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Contents

2	Structural Mechanics of TV Towers: Strengthening for Hauling up of Additional DTT Antennas
8	Impact of Interference on Broadcasting Satellite Services in Terms of Increase Rate of Outage Time Caused by Rain Attenuation
13	NHK Wins Engineering Emmy® Award
15	ABU Technical Committee Meetings in Bali
20	ABU Distinguished Service Award 2016
21	ABU Engineering & Technical Awards 2016
23	ABU Technical Bureau 2016/2018
24	ABU-AIBD Workshop on Engineering Fundamentals for Broadcasters
25	Integrated Broadcast-Broadband (IBB) and Over-the-Top (OTT) Services: Deployments and Progress in ABU Member Countries
28	EBU Technology & Innovation Update
30	Kazakhstan Television Industry: Current State and Problems of Development
35	NABA Symposium: Cyber Security in Broadcast Media
36	ABU Technical Advisory Service to Mauritius Broadcasting Service
37	NBTC Capacity Building Workshop for Digital Radio Broadcasting
38	InterBEE 2016
39	DVB Asia Conference
41	News from the ABU Region
42	Digital Broadcasting Update
43	Equipment Trends
44	Personalities & Posts New Members



Cover:
*RRI hosts
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Asia-Pacific Broadcasting Union

TECHNICAL REVIEW

From the Editor's Desk



This issue of ABU Technology's *Technical Review* carries a summary report from this year's Technical Committee (TC) meetings. A number of papers addressing relevant issues for broadcasters are presented in the areas of hybrid broadcasting (Integrated Broadcast Broadband – IBB), Structural Mechanics of TV Towers, Impact of Interference on Broadcasting Satellite Services, Over the top (OTT) Services Integrated with IBB and 'Current state and hindrances to development of the Kazakhstan Television Industry'.

The InterBEE Report, provided by a fellowship recipient, covers the technology discussions at the InterBEE-2016 Conference and Exhibitions held in Tokyo.

This issue also contains activity reports on capacity building, carried out by the Technical Department with WorldDAB, AIBD ASBU and NBTC.

This Technical Review also summarises the technical committee meetings and awards presented during TC meetings.



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Structural Mechanics of TV Towers: Strengthening for Hauling up of Additional DTT Antennas



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abstract

Doordarshan has about 1266 towers for the installation of TV and FM antennae. Towers are key organs for terrestrial transmission. The towers are designed considering wind zone, seismic zone and environmental condition including water table & soil condition etc. besides the intended loads of antenna, RF feeder cable etc. Whenever additional load of antenna etc. is to be put on the tower, it need to be analyzed for its required strengthening, to meet the requirement of various forces. This paper gives insight of observations, detailed analysis and measures relating to structural mechanics of TV towers, taken during hauling up of DTT antenna on existing TV towers.

Indexed Terms: Verticality, Fasteners, Aperture, Wind speed, Drone Helicopter, IS Codes

1. Introduction

Doordarshan has started digitalisation of its terrestrial network with 2nd generation of Digital Video Broadcasting (DVB) (known as DVB-T2). Even in the presence of huge number of DTH and cable TV channels, a strong terrestrial platform is critical to healthy competition in the TV and radio market and to the realisation of a wide range of social and cultural benefits and most essentially an all-weather reliable platforms for distribution of radio and TV signals. FM antennas have also been mounted on various TV towers. Cellular operators also use TV towers. In order to add the additional loads of DVB-T2 antenna having self weight of 1670 kg and wind load of 3350 kg at 216 km/h, these towers were analyzed and requisite strengthening had to be carried out. The importance of towers is thus of paramount importance for broadcasting in India and the experiences of tower strengthening are educative.

2. TV Towers: Steel vs RCC Towers

Doordarshan has towers ranging in height from 30 m to 300 m. The RCC and all steel towers have their own advantages and disadvantages. Any vertical structure of circular continuum construction is more prone to higher stresses due to resonance induced by aerodynamic vibration than a square shaped lattice structure.



Figure 1: Steel tower

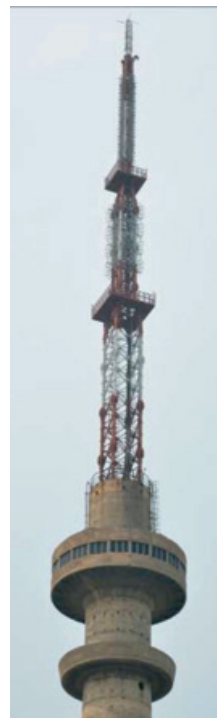


Figure 2: RCC tower

The steel material is inherently more efficient in elastic behaviour than concrete. The architecture of a RCC tower, normally constructed in India is of hybrid construction i.e. lower part is RCC and upper 40-60 m made of steel. Some people feel that the Reinforced Cement Concrete (RCC) towers are superior in aesthetic look. The cost of RCC towers above 120m becomes uneconomical in comparison to steel towers. Steel structures are most reliable as the material is perfectly homogeneous in composition and its modulus of elasticity is higher. The ratio of allowable stress as compared to density of material is relatively very high for steel. The factor density/allowable stress works out to be 3.7×10^{-4} m for steel and only 2.47×10^{-3} m for concrete. The all steel towers in India are made of steel somewhat resembling the Eiffel tower in Paris in overall shape. However India has also 75 m to 300 m high RCC Towers. The construction time for RCC towers is generally twice that of steel towers because in a steel tower the shop and site activities can run in parallel, whereas in case of RCC towers all works has to be done at site in series. The 300 m all steel tower in Mumbai was constructed in 2 years. The steel towers are very light due to better mechanical properties of steel for higher stresses. The repairs of even

a damaged load bearing member can be replaced on a standing steel tower. It is easy to identify the defects in steel compared to RCC. Doordarshan carried out repair of a twisted member in one such tower and also damages in one RCC Tower. During the 7th Five year Plan twenty RCC towers were erected by Doordarshan.

3. Tower Size and Apertures

Generally Doordarshan TV towers range from 30 m to 175 m high. The highest towers, of 300 m height, are in Mumbai, Fazilka, Ramgarh (Jaiselmer), Bhuj, Rameshvaram and Amritsar. TV towers have been designed with a factor of safety of 2 and their life is about 50 years. The evolution of TV and radio in terrestrial mode is unstoppable, as their technological advancements have given new options for delivery of video, audio and data services and even to think of disbanding terrestrial transmission in broadcasting in the presence of other alternative platforms is slightly preposterous.

Foundations for tower and mast structures are designed to withstand the full expected dynamic loads namely, antennae, feeders, wind loading, etc. The designs take cognizance of the geo-technical investigation findings on soil and wind conditions at the installation site for purposes of determining bearing pressures (vertical and horizontal), other sub-surface conditions, the suitable foundation type (reinforced concrete blocks, open foundation, cast in-situ driven piles, under reamed piles, standard pad and column, raft, preset rock anchors), construction materials and installation method.

Details of few tower cases for steel quantity, Wind speed and year of ordering is given in the following table to know some mechanics in tower design:

S. No.	Tower site	Tower height	Steel Qty	Wind speed (for design)	Ordering year
1.	Krishnanagar	150 m	233.60 MT	47 m/s	1998
2.	Fazilka	300 m	1117 MT	47 m/s	1994
3.	Amritsar	300 m	1110 MT	47 m/s	2005
4.	Kolkata	175 m	727 MT	50 m/s	1998
5.	Mysore	150 m	188.70 MT	39 m/s	1998
6.	Kharagpur	150 m	255.70 MT	50 m/s	1994
7.	Surat	113 m	120 MT	44 m/s	1998
8.	Shantiniketan	120 m	111.80 MT	47 m/s	1998
9.	Mangalore	67.5 m	44.50 MT	39 m/s	1998

Tower apertures: DD antennae require predesigned apertures (having specific width and height) on the tower for mounting TV and FM antenna. TV towers also have aperture for FM antenna. As such wherever an aperture for FM is available on a TV tower, AIR is using the TV tower. At some places, the FM towers which are 100 m high, aperture for TV have also been kept and DD is using the same. The typical

requirement of aperture size for TV and FM antenna is as tabulated below:

Type of antenna	Size of aperture		Net weight of antenna	Wind load of antenna system at 216 Km/h
	Length	Cross Section		
Band II (FM)	19800 mm	2500 mm	1800 kg	2000 kg
Band III (TV)	20000 mm	1200 mm	4800 kg	7300 kg
UHF Band IV (TV)	20000 mm	640 mm	4700 kg	7000 kg

4. Tower Strengthening Design Issues:

In case of increase in wind zone or addition of new antenna loads, the strengthening of towers is to be carried out after carrying out their load analysis and modeling with computer software. The minimum factor of safety for towers should be two, based on their ultimate tensile strength. The load carrying capacity in tension and compression for each member is based on IS: 800-2007 working stress method. Next comparison of the computed member forces is carried out with the member capacities. The ratio of computed member force and the corresponding member capacity is called as "Stress Ratio". If this ratio is less than 1.0, then the member is safe and no strengthening is required. If the stress ratio is more than 1.0, it means that member capacity is less than the force it is required to carry. The other important issue is slenderness ratio. In structural engineering calculations, the slenderness is often denoted as the element's "effective" length divided by something called the radius of gyration. The radius of gyration is a measure of the average distance of the material from the centroid (centre of gravity) of the element's cross section. The higher the slenderness ratio, the more slender the structural element is. The slender a structural element is allowed to be depends upon the material it is made from. Steel can be more slender than concrete. The other factors in design includes basic wind speed as per the IS:875-part 3- 1987, Risk factor k_1 for 50 years life, Terrain/height factor k_2 for mean hourly wind speed and terrain type, Topography factor k_3 and Gust factor. No load-carrying angle bar/lattice should be smaller than 50x50x6mm. Service life of the tower is limited by fatigue damages accumulated in welded joints of load carrying structure. The minimum thickness of gussets and similar plates on the main structure should be 8mm. The towers have been modeled using SAP 2000 16 software.

5. Tower Strengthening – Critical Issues

5.1 Change of Wind Speed Zone

Wind zone is an important parameter in design of tower. Besides other factors, if there is change in wind speed, the tower need analysis. One such case is detailed as below:

149 m high TV tower at Hyderabad is steel lattice square cross section with covered lift structure. It was designed and constructed in 1975 taking into consideration of applicable

wind load at that time i.e IS: 875-1960 for which wind pressure of 100 kg/m^2 at 30 m/s . It has loads of Band I Antenna with self load as 6800 kg (6x4 Panels) & its wind load as 9060 kg . The FM antenna consisting of 6 panels with a wind load of 1339.36 kg . Now the new wind code is new IS: 875 (part 3) – 1987 and the wind speed zone is 44 m/s and wind pressure is 146.72 kg/m^2 . Further as per new IS: 875-1987 force coefficient has increased the load considerably. Further a 20 kW DTT antenna is to be mounted at top of this tower which has a self weight of 1670 kg and wind load of 3350 kg at 216 km/h .

The wind load (static) due to tower structure and accessories will be calculated in accordance with IS:875 (part 3) – 1987, is $F_z = C_f \times A_e \times P_z$

Where F_z = Wind load on structure at any height z corresponding to strip area A_e .
 C_f = Force coefficient specified in IS:875-1987
 A_e = Effective frontal wind obstruction area.
 P_z = $0.6 (V_z)^2$, design wind pressure at height z .

The design wind speed $V_z = V_b K_1 K_2 K_3$

Where V_b – Basic wind speed 44 m/s as site location and IS:875-1987.
 K_1 – Probability factor – 1.07 as per table 1 of IS:875-1987.
 K_2 – Terrain, height and structure size factor as per IS:875-1987 for terrain category 2 and class C.
 K_3 – Topography factor

It may be seen that the main leg members at S.No. 3 and 5 (shown in bold) face more force than the capacity of members shown in below table. The details of other members have not been shown in below table. So above members, along with others not shown in above table, need replacements.

5.2 Rusting in Coastal Areas

Towers like those in Mumbai, Trivandrum, Rameshwaram are near to sea and the damage to these tower can be very severe. The Mumbai and Trivandrum towers are all steel and Rameshwaram tower is RCC cum steel. The Rameshwaram tower was inspected using drone helicopter and Mumbai and Trivandrum tower were inspected by manual climbing. The Mumbai tower members were strengthened with additional steel sections and rust was treated. Some additional bracing members of size $L 75 \times 75 \times 6$ were strengthened with additional member adjoining the existing one. The damages of steel portion in Rameshwaram are terrible and have drastic implications. Cement portions is also being treated at various heights as the cement has been eroded and corrosion has ingressed into the steel of the RCC. So the complete steel portion is being replaced. A glimpse of actions and observations are as below:

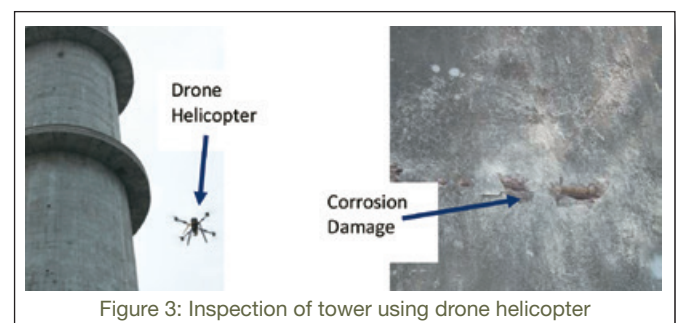


Figure 3: Inspection of tower using drone helicopter

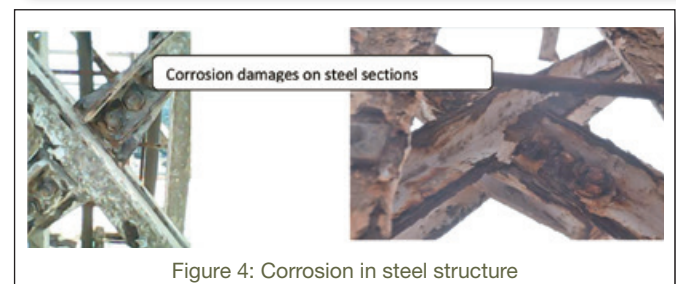


Figure 4: Corrosion in steel structure

Dynamics of loads and capacities of members are tabulated as below:

Sl. No.	Descrip. of member	Force due to static condition						Section	Area cm ² in cm	Actual length	Capacity of member	
		DL+WL with Band I antenna and addl. UHF		DL+WL with half band I & UHF without lift cover		DL+WL with Adl. UHF antenna only with fit cover					Comp. MT	Tens. MT
		Comp. MT	Tens. MT	Comp. MT	Tens. MT	Comp. MT	Tens. MT					
1	Horz.	0.237	-0.495	0.244	-0.453	02.44	-0.453	Bit MC300	74.0	380	109.21	115.44
	Leg.	6.040	-3.767	5.440	-3.631	5.440	-3.631	φ63	31.16	400	18.786	48.61
	Brcg.	2.118	-1.744	1.699	-1.396	1.699	-1.395	LL65X65X6	14.88	551.7	9.920	19.937
2	Horz.	0.689	-1.279	0.031	-1.085	0.632	-1.084	LL65X65X6	14.88	380	6.012	19.937
	Leg.	11.88	-8.266	9.594	-6.935	9.595	-6.934	φ63	31.16	400	18.786	48.61
	Brcg.	3.459	-2.978	2.319	-1.964	2.318	-1.964	LL65X65X6	14.88	551.7	9.920	19.937
3	Horz.	1.292	-2.069	1.007	-1.561	1.006	-1.565	LL65X65X6	14.88	380	6.012	19.937
	Leg.	20.06	-15.20	14.669	-11.221	14.660	-11.224	φ63	31.16	400	18.786	48.61
	Brcg.	4.750	-4.104	3.001	-2.552	3.007	-2.550	LL65X65X6	14.88	551.7	9.920	19.937
4	Horz.	2.454	-3.524	1.658	-2.448	1.668	-2.412	LL65X65X6	14.88	380	6.012	19.937
	Leg.	30.06	-24.08	20.753	-16.176	20.291	-16.172	φ63	31.16	400	38.783	48.61
	Brcg.	6.694	-5.788	4.205	-3.507	3.975	-3.352	LL65X65X6	14.88	551.7	9.920	19.937
5	Horz.	3.021	-4.125	1.894	-2.764	1.889	-2.646	LL65X65X6	14.88	380	6.012	19.937
	Leg.	44.79	-36.89	30.092	-23.693	28.392	-23.001	φ80	50.3	400	41.558	78.47
	Brcg.	7.159	-6.473	4.550	-4.015	3.965	-3.489	LL65X65X6	14.88	551.7	9.920	19.937

The 300 m TV tower at Mumbai has rust in truss members of length 18 to 20 metres and of considerable weight of three to five tons. So their removal is not feasible. So, additional plates were welded on top of these sections. Those sections which were rusted minimally were cleaned and painted with two coats of zinc rich primer of 80 U and allowed the primer to dry up. Thereafter two rubberized paints were applied, with a gap of 6 to 8 hours.



Figure 5: Bending in main diagonal braces

5.3 The Sinking of Foundation and Buckling of Tower Member

At one location there was sinking of a concrete foundation block in one leg, which resulted in buckling of the diagonal brace in the lowest panel which is about 5 m length. The buckled members were replaced with new members using additional support. In the lowest panel, there are 6 sub-divisions and the buckled brace is located in the 3rd sub-division from the bottom. An angle section L100x100x8 vertically (in C-B-B' plane) was connected between each of the upper 5 sub-divisions as shown in Fig. 6 just behind the existing diagonal brace in the lowest panel. This angle should be tack welded at 4 or 5 points at each end to the horizontal angle section of the hip bracing at a distance of about 30-45 cm from point B. If required, a small gusset plate can also be used to connect it. Similarly, an angle section L100x100x 8 vertically (in C-B-A plane) was connected between each of the upper 5 sub-divisions just to the left of the existing diagonal brace in the lowest

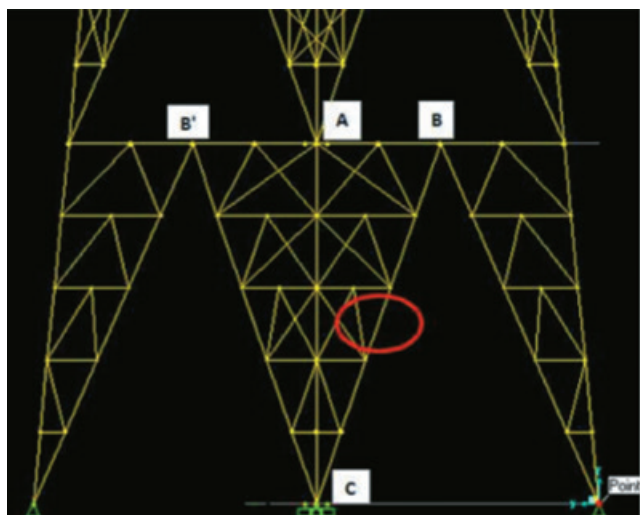


Figure 6: Replacement of buckled members

panel. 2ISA 100x100x8 lengths were kept ready in exact length with proper holes as per site to replace the existing buckled member. The buckled members were disconnected by removing the bolts at its two ends. The hip bracing was not much disturbed because of the above strengthening. The buckled members were replaced with the new members.

