



Asia-Pacific
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**ABU Technical Bureau meets
in Kuala Lumpur**
Report Inside



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Cover:
*ABU Technical Bureau
meets in Kuala Lumpur
(Report Inside)*



Asia-Pacific Broadcasting Union

TECHNICAL REVIEW

From the Editor's Desk

We had a very fruitful mid-year meeting of the Technical Bureau in May and a report highlighting the key decisions from the meeting is included in this issue. The study project reports presented at the meeting are also part of this issue, in-line with a decision by the Bureau to publish these reports.

One of the main discussion points and of concern to members was the digital switch over taking place among members and within the region. How we can help members in the process and steps involved as some of our members are yet to start the process? In this regard I would like to point out the first article in this issue on "Frequency Planning for Digital Terrestrial Transmitters" by our colleagues at Doordarshan, highlights an initial and most important step in the process of planning for digital migration.

This issue also includes two more articles, one on Cyber Security, a general look at the security systems within the information technology and networked environment contributed by IRIB, Iran. A third article on "Human and Technical Resource Development for Digital File-based Solution for HD/SD TV Workflow", also contributed by our Doordarshan colleagues, looking at how they are going about managing the move to a file-based workflow in terms of training of human resources and required technical facilities for a smooth and efficient operations.

Short reports on the activities, carried out for members in the past few months by ABU Technology, are included and provide a summary of these activities. As usual news and technology updates, from the region and around the world, complete the issue. We hope the information and updates included in this issue will be of benefit to our readers.

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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Frequency Planning for 2x630 Digital Terrestrial Transmitters



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DDG(E), DD India.



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abstract

Frequency planning of television transmitters needs to be carried out with utmost care due to the fact that these have to co-exist with upcoming digital transmitters and the existing analogue transmitters. The approach adopted by Doordarshan for planning the proposed DVB-T2 transmitter network manually has been illustrated in this paper. The concepts involved in determination of DVB-T2 planning parameters such as minimum field strength, lattice planning, minimum number of frequencies for desired area coverage, co-channel separation and criteria to protect existing analogue transmitters are described, along with the references of standards used for the purpose. This exercise was very useful in frequency planning of proposed DTT network of DDI and may be useful to other broadcasters, who are in the planning stage.



Mr Umesh Kumar Sikri
Dy. Director (Engg.)

Introduction

The world is witnessing unprecedented developments in the field of broadcasting. Though introduction of digital transmission and advancements in encryption technology have made RF transmission spectrum more efficient, enormous increases in applications, coupled with simultaneous increases in human expectations, has necessitated additional spectrum allocation. Applications like mobile TV; digital terrestrial transmission; high definition TV; UHDTV; digital radio; satellite-radio; multimedia broadcasting etc. are some such examples. Spectrum is not only a precious and limited commodity but also is a national asset. It has, therefore, to be judiciously utilised and shared by all users effectively and efficiently.

It is unrealistic to demand additional spectrum and therefore DTT systems must co-exist with the existing analogue television services without mutual interference. This scenario will continue for a considerable time because of the large number of analogue TV receivers being used by the public. Hence, frequency planning of Digital Terrestrial Transmitters is a very important exercise before commencement of transmission.

Major planning objectives which need to be targeted, are as under:

- Protection of existing services and transmitters
- Efficient use of spectrum using MFN/SFN
- Efficient use of existing transmission infrastructure
- Minimum cost of transition to viewer

Doordarshan's DTT Plan

In India, VHF Band-I (47-68 MHz), Band-III (174 – 230 MHz), UHF Band-IV (470-582 MHz) and Band-V (582-698 MHz) are allocated for TV broadcasting. These bands are shared with other users of spectrum, such as fixed and mobile services. Channel bandwidth of TV transmission is 7 MHz in VHF bands and 8 MHz in UHF Bands.

Doordarshan has drawn up a plan for digitalisation of its terrestrial transmission network using the DVB-T2 standard. Under this plan, for achieving the current level of terrestrial coverage, 630 DVB-T2 transmitters will be required. Doordarshan has planned establishment of the above transmitters in Band-IV & Band V. The existing analogue transmitters will have to be continued in service along with digital transmitters until the time complete analogue switch off takes place. Frequency planning for 630 digital transmitters, including 230 High Power Transmitters (HPTs) and 400 Low Power Transmitters (LPTs), in the presence of 350 existing analogue transmitters, has been carried out.

Initial planning has been done for 2 multiplexes at each location. This will be further expanded to 3-5 MUXs at each location in a phased manner, maybe after analogue switch-off.

Critical Parameters for Coverage Contours

Spectrum requirements for digital transmitters are dependent upon various factors as indicated below:

- Total no. of multiplexes & no. of transmitters at each multiplex;
- Location co-ordinates & AMSL;
- ERP of each transmitter and antenna radiation pattern;
- Frequency of operation & Frequency re-use technique MFN/SFN;
- Terrain profile data;
- Propagation characteristics & prediction model;
- Transmission parameters, e.g., modulation, code rate, guard interval, FFT size etc.
- Reception type – fixed/portable/mobile, indoor/outdoor
- Minimum usable field strength & protection ratios

Frequency Planning – A Manual Approach

The approach adopted for frequency planning of the proposed DTT network of Doordarshan is described in subsequent sections.

A. Technical Parameters

Technical parameters being used for planning purpose are as under:

Digital Standard	: DVB-T2
Power of Transmitters	: 230 TRs of 10 kW & 400 TRs of 500 W
Operating Frequency Range	: 470-582 MHz (band IV); 582-646 MHz (band V)
Antenna Height	: 150 m for 10 kW; 45 m for 500 W (in general)
Antenna Pattern	: Omni directional
Antenna Gain	: 13 dB for HPTs & 10 dB for LPTs
Reception Type	: Fixed
Height of Receiving Antenna	: 10m above ground level
Modulation	: 16 - 256 QAM & QPSK
Code Rate (FEC)	: 2/3, 5/6, 4/5, 3/5 & 1/2
Guard Interval	: 1/128, 1/4, 1/32, 1/6 & 1/8
No. of Carriers	: 8k

B. Minimum Usable Field Strength

As per ITU-R Report BT-2254, field strength of 55 dB μ V/m (at 650 MHz, reference for Band IV&V) is required for good reception for DVB-T2.

C. Lattice Planning

The following documents have been referred to:

- EBU Technical Monograph Tech. 3080 and ITU-R Rec.

BT-1123 dealing with TV frequency planning are used for lattice planning.

- Propagation curves as in ITU-R Rec. BT-1546-5 is used for coverage range and interference range prediction.
- Report ITU-R BT 2254 & ITU-R Rec. 1368-10 is used to take various planning parameters of DVB-T2 transmitters including protection ratios.

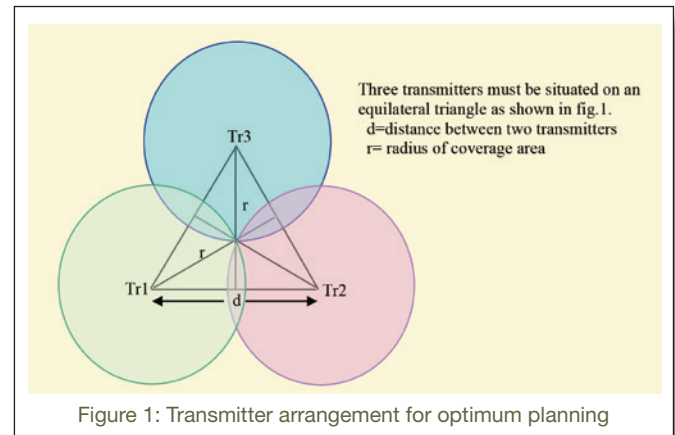


Figure 1: Transmitter arrangement for optimum planning

Relevant calculations for 10 kW DTT are illustrated below

Coverage range	: Minimum usable field strength = 55 dB μ V/m coverage range for 10kW transmitter $r = 60$ km (using ITU-R BT.1546-5)
Distance between two adjacent transmitters	: $d = r\sqrt{3} = 103.92$ km taking a value, i.e., 100 or 121km (higher side 121km has been taken)
Protection Ratio	: 15 dB
Interference Range, IR	: 135 km
Co-channel separation	: Co-channel separation, $D = IR + r = 195$ km
Minimum number of channels required for the coverage of desired area	: $N \approx 3$

Lattice structure is shown in figure.2 below. Lattice gives a co-channel distance of $121\sqrt{3} = 210$ km for HPTs, which is satisfying the co-channel separation criteria as calculated above.

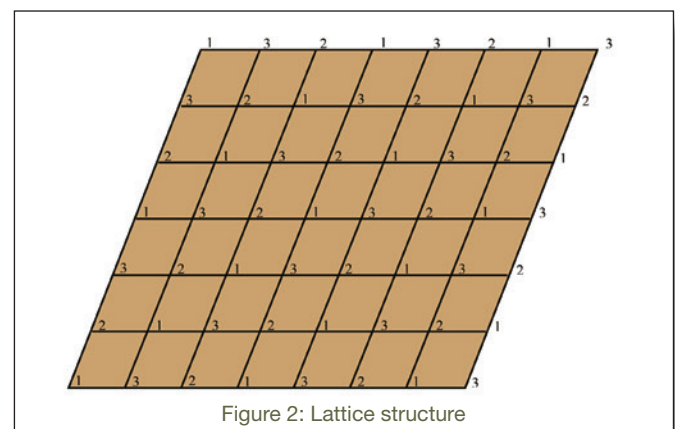


Figure 2: Lattice structure

D. Protection of DVB-T2 transmitters from DVB-T2 transmitters

DD has chosen to use 10 kW HPTs and 500W LPTs for providing pan-India coverage.

Protection ratio for digital-digital transmitters = 15 dB
With DDI planning, following two DVB-T2 co-channel scenario arose:

i) Co-channel separation between 10 kW – 500W DVB-T2

From calculations, IR of 10 kW DVB-T2 = 135km;
CR of 500W=18

Co-channel separation = $IR_{10kW} + CR_{500W} = 153 \text{ km}$

ii) Co-channel separation between 500W – 500W DVB-T2

From calculations, IR of 500W DVB-T2 = 40km;
CR of 500W=18

Co-channel separation = $IR_{500kW} + CR_{500W} = 58\text{km}$

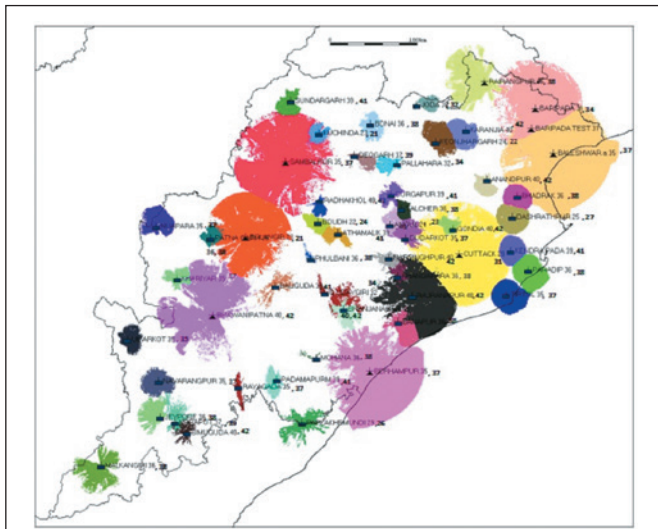


Figure 3: Orissa (a province in India) DTT transmission prediction

A. Protection of Existing Analogue Transmitters from the Proposed Digital Transmitters

The protection ratio for analogue transmitters from digital transmitters, as in ITU-R Rec. BT 1368-10, is 34 dB. Using this criterion on ITU-R BT 1546-5 curves gives separation of 182 km (for 50 W analogue transmitters) to 230 km (for 20 kW analogue transmitters).

Table 1: Co-channel separation for wanted analogue transmitter from DVB-T2

Power of DVB-T2 transmitter	Analogue transmitter		Interference Range of DVB-T2 transmitter (IR)	Coverage Range of analogue transmitter (CR)	Co-channel separation (IR + CR)
	Power	Antenna Height			
10 kW	20 kW	150m	180 km	50 km	230 km
	10 kW	150m		47 km	227 km
	5 kW	150m		35 km	215 km
	1 kW	150m		26 km	206 km
	500W	52m		14 km	194 km
	300W	37.5m		10 km	190 km
	100W	37.5m		6 km	186 km
	50W	30m		2 km	182 km

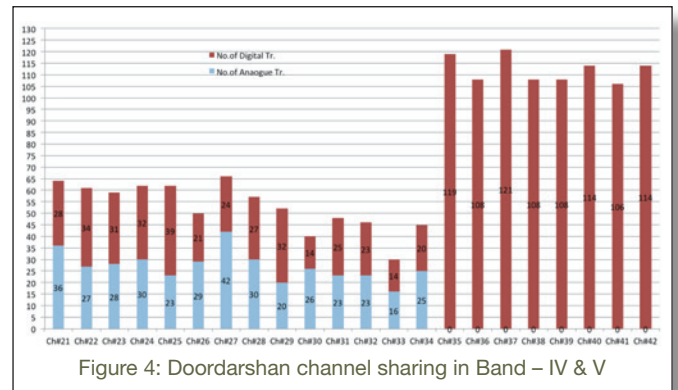


Figure 4: Doordarshan channel sharing in Band – IV & V

To examine the possible interference to existing analogue transmitters, work sheetw for each proposed digital transmitter need to be prepared, taking into consideration all the analogue transmitters which fall within 250 km range. In cases of possibility of interference with any analogue transmitter, one of the following actions may be adopted:

- A different frequency can be assigned to the digital transmitter.
- The frequency of existing analogue transmitter(s) can be changed.
- Possible action can be determined on a case by case basis.

Figure 3 provides indicative coverage of DVB-T2 transmitters in Orrisa province, which has been proposed to have two digital transmitters at 51 locations. Figure 4 provides sharing of UHF frequencies after the DVB-T2 frequency planning exercise.

Conclusion

Frequency planning of television transmitters has acquired greater importance due to the scarcity of spectrum. Radio spectrum is a limited natural resource, though re-usable, so it has to be used efficiently and effectively. Spectrum management will allow equitable access to the spectrum for all existing and potential users. Saving in spectrum results in direct saving of money due to cost associated with bandwidth. The ITU, with the help of member states, is continuously studying the technological evolution to set

standards for interference-free operations. Doordarshan has planned the network using current ITU guidelines. The approach outlined in this paper can be used for frequency

planning of DTT networks and also, it could be utilised for cross-verification purpose in case of software based frequency planning.

authors

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Sh. M. S. Duhan has over three decades of experience in the broadcasting sector, with a predominant focus on digital terrestrial technologies, eco-systems and solutions. He brings vision for the system design and maintenance of all broadcasting organs encompassing studios, earth stations and transmitters of AIR and Doordarshan. He possesses a degree in Electrical Engineering, an MBA and Master of Mass Communication. Sh. Duhan is a participant at various industry forums, events, Journals and TV talk shows. He is a recipient of numerous honours and awards including "The Best Article" and "Commendable First" awards conferred by ABU and various DD awards.

He has published many papers/articles on issues related to terrestrial TV, radio transmission and usage of RF spectrum in national and international journals. He has contributed significantly to the system design, network planning and the implementation of DVB-T2 transmitters in India and finalisation of a BIS standard for DVB-T2- HDTV STB and iDTV. He is currently posted at O/o ADG (NZ), AIR & DD, New Delhi and is responsible for maintenance of Doordarshan TV network in North Zone. He is anchoring a new initiative in repair and measurement methodology for TV transmitters.

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2017 SETS NEW RECORD FOR DAB RECEIVER SALES

A Almost 12 million DAB receivers were sold in 2017 across 10 key markets in Europe and Asia Pacific, a new record for yearly sales. Almost half (5.9m) of the sales are for automotive devices, with key markets showing a significant increase in the number of cars sold with DAB fitted as standard.

Available to download from Worlddab.org, the new data shows continued growth across all key digital radio markets, covering home and automotive line-fit DAB receiver sales, population coverage, household penetration, digital radio reach, DAB+ share and national DAB stations statistics for markets in Europe and Asia Pacific up to the end of 2017. Cumulative sales for DAB receivers have now reached over 65 million for the 10 key markets covered.

Progress in automotive has been particularly strong with nearly 6 million new cars sold with DAB radios last year. In addition to the growth in Europe, there

are an increasing number of emerging DAB markets in the Middle East, Africa and Asia Pacific regions with DAB increasingly becoming a global standard.

Upcoming WorldDAB events in Asia Pacific

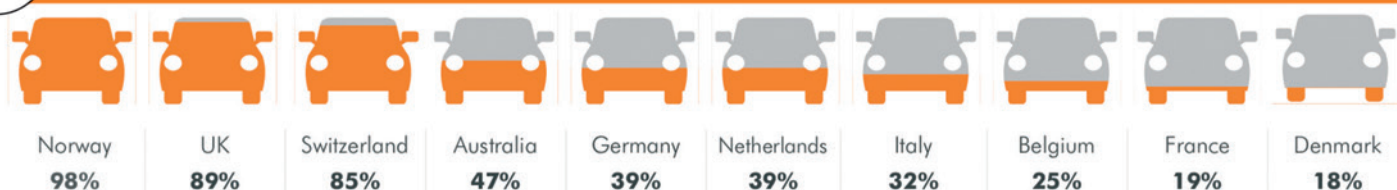
The future of radio is the topic of a Broadcast Asia session at Suntec Singapore on June 27, to be chaired by Joan Warner, WorldDAB Vice-President and CEO of Commercial Radio Australia. Titled "Radio's New Wave", the session will include DAB+ progress in Asia Pacific, evolving platforms, big data and measuring Gen Z and Millennials.

In July, the Asia-Pacific Broadcasting Union, the Arab State Broadcasting Union, the Asia-Pacific Institute for Broadcasting Development and WorldDAB are jointly organising the fourth Regional Workshop on DAB+ Digital Radio Broadcasting to be held in Kuala Lumpur, Malaysia, from 23rd to 27th July 2018. For more information contact projectoffice@worlddab.org

A CUMULATIVE DAB/DAB+ RECEIVER SALES (INCLUDING LINE FIT AUTOMOTIVE) 2008 - 2017



B % NEW CARS W/DAB/DAB+



E-Commerce and Identity Theft Issues

abstract

Cyberspace is the digitised and networked work area people enter when using the Internet. Electronic commerce depends on the use of personally identifiable information and unfortunately, identity theft is a growing problem in today's world. Identity theft crime comes from a combination of cybercrimes from one side and a lack of user awareness from another side. This paper gives perspective about identity theft crime in e-Commerce.

