2018 KOBA Daily News

KOBA

2018.5.15-18

KOBETA

THE KOREA BROADCATING ENGINEERS & TECHINCIANS ASSOCIATION
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KOBA 2018 to open at the COEX, Seoul, on May 15, 2018

Find Out Everything About the Convergence of Media

> “KOBA 2018 will showcase the leading ICT of the Fourth Industrial Revolution, such as UHD, 5G, IoT, and AI, and their applications in the broadcast market.”

Kim Taek-Goo
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The 28th Korea International Broadcast, Audio&Lighting Equipment Show (KOBA 2018), co-organized by the Korea Broadcasting Engineers&Technicians Association (KOBETA) and Korea E&EX Inc., will be held from May 15 to 18, 2018, at the COEX, Seoul.

Sponsored by the Ministry of Science and ICT, Ministry of Trade, Industry and Energy, Korea Communications Commission, Korea Trade-Investment Promotion Agency, KBS, MBC, SBS, EBS, OBS, Electronics and Telecommunications Research Institute, Korea Association of Sound Artists, and Acoustical Society of Korea, KOBA is recognized as one of the world's top broadcasting equipment exhibitions, along with the National Association of Broadcasters (NAB) of the United States, International Broadcasting Convention (IBC) of Europe, and International Broadcasting Equipment Exhibition (InterBEE) of Japan.

As it was last year, this year's KOBA will be held in Exhibition Halls A, C, and D of the COEX (total area of 27,997 square meters), where various programs will be offered, including: the KOBA World Media Forum, the International Broadcast Technology Conference, HiFi Audio Show, and the Tech Cemonstrations and Seminars Held under the theme “Media, Connected Everywhere!,” KOBA 2018 will showcase the leading ICT of the Fourth Industrial Revolution, such as UHD, 5G, IoT, and AI, and their applications in the broadcast market.

In particular, the International Broadcast Technology Conference to be held at KOBA 2018 from March 16 to 17 is not to be missed. The conference will analyze and predict the overall global trend of and examine topics related to various broadcast technologies, including UHD, radio, lighting, archiving, post-production, smart media, VR/AR, cloud, blockchain, IP, AI, and 5G technologies. In particular, the lecture on blockchain, the technology behind virtual currencies that has drawn a great deal of attention worldwide, is expected to attract a large audience.

The “Pre-Engineer: How I became a broadcasting Engineer” session, which always draws a lot of attention, is in its fourth run this year. At this session, broadcast engineers and technicians working at KBS, MBC, SBS, EBS, and CBS, each with three to five years of work experience, will respond to jobseekers' questions on various topics, such as how they got their jobs, the recruitment process, and the differences between what they learned in school and the knowledge they actually use in the field.

KOBA 2018 will also debut the “KOBA HiFi Audio Show” in the conference room on the third floor of the COEX. The show will present the world's most respected brands in the audio industry, including some of Korea's top companies, along with seminars and performances. An official of Korea E&EX Inc. said, “At this year's exhibition, visitors will be able to discover and experience brands of high-end audio equipment, mobile devices, and headphones from Korea and around the world. If you pre-register on the KOBA website, admission is free.”

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KOBA 2018

Media, Connected Everywhere

President of KOBETA
Park Jong-Seok

President of Korea E&EX Inc.
Kim Choong-Han

KOBA 2018 (Korea International Broadcast, Audio & Lighting Equipment Show), jointly hosted by KOBETA and Korea E&EX Inc., is Korea's largest trade show of its kind. In its 28th run this year, KOBA 2018's theme is "Media, Connected Everywhere!".

KOBA is one of the world's top three broadcasting/media technology expos, along with NAB in the US and IBC in Europe. Through displays and introductions of outstanding products and software-based solutions on production, transmission and new media from diverse countries, KOBA provides a bird's eye-view of changes in broadcasting and media as well as the process by which the equipment industry is becoming increasingly cutting-edge. It also serves as an occasion to ascertain the direction in which the media industry for the next generation is evolving and the potential for growth.

KOBA 2018 will feature many products based on new technologies (AI, AR, VR, IoT, Big Data, Smart Media) that are rapidly evolving in this "era of mega-convergence" - the Fourth Industrial Revolution - as well as broadcasting, video, audio, and lighting equipment that has seen significant advancements in terms of performance, and we expect it to be a wonderful opportunity to catch a glimpse of industries for future growth. This year, the display of equipment with ATSC 3.0 (technology that forms the basis of terrestrial UHD broadcasting, which was first featured at the PyeongChang Olympic Winter Games, and HD mobile services) and a wide range of sophisticated IP-based UHD production/solution equipment is expected to result in unprecedented levels of interest.

In addition to the exhibition, KOBA 2018 has invited media experts from all over the world to take part in the World Media Forum, to share and discuss their knowledge on the trends and cutting-edge technologies of today's fast-evolving media industry. We will be focusing on turning points that will be brought about by technological progress and predicting the future with these experts from diverse fields. Through innovative corporations making inroads in the media industry, we will share our visions for and current trends in the global media market.

KOBA Conference 2018 will be featured in conjunction with KOBA 2018 at the COEX Conference Center, and will comprise more than 50 in-depth sessions on major issues and technologies in the broadcasting industry: web services, UHD, smart media, content & business, VR, and drones. Through these sessions, visitors will be able to look five or even 10 years into the future. The technology demonstrations and independent seminars held during KOBA Conference 2018 will demonstrate cutting-edge equipment from a variety of makers, allowing you to take a hands-on approach to understanding each item's performance and practicality.

It is my personal wish that everyone participating in KOBA 2018, a true festival of broadcasting and media technology, will gain an understanding of the key concepts that will dominate broadcasting and media in the future and pay close attention to the fundamental issues surrounding our rapidly-changing media environment. My sincere thanks goes to the members of the National Assembly, employees and management of broadcasting companies, government representatives and CEOs of broadcasting equipment makers for their contributions toward KOBA's development.

Thank you.

> "Marking the 28th run this year, KOBA 2018's theme is "Media, Connected Everywhere!".

Park Jong-Seok President of KOBETA

Kim Choong-Han President of Korea E&EX Inc.

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Production of UHD Broadcasts of Ice Hockey Matches during the 2018 PyeongChang Olympic Winter Games

Deputy Manager of MBC Relay Div. | **Kim Taek-Goo**

MBC's UHD OB van

Background to MBC's UHD Olympic Broadcast Production and Its Outside Broadcast Van (OB van)

Having undergone a ridiculous process for distributing 700MHz frequency, Korean broadcasting companies were the first in the world to transmit ultra-high definition (UHD) formatted-TV shows on May 31, 2017. In December of the same year, metropolitan cities and the areas where the Olympic Winter Games were to be held began receiving UHD broadcasts directly. The three nationwide TV networks consulted with the Olympic Broadcasting Service (OBS) to broadcast three 2018 PyeongChang Olympic Winter Games in UHD format.

KBS was granted rights to live broadcast the curling matches, which were the most popular of all the Olympic Winter games sports. SBS took speed skating, and MBC ice hockey because it has the largest UHD outside broadcast van (OB van).

MBC began designing its UHD OB van in 2016 and completed it in September 2017. After three months of adjustment, the van was dispatched to the broadcast production sites. While existing expandable OB vans have usually been designed and manufactured overseas, all system design and coach-building processes for the MBC UHD OB van were based on technologies invented by domestic companies.