In order to avoid waterlogging in the area near tower foundation blocks, water channels were provided to divert the rain water beyond the foundation of the tower base. Impervious aprons were provided around the four legs of the pedestals so that no ingress of water into the foundation soil/strata takes place. Proper slope was provided to facilitate flow of surface water outside the foundation area.

5.4 Missing and Skewed Fasteners

The tower members and other components of structure are connected/assembled by means of nuts and bolts with locking nuts or spring washer. A few fasteners were observed missing and skewed due to various forces. These were replaced with new ones. While replacing them the quality of steel used for nuts, bolts, washers etc. was conformed to mechanical properties as per IS:1367/79 (with latest amendments) and dimension to IS:6639 (with latest amendments). No appreciable fillet was left at the point where shank of the bolt connects to the head.



Figure 7: Fasteners missing in lower panel

5.5 Verticality and Maximum Deflection of Tower

Tower verticality affects the radiation pattern of the antenna. So the tower should be vertical and no straining will be permitted to achieve this. The erection tolerance of verticality was maintained within 25 mm every 9100 mm, subject to overall verticality of tower within 50 mm of full height of tower. Stage-wise corrective actions were taken where required. The maximum deflection of the axis of a tower must not be more than 1/100 of tower height from vertical at various levels including top, under maximum wind and other critical loading condition. The deviation in verticality of tower effects the beam tilt of antenna. The beam tilt increases with increasing tilt of the antenna. On the other side of the tower, the panels will be tilting upwards, so the beam tilt will also be less and will go above the horizon. Actually this will be far worse, in terms of effect on the population and coverage area. The DTT antennas were erected with an interface between tower top and the antenna, without any deviation to achieve the desired radiation pattern.

5.6 Tower Painting

The lattice steel portions of the tower were painted. One coat of Zinc Rich epoxy primer conforming to IS: 5666 and final two coats of synthetic enamel conforming to latest IS:2932 (colour, international orange & white.) were carried out. For the final coats of paint the tower was painted with synthetic enamel to have alternate band of international orange and white colours with top and bottom bands painted in international orange as per civil aviation regulation.

5.7 Aviation Lights

Aviation obstruction lights including beacon light were provided on the top of DTT antenna as per the International Civil Aviation Organization (ICAO) norms.

5.8 Safety Precautions

RF shutdown of existing services of radio and TV took place during the time of the tower strengthening work, which was generally from midnight 0000 hrs to 0600 hrs, and all persons involved were covered by a Workmen's Compensation insurance policy. The agency insured the workers against third party claims in the event of any mishap. Requisite safety equipment was available to the workers during the work.

6. Conclusions

Doordarshan Towers are assets to the transmission of TV, radio and mobile signals. They are of varying heights, designed to withstand antenna loads and sustain the wind loads. The towers are long lasting creations and need periodic cares. Additional load of DTT antenna necessitated thorough analysis

and strengthening of towers. The dynamics of loads, forces and stresses was keenly studied before taking on the job of tower strengthening. The cases of most interest are those of coastal areas and where wind zones or seismic zones change. The use of drone helicopter in analysing the 300 m RCC tower was unique experience. The towers play crucial role in expansion and digitalisation of the terrestrial TV network and its mechanics of forces and capacity of members need to be analyzed before hauling up additional antennas.

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people covered by DAB/DAB+

1,970
Full-time DAB/
DAB+ services
on air



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



Australia: DAB+ launched July 2009



Hong Kong: DAB+ launched 2011



Indonesia: DAB+ trial on air in April 2016 in Jakarta, 2 million population coverage



S Korea: interest in DAB+, DAB on air



China: DAB in Beijing & Shanghai



Malaysia: DAB+ trials on air and policy in development



NZ: DAB+ trial on air in Auckland and Wellington



Thailand: DAB+ trial in 2017



Vietnam: DAB+ trial 2013

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47%

⁴ Refers to % of people who have access to a DAB+ digital radio at home, at work or in the car in major metropolitan areas.

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Impact of Interference on Broadcasting Satellite Services in Terms of Increase Rate of Outage Time Caused by Rain Attenuation



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summary

SUMMARY The indexes of the degradation of C/N , $\Delta T/T$ and I/N , which can be converted from one to another, are used to evaluate the impact of interference on the satellite link. These indexes are based on the increase of the noise temperature. On the other hand pfd (power flux density) and C/I values are used as a threshold for triggering coordination or sharing criteria. However, it is not suitable to intuitively understand how these parameters degrade the quality of services. In this paper, we propose to evaluate the impact of interference on the performance of BSS (Broadcasting Satellite Services) in terms of the increase rate of the outage time caused by the rain attenuation. Some calculation results are given for the 12GHz band BSS in Japan.

Key words: Rain attenuation, Broadcasting satellite services, Frequency sharing, Evaluation of impact of interference, Outage time.

Introduction

This paper is based on our previous studies. Therefore, the authors would like to invite the readers to refer [1] for detail explanations and analyses.

The indexes of the degradation of C/N (Carrier to Noise ratio), $\Delta T/T$ (The increase of noise temperature caused by the interference and the system noise temperature ratio) and I/N (Interference to Noise ratio), which can be converted from one to another, are used to evaluate the impact of interference on the satellite link. These indexes are based on the increase of the noise temperature.

On the other hand pfd (power flux density) and C/I (Carrier to Interference ratio) values are used as a threshold for triggering coordination or sharing criteria. For example, Figure 1 shows the pfd masks used as a threshold for triggering coordination for the 12GHz band BSS and the 21GHz band BSS, respectively. The criterion for the 12GHz band is that the C/I is greater than 28.4dB when a 60cm receiving antenna is used. In Fig.1 the pfd masks for the 60cm receiving antenna with minimum $C/I = 29.7$ dB and the 45cm receiving antenna with minimum $C/I = 27.5$ dB are also shown for the purpose of comparison. The criterion for the 21GHz band is that the C/I is the addition of the required C/N and 12.2dB, then the maximum required

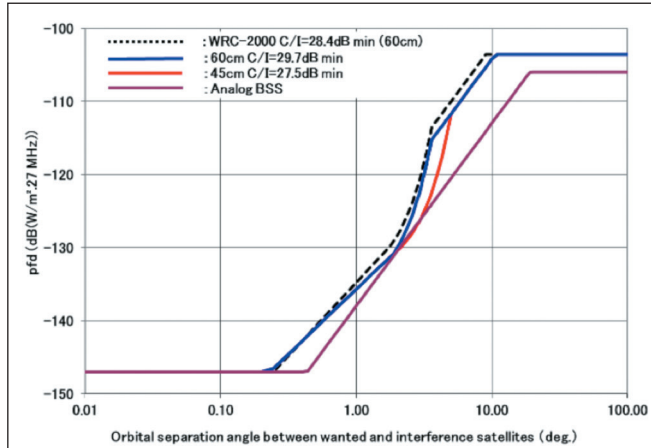
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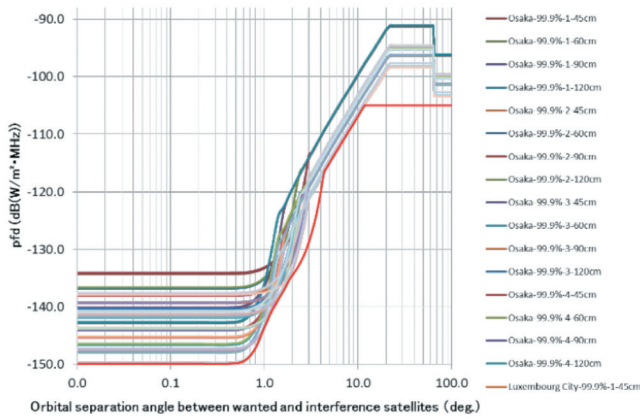
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C/N is selected among the various antenna diameters and modulation schemes.



(a) The pfd mask for the 12GHz band BSS (Radio Regulations, AP30, Annex 1, Section 1)



(b) The pfd mask for the 21GHz band BSS (Radio Regulations, Resolution 554)

Figure 1: The pfd masks for BSS

However, it is not suitable to intuitively understand how these parameters degrade the quality of services. In this paper, we propose to evaluate the impact of interference on the performance of BSS (Broadcasting Satellite Services) in terms of the increase rate of the outage time caused by the rain attenuation.

This study is useful for the BSS satellite design, especially to estimate the service availability under the interference environments. The usage of BSS is regulated in Radio Regulations and it was originally assumed to have a geostationary orbital separation of 6 degrees. However, nowadays due to the increase of the BSS demand, the BSS has to share its spectrum with a smaller orbital separation. Therefore, the evaluation of impact of interference is inevitable and important. In ITU-R a frequency sharing condition is recommended that the aggregate inter-network interference should be responsible for at most 10% of the time allowance for unavailability [2].

In order to evaluate the impact of interference on the performance of BSS in terms of the increase rate of the outage time, we have studied the relations between the degradation of C/N , $\Delta T/T$, I/N , C/I and the increase of outage time caused by the rain attenuation as well as the increase rate of the outage time by using the Rec. ITU-R

P.618 for the Japanese BSS in the 12GHz band with several different link margins (the difference between the receiving C/N under clear sky and the required C/N).

The outage time varies depending on the required C/N , the link margin and the receiving location (rainfall rate). Some simulation results and consideration are shown for the relation between the link margins and the increase of outage time, the increase rate of the outage time, and also the allowable interference in terms of C/I and $\Delta T/T$ values satisfying a certain increase rate of the outage time.

Calculation Method for Impact of Interference

The mechanism of the outage of satellite broadcasting caused by rain attenuation is shown in Figure 2. The subscripts c and r indicates clear sky and rain, respectively. The carrier (wanted wave) attenuates by the atmospheric absorption $L (= C_c - C_r)$. When the attenuation of atmospheric absorption increases, then the antenna noise temperature also increases and results in the increase of total noise temperature of antenna and receiver from N_c to N_r . During rain, the impact of interference is added to degrade the receiving signal. If $C_r/(N_r + I_r)$ decreases below the required C/N , the outage of broadcasting would occur. In this paper, since severe interference occurs when the orbital separation between the wanted and the interfering satellites is small, then the atmospheric absorption including rain attenuation is assumed to be same for the wanted and interfering signals. Therefore, the C/I is assumed to be same under both clear sky and rain conditions, that is, $C_c/I_c = C_r/I_r$.

In this paper, the impact of interference is assumed to be treated as same way as the noise [3]. In [3], the relation between C/N and C/I was shown when the mixture of the noise and the interference gives no error for 10^{10} bit transmission (called as Quasi Error Free, QEF) under co-channel interference situation.

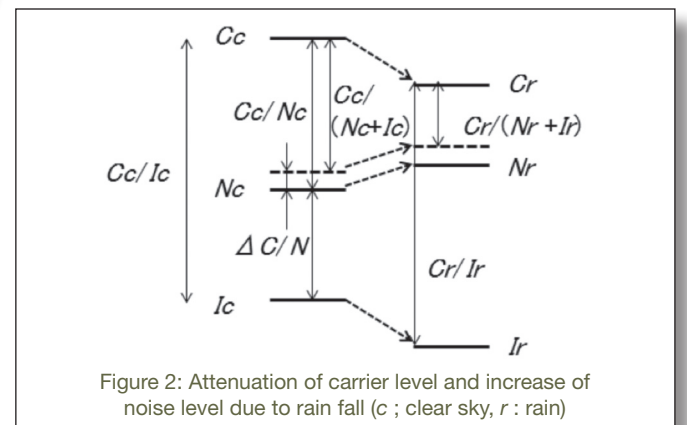


Figure 2: Attenuation of carrier level and increase of noise level due to rain fall (c : clear sky, r : rain)

The addition of the thermal noise power (N) and interference power (I), and the synthesis of C/N and C/I , which is resulted in $C/(N+I)$, is assumed to be obtained by the following equations in this paper.

$$N + I = -10\log(10^{-N/10} + 10^{-I/10}) \quad (1)$$

$$C/(N+I) = C/N \oplus C/I = -10\log(10^{-(C/N)/10} + 10^{-(C/I)/10}) \quad (2)$$

The operator $\oplus$ in Eq. (2) is expressed as the last term of Eq. (2). It is used in the interference calculation method.

The interference level is sometimes expressed in terms of $\Delta T/T_{sys}$ (%) (T_{sys} is the system noise temperature of receiver) and I/N (dB).

$$N = 10 \log (k T_{sys} B) \quad (3)$$

$$I = 10 \log (k \Delta T B) \quad (4)$$

$$I/N \text{ (dB)} = 10 \log (\Delta T/T_{sys}) \quad (5)$$

Here, k is the Boltzman's constant, B is the bandwidth and the $\Delta T = \sum T_i$ is summation of the noise temperatures converted from the interference powers by the interfering satellites.

The degradation of C/N , $\Delta C/N$, is defined and interrelated to the $\Delta T/T$ as follows.

$$\Delta C/N = C/(N+I) - C/N = 10 \log (T_{sys}/(T_{sys} + \Delta T))$$

$$= 10 \log (1/(1 + \Delta T/T_{sys})) = 10 \log (1/(1 + \Delta T/T_{sys})) \quad (6)$$

The calculation methods used in this paper for the propagation parameters in the satellite link like the antenna noise temperature, attenuation under rain etc. are shown in Table 1.

Table 1 Calculation methods for the propagation parameters in the satellite link.

Antenna noise temperature	Rec. ITU-R BO.790 $T_a \text{ (K)} = T_c \times 10^{(-L/10)} + T_o \{ 1 - 10^{(-L/10)} \}$
Atmospheric absorption, Rain attenuation	Rec. ITU-R P.676, P.840, P.618 ITU-R, Dynamic Link Library (DLL) for calculation of propagation losses for Earth to space (or space to Earth) transmission links [4]
Point rainfall rate in an average year, $R_{0.01}$	Rec. ITU-R P.837 For example, at Naha 76.56 mm/h

The increase rate of the outage time q due to the addition of interference can be obtained as the difference between the percentages of time p in which $C_r/(N_r+I_r)$ and C_r/N_r are lower than the required C/N . However, it is difficult to express the relation between $\Delta T/T_{sys}$, I/N , $\Delta C/N$ and the increase rate of the outage time q by equations. Therefore, they are obtained by link calculation in this paper.

$$q = (\text{Outage time with interference} - \text{Outage time without interference}) / \text{Outage time without interference} \times 100 \text{ (\%)} \quad (7)$$

Table 2 shows the example parameters used for the link calculation in this study.

Table 3 shows the link calculation for BSS in the 12 GHz band and the example of calculation results of the increase rate of the outage time q . The service availability (year) (%) of 99.803% and 99.762% in Table 3 corresponds to the condition without and with interference, respectively. In this example, for the link margin of 5.08dB (the difference between $C/(N+I) = 15.78\text{dB}$ under clear sky and required $C/N = 10.7\text{dB}$) and the interference level of $\Delta T/T=30.2\%$, $I/N = -5.2\text{dB}$ and $\Delta C/N = -1.15\text{dB}$, it is resulted that the increment of the outage time in a year is 218.8 min. and the increase rate of the outage time q in a year is 21.17%.

Table 2 Example parameters used for the link calculation.

Frequency	11.72748 GHz (ch1)	
Uplink C_u/N_u	36 dB	
Antenna pointing loss of receiver	0.3 dB	
Antenna efficiency of receiver	70 %	
Noise figure of receiver NF	1 dB	
System	ISDB-S [5]	ISDB-S3 [6]
Required C/N TC8PSK	10.7 dB	
QPSK1/2	4.8 dB	
16APSK7/9		12.6dB
Noise bandwidth B	28.86 MHz	33.7561 MHz

Calculation Results for Impact of Interference

In this section, some simulation results and consideration are shown for the relation between the interference $\Delta T/T$, I/N , $\Delta C/N$ and the increase rate of the outage time q . It is interesting that for a same link margin, which is defined by $EIRP$ (Equivalent Isotropically Radiated Power) of a satellite, pfd on the ground and the receiving antenna, whether the increase rate of the outage time q is constant or varies depending on the required C/N (modulation scheme) or the receiving location (rain attenuation).

The relation among the link margin, the interference level from other satellite networks and the increase rate of the outage time q is calculated by using the link calculation method in Table 3 and shown in Figure 3 for TC8PSK (Required $C/N = 10.7\text{dB}$) as shown in Table 2 at Naha ($R_{0.01} = 76.56\text{mm/h}$). The correspondence between the link margin and satellite $EIRP$ is given in Table 4. In Table 4, the link margin of 3.42, 5.08, and 6.59 dB, respectively, is not round figure, since it is derived when the EIRP is assumed to be 54, 56, 58 dBW, respectively.

It can be said from Figure 3 as follows.

- (1) The smaller the link margin is, the larger the increase rate of the outage time q is, since the small link margin means sensitive to the interference. For example, there is a large difference between the increase rate of the outage time q of 7.7% and 25.3% caused by the interference $\Delta T/T$ of 20% for the link margin of 6.59dB and 3.42dB, respectively.
- (2) The smaller the link margin is, the smaller the allowable interference level is, which gives a specified value of the increase rate of the outage time q . For example, there is about 5dB difference between the interference level $\Delta T/T$ of 8% ($I/N=-11\text{dB}$) and 26% ($I/N=-5.9\text{dB}$) which gives the increase rate of the outage time q of 10% for the link margin of 6.59dB and 3.42dB, respectively.