Keywords: *e-Commerce, identity theft, cyber crime*



Ms Atefeh Tajpour
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1. Introduction

Today, many transactions are done through the internet and providing security for e-Commerce is a challenging issue, because there are a lot of cyber threats, malware, spam, phishing, social engineering, scareware, identity theft, etc. Without ensuring a secure e-Commerce environment, it is almost impossible to gain confidence and trust for online customers and business entrepreneurs.

Identity theft is a crime that involves cyber security. Identity theft occurs when people use the personally identifiable information (PII) of others to commit fraud without their consent or knowledge. Social Security numbers, biometric information like finger prints and retina images, passport numbers, medical records, email addresses, names and address, etc. are PII. Governmental organisations, companies and private corporations are related in business, so information security is an issue for information technology.

Private information can be misused for different purposes, such as to open a new account, gain control over victims' credit accounts, gain benefits from government and break the law by using fake identity. Unfortunately identity theft methods are hidden from the victims because usually people only become aware when they are denied new loans or credit cards, refused employment or are asked by a debt collector to repay a debt that the victim did not cause. Sometimes victims spend billions of dollars annually to compensate the effects of identity theft and personal data breach.

It can be concluded that important information, especially PII must keep secure without compromise, otherwise e-Commerce will face real challenges. On the other hand individuals can face serious financial disaster when identity theft happens.

This paper presents definition and different types of e-Commerce and also explains identity theft issues in this area.

2. Identity Theft

Types of personal identifiable information (PII) include Social Security numbers (SSNs), driver's license numbers,

government identification numbers, alien registration numbers, email addresses, taxpayer identification numbers, financial records, credit card numbers, passport numbers, employer identification number, electronic identification number, and criminal history. It also includes unique biometric data (fingerprints, retina scans, facial geometry, iris images, and other unique physical representations), patient identification numbers, and medical records [1].

Identity-theft is a relatively new phenomenon and there is no a unique universally accepted definition yet [2], [3]. However, some consistency in the definition is found in the research literature for business and information systems.

The definition most commonly encountered for identity theft is "The use of another individual's personal identifying information without that individual's permission for purposes of committing a crime" [4], [5], [6].

Also, based on [7], "An identity thief is an individual or organisation that tries to steal and use identity illegally for financial fraud or other purposes. An identity thief could be an individual criminal, a terrorist, or a crime ring."

The UK Home Office defines identity theft as an act which "occurs when sufficient information about an identity is obtained to facilitate identity fraud, irrespective of whether, in the case of an individual, the victim is alive or dead" [8].

United States Congress defined an identity thief as "Someone knowingly transferring or using, without lawful authority, a means of identification of another person with the intent to commit, or to aid or abet, any unlawful activity that constitutes a violation of Federal law, or constitutes a felony under any applicable state or local law" [9].

3. E-Commerce

There are different definitions for e-Commerce. Laudon and Zhu [10, 11] defined it as "digitally enabled commercial transactions between and among organisations, mostly conducted over the Internet and other computer networks".

Also, another definition, “Electronic commerce is sharing business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks” [12].

[13] defines e-Commerce as “the process of buying, selling, transferring, or exchanging products, services, and/or information via computer networks including the Internet.” Similarly [14] defines “Electronic commerce, commonly known as e-Commerce, is considered to be the buying and selling of information, products, and services via computer networks”. Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of business transactions.

Also, [15] defines e-Commerce as “any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact”. Whereas, [16] defines “E-Commerce is usually associated with buying and selling over the Internet, or conducting any transaction involving the transfer of ownership or rights to use goods or services through a computer-mediated network”.

“In simple words, e-Commerce is doing the work of commerce electronically. E-Commerce can be between many groups. It can be between business and business, or between business and consumers, or can be between business and employees, and can be many more” (Raj Kumar Sharma 2012).

Products and structures of e-Commerce cover its three categories: consumer-oriented commerce, business-to-business commerce, and inter organisational business. All three are experiencing vigorous developments, with differing economic outcomes at this time [12]. The most highly touted applications of e-Commerce are consumer-oriented. They include remote (or home) shopping, banking, and stock brokerage, accompanied by on-line advertising.

4. E-Commerce Types

There are different categories for e-Commerce, according to [15], major different types of e-Commerce are: business-to-business (B2B); business-to-consumer (B2C); business-to-government (B2G); consumer-to-consumer (C2C); and mobile commerce (m-commerce).

Also, there is another category from [17] (Raj Kumar Sharma 2012), Business-to-Consumer (B2C), Business-to-Business (B2B), Consumer-to-Consumer (C2C), Business-to-Government (B2G), Mobile commerce (m-commerce).

Moreover, G2G (Government-to-Government), G2E (Government-to-Employee), G2B (Government-to-Business), B2G (Business-to-Government), G2C (Government-to-Citizen), C2G (Citizen-to-Government) are other forms of e-Commerce that involve transactions with the government from procurement to filing taxes to business registrations to renewing licenses [18]. There are other categories of e-Commerce out there, but they tend to be superfluous (Raj Kumar Sharma 2012). Major types of e-Commerce can be categorised as following [17]:

4.1 Business-to-Business (B2B)

B2B or business to business is an e-Commerce transaction between companies for sale or purchase of products, services, or information. Forecasts are that B2B income will far exceed

business-to consumers (B2C) income in the near future. B2B e-Commerce can save or make your company money.

4.2 Business to Consumer (B2C)

B2C (Business to Consumer): Refers to a business communicating with or selling to an individual rather than a company. It refers to businesses selling to the general public typically through catalogs utilising shopping cart software. Doing business online no longer requires a huge investment by retailers, thanks to developments in template-based online stores which are based on packaged applications that are delivered over the internet. All online stores will require the same functions: catalogues, order baskets, payment processing, content management and member management.

4.3 Consumer to Business (C2B)

C2B is a business model in which consumers (individuals) offer products and services to companies and the companies pay them. This business model is a complete reversal of traditional business model where companies offer goods and services to consumers. This kind of economic relationship is qualified as an inverted business model.

Blogs have paved the way for new C2B and C2C applications by giving the opportunity and tools to anyone to express themselves easily and to communicate inexpensively. Video casting, RSS and other blog related technologies help to provide opportunities to develop new economic systems and to generate alternative revenues. Online Advertising sites like Google Ad sense, affiliation platforms like Commission Junction and affiliation programs like Amazon are the best examples of C2B schemes.

4.4 Business to Employee (B2E)

B2E (Business to Employee) e-Commerce generally refers to the business between the company and its employees. The examples could be a company e-store where employees can buy the company goods and services at discounted prices. However, B2E has grown into technologies that allow the employee to access their employee records to update address information, shift investments, or maintain their internal resume.

4.5 Consumer-to-Consumer (C2C)

The C2C business is the one that originates from consumers and the destination is also consumers. The most famous and successful example of a Consumer-to-Consumer application is EBay. It is an online site that facilitates the trade of privately owned items between individuals. The website claims that through EBay, practically anyone can trade anything. EBay is now considered one of the most successful C2C e-businesses ever.

There are many sites offering free classifieds, auctions, and forums where individuals can buy and sell thanks to online payment systems like PayPal where people can send and receive money online with ease. Consumer-to-Consumer applications are a growing area of e-Commerce. As online business expands, peer-to-peer transactions will continue to grow in popularity and the industry will become highly profitable.

All the above types of e-Commerce are exposed to identity theft because they include remote (or home) shopping, banking, and stock brokerage, accompanied by on-line advertising and financial misuses are the common purpose of criminals.

5. E-Commerce and Identity Theft Issues

Cyberspace is the digitised and networked work area people enter when using the Internet. Online users “surf” cyberspace to exchange information, for communication, for entertainment, to buy and sell products and services, to navigate and use public and private transportation, share their interests, and make financial transactions across a wide range of sectors, both nationally and internationally.

Customers do not need to drive, park, stand-on-line, and wait for shopping hours or inclement weather. Commodities can be purchased either locally or around the world 24 hours a day. Financial accounts (bank cards, credit cards, etc.) can be opened online and funds can be transferred around the world with the click of a mouse. The Internet has transformed the world in a single and borderless e-Commerce marketplace. Organisations all over the world are increasingly relying on e-Commerce for their business transactions and growth. E-Commerce is growing rapidly, accounting for \$132 billion in retail sales in the U.S. in 2008 and £50 billion in purchases and sales in the U.K. in 2009 [9]. In the European Union (EU) countries, 15% of enterprises received orders online in 2007, 6% up from 2003. The EU average for online purchases grew from 13% in 2003 to 27% in 2007 [19].

As people conduct e-Commerce and use cyberspace, enormous amounts of personal, financial, organisational, and commercial data are being collected, processed automatically, and stored electronically. A secure cyberspace protected against unauthorised intrusions or unlawful use is important and is a pre-condition to the critical infrastructures and the health of our digital economy.

Identity theft is the assumption of another person's financial identity through the use of the victim's identifying information. This information includes a person's name, address, date of birth, social security number, credit card numbers, and checking account information. With this information, a thief is capable of charging merchandise to the victim's account and changing the billing address for the account so that the unauthorised purchases remain undetected.

Identity theft opens the door to other crimes, such as gaining access to welfare and social security benefits, ordering new checks to a new address, obtaining new credit cards, obtaining the victim's paycheck, taking out loans in the victim's name, and using the victim's name upon arrest [20],[21], [22] , [23].

The risk posed by identity theft clearly has affected online consumer behavior [24]. Customers are more cautious about revealing information in transactions, and they opting out of transactions that redirect them for payment information. In addition, retailers have lost nearly \$21 billion in revenue because of online shopping fears.

A 2004 survey conducted by the Identity Theft Resource Center, ITRC [25] reported that victims spent an average of 330 hours repairing the damage from identity theft. Not only is this process time consuming, it can also be extremely frustrating because victims must deal with an array of different agencies and institutions. Contact with these agencies generally needs to be made during business

hours and creates havoc for a victim who works and doesn't have the flexibility to make time-consuming personal calls.

Identity thieves typically commit fraud in two steps. The first is to steal an identity or create a fake one. The second is to illegally use a fake identity to gain access to the victim's financial services or to commit crimes. Stolen personal identifiable information, is misused for different purposes such as opening new account, gain control over victims' credit account, gain benefits from government and withdraw law by using fake identity. Unfortunately identity theft method are hidden to the victim because usually people are only aware when they are denied new loans or credit cards, refused employment or when a debt collector asks for payment of a debt that the victim did not cause. Sometimes victims spend billions of dollars annually to compensate the effects of ID theft and personal data breach [26].

Some organisations guard against information sharing to other organisations because identity theft is a continuing problem. Also, gathering accurate information about individual and organisational victims is difficult and time consuming. This lack of information is now a growing threat to the validity of identity theft and data privacy breach research.

The growth potential of e-Commerce comes with vulnerabilities also. Perhaps the most important reason for both businesses and consumers to partially avoid from establishing and participating in e-Commerce is the potential for loss of personal data. A single highly publicised security breach in personal data can destroy confidence in the business and can not only damage the reputation of the firm, but cause widespread consequences in the e-Commerce industry [27]. An organisation must protect the confidentiality, integrity, and availability (CIA) of their and their customer's information.

Electronic commerce depends on the use of personally identifiable information (PII). Types of PII include Social Security numbers (SSNs), driver's license numbers, government identification numbers, alien registration numbers, email addresses, taxpayer identification numbers, financial records, credit card numbers, passport numbers, employer identification number, electronic identification number, and criminal history. It also includes unique biometric data (fingerprints, retina scans, facial geometry, iris images, and other unique physical representations), patient identification numbers, and medical records [28], [1].

Consumers should be aware not only of the risk of breaches in information security at companies they conduct e-Commerce with, but also breaches in information security on their personal devices and collection of their private information without their knowledge or consent. The internet has presented opportunities for companies to bombard the consumers with various marketing information, especially in online advertisements. Some of these techniques break data privacy and leave consumers with security issues.

Consumers who fall victim to identity theft can be harmed by having their privacy invaded, suffering the psychological stress of having their reputation ruined, incurring financial liabilities, and undergoing tremendous transaction costs to restore their names [29].

There should be a growing awareness among e-Commerce customers that they must stay ahead of the risks, because

risk is everywhere. Even using an automatic teller machine is a potential risk when a criminal might watch the personal identification number (PIN) over the shoulder and use it later or sell it to others for financial gain [30].

Conclusion

Growth of e-Commerce from one side and increase of

information sharing in cyberspace from another side increase the importance of attention to cyber security. E-Commerce uses cyberspace for data transformation so cyber threats such as identity theft, is considered as the threats to e-Commerce.

It could be concluded, personal identifiable information must keep secure without compromise, otherwise e-Commerce will face real challenges. On the other hand individuals can face serious financial disaster when identity theft happens.

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Atefeh Tajpour received her Ph.D. in Computer Science from Universiti Teknologi Malaysia in 2015. She has more than 15 years experience in application programming and system analysis. Atefeh has been university lecturer and currently works in Islamic Republic of Iran Broadcasting (IRIB). She has published journal papers, conference proceeding papers, and books on related topics to her area of interest, including web application security, privacy and social networks. She also has been reviewer/editor in international conference organisation and journals.



15th Iran Media Technology Exhibition & Conference IRIB Annual Technical Assembly Tehran, IRAN, 20-21 November 2018

Major Topics :

- Content production technologies and media services
- New contribution and distribution infrastructures
- Artificial Intelligence applications in media and broadcast industry
- Data center and Secure cloud infrastructure
- Future Media architecture

Other Topics of Interest :

- * Digital radio and television systems: Terrestrial, Satellite, Broadband infrastructures
- * Immersive and Beyond HD Production, Transmission and Distribution
- * Immersive and next generation audio production and distribution
- * Internet of Things: Functions and applications in Media
- * Quality of Experience and Quality of Service
- * Targeted Advertising for broadcasters (TA)
- * Hybrid Broadband Broadcast (HbbTv)
- * Social Media and Broadcast industry
- * Content and audience analysis tools
- * Interactive Media Services
- * Cloud based Production
- * 5G:Media applications
- * IP production facilities

Call for paper

Paper submission deadline:
October 17, 2018

Acceptance notification:
November 6, 2018

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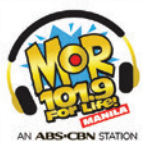
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ABU TECHNICAL COMMITTEE MEETING SCHEDULE

Ashgabat, Turkmenistan

1-2 October 2018

Time/Date	Sunday, Day 0 30 September	Monday, Day 1 1 October	Tuesday, Day 2 2 October
9.00am – 10.30am		<i>Banquet Room 3</i>	<i>Banquet Room 3</i>
11.00am – 12.30pm		OPENING SESSION ABU Engineering Awards & Technical Review Prizes Announcements & Presentation Director's Report Bureau Proposals	Keynote Presentation Summary from Topic Area Chairmen: Production, Transmission, Capacity Building and Spectrum Election of TC Office Bearers
2.00pm – 3.30pm	<i>Banquet Room 3</i> Technical Bureau Meeting 2.00pm – 6.00pm	Strategic Issues	Technology Debate New Recommendations & Decisions of the Technical Committee
4.00pm – 5.30pm	<i>Restricted to Members of the ABU Technical Bureau</i>	Members' Present Networking with ABU TLOs	Updates from Status Reports Information Exchange Session Presented by ABU Members Any other matters CLOSING

ABU ENGINEERING EXCELLENCE AWARDS

PANEL OF JUDGES

ABU DEVELOPING BROADCASTERS' EXCELLENCE AWARD & ABU BROADCAST ENGINEERING EXCELLENCE AWARD



Panel Chairman

Masakazu Iwaki, Deputy Director/Head of Secretariat for AI Promotion, Science and Technology Research Laboratories, Nippon Hoso Kyokai, Japan, appointed as Panel Chairman in April 2011. Mr Iwaki is the Chairman of the ABU Technical Committee.



Tharaka Mohotty, Director, Engineering, MTV Channel (Pvt) Limited and Vice-Chairman, ABU Technical Committee, appointed a member of the panel in June 2015.



Rahadian Gingging, Director of Technology and New Media, Radio Republik Indonesia (RRI-Indonesia), appointed a member of the panel in August 2016.



Naoki Kashimura, Director of the Board, Managing Director, Product Strategy & Marketing Division, Research & Development, Ikegami Tsushinki Co Ltd, Japan, appointed a member of the Panel in 2008.



Peter Bruce, Director APAC, IABM. Appointed a member of the panel in June 2018.



Alexander Zink, Senior Business Development Manager Digital, Radio, Fraunhofer. Appointed a member of the panel in July 2018.

ABU ENGINEERING INDUSTRY EXCELLENCE AWARD & ABU GREEN BROADCAST ENGINEERING AWARD



Panel Chairman

Hamid Dehghan Nayeri, Director, International Technical Affairs, Islamic Republic of Iran Broadcasting, appointed as Panel Chairman in June 2015.



Şahin DEMİR, Deputy Head of Studio Planning, Turkish Radio Television Corporation (TRT-Turkey), appointed to the panel in August 2017.



Hong, Young-Kyung, ABU Technical Liaison Officer, Technology Management, Korean Broadcasting System, appointed a member of the panel in June 2018.



Fintan Mc Kiernan, CEO, Ideal Systems Singapore, appointed a member of the panel in June 2014.



Charles Sevier CTO (APJ), Dell EMC, Data Lake Scale Out Storage. Appointed a member of the panel in June 2015.



Asaad Sameer Bagharib, Director, Thinking Tub Media Pte Ltd, Singapore, appointed a member of the panel in June 2018.

November 2017, Chengdu, China

November 2017, Chengdu, China

November 2017, Chengdu, China

November 2017, Chengdu, China

November 2017, Chengdu, China

October – 1 November 2017, Chengdu, China

ABU ENGINEERING AWARDS 2018

ABU Broadcast Engineering Excellence Award

- Awarded for outstanding contributions in broadcast engineering and related disciplines.
- The award consists of a citation plaque and a trophy.

ABU Green Broadcast Engineering Award

- Awarded for outstanding contributions in developing, implementing and/or promoting green technology in the broadcasting industry.
- The award comprises a trophy presented at the opening session of the annual ABU Technical Committee meeting.

ABU Engineering Industry Excellence Award

- Awarded for outstanding engineering contribution made by an individual to the broadcasting industry in the Asia-Pacific region.
- The award comprises a citation plaque and a trophy.

