highly suitable as the future standard for digital radio. Local content has been a common requirement for DTT Networks, being most economic mode. Typically up to 50% of services in local/regional channels may be appropriate to the use of DVB-T2. The high efficiency power amplifier techniques like envelope tracking, Doherty technology, switched mode power amplification etc., provide a transmitter with power efficiency and less carbon emission.

Receiving Devices

Reception was checked using Integrated Digital TV (iDTV), STBs, dongles with mobile phones and tablets. A Diversity

receiver was also tested using 2-antenna diversity receivers, the test in the vehicle was highly satisfactory. An active indoor antenna with a gain of about 30dB was very useful. Standards for Set Top Box for Digital Terrestrial SDTV/ HDTV and integrated Digital Television (iDTV) have been completed by the Bureau of Indian Standards (BIS). T2 Radio receivers are also available in addition to reception of Radio services on mobile phones. The opportunity for efficient codecs like HEVC, plurality of dongles and inbuilt DVB-T2 tuners in smartphones and tablets will give leverage to manufacturers, broadcasters and viewers.

Conclusion



DVB-T2 for terrestrial transmission is highly useful for the distribution of regional and local content. **Network reach** (Coverage by population) and **appealing content** particularly **Regional/Local contents** are key for success for DTT. The essence of the business model is the proper mix of programme genre of News and Entertainment, as these ranks highest for viewing patterns across all countries and in all age groups. Before analogue-switch-off (ASO) in India, there are lot of expectations to meet and miles to cover. The experience gained, experiments with and expectations for, DVB-T2 and T2-Lite are of great interest in India, which is an attractive investment environment for digitalisation of terrestrial networks for content distribution. It will be boon to the nation to have mobile reception on smartphones, PCs, in moving vehicles and on radio and all those with a single Transmitter. A good mix of the programme genres of local and national programmes seems to be a good business model. So, India awaits exciting technological advancement with commissioning of DVB-T2 and T2 Lite Transmissions.

author



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Sh. M. S. Duhan has rich experience of system design, installation and operations of the transmitters of AIR and Doordarshan. He possesses degrees in Electrical Engineering, MBA and Master of Mass Communication. He has been granted DD Awards, for the best maintained High Power Transmitters. Besides system design and planning of TV Transmitters his keen interest is in study of RF waves – AM, FM and COFDM. He has given many presentations on Digital Terrestrial TV in various conferences and seminars as well as participation in TV Talk shows. He has contributed significantly to the implementation of DVB-T2 Transmitters in India and the finalisation of the BIS Standard for DVB-T2- HDTVSTB and iDTV. He is currently posted as Deputy Director General (Engineering) at DG: DD New Delhi where he is responsible for planning and implementation of TV Transmitters and spectrum planning for Doordarshan.

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ABU FESTIVAL OF TECHNOLOGY WEBINARS 2015

THE ABU TECHNOLOGY WEBINAR FESTIVAL 2015

For the fifth consecutive year a technical webinar festival was organised by ABU Technology, to provide information on the latest developments in broadcasting. It comprised a series of online webinars offered free of charge to all ABU members and others in the industry.

The festival was conducted from 17 August to 21 September 2015 and included presentations on different aspects and applications of broadcast technology. Each webinar session was of around 90 minutes duration, with content taken from various recent ABU Technology Department events. Each webinar session was run twice a day, once in the morning and then the same session repeated in the afternoon. This was to facilitate the participation of attendees from different time zones.

This year the webinar sessions were grouped under the following main themes, with a total of 24 days of webinars presented throughout the more than month-long series.

- Spectrum Issues in Broadcasting
- Workflow and Media Management: IP production, Archiving, Delivery
- Media Evolution: Integrated Broadcast-Broadband, Over-The-Top, UHDTV-1 (4K), Cloud
- Digital Radio Technologies, Implementations and Updates: Hybrid Radio, DRM, DAB+
- Digital Television: HbbTV, Next Generation TV

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Audio Description Trials in TRT

by Tolga INCE and Ahmet Akin KURUCU

TRT

history

With the publication of the 'Accessibility Strategy and National Action Plan (2010-2011)' by the Administration of the Prime Minister, for Disabled People of Turkey, all public institutions and organisations are obliged to implement the plan in seven years. In accordance with it, TRT as a public broadcasting organisation, started research into audio description and audio captions for the blind or visually impaired, and closed captioning and signing for the deaf in 2012.

Technical Studies

In this context, a commission was formed consisting of technical units and channel coordination units.

Initially, the audio tracks to be selected were investigated according to the international file exchange system.

Technology	Audio Channels
Hdcam VTR	4
270 Mbit/s ASI-mux Link	4/8
Dolby E (16 bit)	6
Dolby E (20 bit)	8
HdcamSR VTR	12
E ² (Linear Acoustics)	16
SD-SDI	16
HD-SDI (1.5 Gbit/s)	16
HD-SDI (1.5 Gbit/s) Dual link	16 x 2
HD-SDI (3 Gbit/s)	32 (Proposed)

This is a listing of representative Technologies used to bear multi-channel audio streams and associated metadata. The list is not comprehensive.

Later the commission evaluated the EBU Recommendation R 123 "Audio Allocation for File Exchange" and ascertained that ref. 4c and ref. 8h could be used. This means that audio tracks 3 and 4 or 7 and 8 could be used for audio descriptions.

According to TRT program standards, audio tracks 3 and 4 respectively were already allocated to programme effects and original sound. So, audio tracks 7 and 8 were allocated for audio description.

Besides this, our brand new head end system had the capability for statistical multiplexing and was ready for audio description broadcast and the encoders' "visually impaired" property has been enabled.

After research and preparation of all technical infrastructure, a series of meetings and interviews were held with Arçelik and Vestel companies in the first quarter of 2014 to discuss the tests. Meetings were held on a completely voluntary and social responsibility basis and, in this context, we continued to work with Vestel.

Firstly, a part of the Keloğlan cartoon was broadcast on the TRT Childrens' channel in compliance with audio description for test purposes.



Audio tracks 7 and 8 were directed to the headphones by the Vestel engineers, however these did not include the original sound.

This was not a successful trial as the original sound needed to be heard. In the second study, 1,2,7 and 8 audio tracks were mixed and directed to the headphones successfully.

TRT 1, TRT Children, TRT Avaz, TRT, Documentary, TRT Sport, TRT Education channels have been technically ready

for audio description broadcast since October 2014. TRT Avaz channel is ready for closed captioning and singing for deaf. Also, other TRT TV channels will be ready technically within the year 2015.

Terminology and Definitions

Audio Description: Also known as “Video Description”. Audio description is the verbal depiction of key visual elements in media and live productions. The description of media involves the interspersing of these depictions with the programme’s original audio.

Captioning, Audio is also known as Audio Subtitles or Spoken Subtitles. Audio content of an audiovisual work or sequence in a foreign language is converted into captions or subtitles in the target.

EBU – European Broadcasting Union, EBU is the largest association of national broadcasters in the world. It has 73 Active Members, from 56 countries in and around Europe, and beyond.

Captioning, Closed is also known as Closed, or User-selected Subtitles. The user has to select the service, c.f. Open Captioning which is seen by all and cannot be turned on and off.

Impairment, visual: Visual impairment (or vision impairment) is vision loss (of a person) to such a degree as to qualify as an additional support need through a significant limitation of visual capability resulting from either disease, trauma, or congenital or degenerative conditions that cannot

EBU R 123				Audio Track Allocation for International File Exchange																
				Table 1: Audio Track Allocations for International File Exchange																
				AUDIO TRACK NUMBER																
R 123 Ref.	No. of Tracks	Programme Type	Notes	Origin (used by)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2a	2	Encoded MCA	4	[1] 11a	encoded MCA															
4a	4	② with encoded MCA	1, 4, 6	[1] 11a	② L	② R														
4b	4	② with IT or EFX		[1] 12b (ARZ, ZDF, ORF)	② MCA L	② MCA R	② IT or EFX L	② IT or EFX R												
4c	4	② with AD or FL		(ARZ, ZDF, ORF)	② AD/FL L	② AD/FL R														
8a	8	② with discrete MCA	1, 2	[1] 11b	② L	② R	② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R								
8b	8	Discrete MCA with ②	1, 3, 5	[1] 11c	② L	② R	② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R								
8c	8	Discrete MCA with 2 x ②	1, 3, 5, 6	[1] 11c	② L	② R	② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R								
8d	8	2 x ② with 2 x encoded MCA	2, 4, 7	(SKY)	② MCA L	② MCA R	② EFX L	② EFX R	② MCA L	② MCA R	② MCA L	② MCA R								
8e	8	② with M/S and/or ② format characteristics	4, 7		② L	② R	② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R								
8f	8	② with AD or FL and IT and encoded MCA		(ARZ, ZDF, ORF)	② MCA L	② MCA R	② AD/FL L	② AD/FL R	② IT L	② IT R	② MCA L	② MCA R								
8g	8	② with encoded MCA and IT and AD/FL		(ARZ, ZDF, ORF)	② MCA L	② MCA R	② MCA L	② MCA R	② IT L	② IT R	② AD/FL L	② AD/FL R								
8i	8	② with IT and/or IT and encoded MCA		(ARZ, ZDF, ORF)	② MCA L	② MCA R	② IT L	② IT R	② MCA L	② MCA R	② MCA L	② MCA R								
12a	12	② with discrete MCA + encoded MCA + mono/②	1, 2	(VTT)	② L	② R	② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R								
12b	12	② with discrete MCA + encoded MCA + mono/②	1, 3, 5	(VTT)	② L	② R	② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R								
12c	12	2x ② with 2x encoded MCA + extra ②/s	2, 4, 7		② MCA L	② MCA R	② EFX L	② EFX R	② MCA L	② MCA R	② MCA L	② MCA R								
12d	12		4, 7		② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R	② MCA L	② MCA R								

be corrected by conventional means, such as refractive correction, medication, or surgery. The loss may cover visual acuity, significant central or peripheral field defects or reduced contrast sensitivity.

Signing is the communication using sign language.

TRT: Turkish Radio and Television Corporation, Public Broadcaster of Turkey

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TRT

Tolga Ince is Deputy Head of Studios and Programme Transmission Systems Division at TRT. He holds degrees of MSc in Electronic Engineering and B.Sc. in Electrical and Electronics Engineering from Gazi University. Mr Ince has worked with TRT for more than 15 years as engineer, chief engineer, manager and more recently as deputy head of the technical division. He has been technical manager on behalf of TRT during many events such as general elections, world football championships, 2000 Sydney, 2004 Athens and 2008 Beijing Olympics. He has also been involved in the planning and implementation of new head end systems.

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Ahmet Akin Kurucu has worked for TRT for more than 20 years and has been involved in many software and hardware development projects involving microprocessor programming and applications; remote control systems and security systems. He has expertise in studio planning, broadcast automation systems, media servers. He holds an MSc degree in Renewable Energy (Reading, U.K.) and a B.Sc. in Electrical-Electronics Engineering from Middle East Technical University. A Ph.D candidate Mr Kurucu also holds degrees of M.A. in Public Administration and an M.B.A

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Real-time 3D Sign Language Avatar Animation from DTV Closed Captions

by Juhyun Oh, Byungsun Kim, Kisun Yang and Sungchoon Park

Korean Broadcasting System (KBS), Korea

abstract

Whereas closed captions are provided for almost the whole broadcast time for deaf people, in South Korea sign language broadcasting covers only 5% of the time. By translating the closed captions into sign language it is possible to provide three-dimensional (3D) sign language interpretation for more of the broadcast time. We propose a real-time avatar-based sign language broadcasting system for all kind of TV programmes. We analyzed the last three years' of weather forecast scripts, and an open-domain corpus of about 1.2 million words from KBS, so that we could find the frequency of each word and determine the priority of sign word motion capture. We used the Korean wordnet, *KorLex*, to build the sign language synonym dictionary and disambiguate the words with multiple meanings, for better translation performance. Optically-captured 3D sign language motions are used for the avatar to present motion-blended sign language interpretation. We implemented the real-time sign language interpretation system by extending the sign language dictionary, translation module, and motion database of our previous on-demand weather forecast sign language interpretation system.

1. Introduction

Closed caption and sign language broadcasting services for deaf people are provided with terrestrial digital television (DTV) in most countries. Closed caption broadcasting, within the DTV standard, can be selected, to be shown or hidden [1], and so does not disturb the hearing (non-disabled) audience's viewing. Therefore, closed captions can be provided for the whole broadcast time. However, sign language translation, aside from the cost problem, occupies space on the TV screen and is provided for little more than 5% of broadcast time in Korea. Furthermore, sign language interpretation is provided mostly in the daytime, when the viewer ratings are not high. It is known that deaf viewers are also dissatisfied with the sign language broadcasting provided, because it is usually small and fixed in the corner of the screen.

If one can generate the sign language translation from the closed captions, the sign language translation can be provided for the remaining 95% of the broadcast time. For this purpose, the real-time Korean-Korean sign language (KSL) translation and 3D avatar animation technologies are required. There are automatic 3D avatar-based sign language translation systems working in a few countries. A system for Japanese sign language (JSL) proposed the use of TV programme making language (TVML) by Kaneko et al [2]. An automatic translation and middleware structure for DTV

was also proposed for Brazilian sign language (LIBRAS) by Araújo et al [3].

We have proposed a system that translates the closed captions of weather forecast programs into KSL and present it with 3D avatar animation [4]. The translated sign language data are sent via the Internet to receivers such as personal computers (PCs) or mobile devices to show the corresponding sign language animation. The system consists of the Korean-KSL translator, the sign language avatar animation system, and a server system that provides the closed caption and video for the most recent weather forecasts in an on-demand manner. We can extend the translation and the animation systems for all kind of TV programs other than weather forecast.

Similar to existing systems, the purpose of the system proposed in this paper is to provide a service when human interpreters are not available rather than to replace them.

2. Sign Language Translation

Table 1 shows an example of Korean-KSL translation in a couple of weather forecast sentences by a professional sign language interpreter. Our goal is to implement an automatic translator that outputs similar KSL results when the same Korean weather forecast input is presented.