Table 3 Link calculation for BSS in 12 GHz band and increase rate of the outage time q (Naha)

	Clear sky	Rain	Interference
Orbital location of satellite	110 deg. East		
Receiving location	127.68deg. E, 26.23deg. N		
Satellite $EIRP$ (dBW)	56		
Receiving pfd (dB(W/ (m ² ·MHz)))	-120.9		
Total attenuation of atmospheric absorption L (dB)	0.1	2.9	2.6
Gas attenuation L_g (dB)	0.1	0.1	0.1
Rain attenuation L_r (dB)	0.0	2.41	2.14
Cloud attenuation L_c (dB)	0.0	0.38	0.38
Scintillation L_s (dB)	0.00	0.28	0.27
Diameter of receiving antenna (cm)		45	
Receiving power C (dBW)	-116.3	-119.1	-118.8
Antenna noise temperature (K)	50.0	159.6	150.8
Noise temperature of receiver (dBK)	21.0	23.7	23.5
Downlink Cd/Nd (dB)	16.8	11.0	11.4
$C/(Nu+Nd)$ (dB)	16.7	11.0	11.4
Satellite antenna XPD (dB)	27.0	27.0	27.0
Receiving antenna XPD (dB)	25.0	25.0	25.0
Interference from other satellite networks C/I (dB)	100.0	100.0	21.0
Total $C/(N+I)$ (dB)	15.78	10.7	10.7
Required C/N (dB)	10.7	10.7	10.7
Link margin (dB)	5.08	0.0	0.0
Service availability (year) (%)		99.803	99.762
Outage time (year) (min.)		1033.6	1252.4
Increment of the outage time (year) (min.)			218.8
Increase rate of the outage time q (year) (%)			21.17
$C/(N+I)$ with interference (dB)			14.63
$\Delta C/N$ (dB)			-1.15
I/N (dB)			-5.20
$\Delta T/T$ (%)			30.2

XPD : Cross polarization discrimination

Table 4 Correspondence between the link margin and satellite $EIRP$ (Naha, Required $C/N = 10.7$ dB)

Link margin (dB)	$EIRP$ (dBW)
3.42	54
5.08	56
6.59	58

(3) On the other hand, when expressing the interference level in terms of C/I , the allowable interference C/I to give the increase rate of the outage time q of 10% stays within a smaller range of about 2dB (23 to 25dB) than $\Delta T/T$ or I/N .

Next, the relation among the link margin, the interference level from other satellite networks and the increase rate of the outage time q is shown in Figure 4 for TC8PSK (Required $C/N = 10.7$ dB) as shown in Table 2 at Sapporo ($R_{0.01} = 36.71$ mm/h). The correspondence between the link margin and satellite $EIRP$ is given in Table 5.

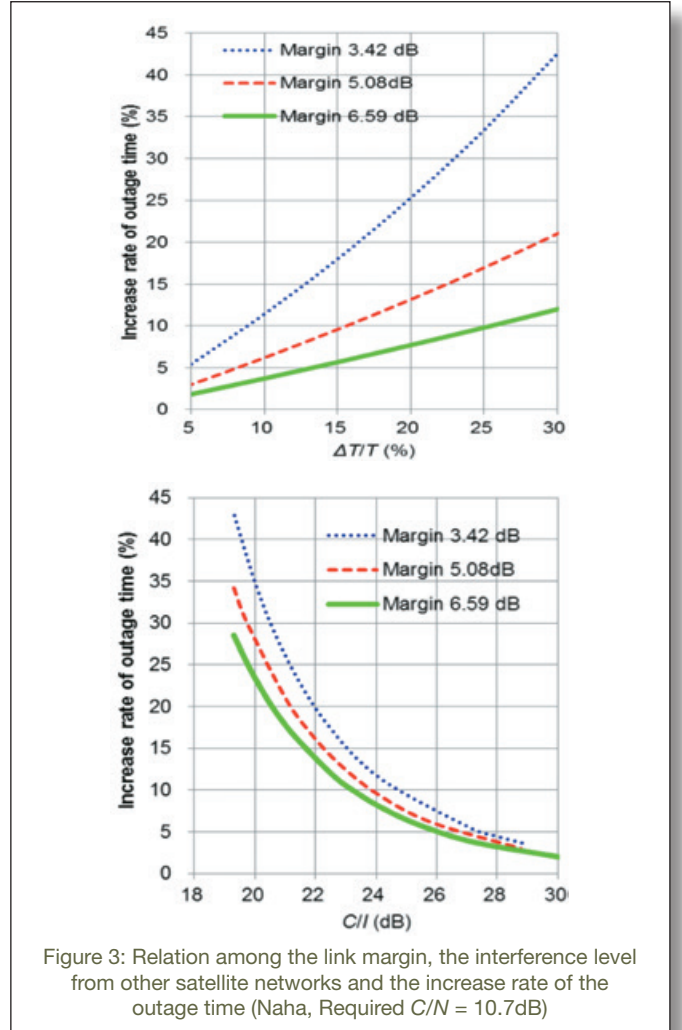


Figure 3: Relation among the link margin, the interference level from other satellite networks and the increase rate of the outage time (Naha, Required $C/N = 10.7$ dB)

Table 5 Correspondence between the link margin and satellite $EIRP$ (Sapporo, Required $C/N = 10.7$ dB)

Link margin (dB)	$EIRP$ (dBW)
3.42	54.4
5.08	56.4
6.59	58.4

It can be said from Figure 4 as follows.

- (1) Compared to Naha where the rainfall is large, at Sapporo where the rainfall is small, the increase rate of the outage time q becomes large when the link margin is small (3.42 dB).
- (2) On the other hand, when the link margin is large (6.59 dB), the increase rate of the outage time q is almost same as Naha from the viewpoints of $\Delta T/T$ and C/I .
- (3) When expressing the interference level in terms of C/I , the allowable interference C/I to give the increase rate of the outage time q of 10% becomes slightly larger than Naha, but stays within a smaller range of about 2dB (23.5 to 25.5 dB).

Furthermore, the relation among the link margin, the interference level from other satellite networks and the increase rate of the outage time q is shown in Figure 5 for 16APSK7/9 (Required $C/N = 12.6$ dB) as shown in Table 2

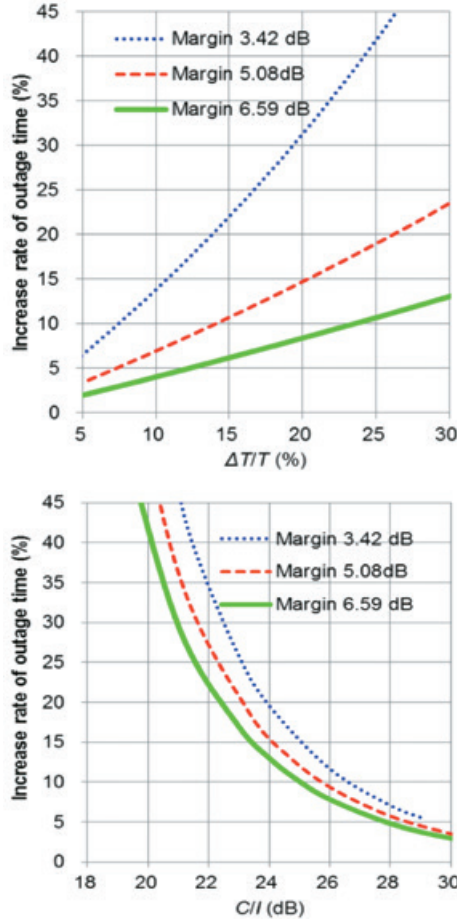


Figure 4: Relation among the link margin, the interference level from other satellite networks and the increase rate of the outage time (Sapporo, Required C/N = 10.7dB)

at Naha ($R_{0.01} = 76.56\text{mm/h}$). The correspondence between the link margin and satellite EIRP is given in Table 6.

It can be said from Figure 5 as follows.

- (1) The relation between $\Delta T/T$ and the increase rate of the outage time q is same as Figure 3 for the required C/N of 10.7dB.
- (2) On the other hand, the relation between C/I and the increase rate of the outage time q is same as Figure 3 for the required C/N of 10.7dB but shifted by about 2dB along the C/I axis, which corresponds to the difference of the required C/N.
- (3) When expressing the interference level in terms of C/I , the allowable interference C/I to give the increase rate of the outage time q of 10% becomes about 2dB larger than Figure 3, but stays within a range of about 2dB (25 to 27dB).

Conclusion

In this paper, we proposed to evaluate the impact of interference on the performance of BSS by the increase rate of the outage time caused by the rain attenuation. We studied the relation among the link margin, the interference level from other satellite networks in terms of $\Delta C/N$, $\Delta T/T$, I/N , C/I and the increase rate of the outage time for the

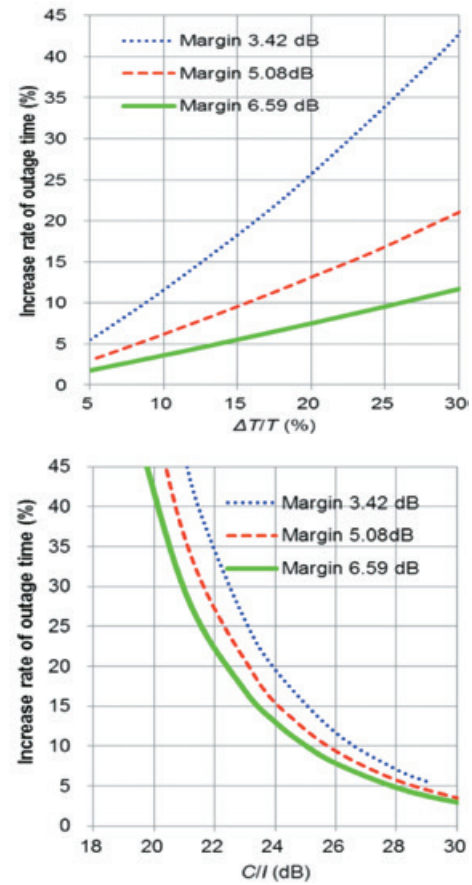


Figure 5: Relation among the link margin, the interference level from other satellite networks and the increase rate of the outage time (Naha, Required C/N = 12.6dB)

Table 6 Correspondence between the link margin and satellite EIRP (Naha, Required C/N = 12.6dB)

Link margin (dB)	EIRP (dBW)
3.42	56.3
5.08	58.6
6.59	61.0

satellite broadcasting in the 12 GHz band in Japan. The results showed the followings.

- (1) If the link margin is same, despite the outage time and the increase of outage time (or the service availability) are different among the different modulation schemes, the increase rate of the outage time is almost same.
- (2) The smaller the link margin is, the larger the increase rate of the outage time is, since the small link margin means sensitive to the interference.
- (3) When expressing the interference level in terms of C/I , the allowable interference C/I to give a certain value of the increase rate of the outage time stays within a smaller range than expressing the interference level in terms of $\Delta T/T$ or I/N .
- (4) The allowable interference C/I is almost same for different locations (rainfall rate in a year).
- (5) For different required C/Ns, the allowable interference C/I is shifted by about the difference of the required C/N.

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Kazuyoshi Shogen received the B.E., the M.E. and the D.E. degrees from the University of Tohoku, Japan, in 1977, 1979 and 1993, respectively. He joined NHK (Japan Broadcasting Corporation) in 1979. He has been engaged in research on broadcasting satellite system, especially on contoured beam antennas for Japanese direct broadcasting satellites since 1982 in NHK Science & Technology Research Laboratories. From 1988 to 1989 he was a visiting scholar at the University of Illinois, Urbana-Champaign. In 1998-2003, he worked in NHK Engineering Administration Department working with groups such as the ABU (October 1999 -), ITU-R (May 1995 -) and APT (December 1998 -). He retired from NHK in June 2011 and he is now in B-SAT. He was the chairman of ABU Technical Committee (November 2006 - October 2010) and was the vice chairman of the ITU-R SG6 WP6S (March 2002 - October 2007). He is an IEEE Senior Member and a Fellow of IEICE of Japan.

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Masashi Kamei received the B.E., the M.E. degrees from the Yokohama National University, Japan, in 1995 and 1997, respectively. He joined NHK (Japan Broadcasting Corporation) in 1997. In 2000-2005, he was engaged in research on satellite broadcasting systems in NHK STRL (Science and Technology Research Laboratories). In 2005-2010, he was engaged in standardization and deployment of broadcasting technologies in NHK Engineering Administration Department. In 2010-2015, he was engaged in research on satellite broadcasting systems using 21-GHz band in NHK STRL. Since 2015, he has been with Japan Telecommunications Engineering and Consulting Service and is engaged in international cooperation of using broadcasting technologies.

Susumu Nakazawa

Susumu Nakazawa received the BE and ME degrees in electrical engineering from Waseda University, Tokyo, Japan, in 1996 and 1998. He joined NHK from 1998. Since 2001 he has been engaged in research on broadcasting satellite system using phased array-fed antenna, on deployable reflector antenna for Electric News Gathering in NHK Science & Technology Research Laboratories. He received Young Researcher Award of IEICE in 2003. He is an associate editor of IEICE Transaction on Communications of Japanese edition. He is a member of IEICE, ITE and IEEE.

Shoji Tanaka

Shoji Tanaka received the BE and ME degrees in electrical engineering from Kumamoto University. He joined NHK in 1988. Since 1991, he has been engaged in research on phased-array antennas and broadcasting satellite system, especially on-board array-fed reflector antenna in NHK Science & Technology Research Laboratories. He is a senior research engineer of the laboratories. Beijing University of Technology in 1999 and EMBA degree from China Europe International Business School in 2012.

NHK Wins Engineering Emmy® Award Lauded for Contributions to Broadcast Engineering



NHK Science & Technology Research Laboratories (STRL) has become the first organisation in Asia to be honoured with the *Philo T. Farnsworth Corporate Achievement Award** of the 68th Engineering Emmy® Awards.

This award is presented to a corporation or organisation which has made outstanding contributions over many years in the broadcasting field. NHK STRL was cited for the development across several decades of pioneering technologies which have expanded the possibilities of broadcasting technology in Japan and all over the world.

Founded in 1930, NHK STRL has recorded many achievements in diverse research and development fields including Japan-U.S. relay broadcasting via satellite, direct satellite broadcasting services, plasma displays, and Hi-Vision and 8K (Super Hi-Vision) ultra-high-definition TV.

NHK STRL continues to perform a pioneering role in the development of broadcasting technology in Japan and abroad through such projects as the development of user-friendly broadcasting technologies and 3D television that can be watched naturally without special glasses.

The presentation was made in Los Angeles on Wednesday, October 26.

* The Philo T. Farnsworth Corporate Achievement Award

The Emmy Awards are presented annually by the Academy of Television Arts & Sciences for outstanding programmes and technologies and also to individuals who have made outstanding contributions in the field. The Philo T. Farnsworth Corporate Achievement Award in the Engineering division is named after the inventor of the world's first fully electronic television (U.S. patent application 1927). Established in 2003, it honours an agency, company or institution whose contributions over time have significantly impacted television technology and engineering.

Source: NHK Press Release on 7th October 2016

<http://www.nhk.or.jp/corporateinfo/english/press/index.html>

<http://www.emmys.com/news/press-releases/68th-engineering-emmy-awards-honorees-announced>

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ABU Technical Committee Meetings in Bali



Strategic Issues

This session was chaired by Mr Tharaka Mohotty, MTV-Sri Lanka and Vice-Chairman, ABU.



Five topics were addressed and summarised as follows:-

(i) HDR, WCG, UHD TV and HFR Presented by Dr Narichika Hamaguchi, NHK-Japan.

Dr Hamaguchi first highlighted the key considerations of developing UHD TV. Apart from resolution were colorimetry, frame rate, dynamic range of intensity, bit depth and sound. He then emphasised that there should be different workflow and focus, tailored to different types of production; i.e. studio production, outside production and post production. Finally, an example using Sony's Simul-Production was used to illustrate how a 4K HDR Broadcast and a 2K SDR Broadcast could be broadcast simultaneously in view of the practicality of limited resources.



Mr Tharaka Mohotty



Dr Narichika Hamaguchi

(ii) Digital Radio – WorldDAB & DRM

This was a joint session first presented by Dr Lindsay Cornell, representing WorldDAB and by Ms Ruxandra Obreja of DRM.



Dr Lindsay Cornell



Ms Ruxandra Obreja

Dr Cornell started the session by introducing the background of the DAB system and the need to review and simplify the standard. Key points regarding streamlining, simplification and necessary additions were elaborated. Describing the implications of implementation of the new standards, he pointed out the benefits of the updated software and rule enhancements related to DAB development. In addition he described the new task force for audio announcements, changes in the DRM+ spectrum mask as well as the minimum receiver requirement specification for DRM+.

Ms Obreja first introduced some key facts and benefits of the DRM standard. She elaborated in detail on DRM's suitability for large area coverage, migration from AM to DRM, energy saving and cost efficiency. In particular she illustrated the great opportunity for the local consumer electronics industry brought about by the requirement for chipsets and receivers. She also mentioned the status of installation of new models of DRM receiver by car manufacturers. Finally a short video was screened to illustrate DRM live transmission from RRI's MW transmitter in Denpasar.

(iii) ABU Digital Strategy

This session was presented by Mr Hamid D Nayeri, IRIB-Iran.

Mr Nayeri started by introducing the Technical Bureau's strategic focus to resolve the digital divide and assist in

speeding up the transition to digital. He then introduced a document which identified the specific aims based on issues raised by members. An activity matrix was shown, which identified the priority areas for members and how the secretariat could facilitate. Proposals for subsequent actions were also elaborated.



Mr Hamid D Nayeri

(iv) Devices for Evolving Media – FM Radio on a Chip

Presented by Mr Bob Plummer, Chair of WBU-TC & NABA-TC



Mr Bob Plummer

Introducing the world's first smartphone with digital radio, Mr Plummer illustrated how DAB+ service and Mobile Apps were combined to give the audience a new experience in enjoying radio programmes. He then presented the status of global standardisation of an open API for smartphones.