ABU Developing Broadcasters' Excellence Award

- Established in 2013 to recognise innovation and excellence among the ABU's developing broadcasters.
- Awarded for contributions of an outstanding nature in broadcast engineering made by an individual in a developing broadcasting organisation.
- The award comprises a citation plaque and a trophy.

BECOME A SPONSOR!

The winners will be announced during the ABU Technical Committee Meeting Opening Session on 1 October 2018 in Ashgabat, Turkmenistan.

Sponsorship packages

Major Sponsor US\$2,000.00

- Your company's logo as a major sponsor in all promotional materials, webpage and the backdrop during the presentation of the award.
- Acknowledgement of your sponsorship as a major sponsor during the announcement of the winners at the annual ABU Technical Committee meeting.
- Invitation to attend the annual meeting of the Technical Committee.
- Invitation to present the award to the winner at the Opening & Awards Ceremony of the annual Technical Committee meeting.
- Provide your company with a complimentary full-page advertisement in the Q3 issue of the ABU Technical Review (which is the issue that features the ABU's annual meetings).
- Acknowledgement of your sponsorship as a major sponsor in the handbook of the following year's ABU Digital Broadcasting Symposium.
- A 10% discount on a single booth or a free conference registration at the following year's ABU Digital Broadcasting Symposium.

Co-Sponsor US\$1,000.00

- Your company's logo as a co-sponsor in all promotional materials, webpage and the backdrop during the presentation of the award.
- Acknowledgement of your sponsorship during the announcement of the winners at the annual ABU Technical Committee meeting.
- Invitation to attend the annual meeting of the Technical Committee meeting.
- Provide your company with a complimentary half-page advertisement in the Q3 issue of the ABU Technical Review (which is the issue that features the ABU's annual meetings).
- Acknowledgement of your sponsorship in the handbook of the following year's ABU Digital Broadcasting Symposium.



April 2018 – Call for Nominations

30 June 2018 – Deadline

July 2018 – Judging

1 October 2018 – Announcement of Winners ABU Technical Committee Meeting Ashgabat, Turkmenistan

ABU Technical Bureau Mid-Year Meeting

1-2 May 2018, Kuala Lumpur

The mid-year meeting of the ABU Technical Bureau took place in Kuala Lumpur on 1st and 2nd of May 2018. The meeting reviewed the progress of current activities carried out by ABU Technology (TD), the Topic Area study projects and other issues raised since the last Technical Committee (TC) meeting in Chengdu, China. It also addressed several important areas of concern to broadcasters and identified specific issues of interest based on the technological developments within the industry.

The Bureau meeting was chaired by the TC Chairman, Mr Masakazu Iwaki of NHK-Japan. A total of 17 participants, representing 12 members, took part in the meeting.



Mr Masakazu Iwaki
NHK-Japan, ABU TC Chairman



Dr Javad Motaghi,
ABU Secretary-General

In his opening remarks, the chairman welcomed all the members to the meeting and highlighted the key agenda points that needs to be addressed and discussed within the two days. The ABU Secretary-General, Dr Javad Mottaghi, thanked the Bureau members for their contributions and hard work in guiding the secretariat to run the most appropriate activities to service the members. He welcomed all present to Kuala Lumpur and highlighted the importance of brainstorming and sharing the different views that members can contribute to identify the best solutions to address members' issues and concerns. He thanked the Chairman for his leadership in drawing the best out of these deliberations in the past and wished him the best in taking the discussions forward.



Mr Lasantha Samaranayake,
EAP-Sri Lanka,
ABU TC Vice Chairman



Mr Tharaka Mohotty,
MTV/MBC-Sri Lanka,
ABU TC Vice Chairman

Progress Reports from Study Topics and review of Study Projects

The Bureau was presented with reports on the work of the Study Topic Areas; Production, Transmission a, Capacity

Building and Spectrum. The progress reports provided updates to selected projects among the 20 study projects currently active under the four topic areas. A summary of these reports is available in this issue of the Technical Review, under a new initiative that was agreed at this meeting by the members of the bureau. The members also reviewed the terms of reference for the 20 study projects and requested the respective chairpersons to make an in-depth review of their respective projects and propose any required amendments.



Dr Kong Bin, RTPRC-China,
ABU TC Vice Chairman



Mr Hamid Dehghan Nayeri,
IRIB-Iran

Brainstorming on Strategic Issues and New Initiatives

The members discussed a variety of strategic issues and new initiatives proposed by the secretariat and those raised within the study projects and outcomes from WBU-TC meetings. Some selected issues received excellent insights and collaboration from the members. The session allowed them to share their own experiences relating to the topic under discussion and to learn what kind of outcomes and benefits members seek from these initiatives and projects. Some of the key areas of discussions included:



Mr Doo-Hyung KANG,
KBS-Korea



Ahmed Nadeem,
ABU

- Short-term staff attachments with developed member broadcasters to help those still developing
- Supporting the establishment of Online Media Training Centre/Media Academy
- Further strengthening of the ABU Digital Broadcasting Symposium
- Further strengthening Webinars and On-line services to members
- Proposed amendments to Selection Criteria for Engineering Awards and Technical Review Prizes



Mr Jamel Seman,
RTM-Malaysia



Nguyen Thanh Nam,
ABU

- Ways to improve the Technical Review and make it more relevant to members
- Strategies and Roadmap for WRC-19
- Identifying Key Areas and Activities to address members' requirements
- Cyber Security Recommendations discussed within WBU-TC
- Big Data and how members can use it
- Ways to further enhance and improve the Technical Committee Meetings



Mr Zainal Zakaria,
RTM-Malaysia



Mr Peh Beng Yeow,
Mediacorp-Singapore

Some of these discussions will be taken further in the coming meetings whereas for some decision were taken by the meeting itself. These decisions will be documented and taken up at the annual Technical Committee meeting where appropriate for adoption and action.

Key Decisions Taken at the Meeting

- The Bureau took a comprehensive review of the selection criteria and guidelines for the Engineering Awards and agreed that the guidelines needed some amendments to further enhance its relevance and the integrity and transparency of the selection process. The amendments will be tabled for adoption by the next Technical Committee meeting.



Mr Akira Negishi,
NHK-Japan



Dr Narichika Hamaguchi,
NHK-Japan

- The Bureau also considered and agreed on a change to the selection criteria for the Technical Review prizes. The new selection criteria will allow more members from different levels in technology implementation to compete for the prizes, hence creating a chance to increase the number

of articles we get from members. The proposed criteria will be tabled for adoption by the Technical Committee meeting.

- In an effort to further enhance the Technical Review magazine, the Bureau decided to publish the Study Topic Area reports, compiled from the updates to study projects and discussed at the Bureau meetings, in the magazine.



Mr Terence Yiu Shu Tat,
Phoenix TV-Hong Kong



Mr Rahadian Gingging,
RRI-Indonesia

- The Members agreed to setup two new study projects, to look into the areas of Cyber Security in Media and Big Data for Broadcast and Media. These new study projects will further investigate the developments in these areas, to provide practical and useful information and guidance to members on these technologies and applications.



Mr Rahut Udomwet,
NBT-Thailand



Mr Chiewchan Nantanapanich,
TPT-Thailand

- The Bureau also reviewed the report from the Spectrum Topic area together with the strategy proposed by the WBU-TC on WRC-19 and decided to support it. This includes the member position on the UHF-band and the safeguarding of the C-Band for broadcasting applications. These reports have already been distributed to members for their information and necessary action through their regulatory frameworks.
- The Bureau tasked the secretariat to re-run the survey among members to identify and prioritise the areas where members need further training and support through consultancies and advisory services.



Mr Anusorn Srimalaikul,
NBT-Thailand



Mr Nawir,
RRI-Indonesia

REPORT:

Study Projects – Production

Report by: ABU Technology on behalf of Mr Kazim PEKTAS, TRT (Topic Chairman)

Reporting Period: November 2017-April 2018, Date of Report: 30 April 2018

Introduction

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

1. Radio & Television Archiving including Metadata for international programme Exchange (P/RTA)
2. Ultra High Definition TV (P/UHDTV)
3. Systems for people with special needs (P/SN)
4. IT-based Production System and file-based workflows (P/ITPS)

For this reporting period (November 2017 to April 2018) two new contributions were received for the projects, (P/RTA) and (P/SN). The following is the compilation of these two updates reports from the Project Managers and contributors for (P/RTA) and (P/SN)

Project P/RTA

(Radio & Television Archiving including Metadata)

Project Manager:

Dr Masanori Sano, NHK

Co-Project Managers:

Ms Fikriye Berker, TRT; Dr Byunghee Jung, KBS;
Mr Wang Yin, MediaCorp; Mr Gary Kum, TVB;
Mr Manoj Gupta, DDI; Mr R P Joshi, AIR

Update of EBU Standardisations and Activities on “Metadata”

There have been four publications on Metadata from EBU since last autumn.

Document: EBU Tech 3356
Title: FIMS Media SOA Framework V. 1.3.1
Release: 03 October 2017
Summary: FIMS is a vendor-neutral common framework for implementing Interoperable Media Services using a Service Oriented Architecture (SOA) base system, supporting interoperability, interchangeability and reusability of media specific services.
Information: <https://tech.ebu.ch/publications/tech3356>
<https://github.com/fims-TV/fims>
 FIMS activity has been done by the joint task force between AMWA and EBU so far, but now the activity will be supported by only EBU. A new group “MCMA” in EBU has been established. See the following URL.
<https://tech.ebu.ch/groups/mcma>

Document: EBU Tech 3293
Title: EBU Core Metadata Set v.1.8
Release: 30 October 2017
Summary: EBU Core is the flagship of EBU metadata which provides a common set of metadata for describing TV and Radio content
Information: <https://tech.ebu.ch/publications/tech3293>
 This version allows props, costumes, timed text actions and emotions can be associated to scenes and persons or character. High Dynamic Range static technical metadata and Virtual Reality flags has been added to the videoFormat element.

Document: EBU Tech 3351
Title: EBU Class Conceptual Model (EBU CCDM) Ver. 2.0
Release: 17 November 2017
Summary: EBU CCDM is an ontology designing a basic set of classes and properties as a common vocabulary to describe business objects, e.g. programmes, articles and other types of content, and their relates in the business processes of media enterprises.
Information: <https://tech.ebu.ch/publications/tech3351>

Document: Tech Report 041
Title: Modelling Core Business Objects and Processes in Digital Media Enterprises
Release: 23 January 2018
Summary: This specification describes a mode of the core business objects and the cycle of business processes in digital media enterprises. The model is a value chain model and supports the analysis, description and comparison of many aspects of business development.
Information: <https://tech.ebu.ch/publications/tr041>

A major event on Metadata in EBU “MDN WORKSHOP 2018” was scheduled from 5th to 7th June 2018 at EBU Headquarters in Geneva. Please see the following URL.
<https://tech.ebu.ch/mdn2018>

Project P/SN

(Systems for people with special needs)

Project Manager:

Mr Shuichi Umeda, NHK

Co-Project Managers:

Mr Özgür Coşar, TRT; Mr Teyfik Arslan, TRT

1. Project on Sign Language CG Production System for Weather Forecast

NHK launched a sign language weather forecast web site to the public in February 2017. Viewer can access the latest weather forecasts by clicking the map on their own PC, smart phones or tablets.

Features

- The purpose of this sign language system is to reduce the production cost and interpreter burden by of automatic systems.
- For automatic conversion from Japanese to sign language, we have adopted a template based method. We have created a template that corresponds to the standardised weather codes distributed by the Japan Meteorological Agency.
- The sign language motions of our system are produced using pre-recorded motion capture data such as joints of fingers, facial expressions, head tilting, and mouthing.
- In sign language, the movement of the face plays an important role. Native signers can understand what we want to express, even with poor facial expressions.

Currently we have started publishing weather forecasts for only limited areas of Japan, however, in the near future, we will apply sign language system to nationwide and emergency warnings.



2. Project on Sign Language CG Presentation System for Sports Programmes

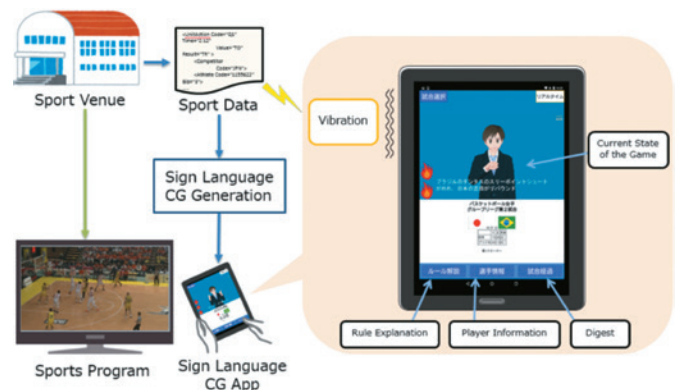
We are researching technology for the automatic generation of sign language with CG animation to make sports programmes more enjoyable for hearing impaired. We developed a sign language CG application for sports programmes that helps

hearing impaired understand broadcast sports events. In February, we conducted experiments to provide content including sign language with CG automatically generated from data received in actual games.

Features

- The sign language CG generator analyses the sport data delivered to the broadcasting stations during a game, so it automatically generates and delivers sign language CG that convey the current state of the game.
- The app displays rule explanation, player information, and digests up to the present in sign language CG on a second screen to deepen viewer's understanding of the game.
- Usually, a viewer watches sports programmes on a TV screen. When the sports data updates, the terminal vibrates and attracts the viewer's attention.

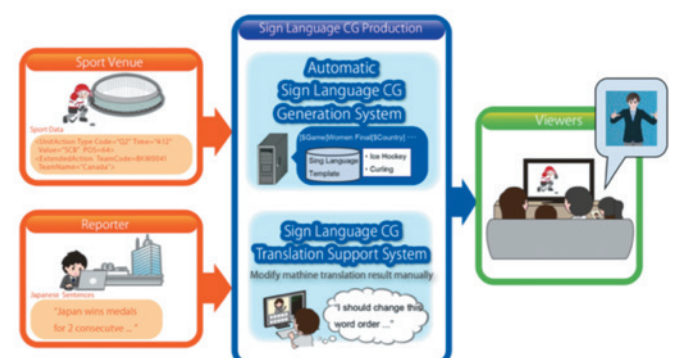
We have participants viewing a prototype app, and we are listening to their opinions and we analyse the collected feedback to improve the app.



In addition, we have developed a sign language CG translation support system that complements automatic systems for content creation that is easier to understand and attracts viewers.

Features

- We conducted an experiment on the automation process from receiving sport game data to upload sign language CG to the website by using an automatic sign language CG generation system. The automatic sign language CG generation system can generate fixed form sentences with a sports data template.
- We are aiming to send sports news that translates from Japanese into sign language CG after a game is over. In addition to sending the automatically generated sign language CG to viewers it is also possible to manually correct expressions at the producer's discretion by using a sign language CG translation support system.



REPORT:

Study Projects – Spectrum

Report by: Dr Li Lei Lei, RTPRC, (Topic Chairman)

Reporting Period: November 2017-April 2018, Date of Report: 30 April 2018

Introduction

This report is on the Topic Area, Spectrum Issues which include the related WRC-19 Agenda items concerning broadcasting service and ABU spectrum issues. The spectrum topic area covers 9 project topics.

Project Topic 1: to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution 766 [COM6/8] (WRC-15) (WRC-19 AI 1.3)

1. Study Progress

A preliminary draft new Report ITU-R SA.[460 MHz METSAT-EESS] is in development which compiles elements related to background on WRC-19 agenda item 1.3 as well as initial technical considerations on EESS and MetSat in the 460-470 MHz band and other services allocated in this band and adjacent bands, namely the Mobile, Maritime Mobile, Mobile Satellite, Fixed, and Broadcast services.

This document provides results of studies evaluating the potential for radio frequency (RF) interference (RFI) from spacecraft operating in the MetSat service and EESS using the 460-470 MHz frequency band to incumbent systems in primary allocated services. The use of this band is already established due to the existence of a secondary allocation to MetSat. Meteorological satellites already transmit in this band to control and interrogate data collection platforms. These studies include the calculation of power flux density (PFD) levels from the spacecraft and translate incumbent system interference susceptibility into the same units and at the same location. The incumbent system vulnerabilities are used to determine PFD limits that will protect them from RFI. One-way analysis was performed to establish criteria such that potential RFI to allocated primary services due to the proposed primary MetSat service and EESS is mitigated and does not occur. In the report static and dynamic analyses are provided to investigate the effect of MetSat and EESS systems on systems operating in the incumbent services.

In the new preliminary draft Report ITU-R SA.[460 MHz METSAT-EESS], broadcast system is referred to as digital television (DTV). The characteristics for DTV including adjacent channel protection ratios, fixed roof top reception, etc., were extracted from ITU-R Recommendations BT.2036, BT.1368 and BT.2033. The protection ratios for DTV by RFI type and from MetSat or EESS were extracted from ITU-R Recommendations BT.1368.

This report is based on the most restrictive results for the PFD levels required to protect mobile and fixed services systems from Metsat/EESS satellite downlinks.

There were three cases of static analysis that presented criteria more stringent than -152 dBW/m²/4kHz. Dynamic analysis was performed where the static analysis resulted in PFD criteria more restrictive (less than) -152 dBW/m²/MHz and time constraints for the RFI were known. This was the case for P-P, P-MP and RF CSA systems. In the worst case below 5° was based on MS NB base stations, from 5° to 15° on RF CSA stations with 10 dBi antennas, and above 15° was based on the minimum permissible limit in accordance with AI 1.3 (WRC-15 Res. 766). The simulations do not take into account aggregation with GSO satellites because GSO and NGSO systems do not operate within the same frequency band.

The proposed pfd limit for the downlink emission of NGSO satellites is provided in terms of angle of arrivals α as:

$$pfd \text{ (dBW/m}^2\text{/4kHz)} = \begin{cases} -157 & 0^\circ \leq \alpha < 5^\circ \\ -157 + 0.5(\alpha - 5) & 5^\circ \leq \alpha < 15^\circ \\ -152 & 15^\circ \leq \alpha \leq 90^\circ \end{cases}$$

The frequency band 460-470 MHz has been utilised by several satellite systems, some of which are not able to meet the above pfd limit masks. An appropriate arrangement is necessary to ensure that the existing satellite systems, including those with a brought-into- use-before date [insert date], can continue their operation according to the provisions adopted at WRC-19.

2. Preliminary Views

Item 1.3 was jointly proposed by CEPT and CITEU, with NOAA of the United States and French space agency CNES as the main drivers.