The UHD OB van is equipped to produce 3840x2160, 59.94p, Level A, and 2SI format digital images and has undergone production testing to verify its ability to support high dynamic range (HDR) and BT 2020 color. Although it includes 3Gx4 equipment, its overall design is based on 12G SDI. Despite concerns about the functionality of its 12G SDI interface during the vehicle design and manufacturing process, it now runs in a reliable manner. In delivery of the audial source, the van is ready to produce immersive audio signals to transmit more vivid and immediate sound to the audience than the existing 5.1ch audio. In addition, the OB van has successfully passed an aging test as it was used in the PyeongChang Olympic Winter Games.

Broadcasting Ice Hockey from the PyeongChang Olympic Winter Games

OBS and MBC had numerous discussions on transmitting the Olympic ice hockey matches successfully. To air the games, three OB vans were deployed – OBS's HD international signal (IS) van, NBC's own OB van, and MBC's UHD IS van - and were assisted by many other OB vans. The decided format was 3840x2160, 59.94p, level A, 2SI, SDR, and BT 709. In addition to 10 UHD cameras in MBC's van, four HD cameras owned by OBS were employed to produce clearer images. OBS provided mic signals and PGM protocols from its HD IS van. For audio source delivery, 5.1ch and stereo sounds were created and transmitted at the same time.

OBS provided two types of electric power source: 50Hz UPS output and 60Hz technical output. Since all devices in the MBC's UHD van use UPS output, a 60 Hz technical power source was hired to prevent any incidents related to power supply.

All camera cables, TOC, cables connecting the OBS HD IS van, and power cables were installed and tested in advance using the cables laid by OBS. MBC owns two XT4K (4ch) class EVS LSM, which were considered insufficient to broadcast the ice hockey matches. After consultation with OBS, MBC converted the LSM to HD. Each of these HD-converted LSM can provide eight channels, enough for broadcast production.

In the production of computer graphics, two types – timing and graphic CG creation methods were employed. Timing CG was shared with the OBS HD IS van through HD signals, while the graphic CG in 3G SDI were converted to 4K via the devices installed in the UHD van.

The OB van used a huge volume of HD signals, both inside and outside, requiring multiple 4K upconverters and 4K FS units. Among ten upconverters and eight FS units, sixteens were hired.

Epilogue to the Broadcast Production of Olympic Ice Hockey

Generally, for the production of international signal (IS) broadcasts, producers of network TVs are dispatched to OBS. The days we spent with producers from various countries as an OBS team towards airing the ice hockey matches were totally different from the experience in the International Broadcast Centre (IBC). While the work in IBC was close to the normal process of producing broadcasts of sports events, we felt like we were participating in the Olympic Games themselves and enjoyed this directly when we were working in the OBS team. In addition, as the foreign OB vans had different structures, installations, and production methods, they provided opportunity to gain new insights into TV broadcast production.

Meanwhile, the engineers from the overseas TV stations were working with greater resources and on looser schedules, so they always looked pleasant and happy at work. We also hope for better resources and something along the lines of their more relaxed production environment.

MBC's UHD OB van is the largest allowed by the Road Traffic Act. But the MBC team was surprised by the size of the OB vans belonging to overseas TV stations parked near the Gangneung Hockey Centre. Our UHD OB van was much smaller and looked cute in comparison. The foreign OB vans had large interiors for the staff to work in a pleasant environment.

While the production of UHD IS of the Olympic Games was expected to be a tough undertaking, it was a great experience, giving opportunities to enjoy the festive mood of such an international event. We hope many of Korea's Broadcast engineers have many such chances to experience events like this.

(From left to right) Gangneung Hockey Centre; Inside the Hockey Centre; Inside the OB van; Outside of the OB van.

UHD Live Studio IP Production Workflow

Manager of KBS Future Technical Research Institute | **Lee Jae-Ho**

The media and entertainment industries are seeing a diversification of platforms, such as live broadcasts, catch up TV, VoD (Video-on-Demand) and OTT (Over the Top), while content is becoming higher quality, larger capacity, and available in multiple formats, such as 4K/8K UHD (Ultra-High Definition), high frame rate (HFR), wide color gamut (WCG), and high dynamic range (HDR). Against this backdrop, IP-based broadcasting production technology is increasingly at the center of attention, as it responds effectively to the rapid development of media and accommodates a variety of services, overcomes limits in scalability, transmission speed, and distance compared to existing SDI (Serial Digital Interface) technology, and supports high-speed transmission and versatility.

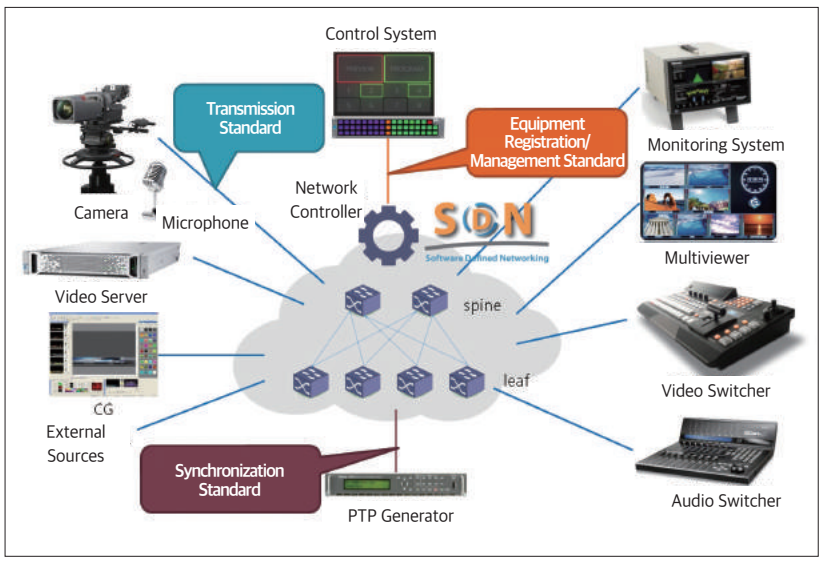
The adoption of IP technology accelerates the transition of broadcasting equipment into software, and by separating the functions of the existing broadcasting production environment, it enables cost-effective production through a variety of workflows. This paper will examine trends in standardization of IP-based broadcasting, which is the basis for UHD live studio IP-broadcasting production workflow, and several technical issues that must be considered when constructing a workflow.

Trends in IP-Based Broadcasting Standard Technology

The IP-based live studio broadcasting system is physically similar to the existing system except for the SDI cable switch, which has become an IP cable. However, the change is significant internally: between equipment, A/V transmission uses IP-based protocols and synchronization uses PTP (Precision Time Protocol) instead of frame sync signals.

In addition, open two-way management and control technology can more effectively manage and control broadcasting and network equipment, while NMOS (Networked Media Open Specifications) and SDN (Software Defined Networking) technology can improve production. As such, underpinning technologies for IP-based live studio broadcasting production can be categorized mainly into transmission, synchronization, equipment registration and management, and SDN technologies. Standardization of these technologies is either complete or near completion.

The JT-NM (Joint Task Force on Networked Media) comprised of the EBU (European Broadcasting Union), the AMWA (Advanced Media Workflow Association), the VSF (Video Service Forum), and the SMPTE (Society of Motion Picture and Television Engineers), presents a roadmap for IP-based broadcasting production technology and pursues standardization as shown in Fig. 2. According to this roadmap, AIMS, an open standard IP partner, develops IP broadcasting equipment and tests interoperability, while verifying the technology and enhancing the system.