Table 1: An example of manual Korean-KSL translation in weather forecast scripts (expressed in English for the readers)

Korean	Recently it is cold every weekend.
KSL	week + end + cold 
Korean	It is raining from the early morning in the southern area and Jeju Island.
KSL	warm + place + and + Jeju Island + place + morning + from + rain

2.1. Sign Language Dictionary

There are about 12,000 words in KSL Dictionary. It is difficult to build the Korean-KSL dictionary and capture the motions for all these words. Therefore we analyzed weather forecast scripts from KBS and a few other sources for the last three years. After some preprocessing of the weather forecast scripts, the scripts are divided into parts of speech (POS). For this purpose we use the POS tagger of PNU with about 1 million registered words [4]. The accuracy of the POS tagger is about 98%. Since the basic word orders of Korean and KSL are similar as subject-object-verb (S-O-V), direct word-to-word translation rules are applied in the proposed system.

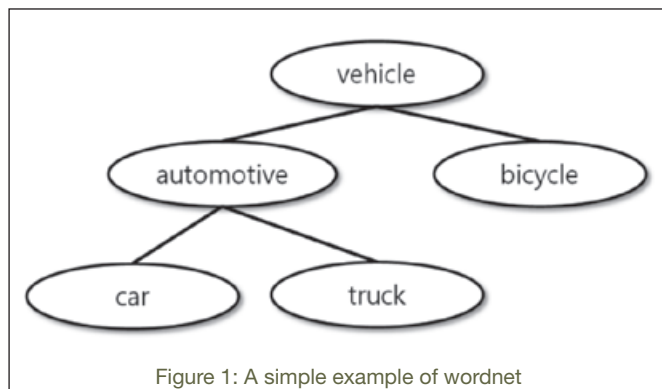
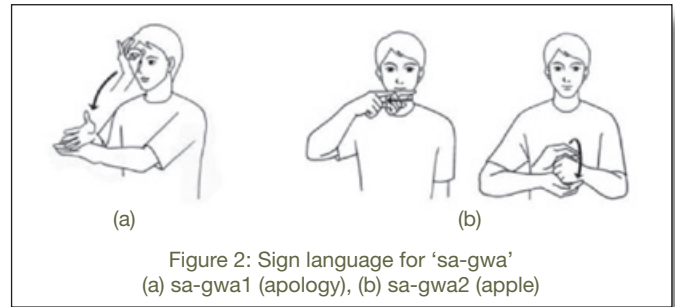


Figure 1: A simple example of wordnet

Synonyms are translated into same sign language words. For example, 'house', 'housing' and 'abode' are synonyms and all should be translated into one sign language word. The synonym dictionary is built based on KorLex by Yoon et al [6], which is the Korean Wordnet. Using this synonym dictionary, a word that is absent in the KSL dictionary still can be translated to a synonym, increasing the translation success rate. In Figure 1, if the word 'truck' is not registered in the dictionary, the word still can be translated to 'car' or 'vehicle'. Without the synonym dictionary, non-registered words would have been omitted or represented with finger spelling, making the system less useful.

2.2. Word Sense Disambiguation (WSD) with Korlex

Words that have multiple meanings have ambiguities and the correct meaning must be chosen for correct translation. For example, the same word 'sa-gwa' in Korean is used to represent two different meanings, 'apology' and 'apple', as shown in Figure 2.

Figure 2: Sign language for 'sa-gwa'
(a) sa-gwa1 (apology), (b) sa-gwa2 (apple)

To determine the meaning of a word, context words around it are considered. If the context words such as 'formal' or 'government' appear together with the word 'sa-gwa', it is translated to 'sa-gwa1' (apology). If the context words 'drink' or 'juice' appears, 'sa-gwa2' (apple) is chosen. In addition to the word 'sa-gwa', the related sibling words such as 'orange', 'peach', 'gratitude', and 'appreciation' are used together to compute the χ^2 values to increase the recall. Table 2 shows the calculated χ^2 values of the word 'sa-gwa' and its siblings with the context words.

Table 2: The siblings of 'sa-gwa' and χ^2 values with the context words

context words	χ^2 with 'sa-gwa1' (apology)	χ^2 with 'sa-gwa2' (apple)
'drink' (verb)	1.25	86.94
'juice' (verb)	0.01	17958.63
'government' (noun)	3.88	0.01
'people' (noun)	9.23	0.01
'formal' (adj.)	70.05	0.01
'announcement' (noun)	25392.88	108.05

3. 3D Avatar Animation



Figure 3: The motion capture system and the body and finger motions

In order to present the translated sign language codes, a sign language motion database must be built. One can make the motions by editing each key frame, but the motions are much more natural when they are captured from a human interpreter. In addition to the 2,700 sign language motions for daily life, we captured 507 words dedicated for weather forecast by a studio. 15 Vicon motion capture cameras and 41 infra-red markers were used to capture the body motion of a professional sign language interpreter, as shown in Figure 3. The CyberGlove system was used to capture the hand and finger motion.

Body and finger motions are combined together in the MotionBuilder software. We manually filter the noisy motion capture data. The original motion data at 250 frames per second (fps) are resampled to 30 fps. Marker interferences are resolved at this time. Figure 8 shows the motion data assigned to biped bones. The CyberGlove captures the right hand and fingers' motion at 90 samples per second. The left hand motion is copied or manually edited. Figure 4 shows the body and hand motions combined together in MotionBuilder software.

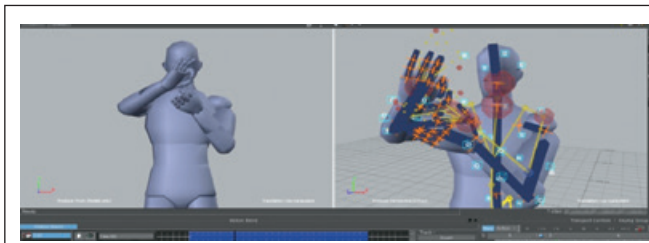


Figure 4: The combined motion

We built a new 3D avatar for sign language animation using 8,000 polygons. Figure 5 shows the avatar model, and the motion applied to the avatar.



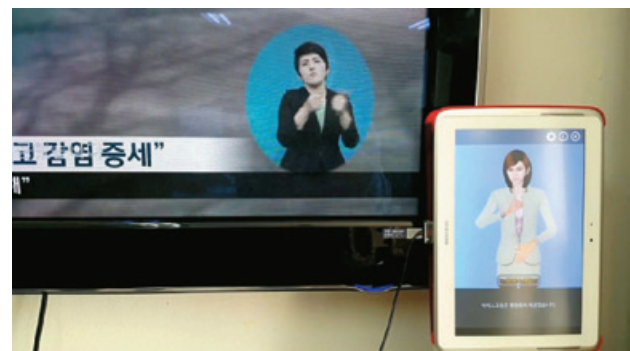
Figure 5: The avatar model and the captured motion applied to it

4. Results of the Proposed System

Figure 6 shows results of the proposed system, in the forms of mobile applications and Windows software.



(a) Weather forecast application [4]



(b) Mobile application for real-time language interpretation, beside a human interpreter screen



(c) PC software (file play mode)



(d) PC software output overlaid on a TV screen using a chroma keyer

Figure 6: Demonstration of the proposed system

Table 3 shows the translation rate for the weather forecast, for the internal and external corpus. It is shown that the translation success rate is improved using KorLex.

Table 3: Translation results of weather forecast

	Corpus size (words)	Word translation rate	
		without KorLex	with KorLex
Internal corpus	82,303	95.87%	96.17%
External corpus	1,448	88.60%	90.68%

Weather forecast is a relatively easy domain for machine translation. The translation success rate decreases when the domain is open. Table 4 shows the translation rate for a few different categories.

Table 4: Open-domain translation results

Category	Corpus size (words)	Word translation rate
News	250	61%
Sports	242	61%
Drama	238	67%

5. Conclusions

The system proposed in this paper generates 3D sign language animation by translating the closed captions in DTV for the deaf people to view the weather forecast with sign language. In order to find the frequency of each word, we analysed the last three years' weather forecast scripts from several sources. We built a sign language synonym dictionary using KorLex, to improve the translation performance. KorLex was also used for the word sense disambiguation process. We optically captured the motions of a professional sign language interpreter and built the motion database. The motions were applied to a 3D avatar with motion blending. We extended the sign language weather forecast system's dictionaries, translation rules, and motion database, for the real-time open-domain sign language interpretation system. The proposed real-time sign language interpretation system is being considered for use for N-screen services such as 'my K' [7].

Although the proposed system is targeted only for KSL users, we believe that it will be helpful to the other similar researches, especially if the source language and target sign language have a similar word order as in Korean and KSL. In future work, we will attempt to develop a statistical translation system to improve the translation rate, and build a large-scale KSL corpus for it.

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Acknowledgement

The proposed system was developed by the joint research of KBS with Pusan National University and Bluenine Inc.



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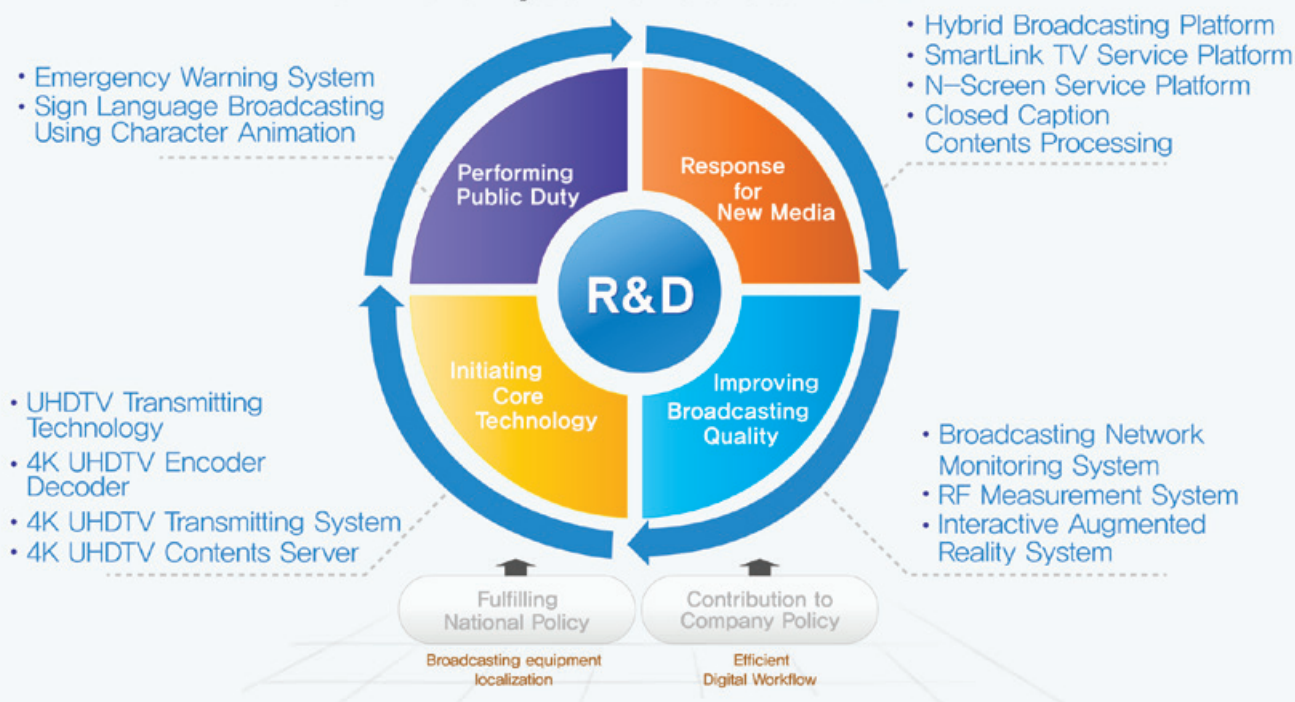
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What happens when content and audience connect is an everyday magic. More than 350 digital TV operators in over 85 countries rely on us to sustain that magic by protecting their content and revenue.

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Meet our Host

Turkish Radio and Television Corporation



TRT is Turkey's first and only channel in public broadcasting. It was established in 1927.

Currently TRT is the biggest broadcaster in Turkey with its 14 TV channels and five national, five regional, three international and three local radio channels. It continues to grow bigger and stronger.

In Ankara, Istanbul and Izmir there are 17 production studios, seven dubbing studios, 15 OB vans and nine uplinks. Almost everything has been upgraded to HD.

Decor, makeup, graphic animation, editing, post production, photography, dubbing and maintenance are all done in-house. In Turkey, TRT channels are distributed on terrestrial, satellite, cable, IPTV and OTT.

With a big terrestrial network of TV and radio channels, TRT reaches almost the entire country.

Radio

TRT FM: 99.9 percent
Radio-1: 93.6 percent
Radio-Nağme: 88.3 percent
Radio-Türkü: 88.3 percent

Television

TRT-1: 98.4 percent
TRT-News: 98.1 percent
TRT-3: 96.8 percent
TRT-4: 92 percent

All TV and radio channels are distributed via TRT's main satellite distribution platform, Turksat, to Europe, the Middle East and North Africa. TRT TURK, VOT (Voice of Turkey) and TRT FM are distributed via 11 satellites to North America, the whole of Europe, Asia, North and South Africa and Australia. Besides this some TV channels are distributed by cable operators and on IPTV platforms in the US and some parts of Europe.

Voice of Turkey shortwave radio programmes are transmitted to Europe, Asia, North Africa, North America and Australia in 37 different languages, 68 hours daily.

TRT's website, www.trt.net.tr, carries live broadcasts and podcasting. Android and iOS apps are serviced and there are also 41 different language web sites in service.

With all these networks, TRT reaches 80 percent of the world.

The video server, media asset management (MAM) and the playout automation systems used in many of TRT's news, production and continuity studios are fully integrated with each other and integrated with NRCS in news studios. The systems can exchange video material and xml metadata with the digital archive system located in the Archive Department. The systems installed in news studios that are being used for graphic presentation on video monitors, monitor groups and video-wall systems are also fully integrated with NRCS.

Besides the video server, MAM and playout systems working together, in the TRT Avaz and Documentary channels there are eight and three different language supports respectively in DVB Subtitling.

The dubbing studios are also compliant with the workflow system and have their own editing suites.