(v) Human Capacity Building

Presented by Ms Chrissie Tucker, ABC-Australia

Addressing the gender diversity issue in the broadcasting industry, Ms Tucker first described the historical background of women in non-traditional occupations related to technological roles, including in broadcasting, as well as the recent changes over time towards equity in employment opportunities. She then gave a comprehensive analysis of the benefits of having a gender balance and challenges encountered in the work place during such implementation. A number of solutions to promote gender balance were raised, with implementation approaches discussed.



Ms Chrissie Tucker

(vi) Broadcast Technology Research Scheme for ABU 2017

Presented by Mr Toshiaki Hara, Senior Manager, NHK



Mr Toshiaki Hara

Mr Hara started by introducing different technological areas of the NHK STRL Research Division. The guidelines applied to the research scheme were elaborated with the participation records of past 16 years demonstrated. Finally Mr Hara presented the theme of the scheme for ABU2017, i.e. MPEG media transport (MMT).

Members' Present



This session was chaired by Mr Hamid D Nayeri, IRIB-Iran and Vice-Chairman, ABU Technical Committee

(i) Transmission System of KBS

Presented by Mr Min-Jun, Yoon, KBS-Korea

Mr Yoon first introduced the operational characteristic and system concept of the TV Master Control Room (MCR). Illustrating with block diagrams, he gave an overview of the transmission system structure used in the MCR and the baseband system. In addition, he described the role of Application Programme Control (APC) and elaborated on the 3-tier system within the APC structure. Finally issues related to standard, interface and new services in the future 4K MCR were briefly addressed.



Mr Min-Jun, Yoon

(ii) Closed Captioning NGB

Presented by Dr Peter Siebert, DVB-Switzerland



Dr Peter Siebert

of related documents in February 2017.

The status of subtitle specifications in DVB was briefly updated during this presentation. Dr Siebert elaborated on DVB's work to define bitmap based subtitles for SD and HD resolutions as well as a future specification to support UHD resolution. He also invited the ABU TC to provide comments and revealed the target for publication

(iii) Eutelsat One-Stop Global Video Distribution

Presented by Mr Ken Loke, CCO of Eutelsat-Asia

Mr Loke gave an introduction on Eutelsat Asia's company background, its service types, coverage, value proposition, company assets and target customers. Presenting his views on the growth and direction of video services, he highlighted



Mr Ken Loke

some innovation in one stop solution and other service features that a service provider should focus on. Finally he described the recent development of Smart LNB as a key enabler for DTH package, its application and working principles.

(iv) HDR for Developing Countries

Presented by Dr Fares Lubbadah, SpaceTech-Jordan

Starting with a technical comparison among SD, HD, 4K and HDR, Dr Lubbadah explained the basic concept of High Dynamic Range and Extended Image Dynamic Range Television. He also illustrated the advanced features of the HDR image as well as introducing the ITU-R BT-2100 Recommendation. In addition, a comparison between Dolby Vision and HDR-10 was highlighted while the implementation status of HDR was briefly updated. Next he explained the current problems and limitations confronting the implementation of HDR, HDR standards and broadcasting of Dolby Vision along with HDR. Finally the HDR technologies developed by Technicolor were briefly covered while the status of HDR broadcast in the BBC and NHK, as well as developing countries, was described.



Dr Fares Lubbadah

Networking with Technical Liaison Officers (TLOs)

Chaired by Mr Nadeem Ahmed, Head of Studio Technology and Training of ABU



Mr Ahmed invited the TLOs to give comments and feedback in terms of ongoing communication with the ABU.

(i) The TLO representative from DDI (India) queried the ABU's status for organising a survey and getting support from the international community on emergency wake-up systems under DVB.

Mr Ahmed commented that each country had specific requirements, while equipment vendors such as Harmonics and Harris would incorporate specific functionalities in their equipment to address the need.



(ii) The TLO representative from TRT (Turkey) asked if member organisations needed assistance from other broadcasters on 4K production, whether they should contact the broadcasters directly or through the ABU.

Mr Ahmed indicated that such experience sharing among broadcasters could be achieved through the workshops organised by ABU or EBU. Dr Amal Punchihewa supplemented that panel discussions could be organised across different regions to cover topics related to new initiatives.

Keynote Presentation

Mr Tomohiro Saito presented a host of recent developments at NHK, Japan. This covered such diverse topics as UHDTV-2 at the Rio Olympics, with test broadcasts by satellite and terrestrial means, production workflows in 8K and looking forward to "smart production" for the Tokyo 2020 Olympics; sign language developments for hearing impaired audience, including automatically generated animations and plans to add this service to the IBB (integrated broadcast broadband) service, and



Mr Tomohiro Saito

ultimately over the air; audio description, to help those with visual impairments to understand the content better, using metadata to generate audio description from stored information in text and synthesised voice.

Technology Debate – Embracing IP for Media Production

Dr Fintan McKiernan moderated the debate entitled “Embracing IP for Media Production”. The debate team consisted of following panelists.

Debate Team Panellists



1. Mr Masakazu Iwaki NHK-STRL, Japan, Chairman, ABU Technical Committee
2. Dr Peter Siebert Executive Director, DVB-Switzerland
3. Mr Bob Plummer Chair, WBU-TC and NABA-TC
4. Mr Naoki Kashimura Director of the Board, Ikegami
5. Dr Narichika Hamaguchi NHK-Technology Management, Japan

Dr McKiernan introduced the topic, explaining that things were changing and SDI, while excellent for SD, struggles in an HD, UHD, 8K world and so IP backbones will, by necessity, become dominant. With companies like iflix and Netlix coming into the market without investing in any equipment, being hosted in the cloud, the scene is changing very fast and traditional broadcasters are beginning to embrace IP for cloud based services and playout.

Dr Narichika Hamaguchi: NHK plans to move to 4K and 8K production more and more, leading to Tokyo 2020 and plans to build a new broadcasting house in Tokyo in 2025. We are looking at IP as the backbone, replacing SDI as the core infrastructure. There are questions: right now, IP based equipment is more expensive than SDI equipment, and the concern about cyber security is high - the costs could be considerable. Also, we will have both SDI and IP for a transition period, and so we will need conversion equipment. The goal is IP from camera to display, but this is not possible yet. We estimate the migration period will be costly. We are carefully watching standardisation – it is not yet mature enough for replacing all current SDI technology. Installing IP systems allows control and monitoring of remote site facilities, so there should be staffing savings – this is a benefit.

Mr Naoki Kashimura: From a manufacturer's point of view, we look at IP according to applications. SDI is established and SDI technology is available for 4K: it is mainstream for 2K. But IP has benefits for some applications, so SDI and IP will exist for some time in parallel. Once an IP platform is established, it has a lot of advantages in terms of remote production, multiple production streams, etc.

There are some main places for IP production standards e.g., AIMS (Alliance for IP Media Solutions), ASPEN (Adaptive Sample Picture Encapsulation). These are not compatible and are supported by different groups, some open, and some proprietary. In studio situations, SDI can be better because IP solutions are all using compression and therefore delays for coding and decoding. If SDI is used now, it can continue. Cable length for SDI is 70m or even 110m by UHD cable, and this is getting better, and is adequate for most studios.

Mr Bob Plummer: I'm sponsored by 21st Century Fox, so I can say a bit about the huge investment they are making in IP. The reason is multi-platform delivery of content – OTT ... TV and radio: radio is ahead on IP: CBC Canada operates 60 IP based radio centres. But cyber security is critical – there have been examples of break-ins and issues of stations going off-air. The North American broadcasters found that they had problems FTPing content among each other, especially around sports. So The Digital Production Partnership (DPP) is developing new standards. Training, retraining is essential and may be part of the expense of moving to IP. At Fox labs we have done research with consumer IP routing equipment and so on and many times they work well if not overloaded. Issues with noise, especially from PSUs, but with some changes they can be made better.

Dr Peter Siebert: IP in the studio is not my field of expertise, but my office is next to the EBU and they are working very hard on this topic. There is great interest from European broadcasters about using IP. A trial was set up with VPRT studios in Belgium. The idea is to be more flexible, to share equipment, like vision mixers, between studios, and so on. Although SDI might be considered less flexible, it is standard and so interoperable. This is needed for IP to avoid vendor lock-in. It is anticipated that the move to IP will be paired with a move from hardware to software, and from CAPEX to OPEX, whereby the peaks and troughs are smoothed out by sharing facilities. Distances of up to 5km have been achieved, that means for some productions OB vans are not needed as the camera and microphones can be connected directly to the studio. One open aspect is seamless switching for redundancy and resilience. Another challenge is the skill sets of those in the studio. Also IP infrastructure has a very short payoff period, only 3-4 years. Measuring equipment is currently missing.

Mr Masakazu Iwaki: Cyber security and cost are key issues. In the telecoms industry there are moves towards cyber security issues and this we need to study. ABU TC will start work on cyber security. Timeframes for IP based issues are shorter than for conventional equipment, and this will impact our budget planning for broadcast technology.

Dr McKiernan: All broadcasters have equipment rooms with servers in them, IT servers, broadcast servers, playout servers. But in the future, these might all become merged in a data centre where only software defines the use of any piece of equipment. The CPUs will be standard, the interfaces will be standard, and you may have capacity in the cloud. One advantage of the cloud is that the versions of operating systems are dealt with by the partner and broadcasters will be able to concentrate on their business, not IT management.

Dr McKiernan: OK, let's open this out.

Dr Najim (Saudi Arabia): You asked if we have a choice or not? I say we have to have a choice. Smaller broadcasters may not be ready or have the skills for IP yet - this has been said by the panel: cost, skills, security issues, etc. Let's be careful! Maybe we need some warnings and guidance for broadcasters to help them understand better before launching into IP.

Dr McKiernan: Yes, you're right. Different broadcasters are at different stages, and bigger broadcasters are taking the risks. Later on smaller broadcasters will benefit from this. A lot of things are changing – only the tripods remain the same. Big broadcast productions will benefit from remote production, so the costs of moving large numbers of staff to events can be saved.

Dr McKiernan: You can rent services in the cloud and this can be very flexible. Amazon services are excellent in terms of granularity of what you have to pay for.

Dr McKiernan: Interestingly, these cloud providers are not traditional broadcast providers: the cloud provides computational rental and storage. Both are likely to become more cost effective in the future. We are starting to see operators not charged for retrieval, so this helps: the market is very competitive if we enter this world with greater open standards and fewer standards.

Mr Sharad Sadhu: Why are we doing it? Why are we moving to IP? Traditional broadcasters are rapidly becoming content producers, losing the dominance in distribution. And this favours IP production. Secondly, we are encouraging broadcasters to use the cloud, but this means we already need to make sure that security is constantly monitored and enhanced. I encourage work that allows all broadcasters to travel the road to IP.

Mr Egiff (TRT): TRT are planning for 4K production facilities, and need to decide on infrastructure for this. At the IBC, there were so many conflicting views and information that the situation makes life hard! Discussion in the ABU helps, and it is good to know that the issues are quite common.

Dr McKiernan: An IP interoperability booth will be set up at Broadcast Asia next year to allow us to find out what works, what doesn't work and so on. The manufacturers may not like it, but we need to know what the status is right now.

Mr Jocoba (RRI): How do you plan to make high quality standardisation with IP basis? And Bob, what cyber security is used by American radio?

Dr Narichika Hamaguchi: NHK are only beginning study on cyber security. Basics are dividing networks between production and other systems. Firewalls, and so on. But we think probably there is no extra security compared to other sectors.

Mr Bob Plummer: NABA will have a cyber security workshop/symposium in New York on December 1st.

Mr Hara (NHK): What is the timescale? Sports broadcasting needs audio, video and metadata. How will this be handled? How about the timestamps for exchange between studios?

Dr McKiernan: These are really low level questions. We have a lot of facilities for these things, it's covered but proprietary right now. And we need to have interoperability, but that's coming later. SMPTE 2021.

Mr Bob Plummer: SMPTE 2020 is significant here for interoperability.

Summary from Topic Area Chairmen

Transmission: Dr Narichika Hamaguchi presented the Topic Chairman's Report. He told delegates that the work programme had been revised. The frequency planning topic is extending to include satellite as well as terrestrial. The MMB topic is changed to have a wider scope too, to allow 8K and terrestrial changes. Projects 3 and 4 were integrated.

1. Frequency planning for digital broadcasting: This covers ITU activity, including experience of analogue to digital transition (ITU-R BT.2140); SFN planning, and so on. The situation reports for the ABU region were also reported: Japan – 4K and 8K test satellite broadcasting; Hong Kong – ASO 99% complete; and Indonesia – DAB+ launched in Jakarta.
2. Under this topic, information on 8K UHDTV field measurements by NHK were presented. In a 6MHz channel, 91 Mbps was received over 27km. 2x2 MIMO, 4096 QAM, dual polarised.
3. IBB and OTT. Studies in ITU-R: IBB and OTT are spreading and integration of IBB and OTT approaching, "Ginga" from Brazil has been added; live streaming for IBB: \$K streams over Hybridcast were down-converted from 8K material; standardisation of multimedia and CA: new standards produced ARIB STD B-62 (multimedia coding) and ARIB TR B-39 (CAS), also closed captions/subtitles requirements being drafted with items like internet integration, character sets, etc.

Capacity building: Tharaka Mohatty presented his Topic Area report.

1. Health and Safety in broadcasting: Reference standard being developed for all members, in production, management, fire suppression systems, news gathering (public access), RF hazards, etc.
2. Modern Broadcast Engineering Management: Help for members to help with new job categories and roles and providing HR information such as recruiting, selection, etc. Also budgeting, accounting, asset management, etc for operational help.
3. IT in broadcasting: Includes automation of archive systems, workflow management, and so on. Especially this will cover education and training for engineers in broadcasting to equip them for higher IP activities.

Spectrum: Due to absences, this topic was not presented. Amal reminded delegates that the three agenda items at WRC-19 on which the ABU will concentrate have been chosen. WRC-19 will be another tough meeting for the broadcast industry and ABU will do their best to represent members, but need their contributions.

Elections of Technical Committee Office Bearers

Amal introduced the election process and conducted the election with the help of secretariat staff.

The 18 members elected to the ABU Technical Bureau are Phoenix TV-Hong Kong, EAP-Sri Lanka, NBT-Thailand, TBC-Tonga, MTV-Sri Lanka, NHK-Japan, TPT-Thailand, TVB-Hong Kong, TBS-Japan, IRIB-Iran, KBS-Korea, DDI-India, Mediacorp-Singapore, RTM-Malaysia, TRT-Turkey, RRI-Indonesia, SBC-Saudi Arabia and RTPRC-China.

The new Bureau was elected with the above 18 members. Mr Masakazu Iwaki was re-elected as the Chairman of the ABU Technical Committee. The three Vice-Chairmen elected were Mr Tharaka Mohotty of MTV-Sri Lanka, Mr Lasantha Samaranayake of EAP-Sri Lanka and Mr Kong Bin of RTPRC-China. The Honorary Vice-Chairman from the host of the 2017 General Assembly, RTPRC-China is Mr Ding Wenhua.

Dr Amal thanked the members and scrutineers.



Record of thanks to TC Honorary Vice Chairman, RRI-Indonesia

The TC Chairman, Mr Masakazu Iwaki, thanked Mr Rahadian Gingging, the 2016 Honorary Vice-Chairman, for his contributions in ensuring the smooth running of the 2016 Technical Committee Meeting. On behalf of the ABU Technical Committee, Mr Iwaki presented Mr Gingging with a token of appreciation.

ABU Distinguished Service Award 2016

Mr Yasuto Hamada has been presented with ABU Technology's highest honor, the ABU Distinguished Service Award.

Mr. Hamada, President of NHK Gakuen (NHK Academy of Distance Learning), was recognised on the opening day of the ABU Technical Committee meeting at the ABU General Assembly and Associated Meetings in Bali, Indonesia.

The ABU Distinguished Service Award recognises outstanding individual achievements in, and contributions to, the broadcasting industry. During his 36-year career in broadcasting, Mr. Hamada has made significant contributions in the nationwide transition of terrestrial broadcasting from analogue to digital and also performed a leading role in the roll-out preparations for 8K Super Hi-Vision broadcasting.

Broadcasting has evolved from radio and television through HDTV, digital broadcasting, hybrid broadcasting and UHDTV with the endless incorporation of the very latest technologies. Television realised the human dream of viewing things happening in distant places and, with UHDTV, the newest technologies are now adding the extreme video and audio realism of not only ultra-high resolution but also HDR (High Dynamic Range), a wide colour gamut, HFR (High Frame Rate), and 22.2 multi-channel sound.

Japan commenced test 4K and 8K UHDTV broadcasts, in August this year, and further technical developments are advancing rapidly to be ready in time for the 2020 Tokyo Olympic Games. The evolution of broadcasting must continue in this manner to satisfy ever more human dreams.

Mr Hamada promised to continue working as a bridge between the Japanese broadcast industry and the broadcast industry in Asia and the Pacific.





ABU Engineering & Technical Awards 2016



The winner of the 2016 **ABU Developing Broadcasters' Excellence Award** was Mr Radeep Maharjan, Senior Technical Officer of the Association of Community Radio Broadcasters (ACORAB). Mr Maharjan won the ABU Developing Broadcasters' Excellence Award for his contributions to technical services of community radio in Nepal. Dr Frederik Ndolu, Member of Supervisory Board, Radio Republik Indonesia, presented the award to Mr Maharjan.



basis for terrestrial UHD broadcasting services. Dr Javad Mottaghi, ABU Secretary-General presented the award to Mr Doo-Hyung Kang, ABU Technical Liaison Officer, Korean Broadcasting System, who accepted the award on behalf of Mr Park.



Mr Byeong-Ryeol Park



The winner of the 2016 **ABU Broadcast Engineering Excellence Award** was Mr Tharaka Gajaba Mohotty, Director Engineering, MTV/MBC Channels Pvt Ltd and ABU Technical Committee Vice Chairman who won for his outstanding contributions to next generation broadcasting infrastructure development. Mr Masakazu Iwaki, Head of Human Interface Research Division, Science & Technology Research Laboratories, NHK-Japan and Chairman of the ABU Technical Committee presented the award to Mr Mohotty.