[Fig. 1] Composition of the UHD Live Studio IP Production System & Technology

1. IP Transmission Technology

IP-based AV transmission technology has developed from SMPTE ST 2022-6 to SMPTE ST 2110. The greatest part of ST 2110 is the ability to independently transmit video, audio, and metadata. To this end, ST 2110-10 defines network interface demands, system timing, and SDP (Session Description Protocol). ST 2110-20 is a video transmission standard, and includes support up to 32Kx32K, YCbCr, RGB, XYZ, ICtCp color expression, and HDR (PQ & HLG). Video is an active image, but its transmission in HD (1080i@29.97) and 4K UHD (2160p@59.94) uses 16.3% less bandwidth than SMPTE ST 2022-6 SMPTE ST 2022-6.

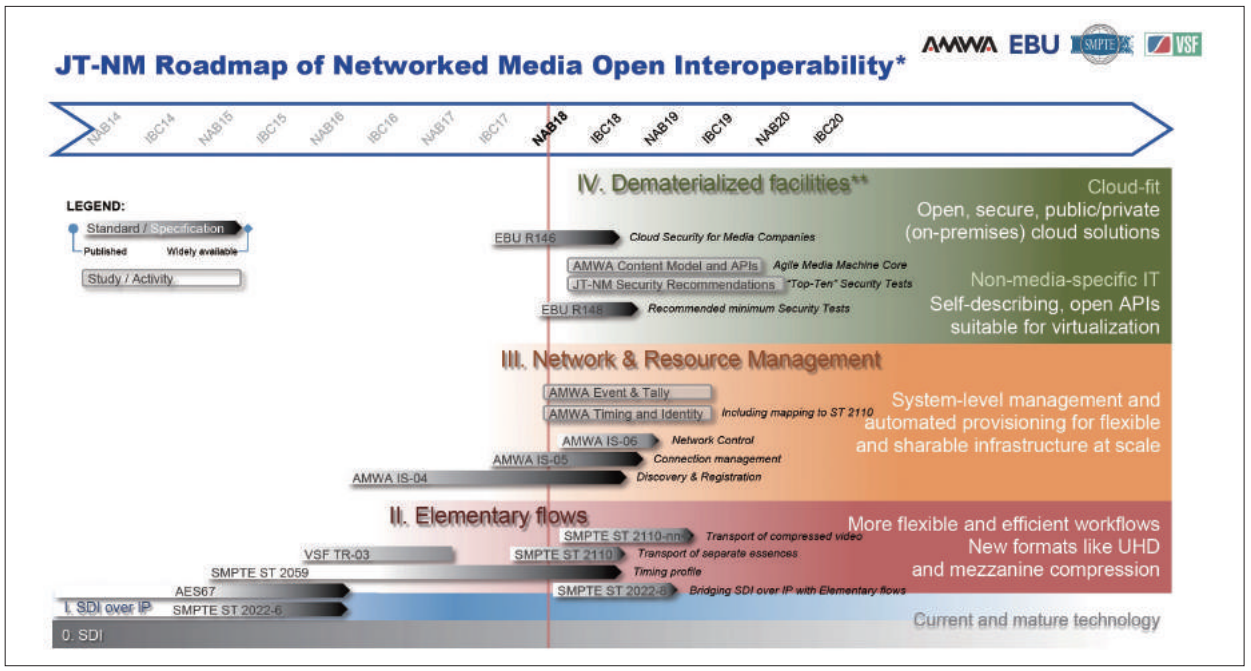
ST 2110-30 is an audio transmission standard based on AES67 and supports 48KHz sampling, 1ms packet time, and 1-8 channels of 16/24-bit depth (up to 64 channels) per stream. The standardization of ST 2110-10/20/30 was certified in September 2017, while the standardization of additional data, compressed video, and compressed audio is currently underway.

2. Synchronization

The IP production environment uses PTP, a method used for many years in the network sector but different from the frame sync signals of existing SDI production systems. PTP synchronizes by controlling the frequency and position of the synchronization messages between master and slave, maintaining a synchronization error of less than one millionth of a second. SMPTE ST 2059 uses the PTP synchronization method and regulates the generation of AV signal time codes based on SMPTE Epoch.

3. Equipment Registration & Management Standard

NMOS is an open, standardized IP-based broadcasting equipment management and control technology created by AMWA, and is comprised of IS-04, which defines the automatic identification and registration of IP broadcasting equipment, IS-05, which defines and manages the link between equipment, and IS-06, which defines the network control between NMOS systems. The standard documents for IS-04 and IS-05 have already been announced, while the specifications for IS-06 are under development.



[Fig. 2] IP-Based Broadcasting Production Technology Roadmap (JT-NM)

4. Network Management Technology - SDN

Previous IP network equipment could independently execute network control and packet transmission since it was part of the hardware. However, it was difficult to control varying video, audio, and language traffic and comprehensively manage and control equipment. IP-based network equipment with SDN (Software Defined Network) is being developed to resolve this problem. SDN technology separates network control and the packet transmission function, and uses a standardized interface and protocol (OpenFlow) for communication between centralized controllers and packet transmission. Furthermore, it enables easy central control of dispersed network elements.

Issues for Consideration in Construction of an IP-Based Broadcasting Production Workflow

On the flip side of the various advantages that can be expected from applying IP technology to the broadcasting production environment are many potential problems resulting from a lack of experience in communications technology and know-how in operation. Major issues that must be considered when constructing an IP-based UHD broadcasting production workflow are codec, remote production delay, integrated networking, and network malfunctions.

For news coverage that requires speed, compressed content is more efficient than uncompressed high-quality, large-capacity content. Development is necessary of an optimal codec that considers system compatibility and the complexity that exists in production situations where both compressed and uncompressed content exists.

For remote production, securing a link bandwidth between the filming site and production center is essential. However, securing a large bandwidth increases cost whereas insufficient bandwidth decreases reliability. Installing a final mixer-out at a remote filming site to improve on this will inevitably create delays in scene transitions. This will require construction of infrastructure and development of a low-latency system to resolve.

Using sync stream, stream control, real-time media stream, and file traffic comprehensively on one network allows for efficient management, but it is difficult to ensure QoS (Quality of Service). Separating the network to secure QoS will generate additional costs and management requirements. Therefore, construction of separate networks based on functions that are applicable to SDN technology should be considered.

The SDN controller manages the network, which streams UHD broadcasts and transmits related data packets in a centralized manner. Therefore, a malfunctioning SDN controller can lead to a malfunctioning overall network. This can be overcome by using more than one SDN controller in clusters, which allows switching to an alternate in the event of an error with one controller. This is referred to as a "Dual active configuration". In addition, composition of a spine-leaf network topology is needed between switches so that when a knot occurs in the link between networks, the stream changes to another link for uninterrupted transmission.

Direction of KBS's IP-Based UHD Broadcasting Production

SMPTE ST2110, the core standard for transmission technology and the base for IP-based broadcasting production technology, was completed in September 2017, while the standardization of NMOS network control (IS-06), which is the standard for open broadcasting equipment management and control, will be completed within this year. In 2019, IP-based UHD broadcasting equipment will be comprehensively launched, which is expected to accelerate the construction of IP-based broadcasting production infrastructure.