TRT started HBB TV applications for TRT 1 HD, TRT News HD, TRT Sports HD and TRT HD channels in February 2015. In the broadcasts, news, finance, EPG, weather forecast, VOD, prayer times and programme trailers are added. For the parliament elections, an interactive application was used. Studies on MPEG-DASH and adaptive streaming are continuing.

TRT updated its first generation digital archive system in 2009 with new functionalities such as; file ingests and xml



based integration from different server systems, automated quality control checks, digitally embedded watermarking, complicated archival workflow as the backbone of the Department of Archives, audio-image-documents archival, tape ingest channels with HD, eight channel audio support with Dolby, multiple preservation format support up to 100Mbit/secs, one-to-one copies in robotic tape libraries as disaster backup in different locations with LTO-5 technology, digitization of film material and restoration. TRT has doubled the storage area capacity and has been continuously migrating from LTO-4 and LTO-5 to LTO-6 tape technologies and now has more than 85,000 hours of digitized video assets in the archive system.

It is sharing this experience with many of its contributors as well as with the ABU at many events.

Together with conventional broadcasting in many networking environments, the R & D Department of TRT is working hard to develop solutions to some specific challenges.

Some of the projects are as follows:

- **LED Projectors:** To make much more energy-efficient lighting compared with the old ones, TRT is changing the traditional projectors and designing its own LED projectors.
- **Light Lifts:** TRT has been producing projector lifts for a long time. It is the unique producer of these systems in Turkey.
- **Broadcast Monitoring System:** TRT built a system to monitor the satellite feeds of TRT.

- **Centralized clock system:** TRT has been producing a centralized clock system, which is synchronized via satellite.
- **Emergency Warning System:** Although Turkey is a country of earthquakes there is no EWS system yet. TRT formed a pilot system, which consists of 10 EWS receivers and two EWS encoders with two audio IRDs. According to the project plan, a demonstration of the pilot system will be made for AFAD, the organization responsible from handling emergencies in Turkey. And the development of the system will be done by TRT's own engineers.
- **Retro Radio:** TRT designed a retro look radio and had it produced in the market. It is planning to put a DAB+ receiver on it.
- **Digital Radio:** TRT is testing digital radio standards namely DAB+ & DRM30.
- **Digital terrestrial television:** TRT is working on DTT, with some tests of DVB-T2 in its laboratory.
- **RadioDNS:** TRT is working with the EBU on developing a RadioDNS application.

As a public broadcaster, with social responsibilities, TRT started the portal www.engelsiztrt.tv in October 2013. It transmits TRT's favorite series, programmes, news and documentaries with audio description and sign language, and subtitled for people with hearing disabilities.

The portal includes a contact form that enables audiences/viewers to get in touch immediately. TRT New Media is trying to reach more people day by day with more attractive and satisfying services.

The logos of TRT TV and Radio channels:



Industry Interview with

Dr. Zeki ÇİFTÇİ, Deputy Director General of Turkish Radio Television Corporation



In your opinion, what are the critical issues for broadcasters in general and specifically for TRT?

Technology is developing at a tremendous pace especially in the broadcasting industry. Moreover people tend to watch content from the Internet rather than on-air television broadcast. Broadcasters should be very flexible to adopt new technologies and trends in the industry. Broadcasting is becoming more and more an IT business nowadays. It is time to invest in R&D. Here we do our best.

What are your broadcast platforms in Turkey? What role does over-the-air delivery play in Turkey?

Broadcast platforms in Turkey are digital satellite broadcasting, (analogue satellite broadcasting has been abandoned), analogue terrestrial broadcasting (digital terrestrial broadcasting is still being planned), analogue and digital cable broadcasting and various IPTV platforms.

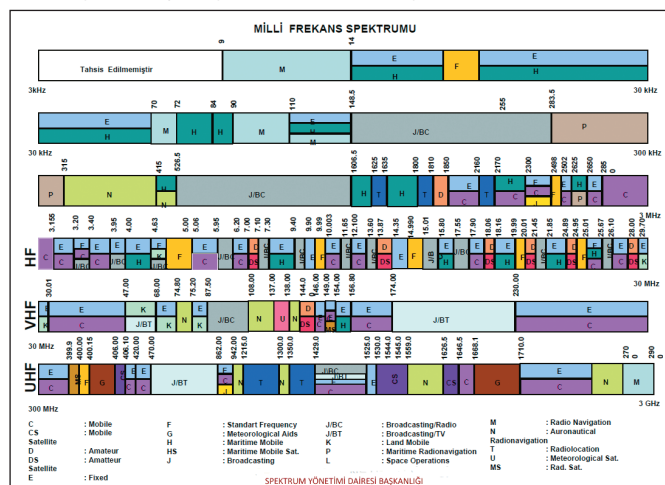
What are the challenges that mobile will bring to the broadcast operations of TRT and broadcasters in general in Turkey?

Mobile is starting to transform the face of broadcasting. Interactive apps and 4G are helping broadcasters evolve their content for today's audience. With the number of mobile-connected devices soon due to exceed the number of people on earth, broadcasters must respond to the changes in viewing habits in order to meet consumers' expectations of experiencing a more engaging, interactive and tailored broadcast experience.

Coupled with the launch of 4G, streaming broadcast on mobiles will produce higher quality content, a more engaging experience and a more immersive viewing experience. This is one of the most significant changes in the broadcast experience since the introduction of colour TV.

South Korea has allocated frequencies from the 700MHz band to be utilised for UHDTV. What is the demand for UHDTV content in Turkey?

Currently the frequency allocations in Turkey are as shown in this chart.



Do you produce any television content in UHDTV-1 format?

No, TRT does not produce UHDTV content for now.

In Europe there are some video service providers who offer UHDTV-1 content. What are the plans of TRT and what preparations have you made for such a demand when it arises?

TRT is about to launch a UHDTV-1 working group and we always follow technological advances in the broadcasting industry. TRT 4K channel test transmission recently started with outsourced content.

The broadcasting industry has been embracing technological developments to provide better experience for its audiences. Integrated Broadcast-Broadband (IBB) services based on such technology are being deployed. TRT has launched hybrid broadcast services on satellite delivery using HbbTV technology. What has the response been?

We got lots of positive feedback from viewers and TV/Satellite manufacturers. During the test period most TV forums started to discuss about HBB TV and TRT Hybrid TV application.

Based on the uncertain outcomes of WRC-15, will there be any adverse impact for TRT's over-the-air operations?

The World Communication Conference will be held in Geneva in October 2015. Turkey is planning to transfer its terrestrial broadcasting into digital systems. After this frequency allocations will be more effective in Turkey. Being the only public broadcaster in Turkey, TRT has privileges and hopefully frequency allocations will never be a problem for TRT.

Has TRT made its concerns known to the spectrum regulator in Turkey?

TRT is always in full collaboration with the spectrum regulator in Turkey.

As a part of EU policy on fostering innovation and competition, media space will become borderless. What are the implications of such initiatives for TRT, especially in relation to offering HbbTV and over-the-top services?

So far TRT has not been into over the top services, but recently started HbbTV broadcasting. We are also following industry trends in over-the-top services. BBC's iPlayer could be a good model for us.



WorldDAB is the global industry forum facilitating the implementation of digital broadcast radio based on the DAB family of standards.

Our goal is to promote the standard around the world by working with sound and data broadcasters, network providers, car, receiver, chip and equipment manufacturers, governments and official bodies to encourage international co-operation and a smooth, co-ordinated roll-out of services.

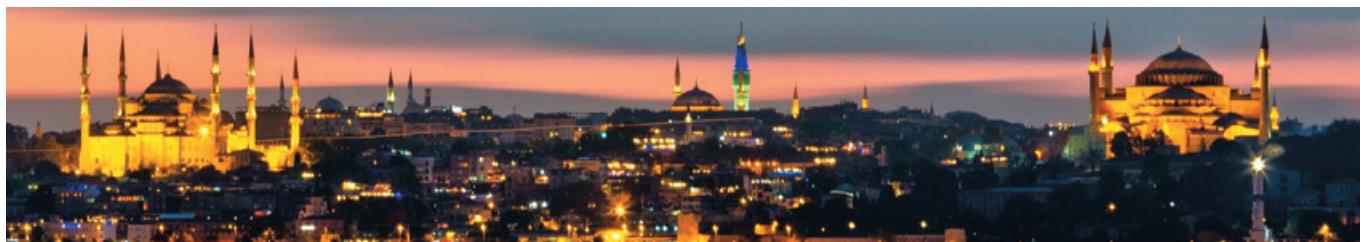
Through workshops, on-air demonstrations and on the ground technical support, we provide you with expertise to assist you with:

- Regulation
- Licensing
- Technical trials
- Network build out
- Production of new digital radio content
- Marketing

DAB+ is the digital radio standard of choice for broadcasters across the Asia Pacific

The move from analogue to digital radio is important for:

- Building brands
- Providing long term transmission and network savings
- Creating new revenue opportunities
- Securing valuable spectrum for radio
- Future proofing radio in a digital world
- Allowing more content for your listeners



ABU Technical Committee 2015 meets in Istanbul, Turkey

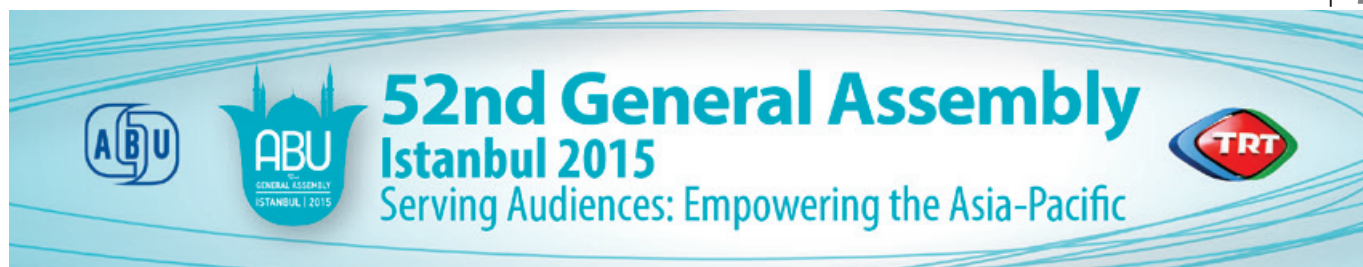
The 2015 ABU Technical Committee Meeting will be hosted by the Turkish Radio Television Corporation (TRT) on 27 and 28 October.

The highlights of this year's meeting are:

- The Technology Debate on the ***Future Media Delivery will be only on IP***
- The ***Host Presents*** by TRT
- The ***Keynote Presentation*** by Dr Egon Verharen, NPO (The Netherlands), Chair, EBU Technical Committee

Time/Date	Monday 26, October	Tuesday 27, October	Wednesday 28 October
9.00am – 10.30am		CC LOWER 1 OPENING SESSION Announcements & Presentation of ABU Technical Review Prizes and Engineering Awards	CC LOWER 1 Keynote Presentation Technology Debate <i>Future Media Delivery will be only on IP</i>
11.00am – 12.30pm		Director's Report Bureau Proposals Technological Inspirations	Summary from Topic Area Chairmen: Production, Transmission, Training & Services and Spectrum New in Study Groups <i>API, HDR, Spectrum, EWS, Character Set for Digital Radio, Updates in Digital Broadcasting</i>
2.00pm – 3.30pm		Strategic Issues <i>Spectrum for Future Broadcasting, DSO+ASO – Leapfrogging to DTT 2.0, IBB–Integrated Broadcast Broadband, UHDTV and EDR, Devices, Human Capacity Building, Disaster Communication</i> Members' Present <i>New services, New features, New installations, New Trails, Completion of DSO</i>	The Host Presents: <i>TRT-Turkey</i> Hybrid TV EWS studies Digital Archives: Outgest & Ingest Methods Audio Description New Recommendations & Decisions of the Technical Committee
4.00pm – 5.30pm	SADIRVAN A Technical Bureau Meeting 4.00pm – 6.00pm <i>Restricted to Members of the ABU Technical Bureau</i>	Networking with ABU TLOs	Useful to know: • New members • Updates from Sister Unions & International Organisations • Updates from Status reports Announcements <i>Closing</i>





SCHEDULE OF MEETINGS

52nd ABU General Assembly & Associated Meetings
Istanbul, Turkey
24 – 31 October 2015

SERVING AUDIENCES: EMPOWERING THE ASIA-PACIFIC

MEETINGS				
Saturday, 24 October	TIME: 15:00-16:30 VENUE: JUPITER Sports Broadcast Rights Committee Meeting			
	TIME: 16:30-17:30 VENUE: JUPITER Sports Finance Committee Meeting			
Sunday, 25 October	TIME: 09:00-17:30 VENUE: SADIRVAN A Sports Group Meeting	TIME: 14:00-18:00 VENUE: MERCURY Programme Bureau Meeting	TIME: 14:00-18:00 VENUE: JUPITER Planning & Strategy Group meeting	
Monday, 26 October	TIME: 09:30-12:30 VENUE: SADIRVAN A Sports Group Meeting	TIME: 09:00-12:30 VENUE: SADIRVAN B Radio Working Party		
	TIME: 16:00-18:00 VENUE: SADIRVAN A Technical Bureau Meeting	TIME: 14:00-17:30 VENUE: SADIRVAN B Programme Committee		
Tuesday, 27 October	TIME: 09:00-17:30 VENUE: CC Lower 1 Technical Committee	TIME: 09:00-17:30 VENUE: SADIRVAN B Programme Committee	TIME: 19:00-20:00 VENUE: LALEZAR Meeting of the Presidency	
Wednesday, 28 October	TIME: 09:00-17:30 VENUE: CC Lower 1 Technical Committee	TIME: 09:00-17:30 VENUE: SADIRVAN B Women With the Wave Forum series	TIME: 09:00-17:30 VENUE: SADIRVAN A Quality Management Workshops	TIME: 09:30-17:30 VENUE: MERCURY Administrative Council <i>(COUNCIL MEMBERS ONLY)</i>
	TIME: 20:00-21:30 VENUE: Istanbul Congress Center TV Song Festival			
Thursday, 29 October	TIME: 11:00-16:00 VENUE: BOSPHORUS CRUISE Excursion	TIME: 19:00-20:00 VENUE: MERCURY President's News Conference		
Friday, 30 October	TIME: 09:00-17:00 VENUE: Conf. Center Upper Level OFFICIAL OPENING • 1st Plenary Session • 2nd Plenary Session • 3rd Plenary Session	TIME: 18:00-21:00 VENUE: Conrad Istanbul Bosphorus Hotel Ballroom Presentation of ABU Prizes		
Saturday, 31 October	TIME: 09:00-12:30 VENUE: Conf. Center Upper Level Super Panel Session Serving Audiences: Empowering Society	TIME: 14:00-15:30 VENUE: Conf. Center Upper Level Professional Discussion The Spectrum Battles: Reclaiming and Retaining The Broadcasters Spectrum	TIME: 16:00-17:30 VENUE: Conf. Center Upper Level Restricted Working Session <i>(Full and Additional Full members only)</i>	TIME: 19:00-21:00 VENUE: InterContinental Istanbul Hotel "Bosphorus Ballroom" NHK Reception