The winner of the 2016 **ABU Engineering Industry Excellence Award** was Mr Byeong-Ryeol Park of Korean Broadcasting System for his outstanding contributions to create the



The 2016 **ABU Green Broadcast Engineering Award** is sponsored by KOBA and there were two winners for the 2016 award, CCTV-China and IRIB-Iran.

CCTV-China won for exploration and innovation for Building the Green Data Centre in the area of Broadcasting and IRIB-Iran for the efforts taken to save energy demands for broadcasting.

Mr Youngseok Chae, Senior Engineer, KBS-TRI represented KOBA in awarding the award to Mr Zhuowei Huang who represented CCTV and to Dr Abbas Naseri Taheri, Advisor to IRIB President and Director General for International Affairs of IRIB-Iran.



The winner of the Best Article Award for 2016 was NHK-Japan for the article titled Automatic Generation System of Japanese Sign Language (JSL) with CG Animation of Fixed Pattern Weather Information authored by Mr Nobuyuki HIRUMA, Ms Makiko AZUMA, Mr Tsubasa UCHIDA, Mr Shuichi UMEDA, Mr Taro MIYAZAKI, Mr Naoto KATO, and Mr Seiki INOUE.

Dr Narichika Hamaguchi, Senior Manager, Planning Division, Engineering Administration Department, NHK-Japan accepted the award on behalf of the authors from Mr Rahadian Gingging, Director of Technology & New Media, Radio Republik Indonesia and ABU Technical Committee Honorary Vice-Chairman.



Nobuyuki HIRUMA



Makiko AZUMA



Tsubasa UCHIDA



Shuichi UMEDA



Taro MIYAZAKI



Naoto KATO



Seiki INOUE

The **First Commended Article Prize** was awarded to Mr Supatrasit Suansook of NBTC-Thailand for the article titled Digital Terrestrial Television in Thailand: Technical Aspects.

Mr Kachan Kannika of NBT-Thailand accepted the award on behalf of Mr Supatrasit Suansook which was presented by Mr Hamid Dehghan Nayeri, Director, International Technical Affairs, IRIB-Iran and ABU Technical Committee Vice-Chairman.



Mr Supatrasit Suansook



The **Second Commended Article Prize** was awarded to Mr Terence Yiu of Phoenix TV-Hong Kong for the article titled HD Broadcast Upgrade Project for Phoenix TV.

Mr Hamid Dehghan Nayeri presented the certificate to Mr Terence Yiu, Phoenix TV-Hong Kong.



Mr Hamid Nayeri presenting the award to Mr Terence Yiu

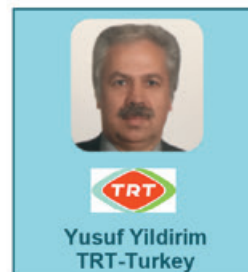
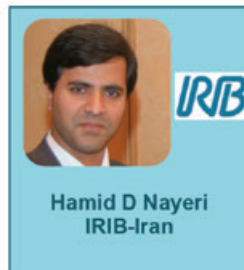
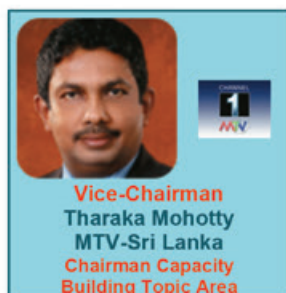
ABU Distinguished Service Award 2016

Mr Yasuto Hamada was presented with the ABU Technology's highest accolade, the ABU Distinguished Service Award. Mr Hamada, President of NHK GAKUEN (NHK Academy of Distance Learning), was recognised for his outstanding achievements and contributions by an individual to the broadcasting industry.



The ABU Distinguished Service Award 2016 was presented to Mr Tomohiro SAITO, Executive Research Engineer, Science and Technology Research Laboratories, NHK-Japan who accepted the award on behalf of Mr Yasuto Hamada.

ABU TECHNICAL BUREAU 2016/2018



Third ABU-AIBD Workshop on Engineering Fundamentals for Broadcasters

The third Regional Workshop on Engineering Fundamentals for Broadcasters was held in Kuala Lumpur from 7th to 11th November 2016. The workshop has taken recent developments in to account by incorporating sessions to impart knowledge on Information Technologies (IT) and Internet Protocol (IP) based services for media broadcasting. Another important aspect to note is that while the course was offered free of charge to AIBD and ABU members, respective organisations looked after the cost of travel and accommodation.



This year workshop was supported by ABU members Mediaprima and Astro with resource persons, also AIBD and ABU partners Rohde & Schwarz and Microsoft provided trainers.



Ms Ima from Mediaprima discussed HbbTV services and how IBB and OTT are integrated in their media services. Mr Vigna of Mediaprima described the design of their HD outside broadcast vehicle.



As a young and upcoming engineer Ms Ima shared her experience and knowledge as one involved in the design and implementation of these broadcast components. It was an valuable opportunity to share her knowledge. Ms Ima is very experienced in setting up HbbTV systems and she covered the software requirements, engaging a CDN operator, she also discussed about the necessary softwares required and how to set up critical services such as subtitling, EPG etc. This was very valuable for

participants. Similarly Mr Vigna who is involved in the design and construction of the latest HD OB van that mediaprima commissioned earlier this year shared hands-on design process and all the pit-falls to avoid in such designs. Also he shared

the design philosophy and preparation for IP integration in the future.



Mr Bala, General Manager of Engineering at Astro radio discussed about modern radio stations, radio studio and system design for the future. Discussion topics included, Radio Studios – Consoles, Automation Systems, Music Storage, Telephone system, Central Routers – Processing, Monitoring and Routing, Transmission: Transmitters, PIE, Combiner and Antenna, Audio for Online and Mobile, Processing for Online and Mobile, Production : Commercial Production, Electrical – Incoming Supply, UPS, Essential and Non-Essential, System Design for the future-Radio Studio Construction.

Mr Jude of Astro Radio shared the challenges in broadcast operation and maintenance management. In his his discussions he covered, Audio Monitoring – Studio, Pre and Post Processing, Off The Air, Smart Monitoring – Telemetry, Maintenance – Why it is important to upkeep facilities as well as Safety and Accidents in Radio Studios.

Basic engineering and technical concepts in media broadcasting and IT were discussed in training sessions. A number of young engineers who are embarking on their careers in modern media broadcasting benefited from the course. The workshop attracted 41 engineers and technical staff from 17 organisations representing 9 countries.



The 5-day workshop focused on relevant fundamentals of audio and video systems, evolution, current trends and possible future scenarios in a converged media world. The workshop also discussed cloud technologies, various services that a broadcaster is able to access and importance of up skilling and human capacity building in such areas. Some of the other topics covered included digital audio and video processing & transmission standards, its implementation and deployment as well as a look at complementing media platforms and evolving technologies.

This was one of a regular series of human capacity building activities of the ABU Technical Department that is conducted annually in November. The feedback from participants and trainers will be used to refine the 2017 training course.



Integrated Broadcast-Broadband (IBB) and Over-the-Top (OTT) Services:

Deployments and Progress in ABU Member Countries

abstract

The recent launch of what is called the red button for Toggle service of Mediacorp is a clear indication of the value of Integrated Broadcast and Broadband services. Toggle service was first launched in 2013 as a pure on-demand service in form of over-the-top (OTT) offering. In 2014, broadcasters in Australia launched Freeviewplus service in Australia based on HbbTV. HbbTV is an Integrated Broadcast-Broadband engine that enables high level of interactivity and ability to offer on-demand services as OTT through broadband. In 2015, New Zealand broadcasters joined the club by introducing Freeviewplus service in New Zealand. Especially public broadcaster TVNZ in New Zealand has observed improved viewership and audience, leading to increased market share. HbbTV can offer catch-up services complementing the broadcast services through online delivery using broadband. Such access serves the changing viewing habits of audience due to their busy lifestyles. HbbTV can also support pause and rewind functions. It can also provide recommendations and manage favourites and reminders. This has been proven in Australia and New Zealand. With strong local and other contents, Freeviewplus is proven to be robust against new entrants to their markets as OTT players. They will also operate HbbTV based services in terrestrial (DTT) and satellite (DTH). With the companion or second screen device operation, HbbTV services could meet the demands of current audience. All of these explain why Toggle wants to embrace HbbTV or in general any IBB engine, complementing its broadcast services through the Internet. A topic that has been discussed in many fora, is that that a pure OTT service has a poor profitability. Mediacorp may be able to achieve improved audiences through the seamless navigation that HbbTV can offer with high level of Interactivity.



Dr Amal Punchihewa
Director Technology & Innovation
of ABU
A Vice-Chair of World
Broadcasting Union Technical
Committee (WBU-TC)

Background

This article outlines how the broadcast industry, and especially the broadcasters in Asia-Pacific, are embracing HbbTV and other IBB technologies to offer hybrid broadcasting. It will also discuss how it helps to keep up with evolving viewing habits and media market conditions.

The article uses four case studies of deployments of IBB and OTT services in four countries in Asia-Pacific; viz. Australia, New Zealand, Singapore and Malaysia. Let's look at each one of them separately.

First, consider MediaCorp Toggle service in Singapore. Mediacorp is the national broadcaster in Singapore. It has the widest range of media platforms in Singapore spanning digital, television, radio, print and out-of-home media. Its mission is to engage, entertain and enrich audiences by harnessing the power of creativity. Mediacorp pioneered the development of Singapore's broadcasting industry, with the radio broadcast in 1936 and television broadcast in 1963. Today, the company has over 50 products and brands in four languages (English, Mandarin, Malay and Tamil), reaching out to virtually all adults in Singapore weekly. Mediacorp offers Channel NewsAsia International, drama co-productions and collaborations in magazine publishing and online media. Its investments include majority share in Kapanlagi Network, Indonesia's largest independent digital media and in Malaysia's digital games publisher Cubinet Interactive. It also has stakes in Reebonz, one of the region's fastest growing

luxury online retailers, and Vietnam television's International Media Corporation.

Toggle is Mediacorp's bilingual OTT service with entertainment and lifestyle content. Mediacorp claims that it redefines TV viewing altogether, going beyond the television set, offering a wide variety of local content options – catchup, Toggle Originals, live coverage of key events, behind-the-scene insights to viewers across multiple devices – computer, laptop, tablet, mobile phone, Smart TV and game consoles. The content can be accessed by logging on to www.toggle.sg or downloading the app on iPhone, iPad, Android devices, Smart TVs and Microsoft Xbox One [1].

Recently Toggle launched a new service that brings together live broadcast TV and its vast catalogue of video-on-demand (VOD) services into a single seamless environment. According to Mediacorp, the new service, called Toggle Red Button provides a huge leap forward in the free-to-air TV viewing experience. Users can access the service just by pressing the red button on the TV remote control, which will give them direct access to Toggle's library of programmes while watching Mediacorp's free-to-air TV channels, all on one screen. They will not need to switch between screens or search for apps. In addition, users no longer need to use recording devices or set top boxes and remember to record their favourite shows – they can watch them on catch-up through the Toggle menu in the TV environment.

According to the Mediacorp, some of the key features of the service are:

- I. Direct access to Toggle's vast catalogue of more than 12,000 hours of Mediacorp TV shows and Toggle Original content.
- II. A visually-rich Electronic Programme Guide (EPG), which provides programme information, synopsis and schedules of recent and upcoming programmes.
- III. Seamless integration of broadcast TV and catch-up TV content in a single interface, providing programme synopsis programme schedules and the ability to discover and play all the past episodes of shows content directly from the EPG, thus enhancing content discovery.
- IV. An interactive menu which provides access to catch-up news content from Mediacorp's news channels and programmes.
- V. Curated thematic streaming channels to serve audiences' specific interests.
- VI. In-programme viewer engagement, e.g. interactive contests.

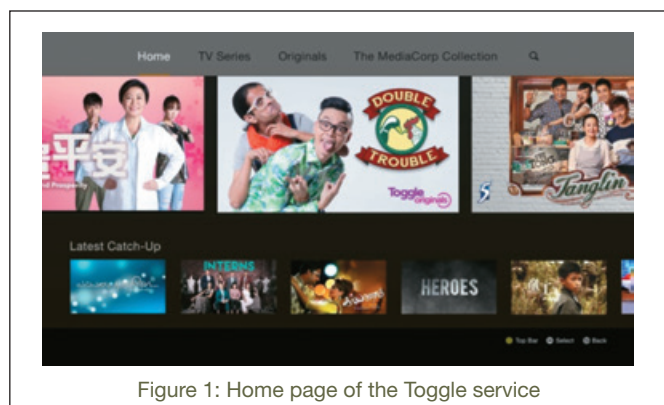


Figure 1: Home page of the Toggle service

According to Mediacorp, future developments will include services like stock quotes, personalised watchlists, voting and social engagement. Audience insights gleaned from the service will enhance Mediacorp's audience targeting solutions for its advertisers and clients. Mediacorp intends to bring a wide range of range of additional features that have planned for the service. Their consumers can look forward to new content and a new level of interactivity. Advertisers can also look forward to innovations in reaching their customers such as addressable TV features and transaction capabilities.

The Toggle Red Button service is based on an Integrated Broadcast Broadband (IBB) technology known as Hybrid Broadcast Broadband TV (HbbTV). The HbbTV technology has been widely deployed across Europe, Australia and New Zealand with adoption rates up to 80% in some markets and a range of services such as games, voting and contextualised advertising. Mediacorp, the company that runs Toggle, is the first in Asia to deploy HbbTV technology and developed the service in partnership with Finland-based HbbTV solution provider, Sofia Digital. The service is delivered on Mediacorp's Digital TV (DVB-T2) terrestrial network and seamlessly combines broadcast with broadband TV. Toggle Red Button is accessible via HbbTV-enabled Smart TVs that are certified for the Toggle Red Button service, and available on selected models by major TV manufacturers. The list of TV models that support the service have been available on www.toggle.sg. The service was commenced as a closed user group, with general availability opened at the end of June [2].

Toggle also allows uninterrupted viewing, allowing users to pick up from where they left off, from one platform to another. Toggle's content goes where the audience goes, allowing him or her to switch from watching on a PC to a mobile phone when person leave home. And with the wide range of content offered, from different channels and movies to original productions, viewers will have a lot to keep them toggling. Toggle is now

available on multiple platforms, including online, smartphones, tablets and smart TVs. Programmes from MediaCorp's free-to-air channels will be available to Toggle users, alongside the linear streaming of Channel NewsAsia.

Users can also subscribe to Toggle-It-First, a catch-up service, to watch the next five episodes of Mandarin local serials before they are aired on TV. Additionally, content can be bought on an a la carte basis, without having to subscribe to a basic bundle of programmes beforehand. Meeting the needs of today's viewer, who is a sophisticated one, expecting to access their favourite content selections without difficulty. Toggle offers this experience by allowing audience to choose the content they want, plus where and how they want to consume it [3].

Toggle was first launched in 2013 as a pure OTT service or a video on demand service. The disconnections and inconvenience of the early Toggle service could have been factors that it did not meet the expectations of audience. Linking traditional broadcast services to seamless access of content on demand may have been the key success factor. From a content point of view, the service includes direct access to Toggle's catalogue of more than 12,000 hours of Mediacorp TV shows and Toggle Original content as well as a visually rich Electronic Programme Guide (EPG), which provides programme information, synopsis and schedules of recent and upcoming programmes [4]

Freeviewplus of TVNZ, Māori TV and Media Works in New Zealand

In July 2015, TVNZ in New Zealand with other two broadcasters; viz. Māori TV and Media Works, launched HbbTV based Freeviewplus. For TVNZ's on-demand content, New Zealand state broadcaster, TVNZ partnered with Brightcove Inc., a global provider of cloud services for video to enable the delivery of a cutting edge Hybrid Broadcast Broadband TV (HbbTV) service. The service is powered by Brightcove's Video Cloud HbbTV solution, the new service, known in New Zealand as FreeviewPlus, seamlessly combines linear broadcast television with On-Demand online viewing. Two of key goals with FreeviewPlus were to deliver an engaging experience and an easy-to-use platform. It was also important to ensure viewers had a consistent experience across all delivery platforms.

Two other leading free-to-air television broadcasters, Mediaworks and Māori TV joined the project and they can potentially reach more than 3.6 million viewers around the country.

According to Brightcove, HbbTV is the future of free-to-air broadcast television, not only in New Zealand but worldwide, because of the amazing viewing experience that combines over-the-air TV with on-demand. Currently we have more than 22 countries that have adopted the standard.

As of December 2014, approximately 20 million television devices were compatible with HbbTV technology worldwide. HbbTV technology enables broadcasters to seamlessly stream on-demand content with a consistent user experience. Broadcasters are able to gain valuable insights into audience viewing analytics and monetise video content.

Viewers with FreeviewPlus-compatible TV sets or set top boxes can access more than 600 on-demand shows and movies, view a TV guide across multiple channels both eight days forward

and backward for catch up on demand content, and have the ability to search content by genre and title [5].

RTM Prepares for HbbTV & MediaPrima has Deployed HbbTV in Malaysia

Radio Televisyen Malaysia (RTM) plans to introduce Hybrid Broadcast Broadband TV (HbbTV) based services in 2016. As previously explained, HbbTV is a global initiative aimed at harmonising the broadcast and broadband delivery of entertainment services to consumers through connected TVs, set-top boxes and multiscreen devices. The HbbTV specification is developed by industry leaders to improve the video user experience for consumers by enabling innovative, interactive services over broadcast and broadband networks.

In the last 10 years, RTM has experimented with various platforms such as Multimedia Home Platform (MHP) to expand their digital broadcast offerings to no avail. According to RTM, with the help of Sofia Digital – an internationally recognized provider of interactive video and TV solutions from Finland – they found the answer with the HbbTV platform and started to run tests since earlier 2015 – all which resulted to positive outcomes.

Since then, RTM has been slowly developing the content for their new services and revamp their current online video-on-demand (VOD) service, 'MyKlik' to adapt into the HbbTV platform – including a news widget namely 'Superteks'. Among the features of HbbTV are multiple camera angles, with embedded picture-in-picture; user controlled information widgets on a TV display; interactive adverts; live and on demand streamed content and many more.