A number of broadcasting system types are widely used worldwide in the adjacent 470-862 MHz band. More detailed characteristics, parameters and protection criteria of the

broadcasting system need to be reviewed and updated. The adjacent band analysis needs to be further studied for the sake of fully protecting the broadcasting system.

Project Topic 3: to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with ITU-R Resolution 159 (WRC-19 AI 1.6)

1. Developments of ITU-R Working Party 4A

For WRC-15 agenda item 1.6, ITU-R WP4A had preliminarily studied the technical characteristics of non-GSO FSS satellite systems, technical characteristics of GSO FSS/MSS/BSS satellite networks, protection criteria of GSO FSS/MSS/BSS satellite networks and methodology for sharing between non-GSO systems and GSO FSS/MSS/BSS satellite networks, etc. At the same time, ITU-R 4A sent a liaison statement to ITU-R 3M to request propagation models for 50/40 GHz bands

2. Preliminary Views

Up to now, there has been no concrete study result announced by ITU-R 4A. We should continue following the corresponding developments of study on WRC-19 AI 1.6 conducted in ITU-R Working Party 4A and pay close attention to possible impact on broadcasting services in Asia-Pacific Area.

Project Topic 4: to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 238 [COM6/20] (WRC-15) (WRC-19 AI 1.13)

1. Developments of TG 5/1 Research

As invited by CPM19-1, SG5 formed TG 5/1 at its first meeting on 9 June 2016 and adopted the Terms of Reference as provided in Annex 9 of Administrative Circular CA/226. TG 5/1 is tasked with conducting the sharing and compatibility studies for WRC-19 agenda item (AI) 1.13, and with developing the draft CPM text for this agenda item.

The fourth meeting of ITU-R Task Group (TG) 5/1 was held in Geneva, Switzerland, 17-26 January 2018. The objectives of the fourth meeting included peer review of the submitted sharing and compatibility studies, filling in of overview tables capturing the parameters and results of each study and initial development of overall summaries for the results of studies. A total of 30 output documents (including revisions) were generated during the TG 5/1 meeting which included a working document for draft CPM text, agreement on a way forward for the drafting of CPM text for summaries of studies, working documents for sharing and compatibility studies and an update to the annex on system parameters and propagation models. This meeting had also refined the table concerning all the system parameters and propagation models to be used in the sharing and compatibility studies.

The further consolidations on above issues were made at this TG 5/1 meeting and were suggested to be considered as guidance to assist in preparing sharing studies for next two TG 5/1 meetings, and some of these are subject to further discussion in order that the scope of the application of each item will be properly determined and used, as appropriate. But, TG 5/1 considered the topic of apportionment and determined that no general guidance could be provided applicable to all sharing cases under study. The apportionment of interference between services which are subject to the TG 5/1 studies, should be determined on a case-by-case basis based on the relevant information on interference protection criteria and apportionment provided by the expert Working Parties. Each study should indicate what level of apportionment was applied in the study together with the underlying rationale. At the same time, the following topics were studied in detail, such as IMT network loading factor, IMT protection criterion, application of the antenna pattern of the FSS space station, averaging of parameters in the simulations, application of Ra and Rb in the simulations, etc. Of course, the sharing and compatibility studies were fully addressed by this meeting for IMT systems in all corresponding frequency ranges with services to which the bands are allocated on a primary basis.

2. Preliminary Views

After four TG 5/1 meetings, there are still no clear preliminary positions to be developed on the priority of candidate frequency band. But, the sharing and compatibility studies

on frequency ranges below 40GHz were more addressed than that above 40GHz on this meeting for IMT systems with other service, especially the frequency band 24.25-27.5 GHz was one of most intensive discussions on studies results.

Project Topic 6: to consider the results of studies in accordance with Resolution 557 [COM6/9] (WRC-15), and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (Rev.WRC-12), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks;(WRC-19 AI 1.4)

1. Study Progress

WP 4A had two meetings on agenda item 1.4 in this period and two output documents were produced as Annex 26

and 27 to WP 4A Chairman's Report in the latest meeting in February 2018. The scope of the output documents was broadened with a view to perform the work necessary under the WRC-19 agenda item and the structure of the

TABLE 1 ANNEX 7 TO APPENDIX 30 (REV.WRC-12) LIMITATIONS

Annex 7 Limitation	Region and Service of interfering assignments	Region and Service of impacted assignments	Frequency band	Limitation description	Associated regulatory text
A1 (part a)	Region 1 BSS	Region 2 FSS (Atlantic)	11.7-12.2 GHz	No assignments in the Region 1 List further west than 37.2°W	Section A 1)
A1 (part b)		Region 2 FSS (Pacific)		No assignments in the Region 1 List further east than 146°E	
		Region 3 BSS subject to Appendix 30			
A2a	Region 2 BSS	Region 1 FSS (Atlantic)	12.5-12.7 GHz	No modification in the Region 2 Plan further east than 54°W	Section A 2) a)
A2b		Region 1 BSS subject to Appendix 30	12.2-12.5 GHz	No modification in the Region 2 Plan further east than 44°W	Section A 2) b)
A2c		Region 3 FSS	12.2-12.7 GHz	No modification in the Region 2 Plan further west than 175.2°W	Section A 2) c)
		Region 1 BSS	12.2-12.5 GHz		
		Region 1 FSS (Pacific)	12.5-12.7 GHz		
A3 (part a)	Region 1 BSS	Region 2 FSS	11.7-12.2 GHz	No assignments in the Regions 1 & 3 List outside specific allowable portions of the orbital arc between 37.2°W and 10°E	Section A 3)
A3 (part b)				Max. e.i.r.p. of 56 dBW for assignments in the Regions 1 & 3 List at specific allowable portions of the orbital arc between 37.2°W and 10°E	
A3 (part c)				Max. power flux density of -138 dB(W/(m2.27 MHz) at any point in Region 2 by assignments in the Regions 1 & 3 List located at 4°W and 9°E	
B	Region 2 BSS	Region 2 BSS	12.2-12.7 GHz	Required agreement of administrations having to space stations in the same cluster when an administration may locate a satellite within this cluster	Section B

Report was updated so as to include analysis to assess each limitation contained in Annex 7 to RR Appendix 30 (Rev.WRC-12).

There was no opportunity at the latest meeting to discuss and review the text in the WD. Nevertheless, the text in the WD has been updated editorially, where appropriate, to match the text agreed upon in the preliminary draft CPM text. The WP 4A also updated the work plan for this agenda item.

The output documents present several scenarios of current limitations shown in the table: TABLE 1 ANNEX 7 TO APPENDIX 30 (REV.WRC-12) LIMITATIONS.

Based on the results of the discussions within WP 4A, the latest meeting agreed on the following analyses of the results of the studies:

- Deletion of limitation A1 (part a) (No assignments in the Region 1 List further west than 37.2°W) and limitation A2a (No modification in the Region 2 Plan further east than 54°W), noting the necessity for additional efforts by administrations concerned in order to successfully resolve small orbital separations coordination cases between Region 1 BSS and Region 2 FSS networks submitted after WRC-19 at an orbital position further west than 37.2°W, and small orbital separations coordination cases between Region 2 BSS and Region 1 FSS networks submitted after WRC-19 at an orbital position further east than 54°W.
- Retention of limitation A1 (part b) (No assignments in the Region 1 List further east than 146°E) and limitation

A2c (No modification in the Region 2 Plan further west than 175.2°W) due to the limited geographical separation between Regions 1 and 2 (i.e. Chukotka and Alaska).

- Deletion of limitation A2b (No modification in the Region 2 Plan further east than 44°W).
- Deletion of limitations A3a, A3b and A3c (Regions 1 and 3 List at specific allowable portions of the orbital arc between 37.2°W and 10°E) subject to additional measures ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and in the List which are located in the allowable portion of the orbital arc 37.2°W to 10°E and including those which have antenna sizes lower than 60 cm.
- Retention of limitation B (Region 2 cluster in the band 12.2-12.7 GHz).

WP4A also discussed, with respect to limitation A3 related to Regions 1 and 3 BSS networks in the orbital arc 37.2°W to 10°E, a possible definition of “implemented” networks according to ITU-R Resolution 557 (WRC-15).

2. Preliminary Views

The scenario of the orbital position limitation is limited in Region 1 and 2, as well as within the orbital arc of the geostationary-satellite orbit between 37.2° W and 10° E in Region 3.

The compatibility studies between BSS assignments subject to RR Appendix 30 within Regions 1 and 3 were discussed in the meeting, so we should follow developments in ITU-R WP 4A in respect of the revision of Annex7 to AP30 and assess possible impact on BSS in Region 3.

Project Topic 8: Compatibility of International Mobile Telecommunications and broadcasting satellite service (sound) in the frequency band 1452-1492 MHz in Regions 1 and 3 (WRC-19 AI 9.1.2)

1. Developments of ITU-R Working Party 4A

For WRC-15 agenda item 1.6, ITU-R WP4A had extensively discussed the typical technical characteristics of non-GSO FSS satellite systems, technical characteristics of GSO FSS/MSS/BSS satellite networks, protection criteria of GSO FSS/MSS/BSS satellite networks and methodology for sharing between non-GSO systems and GSO FSS/MSS/BSS satellite networks, etc. At the same time, ITU-R 4A had, by way of reply, receive a liaison statement from ITU-R 3M proposing propagation model for 50/40 GHz bands

2. Preliminary Views

Up to now, there have been no concrete study results from ITU-R WP4A.1. We should continue to follow the corresponding developments of study of WRC-19 AI 1.6 conducted in ITU-R WP 4A and pay a close attention to possible impact on broadcasting services on the 40.5-42.5GHz frequency band in Asia-Pacific area.

REPORT:

Study Projects – Transmission

Report by: Dr Narichika Hamaguchi, NHK (Topic Chairman)**Reporting Period:** November 2017-April 2018, Date of Report: 30 April 2018

Introduction

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

After the ABU Technical Committee meeting in Chengdu in November 2017, this topic area was modified according to the latest trends. This document has been submitted for this Technical Bureau mid-year meeting. Below are the contributions received from project managers and contributors for the study projects under Transmission Topic.

Project: DTTB Coverage and Frequency Planning (T/DTTB)

1. ITU-R Text Related to DTTB Coverage and Frequency Planning

1.1 Recommendations (<http://www.itu.int/rec/R-REC-BT/en>)

- BT.1306 “Error correction, data framing, modulation and emission methods for digital terrestrial television broadcasting”
- BT.1368 “Planning criteria, including protection ratios, for digital terrestrial television services in the VHF/UHF bands”
- BT.1877 “Error-correction, data framing, modulation and emission methods for second generation of digital terrestrial television broadcasting systems”
- BT.1895 “Protection criteria for terrestrial broadcasting systems”
- BT.2033 “Planning criteria, including protection ratios, for second generation of digital terrestrial television broadcasting systems in the VHF/UHF bands”
- BT.2036 “Characteristics of a reference receiving system for frequency planning of digital terrestrial television systems”

1.2 Reports (<http://www.itu.int/pub/R-REP-BT/en>)

- BT.2035 “Guidelines and techniques for the evaluation of digital terrestrial television broadcasting systems, including assessment of their coverage areas”
- BT.2140 “Transition from analogue to digital terrestrial broadcasting”
- BT.2209 “Calculation model for SFN reception and reference receiver characteristics of ISDB-T system”
- BT.2265 “Guidelines for the assessment of interference into the broadcasting service”
- BT.2294 “Construction technique of DTTB relay station network for ISDB-T”
- BT.2295 “Digital terrestrial broadcasting systems”
- BT.2302 “Spectrum requirements for terrestrial television broadcasting in the UHF frequency band in Region 1 and the Islamic Republic of Iran”

1.3 Handbook (<https://www.itu.int/pub/R-HDB-63>)

“Handbook on Digital Terrestrial Television Broadcasting networks and systems implementation”

2. Latest ASO Situations in the Region

2.1 Singapore

Singapore announced in November 2017 that the

cessation of analogue TV broadcast had been shifted from end-2017 to 31 December 2018 to allow more time for households to switch over to DTV.

2.2 Nepal

According to DSN (Digital System of Nepal) website, Nepal has finally switched off its Analogue cable TV signal (at least in papers for local cable TV operators). As per the directives from Ministry of information and communication (MOIC), analogue cable TV is going to be blocked at first in metro, sub-metro and municipality areas.

2.3 Norway

Norway has become the first country in the world to turn off analogue (FM) radio and make the switch to digital. On December 13, region-by-region transition that began in January of this year, Norway's nationwide radio channels stopped broadcasting on FM in the country's northernmost counties Troms, Finnmark and Svalbard.

3 Latest Topics over Frequency Policies in the World

3.1 Hong Kong Frequency Planning Status

1. The broadcast-type mobile TV services (CMMB), which occupied radio spectrum of 678 MHz to 686 MHz (CH47) stopped providing its transmission on 31 March 2018 after 7 years of service in Hong Kong.
2. CA plans to make additional spectrum available in three bands for public mobile telecommunications services, e.g. 5G, towards 2020 and beyond. They are 3.5 GHz band (3.4-3.6 GHz), 26 GHz band (24.25-27.5 GHz) and 28 GHz band (27.5-28.35 GHz). CA will conduct public consultation on the spectrum assignments in Q2 of 2018.
3. CA plans to allocate 402 to 405 MHz for the use of Medical Data Service (MEDS) on a secondary basis on top of primary basis, which is for Meteorological Aids, Earth Exploration-satellite and Meteorological-satellite services.
4. Regarding frequency range of 900 MHz band and 1.8 GHz band for current public mobile telecommunications services, it will be expired in late 2019/2020. CA will promulgate the re-assignment later this year after completion of public consultation in 2016/2017.

(Information courtesy of OFCA press release)

3.2 DVB-T2 Trials Launched in Australia

Free TV and Broadcast Australia announced that they had agreed to conduct trials of next generation broadcast technology in Sydney. The SBS and the ABC will also be active participants in the trials.

According to their release, the trial will assess the

performance of next generation DVB-T2 technologies in the Australian environment. DVB-T2 is being considered as a technology to replace the current DVB-T standard for television delivery in the medium term. When combined with new compression technologies, DVB-T2 will have the potential to allow 4K TV reception – four times the picture quality of the current high definition standard.

Project: Next Generation Terrestrial Broadcasting (T/NGTB)

Investigate Efforts Toward the Realization of Next-generation Terrestrial Broadcasting in Japan

1. Introduction

Next-generation digital terrestrial television broadcasting will be dominated by UHDTV applications. UHDTV broadcasts consist of a huge amount of data and therefore require large-capacity transmission paths.

Japan is conducting research on large-capacity transmission technology for next-generation digital terrestrial broadcasting systems that will provide large-volume content services such as 8K. In order to transmit the 8K signal, which has a resolution 16 times greater than HDTV, it will be essential to utilise new technologies that expand transmission capacity, such as higher order modulation (4096-QAM), orthogonal frequency-division multiplexing (OFDM), and dual-polarised multiple-input multiple-output (MIMO).

This experiment establishes parameters for maximising transmission capacity. However, in actual implementation, these parameters will have to be decided taking link budget, the transmission network, the receiving environment, and other factors into account.

2. 8K-UHDTV Field Experiments in Rural Area

Japan has installed an experimental transmitting station in Hitoyoshi city, Kumamoto prefecture that uses dual-polarized MIMO and ultra-multilevel OFDM technologies in January 2014. Two 8K field experiments were conducted there: a transmission test and field measurements around Hitoyoshi.

Figure 1 is a block diagram of the modulator and demodulator used in the experiments.

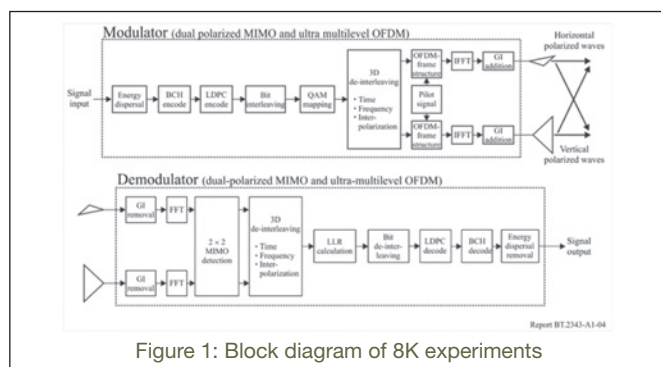


Figure 1: Block diagram of 8K experiments

3. 8K-UHDTV SFN Field Experiments in Rural Area

In February 2015, Japan conducted 8K-UHDTV single frequency network (SFN) field experiments using two transmission stations to form a 2x2 MIMO Space Time Coding (STC)-SFN system. In this field experiment, the STC method was employed to improve the reliability of high data rate transmission. In November 2016, an 8K-UHDTV field experiment using high efficiency video coding (HEVC) was conducted. It was confirmed that the video and audio were successfully received within the STC-SFN area.

Figure 2.1.2 shows the outline of a 2x2 MIMO STC-SFN system formed by two experimental stations, namely, the Hitoyoshi and Mizukami stations. The distance between the two stations is 38 km. Both stations use dual-polarised space division multiplexing (SDM) MIMO. The Mizukami station was connected to the Hitoyoshi station by a transmitter link (TTL) in the super high frequency (SHF) band.

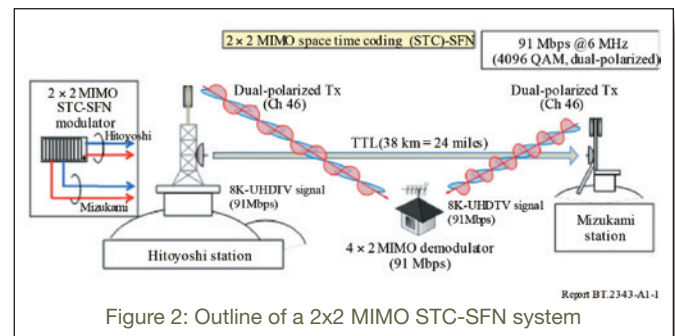


Figure 2: Outline of a 2x2 MIMO STC-SFN system

4. 8K-UHDTV field experiments with non-uniform constellation in urban area.

An 8K-UHDTV field experiment with Non-Uniform Constellation (NUC), in which the signal points in the constellation are distributed non-uniformly, was conducted in an urban area; Kinuta, Tokyo.