Sony Study Tour

— 2015

SONY

Report by Lasantha Samaranayake

of EAP Broadcasting Company Limited of Sri Lanka,
winner of the 2014 ABU Developing Broadcasters' Excellence Award sponsored by SONY

Sony Corporation of Hong Kong Limited



I started my study tour with the Sony Corporation of Hong Kong Limited. During the visit I met Mr Hiroyuki Takahama, Ms Joan Chan, Mr Wilfred Leung and Mr Calvin Ng. The Sony team commenced the discussion with the theme 'Beyond Definition'. It was mainly focused on 4K and UHD Technology, along with the latest developments in High Frame Rate, IP High dynamic range, XAVC and wireless streaming. Regarding the 4K camera system, the cutting-edge Sony technological innovations of the HDC-4300 4K camera were described. The camera has the world's first three- $\frac{2}{3}$ " 4K CMOS devices, which feature high sensitivity, the sharpest cleanest super-zoom, and give more precise colour reproduction. The camera can be used for sports, news and entertainment applications. I learned that the HDC-4300, one-camera platform is able to handle 4K, HD and super slow motion and joins Sony's widely acclaimed HDC series family of live production solutions. The Sony PMW-F55 CineAlta 4K Digital Cinema Camera was described together with its features for capturing 4K, 2K and HD resolution video in a variety of formats via the camera's internal recorder and an 8.9MP Super 35mm image sensor. The Sony 4K CMOS sensor captures a true 4K, 4096 x 2160 DCI-standard cinema images. Sony claims to be the only manufacturer with acquisition and display technologies that can achieve HDR for professional and consumer applications.

Next discussed were the Sony IP live production solutions and the PWS-100RX1 Network RX station for XDCAM camcorders and live streaming over 4G/LTE and Wi-Fi applications. For IP live solutions, all connections are simplified using a single network cable, which reduces the number of cables. Sony Network Manager can easily monitor usage and traffic. Operation of IP-based AV production workflows for in-house and remote location was explained including new control

protocols and ways of structuring the packets to ensure the delivery of high definition images over an existing Ethernet network. The high capability of error correction includes real time ARQ, Adaptive Rate Control and Forward Error Correction in Sony's QOS technology, which gives correction of up to up to 30% packet loss.

Sony's switcher lineup, including its MVS series was also introduced. It has colour XPT buttons, OLED displays with more status information, more flexible buttons. The high-end MVS 8000X has 40 keyers and 5MEs. Next described was an optical disc archive system, based on Blu-ray technology and involving the use of multiple bare discs contained within a robust cartridge, together with a dedicated disc drive unit.

TVB



My next visit was to TVB Hong Kong, which runs a pay TV service and is also Hong Kong's commercial free-to-air broadcaster. I had a meeting with Mr Lam Wing, Mr Vincent Knok Wing Shing, Mr Wong Knong Hoi David, Mr Ko Cheuk Wai and Mr Kwan Wing Yiu. TVB is one of the largest commercial Chinese programme producers in the world and has Asia's largest commercial television production centre with 20 production studios. It is operating five HD and two SD channels in the current simulcast period. We principally discussed the TVB facilities and the detailed operational processes, including the deployment of tapeless workflow. TVB Jade and TVB Pearl are TVB's main television channels, while TVB HD Jade is Hong Kong's first free, 24-hour channel broadcasting in high definition. TVB has a subscription satellite service, catering to Chinese communities around the world including those in the USA, the UK, Canada and Australia.

Phoenix Satellite Television CoLtd

During my visit to Phoenix Satellite Television Co. Ltd., I met Mr Terence Yiu. Phoenix Satellite Television was founded in 1996 and moved into their new premises in 2009. It has new state-of-the-art production facilities, including studios and post production facilities. It broadcasts to viewers in Asia, the USA, Africa and Europe through Asiasat and Eurobird. The Phoenix Chinese Channel, Phoenix Hong Kong Channel and Movie channels are very popular among Chinese people all over the world. During the visit the development of the new facilities was described, together with the main features of the facilities. Programmes feature a mix, ranging from political and economic news and current affairs through talk shows, film and music reviews to movies.



Phoenix U Radio provides digital audio broadcasting services in Hong Kong. It operates three radio channels on the DAB+ platform. I visited the entire area of the TV and Radio facilities and discussed the penetration of DAB+ in Hong Kong. Phoenix is a multi-national media venture with worldwide brand recognition.

RTHK



Radio Television Hong Kong (RTHK), is Hong Kong's public broadcaster, operated as an independent government department. There, I met Mr Chi-wah Leung and we discussed the comparison of FM, AM and DAB+ penetration in Hong Kong. The Hong Kong Government launched their first radio broadcast service in 1928 and now operates 12 Radio channels on FM and AM in the analogue domain and 5 on DAB+ in the digital domain. TV broadcasting is in analogue in the UHF band on the DTMB platform. RTHK's target date for ASO is 2020. TV programme production is HDTV and is file-based.

APSTAR



My next visit was to the APT Satellite Company Limited, which is one of leading satellite operators in the Asia Pacific region. I was met by Mr Huang Baozhong and Ms Cynthia Zhang. APT provides satellite transponder leasing, broadcast, Teleport and Network, as well as data centre services to broadcasters and telecommunication customers. It currently operates five in-orbit satellites including APSTAR-9A satellite. It covers regions in Asia, Europe, Africa, Australia and the Pacific and covers around 75% of world population. The main discussion centred on the launch of the APSTAR-9 satellite in December 2015. Also explained were the uplink operation and satellite transponder leasing. Described in detail was APT's advanced and flexible capacity solution, with guaranteed 24/8 transponder capacity on both C-band and Ku-band.

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World Broadcasting Unions' (WBU) Statement on Spectrum Allocation Associated with WRC-15

August 11, 2015 / Toronto, Canada – At a June 23rd meeting of the Directors and Secretaries General of the WBU in Prague (the Czech Republic) the WBU position on Spectrum Allocation, which will be discussed in the forthcoming World Radio Conference (WRC-15) later this year, was strongly reaffirmed.

The use of radio-frequency spectrum by broadcasters remains the most important vehicle for the efficient and scalable delivery of high-quality media content and emergency alerting services to both fixed and mobile audiences, specifically relying on the following services and systems;

DTV Broadcasting Service

The WBU does not support any change to the current spectrum allocations at UHF frequencies (470–694/ 698 MHz).

Contiguous spectrum should be allotted in the bands assigned to the broadcast service to allow for the robust delivery of high-quality media content, data and signaling that meets or exceeds the capabilities of current fixed and mobile reception and display devices as well as those that are expected to be deployed in the future.

Satellite Distribution Systems

The WBU does not support any change to the current spectrum allocations at C-band or extended C-band frequencies. The use of downlink spectrum allocated at C-Band (3.7–4.2 GHz) or extended C-band in the Fixed-Satellite Service (FSS) is essential to broadcasters' operations around the world. Systems employing this FSS band have been extensively deployed over decades, primarily for the distribution of content from network centres to affiliated stations, cable head-ends and to other receiving systems.

Summary

This WBU position has been supported by spectrum studies both at UHF and C-band frequencies which have demonstrated that major interference to broadcast operations would result from sharing in these bands with IMT. These studies have been filed with the ITU. The WBU will continue to participate actively in spectrum studies of the radio-frequency bands both assigned and associated with broadcasting, in order to ensure the continued efficient use of these bands for broadcast media content distribution.

It is the view of the WBU that delegates to WRC-15 and ITU member countries give serious consideration and attention to this Statement.

About WBU

The WBU is the coordinating body for broadcasting unions who represent broadcaster networks across the globe. It was established in 1992 as a coordinating body at the international broadcasting level. Since then, the WBU has provided global solutions on key issues for its member unions. The North American Broadcasters Association (NABA) acts as secretariat for the WBU.



ASEAN Broadcasting Regulation Forum 2015

ABU made a strong impact in raising spectrum issues at the ASEAN Broadcasting Regulation Forum which took place from 7-8 July 2015 in Thailand. The forum was inaugurated by Air Chief Marshal Thares Punsri, the chairman of the National Broadcasting and Telecommunication Commission (NBTC) of Thailand.

The seven sessions of the two-day forum addressed various aspects of broadcasting regulation. The forum was jointly organised by NBTC and International Institute of Communications (IIC) and hosted by NBTC. During the first day of the forum, ABU managed to persuade an audience, which comprised mainly of regulators, about spectrum requirements for future broadcasting. The Director of Technology of ABU, Dr Amal Punchihewa informed the audience that the key regulatory policy issue in terms of broadcasting is the availability of frequencies to enable over-the-air, free-to-access media services.

ABU has members from 50 countries in Asia-Pacific region in addition to members from the rest of the world. Only five countries have opposed further release of frequencies for other services after the completion of the digitalisation process. Four countries in APAC have carried out complete analogue switch off (ASO) and individual countries which are yet to realise digital dividend have to complete ASO and restacking of frequencies. As per the ITU-R BT.2140 report, restacking is the process of clearing digital television

services from a digital dividend band (e.g. 694-820 MHz) and relocating them in another broadcast band.

Regulators and the ITU are aiming at maximising the digital dividend with policy and regulatory frameworks for digital terrestrial broadcasting, including mobile television and spectrum reframing. Spectrum reframing is the abolition of existing band allocations in the radio spectrum with more efficient reallocation of the spectrum into smaller bands. It is a reassigning of government-regulated electromagnetic spectrum for services with higher value. The users of the existing spectrum are forced out, although they may be compensated in some manner – due to the digital dividend. ITU and collaborators such as NBTC are extending their support for such activities including provision of assistance in the field of interactive multimedia services to broadcasters in the Asia-Pacific region.

The Director of Technology recalled that NBTC is a member of ABU and (MCMC) is a close collaborator with the ABU. Regulators are playing an important role in the APAC region as converged regulators.

In the second day of the forum, ABU chaired the final session on spectrum issues which discussed digital dividend, digital divide, interference and connected devices. A number of key issues were discussed as follows:

The forum's main focus was on regulatory issues in relation to broadcasting, having special emphasis on ASEAN members. Regulators and delegates from other regions such as North America/Canada, Europe/UK and Oceania/Australia and Asia attended in addition to those from ASEAN countries. It was discussed that broadcasting is changing rapidly making it is harder for the regulation process.

Transition to digital, digital switchover, social media and empowerment of users, competition in digital radio and TV markets and spectrum issues were the key regulatory issues discussed during two-day forum. To date only five countries in Asia-Pacific region (APAC) have opposed allocation of frequencies below 700MHz band for other services. They are Australia, New Zealand, Thailand, Malaysia and Vietnam. Among members from 50 countries in Asia-Pacific, only four countries have switched off analogue completely and other countries are yet to commence simulcast or a few performing simulcast. Forty six countries in APAC are in-decisive about their frequency allocations for future broadcasting.

The forum enabled delegates to understand the rapid changes taking place in the media industry and the ABU was extremely happy that the participation enabled them to make a lasting impact on regulators and other delegates who attended the forum.

The first day of the Forum was concluded having listened to industry views followed by discussions. The ABU presented its views, representing its members and informing the delegates of the value of broadcasting from economical, audience and social points of view. ABU convinced the delegates that broadcasting is the most efficient way of communicating with the masses. While noting the changes in media consumption patterns, engagement and interactivity can be addressed using return channels provided by broadband and other evolving technologies. Such platforms and technologies can be deployed to augment the media delivery, however they will not replace broadcasting. All other alternatives will complement broadcasting rather than functioning as substitutes for broadcasting in the near future.

During the final session of the second day, chaired by ABU, three regulators presented and discussed spectrum issues concerning various areas such as digital dividend, digital divide, interference and connected devices and requirements for spectrum.

The Director of ABU Technology expressed his belief that the ABU, as a professional organisation of radio and television broadcasters in the Asia-Pacific region, could feel some relief that the messages were communicated well and were well received by many regulators and other broadcasters. Some of the messages included:

1. Broadcasting renders a wide variety of public services to society. Broadcasters continue to render such services

by introducing timely changes to their operations by embracing appropriate technologies.

2. Making use of broadband as a return channel, integrated broadband broadcast services can provide greater interactivity and engagement between media content and the audience. This could lead to better brand loyalty.
3. The functions performed by broadcast media in the run-up to, during, or in a post-disaster period are commendable, where other services such as mobile and broadband fail to operate and deliver.
4. Sources of interference can be both natural and man-made. For example ducting, where radio waves may tunnel over long ranges, reaching regions beyond the radio horizon of transmitting stations, or interference from LTE networks, out of band emissions etc.
5. Digital dividend is the key driver for regulators to promote digital radio. So, regulators should formulate policies and strategies to promote and implement digital radio broadcasting services.
6. Regulators need to formulate policies to mitigate a digital divide and all people living in rural and urban areas should have access to digital services.

Session seven on spectrum issues was concluded by reminding the regulators and delegates that communication is a human right. Though the right of communication is not explicit in UN documents, articles 33 and 34 of the ITU constitution and other international treaties, they provide provisions for an implied right for human communication subjected to international telecommunication regulations. Broadcasting offers information to the audience, especially via over-the-air and free-to-access services, without any discrimination. In jargon this is known as 'no gatekeepers'. However services via broadband, mainly over-the-Internet, may benefit from special treatment, which violates net neutrality. As future broadcasting is integrated with the Internet (Broadband), there should be no discriminatory services from the internet access providers. Broadcasting continues to innovate, finding more efficient and effective ways to manage media from acquisition to delivery. Current era, media delivery is borderless due to the emergence of over-the-top (OTT) services. It was also discussed that the playing field is not level, due to the fact that incumbent broadcasters are subject to high levels of regulation. New entrants to the media market enjoy less regulation.