These will be part of the function of the Interactive Content Creation Centre (ICCC) at RTM. The head of ICCC believes that the HbbTV will take off with positive responses from everyone as the platform allows them to control their preferred content and enrich their viewing experience.

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Director Technology & Innovation of ABU A Vice-Chair of World Broadcasting Union Technical Committee (WBU-TC)

Amal graduated with BSc (Eng) Hons specialised in Electronics and Telecommunication Engineering from Sri Lanka, MEng from Technical University of Eindhoven, the Netherlands & PhD from Massey University in New Zealand. He has published over 100 scholarly articles (peer-reviewed technical journal and conference articles) in various journals including IEEE and IET digital libraries and transactions. He has held visiting positions at Tokyo University of Science (Japan) as a visiting associate professor and visiting professor. He was a Royal Dutch fellow of Netherlands and Japan Society for the Promotion of Science (JSPS of Japan). He has served on technical/programme committees, organizing committees and as track/session chairs for many international conferences. He advises on many International conferences including CCBN conference in China, BES in India and BCA in Singapore. Amal is a Senior Member of IEEE, Chartered Professional Engineer-CEng, Fellow of IET (UK) & Fellow of IPENZ (New Zealand).

Amal is currently Director Technology & Innovation at ABU. In that position, Amal drives innovation of media technology in the complete chain of media, starting from acquisition to consumption in the broadcasting industry. He influences the development of media technology in the best interest of ABU members. He leads a team of specialists, he facilitates technical guidelines and standards, and provides expertise related to the convergence of media, and evolving technical needs. He creates, encourages, and manages member communities, and understands and explains the trends that shape the media, to empower Members to continue to take good strategic decisions.

He ensures that the Department continues to be a vital and respected partner for its members and for the media industry. As a member of the ABU Headquarters Management Team, he also plays a major part in shaping ABU strategy.

Amal is active in many of the WBU-TC and ITU broadcast related technical activities. He is a vice chairman of the WBU-TC. He is an advisor to IET Vision and Imaging Professional Network having served as an executive of IET Vision and Imaging Professional Network.

He possess more than 30 years of experience in all three sectors of broadcasting: viz. Academia, Research and Industry in senior broadcasting technology and ICT roles, including research and developments, regional capacity building in media and head of engineering of national TV-Sri Lanka, having started his career in computer engineering.

ABU-AIBD-ASBU-WorldDAB Regional Workshop and Training on Digital Radio Broadcasting

The second regional workshop and training on Digital Radio Broadcasting was concluded with a great success. This year AIBD also collaborated with the training programme and provided the venue for the course in their training facility in Kuala Lumpur. The first regional training on digital radio broadcasting was organised by ABU in collaboration with ASBU and WorldDAB that was held last year in Kuala Lumpur, Malaysia to extend support to sister union Arab Sate Broadcasting Union (ASBU) in training.

Representing a wide range of countries, organisations and bridging the two regions, Asia-Pacific and Arab States, 35 participants from 11 ABU Member countries and 5 from Arab states attended the human capacity building event which spanned five days. Six resource personnel contributed to the course, which also included a field visit to the radio facilities of ABU member – Radio Television Malaysia (RTM).

The 5-day course aimed at imparting knowledge on state-of-the-art digital broadcast technologies, standards and services based on DAB, especially in delivery, having primary emphasis on current DAB+ technology. The course also discussed how radio broadcast organisations can explore hybrid technologies to offer evolving services. Participants also learned how to plan, design and implement a digital radio broadcast network.



EBU Technology & Innovation Update

Software Shows the Way

Simon Fell

Director of Technology & Innovation, EBU



In November, I had the pleasure of giving the opening address at our annual conference for software developers, EBU DevCon. It's the fourth time we've held this event, which is, in a way, at the vanguard of just about everything we're doing. Even if it doesn't yet attract the same number of attendees or the same levels of attention as our longer standing events like FORECAST or the Production Technology Seminar, there's no doubt that DevCon is a bellwether for public service media (PSM) organizations with regard to technology and innovation.

Software plays an increasingly important role in the lives of broadcasters, media companies and the consumer. Whether it is the recommendation engines that point you towards "a new television show you might like" or the apps that drive your smartphone addiction, software is at the heart of it all. It, more than anything else, is what enables us today to deliver exciting experiences that bring new ways to enjoy all the great content that we produce. It may even be able to predict the outcome of elections by utilizing big data and trawling social media activity – but maybe that is not such a good thing!

Through events like DevCon and the various EBU groups that are working on software, I have noticed that developers

like to cluster together for warmth. Their tendency to work together in agile and collaborative ways is starting to influence colleagues in other spheres for the better. In a way, the open sharing of the software development workload espouses the best principles of organizations like the EBU and the ABU, building bridges and breaking down barriers to communication. By working and sharing together we can achieve so much more.

One of the things that came through loud and clear at EBU DevCon 2016 was that broadcasters are once again becoming engineer-driven companies, having generally been seen more as purely content houses in recent years. While they remain far below the 80% engineers that compose the staff of a company like Netflix, changing patterns of distribution and consumption are leading to software-driven changes throughout the broadcast production and distribution chain.

More and more broadcasters are realizing the value of maintaining in-house development teams. Among this year's DevCon participants were software developers from fourteen different EBU Members, as well as many others working as external collaborators. To quote the winner of this year's Nobel Prize for Literature, the times they are a-changin'!

UPCOMING EVENTS

We are always happy to welcome ABU Members to our technology-focused events in Geneva. Make sure you check the list of EBU Associate Members to see whether your company qualifies for discounted registration fees. (See: www.ebu.ch/about/members)

Production Technology Seminar 2017

24-25 January

tech.ebu.ch/pts2017

There are few events that offer the same breadth and depth of coverage and analysis of recent and future trends in media production technology. PTS is consistently our most popular annual event. This year's keynote speakers include Al Jazeera's Director of Technology Solutions and Integration, Miljenko Logoazar. We're also looking forward to a special screening of the BBC's wonderful series Planet Earth II in UHD and HDR.

Digital Radio Summit 2017

8 February

tech.ebu.ch/radio2017

Each year we host a week of events dedicated to digital radio. It's centred around the Digital Radio Summit, a day-long examination of all of the current trends and challenges facing the industry. Also on the agenda during the week are our RadioHack workshops, plus meetings of the RadioDNS and WorldDAB associations.

And more...

Also on the agenda in the coming months are a Media Cyber Security Seminar (21-22 February 2017) and BroadThinking (11-12 April 2017), which is our annual event focused on the crossroads of broadband technologies and broadcast distribution. You can find information on these and all of our events at tech.ebu.ch/events.



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Kazakhstan Television Industry: Current State and Problems of Development

introduction

According to TNS, 99% of households in Kazakhstan have at least one television receiver (TV); 24% of households have two TVs, and 5% - more than three TVs [1]. The case study indicates that television remains the most popular form of media among the citizens of Kazakhstan [2]. According to the Committee on Statistics of the Kazakhstan Ministry of National Economy, the share of Internet users (including mobile Internet users) aged 6-74 years is 72.9%; 16-74-year category reaches 77.2% of total population in this age category. The share of computer users (from the whole population aged 6-74 years) reaches 74.2%, where 16-74-year group takes 77.2% [3].



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Due to the fact that the bulk of media content, including Internet, is produced by the channels, it becomes quite obvious that TV rather than any other media plays a major role in informing and entertaining population in Kazakhstan. At the same time, there is a steady trend toward the growth in the number of Internet users, which is a consequence of new opportunities offered by the Internet. Among those there is ability to create their own content, to organise non-linear broadcasting and to have access to the Internet from mobile devices. As a result, growth in services provided by the Internet, allows the experts to raise the issue of the end of the TV era in near future [4].

Apparently, high consumer demand for television productions, its importance in terms of national information security, as well as impact on the formation of national identity make the goals of improving competitiveness of Kazakhstan's television market media services transfer from private business to the strategic interests of the state. In this regard, the features of state policy gradually gains specific relevance. Finding an answer to this particular question has formed a basis of analytical research, the results of which are described in this article.

Throughout the history of television development the most active issues related to the media business have been studied within Western academic schools. Great attention to the field of media management is traditionally paid to American researchers, where media environment has been researched for decades. In post-Soviet states this area of research has been neglected for a long time. Early studies were primarily focused on exploring foreign experience and its implications in domestic realities. Basically they were papers written by Russian researchers, covering Russian topics. Nevertheless, this kind of research is more appropriate to understand Kazakhstan reality, rather than through the Western scholars. It is linked to specifics of media space organization on the territory of both states, especially television audience and so forth.

In general terms the entire array of Russian studies in the field of media can be divided into the following groups of research, where i) media management of the enterprises is

evaluated through the prism of its adaptability to specific conditions of the market economy; ii) social and psychological aspects plays a major role in the study; and iii) problems of media are shown in the context of journalism. Unfortunately, the topic to improve management of TV companies' innovative activity, as well as to attract investments in TV industry, has not been properly researched and discussed. Despite the significant role that television plays, there are very few academic researches on television development, both problems and prospects of the TV industry. As a rule, Kazakhstan authors are exploring television industry through the prism of journalism and linguistics theories, while at the same time there is a deficit of research, related specifically to the management of the television industry. All the materials, displayed public policy issues in the direction of TV development in one way or another of television, has journalist nature rather than academic research.

Methodology. The ideas of neoliberalism set a basis of the applied methodology of the study. In particular, the author in analysis of sources proceeds from the understanding of the media sphere in Kazakhstan as the competitive environment, subject to the laws market economy. At the same time the importance of the state in the regulation of Kazakhstan media market is beyond doubt. On one hand, the presence of the state is expressed in its performance both as an arbitrator and actor with regulatory and control functions. On the other hand, government plays a role of independent media player, who generates information, provided as part of the broadcast through the mechanisms of the state order either by their own media structures or commercial media enterprises. Among neoliberalism theorists the views of Ludwig Erhard and Clayton Christensen theory of disruptive innovation have large impact on interpretation of the processes, taking place in the media sphere in Kazakhstan. Content analysis of regulatory legal acts, secondary analysis of sociological surveys, observation, generalization and description are the main methods of research.

Study Results. Today 111 local channels are officially registered on the territory of Kazakhstan, 24 of which are countrywide and 87 regional. There are 4 channels in Akmola, Almaty and Pavlodar regions, 14 in Almaty, 4 in

Astana, 5 television stations in Aktobe region, 3 in Atyrau, 6 channels in East Kazakhstan and Kostanay region, 1 channel in Zhambyl region, 2 channel in North, West Kazakhstan region and Kyzylorda regions, 13 TV channels in Karaganda region, 19 television stations in South Kazakhstan region [5]. There are 254 foreign TV channels also present in Kazakhstan media environment [6].

According to the monitoring of volumes of different media audience, television continues to hold leading positions in demand among the population of Kazakhstan [2]. At the same time three-year polls indicate low, but still positive trend in this direction. The popularity of TV is caused by its universality as a source of both information and entertainment. In conjunction with high level of demand, the strength of information influence of television today cannot be compared to any other type of media. At the same time, Kazakhstan modern television industry is facing a number of challenges, which can be roughly described as *social, economic and professional*.

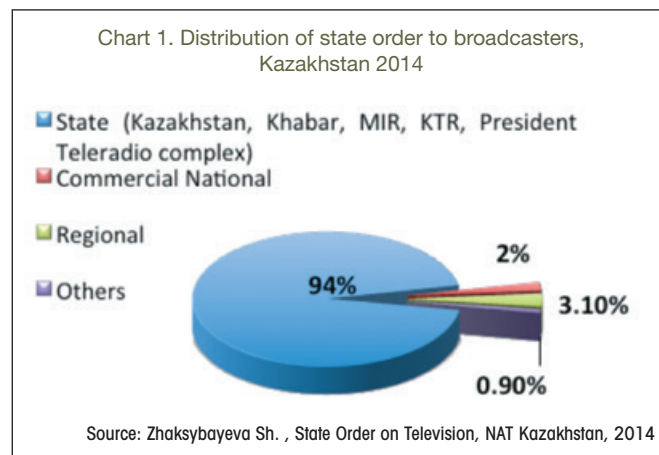
Social Issues. Sociological and market research records serious differences in practices of media consumption among different age groups. Emerging forms of viewing information and entertainment content have led to a reduction of TV consumption among young people. In this regard the reduction of the television audience is referred to 17-24-year group. With regard to children and teenagers, their share is correlated with the proportion of adults. At the same time, we can speak about complete exclusion of young audience from the lists of TV products; moreover, consumers more tend to reduce the frequency of television viewing. Older groups are still highly involved in television viewing. The motivations of TV consumption are different in young and old age groups. The older the person, the more he turns to television as a source of information, and, on the contrary, the younger - the higher is the demand for entertainment content. And here lies one of the reasons for the decrease of TV popularity among young people. Entertainment content begins to lose due to variety of formats, which Internet and new media provide. This trend shows that the level of demand for traditional television will soon decline.

Another point, which attention should be paid to, is the development of Kazakh-TV content. Expanding the area of Kazakh language application, in general, it has not yet led to significant qualitative changes in developing information products in Kazakh language. Kazakh content still does not meet all needs of the audience. As a rule, Kazakh-TV product consumers have expressed similar complaints about the Kazakh language content. Summing up key proposals put forward, they can be highlighted as the following:

- Improve the quality of dubbing and interlinear translation into Kazakh language as the claims primarily relate to improper use of words, excessive complexity of translation, use of compound terms, unknown to wide audience, unnecessary invention of new words;
- Produce more domestic TV series, films and documentaries;
- Move away from the massive use of 'tracing paper' of Western or Russian formats to produce more original programmes and broadcasts;
- Information products in Kazakh should not be derived from the content in Russian; it has to comply with its own logic of development. [2]

Economic Issues. The main components of Kazakhstan television revenues include state order, advertising and

subscription fees. Globally channels receive significant share of income by selling their own content to other transponders. In Kazakhstan, this type of income has not received its proper development. Besides the television industry is developing abroad and by attracting foreign investment, it is also not typical for Kazakhstan.



According to the experts of National Association of Broadcasters, in 2014 state orders for broadcasting companies reached 38.5 billion KZT [7].

Among state Tele-radio complexes the major TV channel beneficiaries are 'Kazakhstan', followed by 'Khabar', 'President Tele-Radio Complex', and 'Mir'. Regional akimats play crucial role in the process of state order placement among private companies. In this regard state policy in the field of state order says that all that has been created within the state order must be taken into account, registered in the content base, created with a state order, and gratuitously distributed to all Tele-Radio complexes throughout Kazakhstan in compliance with the terms of the broadcast.

In addition to TV channels that are freely accessible and disseminated by national operators [8], the *pay-tv* market is gradually expanding in Kazakhstan. In particular, it is expected that in 2012-2017 the penetration of pay-tv services will increase from 24% to 52% [9]. 2Day Telecom's experts also predict growth of the market of paid services to the end of 2017 to 52% [10]. Despite the fact that the cable TV market in Kazakhstan represents about 99 cable operators [11], the main players are only four, who constitute competing quartet. ALMA-TV, which occupies a large part of the market (about 42%); 'Kazakhtelecom' with 32% of the market; OTAU – 10% and ICON with 5% of the market. Issues, specific to pay-tv segment, are consequences of its small capacity. In the future, until 2017 the market will keep steady growth of more than 20% per year, and at the end of that period it could reach 241 USD million. At the same time the monetary expression of the market services sector in Kazakhstan is directly dependent on the volatility of the Tenge. In addition, there are additional factors that could negatively affect the pay-tv market. Firstly, market development can be suppressed by government regulation and the development of DVB-T2 standard, which is quite unreal. The second is the decline in purchasing power of subscribers.

The largest source of the revenue in TV industry, without regard to government funding of public television and radio channels, is advertising. International Media Service

conducted a survey, which showed that in 2015 the television advertising market in Kazakhstan amounted to 22.4 billion KZT, including VAT, with decrease by 6% in comparison to 2014 (a decrease of 24% in USD). [12] Many experts agree that the main factors influencing the advertising market volumes are deteriorating macroeconomic indicators. At the macroeconomic level changes in global economic conditions and sharp decline in prices for the main export commodities seem to be the main challenges for advertising market of Kazakhstan. In addition to advertising budgets the volume of GRP-points and advertising hours were also reduced in 2015, which has become the first ever time since 2009 crisis.

Law “On Advertising” [13] and, in particular, the amendments to the Law “On Broadcasting”, adopted at the end of 2015 regulate the structure of TV consumption market. In accordance with the amendments, which shall enter into force, there is a ban on advertising to retransmitted TV channels. In particular, the new edition of Article 34 of the Law “On Broadcasting” provides the following:

1. “Retransmission of TV, radio, television, radio programmes performed without modifying content, unless otherwise provided by the agreement between the operators of broadcasting and TV, radio companies (copyright), and except for cases provided for in this article.”;
2. “Operators of broadcasting when retransmitting foreign television and radio channels on the territory of the Republic of Kazakhstan shall prevent the spread of advertising.” [14].

The new version of the law primarily affects the interests of advertisers, cable network operators, media agencies and TV channels. The main objective of introducing amendments to the legislation is to reduce the outflow of advertising media outside the country and redirect financial flows circulating in the advertising segment in the direction of the Kazakhstan aired television. Expert opinions on the effectiveness the measures taken are divided and are largely dependent on affiliation of the experts themselves. E.g. representatives of cable operators suggest that the obvious benefits of innovations for the media market are not visible. Advertisers are likely to be looking for audience at other venues. They would reallocate budgets and focus on Internet. The expected return of money to air TV is not going to happen. This conclusion follows from the experience gained in their time in Russia and Ukraine.