The NUC is a technology to improve the transmission performance by adjusting the distance between the signal points to be suited for the noise in the propagation channel. It is confirmed that the greater number of signal points in the constellation, such as 4096 QAM, the larger improvement in performance is obtained. The signal points of the 4096 NUC implemented on the prototype transmission system and conventional 4096 Uniform Constellation (UC) are depicted in Figure 3. In this figure, the average power of NUC is normalised to be the same as that of UC, and the signal points of 4096 NUC are optimised for 30 dB of Carrier to Noise Ratio (CNR) as the expected CNR in the transmission channel.

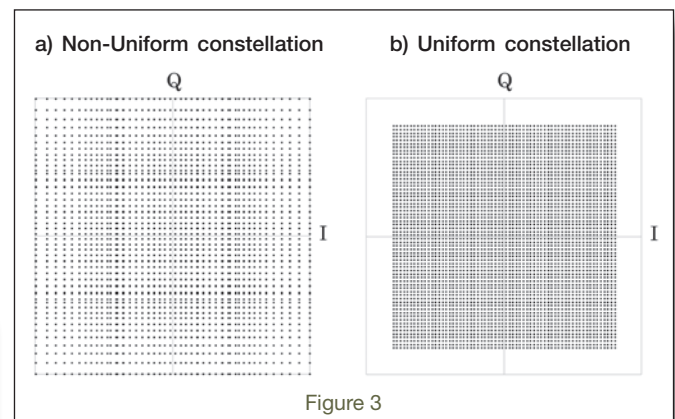


Figure 3

5. Terrestrial 8K UHDTV public viewing of the Olympic games in Rio de Janeiro

During the Rio de Janeiro Olympics in August 2016, TV Globo and NHK (Japan Broadcasting Corporation) provided 8K UHDTV Public Viewing (PV) of the Olympic Games for the local viewers. This PV at Museum of Tomorrow was carried out by transmitting 8K UHDTV signal through terrestrial network in the UHF band, from Mt. Sumaré station, using multiple-input multiple-output (MIMO) orthogonal frequency division multiplexing (OFDM) transmission technologies, utilising dual polarization technique which was developed by NHK. The

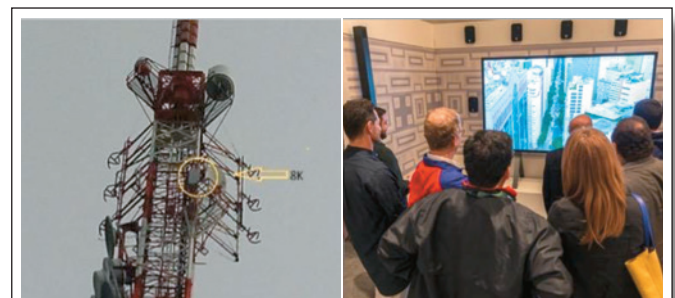


Figure 4: Transmission station antenna and Public viewing at Museum of Tomorrow

transmission parameters of the 8K UHDTV PV service are shown in Table 1 and Figure 4 shows the transmission station antenna and images of the viewing session.

Table 1: Transmission parameters of the 8K UHDTV PV service

Modulation method	COFDM
Occupied bandwidth	5.57 MHz
Transmission frequency	569.142857 MHz (UHF channel 30 in Brazil)
Transmission power	Horizontal polarized waves: 100 W, ERP: 660 W Vertical polarized waves: 100 W, ERP: 660 W
Carrier modulation	4096-QAM
FFT size (number of radiated carriers)	32k (22,465 carriers)
Guard interval ratio (guard interval duration)	1/32 (126 μ s)
Error-correcting code	Inner: LDPC, code rate = 3/4 Outer: BCH
Transmission capacity	91.8 Mb/s
Video coding	HEVC
Audio coding	MPEG-4 AAC
Transmitting station	Mt. Sumaré
Height of transmitting antenna	830 m above sea level
Receiving station	Museum of Tomorrow (approx. 8.5 km from the test transmitting station)
Height of receiving antenna	30 m above sea level (30 m above ground level)

6. Summary

In the field of broadcasting, 8K-UHDTV has the potential to succeed HDTV.

More information such as transmission parameters, experimental results was described in the Rep. ITU-R BT.2343-2. (<http://www.itu.int/pub/R-REP-BT.2343>)

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

1. Studies in ITU

ITU-R WP6B is working for the study on IBB system. The working party started the study on harmonization of IBB systems. At the meeting held in March 2017 in Geneva, the work progresses the additional comparison of TOPSmedia which is standardised by Republic of Korea to the comparison of Hybrid cast 2.0 and HbbTV 2.0 with respect to application behaviours and additional objects. And at the meeting held in October 2017 in Geneva, the working party revised the report of IBB system (Report ITU-R BT.2267 “Integrated broadcast-broadband systems”) to add the use cases of second screen device collaboration with companion devices in the Hybridcast system and a new common protocols of companion device collaboration in the Hybridcast 2.0 specification which is called “Hybridcast connect”.

The working party also studies on the global platform. The global platform is a delivery platform to facilitate distribution of broadcast content to end-users with various receiving devices in multiple reception environments, implemented by using both broadcasting and non-broadcasting (e.g. broadband) technologies. As the first output, Report ITU-R BT.2400 “Usage scenarios, requirements and technical elements of a global platform for the broadcasting service” was approved in March 2017 meeting.

ITU-T SG9 is also working for the study on IBB system applied to

Cable Digital TV. At the meeting held in January 2018 in Geneva, the Study Group revised IBB system Recommendation (ITU-T Recommendation J.207 “Specification for integrated broadcast and broadband digital television application control framework”) to add an IBB system called Ginga to this Recommendation. ITU-T SG9 started the work of smart TV operating system for hybrid cable Digital TV services including IBB DTV service provided by cable television operators and third-party providers.

2. Standardisation of Multimedia Coding for UHDTV in Japan

The ARIB (Association of Radio Industries and Businesses) Standard Assembly approved the revision of the standard, ARIB STD-B62 “Multimedia Coding Specification for Digital Broadcasting (Second Generation)” for UHDTV satellite broadcasting in July 2017. The revision of the standard is made for use of the Variation Selector and Variation Sequence defined in ISO/IEC10646:2014 for the variants of the subset of character repertoire.

ARIB adopts UCS (Universal Coded Character Set, ISO/IEC 10646) as a character encoding format in ARIB STD-B62. ARIB STD-B62 defines subsets covering JIS level-4 kanji set, Basic Latin, Latin-1 supplement and additional kanjis and additional symbols defined in ARIB STD-B24.

3. Standardisation of content protection

IBB services are provided via web browsers in a user terminal and it is necessary to protect the content from various attacks, such as illegal copying of content and leakage of user privacy. The World Wide Web Consortium (W3C) published Encrypted Media Extensions (EME) as a W3C Recommendation on 18th September 2017. EME is an Application Programming Interface (API) that allows plugin-free playback of protected (encrypted) content in Web browsers, which works seamlessly on all major platforms. EME is already widely adopted among major organisations such as Google, Microsoft, Netflix, Mozilla, Apple, CableLabs, Adobe, and has significant implementation across Web browsers.

IPTV Forum Japan (IPTVFJ) already adopted EME APIs as the open standard to be used in IPTVFJ STD-0013: Hybridcast Operational Guideline Version 2, which is being deployed to the actual IBB services in Japan.

4. Cyber Security in Broadcast Media

During IBC 2017, multiple sessions about cyber-security in broadcast media were organised in the conference, and experts of security reported the latest technical issues to defence the broadcasting systems.

In a panel discussion by cyber-security experts from the IT industry, the experts emphasised the importance of information sharing and collaboration in the broadcasting industry. The chief information security officer of a media company mentioned that broadcasters must improve the management methods of their servers and terminals in broadcasting systems. He also recommended the use of long passphrase that is tolerant of brute-force attack, instead of a short random password, referencing a revision of NIST (National Institute of Standards and Technology) guidelines.

Meanwhile, European broadcasters are planning to open new broadcasting centres in which fully-IP facilities will be deployed for programme productions. Currently, safety of the IP-based infrastructure is concerned and unclear. Therefore, the broadcast and media industries are requiring advanced case study and proposals.

5. Advanced Conditional Access System for UHDTV Broadcasting Services

In Japan, new UHDTV (4K/8K) broadcasting services will be launched in December 2018. For conditional access and copyright protection of content, an Advanced Conditional Access System (ACAS) has been under development since 2015 and a sample of chipset for testing the ACAS functions was given to TV receiver manufacturers in January 2018. If no critical problem for the ACAS functions is reported, the chipset will be mass-produced in July 2018 and offered to a market in September 2018 to produce TV receivers.

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Mr Satyajeet Dash
Dy Director General
(Engineering, Doordarshan
Mumbai, Prasar Bharati)

abstract

Doordarshan, the public service broadcaster of India, has a huge repository of video/audio content dating back from the analogue 'Ampex' days to the current born-digital days. The content are available in multiple mediums/formats such as Ampex, BCN, U-matic, Betacam, DVCPro to the current XDCAM (optical), SSD, LTO mediums and formats. This multi medium/format of content is a serious challenge for migration to the digital technologies where the old analogue content along with the present born-digital content can be effectively stored and repurposed.

Doordarshan, to use the current level of digital technology, with its vast demography of staff members, each with different level of understanding of technology, needed to be made aware and understand the necessity and ease that the digital file-based workflow would provide to its smooth and efficient functioning.

This paper aims at presenting the efforts put up by Doordarshan, to plan and, develop to empower itself, both intellectually and technically. In this process, there has been ample development of both human resources as well as in-house technical resources. This has also led to more efficient and smoother co-ordination between various sections of the TV station.

This paper also highlights the necessary additional steps in the pipeline, that would bring about a near complete digital file-based solution.

Introduction

Doordarshan's workflow from content gathering to transmission can be broadly divided into a few major work areas such as, shooting (rushes) & acquisition of content, editing/post-production, archive/storage of edit-masters and transmission/broadcasting. In each of these areas, tape has traditionally played a major role. Over the years, Doordarshan has used a multiplicity of tape formats such as Ampex, BCN, U-matic, Betacam tapes, holding the analogue content and DVCPro tapes holding the digital-SD content. The video/audio content is stored in physical tapes and exists on the shelves. Tagging is done on pieces of papers to describe the content.

But the advent of file-based workflow is changing all that. Content is more subtle now and no longer exists on a shelf. It is very important to mark up and describe video footage for their identification in the workflow, and if not done, probably the footage may never be found. Moving from a tape to tapeless file-base require to ensure adoption of proper security measures for the content. With a proper understanding and adoption of the file-based workflow, the rewards are many and ensure all the benefits of IT.

A majority of Doordarshan Kendras are still continuing to use tape based camcorders, though, at certain points in the production workflow, there is greater use of computers and networks to take certain of the advantages of IT. Nevertheless, the end product in the workflow is always taken out in the form of tape, as psychologically, tapes provide a sense of surety and gives physical backup in the event of something going wrong in computers and networks.

Doordarshan, as a step towards file-based workflow, has introduced camcorders and decks based on XDCAM HD422 format with MXF OP1a wrapper which stores media files in optical media. It has also camcorders based on AVCHD format storing media in memory cards. As the older media (which are both in analogue/digital tape format) need to co-exist with the recent born file-based digital content, a mechanism needed to be developed to digitise the analogue tapes to file-based formats with proper meta tags and security.

Doordarshan also requires to repurpose its archived content for its day to day transmission. This needs packaging of the content before being delivered to the channel payouts. In order to use standard IT equipment and use cheaper storage and network solutions, editing for packaging in low-resolution proxies is suggested with the EDL being reflected on the corresponding high-res content in the back-office media operations.

Acquisition and Distribution Standards for SD Video

Doordarshan has a vast repository of both analogue and digital video/audio content available in various medias and formats. The analogue content are available in BCN, U-matic and betacam tapes whereas the digital SD content are available in DVCPro tapes in DVCPro50 and DVCPro25 formats. The SD content shooting are still being done in DVCPro tapes and the final edited versions are taken out in this format. The technical preview of these content are done by playing the tapes and observing manually by the technical experts. Tagging for

identification of tapes and its content are manually done on paper, the records are also kept in computers in excel sheets.

Earlier Work Done for Digitisation of Analogue Content at Doordarshan

Doordarshan as a continuous process, has been adopting all the evolving video recording formats/medias. It has also done the work of transferring of content from older system/media to evolving newer systems/medias.

Many of the BCN content has already been digitised to DVCPro50 format by transferring them to DVCPro tapes. Similarly many U-matic and Betacam content have also been digitised to DVCPro format using DVCPro tapes. However, there are still many hours of content in old analogue modes.

Recently Doordarshan has adopted XDCAM HD 4:2:2 tapeless file-based system, thereby moving from tape base to optical media.

Necessity of File-based Workflow

Digitising the old analogue content and migration from one media type to another, makes provision for the availability of the content a bit longer – till the time a newer and efficient medium of storage supersedes the older ones, thereby needing another cycle of migration. Digitising may also help the content to see less quality loss while coping, but, digitisation by itself alone can't exploit all the benefits that the IT world can provide. Tapes being a linear devices, accessing content stored in tapes is sequential, hence takes longer time, thereby making tapes unsuitable for on-demand services. Tapes, though very reliable, only suit the need as backup media and not for online delivery.

Steps into the File-based Workflow

After much discussion and deliberation a model of the workflow was devised and it was subjected to modifications and amendments as and when the necessity for change arose during the implementation of the stage. Various workgroups were formed to work on their assigned functional areas.

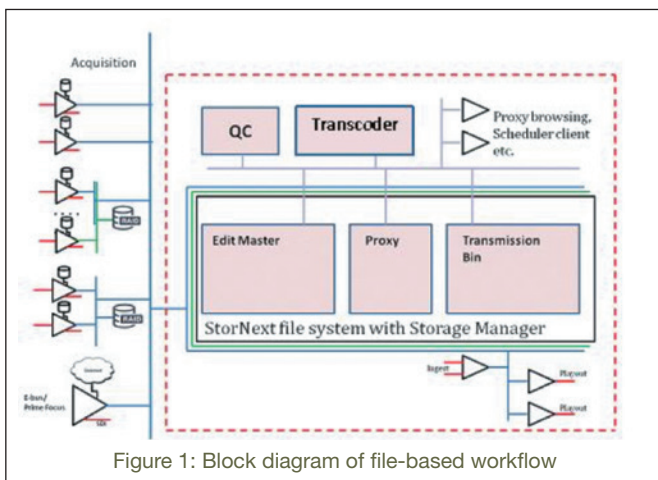


Figure 1: Block diagram of file-based workflow

- **Content Acquisition Group:** the content acquisition group worked on the reuse of tape based DVCPro camcorders as a file-based acquisition system through low-cost attachments that could record media as files. Similarly, the format for HD content acquisition was also decided. Further, the file formats for final edit masters from the old and legacy NLEs were identified.
- **Hardware & Network Group:** the storage requirement for keeping the video files were taken up and the augmentation of storages space was done. The computer network was

strengthened to cater to the demand that a file-based environment was required which also included networking of all NLEs, Storages, Servers, Playouts etc. A few servers were added to the system to hoist the Database and Active Directory.

- **Access and Security:** Microsoft Active Directory was used to setup permission and security of the central storage such that NLEs, Playbacks, Previews could share media files for workflow requirements. A few older machines used FTP to share files with the central storage.
- **Technical Preview:** for Technical Preview of content an in-house media player was developed. Also commercially available Drastic Preview Pro media players were installed for technical preview purpose.
- **Transcoder:** for the creation of proxy low-resolution of the hi-resolution ingested videos, a transcoder based on open source FFmpeg was developed.
- **Database:** the database team developed the database based on MySQL for keeping the metadata and other ancillary data related to videos and workflow. They also developed web-based front-end panels for editors, technical preview groups, ingest/transcode and archive groups such that the individual users can enter their part of metadata and reports into the database.
- **Packaging and Playout:** NLEs that could use file-based content were used to package programmes for the channel. To cater to channel playout in-house video servers were developed that was based to Caspar Server.

Converting Old Tape-based Camcorders for File-based Acquisition

A few Doordarshan stations experimenting to record content on SSD/HDD media using BMD/AJA disc recorders, that can record in Apple ProRes or DNxHD formats. The DVCPro camcorders that are already available, along with low cost Atomos SSD recorders, are used to generate file-based content.

HD Video Acquisition and Distribution Standards at Doordarshan Network

A majority of the HD content is shot in PFD disc using XDCAM systems (XDCAM HD422 format @50Mbps with MXF OP1a wrapper). The final edited content is also stored in this format using PFD blue ray disc. Additionally, a few camcorders are also available in the network that use AVCHD format for HD shooting and store in memory cards.

Creation of Infrastructure for the File-based Workflow:

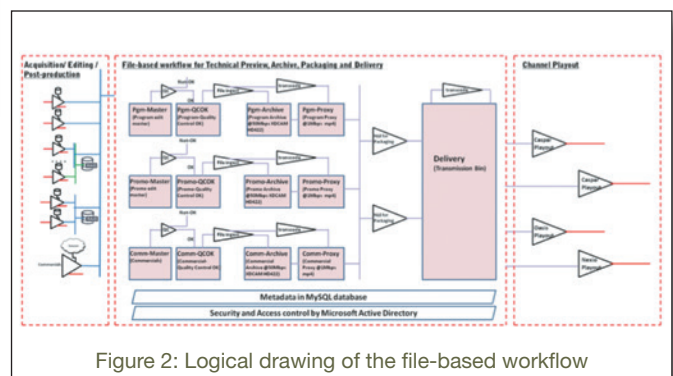


Figure 2: Logical drawing of the file-based workflow

Realising the importance of storage, computation and network requirement for the file-based workflow, investments have been done for procuring and augmenting the online and offline storage for video/audio content. The already available StorNext system was upgraded and storage capacity was increased to 144 TB of online storage and offline storage with LTO-6 library with two drives and 41 slots.

The requirement of accessibility and security of storage is managed by Microsoft Active Directory on a dedicated server. The storage space is mounted to many of the NLEs in the network and this process is managed by Microsoft AD. The older systems and NLEs which are not compatible to Microsoft AD, have been configured to use FTP for file transfer from and to the storage.

The computational need for maintaining the metadata related to the lifecycle and identity of the video/audio content is met by database in MySQL. Web based clients for recording and updating of database has also been developed in-house.

The advantage of open source VLC has been taken to develop an in-house preview system for technical quality check of the content. Similarly, in-house transcoders based on open source FFmpeg have been developed for creating both proxy as well as high resolution copies of video/audio content.

Similarly, investment has also been done in strengthening the computer network to cater to the throughput requirements. The storages are in SAN network with gateway to cater to LAN clients.