KBS has adopted a policy to construct UHD broadcasting production based on an open IP standard as an effective response to a new and diversifying media environment, as content becomes higher quality and larger in quantity, and in consideration of future scalability. To this end, KBS has constructed an open standard IP-based UHD broadcasting production testbed to test and verify a variety of workflows in such environments to minimize trial and error. This testbed is based on the technology to transmit content between broadcasting equipment, synchronization technology, and open standard technology for efficient workflow management and control. In addition, broadcasting network control and management technology that is SDN-based is being developed for application to broadcasting production in step with the development of network technology towards centralized SDN. With this as the backdrop, KBS is pursuing a national government task to develop an IP-based UHD production workflow platform technology, and related equipment, such as an IP signal converter and IP video switcher.

The development of broadcasting equipment towards IP means that existing hardware is being absorbed by software, which will enable the efficient operation and management of IP broadcasting equipment and increase scalability and flexibility. An IP-based broadcasting production infrastructure will enshrine this and increase utility and scalability of resources, which in turn will enable quick response to diverse new media services and lower infrastructure investment in the long term. The development of broadcasting production infrastructure towards IP is both a monumental challenge and an opportunity for groundwave broadcasters.

The Evolution of Broadcasting Platforms : OPS (Online Publishing Systems)

Manager of SBS Media Research Institute | **Yoo Seong**

What should we do if an overseas service provider suddenly requests broadcasting content from the past ten years? Anyone pondering a response to such a request would eventually think about utilizing original files saved in the archives. However, one would also reach the conclusion that it would be nearly impossible to provide high quality original files, in either physical or policy terms, for production to outside sources.

We are living in an era of openness and sharing. Service platforms such as YouTube and Facebook, who joined this trend much earlier than others, continue to grow as they are repeatedly chosen by the younger generation. Perhaps it would be relevant for broadcasting companies as well to take the golden goose out of their closet and join in. It would be natural to begin by setting up the definition and decide who gets to see what and how that can happen. In this context, I would like to briefly introduce a group integrated distribution infrastructure – the online publishing system, or OPS.

OPS was developed over a period of about two years (Phase 1: end of 2015 to end of 2016, Phase 2: early 2017 to end of 2017), and having recently been completed, it has entered phase-by-phase operations. This mainly consists of the construction of a distribution infrastructure that offers integrated management of content service platforms being developed individually, development of a clip image search management system based on scene metadata, development of a statistics system to analyze user patterns and establish distribution strategies, and expansion of a distribution window to construct an open online archive.

This required construction of a real-time automatic encoding system in Phase 1, which consequently required development of functions such as a main control room APC automatic control, CM separation pre-/post utilization of TPO (Transfer Program Only) watermarks, file change to enable real-time editing while recording, and 24-hour continuous encoding (to be used in the event of errors). Furthermore, high-quality original content accumulated in the archives over the past 27 years (more than 100,000 hours) was transcoded into multiple formats (according to resolution) to enable streaming. Based on these functions, an online archive system was constructed which could be randomly accessed anytime by domestic and foreign service providers. In addition, an online clip editing device was developed to enable IBP frame editing and clip creation in H.264 videos, and distribution storage was constructed for online services with scale-out architecture and easily expandable nodes.

The development of integrated CMS, which can enshrine major philosophy, took place simultaneously with the construction of basic hardware infrastructure and functions that include: media creation, editing, and distribution for online services; data analysis for content distribution statistics (by region, device, gender, age, etc.); archive sophistication centered on scene unit queries (including input UI unification with an archive system); B2B contract management, including of providers, packages, authorizations, distribution, and API; and Multi-CDN linkage, which can transmit media content from domestic and international service providers with maximum flexibility.

Two interfaces were developed for external sharing and distribution. First, a separate website was developed as an open archive system (promoted as the OASYS TV brand), with the objective of making available 27 years of archive content online and allowing for curation, unlimited logical section clips to partners, PIP-based statistics collection (provision of 'Embedded Player' or 'Media URL + Statistics API'), and metadata searches. Another interface is the OPEN API System, which can handle large-capacity traffic and can be accessed by up to 100,000 users at the same time (for VoD). It provides B2B and B2C interfaces that allow easy operation of broadcasting content-based services, and a VIDEO API which can separate player and media URL by provider. DATA API is also available, where queries and searches can be done for channels, programs, episodes, and scenes, as well as allowing for curation, and separates data (IDC) and media (CDN) networks for global providers.

In the recently completed Phase 2 of OPS sophistication, additional developments included virtual channel organization and real-time streaming, deep learning-based automatic scene metadata extraction and automatic online metadata collection, integrated ID-based automatic encoding, automatic scene metadata re-mapping for re-edited versions, and integrated group infrastructure management systems, including POOQ/SMR.

As such, construction of infrastructure over the past two years has been completed, and is being applied phase-by-phase to the provision of POOQ virtual channels, scene-linked advertising-based touch TV, OASYS TV (beta), organization-linked real-time streaming news on YouTube, TIVIVA UHD VOD file editing and distribution, and UHD ESG clip provision. After determining the main agent of operation, among other things, we will provide more diversity and entertainment in our services.

I would like to conclude by introducing how NCSoft managed to overcome a crisis, a story I heard during a presentation at SDF 2015. During the Asian Financial Crisis of 1997, NCSoft was having difficulties with direct sales of its game 'Lineage' to its users. After lengthy consideration and planning, it created a B2B2C business model that took advantage of a new distribution environment: PC rooms. In fact, this was an example of designing the concept of an OPS external interface, as introduced above. I believe we will soon witness concrete examples of mobile and online services available through OPS.

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Understanding the Cloud & EBS Cloud

Manager of EBS IT Operation Dept. | **Choi Won-Young**

The role and importance of IT continues to increase gradually as broadcasting programs undergo a change to a digital workflow based more on files than tapes, and as media users move on from TVs to mobile and web-based content.

In addition, companies are actively utilizing big data, a technological development of the Fourth Industrial Revolution, and artificial intelligence (AI), which is based on big data. Amidst these and other developments, this paper aims to critically examine cloud computing, which is the basis of and at the center of such changes, and discover how EBS is preparing to adopt cloud technology.

First, what is cloud computing? Cloud computing allows users as much access as they need to IT resources that exist in virtual form, including computing, storage, networks, and software, and then pay for the amount used.

Five essential characteristics of cloud computing are (i) On-demand self-service; (ii) Broad network access; (iii) Resource pooling; (iv) Rapid elasticity; and (v) Measured service.

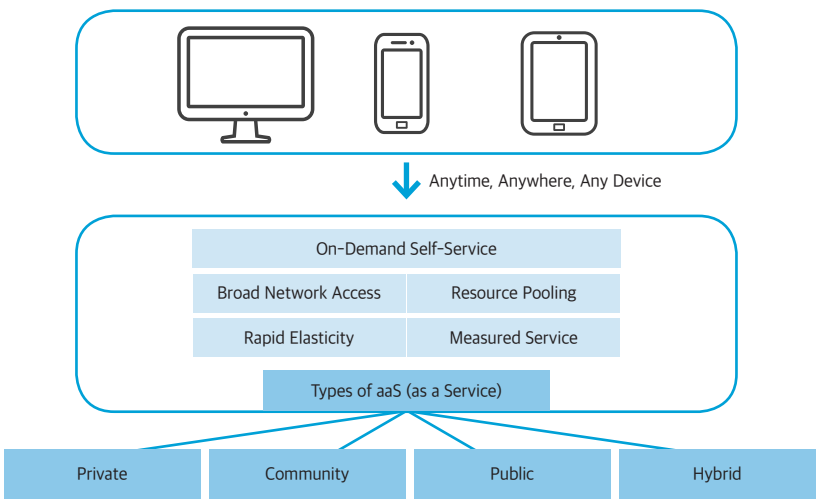
There are four deployment models according to location of computing resources and whether or not it is shared, and three service models according to the scope of service. (NIST: National Institute of Standards and Technology, 2010)

Cloud Deployment Model

Interpretations of the cloud deployment model may differ slightly, but generally it is a model to determine whether to establish an independent cloud environment, or create and provide a service using a public cloud company. This may be decided according to the characteristics of a company's services and its situation.