From the content perspective, protection of minors and 'must-carry' rules were also discussed in addition to the challenges faced by public broadcasters in securing broadcasting rights for sports.

The ABU was happy to learn, in the week of the forum, that our Korean Broadcasting colleagues had secured spectrum to enable ultra-high definition television (UHDTV-1) services in Korea using the 700MHz band.



ABU 2015 TASHKENT FORUM

The ABU's second Central Asia Media Forum



The second ABU Central Asia Media Forum, by the name, "ABU 2015 Tashkent Forum," was held from 23-24 July 2015. The Forum was organised by the Asia-Pacific Broadcasting Union (ABU) and was hosted by the National Television and Radio Corporation of Uzbekistan.

The forum, which ran for two days, started with pre-conference workshops on the first day followed by a full day conference sessions discussing key broadcast related issues pertinent to the region. The main aim of the Central Asia Media forum initiative is to provide a platform for broadcasters and media players to share knowledge and expertise in order to improve and promote media development in the region.

The forum was inaugurated by the Deputy Chairman of the National Television and Radio of Uzbekistan. In his keynote address he highlighted the importance of moving to digital and the steps Uzbekistan and NTRC have taken to meet the 2017 deadline of Analogue-Switch-Off. The opening session was also addressed by the Secretary-General of the ABU welcoming the participants to the forum and shared his views on the way forward for the forum announcing that the ABU would like to make it an annual event.

Over 50 delegates representing journalists, programme professionals, senior executives, engineers, policy makers and regulatory authorities from 12 countries attended the event. This includes more than 16 industry experts and professionals, who presented at the event, from around the world and the local media industry.

Pre-Conference Workshops

The pre-conference workshops sessions focused on areas of interest within the industry with subject experts from

advanced broadcasters and other industry professionals presenting and sharing their expertise and experiences with the delegates. The workshops were conducted in a very informal manner to allow interactive discussions with the delegates. The workshop topics included areas such as;

- Digitalisation of Audiovisual Archives and Management
- Techniques for single-person news production
- New Media and Social Media integration in Broadcasting
- Sports Media Rights Acquisition and Distribution

The workshops were run in a very interactive manner with active involvement from participants and were well received. Each topic presented case studies of such implementations, providing insights into practical applications including problems faced and how they were overcome. This provided easy ground for the participants to understand and interact as in many cases they themselves are faced with similar



problems. Most of the topics also included presentations from local experts sharing experiences and discussing issues from their perspective.

CAMF2015 Conference

The full day conference that followed presented sessions was structured to make the participants aware of the rapidly changing media landscape and help them in responding to the changes that are taking place in the industry. It offered an opportunity to the senior executives to discuss issues crucial to the sustainability and development of broadcasting at organisational, national and regional levels. The conference addressed various issues that pertain to New Media, News gathering, Creative Content, Social Media in News, Technology trends, Digital Migration and Broadcasting and Disaster Communication. Special emphasis

at the conference was placed on practical applications and implementation of methods and techniques.

The workshops and conference sessions were presented in both English and Russian allowing the participants from the region to be fully involved in the discussions and deliberations. The Forum with its workshops and conference provided a platform specifically intended for Central Asian Broadcasters, in particular the smaller broadcasters to articulate their views and experiences and help in finding effective solutions. The forum enabled the participants to interact, share and learn from the experts and professionals present at the Forum.

Our members and other industry partners including TRT-Turkey, Whiteways-Singapore, Thinking Tub Media-Singapore, ARD-Germany, APT Satellite and Ajou University-Korea supported the event.

Supported by:



ABU-ASBU Technology Workshop focused on Digital Radio



The Asia-Pacific Broadcasting Union (ABU) in collaboration with the Arab States Broadcasting Union (ASBU) and WorldDAB conducted a week long workshop from 10-14 August 2015 at IPPTAR training centre in Kuala Lumpur.

15 broadcast engineers coming from Algeria, Bahrain, Saudi Arabia, United Arabs Emirates, Sudan and Malaysia took part in the workshop which focused on various technological aspects related to DAB+ digital radio. The resource persons were Dr Les Sabel from WorldDAB, Dr Amal Punchihewa, ABU Director of Technology, Dr Adnan Salhab from ASBU, Nils Ahrens from Rohde & Schwarz, Jason Malure from All In Media and Alex Ng from GatesAir.

Dr Adnan Salhab, Technological Director of ASBU Training centre said that the level of the workshop and that of the participants were very good. He added that cooperation between ABU and ASBU has always been very productive. He announced that Digital TV will be the main theme of the next workshop to be conducted jointly by both unions.



ABU DIGITAL BROADCASTING SYMPOSIUM 2016

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Until recently, a viewer had to use a personal computer or laptop to watch online services such as catch-up TV or movies on demand. Now, with Connected TV, it is possible to access content from the comfort of your sofa and watch your favourite shows on television.

The last few years have seen an increase in media industry activities around Connected TV. Content owners, broadcasters and technology providers are working together to find business models that will make Connected TV commercially viable and change the way we consume radio and television content.

DBS-2016 aims to stimulate thinking among delegates on the business and technology strategies that will safeguard and grow radio and television services in the highly competitive connected era. The three-day event will address the multiplatform delivery of radio and TV in the future, the software defined platforms, networks and services, the transformation in the broadcasting field, the immersive audio and television experiences and the emergence of OTT as a pay and FTA service.

CONFERENCE

EXHIBITION

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Contact: dbs@abu.org.my

www.abu.org.my/dbsymposium

Mobile Television Services: Technologies and Business Viability

NBTC Expo Thailand 2015 (NET 2015) NBTC/ITU Regional Seminar on “Delivery Technologies and Business Models for Mobile Television and Multimedia Services.

On the occasion of the NBTC Expo Thailand 2015 (NET 2015), which was organised by the National Broadcasting and Telecommunications Commission (NBTC) from 6-9 August 2015 at the Queen Sirikit National Convention Center, Bangkok, Thailand, the NBTC and the International Telecommunication Union (ITU) jointly organised the NBTC/ITU Regional Seminar on “Delivery Technologies and Business Models for Mobile Television and Multimedia Services which was held on Saturday 8 August 2015 at the same venue as NET 2015.

The Asia-Pacific Broadcasting Union participated actively in this regional seminar on “Delivery Technologies and Business Models for Mobile Television and Multimedia Services (MTV)” and related EXPO NET2015. The ABU Technology Director, who was among the main speakers, gave an insight into the network architectures and functionalities of the different MTV technologies, including ISDB-T (OneSeg/mm), T-DMB and DVB-T2 Lite, as well as their application in different countries. He also highlighted challenges and limitations of such services compared with traditional over the air services.

The aim of the seminar was to define the different multimedia services, including Video on Demand and linear television services on mobile platforms; introduce the different delivery technologies for mobile television services, including various MTV transmission standards and LTE eMBMS; share experiences from countries which have launched commercial services or testing innovative new technologies or business models and discuss the opportunities and challenges faced when offering mobile television services.

The Regional Seminar was aimed at:

- Defining the different multimedia services, including the Video on Demand and linear television services on mobile platforms;
- Introducing the different delivery technologies for mobile television services, including various MTV transmission standards and LTE eMBMS;
- Sharing experiences from countries which have launched commercial services or were testing innovative new technologies or business models;
- Discussing the opportunities and challenges faced when offering mobile television services.

The event provided an opportunity for companies and organisations to advocate and showcase innovations in products and services during the seminar and EXPO. There were participants from all sectors of the media industry.

The seminar provided an opportunity for companies and organisations to showcase innovations, products and services in the EXPO.

In the opening session, welcoming remarks were given by Air Vice Marshall Thanapant Raicharoen, Deputy Secretary General, Office of National Broadcasting and Telecommunications Commission and by Mr. Ioane Koroivuki, Regional Director, ITU Regional Office for Asia and the Pacific. Opening Remarks were made by Colonel Dr. Natee Sukonrat, Chairman of the National Broadcasting Commission, Vice-chairman of the National Broadcasting and



Telecommunications Commission (NBTC). There were eight sessions in which various aspects of mobile broadcasting were discussed.

Session 1, with the title, “Overview of Multimedia Services and Mobile Television Services, including Different Delivery Technologies” provided an overview of different multimedia services and the role of mobile television services in this converged market of ICT, telecommunications and broadcasting. In addition, an overview of different delivery technologies and the pros and cons of each were presented.

In session 2, an Introduction on MTV standards was given with insight into the network architecture and functionality of the different MTV technologies, including ISDB-T (OneSeg/mm), T-DMB and DVB-T2 Lite, as well as their application in different countries.

Session 3 on the Introduction on LTE eMBMS with Evolution and Applications provided insight into the network architecture and functionality of LTE and its evolution into eMBMS, as well as its application in different countries.

The case studies session presented the implementation of and business case for mobile television services on a broadcasting platform (i.e. ISDB-Tmm), including challenges, lessons learned and future developments for Japan/NOTTV.

The South Korea/KT case study described the Smart DMB based on Hybrid DMB having focus on the implementation of and business case for mobile television services on the LTE eMBMS platform, including challenges, lessons learned and future developments.

The session on Future Technology Developments and Trials in the Telecommunication Industry featured the latest technology developments for mobile television services, led by telecommunications industry players; more specifically on the development of 5G networks and the inclusion of mobile video services. The session also aimed at demonstrating the latest technology developments for mobile television services, led by broadcast industry players; More specifically, the trials in Germany and Italy on the application of LTE broadcast services carried in a DVB-T2 multiplex.

The panel discussion session, on challenges and the way forward for mobile television services, discussed practical aspects of such services. The session, included aspects such as industry convergences, cooperative business models and access to and sharing of spectrum.

In the closing session, remarks were made by Mr. Ioane Koroivuki, Regional Director, ITU Regional Office for Asia and the Pacific and by Mr. Sombat Leelapata Deputy Secretary General, Office of the National Broadcasting and Telecommunications Commission.

The presentations can be accessed from the website

<http://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Pages/Events/2015/August-MTV/home.aspx>

Digitalisation and Spectrum Issues for Pacific Members

– Outcomes from PMPC-2015



Dr Amal Punchihewa, Director ABU Technology,

Ms Sireerat Bunnag, Programme Officer,
ITU Regional Office for Asia and the Pacific.

ABU Technology organised and conducted the PMPC-2015, Pacific Media Partnership Conference of ABU in collaboration with ITU, Department of Communications, Australian Government, Pacific Media Assistance Scheme (PACMAS) and Samoa Broadcasting Corporation. Over one hundred delegates from 21 countries registered for the event. More than 50 delegates attended a workshop on Digital Broadcasting, followed by a full day conference which summarised findings from all three workshops and some special presentations. More details on the general outcomes of the PMPC-2015 programme can be found in ABU News magazine.

The following is a summary of technical and other related factors based on presentations and discussions, held over three days, to facilitate digital transition in Pacific and APAC in general.

Current Status of Analogue to Digital Transition

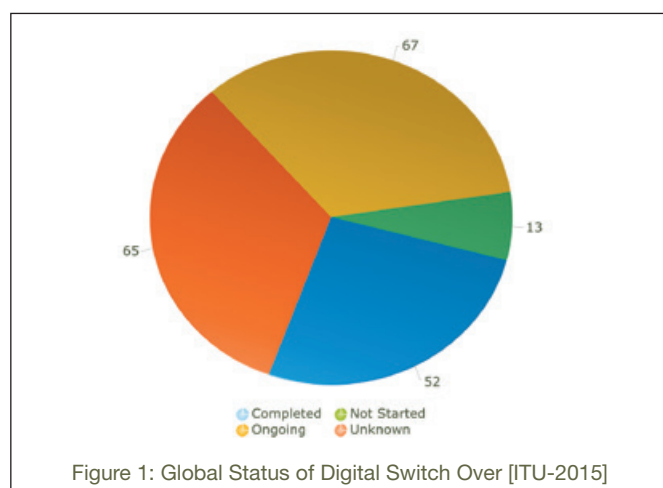


Figure 1: Global Status of Digital Switch Over [ITU-2015]

ITU has assisted 24 countries in Asia and the Pacific to develop their national road maps for Transition from Analogue to Digital Terrestrial Television Broadcasting. In Pacific region, nine road maps have been prepared. They include Fiji, Kiribati, Micronesia, Nauru, Papua New Guinea, Samoa, Solomon Islands, Vanuatu and Tonga.

In the region, only Australia, Japan, Korea R. O. and New Zealand have completed DSO.

Risks of Not Embracing the Switchover

The following are some of the risks that incumbent broadcasters will face if they delay in making the transition.

- I. Increased costs for analogue broadcasting
- II. Loss of revenues from analogue broadcasting
- III. On an analogue platform, broadcasters are not competitive against Pay-TV operators
- IV. Other Economical and Social issues

Media Industry

The media industry has been undergoing enormous changes. Audiences not only rely on linear content delivery services but also non-linear media services to consume at anytime, anywhere and on any device. Hence, delivery should be agnostic to device, time, and the location of access. The following are some of the observations made during the workshop.

- I. Appealing and affordable content that is accessible drives consumption of more media content.
- II. Networks and devices make content ubiquitous.
- III. Though not drastic, there are notable changes in consumption patterns and audience behaviour.
- IV. New business models are emerging for Integrated Broadcast and Broadband Services.
- V. The regulatory regime requires to accommodate the new context

Challenges

Such a changing media landscape and audience behaviour bring many challenges to incumbent and new players in the media industry.

- I. Service providers that previously served different markets are now competing for the same customers.
- II. There are significant and on-going changes in how services, applications and content are provided and made available to the audience, or consumers.
- III. There is a need to understand the underlying dynamics of convergence from a consumer perspective.

Strategies by Regulators

Considering the challenges and issues face by the stakeholders of the media industry, regulators have to be vigilant and need to have comprehensive strategic planning to safeguard the audience, while fostering healthy innovation and competition. The following are some factors which need to be considered when formulating strategies.