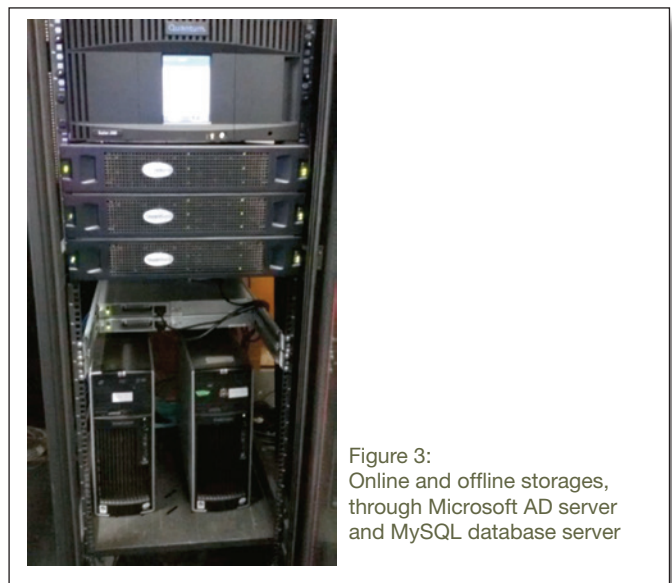


Figure 3:
Online and offline storages,
through Microsoft AD server
and MySQL database server

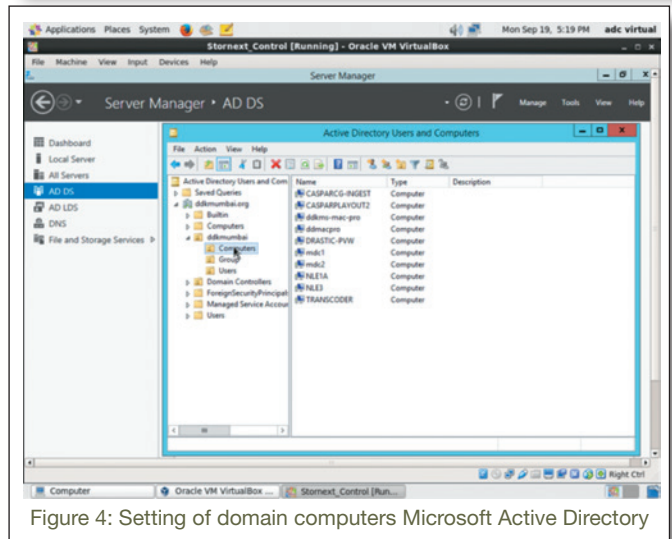


Figure 4: Setting of domain computers Microsoft Active Directory

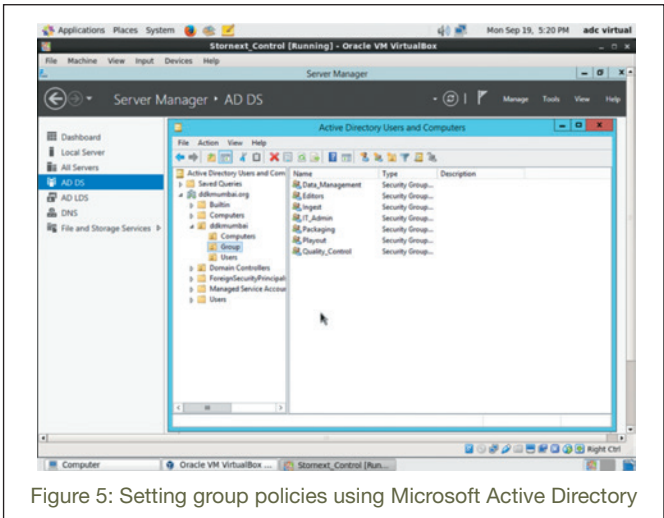


Figure 5: Setting group policies using Microsoft Active Directory

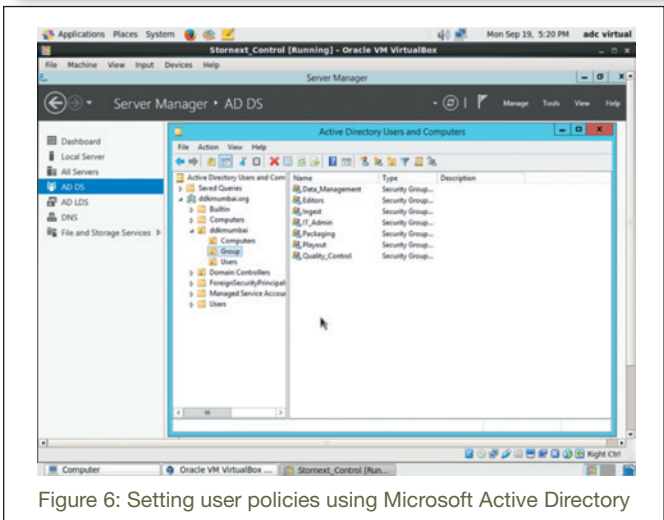


Figure 6: Setting user policies using Microsoft Active Directory

Various Functional Areas of the Workflow

Acquisition/Editing/Post-production: The editing/post-production are done on NLEs (Velocity, Adobe Premiere, Edius, FCP etc.) that are stand-alone, there is also a collaborative editing setup (Velocity with Harris Storage) for HD content. All the editing platforms have been networked and a NAS storage available for sharing of files and footages amongst themselves. The folders of StorNext storage system are also mounted in few of the NLEs that can be controlled through Microsoft AD. The older NLEs whose operating systems do not support Microsoft AD can exchange files and footages with StorNext storage system through FTP. To facilitate FTP, the FTP server is installed in the SAN gateway server and FTP clients are installed in individual NLEs.



Figure 7: Web-based interface for the editors to create and enter metadata for the content submitted for QC

All the edited final copies of the programmes from respective NLEs are taken out as files with XDCAM HD422 @ 50 Mbps codec and are then transferred over the network to the SAN storage through mounted drives or FTP depending upon the interface of the particular NLE with the SAN storage. The life-cycle of the content starts here with the editor entering the metadata into the database through a web-based interface. The software handling the database then notifies the Technical Director about the submission of programme for Technical Preview.

Technical Preview/QC: upon sending the media to the storage, and subsequent database entry by the editor, the database notifies the technical director about the availability of content for technical preview purpose. The quality control/technical preview is done by manually observing the video/audio content by playing it in a in-house developed media player and displaying it through a video card onto a SDI monitor. Commercially available Drastic PreviewPro is also implemented for preview purpose. The report on the QC is entered in the database by the technical director.

In the event of QC-not OK, the notification is received by the editor who in turn corrects the mistakes and the corrected content goes for another round of QC cycle. Each time, entries are made in the database and history of all action taken, and the status reports are maintained in the database.

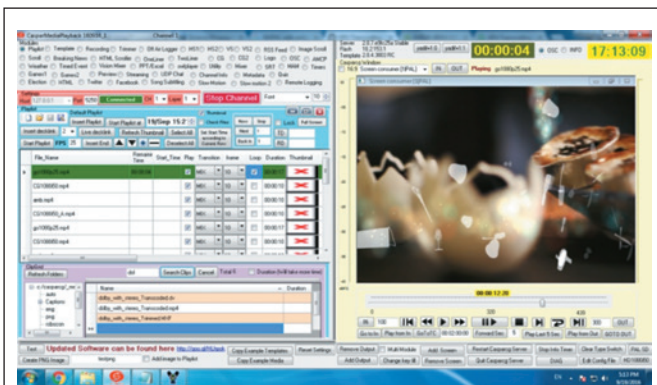


Figure 8: In-house created media player for Technical Preview of file-based content



Figure 9: Drastic PreviewPro for Technical Preview of file-based content

The Technically Okayed content are then ready for being file-ingested into the archive folder in case of content being of archival value, or is stored in temporary location till its telecast.

File Ingest and Transcoding: the Technically Okayed content is sent to a folder for storage for future use. Simultaneously, a low resolution proxy copy of the original content is created by the in-house made Transcoder software. The in-house made Transcoder is based on the open source FFmpeg. Thus a repository of all high and low resolution copies of Programme-edit

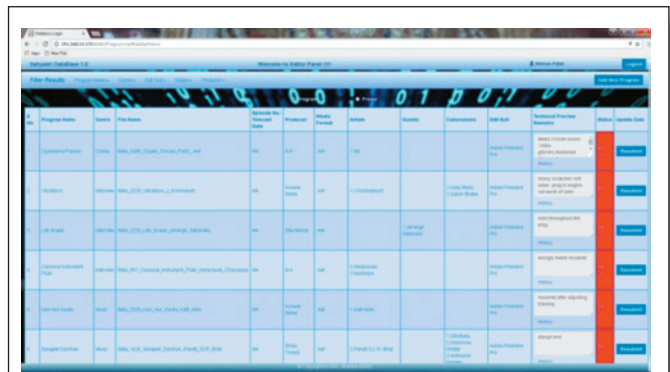


Figure 10: Web-interface showing QC-Not OK feedback to Editors and subsequent re-submission mechanism



Figure 11: Web-interface for the Technical Director to report on Quality of the content

masters, Programme-promos and Commercials are maintained in the storage. All the high resolution content of Archival value is also sent to LTO tapes. Simultaneously a XDCAM copy of the content is taken out on PFD blue ray disc and is kept away from the system in physical library.

Corresponding entries are done in the database to reflect the location of storage of each content (both high-res and low-res) through a web-based interface.

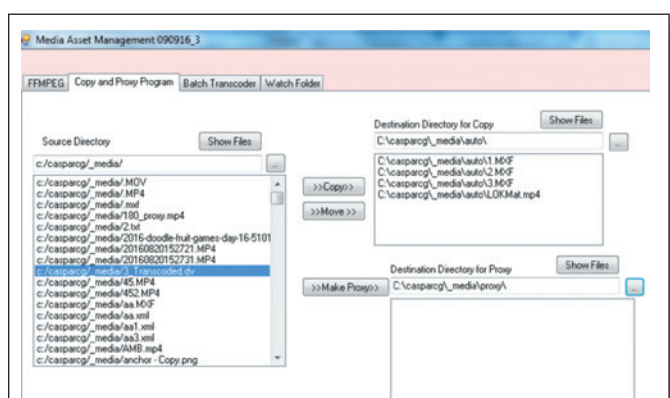


Figure 12: In-house make Transcoder based on FFmpeg for making proxy copies

Packaging and Playback: all the Technically Okayed content is now either available on online or offline storages. The content is of various types such as Programs, Program-promos and Commercials & Spots. These are used, depending upon the transmission cue-sheet to make package for future telecast. Two file-based editing systems are used to package materials where the commercial and promo/spot insertion is done and delivered to the Delivery bin, from where, the channel Playouts create their playlist for playback.



Figure 13: Web-interface for entering data related to archiving

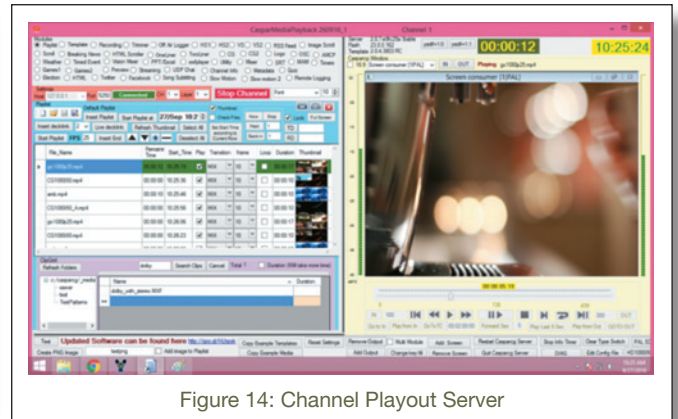


Figure 14: Channel Playout Server

Conclusion

This project helped in creating an awareness and understanding about file-based workflow. In the process of implementation of the project, a few software modules were designed in-house

and put to use. This project has lead to more efficient and smoother functioning of the station.

In future, it is envisaged to add a Media Asset Management solution to the system such that the workflow is more responsive and automatic.

author

Mr Satyajeet Dash

Dy Director General (Engineering, Doordarshan Mumbai, Prasar Bharati)

Satyajeet Dash, Dy Director General, is an Indian Broadcasting (Engineering) service officer. He is a graduate in Electronics and Telecommunication Engineering. He has 25 years of diverse experience in areas such as broadcast studio, transmission and satellite technologies, planning and use of information technology on broadcasting etc. He is also involved in planning and execution of various live event coverages for Doordarshan Network.

At present, he is heading the technical division of Doordarshan Mumbai and is in forefront in planning, design and implementation of file-based workflow for Doordarshan network.

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Workshop on Training of Trainers



Face-to-face training in a classroom has proven to be one of the best learning solutions for the retention of knowledge. This allows the learners to interact with each other, helping to create a professional learning environment which is conducive to training. The Asia-Pacific Broadcasting Union (ABU) organised a training programme for eight media professionals from Radio Television Afghanistan to participate in a face-to-face workshop on Training of Trainers. The workshop was held from 16th to 20th April 2018 in Kuala Lumpur, Malaysia. The participants were identified as potential trainers who will serve a Media Training Centre that will be established in the near future in Afghanistan.

The week-long workshop was designed to explore key issues that potential trainers need to understand, together with teaching and learning techniques which create a successful learner centred learning environment to achieve effective training outcomes. They were required not only to acquire new knowledge and skills but also to re-think evolving training techniques, examine key considerations that needed to be addressed while designing learning, fundamentals of traditional training methods, learning concepts, theories and models and the planning and design of training to suit present environments.

The workshop was inaugurated by Mr. Ahmed Nadeem, Head of Production Technologies of ABU and was followed by brief introductions by the participants.

The workshop commenced with an exercise that allowed the participants to understand the importance of communication and what needs to be done to create and maintain learner engagement during training. Some constraints were faced due to language difficulties which were soon overcome with interpretation between English and Persian. Some participants who were well versed in both languages assisted in interpreting some of the more difficult concepts. The interpretations generated questions followed by discussion among the participants before moving on to the next topic.

Session one of the workshop, which was on the topic “21st Century Learning/Understanding Learning”, examined the effects of new technologies on the trainers who needed to constantly update their knowledge and skills. Digital media has changed the way that trainers not only socialise

through online media but also the way they are required to impart training in the 21st century. Therefore, the content was designed with the logical sequencing of instruction needed to equip trainers with an understanding of the fundamental principles and techniques, along with tangible skills that they could apply in their own career settings.

As an important step in the training process, the participants were introduced to the process and key concepts of Analysing Training Needs prior to starting a training programme.



Mrs Manil Cooray
Consultant



Due to the rapidly developing technologies, the working procedures in all jobs require the development of a multi-skilled workforce. By carrying out a Job Analysis the participants were able to acquire knowledge on the process of analysing a job and its components such as duties, tasks, sub tasks etc. This analysis enabled the participants to identify the discrepancies occurring in performing a job to a specified standard as required where employees lacked either in knowledge or skills. The participants analysed various tasks in particular jobs according to their specialisation in either radio or television broadcasting to comprehend the steps involved in this process as a priority duty of a trainer before starting any training event. Through this exercise they discovered the



discrepancies occurring when performing a job may or may not be resolved by carrying out training.

The participants showed a lot of interest in the educational video on **“How our brains work”** followed by the presentation on topic on **“cognition, learning and memory”**. By providing an insight to short-term and long-term memory, the participants were able to get an idea on how knowledge is acquired stored and retrieved in the brain. By recognising the challenges faced in learning the participants were able to foster a better understanding about memory and the underlying process behind it to apply appropriate strategies in planning their training.

The topic on **“Learning Domains”** elaborated the sub categories of learning which process knowledge from a simple to a more complex level of understanding. The participants were actively engaged in practical exercises for instance to understand how the capability of memorising differs from one individual to the other. They realised the need and the importance of designing training to suit the appropriate domains and its sub categories of either cognition, psychomotor and affective, if the training is to be successful.



The session on **“Training by Objectives Model”** allowed the participants to know that objectives were the benchmarks to measure the success of any training programme. However following the concept through the practical project the participants experienced that formulating objectives which are clear, concise achievable and measurable was not as easy or straightforward task as it may seem, but one which was quite challenging for them.

The topic on **“Instructional Design”** was introduced and defined as the strategy of obtaining the desired behaviour of the learner which was followed by **“Session Preparation”**. A few other definitions and models of instructional design and session design were explained. The role of the trainer in the instructional process was illustrated. The participants were able to understand the fundamental principles of different models of instructional design with a few examples of each model having its own advantages and disadvantages. They prepared session plans for presentation, which were then analysed and discussed for further improvement.

The presentation on **“Evaluation”** focussed as the output stage of the cycle in training. It attempted to measure the value and the success of the entire process where positive and negative outcomes were identified. The participants understood the purpose and different methods of evaluation applied to suit the learning domains in order to improve the quality of performance of the training programme in terms of its value to the learners themselves and to the organisation at large. The participants presented their fifth and final micro teaching project on the last day, applying the methodologies learnt during the workshop.

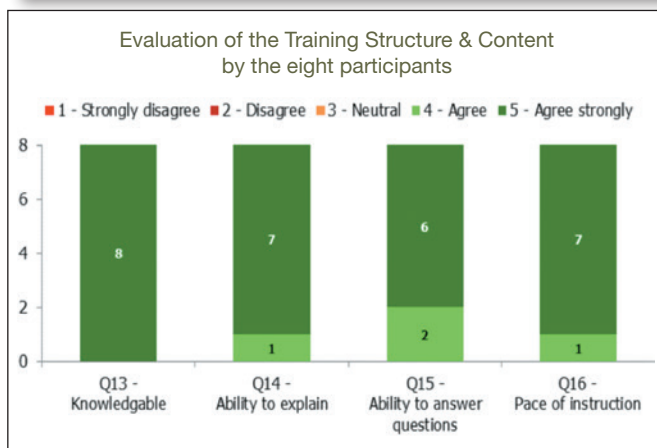
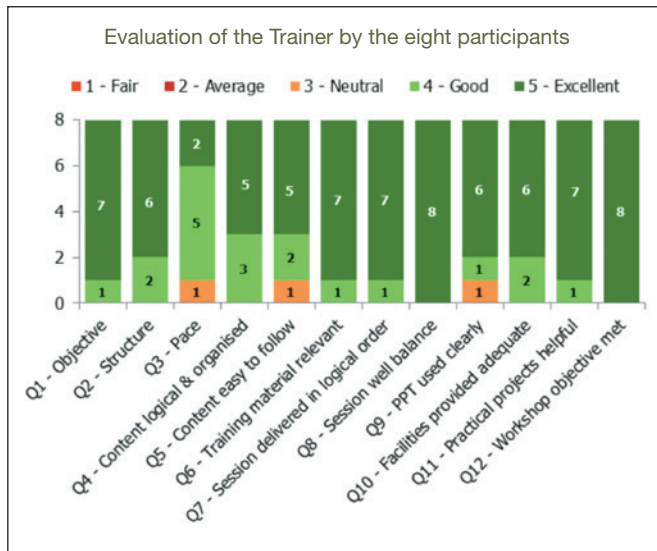
The entire structure of the workshop was delivered through lecture presentations of concepts and theories related to relevant topics followed by five practical projects. In these stimulated learning sessions, these experienced Afghan media practitioners worked in groups. They dealt with real issues in training and offered their views and insights on a range of matters covered by the content.