Cloud Service Model

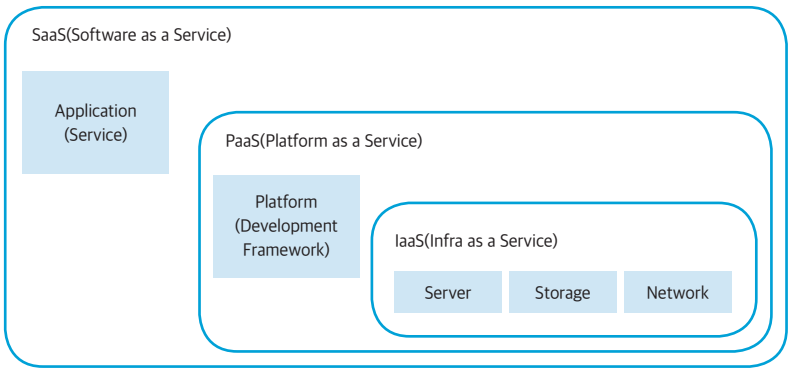
The cloud service model can be classified into three categories according to the service field provided by cloud computing. Recently, a variety of services related to the cloud have emerged, such as BaaS (Backup as a Service).



Cloud Computing Conceptual Diagram

	Description	Purpose for Use	Major Technology & Service Company
Private Cloud	• Exclusive cloud for a certain consumer • Managed and controlled by a company or institution	• Data protection • Security (network accessibility) • Compliance with industrial regulations	• Openstack • vmware vCloud • MS Azure Stack
Public Cloud	• Service provided by a cloud service company • Multiple users share the cloud via the Internet	• Requires significant computing resources in the short term • Requires various services (database, big data, development tools, etc.) • Provision of global services	• Amazon Web Service • MS Azure • Google & Oracle • Naver & KT Cloud
Hybrid Cloud	• A cloud which is a combination of private and public aspects	• According to the purposes of companies larger than a certain size – builds a private cloud, and – links it to the public cloud via a dedicated line	

Major Characteristics of Cloud Deployment Models



Cloud Service Model Fields

1. IaaS: Server computing (CPU, MEM), storage, and other infrastructure are provided as a service
2. PaaS: Customer applications and development platform are provided as a service
3. SaaS: Apps (programs) are provided as a Service

EBS Prepares to Adopt Cloud Computing

So far, we have looked at the concept and major characteristics of cloud computing. Cloud computing continues to evolve, and it seems that cloud architecture design in a virtual environment can be standardized to a certain extent. Cloud computing operations have entered the stabilization stage.

EBS has been meticulous in its preparations to adopt cloud computing since last year. Let's look at what EBS has been doing in this area, and its plans for future application and proliferation.

1) Transition of External Web System to U2L (Unix to Linux)

EBS services can largely be classified into an external web system for main services (to provide TV, FM radio), education content for elementary and middle school students, and the Korean SAT (Scholastic Aptitude Test); an internal interlocked system related to broadcasting production and delivery, and provision of content; and an in-house system, such as groupware.

In 2017, the external web system was changed from the traditional scale-up method (upgrading of capacity by purchasing large-scale equipment) to scale-out (upgrading of capacity by installing in parallel multiple small-scale equipment) via transition to U2L, and thereby successfully achieved transition and completed service verification to allow the provision of EBS web services on an x86 system.

2) Cloud Transition PoC (Proof of Concept) and Plans to Adopt & Proliferate

The possibility of transitioning to cloud computing is being reviewed from multiple aspects, and a transition to a public cloud PoC is being done for certain websites in the first half of this year to identify issues that need to be considered when transitioning to a cloud environment.

Based on the outcome of this PoC, we will examine what is needed in terms of services, technology, and management for a full transition to cloud computing, and determine top priority transition targets by considering service influence and resource utilization, and then pursue their transition to a cloud environment.

Today, technology and services are evolving to enable cloud application of the entire process from production to distribution and consumption of broadcasting media, and some ground wave broadcasting and media companies are already providing a variety of services through the cloud. EBS is an education service for all Koreans, and after lengthy consideration, has decided to set up plans for such a transition.

EBS is working very hard to put its "Restarting EBS in 2108" slogan into action, and by adopting cloud computing, a fundamental step forward in digital transformation, it is striving towards even greater reliability as an education broadcaster by acquiring quality education content through a cloud environment.

Panasonic

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A High End System Camera Setting a New Standard in 4K/HD HDR Acquisition

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KOBA World Media Forum 2018

At "KOBA World Media Forum 2018", we are going to talk about future media industry such as broadband wireless internet with launch of UHD and the change brought along fourth industrial revolution with well-known media experts from around the world. Along with this new paradigm which will fundamentally change our live, we want to invite you to discuss media revolution based on state-of-the-art technology and diverse contents with keen insights.

Theme : **Broadcast and Media, Connected Everywhere!**

Date and time : Tuesday, 15th May, 2018 14:00~17:30

Venue : COEX Conference Room 401

Language : Korean, English
(provide simultaneous translation)

Host :
KOBETA (Korea Broadcasting Engineers & Technicians Association)
BEA (Broadcasting Engineer Academy)
Ministry of Science and ICT
Korea E&EX Inc.

Sponsor :
Korea broadcasting development fund
Korea Communications Commission
Seoul Metropolitan Government

Tel : +82-2-3219-5635~42

15 Tue

Time	Contents
14:00-14:15 (15)	Opening
	[Session I] The Future of Media and New Challenge
14:15-14:50 (35)	"The Evolution of Connected Media" James Jackson (Technology Director, Digital UK)
14:50-15:25 (35)	"Watson Media Service" Kim, Geon-Hak (Client Technical Leader for Media Industry IBM Korea)
15:25-16:00 (35)	"Perfecting Media Experience with AWS" Shin, Jae-Won (Principal Sales, Amazon Web Services)
16:00-16:35 (35)	"The Future of Media Platform and Technology" Joseph Jongmin Lee (Senior Vice President, SK Telecom)
16:35-16:45 (10)	Break Time
	[Session II] Wrap-up : Broadcast and Media, Connected Everywhere !
16:45-17:15 (30)	Discussion : How broadcasting and media will be connected to each other? - Digital UK, Amazon Web Services, SK Telecom, KOBETA
17:15-17:30 (15)	Closing

KOBA 2018 International Broadcasting Technology Conference

The KOBA 2018 International Broadcasting Technology Conference will be held at the COEX Conference Center May 16-17, and aims to provide the latest information on broadcasting and media solutions. With the general public now able to access UHD resolution through terrestrial broadcasting channels, expectations for and interest in UHD broadcasting is at an all-time high in Korea. Through sessions on topics like UHD, IP and the cloud, KOBA will explore UHD broadcasting standards, work flow, and solutions. Sessions on smart media, AI and VR/AR will provide participants with a summary of issues on service strategies related to changes in media platforms. The pre-engineer session, in its fourth run this year, will offer an overview of broadcasting and media trends and an opportunity to explore major issues in the broadcasting engineer vocation. Come and see for yourself today's changing media environment at KOBA 2018!