Representatives of specialised public organizations have expressed skepticism about the improvement of air television in Kazakhstan. According to them, the advertiser will increase the amount of advertising on air TV channels only in case of real improvement of content quality and its presentation. At the same time, the money allocated by the state order, does not contribute to improving the quality of air television production. Media agencies have also expressed skeptical attitude towards prospects for advertising sector in air television with domestic advertisers more likely to freeze advertising activity. [15]

Professional Issues. The problems in professional sector may be the result of both objective and subjective factors. The objective factors are an insufficiently capacious consumer market, which reduces the return of products. The subjective ones include mainly human resources. In general, professional nature of the problem is as follows:

- *Unoriginal content.* The main problem of Kazakhstani TV

is the quality and quantity of its own content. TV channels have been criticised for duplication of subjects from foreign TV programmes (mostly Russian), unwillingness or inability to create their own original programmes;

- *Lack of local content.* In Kazakhstan, there are requests to create more domestic series. Moreover, despite the low level of demand, it is a national interest to develop our own educational programmes;
- *Insufficient trained journalists.* Kazakhstani people always complain about the lack of high qualified journalists, both locally and on national television. As a result of reporters' incompetence there is poor quality, uninteresting presentation of materials, lack of investigative journalism, etc.;
- *Bias when submitting news.* In this case the question is about the criticism of practice, when Kazakhstan TV channels and media suffer impartiality of presenting information. Kazakhstani people attribute this, on one hand to the fact that most of them are funded by the state. On the other, as noted above, it is due to the lack of professionals, who superficially present information, and sometimes deliberately distort it for the sake of high ratings;
- *Insufficient number of sectoral channels.* Such claims to Kazakhstan television industry are typical for young people aged 18-24 years, who noted the lack of specialised popular science, legal, news channels similar to foreign branch ones.

Prospects for Domestic Television Development. State policy.

State vision of the prospects for Kazakhstan's media segment development is reflected in a number of policy documents [16-17]. Above all of them is “Information Kazakhstan-2020” state programme. In accordance with the provisions of this programme, the main objective of the domestic media industry is its modernization [18]. These goals are set by the process of transformation of social relations in a global information age. The section relating to the modernization of Kazakhstan's media emphasises the competitive nature of the environment, where domestic media operates. One of the main rivals to national players is foreign media. In this case current situation seems to be a result of deliberate and conscious state policy. And since independence, the information space of the Republic of Kazakhstan has been open to foreign mass media.

As a result, the government has established certain conditions that are acceptable to the progressive development of its own media industry. Among those, there is logistical base, such as a national satellite system, operating since the end of 2010. Another example can be “Kazmedia Ortalygy” TV-radio complex (established in 2012), which is a unique business model for Kazakhstan market. The objectives of this complex were to i) provide qualitative and uninterrupted broadcast of TV and radio channels, ii) create necessary and favorable conditions for technical, administrative and creative staff, and iii) build infrastructure for entire media market, including private [19].

In the end the main target indicators, relating to television industry, suggest achieving the following results [18]:

- In 2017 the coverage of digital broadcasting throughout the country should reach 100%;
- In 2017 the number of national satellite network subscribers is expected to reach 700,000 subscribers, and in 2020 – 1 million subscribers;
- By 2017 45 local TV channels should be available throughout the country;

- In 2017 the geography of Kazakhstan TV channels should extend to 100 foreign countries, and in 2020 - to 110 countries;
- By 2017 50% of media should be available on the Internet, by 2020 it should reach 80%;
- In 2017 the demand for domestic media meeting information needs of the population should reach 64%, in 2020 – 70%;
- In 2017 advertising funds raised by state media should increase in comparison with 2012 by 35% and by 50% in 2020.

Certain digital indicators had already been achieved in 2014 [20]. In particular, in 2014 the geography of Kazakhstan TV channels broadcast extended to 118 countries with the establishment of “KazakhTV” channel. In addition, 94% of Kazakhstan media are available on the Internet. Moreover; in 2014 state media enterprises developed two mobile applications for Android and IOS. Further technical base renewal suggests the transition of all aired television to digital format. Four years’ experience of “Kazmedia Ortalygy” TV-radio complex allows to set goals for further expansion of its production structure, as well as to establish digital archive of the golden fund of state TV channels on its base. The transition of Kazakhstan TV channels to modern manufacturing technologies, in particular to tapeless production technologies, seems to be of great importance for long-term industry development.

Despite ambitious plans to expand the geography of Kazakhstan TV channels broadcast abroad, there is an issue to extend its distribution throughout the country. For this purpose the government intends to encourage national channels to expand the geography of their broadcasting, due to the presence in remote settlements. The government has also set a goal to provide support to domestic television channels to enhance their online presence on the web, which implies on one hand, with an information campaign to promote Internet versions of TV production and, on the other hand, assisting to develop mobile applications to existing versions. It is necessary to draw attention to the fact that the indicated measures to support and stimulate the development of on-line activities are not confined to state but also on the non-state TV channels.

One of the main problems of Kazakhstani media services market is poorly developed production of its own content, which significantly reduces the stability of Kazakhstan TV channels in terms of competition with foreign channels. In this regard, it is high time to stimulate the development of domestic media industry. Improving the quality of products is on the agenda as well. In particular, it seeks to improve the quality of public television channels to HD format. Center for development multimedia products in new formats such as 3D movies, holographic images and other innovative solutions can deliberately contribute to improving the quality of television production in Kazakhstan. [18] Noting high cost of high-quality original content production, and very long-term payback in Kazakhstan realities, directors of major national TV channels put forward an idea of a protectionist regime and imposed a moratorium on showing foreign TV series on public television channels for up to three years. And the emerging deficit will encourage the redistribution of public funding in favor of domestic production of the television series [21].

At the same time media industry development is correlated with the consumer market, and depends on the level of domestic demand for Kazakhstani content. In 2013 growth

in demand for content produced in Kazakhstan became an issue of information security. According to the Concept of Information security of the Republic of Kazakhstan until 2016, it was planned to bring the level of demand of domestic information products in 2012 to 35%, in 2013 – up to 40%, in 2014 – up to 45%, in 2015 – up to 50% and in 2016 – to 55% [17]. One of the urgent tasks in order to manage state channels is to increase the level of strategic planning. With regard to transformation of existing media business management models, there is a need to *i)* revise and optimise the staff schedule of public television with introducing online editions in their structure, *ii)* develop practices of branding products, its announcement using different methods of information delivery, including mobile devices; *iii)* promote domestic content in the consumer market, *iv)* strengthen the marketing component of the state television and orientation primarily on the needs of the TV channels audience, and *v)* sign and extend labour contracts with the management of state TV channels as it will be in direct dependence on results of the work done and effectiveness of the efforts made in terms of expanding the audience, raising viewers’ satisfaction, etc.

Recap. Government policy in the field of television industry development in Kazakhstan is primarily focused on building institutional and technical conditions to enable television companies to adapt more quickly to the changing reality.

One of the cornerstones of the television industry in Kazakhstan is to increase production capacity in making its own audiovisual content and proportion of original Kazakhstan content in general television grid. Taking into account the fact that the large market of TV consumption has a negative impact on the implementation of mechanisms to get monetization, produced by the channels, the state is ready to strengthen protective measures to protect Kazakhstani TV channels. It should be noted that the state set an objective in the media sector to facilitate all the major media transition to Internet. It is assumed that ‘Internet will actually become a common platform for the media.’ [18]

At the same time, at the tactical level the transition of Kazakhstani TV channels into online format has become a challenge due to the lack of certain necessary conditions. In particular, the risks, which national TV channels may face, refer to the following:

- Insufficient (in terms of quantity) audience of consumers, consisting mostly of young people;
- Lack of established social practices to sustainably consume in the Internet;
- Lack of resources (financial, human, etc.) to produce truthfully interactive television products;
- Lack of acceptable practices for channels to monetise products, in comparison with adequate mechanisms to ensure profitability in traditional broadcasting.

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author

Dr Kanat A. Sakhariyanov - MBA,
General Director JSC "Commercial TV Channel"
Doctoral Scholar, ALMA Management University, Kazakhstan

Mr Sakhariyanov received his DBA (Doctor of Business Administration) degree from the Russian Presidential Academy of National Economy and Public Administration, Moscow-Almaty in 2016, Kazakhstan State diploma of Master's of Business Administration from the International Academy of Business, Kazakhstan, in conjunction with HEC in Paris, France in 2008, Law degree with honours from the Kazakh National Law Academy in 2001 and Medical Degree, Dentistry Division from the Kazakh State Medical University in 1997.

His professional career commenced in 1997 in the field of marketing and international relations. In 2001 he joined Kazakhstan National Broadcaster – JSC "Khabar Agency" having worked for it for 11 years in different positions having started from a Legal Counsel position and having achieved the position of the First Deputy General Director in 2006 until 2012. In 2012 Mr Sakhariyanov was appointed as a Director-General of the Kazakhstan National TV and Radio Complex – "Kazmedia ortalıǵy". In 2014 he shifted to head JSC "Commercial Television Channel "KTK" having served as Director-General for 2 years until 2016.

Mr Sakhariyanov has been awarded with a number of honourable commendations on behalf of the Government and the President of the Republic of Kazakhstan personally, for his outstanding accomplishments, loyal service and valuable contribution to the various significant government projects as well as development of Kazakhstan broadcasting and mass media industry.

NABA Symposium

Cyber Security in Broadcast Media



A symposium on cyber security in broadcast media was held by the North American Broadcasters Association (NABA) in New York on 1st December 2016.

Over 100 attendees from the field of broadcasting and IT engineering joined the symposium and discussed the cyber security of broadcasting and media industries through five panel sessions.

The symposium started with opening remarks by Michael McEwen, Director General of NABA. A security consultant from PwC explained the business trends of cyber security and presented the latest statistics showing the number of cyber-attack incidents and average security budget, based on a global survey.

At the first panel session, the French broadcaster TV5 explained the way in which their broadcasting system was brought down by cyber-attack in April 2015. IT security experts presented their views and emphasised the need to protect the system from cyber threat.

Another panel session was organised for the discussion of supply chain risks in the broadcasting industry. The threat of cyber-attack on business continuity and the protection of the supply chain is a key issue of the system security discussion. For example, even if the main broadcasting system is secured from cyber-attacks, Distributed Denial of Services (DDoS) attacks may disrupt the content development and supply system, and affect the content supply chain, which interrupts the delivering of contents as a result. On this subject, a moderator emphasised the visibility of the workflow in identifying the problem as a solution.

By Mr Shuhei ODA

Internet Service Systems
Research Division
Science & Technology
Research Laboratories,
NHK

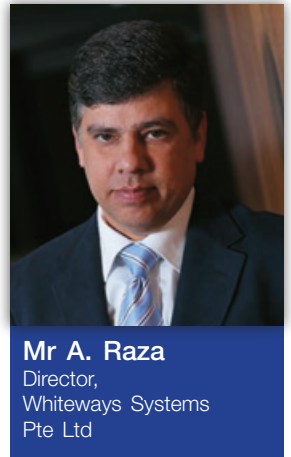
As general information, an officer from the Department of Homeland Security of U.S presented the corporate activities of the industry organisation called Information Sharing and Analysis Center (ISAC) and security guidelines published by the National Institute of Standards and Technologies (NIST). A moderator, Simon Fell from the European Broadcasting Union (EBU), mentioned that EBU have also provided recommendation papers for broadcaster security, such as defense from a DDoS attack.

Finally the organiser summarised the symposium by suggesting that, as a first step, each broadcaster must take action using the conventional measures to resist cyber-attacks, as described in the panel sessions. Moreover, information sharing was also highlighted as a major issue to promote security, and broadcasters were encouraged to continuously share information of cyber-attacks. To conclude the symposium, the attendees and organisers committed to initiating security activities and continuously sharing security risk information. It is proposed that ABU should also promote activities for cyber security.



ABU Technical Advisory Service to Mauritius Broadcasting Service

Training on OTT | Mauritius| 31st October – 3rd November 2016



Participants were shown videos on how the broadcast industry was born, how it evolved over time and how we came to this point. Since most of the participants were engineers, they were familiar with video basics. Participants were updated on the new codecs, video formats, SD to HD transition.

MBC staff took the trainers on an extended tour of the facilities so we become familiar with the system. Then the discussion could be on how to move forward from the current system to the new system.

When it came to OTT, there was lively discussion and sharing of views. MBC senior engineers felt that it is imperative that MBC modernizes its technology and provide more and better quality content to its viewers.

Disruption in the Broadcast Industry

The Broadcast industry worldwide is undergoing a disruption. What happened 20 years ago to newspapers, then to the Music industry is now happening to the Broadcasting industry. The Director General of Mauritius Broadcasting Corporation explained – “Gone are the days when linear television ruled the roost. Viewers want to watch content when they like it, where they like, on a device of their choice”. MBC approached ABU to organise a training for their senior technical staff. A 4-day training was planned with topics such as:

- | | |
|---------|--|
| 1st Day | TV Basics (How TV evolved, quantisation, sampling, bitrates, compression and so on) |
| 2nd Day | OTT (What is OTT, what is IBB, difference between OTT and IBB, multiplatform distribution, case studies and so on) |
| 3rd Day | OTT Cont. (IBB Services, catchup TV, VOD, analytics, refresher course on networking & so on) |
| 4th Day | Post course evaluation, summary, discussion and debate, |

The Training Course

The training course was structured a bit differently this time. Most of the training was conducted using videos with a few PowerPoint presentations thrown in. The emphasis was on discussion, sharing of views, and putting the global situation in the context of MBC.

MBC was updated about the key threats facing the entire Broadcast industry:

- 1) Digital advertising was eating into the television advertising revenue. This resulted in TV advertising revenue being dwarfed by digital advertising giants like Google, Facebook, Apple and Amazon.
- 2) Viewers were slowly going away from Linear TV and going towards OTT and VOD.
- 3) The quality of the programmes had to be updated as viewers are exposed to lots of international programmes and have come to expect a certain minimum level of quality. If MBC programmes do not meet this minimum level of quality, the viewers will switch off and watch something else.



Some participants felt that while OTT was necessary, what was even more important was to upgrade the in house productions of MBC. If the programmes are not interesting and absorbing, all the viewers will go away.

How Will MBC Overcome These Threats?

Participants felt that MBC has to keep its loyal base of linear TV viewers. The only way to do this is to upgrade their systems, train their personnel and improve their technology.

They also felt that MBC should launch an OTT and VOD service in order to catch the viewers who are in Mauritius, but prefer to watch in their own time and on a connected device.

Lastly, MBC needs to change its programming mix in order to cater to the new generation who do not tune into the current programming mix.

After discussions and sharing of views, MBC staff wanted to understand all the new technology that they can use to make their productions better and more appealing. Training was provided on the 3rd day on graphics, virtual sets, new cameras, formats (HD vs 4K), compression formats and so on.



On the 4th day, the Director General of MBC addressed the team and told them that MBC is moving forward on the upgradation path. Old ways needed to be changed, systems needed to be upgraded and new ways like OTT and IBB needed to be implemented.

There was a broad consensus that this training was very useful and more such training need to be organised. Participants wanted more training on Business management systems,

newsroom systems, automation systems, HD cameras, virtual sets and other systems which will enhance production of in house programmes and help to gain viewers.

MBC Director General and staff were unanimous that ABU had been of great help to MBC and they wanted to thank ABU Director General – Dr Mottaghi, Dr Amal and the rest of the staff who helped to organise the training.

All the participants were given a training certificate.



After a vote of thanks, the meeting was adjourned.

I have had a very enjoyable time in MBC. The staff was very forthcoming in their views and opinions. I felt that there was genuine interest in the training and it was appreciated. Many-a-time, when we conduct a workshop, we feel that people are not really interested and after some time they tune out and start nodding off, or start playing with their phones, but not this time. The discussions were passionate and from the heart.

The other thing that I want to report is the warmth and hospitality of all the MBC staff from the driver to the engineering staff to the higher officials, all the way to the Director General. It was very heart warming and I wish to put my sincere appreciation on record.



NBTC Capacity Building Workshop for Digital Radio Broadcasting

As part of a series of events that NBTC has been conducting in Thailand, to create awareness and build capacity in Digital Radio broadcasting, another event was held in Pattaya on 2nd December. ABU contributed to the event by educating an audience of over 100 from government agencies, radio broadcasters, consumers, media specialists, media associations and other stakeholders, in Digital radio broadcast technologies, standards, services and future trends of media consumption and hybrid radio. It also presented 'Radio Broadcasting evolution and lessons learned in Thailand', 'International Case Studies', 'Digital Radio implementation strategies and practical guideline to implement Digital Radio in Thailand'. The project is spearheaded by Orasri Srirasa, Division Director of Broadcasting Bureau of NBTC which is a member of ABU, representing the converged media regulators and a strong supporter of ABU activities. ABU will continue to work with NBTC and ITU, facilitating the digital radio broadcasting development in ASEAN region as well as in Pacific, SAARC region and APAC in large.



InterBEE 2016



**By Mr Heri
Musharoni Abdul
Karim**
Head of RRI Sumenep,
RRI-Indonesia

The International Broadcast Equipment Exhibition was a 3-day event held from 16th to 18th November, 2016 at the Makuhari Messe in Chiba, Japan. This event showcased products from Telecom Products & Equipment, Media & Advertising industries etc. This year's InterBEE was the 52nd exhibition.

InterBEE, which has been held over half a century was held for the first time in 1965, as a trade show for broadcasting equipment. It is organised in four exhibit categories: Video Production Broadcast Equipment, Video Expression Professional Lighting Equipment and ICT/Cross Media and Professional Audio. But there is also InterBEE creative, InterBEE connected, InterBEE ignition and InterBEE forum.

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

InterBEE 2016 had a very important message; that broadcast and communication media were going through a period of huge convergence. A transformation brought about mostly by:

1. The 4K and 8K ultra-high-definition technologies,
2. The increase in spatial information,
3. High-frame-rate (HFR) data transmission capabilities,
4. And the ability to simultaneously capture contrasting levels of luminosity through the expansion of dynamic range (HDR).

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

In parallel with the exhibition, at the International Conference Hall, various conferences and seminars were



held. The opening ceremony of the 52nd InterBEE took place at the entrance lobby where representatives from the main sponsors, JEITA, and others, jointly presented their opening remarks. During the ceremony, large displays that had been set up on the left and right of the main stage, showed video clips using 4K and 8K Ultra-High Definition technologies. After the opening ceremony and in parallel to the exhibition there were important keynote speeches in the International Conference Hall.