Group projects allowed the participants not only to ‘learn by doing’ but also gave the opportunity to consolidate their understanding. The discussions enabled them to get perspectives on many dilemmas faced by them in actual situations in their country, Afghanistan and to offer alternative approaches to resolving those dilemmas when organising training. The session also allowed the trainer to assimilate their ability to apply and evaluate the new knowledge gained during the training programme.

As seen below from the tabulated responses to the evaluation questionnaire by the participants on the structure & the content of the workshop and the level of competency of the Trainer revealed that the outcomes were successful. The majority rated the workshop as excellent, highly interactive and fruitful.

It is worthwhile to take note of the following recommendations when organising future training workshops for trainers.

- While understanding the concepts and theories of the fundamental principles in training, the participants



require time for the methodologies to be applied and tested while micro teaching by individual trainers is an essential element,

- The participants should at least have the ability to understand, speak and write in English,
- Therefore, it is proposed that the duration of the workshop of this nature should be at least eight to ten working days.

The workshop was concluded on Friday 20th April 2018. His Excellency Atiqullah Atifmal, Ambassador of the Islamic Republic of Afghanistan to Malaysia was the Guest of Honour for the closing ceremony. He was accompanied by Ms. Fayeza Sadat, Second Secretary, Consular of the Embassy.



Mrs Manil Cooray, the training consultant of the workshop provided the overview of the workshop during the closing ceremony. In her remarks, she stated that this was a very special group of learners who were diligent in their approach to learning though-out the training. The impact of the training was stated as excellent by Mr. Farhad Noori, Deputy Director International News & Training Centre Coordinator of RTA. Dr. Javad Mottaghi, Secretary General of ABU elaborated on the additional training activities organised by ABU in fields such as News and Sports for the broadcasters of RTA. In his closing remarks His Excellency Atiqullah Atifmal, complimented and thanked Dr. Javad Mottaghi for organising not only this particular workshop that strengthened the capacity building of Afghan trainers but also for the assistance extended for the development of human resources of RTA which was highly essential to Afghanistan. His Excellency presented the certificates to the participants.



Broadcasting in the Fourth Industrial Evolution Conference



Mr Do Anh Duc
Engineer, Broadcast
Engineering Centre, VOV

The Broadcast Engineering Centre of the Voice of Viet Nam (VOV) organised this technical conference on 3rd May 2018, in conjunction with the 13th National Radio Broadcasting Festival in Vinh city, Nghe An province, Viet Nam. "Broadcasting in the fourth industrial revolution" was the theme of this year conference. It was focused on new broadcasting technologies, transition from analogue to digital broadcasting, IP-based program production system and OTT solution for broadcasting.



Mr Nguyen The Ky,
President, VOV



Mr Nguyen Xuan Huy,
Vice President, VOV



Mr Vu Hai Quang,
Director, BEC, VOV

The conference was opened by Mr Nguyen The Ky, President, VOV, Mr Nguyen Xuan Huy, Vice President, VOV and Mr Vu Hai Quang, Director, BEC, VOV.



The keynote presentation, entitled "Recent updates on technology trends in the ABU region and smart production, technologies for TV program production using artificial intelligence", was delivered by the ABU delegation Mr Masakazu Iwaki, Chairman of the Asia Pacific Broadcasting Union (ABU) Technical Committee and Deputy Director, Head of Secretariat for AI Promotion, NHK Science & Technology Research Laboratories.

Mr Iwaki showed the strategic issues for ABU members such as new methods for content production using new technologies, remote production, digitalisation of transmission, access for all and secure and safe systems. In addition, he introduced new technologies being used at NHK for smart production, based on AI technologies, including:



Mr Masakazu Iwaki,
NHK

- Big data analysis for extracting useful information and generating news manuscript
- Speech recognition for generating transcriptions of interviews

- Image analysis for generating metadata for searching materials
- Simplified Japanese for non-native Japanese speakers
- Audio descriptions for the visually impaired
- CG-based sign language for the hearing-impaired

Mr Alex Ng, Sales Support Manager, APAC, GatesAir, gave a presentation on the topic, "DAB+ Overview". Besides introducing the conversion from analogue to the digital DAB+ standard, he also analysed the advantages of DAB+ in terms of energy, transmitter infrastructure costs and RF spectrum usage

Mr Frank W. Massa and Mr Domenico Lo Conte of Itelco Broadcast introduced new DTV dual cast transmitters and new FM liquid cooled technology. Cooling systems for transmitters, using liquid, can lower the temperature at the flange of the device to 15°C below that of air-cooling systems and are very simple to maintain.

Mr Ho Van Tan, manager of Dien Bien radio station gave a presentation on the topic, "The innovation in the production of ethnic languages radio programmes". Throughout this topic, he talked about the problems of producing radio programs in ethnic minority languages and provided a system management solution for program production.



Mr Ho Van Tan,
Dien Bien radio station

Representing Vietnam Television Corporation – VTC, Mr Truong Quoc Sanh said, "If you want to catch up with the fourth industry revolution, producers should pay attention to programme production system running on IP networks and content delivery via OTT platforms". He showed the benefits and challenges of IP in live production and IP application technologies in use at VTC. VTC provides OTT services using the public internet and standard protocols to deliver multimedia content either Live or On Demand.

Mr Cu Ngoc Hoang from the production and storage centre of VOV presented the topic, "Studio to Transmitter Links (STL) over any IP network". Using STL-IP for broadcasting will offer high-quality audio and low delay STL-grade audio over affordable public internet connections, private LANs, fibre connections and public or private WiMAX networks.



In addition, the conference also involved companies providing hardware and software solutions in the field of broadcasting such as Media TECH, HD Vietnam. Interactive media solutions, content management on social networks were also brought to the attention of participants.

ABU/IRIB and RTA Partnership for Afghanistan



The ABU has extended its support to National Radio and Television of Afghanistan (RTA), in establishing its own Media Training Centre within RTA in Kabul. In collaboration with the IRIB (Islamic Republic of Iran Broadcasting), the ABU arranged a study tour for two colleagues from RTA to the IRIB headquarters, Tehran, Iran from 22-29 June 2018. The two colleagues, Mr Farhad Ahmad Noori, Deputy Manager, International News Studio and Mr Mohammad Ismail Alizai, Director, Local News were nominated by RTA in connection with the implementation of its Media Training Centre. The main objective of the study tour was to gather useful concepts and experiences from the experts at IRIB for the new established media training centre in RTA.

IRIB is one of the largest media broadcasting organisations in the Asia Pacific region and is a member of ABU. IRIB has Local, National, International, IPTV and OTT broadcasting services in different languages. IRIB also designed a Media



Farhad Ahmad Noori

Deputy Manager,
International News Studio,
RTA



Mohammad Ismail Alizai

Director, Local News, RTA



City for Radio, TV, Social Media, Film, Press TV, Span TV and Media University in Tehran which employs about 49,000 staff.

The two colleagues made a visit to a campus of IRIB University that is located in Qom city, Iran. During this visit, the international relations department showed its media university, where a large number of students are studying media in three different faculties (Faculty of Radio and TV Productions, Faculty of Broadcasting Engineering and Faculty of Communications). Graphics, 3D Animations and Virtual Scenery are also taught at this university. For the students' practical work, the university has its own Radio and TV studios. Some programmes, produced by the students as part of their practice, have been nominated for ABU Prizes in recent years. The two colleagues also met with the chairman of IRIB university Dr. Shahab Asfandiyari and with the faculty authorities, to discuss mutual relations and short term training for RTA. The IRIB authorities promised that whenever RTA wanted to have the training, they would be happy to send teachers to RTA or invite the trainees from RTA to IRIB, based on an agreement for the improvement of capacity building in the newly established media training centre and quality broadcasting of RTA. The university selected three general topics for discussion; these were Pre-Production, Production and Post Production which were very useful. After each discussion, the university arranged a tour of the related departments. During the training, radio and TV working procedures, automation studios, archive methods, the newsroom system and many more features were shown to the RTA colleagues.

The two colleagues also took the opportunity to study IRIB TV, Press TV, Span TV, IRIB Radio, IRIB-Social Media and IRIB-Film city during their visit.

"It was a really useful tour. I'm grateful to our IRIB colleagues for their warm hospitality, excellent arrangements and for providing the opportunity to visit different broadcasting departments of IRIB" Mr Farhad said.



News

from the ABU Region

Mediacorp Launches Creative Talent Pool Initiative

Mediacorp has launched the 'Young Creators Project', a talent development initiative to nurture and grow Singapore's creative talent pool.

Supported by the Infocomm Media Development Authority (IMDA), the initiative aims to provide young content creators with resources and skills needed to bring their ideas to life. This includes funding support, mentorship by industry experts, and access to production resources such as filming equipment, studio facilities, and props.

Since last June, each group of the young creators was paired with a mentor from Mediacorp Studios. The mentor, either an executive producer, director, writer or cameraman offered valuable advice and insights to the group from the story pitching process to the actual production work-in-progress.

A total of 11 short films have been produced by students from Ngee Ann Polytechnic, Republic Polytechnic, and Temasek Polytechnic, and are now available on Toggle for free viewing. *(ChannelnewsAsia)*

Russia Considers Deploying Digital Radio

The Minister of Communications and Mass Communications of the Russian Federation, Nikolai Nikiforov, held a meeting on 17 April in Moscow with the State Commission for Radio Frequencies (GKRC) during which the possibility of deploying DAB+ was discussed, where appropriate and dependent on availability of spectrum. Relevant regulation and licensing measures would also be required.

The Commission presented a report of the Radio Research Institute on the possibility of working with DAB+ networks in Russia and their compatibility with existing networks in the radio frequency band 175,872-228,128 MHz.

GKRC has decided that DAB+ technology can be used under certain conditions and with the availability of a free radio frequency resource within the current order and established procedures. To deploy communication networks with DAB+ technology, it is necessary to certify the equipment and adjust the regulatory documents that define the licensing of digital broadcasting of the new standard.

(Asiaradio Today)

Kiribati with its First Digital Television Station

Wave TV is scheduled to kick off services in July with at least 20 pay and free view channels. Wave TV will be assisted by Papua New Guinea-based Click Pacific with the hope of rolling out services to 1000 homes on the main island of Tarawa and then eventually spreading to other communities.

It is hoped that this will allow people of Kiribati to get that easy access especially in knowledge-wise and to update them every day on all the news and information on TV. Currently the people of Kiribati only have access to satellite TV via Sky Pacific.

Click Pacific's Richard Broadbridge said the station will allow i-Kiribati to see themselves on TV, but he said it will also connect them with communities from abroad.

(RadioNZ)

Radio Brunei Marks 61 Years of Broadcasting

RADIO Brunei should continue to embrace current technology to appeal to mass audiences, said Radio Television Brunei (RTB) Director Haji Muhammad Suffian bin Haji Bungsu yesterday in marking 61 years of broadcasting services at RTB.

"The medium of radio should also be consistent and sensitive to the development of the information and communications technology (ICT). The use of technology that supports the survival of radio broadcasts, especially among the younger generation, should continue to be promoted in this digital era," he added.

The event also featured a presentation of prizes to 24 winners of the Radio SMS Quiz, funded by numerous sponsors. Radio Brunei's first official transmission to the public was at 7.45pm on May 2, 1957 and lasted only two hours and 45 minutes, owing to the fact that there was only one station at the time.

(Borneobulletin)

AIR, Betar to Co-produce Radio Programmes

The All India Radio (AIR) and state-run Bangladesh Betar will co-produce radio programme on music, quiz, theatre, tourism and sports among others, a move aimed at further strengthening bilateral ties, a senior official said.

The two broadcasters have also agreed to jointly produce one daily news bulletin of ten minutes with a focus on cooperation between the two nations in various developmental aspects like tourism, commerce and trade, sports, culture, agriculture and climate change, the official added.

A music reality show, drawing participants from both the nations, is also on the cards. "The programme would be in the nature of a music competition among participants from different categories namely school and college students and housewives," the official said.

(tribuneIndia)

Voice of Vietnam tests DRM Digital Radio

The Voice of Vietnam is testing Digital Radio Mondiale

(DRM) digital radio on medium wave (675 kHz) during the month of April from a transmitter situated 30 kilometres outside Hanoi.

During the initial trials, the public-service media house successfully broadcast content and data of its three channels – VOV1, VOV2 and VOV3 – on a single frequency.

VOV is now readying for a second set of test transmissions. The broadcasts are expected to cover an area of more than 200 kilometres.

(radioworld)

VOV Steps Up Cooperation with Cuban Partner

A Voice of Vietnam (VOV) delegation, led by its General Director Nguyen The Ky has been on a visit to Cuba from June 6-9 to strengthen bilateral cooperation in radio broadcast.

During the visit, Ky attended and delivered a speech at a seminar on historical memory and cultural heritage of the International Convention of Radio and Television in Varadero from June 7-9.

He and Alfonso Noya Martinez, President of the Cuban Institute of Radio and Television (ICRT), signed a cooperation agreement, during the framework of the International Convention of Radio and Television.

(vietnamplus)

SBS Radio Launches New Digital-Only Language Services

Australia's SBS Radio has launched digital-only services for five new languages. The new services will provide weekly content to meet the needs of new migrant communities, including settlement guide information and community updates. Drawing on expert advice and tips from service providers, each week the SBS Radio Settlement Guide focuses on a facet of daily Australian life that new migrants and emerging communities might find unfamiliar – from how to vote or lodge a tax return to information about water and fire safety, healthcare and housing.

Offering a platform to share their stories and celebrate their culture and people, SBS Radio will connect communities as they navigate life in Australia.

SBS Radio recently reviewed its language services to ensure they reflect Australia's evolving demographics. The review process involved various consultations and, in conjunction with the 2016 Census, resulted in identifying seven new languages to be provided by SBS Radio.

The commencement of Rohingya and Telugu services will be announced soon. All content in the new languages will be available digitally via on demand audio podcasts accessible via the SBS website, SBS Radio app and on all podcast players.

(sbs)

Enensys Provides DVB-T2 Re-Broadcast Solution for Broadcast Australia

ENENSYS has announced that it has provided its T2Gateway and DTTcaster products to enable Broadcast Australia / Free TV, trials of next-generation broadcast technology in Sydney.

The trial is assessing the performance of DVB-T2 technologies in the Australian environment, utilising both VHF and UHF transmission with single frequency network (SFN) operation. DVB-T2, a widely deployed and proven technology, is being considered to replace the current DVB-T standard used for Australian terrestrial television delivery. When combined with new video compression technologies (HEVC) and High Dynamic Range (HDR), DVB-T2 enables broadcasters to delivery significant improvements in picture quality at lower bitrates.

Following testing at Broadcast Australia's lab, the on-air trial uses an ENENSYS T2Gateway to feed a DVB-T2 VHF 'parent' transmitter covering the Sydney area from the Gore Hill transmitter. The VHF signal is received off-air for re-broadcast at two low-power UHF 'child' transmission sites at Kings Cross and North Head using ENENSYS' DTTcaster professional receivers.

The DTTcasters receive the off-air VHF signal from the 'parent' transmitter and regenerate the T2-MI stream to enable the 'child' transmitters to re-broadcast in SFN and multiple physical layer pipes.

Colin Prior, APAC Sales Manager at ENENSYS said, "We are pleased to participate in this trial that will enable the Australian broadcasters to confirm the capabilities of DVB-T2 in their operational environment and network configuration, as well as ensure interoperability between equipment manufacturers."

Stephen Farrugia, Chief Technology Officer at Broadcast Australia, said, "The DVB-T2 trial is an important step to validate that the terrestrial television technology is ready for next generation broadcast, enabling Australian broadcasters to deliver the best possible viewing experience with optimal spectrum efficiency."

(C+T)

Mediacorp Raises the Stakes with On-Air AR Graphics from Vizrt

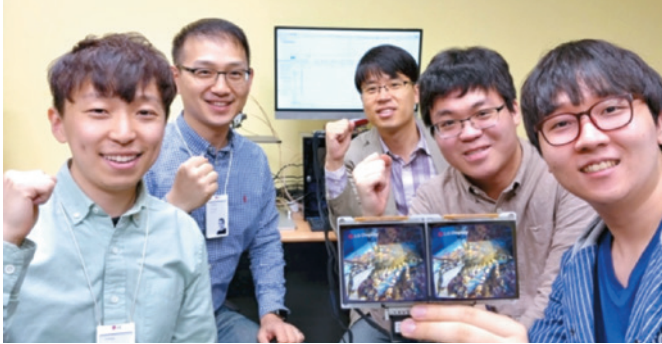
Mediacorp in Singapore has a new campus with production teams using the latest augmented reality and automation tools from Vizrt. The on-air graphics, used for many of Mediacorp's live and studio programming, are generated with the latest virtual set and AR tools from Vizrt. The live news studios' operations are handled by Vizrt's Viz Mosart studio automation system, ensuring synchronised, error-free, single-operator productions that combine live video with the graphics.

The News department also includes an in-house graphics team with highly skilled graphics artists that specialize in 3D and virtual set design. The journalists use Viz Pilot, a template-based content creation system, that is tied together with their newsroom control system (NRCS) to create, manage, and deliver the playlist of graphics needed to support Mediacorp's live TV, online and mobile services. Live graphics are controlled using a Viz Multiplay system, which from a single interface helps orchestrate the often complex presentation of the AR graphics with live video that appear to extend towards the viewer from multiple screens on the studio. Viz Multiplay gives the Mediacorp crew a simple way to control the display of that content across all of the large screens in the studio.

(C+T)

Digital Broadcasting Update

LG Display, Sogang University Jointly Develops AI-Based VR



Kang Seok-ju (middle), professor of Sogang University, poses for a photo with LG Display researchers and his students.