- I. Free & fair competition of newly emerging markets.
- II. Strengthening of broadcast and broadband cooperation models.
- III. Socio-economic value.
- IV. Bridging the digital divide.
- V. Privacy, security, availability, affordability, and reliability
- VI. Consumer protection

Factors to be Considered for Successful Implementation

After having discussed the implementation experiences of Australia and New Zealand, the following factors were identified for Pacific and other ABU members, for consideration in the digitalisation process.

- I. The maintenance of a close working relationship between Government and Broadcasters.
- II. Open communication with the public, to seek feedback on reception conditions and communicate changes.
- III. The development of standards to adapt a 'toolkit' of international standards to incorporate local requirements.
- IV. Planning each stage is key; every detail must be examined.
- V. Source Infrastructure funding.
- VI. Technical Skills Development

Spectrum Related Issues, Observations and Recommendations

Based on the discussions and presentations during the digital broadcasting workshop on the first two days, the following were noted in relation spectrum issues.

- I. Both VHF and UHF frequency bands are used for broadcasting across the Pacific Nations.

- II. The broadcast bands are being reduced to allow for more mobile services.
- III. Broadcasters should retain an active dialogue with their regulators / governments to retain adequate spectrum for broadcasting and allow for future broadcast services.
- IV. The VHF frequency band offers benefits to Pacific Nations and should not be overlooked.
- V. Spectrum Planning and Standards selection are key to the success of a digital transition.
- VI. Developing a regional standard can be considered.

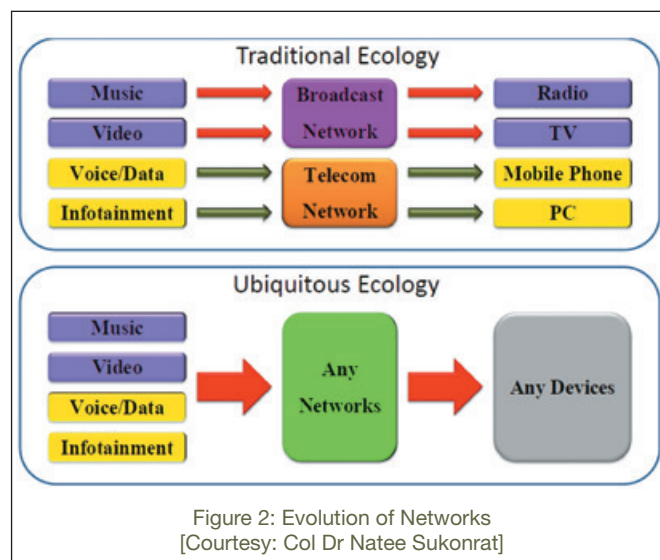
Next Generation Platform

While Japan using is Hybridcast and Korea has deployed OHTV (iCon) as integrated broadcast-broadband (IBB) technologies for its IBB services, both Australia and New Zealand have introduced Freeviewplus as an IBB service using an HBB technology engine. More details can be found in the two previous publications of Technical Review.

The Freeview consortium claims that with the deployment of Freeviewplus, they achieve

- I. Integrated broadcast channels and broadband video.
- II. A marketable platform for free television.
- III. Engagement with all major television manufacturers.
- IV. A retail market of interoperable products.
- V. Retailers motivated to promote the platform.
- VI. Broadcaster branding and control.
- VII. Delivery of an unrivalled user experience.

Future Scenarios



While acknowledging the fact that broadcasting will serve audiences in its current form over many decades, it was deliberated that media delivery will take a hybrid form. Linear forms of media delivery will remain the most dominant form and broadband will also be used to access non-linear content.



BroadcastAsia2015 –

leading the industry in Asia's integrated broadcasting, digital multimedia and entertainment scene

BroadcastAsia2015 which took place from 2 – 5 June at Marina Bay Sands, Singapore was yet another resounding success. Re-establishing its position as Asia's most comprehensive industry tradeshow, the 4-day event witnessed a gathering of more than 17,000 trade attendees. Professionals from the broadcasting, film / production / cinematography and post production industries had the opportunity to check out updated solutions, share industry knowledge and network with their peers at this yearly affair.

Shifts in broadcasting economics addressed at BroadcastAsia2015

With consumers increasingly taking control of where and when they want to access content, BroadcastAsia2015 responded by bringing together the latest in OTT and 4K technology, media asset management (MAM) and video analytics.

ARRIS, a global innovator in IP, video and broadband technology gave BroadcastAsia attendees an exclusive first look of its 2015 Consumer Entertainment Index. It is one of the only global studies of its kind undertaken annually that looks at the evolution of entertainment through the lens of consumer engagement with content, connected devices, and each other.

"This week at BroadcastAsia2015, we shared a first look of the findings of our ARRIS Consumer Entertainment Index. This event provided the perfect platform for us to talk about the evolving trends of consumers from across APAC. This year's study revealed that while consumers' consumption habits are changing, there are many frustrations, such as challenges with streaming and Wi-Fi connectivity, and experiencing quality mobile TV content through cellular and mobile Wi-Fi streaming services," said Tim Gropp, Senior Vice President, Sales, Asia Pacific, ARRIS. "Understanding their concerns

present significant opportunities for service providers. Beyond addressing these issues, businesses can look at developing new and differentiated offerings that would be most relevant to viewers."

"BroadcastAsia is THE meeting place for broadcasters in the region. The wide spectrum of products and variety of exhibitors allow me to choose the ideal digital solutions for our company's ICT strategy," said BroadcastAsia2015 visitor Alain Roger Poirier, Chief Operating Officer, Bloomberg TV Malaysia.

Choice platform for products and solutions launches

Leading exhibitors such as Cobham, EMC2, Imagine Communications, Panasonic, Samsung, Sony, Thomson Video Networks, Village Island and many others had chosen BroadcastAsia as their launching pad for new products / solutions.

Panasonic, an exhibitor at both BroadcastAsia and CommunicAsia, announced seven new business technology products and solutions for the Asia Pacific markets. These include the, the new AG-DVX200, the world's first 4K integrated zoom lens camcorder, the world's lightest 4K+ 3-Chip DLPTM Laser Projector and Toughpad FX-X1, a fully-rugged 5-inch tablet alongside the latest in mobile surveillance technology, blu-ray data storage, and professional broadcast video equipment.

"Asia Pacific is a fast-growing dynamic marketplace, and presents huge opportunities for Panasonic across all our B2B business segments from integrated solutions to audio visual products," said Hiro Sakamoto, Managing Director of Panasonic System Solutions Asia Pacific. "Our commitment to delivering total end-to-end solutions in the region is an integral part of our growth strategy. BroadcastAsia2015

and CommunicAsia2015 was an ideal platform for us to launch new products and solutions for the Asia Pacific markets as part of our commitment to strengthen our B2B business."

Samsung unveiled the world's first low temperature video wall, and Sony – their new HXR-NX100 professional camcorder at BroadcastAsia.

Best practices and growth potential – the focus of industry discussions

Close to 500 industry leaders and professionals gathered at BroadcastAsia2015 International Conference and the Creative Content Production Conference to discuss fundamental shifts in broadcasting economics, and digital media challenges.

"BroadcastAsia2015 International Conference was a good combination of both technical and commercial aspects of cloud and virtualisation, as it applies to all video applications. Attendees were a good balance between IT, enterprises and those with broadcast experience," said Ian Trow, BroadcastAsia2015 International Conference speaker and Senior Director of Emerging Technology and Strategy at Harmonic.

"The social TV and second screen track was absolutely outstanding this year. 2014 and 2015 has seen some of the biggest changes in OTT, social media and the second screen and our panellists and speakers represented all different parts of the business. From gamification to analytics and video this year's BroadcastAsia was truly enlightening when it came to understand the future of TV," said BroadcastAsia2015 delegate and Senior Vice President of the Shorty Awards & Muck Rack, Natan Edelsburg.

The event will return to Marina Bay Sands on **31 May – 3 June 2016**.

The ABU Continues to Educate Members on Hybrid Broadcasting

by **Dr AMAL Punchihewa**
Director ABU Technology



ABU Technology, in collaboration with the Asia-Pacific Institute for Broadcasting Development (AIBD), organised a regional workshop on Over-The-Top (OTT) and Integrated Broadcast Broadband (IBB) technologies and services, in Kuala Lumpur, Malaysia, from 29 September to 1 October 2015. The workshop was the third in a series on IBB and OTT Technologies and Services, which started in November 2013.

The workshop, like its predecessors, addressed hybrid technologies that are of significant interest to all broadcasters and discussed the challenges, which the broadcasters face in planning and implementing IBB services.

At this latest workshop, attended by 63 participants from 15 countries, 26 organisations were represented, 22 of which were ABU members.

Throughout the series so far the ABU, through its partnerships, has attracted a host of industry speakers, together with several speakers from the Union's broadcast membership, and on this occasion the speakers were from Fraunhofer IIS; NHK; Media Prima; Sony; Dolby; Thinking Tub; EMC² Isilon; TRT and Digital LabTV.

The general theme of the workshops is to provide an introduction to three key IBB technologies – HbbTV, Hybridcast and OHTV, together with services such as catch-up, on-demand and live streaming, offered through the Internet. Previous workshops and seminars had revealed that OTT and IBB Technologies were not yet well understood by broadcasters, to whom they offer a wide range of opportunities, but with some associated challenges.

The technologies are introduced in the workshops over a period of three days and address some of the main issues that broadcasters face when they decide to add OTT and IBB services to their portfolios. They not only explore the technology but also look at other value-added services and business opportunities that can be introduced to attain a competitive edge in the market place. Case studies from the Asia-Pacific region are presented, together with some reference to European implementations.



Traditional broadcasting has been a one-way communication scheme, which provided little opportunity for interaction due to the lack of an integrated return channel. With the penetration and popularity gained by broadband, broadcasters can now make use of broadband as a return channel, to interact with the broadcast services.

There are now a number of technologies and standards available which offer hybrid or integrated broadband broadcast services. Until recently, when watching online services such as catch-up TV or video on demand, the user had to do so using a personal computer or laptop. Now, with a Connected TV receiver, it is possible to access content from the comfort of your sofa and watch your favourite shows on the television screen.

A number of broadcasters have already explored these platforms, which have the potential to increase a broadcaster's reach and brand loyalty by, at the same time provide an enhanced experience for the audience.

As an example of implementations, in September 2014 Australia introduced Freeviewplus, a new hybrid television service integrated with broadband. In June 2015 New Zealand followed a similar path, introducing hybrid broadcast broadband, augmenting Freeview. The hybrid broadcast and broadband platforms were based on an HbbTV specification. HbbTV services with enhanced EPG and Catch-up or On-Demand-only content are made available in conjunction with Freeview NZ and other broadcasters. This service includes improved metadata and a content management system. Two other leading free-to-air television broadcasters, Mediaworks and M?ori TV joined the project which can now reach more than 3.6 million viewers around the country which has a total population of a little more than four million.

So, in collaboration with AIBD and its partners, the ABU yet again took the lead in helping members make the most of new hybrid broadcasting technologies in the latest, 'Integrated Broadcast Broadband (IBB) and Over-the-Top (OTT) Services Workshop' in Kuala Lumpur, Malaysia, from 29 September to 1 October 2015.



ABU Media Summit on Climate Change and Disaster Risk Reduction 12-14 May 2016, Phuket-Thailand



Climate change and global warming are critical long-term threats to human populations and the land they inhabit. Rises in temperature are causing the melting of ice caps, receding of glaciers and a rise in sea levels. Globally, weather systems are manifesting extreme swings that are disrupting and endangering life and livelihoods. More vulnerable countries might be the first to experience the ill effects of global warming and climate change, but others will not be far behind.

Although widely acknowledged as a critical threat, climate change agenda has not got the media attention it deserves and programming on the subject is often limited to a niche interest area. Furthermore, media hasn't been truly integrated in the national disaster management policies and processes to prepare the general public to cope with increasingly frequent and more intense natural hazards like typhoons, sea level surges, flooding and drought.

Given its unparalleled reach to wide audiences, the media should become a trusted partner of governments in promoting disaster risk reduction policies, disseminating early warning messages and advancing regional and national disaster risk reduction agendas.

Many media organizations already accept their duty to serve wide audiences (including most vulnerable groups such as women, children, youth, persons with disabilities and elderly) before, during, after disasters. They recognize the need to be pro-actively preparing people during quieter times between disasters and commit to expand coverage of climate change and DRR and educate their audiences on these issues.

They also recognize the huge gap in media knowledge and expertise to do so and that the "messengers" have to be educated themselves about the complex issues of climate change impacts and mitigations and DRR.

The Media Summit will aim to bridge this gap. It will bring together media, government agencies responsible for disaster management and disaster risk reduction, international agencies working in the field and NGOs. They will discuss how to put media in the frontline for climate change adaptation and disaster risk reduction. Furthermore, how to educate the "messengers" and equip media practitioners with the skills and knowledge to translate the complex climate change issues into relevant understandable programmes for wide audiences.

Session highlights

- Weather Reporting and Climate Change Education
- Integrated SOPs, coordination and stakeholder partnerships
- Climate Change and Disaster Literacy through Media
- ICTs and advanced tools currently available

Latest News from EBU Technology & Innovation

Shannon Frame

Technical Editions Manager (EBU)

“This has been the best IBC in years” I heard several people say as they passed by the EBU stand in Amsterdam. They were right. UHD TV, personalization and the world's first Live IP TV production studio were only some of the latest achievements in media technology and innovation that were showcased this year.

In collaboration with Members, the EBU also demonstrated on key topics including FIMS, semantic data, quality control, high dynamic range, high frame rate and HbbTV 2.0 as well as taking part in discussions about the changing media landscape.

The traditional production environment is undergoing transformation. This year's EBU Session at IBC focused on the 'Media Factory of the Future' and how it will continue to build on the work broadcasters are currently doing to integrate platforms, services and data and will add more flexibility, the ability to produce new live and on demand content and reduce costs.

For several years now, the EBU has actively addressed the relevance of using open source for media applications. Our annual EBU Open Source Meet-up at IBC proved that remains a hot topic with more than 100 participants taking part in the event.

The EBU and Belgian public broadcasting company VRT showcased a LiveIP studio at the stand. They were awarded “special recognition” at the IABM Design & Innovation Awards with the Sandbox LiveIP Project for their efforts.

This year's IBC Conference closed with 55,128 attendees.