Theme : *Media, Connected Everywhere!*

Hosting organizations : KOBETA, Korea E&EX Inc.

Sponsors : Ministry of Science and ICT,
Korea Communications Commission

Special sponsors : SONY, Grass Valley, AWS

Venue : COEX (Conference Center, 3rd fl.)

Inquiries : KOBETA Tel.) 02-3219-5635~42

16 Wed

Room no.	Session	Time	Theme/Title	Speaker
307	ATSC 3.0 Tech Insight (Special free session)	10:00~10:50	UHDTV transmission technology & overall understanding of UHDTV (ATSC 3.0)	Jeon Sung-Ho, Research Engineer of Technical Research Institute, KBS
		11:00~11:50	IP and mobile (wireless) broadcasting services based on ATSC 3.0	Kim Jin-Pil, Research Fellow of Advanced Standard R&D, LG Electronics
		13:00~13:50	UHD broadcasting and future goals	Yim Zung-Kon, Deputy Director of UHD Broadcasting Strategy Team, KBS
		14:00~14:50	2018 UHD customer experience : TIVIVA 2.0 & Olympic Winter Games IBB Service	Kwon Kee-Jung, Deputy Director of UHD Broadcasting Strategy Team, SBS
		15:00~15:50	Production of UHD international signals for the PyeongChang 2018 Olympic Winter Games	Song Hae-Dong, Deputy Manager of Sports Planning, KBS
		16:00~16:50	Understanding of HDR video transmission for the 2018 FIFA World Cup in Russia	Lee Byoung-Ho, Deputy Director of TV Transmission, KBS
308	Radio	10:00~10:50	Radio data analysis using the Gorealra application	Lee Kyung-Ryul, Deputy Director of Media Technology Research Institute, SBS
		11:00~11:50	Changes in environment & response strategies for radio broadcasting	Lee Sang-Woon, Professor of Namseoul University
	Pre-Engineer (Special free session)	13:00~13:50	Broadcasting technology as seen by a production director	Oh Kang-Sun, Chief Producer of KBS
		14:00~14:50	Major issues in 2018 broadcasting technology	Kim Sang-Jin, Director of Research of SBS
		15:00~16:50	How I became a broadcasting engineer : Season 4	3 to 5year Staffs (KBS, MBC, SBS, EBS, CBS)
317	Post production	10:00~10:50	DIT (Digital Image Technician)	Lee Jae-Hun, Technical Supervisor of DEXTER The EYE
		11:00~11:50	Appealing to the emotions through DI-Tone	Kim Il-Kwang, Sr. colorist of Dexter Studio
	Media services	13:00~13:50	IP Workflow and cloud computing	Kim Tae-Han, CEO of IML Co. Ltd.
		14:00~14:50	AI & the media platform as seen through POOQ	Kim Jun-Hwan, CEO of Content Alliance Platform Co.,Ltd
		15:00~15:50	AWS Media services *** free**	Shin Jae-Won, Principal Sales of Amazon Web Services
		16:00~16:50	Amazon AI/ML for media & entertainment *** free**	Kim Ki-Waon, Solutions Architect Manager of Amazon Web Services
318	Lighting	10:00~10:50	Show lighting & design for 4K (SBS Inkigayo)	Lee Seung-Hyun, Lighting Director of SBS A&T
		11:00~11:50	Understanding show lighting : Three years of King of Mask Singer	Oh Seung-Cheol, Deputy Director of MBC
	Blockchain technology	13:00~13:50	The Fourth Industrial Revolution's "Infrastructure of Trust" : Structure & theory of blockchain technology	Keum Chang-Sup, CEO of bigpicturelabs inc.
		14:00~14:50	Examples of blockchain use & possibilities in the broadcasting/media industry	Keum Chang-Sup, CEO of bigpicturelabs inc.
		15:00~15:50	Changes in the media environment from blockchain & AI	Nam Yoon-Sun, Media Strategy Team Leader of Cyworld
	Archiving	16:00~16:50	Understanding archiving systems for UHD video	Seong In-Ho, Vice President of SJ Technology Inc.

17 Thu

Room no.	Session	Time	Theme/Title	Speaker
307	UHD	10:00~10:50	Examples of UHD workflow & HDR content production	Kim Hyun-Min, Staff of SBS Production Technology
		11:00~11:50	Workflow of 4K/UHD live HDR production *** free**	Park Young-Cheol, Senior Manager of Sony Korea Professional Solution Div. Marketing
	IP & networks	13:00~13:50	Workflow of Grass Valley's IP-based UHD production *** free**	Yun Hyun-Dong, Sales & Marketing Director of SAMADMS, Inc.
		14:00~14:50	Basic theory & examples of establishment of networks	Heo Wan, Deputy General Manager of Ringnet
		15:00~15:50	UHD live studio IP production workflow	Lee Jae-Ho, Senior Research Engineer of Future Technology Research Institute, KBS
		16:00~16:50	Examples of establishing UHD multi-IP structures	Shin Jong-Seob, Executive Director of Production Facility, KBS
308	Smart media	10:00~10:50	Prospects for media platforms in 2018	Kim Jo-Han, Future Strategy Director of Gom&Company
		11:00~11:50	Analyzing viewers through social media data	Cho Won-Hyun, Senior Engineer of Marketing Stragegy, KBS
		13:00~13:50	The world of media & reality offered by blockchain tech	Cho Young-Shin, Senior Research Fellow of SK Research Institute
		14:00~14:50	Challenges & structural downsizing of the broadcasting market	Kang Jeong-Soo, CEO of Mediati
		15:00~15:50	Smart media & meta data	Yoon Sang-Hyeak, Manager of Smart Media Rep.
		16:00~16:50	Status & future directivity of the technological development of smart media	Lee Yong-Tae, Managing Director of ETRI
317	Filming technology	10:00~10:50	Drone technology at the PyeongChang Olympic Winter Games	Chang Mun-Gi, CEO of droneid
		11:00~11:50	Characteristics & technology of 4K/UHD lenses	Park Yong-Chan, Technical Master of CANON KOREA Consumer Imaging Inc
		13:00~13:50	Characteristics & utilization methods of HDR monitors	Charlie Shin, Managing Director/Divisional Head of Vidente Co., Ltd.
	AI	14:00~14:50	Clip broadcasting services that utilize deep learning technology	Hong Soon-Gi, Manager of Media Technology R&D Center, SBS
		15:00~15:50	Educating a part of yourself you never knew	Seo Jin-Soo, Deputy Director of Digital Revolution Team, EBS
		16:00~16:50	Broadcasting service strategies that utilize big data : Misunderstandings & analysis	Choi Hong-Gyu, Researcher of EBS
318	Future broadcasting industry	10:00~11:50	Fourth Industrial Revolution : Characteristics of the VR platform & its users	Jang Hyung-Jun, Technical Director of KBS TV
	5G	13:00~13:50	5G tangible broadcasting services for the PyeongChang Olympic Winter Games	Park Jae-Yeon, PM of KT Service Labs
		14:00~14:50	Development of mobile telecommunications technology in accordance with the Fourth Industrial Revolution	Steven Kim, Senior Director of Telit Wireless
	VR	15:00~15:50	Cases of 360 VR content production at actual broadcasting sites	Yoo Nam-Kyung, Director of Special Visual Effects, KBS
		16:00~16:50	360-degree live broadcasting technology used in broadcasting system	Kim Taek-Yung, Manager of SBS