Highlighting the latest developments in Japan's broadcasting policy was, "The future of 8K in broadcasting and its application beyond broadcasting." The presentation referred to the many preparations being made for 8K test broadcasts planned to start in time for the 2020 Tokyo Olympic Games. Also referred to were expectations of the potential contribution to other industries, by developments in the broadcasting industry, in particular the extension of the highly advanced features of 8K technology to areas as diverse as medicine, film, digital signage, advertising, public viewing, and museums.

Several presentations dealt with the latest progress in 4K to 8K broadcasting and distribution and operations in 4K to 8K broadcasting. Deployment of 4K to 8K IPTV service and technology in cable TV.

'A roadmap for 4K and 8K: what lies beyond them?' described some challenges and issues that could be encountered further into the future. It introduced various technical developments in more detail: wide colour gamut, high-dynamic-range imaging (HDR), development of highly efficient compression technology (HEVC) for superb image quality. Also, fast post-production and low-cost archiving for more efficient production.

Aside from InterBEE, two parallel programmes, the video Symposium and the Audio Symposium, were held. The Video Symposium was arranged around the central theme of “New trends in content production: the impact of big-data visualisation.” Highlighting that the utilisation of big data had enabled video applications. There were a number of topics on big themes that related to the present and future of broadcast media. This report focuses on the important themes below: 8K and latest developments For sports, wildlife, and nature documentaries 8K would offer a super-realistic, immersive experience, and 8K technology was very prominent at this year's InterBEE show. With plans to broadcast the 2020 Tokyo Olympics in 8K, Japanese manufacturers were teaming up with broadcasters to make this a reality.

While 8K might still be quite a long way off for broadcasters outside Japan, we will slowly start to see more and more 8K-capable cameras and displays coming onto the market in the near future.

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

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

For the purposes of RRI the exhibition included only a few items that could be utilised now, for example: digital



mixers, various microphone and headphones from a wide range of manufacturers, in addition was a FM transmitter produced by HITACHI. While the usefulness of SNG can be used because the parabolic antenna is much simpler. All the activities and presentations could not be followed, because of the limited time and overlapping events.

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

In conclusion, I wish to express my sincere thanks to ABU and JEITA for providing me with the valuable opportunity to attend this major event, until we meet again InterBEE 2017.

DVB Asia Conference: ABU Supported the first DVB Asia Conference held in Bangkok

The first DVB Asia conference was held in Bangkok from 29th November to 1st December. It was attended by over a hundred delegates from Asia-Pacific and beyond. The conference discussed more than 25 topics addressed by 25 speakers from all regions, covering a wide range of recent developments in broadcast media. NHK presented its plans for 3D TV solutions that they are currently working on. ABU presented the digital terrestrial television status in Asia-Pacific region. ABU also participated in a panel discussion on mobile TV over DTT. Both Thailand and India are deploying DTT for people to receive while they are on the move. Among other topics, 'HbbTV and second screen, bringing broadcast to a tablet near you', 'Single illumination for DTT' and 'DTH and IP in the studio' were some of note.

ABU members were offered a discount to attend the conference which started with a master class by Prof Ulrich Reimers on DVB-T2 and concluded with a UHD workshop conducted by Dr David Wood of EBU.



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News

from the ABU Region

Radio Launches Streaming App with 250 Stations

In an Australian first, the radio industry has launched RadioApp, a mobile app that allows consumers to live stream 250 Australian radio stations on the go. The free app allows listeners to tune in to Australian radio from anywhere in the world, add stations to their favourites list and simply swipe to see what's playing on other stations. Listeners can also view a list of recently played songs and share what they're listening to with friends.

Developed by industry body, Commercial Radio Australia, and app developer All In Media, the app is part of a strategy to make listening to radio on smartphones much easier. The app includes features such as; Listen live to 250 Australian radio stations covering music, sports, talk, and news; Access digital-only stations such as Buddha, Kinderling Kids Radio, Koffee, EON Sports Radio and Christmas station Elf Radio; See what's playing on air and simply swipe to change stations; Search for stations by name, town, or frequency; View a list of recently played songs and purchase songs. More features will be built into the app in future stages, including the ability to subscribe to podcasts.

RadioApp can be downloaded free through the App Store and Google Play or visit www.radioapp.com.au for more info. The industry will promote the app through a national marketing campaign that launches today, including radio and online advertising, social media and interior bus panels. The ads carry the tagline; 'RadioApp. Your radio, wherever you are'.

(WorldDAB)

Thaicom Launches C-Band MCPC Broadcast Platform

Thaicom Public Company Limited recently announced that it has signed a contract with iSAT Africa – a fast growing broadcasting, data and Internet service provider with teleports in Africa and Europe – to expand its C-band Multi Channel Per Carrier (MCPC) broadcast platform and service into Africa. The service will facilitate distribution of TV channels on the THAICOM 6 satellite.

The MCPC broadcast platform enables Thaicom to expand its broadcast services in Africa from the THAICOM 5 to the THAICOM 6 satellite at the company's 78.5° East prime video neighbourhood. The platform is a cost-effective solution for African and international broadcasters requiring to develop their content distribution across Sub-Saharan Africa. Teleport operator iSAT Africa will provide ground and up-link services for the MCPC broadcast platform from its facility in Nairobi, East Africa.

Thaicom's MCPC media platform is based on DVB-S modulation and MPEG-2 compression technology, and can be received with small antenna sizes in much of its coverage area thanks to the THAICOM 6 satellite's high power C-band beam.

(onscreenasia)

TVB Hong Kong – OTT TV Platform passes 1 million users

Users of myTV SUPER, Hong Kong's leading OTT TV platform,

have passed one million mark in just six months. Television Broadcasts Limited (TVB) announced the total number of myTV SUPER users has reached 1,037,777 including 312,359 OTT TV boxes sold through ISPs or various retail outlets and 725,418 active app users.

A TVB spokesman said, "We are excited that the number of myTV SUPER users has grown to more than a million in just six months. "When launching the myTV SUPER on 18 April this year, we had the vision of creating a second platform to meet changing viewing habit and viewers' need for more diversified contents. Today we are very encouraged that one million people have recognised that vision."

(Advanced-television)

SBS-Australia Launches a new online interactive animation

SBS recently launched 'My Grandmother's Lingo' which tells the personal story of Angelina Joshua, a young Aboriginal woman dedicated to preserving her endangered Indigenous language.

Drawing on the expertise of SBS Online and NITV, the documentary features voice-activated gaming technology and unique animations to unlock the chapters in Angelina's story, and simultaneously raises awareness of Australia's Indigenous languages – specifically Marra, a language now spoken by only three people in the remote East Arnhem Land community of Ngukurr where Angelina lives.

Ben Naparstek, SBS Head of Editorial Online and Emerging Platforms, said, "SBS is dedicated to telling unique stories in innovative ways and My Grandmother's Lingo is a great example of this – combining interactive storytelling with digital technology to encourage further understanding of Indigenous languages amongst all Australians." (C&T Mag)

(sbs.com.au)

Bangladesh Betar teams up with GatesAir for HD radio rollout

Bangladesh Betar, the only national government broadcaster serving Bangladesh, awarded the contract as the first phase of the GatesAir-supported rollout moves forward. GatesAir, a wireless, over-the-air content delivery solutions provider for radio and TV broadcasters, has won phase two of Bangladesh's national HD Radio rollout.

The turnkey system comprises two self-contained FM radio stations with high-efficiency GatesAir Flexiva™ FAX air-cooled 10kW FM transmitters, antenna systems and all auxiliary and support equipment. The initial phase, which covers the capital city of Dhaka, also includes two GatesAir Flexiva FAX 10kW transmitters and is targeted for completion by the end of 2016.

The second phase will cover the heavily populated cities of Mymensingh and Gopalganj, with an expected on-air date of June 2017. Both projects are especially notable as the first HD Radio deployments in South Asia.

(Broadcastbeat)

Digital Broadcasting Update

Handbook on DTTB Networks and Systems Implementation

ITU-R Study Group 6 (SG 6) has approved a new Handbook on Digital Terrestrial Television Broadcasting Networks and Systems Implementation. The Handbook will be published soon.



The Handbook is designed to provide assistance in technical and service issues such as networks and systems, audiovisual quality and quality of transmission as well as on other issues of interest for the introduction of digital terrestrial TV broadcasting (from multimedia systems to UHDTV) in different countries. The Handbook takes into account progress and convergence of technologies, different environments for production, primary and secondary distribution of broadcast programmes as well as experiences in providing quality of service for DTTB.

The new Handbook compliments the earlier published ITU-R Handbook on digital terrestrial television under the title *Digital terrestrial television broadcasting in the VHF/UHF bands* as well as *ITU-D Guidelines for the transition from analogue to digital broadcasting*.

(ITU)

DVB SB Approves UHD HDR Specification



The DVB Steering Board approved a new version of the audio-visual coding specification, TS 101 154, adding support for High Dynamic Range (HDR), Higher Frame Rates (HFR) and Next Generation Audio (NGA). The new specification is a major milestone for the industry, allowing broadcasters and CE manufacturers to provide enhanced video and audio in their products and services. This will enable DVB services offering UHDTV with HDR. This would be the first element of UHD-1 Phase 2 features to be implemented and could be available from next year.

High Dynamic Range (HDR) significantly increases the contrast ratio and results in pictures with more 'sparkle'. The DVB HDR solution supports Hybrid Log Gamma (HLG) and

Perceptual Quantizer (PQ) transfer functions. Furthermore, the new specification defines Higher Frame Rates (HFR), offering sharper images of moving objects by going beyond the current 50/60 frames per second. When it comes to audio, DVB has added the latest Next Generation Audio (NGA) schemes to provide immersive and personalised audio content using object- or scene-based coding.

The specification has been published as BlueBook A157 and will be passed to ETSI for formal publication as TS 101 154 v2.3.1.

(DVB)

Test Suite for HbbTV 2 Specification



The HbbTV Association has announced the release of Test Suite version 9.0 which will support the HbbTV 2 specification.

The new Test Suite expands on the existing suite, making it 50% larger with an additional 350 new tests covering HbbTV 2 functionality. It will also improve test coverage of the widely adopted HbbTV 1.1 and 1.5 standards. The release is an important step towards enhancing interoperability between HbbTV services and HbbTV devices.

The Test Suite has been made available through HbbTV Registered Test Centers. HbbTV members, who have the necessary expertise and equipment, may also license the Test Suite for use in their own facilities. The Test Suite is distributed with details on how to obtain a new test harness, which provides minimum required functionality to execute the approved test materials. Commercial test tools, which support the HbbTV test harness specification, are also available from different vendors.

The current version of HbbTV 2 is 2.0.1 (ETSI TS 102 796 1.4.1). This version adds features to 2.0 that were requested for the UK and the Italian markets, and addresses a small number of issues found during early implementation work on version 2.0. The HbbTV Association and ETSI have withdrawn version 2.0 (ETSI TS 102 796 1.3.1) from publication, completely replacing it with version 2.0.1.

(HbbTV)

Equipment Trends

New FS7 II Camcorder



New Model Delivers Advanced Features for Documentary and Indie Production with Electronic Variable ND Filter, Lever Lock Type E-mount and Refined Mechanical Design

Sony is expanding its FS Series Super 35mm professional family with the addition of the new FS7 II camcorder. The new model builds on the original FS7's strengths by adding advanced features including Electronic Variable ND technology, a lever lock type E-mount, and a new mechanical design for faster and easier set-up. The new FS7 II camcorder also supports Sony's α Mount System, which includes more than 70 lenses.

The new FS7 II camcorder is designed for long-form shooting and production applications, especially documentaries and independent filmmaking. Sony is also introducing an FS7 II kit model which includes a new E-mount, Super 35mm lens, model SELP18110G, covering Super35mm and APSC sensors. (SONY)

Measurement Microphones



Audio Precision has announced the expansion of its electro-acoustic test offering with the introduction of a series of calibrated measurement microphones. The microphones are free-field, pre-polarized systems combining mic capsules with low-noise preamplifiers, and are an ideal complement to the APx line of audio analyzers, software and accessories.

The AP microphone family includes two 1/2-inch and two 1/4-inch measurement mics, as well as an occluded ear simulator. All units are pre-polarized, TEDS-compliant and CCP powered. The microphones are calibrated, ensuring the utmost of confidence in measurement results when paired with calibrated instruments such as the APx515 Audio Analyzer and APx1701 Transducer Test Interface. Each mic is delivered with its own certificate of calibration.

Each Audio Precision measurement microphone and microphone system is TEDS programmed to the IEEE 1451.4 standard

for SMART transducers, v1.0 format. TEDS—Transducer Electronic Data Sheet—data contains microphone identification and calibration information that can be read by a connected instrument, such as the Audio Precision APx1701 Transducer Test Interface.

When compared to traditional, externally polarized microphones, pre-polarized systems offer a number of advantages. Specifically, pre-polarized mics offer a lower cost per channel (cabling, power supplies, and preamplifiers), are better suited to environments with changing, or high, humidity, and offer reduced set-up and test time owing to easy access to CCP power, interchangeability with other CCP sensors and measurement efficiency.

(Audio Precision)

Multi-Format LCD Monitors



JVC Professional Video, a division of JVCKENWOOD USA Corporation, has announced new multi-format LCD production monitors designed for critical image evaluation for studio, field, and master control applications. The new DT-V G2 line includes the 16.5-inch DT-V17G25Z, which is a near EBU Grade 1 LCD monitor, as well as the 24-inch DT-V24G2Z, 21.5-inch DT-V21G2Z, and 16.5-inch DT-V17G2Z models.

The DT-V17G25Z and DT-V24G2Z each feature a 10-bit IPS panel, wide gamma range, 1500:1 contrast ratio, and integrated toolset. All models monitor up to 16 channels of embedded audio, while a new Lissajous meter displays the stereo field of a signal and shows possible phase issues. Other built-in features include a waveform monitor, vectorscope, histogram, zebra, four gamma preset modes, and a variety of on-screen markers. Two function keys allow users to save customized functions. All monitors deliver 1920x1080 resolution except the DT-V24G2Z, which has 1920x1200 (WUXGA) resolution.

The versatile monitors support an extensive list of video formats including 3G-SDI and Dual Link with dual HD-SDI inputs, as well as HDMI, component, and composite connectivity. Other features include colour temperature settings, time code display, SDI closed captioning support, built-in stereo speakers, and a tilt desk stand with two-way installation capability. The DT-V17G25Z and DT-V17G2Z also include a carrying handle.

The new DT-V G2 monitors are now available at the following MSRPs: DT-V17G2Z \$2,900, DT-V17G25Z \$4,150, DT-V21G2Z \$3,550 and DT-V24G2Z \$4,295

(JVC)

Personalities & Posts

Changes in the ABU Technical Bureau



Mr Ding Wenhua
Radio and Television of the People's
Republic of China

Mr Ding Wenhua, Chief Engineer, China Central Television & the Chinese Academy of Engineering, has been appointed the ABU Technical Committee Honorary Vice-Chairman for 2017 representing Radio and Television of the People's Republic of China (RTPRC-China) on the Technical Bureau. We wish to thank Mr Rahadian Ginggong of RRI-Indonesia for his contributions as the ABU Technical Committee Honorary Vice-Chairman for 2016.



Eng. Bander Alrasheedi
Saudi Broadcasting Corporation

Saudi Broadcasting Corporation was elected to the ABU Technical Bureau represented by Eng. Bander Alrasheedi, Head of Safety & Security, Saudi Broadcasting Corporation.



Mr Magli Alias
Radio Television Malaysia

Mr Magli Alias, Director (Multichannel Transmission, Network & Control Centre), Radio Television Malaysia, has replaced Hj. Ab Wahid Bin Ab Hamid on the Bureau. We welcome Mr Magli and wish to thank Hj Ab Wahid for his contributions.



Ms Lim Soh Kwang
Radio Television Brunei

Radio Television Brunei did not seek re-election to the Bureau. We wish to thank Ms Lim Soh Kwang, Superintendent Engineering (Technical Services), Radio Television Brunei, for her contribution and expertise during her time on the Bureau.



Dr Li Leilei
Chairman Spectrum Topic Area

Dr Li Leilei, Senior Engineer, Academy of Broadcasting Planning, SARFT, China has replaced Mrs Zhu Yunyi as the Chairman Spectrum Topic Area. We thank Mrs Zhu for her immense contributions while serving as the Spectrum Topic Area Chairman. The ABU deeply appreciates her contributions since 2009.



New Members

Affiliate Members

PromaxBDA – Singapore

Promax was established in 1956 as a non-profit, full-service, membership-driven association for promotion and marketing professionals working in broadcast media. In 1997, the Broadcast Design Association (BDA), who had partnered Promax for years on their annual conference, officially joined forces with Promax and the association became PromaxBDA.

PromaxBDA represents more 10,000 companies and individuals at nearly every major media organisation, marketing agency, research company, strategy partner, creative studio and technology provider and is considered to be the leading global resource for education, community, creative inspiration and career development in the media & media marketing sectors worldwide.

Drawn from more than 65 countries, and with conferences taking place in Asia, Africa, Australia, New Zealand, Europe, South America, the United States and the UK, PromaxBDA is a truly international organisation uniting the individuals who are in the driver's seat of the media marketing industry.

MediaGeniX – Singapore

MediaGeniX has delivered state-of-the-art software for radio and television channels since 1992. Their integrated software suite WHATS'On has developed into the most advanced broadcast management solution. It is the backbone for broadcasters, on-demand service providers, and platform/telco operators worldwide as it includes long- and short-time scheduling, media and rights management and reporting. With WHATS'On customers schedule content in line with strategic, editorial, budgetary, operational and regulatory requirements, and have the central hub they need to streamline workflows and optimise core processes.

Over 1,700 channels and on-demand services are managed with WHATS'On, with 9,500+ users at more than 65 media networks, worldwide.

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Because the size, format and brightness of the television sets being sold have a direct influence on viewer behaviour. That, in turn directly affects the system design of current or future television channels (and transmission head ends). Larger screens, UHD TV, smart TV in more homes will change viewing habits irrevocably. Broadcasters need to make sure that they are leading the change.

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