To find out more, visit our website at tech.ebu.ch or follow us on social media: Twitter – @EBU_TECH, Facebook – EBU Technology & Innovation or LinkedIn – EBU Technology & Innovation.

JOIN US AT OUR NEXT EVENT!

Production Technology Seminar 2015

26 – 28 January, EBU, Geneva

The production technology seminar is one of the biggest annual EBU events, attracting more than 120 delegates for two and a half days of keynotes, use cases, technology updates, tutorials and demos.

<http://tech.ebu.ch/events/pts16>



Digital Radio Summit

Short description:

10 February, EBU, Geneva

The EBU Digital Radio Summit every year brings together key players from the radio community to share ideas, experiences and inspiration.

<http://tech.ebu.ch/events/drs16>

EBU RadioHack

08-09 February, EBU, Geneva

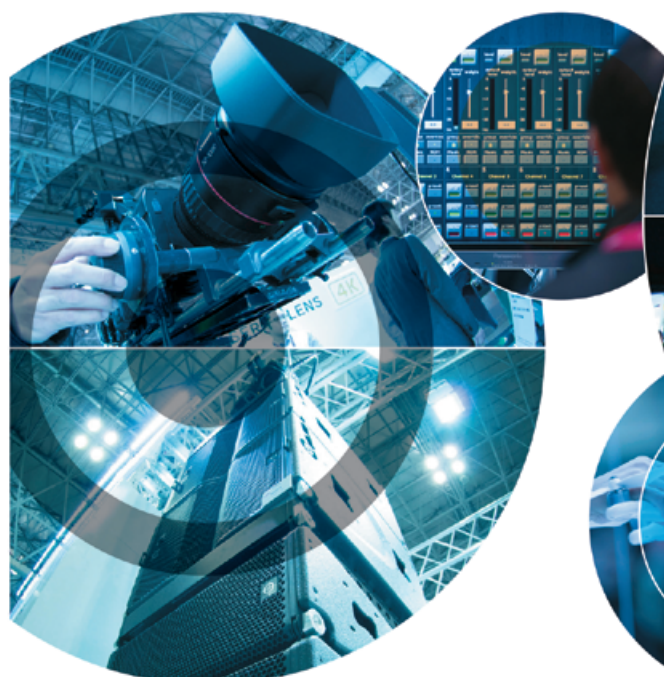
The EBU RadioHack is a hands-on event for software developers, integrators, and engineers from broadcasters, service providers, network operators and manufacturers. It is a unique opportunity to meet developers, learn how to set-up new services, existing open tools, and contribute to developments and make contacts. It is also an opportunity for participants to bring knowledge and tools back to their organizations.

<http://tech.ebu.ch/events/radiohack16>



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New Members

Additional Full Members

New Delhi Television, India – (28.7.15)

New Delhi Television is a pioneer in India's news television. Founded in 1988 by Radhika Roy and Prannoy Roy, NDTV is today the most watched, credible and respected news network in India. From the path-breaking "The World This Week" (nominated as one of India's 5 best television programmes since Independence), the first private news bulletin, "The News Tonight", India's first 24-hour news channel "Star News" and the country's first ever 2-in-1 channel Profit-Prime, NDTV has been at the forefront of every single news revolution.

NDTV is most proud of how its work impacts the real world and how it is using its powerful reach to campaign for and with the people of India. Seen as an honest, unbiased and fearless crusader, NDTV's sustained and award winning campaigns against injustice and human rights violations have forced governments to act, legislation to be changed and made the nation aware of the power of the people.

South Asian Television, Bangladesh – (9.9.15)

SA TV (South Asian Television) is a privately owned 'infotainment' television channel in Bangladesh. It is the first ever station in Bangladesh using both HD and 3G Technology. The channel is owned by SA Group, one of the largest transportation and real estate groups of the country. SATV is the first channel to bring 'Idol' franchise in Bangladesh through Bangladeshi Idol. SATV's head office is located in Gulshan 1, Dhaka.

S.A. Channel Pvt. Limited (South Asian Television) is a Bangladeshi based privately owned high definition satellite channel which officially began broadcasting in 19th January 2013. SA TV is a sister concern of SA Paribahan Pvt Ltd, a renowned courier and logistical support provider in Bangladesh. SATV uses the latest technology in broadcasting news and program production through satellite Apstar-7. The channel promotes Bengali culture and language to the mass viewers via news, talk shows, dramas, national and international sports, music, movies and also programs about health, fashion and lifestyle. SATV also played host to the largest reality show in the world, Bangladeshi Idol in 2013.

Associate Members

Daejeon MBC, Korea – (14.7.15)

Daejeon MBC is a terrestrial broadcaster based in Daejeon, the 5th city in Korea. It was established in 1964 and it first transmitted on radio in 1964 and on TV in 1971. Daejeon MBC is a public broadcasting company with general programming, covering the area of 3.7 million viewers.

Daejeon MBC's major shareholder is MBC HQ but it is a financially independent company. President and CEO is Ms Jinsook Lee, who has served in the MBC group for 28 years.

The recent Awards Daejeon MBC has won:

2014: Grand Prize, Local Current Affairs
Grand Prize, Local Documentary

2012: Finalist, Monte Carlo TV Festival Prince Reyner Prize
Grand Prize in Local Current Affairs

2011: Grand Prize in Regional News/ Local Current Affairs

2010: Grand Prize, Huston International Film Festival
Excellence Award, Documentary Section

The WFMT Radio Network, USA – (28.7.15)

The WFMT Radio Network is a premier creator and distributor of radio programs that are syndicated to hundreds of radio stations throughout the United States and around the world, with a focus on classical music, jazz, folk, and world culture. The Network distributes programs such as weekly broadcasts by the New York Philharmonic, Los Angeles Philharmonic, Chicago Symphony Orchestra, Milwaukee Symphony Orchestra, the renowned daily music appreciation series, Exploring Music with Bill McGlaughlin, a national opera series featuring the Los Angeles Opera, Lyric Opera of Chicago, San Francisco Opera and others, weekly concerts by the Chamber Music Society of Lincoln Center, The Midnight Special (folk music with a sense of humor), the Salzburg Festival, hourly modular classical and jazz series (Beethoven Network and Jazz Network), and dozens of other programs that range from ongoing weekly series to one-time radio specials.

The WFMT Radio Network is a division of Window to the World Communications, Inc., which also operates local classical radio station, WFMT, and WTTW-TV, a PBS affiliate.

Radio Tulsipur, Nepal – (27.8.15)

Established in 2005, Radio Tulsipur is the Independent Community Radio in Nepal. On air from 5 am to 10 pm every day, from its studio in Mid-Western in Nepal (Dang District), it has evolved as a truly independent and highly credible community radio of Nepal. Radio Tulsipur was founded with the pointed objectives which have been summarised as follows:

- To promote open public discourse on issues of public interest
- To set standards in public-interest broadcasting
- To produce a pool of journalists in community broadcasting
- To educate the masses in issues of their interests
- To contribute to the proliferation of community radio stations
- To sensitise government and policy-makers
- To facilitate the democratisation process
- To strengthen democratic culture, peace, sustainable development and the environment.

Thinking Tub Media Pte. Ltd, Singapore – (17.8.15)

Thinking Tub Media Pte. Ltd. was incorporated in Singapore on 8 October 2008. It is a private limited company and has been in the forefront of CDN and OTT services. They have worked closely with many broadcasters such as MediaCorp Singapore, Media Prima Malaysia, Telkom Indonesia, TVB Hong Kong and BeTV China, to launch streaming services. A CDN service with Telekom Malaysia for Southeast Asia region was launched in 2010. With the same technology acquired from BeTV China coupled with self-developed technologies, Thinking Tub Media will be launching the following:

- OTT Box with Indosat in Indonesia and Telkom Indonesia in August 2015
- Launch with GMM Grammy later in 2015 in Thailand
- Launch similar service in Malaysia in October 2015.

Thinking Tub Media has worked with many OTT content owners such as HOOQ (a SingTel, Warner and Sony collaboration to launch the Netflix of Asia); iFlix (a similar movie and TV series service in Southeast Asia); CTV (an indie content owner based in New York) and launch Barclay's Premier League and European Football leagues in Thailand and Indonesia.

Affiliate Members

Whiteways Systems Pte. Ltd., Singapore – (7.8.15)

Whiteways is a private limited Singapore-based systems integrator, dealer, reseller and service provider. They design, supply, install, integrate and commission complex solutions for customers who are involved in video production, post production, film and broadcasting industries throughout the Asia-Pacific region.

Whiteways is focused on providing cutting edge technologies for digital media creation, management and distribution. They sell products on a stand-alone basis and they provide turnkey solutions such as supply, design, commissioning of studios, newsroom systems, control rooms, uplink/downlink, DSNG.

They provide service such as digitizing tapes, providing annual maintenance and support, acoustics treatment for studios, lighting set up for studios, specialised training and a host of other services. They offer consultancy services by providing a system audit, technical feasibility study, techno-commercial study, knowledge transfer and other consultancy services.

Independent Broadcasting Authority, Mauritius – (3.9.15)

The promulgation of the Independent Broadcasting Authority Act has led to the setting up of the IBA. The Authority is at the centre of the now emerging landscape wherein private, commercial and community broadcasters will operate side by side.

The Authority will regulate this sector by granting licenses and more specifically by:

- Promoting diversity, wider choice in the field of broadcasting
- Ensuring that broadcasters operate in a level playing field where fair competition is the rule.
- Ensuring that broadcasters preserve and promote the plural nature of the Mauritian society
- Encouraging the development of a local programme production industry.
- Ensuring that the people of Mauritius have the ultimate control of broadcasting services whilst accommodating foreign participation in this sector.
- Providing protection and avenues for redress and representation to listeners and viewers in their relationship with operators.
- Optimising the efficient use of broadcasting frequency bands.
- Encouraging the broadcasting sector to eventually self-regulate itself.

News

from the ABU Region

CRA Welcomes Government Response to Spectrum Review

Commercial Radio Australia (CRA) has welcomed the Government's response to the Spectrum Review. The Department of Communications has agreed to go along with recommendations to revamp spectrum allocation and licensing laws in order to bring them in line with modern communications infrastructure.

The federal government has announced that it will begin reforming the legislation, licensing, and pricing of spectrum in Australia, with plans to have the new legislation passed by mid next year.

Ms Joan Warner, CRA's chief executive, said, "A simpler and more flexible framework will allow for a more efficient and responsive system. It will however be important to consider the pricing of spectrum licences for commercial free-to-air radio broadcasters in the broader context of heavy regulation, local and Australian music content requirements, advertising restrictions and mandatory tags required of radio broadcasters, as well as the key role of radio in emergency situations."

The Department of Communications reported that during the next 15 years, the economic value of spectrum could contribute up to AU\$177 billion to Australia's economy. Spectrum is a critical input to a networked and digital economy and society since it supports a wide range of services that promote economic growth and enhance social well-being. Its role as an economic driver, and the value it returns to society, is increasing.

(Radiotoday)

Digital Radio Trials Extended

Commercial Radio Australia (CRA) has welcomed the decision by the Australian Communications and Media Authority (ACMA) to extend the DAB+ digital radio trial licences in Canberra and Darwin for a further 12 months and looks forward to exploring how these services might become permanent as suggested in the Communications Department's recently released Digital Radio Report.

Commercial Radio Australia is the trial licensee for Canberra and Darwin and applied for the licence renewal on behalf of the ABC, SBS and all commercial broadcasters. The trials began in 2010. The DAB+ trial signal in both cities is at low power but tests have indicated coverage at low power has been able to extend to a large part of the Canberra and Darwin areas. A boost was required to retransmit

the trial signal into Parliament House. This has provided additional testing opportunities for "in building" coverage in a challenging structure. The trial services continue to be subject to occasional interruptions and changes in power for on-going technical testing.

(C&T)

Globecast Australia Relunched as Telstra Broadcast Services

Telstra has announced the rebrand of recently acquired business, Globecast Australia, to Telstra Broadcast Services, unveiling the new brand at the International Broadcasting Conference (IBC) in Amsterdam.

The move cements Telstra's commitment to providing deeper capabilities in media services for customers in the broadcasting industry. Telstra Broadcast Services offers its global customer base media delivery over satellite platforms, including direct to home satellite transmission and IPTV managed services; IP streaming and encoding; satellite monitoring and disaster recovery. It has also developed live point-of-view miniature camera technology which is used extensively at sporting events through its Globecam business.

One of the first deals reached under the Telstra Broadcast Services name, has seen Network Ten renew a multi-year contract for its global content delivery via fibre. This year will also see Telstra Broadcast Services increase its Globecam live, digital devices commitment for Network Ten's broadcast of the KFC Big Bash League, with more games than ever before.

(C&T)

World Broadcasting Unions Caution on WRC-15 Spectrum Changes

At the meeting of the Directors and Secretaries General of the World Broadcasting Unions' (WBU) in Prague, Czech Republic, the WBU's position on Spectrum Allocation, which will be discussed in the forthcoming World Radio Conference (WRC-15) later this year, was strongly reaffirmed.

According to the WBU, the use of radio-frequency spectrum by broadcasters remains the most important vehicle for the efficient and scalable delivery of high-quality media content and emergency alerting services to both fixed and mobile audiences.

In the case of DTV Broadcasting, the WBU says it "... does not support any change to the current spectrum allocations at UHF frequencies (470 –694/ 698 MHz). In the case of

Satellite Distribution Systems, the WBU says it does not support any change to the current spectrum allocations at C-band or extended C-band frequencies.

This WBU position has been supported by spectrum studies both at UHF and C-band frequencies which have demonstrated that major interference to broadcast operations would result from sharing in these bands with IMT. These studies have been filed with the ITU. The WBU will continue to participate actively in spectrum studies of the radio-frequency bands both assigned and associated with broadcasting, in order to ensure the continued efficient use of these bands for broadcast media content distribution.

(C&T)

ITU Deploys Emergency Communication Equipment in Myanmar

ITU has deployed emergency telecommunication equipment in Myanmar following severe floods that have claimed many lives and submerged more than 200,000 acres of farmland, damaging essential infrastructure and thousands of homes.

The emergency equipment deployed by ITU includes Iridium satellite phones, Inmarsat satellite terminals (Broadband Global Area Networks), accessories and laptops to support rescue and relief coordination efforts.