LG Display and a Sogang University team have jointly developed the world's first artificial intelligence (AI)-based content creation technology and measurement equipment.

The Sogang University team was led by Kang Seok-ju, a professor of the Department of Electronics Engineering.

Head mounted displays (HMDs) generally used in virtual reality (VR) offer users a high degree of immersion but can make them feel dizzy and experience motion sickness due to motion to photon latency and motion blur. Particularly, the higher a display resolution is, the more computing an HMD needs to generate VR content, making the problem worse.

The core of the newly developed technology is an algorithm that can generate ultra-high resolution images from low-resolution ones in real time. Deep learning technology makes this conversion possible without using external memory devices.

The new technology boosts power efficiency and optimizes the algorithm, realising high resolutions on mobile products. It cuts motion to photon latency and motion blurs to one fifth or less the current level by slashing system loads when operating displays for VR.

In addition, LG Display and Sogang University agreed to develop an instrument to measure the motion to photon latency and motion blurs of VR devices by applying a platform loaded with a precision motor that can simulate human neck movements and an optical system based on the human visual system through this industry-academy cooperation.

(BusinessKorea)

Qualcomm Reveals the World's First Dedicated XR Platform

Qualcomm Technologies, Inc. debuted the Qualcomm® Snapdragon™ XR1 Platform, the world's first dedicated Extended Reality (XR) platform during a launch event.

XR1 is a next-generation platform offering mainstream users high-quality XR experiences while enabling OEMs to develop mainstream devices. The XR1 platform also has special optimizations for Augmented Reality (AR) experiences with Artificial Intelligence (AI) capabilities offering better interactivity, power consumption and thermal efficiency.

XR1 integrates Qualcomm Technologies' heterogeneous compute architecture, including the ARM-based multicore Central Processing Unit (CPU), vector processor, Graphics Processing Unit (GPU) and Qualcomm® AI Engine. Other key features include an advanced XR software service layer, machine learning, the Snapdragon XR Software Development Kit (SDK) and Qualcomm Technologies connectivity and security technologies.

The XR1 platform also provides an AI engine for on-device processing. This engine provides customers the ability to process AI-use cases and run high performing, power efficient machine learning based computer vision algorithms that can help with key AR use cases like better pose prediction, object classification, etc.

(Qualcomm)

A New JPEG Format for Virtual Reality, Drones and Self-driving Cars



Working group head
Touradj Ebrahimi

The Joint Photographic Experts Group (JPEG), an international committee headed by an EPFL (École Polytechnique Fédérale de Lausanne) professor, has just unveiled JPEG XS. With this new format, the image-compression process uses less energy, and higher-quality images can be sent with low latency over broadband networks like 5G. JPEG XS will have applications in areas such as virtual reality, augmented reality, space imagery, self-driving cars and professional movie editing.

professional movie editing.

Why do virtual reality headsets make users nauseous? One reason is latency, or the almost imperceptible amount of time it takes for a display image to change in response to a user's head movement. However, the Joint Photographic Experts Group (JPEG) has just introduced a new image compression standard that could resolve this problem. This working group is headed by Touradj Ebrahimi, a professor in EPFL's School of Engineering (STI).

With JPEG XS, images and videos maintain an extremely high level of quality thanks to a compression process that is simpler and faster – and thus more energy efficient. The compressed files end up being larger, but that's not

a problem thanks to broadband networks such as Wi-Fi and 5G: the aim is to stream the files instead of storing them in smartphones or other devices with limited memory. This means that you could use your smartphone, tablet or computer to project a high-definition movie or a video game onto a large-screen display almost instantaneously. No cables would be required, and the image quality would be extremely high.

JPEG compression, which has been widely popular over the past 25 years, typically reduces image file sizes by a factor of ten. This compression process was developed so that images could be stored in cameras, with their limited memory, and easily shared over communication networks. Yet the process needs to evolve in response to new applications, more efficient broadband networks and technological advances. The JPEG XS standard compresses files by no more than a factor of six and is not meant to replace the popular JPEG format.

JPEG XS could come in handy whenever images and videos need to be sent to a processor as fast as possible. Potential applications include the “eyes” of drones and self-driving cars – technologies where long latency represents a danger for humans.

The new format has also attracted the attention of the European Space Agency (ESA). The low-power algorithms used by JPEG XS would be a boon for space probes, which need to take very high-quality photos using only a tiny source of energy. Smartphones and other everyday devices with limited memory will continue to use the legacy JPEG format to store pictures.

Another advantage of JPEG XS is that, like all previous JPEG formats, it is open-source. The Society of Motion Picture and Television Engineers (SMPTE), based in Hollywood, is already considering adopting JPEG XS as its editing format. Currently, every brand of video camera that uses high-dynamic-range (HDR) imaging techniques has its own proprietary coding format. That means individual files must be transcoded before they can be edited. JPEG XS will change this situation by providing a universal format. (EPFL)

SMPTE Publishes ST 2110-40, Addressing Ancillary Metadata for Professional Media Over Managed IP Networks



SMPTE® has extended the SMPTE ST 2110 Professional Media Over Managed IP Networks standards suite with the publication of SMPTE ST 2110-40. This new document maps ancillary data packets (as defined in SMPTE ST 291-1) into Real-Time Transport Protocol (RTP) packets that are transported via User Data Protocol/Internet Protocol (UDP/IP) and enables those packets to be moved synchronously with associated video and audio essence streams.

The SMPTE ST 2110 standards suite specifies the carriage, synchronisation, and description of separate elementary essence streams over professional IP networks in real time for live production, playout, and other professional media applications. SMPTE ST 2110 separately routes the individual essence streams (audio, video, and ancillary data), which simplifies, for example, the addition of captions, subtitles, and Teletext, as well as tasks such as the processing of multiple audio languages and types. It also enables the efficient carriage of next-generation image formats with new features, such as HDR over IP, that may require metadata.

SMPTE is offering a Virtual Classroom course on ST 2110, and the newly published ST 2110-40 standard will be a focus of the course. The course assumes a basic understanding of IP and associated terminology. The SMPTE Virtual Courses “Introduction to Networks,” “Routing and Switching Essentials,” and “Essentials of IP Media Transport for Broadcasters: Moving Real-Time Video and Audio over Packet Networks” are not required to register for “Understanding SMPTE ST 2110.” However, these courses enable a deeper understanding of IP, internetworking, and many essential concepts that are referenced in the ST 2110 suite of standards and are recommended to be completed before enrolling in “Understanding ST 2110.” SMPTE Virtual Classroom course descriptions and registration are available at www.smpte.org/courses.

(SMPTE)

Guidelines for DAB Network Planning

This strategic report provides guidance on key elements necessary to plan and design a DAB network. The term DAB applies to both DAB and DAB+, but where there are differences between the systems, they are explained.

The EBU's previous report on DAB planning issues, TR 021, was prepared in 2003 and it still remains a useful guide. Since then, however, the widespread availability of new receivers, the experience gained by network planners and the revision by ETSI of the DAB standard in January 2017, has highlighted the need for an updated planning document on DAB.



This report provides guidance on key elements that are necessary to plan and design a DAB network. No information on the overall transmitter network planning process has been included as this is specific to country situations and constraints and it can be found in other documents, e.g. TR 021. The latest release of the DAB standard only covers the VHF band, which includes Bands I, II and III. In this report only Band III is considered.

As well as the main body of the report there are eleven annexes that detail studies of subjects already considered in the main report and which are not publicly available elsewhere. (EBU)

Equipment Trends

SMPTE ST 2110 Compliant IP-based Broadcast Vehicles

NEP UK has unveiled Venus and Ceres, the latest outside broadcast vehicles in its fleet to be SMPTE ST2110 compliant, joining NEP's worldwide family of IP-based vehicles in Australia and the US. The vehicles will be used at major events, sports fixtures and other large-scale productions.



The SMPTE ST 2110 standards suite specifies the carriage, synchronisation and description of streams over IP for real-time production, playout, and other professional media applications.

The ST 2110 system infrastructure is identical in both vehicles. Each system is built around Grass Valley (formerly SAM) IQ UCP 25GbE Gateway cards, which provide two-way links between the all-new robust and resilient IP-based equipment and the existing baseband technology that is still needed to accommodate clients using SDI feeds. The trucks can also offer dual level UHD and HDI-SDI simultaneously.

Venus and Ceres are also equipped with PHABRIX's HDR and IP-enabled test and measurement solutions. This includes three Qx 12G signal generation, analysis and monitoring solutions, to accommodate clients regardless of whether they are using SDI or IP feeds. NEP also invested in four Rx2000 units, with each Rx providing up to 4 channels of 2K/3G/HD/SD-SDI video/audio analysis and monitoring (dual inputs per analyser).

Other equipment installed in each vehicle includes Grass Valley Kayenne Video Production Centres and Kahuna vision mixers, Calrec sound desks, PHABRIX HDR and IP-enabled test and measurement solutions, Telex Talkback system, Arista 7504 IP switches and Axon Cerebrum control systems.

The other major differentiator for these vehicles is the significant reduction in cabling; the system requires far less fibre optic cable compared to the miles of coaxial cable previously required, which proves quicker to integrate and is much lighter. The new equipment requires greater cooling; therefore, the truck design takes into account the ability to provide greater air conditioning and all equipment can be cooled separately in operational areas.

Venus and Ceres can also expand their capacity and facilities exponentially via modular connection with multiple IP flypacks. Venus and Ceres mark a new direction for UK OB vehicles and a shift in thinking – following the first-generation OB trucks built to support SMPTE ST 2110.

(NEP Group)

JDI Announces Development of High-Pixel-Density 1001ppi LCD Specifically-Designed for Virtual Reality Applications

Japan Display Inc. (JDI) has announced the development of a 3.25-inch 1001ppi low temperature polysilicon (LTPS) TFT LCD specifically-designed for virtual reality (VR) head mount display (HMD) applications. JDI plans to start commercial shipments by the end of March in 2019, and will accelerate the design of even higher resolution displays for VR-HMD applications in the future.



Comparison of Pixel Density

In order to achieve natural and realistic motion pictures in VR-HMD devices, the desired display characteristics are: high pixel density, improved motion blur, and low latency. JDI announced the development of a high-pixel-density 803ppi LCD last year, which helped to alleviate problems associated with users noticing pixel grid lines (i.e., pixelation). However, even more compact-size LCDs and higher magnification lenses are required to decrease the size and weight of HMD devices. 800ppi is not sufficient for this purpose. Instead, display resolution over 1000ppi is anticipated from the market.

JDI's new 1001ppi LTPS TFT LCD not only features high pixel density, but also has improved LC response time from 4.5msec to 2.2msec (gray-to-gray, worst case) which helps to reduce motion blur. In addition to these features, the 1001ppi LTPS TFT LCD is able to operate at 120Hz refresh rate, though most displays for VR-HMD applications operate below 90Hz. This 120Hz refresh rate contributes to minimize system latency.

By applying this 1001ppi LCD to new VR-HMD devices, users will have enhanced enjoyment of their virtual reality experience, and, further VR market expansion is expected by this technology.

(Japan Display Inc)

Personalities & Posts



Mr Masakazu Iwaki
Promoted at NHK-Japan

Mr Masakazu Iwaki has been appointed Deputy Director of the Science & Technology Research Laboratories (STRL) at Japan's public broadcaster, NHK.

He is also Head of Secretariat for AI promotion at the laboratories, and will supervise the introduction of AI technologies to the broadcasting industry.

Before his appointment, Mr Iwaki was Head of the Human Interface Research Division in STRL and controlled research and development of human interface technologies to improve media accessibility.

STRL is the sole research institute in Japan specialising in broadcasting technology. It conducts a wide range of research and development activities, and engages in international and domestic standardisation efforts for the technology it develops.

Mr Iwaki has been Chairman of the ABU Technical Committee since 2014.

He joined NHK in 1990. From 1994 to 2008, he worked as a research engineer of acoustics in the STRL.

He is a member of the Institute of Electronics, Information and Communication Engineers (IEICE), The Institute of Image Information and Television Engineers, the Audio Engineering Society (AES) and the Acoustical Society of Japan (ASJ).



Mr Ahmed Nadeem
New Director, ABU Technology and Innovation

Mr Ahmed Nadeem has been appointed the new Director, ABU Technology & Innovation, with immediate effect.

Nadeem is an experienced electronic and ICT engineer with over 20 years of experience in the field of Broadcasting and Telecommunications. He has been working with the ABU Technology Department since 2008, most recently as Head of Production Technologies.

Before joining the ABU, Nadeem worked as a Project Engineer at LSV Enterprises of Singapore (2007-2008) and Television Maldives (1996-2007).

He holds a BEng (Hon) in Electrical & Electronic Engineering from the University of Hertfordshire in the UK, and is presently pursuing his MBA on a part-time basis.



Mr Kenichi Murayama

Mr Kenichi Murayama
Appointed ABU Transmission Topic Area Chairman

Mr Kenichi Murayama has replaced Dr Narichika Hamaguchi as the Chairman of the ABU Transmission Topic Area.

Mr Murayama is Senior Manager, Planning & Management Division, Engineering Administration Department, Japan Broadcasting Corporation (NHK).

He joined NHK in 2002. From 2002 to 2008 he worked at the NHK Engineering Administration Department/Transmission & Audience Reception Engineering Center. From 2008 he worked in the Advanced Transmission Systems Research Division of the NHK Science and Technology Research Laboratories (STRL).

Earlier this year he joined the NHK Engineering Administration Department, where he is engaged in planning and management related to advanced terrestrial broadcasting.

We welcome Mr Murayama to the ABU Technical Bureau and wish to thank Dr Narichika Hamaguchi for his valuable contributions as Transmission Topic Area Chairman.



Dr Narichika Hamaguchi



Ms Hong, Young-kyung

Ms Hong, Young-kyung New ABU Technical Liaison Officer for KBS-Korea

Ms Hong, Young-kyung has replaced Mr Doo-Hyung Kang as the ABU Technical Liaison officer and also as KBS's representative on the ABU Technical Bureau.

Ms Hong joined KBS in 2005 as a sound engineer in the TV Technology Department, working on informational and entertainment programmes as well as drama.



Mr Doo-Hyung Kang

She was later transferred to the Equipment Management Department, which handles planning, purchasing and supplying equipment for broadcasting. She then took up the position of establishing the media strategy in the Future Strategy & Planning Department.

Ms Hong now works in the Production Technology Management Department, in charge of international relations.

We would like to thank Mr Doo-Hyung Kang for his outstanding contributions to the ABU Technical Bureau and support to the ABU Technology Department. We wish him well in his new position at KBS.

Dato' Abu Bakar Ab Rahim Retires from RTM

Dato' Abu Bakar Ab Rahim, Director-General of Malaysia's public broadcaster, RTM, retired in May.

Dato' Abu Bakar played a key role for many years in ABU activities, particularly those of the Technology Department. He was Chairman of the ABU Technical Committee for two years until 2014, and was responsible for major improvements in the way the TC operated.

He also provided invaluable support to the annual ABU Digital Broadcasting Symposium, helping it grow into a leading event on the broadcasting calendar.



ABU Technology presented a token to Dato' Abu Bakar.
(From L-R, Ahmed Nadeem, Dato' Abu Bakar Ab Rahim, Nguyen Thanh Nam and Amir bin Khairul Anuar)

Dato' Abu Bakar became RTM's Director-General in October 2014. Before that he was Deputy Director-General (Broadcast Operations). We thank Dato' Abu Bakar for his outstanding support for the ABU and its activities, and wish him every success in the future.

Changes in Engineering Awards Judging Panels

There have been changes in the ABU Engineering Awards judging panels. The new line-up can be found in this issue. The ABU is pleased to welcome the new judges, Ms Hong, Young-Kyung of KBS-Korea, Mr Asaad Sameer Bagharib of Thinking Tub Media-Singapore, Mr Peter Bruce of IABM-APAC and Mr Alexander Zink of Fraunhofer-Germany.

We wish to thank the past judges, Mr Doohyung KANG of KBS-Korea, Mr Simon Lockington of Imagine Communications, Mr Lim Chin Siang of IMDA-Singapore and Mr Sanjay Salil of MediaGuru-India, for their huge contributions.

ABU TECHNOLOGY CALENDAR OF EVENTS

2018

16-18 July	Metrics-based Corporate Innovation Management Workshop	Kuala Lumpur
23-27 July	4th DAB+ Digital Radio Workshop (ABU-ASBU-AIBD-WorldDAB)	Kuala Lumpur
15 Aug-15 Sep	ABU Technology Webinars	Online
13-18 Sep	International Broadcasting Convention 2018	Amsterdam
25-27 Sep	6th Regional Workshop on OTT and IBB Technologies	Kuala Lumpur
30 Sep-5 Oct	ABU General Assembly & Associated Meetings	Ashgabat
23-25 Oct	6th Regional Workshop on OTT and IBB Technologies and Services for Media (ABU-AIBD)	Kuala Lumpur
13-14 Nov	1st DRM Digital Radio Workshop (ABU-AIBD-DRM)	Kuala Lumpur
14-16 Nov	Inter BEE 2018	Tokyo
20-21 Nov	15th Iran Media Technology Exhibition & Conference, IRIB Annual Technical Assembly	Tehran
3-7 Dec	5th Training Course on Engineering Fundamentals for Broadcasters (ABU-AIBD)	Kuala Lumpur

New Members

Additional Full Members

Mongol Radio

Is Mongolia's first online radio station through the mglradio.com website, with 2 radio channels – MGLRADIO FM-102.1, MGLRADIO NEWS FM 88.3.

Mongol Radio prepares and broadcasts radio and TV content, runs online radio and radio content and arranges live broadcasts through TV and radio, of conferences, seminars, concerts, which it uploads at the requests of its customers.

It is the first online radio station in Mongolia and the only radio station that broadcasts live streams through its Facebook page.



Sichuan Radio and Television

Is a major television network in China. The television network is owned by the Sichuan provincial government. The network is based in Chengdu in Sichuan.



SRT was launched in Sichuan on 1 May 1960 as a local television network. On 1 August 2003 SRT began broadcasting nationally.

Shandong Radio And Television

Shandong Radio And Television Network Co., Ltd. is based in Jinan, China and provides television and radio broadcasting services.



Radio and Television Station of Shanghai

Radio and Television Station of Shanghai (RTS), is a Shanghai-based government institution, and its wholly owned subsidiary, is one of China's largest media and cultural conglomerates, with the most complete portfolio of media and related businesses.



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