Radio Revitalization Strategies in Light of FM Radio Reception by Smart Phones

General Manager of CBS Media Policy Planning Div. | **Kim Jung-Suk**

Absence of Promotional Policies for Radio

I once saw a newspaper article that warned against a "passive method of radio promotion" that relies primarily on "utilizing the scraps of the TV market," arguing that such passivity would make it impossible for radio to emerge from the industry's current downturn. Given the situation in today's radio market, the author of the article has a valid point. The operational plan of the Korea Communications Commission (KCC), which is publicly released each year, rarely, if ever, includes policies on radio: major terrestrial broadcasting companies are focused only on television-related policies. Even the systemic regulations on terrestrial broadcasts apply the same standards used for terrestrial TV to radio. While terrestrial TV is consistently expanding its share of the broadcasting market pie, starting from UHD and cable TV to now include comprehensive programming channels and IPTV, radio has been restricted by alienated promotion policies and outdated regulations. Today's radio landscape is bleak at best, based on tenacious dependence solely on FM to satisfy listener demand.

One-Fourth of Korean Citizens Listen to the Radio Every Day

According to an MRS survey[1] conducted in the first quarter of 2018, the radio listening rate of Seoul/Gyeonggi residents was 25.2 percent. As for listening venues, "the car" was the most popular choice (64.1 percent), while the method of listening was divided between radio transmitter (83.1 percent) and Internet radio (19.6 percent). In terms of Internet radio use, the number of people using smart phone applications was between three and four times higher than those who used a PC. While radio is still listened to mostly via car radio transmitter, it is worth noting that the number of smart phone listeners is rapidly increasing. In response to this trend, radio broadcasting companies have rushed to develop radio apps, with those that utilize supplementary functions (e.g. bidirectional service) becoming so prevalent that there are millions of logged-on users every day. The decline of radio is still a cause for significant concern given the rise of new media (e.g. podcasting), but it remains an integral part of everyday life.

Revitalization of Radio and Reduction of Telecommunications Fees for Users

On August 29, 2017, the nation received some very welcome news. A press release by the Ministry of Science and ICT stated that smart phones released from 2018 will be able to receive FM radio.

For many years, radio broadcasting companies tirelessly sought to persuade the National Assembly's Science, ICT, Broadcasting and Communications Committee (SIBCC), the Ministry of Science and ICT (MSI), and the KCC to enable the reception of FM radio on smart phones. To support the September 2016 proposal on revision of the Act on the Mandatory Reception of Radio on Mobile Telecommunications Devices and promote awareness of the need for FM radio reception on smart phones as a broadcast medium for disaster situations, CBS conducted several academic broadcasting-related debates, including two at the National Assembly. At these two debates, representatives of the National Assembly, the government and the general public agreed on the public value and practical necessity of making all smart phones FM-receivable. However, the enforcement of FM radio reception by smart phone manufacturers through government regulation alone poses numerous risks, including international trade frictions. The systemization of the direct reception of radio as a disaster broadcast medium is also ill-advised: there is no case of mandatory regulation overseas, and the predominant consensus among experts is that this matter must be left to the market's self-regulation. All of these processes gained the interest of the press and general public. In September 2017, just before a National Assembly discussion panel was scheduled to take place, the two largest smart phone manufacturers in Korea (Samsung Electronics, LG Electronics) agreed to include an FM radio reception function in their upcoming releases. Samsung's current main items (Galaxy S9 / S9+) include an FM radio function, which is also expected to be the case for the soon-to-be-released LG G7.

Finally, an opportunity has emerged for the auditory medium of radio. One would be hard-pressed to find radio listeners who have purchased a separate radio reception device (not including in their vehicles). However, tens of millions of smart phones can take the place of the radio transmitter, which leads to a foundation on which radio corporations can compete with other forms of smart media while strengthening the competitiveness of radio content without having to worry about device compatibility.

However, it is important to note that smart phone reception of FM radio is only an alternative window of opportunity: it cannot alone bring about the revival of radio. Currently, listeners access radio through the smart phone applications provided by each of the major broadcasting companies (CBS Rainbow, KBS Kong, MBC mini, SBS Gorealra, etc.) and can only listen through existing telecommunications networks. There is concern that users who are accustomed to the variety of functions available through radio applications will not want to use the much simpler mobile application that comes with the smart phone. Before we focus on increasing listener numbers for radio, which is a free and universal service, we must first require radio applications to enable reception of FM radio as a means of protecting users from excessive telecommunications fees.[2]

Hybrid Radio and Radio-Integrated Applications

For radio apps to receive FM signals, smart phone manufacturers must make public their API (Application Programming Interface) for the execution of FM reception chips in smart phones—a process that requires complete cooperation by the manufacturers. Currently, all terrestrial broadcasting companies (through the MSI's Radio Broadcasting Management Department) have officially requested that manufacturers reveal their APIs. The revealing of manufacturer APIs will finally open up an age of hybrid radio,[3] which has been discussed since 2014.

The Radio Broadcast Council[4] is also continuing discussions (which began in 2017) on the launch of a comprehensive radio application that enables smart phones to receive FM radio and services all radio-related content. To launch a platform that can (separately) accommodate the app services of each radio broadcasting company as well as all domestically-produced radio content, a great deal of time and discussion will be required to decide on operational methods and investment plans as well as for broadcasting companies to decide on what their stance will be. Indeed, the release itself of today's mandatory smart phone app was simple, but required the addition of other indispensable functions in order to gain prominence as a truly popular app. If radio manufacturing companies can create a revolutionary comprehensive app service, this may lead to the creation of a new market for the radio industry.

Establishment of Advisory Body on Radio Policy

The reception of FM radio on smart phones, hybrid radio, and the comprehensive radio app were all part of the radio revitalization plan submitted to the government for the survival of radio after an analysis of successful foreign cases by radio broadcasting companies and academia. The Korean government has now assumed a more proactive stance. Starting with the launch of the fourth KCC, the 2018 work schedule for it includes the preparation of a policy strategy for terrestrial radio. The content (diagnosis of the current status of the Korean radio industry, formation/operation of an expert research team that will analyze overseas cases for future policy discussions [first half of 2018], use research findings as the basis for establishment of a radio policy advisory body [second half of 2018]) is mostly abstract and may not produce immediate outcomes, but the fact alone that radio policy is on the agenda for the second half of the year is a significant advance. It is my personal hope that this advisory body can be the agent that produces a variety of radio policies to be implemented by the government.