At the Third UN Conference on Disaster Risk Reduction held in Sendai, Japan, in March 2015, ITU emphasised that with over 7 billion mobile cellular subscriptions worldwide, almost 3 billion people connected to the Internet and with 4.9 billion connected devices, ICTs have a vast potential to support disaster management efforts.

ITU considers emergency telecommunications as an integral part of the post-2015 sustainable development agenda. Through innovative and easy-to-use technologies, local communities can be empowered to provide early warning signals and also act as first responders when disaster strikes.

(ITU News)

Live Streaming Platform Upgraded

When Parliament Television was in need of an upgrade to its live streaming platform, service operator Kordia partnered with New Zealand Systems Integrator Gencom Technology to implement the most advanced live streaming platform available, from Elemental Technologies.

Since 2007, the New Zealand public has been able to watch their democracy at work thanks to Parliament Television, a public service that delivers live feeds of parliamentary sessions via Sky Television, Freeview and streaming on the internet. The initial infrastructure build was completed in 2007 by Gencom Technology, and the service is operated by Kordia. Says Gencom General Manager, David Barnard, "when we first built Parliament TV in 2007, the technology was state of the art. We implemented robotics and studio automation, as well as a basic web streaming capability.

Gencom provided a solution leveraging Elemental Live and Elemental Delta software-defined video solutions. Elemental

Live provides real-time video and audio processing for linear pay TV broadcast and live streaming to new media platforms. Another advantage of the Elemental Delta video delivery platform is that it provides multi-tenant support, giving Kordia the ability to extend its live streaming offering to other customers, including broadcasters, content providers and large enterprises looking to deliver a television-quality viewing experience online.

(C&T)

Singtel Enhances its IPTV Services

Singapore Telecommunications Limited is using ThinkAnalytics' personalised search and recommendations engine across more than 120 linear channels and on-demand libraries to enhance its IPTV service. Singtel TV's 400,000-plus subscribers can access personalised recommendations in multiple languages via the set-top box (STB) and companion TV GO apps.

A cloud-based deployment, ThinkAnalytics' IPTV platform is pre-integrated with Ericsson Mediaroom at Singtel. The recommendations are available within the electronic programme guide on STBs and on the Singtel TV GO apps for iOS and Android devices, giving subscribers a superior, personalised Mediaroom experience without having to login or identify themselves. ThinkAnalytics' Asia Pacific operations now include Singapore, Hong Kong and Pune, India.

(Newsoneplace)

ST Teleport Partners with AsiaSat for Capacity

One of Asia's leading satellite operators Asia Satellite Telecommunications Co. Ltd. (AsiaSat) announced that ST Teleport, a full-service satellite and fibre communications solutions provider based in Singapore, has expanded its capacity commitment and strategic partnership with AsiaSat to enhance service offerings to the VSAT and media sectors.

ST Teleport recently expanded its C-band capacity in Asia with a new dedicated antenna for AsiaSat 4 at the orbital location of 122°E to provide leading-edge satellite-based service solutions for maritime, oil and gas, enterprise, and media businesses. In response to strong user demand for high-quality connectivity solutions for data and video services in Asia, both companies have further strengthened their collaboration to offer enhanced land/sea/air based VSAT services.

ST Teleport's advanced earth station complex facilities in Singapore is now capable of connecting to AsiaSat's comprehensive fleet of satellites, including the new Ku-band capacity on AsiaSat 8's South East Asia and Middle East beams, to offer more choices to customers. The extension of the partnership will accelerate growth opportunities for ST Teleport and increase its offerings to customers looking for fast and flexible satellite communications solutions at competitive prices.

(RapidTVNews)

Digital Broadcasting Update

Development of World's First HEVC Software Encoding Engine Supporting 60P/120P Simultaneous Transmission of Ultra high-Definition Video

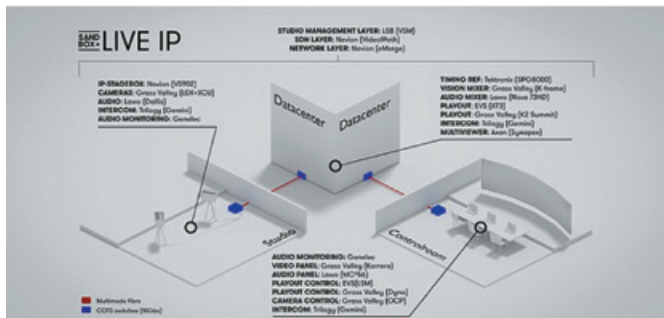
Nippon Telegraph and Telephone Corporation (NTT) has developed a software encoding engine which complies with the International Standard H.265/HEVC (High Efficiency Video Coding), and which enables the simultaneous transmission of video at the 60 frames-per-second that is currently used for 4K distribution as well as ultra high-definition video at 120 frames-per-second.

Encoding done by this technology will enable viewers to watch video at 60 frames-per-second on existing TVs and other devices when distribution of 120 frames per second video starts in the future, facilitating a smooth migration. This functionality is achieved by implementing temporal-direction hierarchical encoding, which enables embedding of 60 frames-per-second HEVC bitstream in a 120 frames-per-second HEVC bitstream. Original bit rate control algorithm by NTT is used to achieve high visual quality while keeping the 60 and 120 frames-per-second HEVC bitstreams at the desired bit rates. Furthermore, by introducing an original variable bit rate encoding technique, we have also achieved an approximately 40% reduction in the amount of data compared to constant bit rate, with image quality that is equivalent to that seen previously, so we can expect a reduction in storage costs, even with current distribution services.

This technique has been acquired by NTT Advanced Technology Corporation (NTT-AT) and upgraded versions of the software codec development kit "HEVC-1000 SDK" and the file conversion software "FileConverter FC4000" are going on sale.

(NTT)

EBU, VRT and Technology Partners Create the World's First IP TV Studio



The European Broadcasting Union (EBU) and Flemish Belgian Member VRT have unveiled the LiveIP Project, a multi-vendor system integration to showcase IP-based live broadcast production.

The collaboration between EBU, VRT and a group of innovative industry partners sees the implementation of a

live TV production studio at VRT's premises in Brussels. It uses state-of-the-art IT-centric hardware and software to enable broadcasters to produce programmes quickly, efficiently and cost effectively.

The multi-phase LiveIP Project is part of Sandbox+, an international joint platform for collaborative innovation put together by VRT, EBU and iMinds. Industry technology partners participating in the project include Axon, Dwesam, EVS, Genelec, Grass Valley, Lawo, LSB, Nevion, Tektronix and Trilogy who provide all the elements of a live production chain driven by IP.

The project shows a high level of interoperability between multiple vendors, enabling seamless switching and limited redundancy of uncompressed video and audio feeds as they're transported over an IP network.

(EBU)

CEA Defines 'HDR Compatible' Displays

The Consumer Electronics Association (CEA)® has announced the industry definition for high dynamic range (HDR) compatible video displays. HDR is a new capability that promises to deliver an expansive range of brightness and shadow detail, further enhancing the viewing experience.

Paving the way for the introduction of HDR-Compatible Displays, the new CEA designation is designed to assist retailers and consumers in identifying display products that incorporate the interface and processing technology needed to display the new content properly. CEA and its display manufacturer members collaborated with leading content providers and distributors as well as other technology companies to establish the new display characteristics for HDR interoperability.

Many 4K Ultra High-Definition televisions (4K Ultra HD) will include early implementations of various next-gen technologies, including HDR, wider colour gamut and higher frame rates, which provide a more realistic and immersive viewing experience.

A TV, monitor or projector may be referred to as a HDR Compatible Display if it meets the following minimum attributes:

- Includes at least one interface that supports HDR signaling as defined in CEA-861-F, as extended by CEA-861.3.
- Receives and processes static HDR metadata compliant with CEA-861.3 for uncompressed video.
- Receives and processes HDR10 Media Profile* from IP, HDMI or other video delivery sources. Additionally, other media profiles may be supported.
- Applies an appropriate Electro-Optical Transfer Function (EOTF), before rendering the image.

(CEA)

Equipment Trends

New High-Efficiency Liquid-Cooled Transmitters

GatesAir has announced the latest advances to its solid-state Flexiva™ radio and Maxiva™ TV and DAB Radio transmitters, including the international debut of the Flexiva FLX range of liquid-cooled transmitters for FM and digital radio broadcasters (HD Radio™, DRM+).

Building on the foundation of the award-winning Flexiva FM air-cooled platform and leveraging advances first instituted in medium-to-high power Maxiva transmitters, the Flexiva FLX design incorporates a heat-to-liquid transfer that removes heat from the RF plant without excessive air conditioning, helping broadcasters cut monthly utility costs and establish a greener plant. The transfer itself cools the air in the RF plant, moving transmitter heat to the outside via a liquid-to-air heat exchanger with redundant fan systems.



To obtain maximum efficiency, the liquid-cooled design, in most installations, integrates low-noise pump modules within the transmitter to further reduce its already compact footprint. Two fully redundant cooling pumps operate in a closed-loop design, with auto-changeover capability in the event of a failure to ensure proper and constant transmitter cooling. The associated size and weight improvements are especially helpful for broadcasters who lease space in the RF plant by the square foot. For example, Flexiva FLX provides a foot print reduction of over 50% – a remarkable difference in monthly rental costs.

(GatesAir)

New Shortwave and Mediumwave Antenna Systems

Ampegon has unveiled two new concepts for antenna design: a shortwave folded dipole antenna system and a mediumwave folded monopole antenna system.

The shortwave folded dipole antenna system is available in the RF power range up to 50kW for domestic shortwave transmission. Designed with Ampegon components and optimised to lower power specifications, the 50 kW system offers simplification without loss of performance. The system also features key performance indicators like $VSWR \leq 1.5$ in the operational frequency range band and a gain of 8 dBi. The design consists of tubular structures for the

suspension of the dipole and is designed for wind speeds up to 99 mph.

The mediumwave folded monopole is also a 50 kW antenna system and is fully grounded with no need for a base insulator for the placement of the antenna. The antenna consists of the mast and radiating element; the guy ropes supporting the mast are each divided by a single insulator. A minimum number of insulators are installed, making maintenance simpler. The newest type of insulator used in the antenna system features silicon protection and shows ruggedness toward environmental influences.

(Radiomagonline)

New Fully Networked Broadcast Audio Production Environment



Solid State Logic has announced System T, designed from the ground up to provide the power to handle large-scale productions in a 'multi-platform delivery' driven future. System T is a new fully networked broadcast audio production environment. A range of hardware and software control interfaces can be placed anywhere on a network with up to three consoles or control interfaces accessing a single or fully mirrored redundant pair of processor cores. Multiple processor cores can be used on a single network. Control interfaces and processing resource can be re-configured to suit daily requirements. Routing and I/O is Dante based with System T featuring the first consoles to use the new Dante HC (High channel) connectivity. SSL's newly expanded Network I/O range puts SSL audio quality Stageboxes and interfaces wherever they are required in a facility. With Dante reaching the 500 product landmark at IBC 2015, System T has plug-and-play discoverability and interoperability as central principles. System T features a wealth of innovation in technology and conceptual design and delivers the versatility to create previously impossible system configurations and to handle future expansion.

(Solidstatellogic)

Portable HEVC Encode/Decode Solution



VITEC has announced the European debut of its portable, end-to-end HEVC encoding/decoding solution. Comprised of VITEC's MGW Ace – the world's first portable HEVC (H.265) hardware encoder – and MGW D265 portable HEVC IP decoder, with built-in ProMPEG FEC and Zixi Error Correction technologies, the solution enables the delivery of secure, error-free video on dedicated and public networks while dramatically reducing bandwidth requirements compared to legacy H.264 systems.

The MGW Ace boasts a real-time H.265 4:2:0 and 4:2:2 hardware compression chip for streaming broadcast-quality video up 1080p. Input interfaces include 3G, HD/SD-SDI,

HDMI, DVI and Composite. The unit is also the first HEVC hardware encoder to feature intelligence, surveillance and reconnaissance (ISR) metadata processing with KLV and STANAG support conforming to MISB and NATO requirements. A secondary MPEG-4 H.264 chip provides support for legacy decoders and proxy streaming. The included Pro-MPEG and Zixi technologies offer one-way and two-way Error Correction protocols for broadcasting artifacts-free over public networks securely and reliably.

Complementing the MGW Ace is the MGW D265, a high-performance IP decoding appliance with a compact footprint, best-in-class connectivity options, and low delay processing. MGW D265 uses advanced hardware to deliver a real-time, broadcast-quality picture with the highest quality of service and resilience required in complex IPTV and full-motion-video environments. MGW D265 offers all typical video output interfaces, including HD-SDI, SD-SDI, HDMI. With integrated Zixi receiver technology it is the ideal decoding mate for MGW Ace encoder.

(Vitec)



Personalities & Posts



Dr Narichika Hamaguchi
ABU Transmission Topic Area Chairman

Dr Narichika Hamaguchi has replaced Mr Kentaro Higashijima as the Chairman of the ABU Transmission Topic Area.

Dr Hamaguchi is Senior Manager of the Planning Division, Engineering Administration Department, at NHK.

Narichika Hamaguchi has conducted research and development about content production, description, distribution, and user behavior analysis of social TV at NHK Science and Technology Research Laboratories (STRL) since 2000. He holds a Master's degree in Management of Technology and a Ph.D. in Engineering from the Tokyo Institute of Technology.



Mr C B S Maurya
New Engineer-in-Chief for Doordarshan

Mr C B S Maurya took over as Engineer-in-Chief of Doordarshan (DDI), the public service television broadcaster of India, on 1 July 2015.

He is responsible for the overall engineering management of DDI's entire television network across the country.

Mr Maurya has also been appointed the ABU Technical Liaison Officer and replaces Mr N A Khan on the ABU Technical Bureau. Our sincere thanks go to Mr Khan for his services to the Bureau.



Mr Chumporn Krua-Kwan
Retires from NBT-Thailand

Mr Chumporn Krua-Kwan, Executive Director, Engineering Support and Development Bureau of the National Broadcasting Services of Thailand, has retired in September 2015. Mr Chumporn was the ABU Technical Liaison Officer and has been a member of the ABU Technical Bureau representing NBT since 2010. We thank Mr Chumporn for his services to the Bureau and wish him well.



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