1 Survey of radio listening rates in Seoul/Gyeonggi area conducted four times per year by Hankook Research

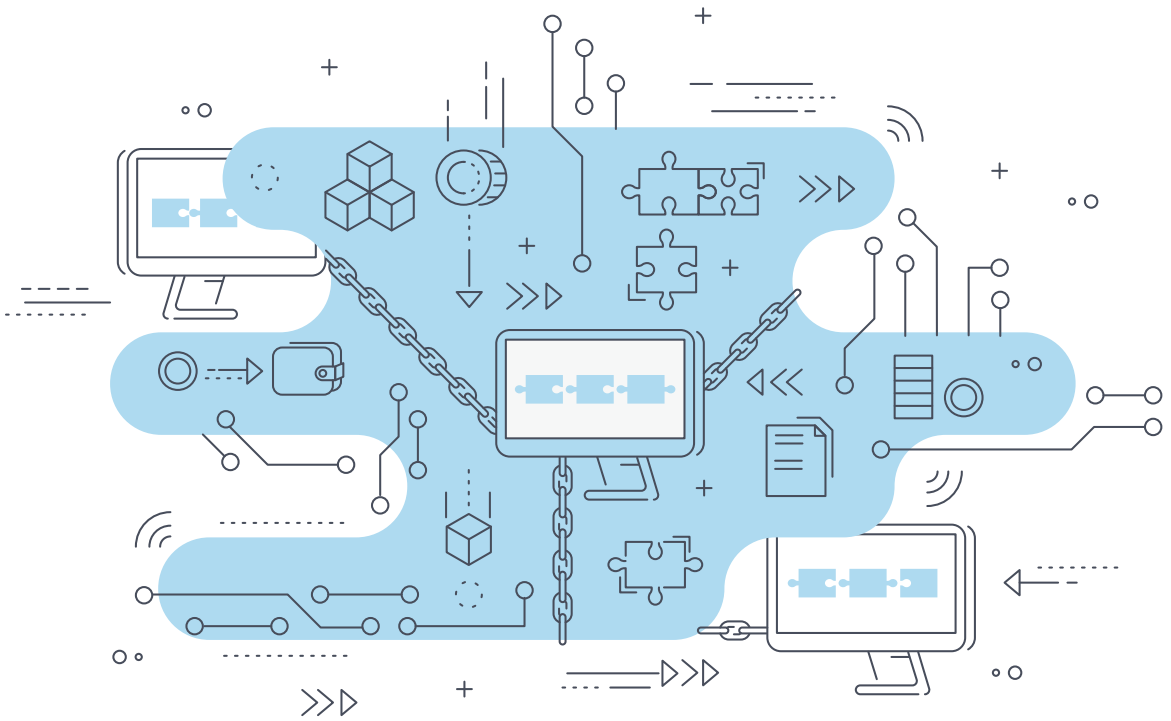
2 Listening to radio broadcasts for one hour per day via streaming consumes approximately 1.3G (given 96Kbps setting) of data per month. When converted to data coupon fees used by Korea's three major telecommunications companies, this results in approximately KRW 15,000~20,000. (August 29, 2017 press release, Ministry of Science and ICT)

3 Broadcasts receive FM signals, while supplementary services (broadcast data, listener feedback, etc.) utilize the telecommunications network, combining the advantages of broadcasting (low-cost simultaneous broadcasting) and telecommunications (bidirectional communication, big data utilization)

4 Terrestrial radio broadcasting company council affiliated with the Korean Broadcasters Association

Case Study of Blockchain-Based Media Distribution Platforms

Principal Researcher of ETRI Creative Contents Research Div. | **Kim Ik-Soon**



Blockchain is a technology that enables transparent and reliable record-keeping and maintenance of transaction information in a distributed ledger without a central server. Blockchain technology was first realized via Bitcoin, which is currently the most widely-used cryptocurrency and enables transparent and reliable management of transaction information even without a central bank amidst the unreliable conditions of P2P (Peer-to-Peer) networks. Universal blockchain platform technology has also made it possible to develop decentralized application programs like Ethereum and Hyperledger.

Blockchain technology is being utilized in a variety of areas, including warehouse distribution, food distribution, document certification, copyrights, land register transactions, and logistics. Through it, a variety of service models is being proposed via connections with digital content. What follows is a brief introduction of some of the most recent digital content service models.

Musicoin

Blockchain is a platform that utilizes decentralized distributed ledger technology which can instantly delivering creative content made by musicians worldwide while protecting musicians' rights to their content. Musicoin is a music source distribution platform that uses blockchain and smart contracts to make audio files public worldwide and directly connects musicians with listeners without an intermediary organization.

Through a transparent and instantaneous blockchain-based music source distribution pool, Musicoin protects copyrights and eliminates commissions (usually incurred during the intermediate stages), thereby making fair distribution of revenue possible. With digitalization in the 1980s and its universalization via the emergence of Napster in the late 1990s, the digital music industry saw increasing sales. However, the resulting profit did not reach the creators of that music. Musicoin uses a digital currency by the same name ("Musicoin (Music$)"): when someone listens to a song, the smart contract within the blockchain automatically withdraws the digital coin amount linked to the song from the listener's account (pay-per-play). The platform is currently in the process of being upgraded to Musicoin 2.0 and will be introducing a new consensus algorithm (proof-of-sharing) by 2018 as part of its commitment to "sharism."

SingularDTV

If Musicoin is for music, SingularDTV is for video. A platform that produces and distributes a variety of content based on the Ethereum blockchain, SingularDTV not only creates and broadcasts movies and TV content but also manages intellectual property rights and the allocation of revenue from distribution—all of which are conducted transparently with smart contracts.

When the revenue for particular content is determined, SingularDTV immediately transfers some of that revenue to the account of the artist/producer through a script inside the contract. SingularDTV uses its own cryptocurrency (SNGLS) and will be able to produce distribution revenue in the future based on the TVOD (Transactional Video on Demand) portal and portals like AppleTV, GooglePlay, and Vimeo. The 11 applications it will offer (ToKit, Launch pad, EtherVision, etc.) by 2018 will add further growth to the ecosystem.

DNN (Decentralized News Network)

DNN is a news distribution platform developed to share factual news that is free of bias and political authorities. The platform uses Ethereum blockchain to take advantage of the growing confidence in blockchain technology to avoid the pressure to distort (or unnecessarily edit) the news and spreads around the authority to verify news content.

Participants will take on one of four roles: writer, reader, reviewer and publisher. Once a writer offers an article, the reviewers (fact checkers) check it for errors in accordance with DNN's editing regulations and verify that the article is indeed based on fact, after which a decision is made on whether or not it is fit for distribution. Everyone involved in this process is adequately compensated for their work with DNN tokens (cryptocurrency). Ultimately, DNN can play an important role in improving the quality and credibility of the news.

KorroBox

KorroBox is an Ethereum-based platform that allows game developers to directly distribute and engage in transactions for games they create. Representing a fundamental break from the existing game distribution system, in which the distributor keeps most of the game's revenue and restricts transaction of game items. KorroBox does not take a commission for distributing games, but for game item transactions instead. Investment in game creation and transactions for in-game items will be funded through cryptocurrency. KorroBox is currently preparing for release in stages during 2018 and 2019.

MadHive's Blockchain-Based Online Advertising System

The fairness and transparency of exposure and click rates are two major issues in online advertising. MadHive is hoping to use blockchain technology to bring transparency to these two items and avoid secrecy and rampant manipulation. The company developed a blockchain technology for OTT TV, which is serviced via the Internet. The system it developed makes public all data related to advertisements (such as the number of exposures and clicks) and saves all such data in permanent blockchain storage. The blockchain data is used as the basis for auditing and distribution of revenue among advertisement industry stakeholders.

Currently, the majority of advertising fees are paid to intermediaries, and most advertisements are based on opaque exposure and click rates. A blockchain-based advertisement system, on the other hand, is expected to significantly contribute to efficiency and lower the costs of online advertising by bringing things into the open and eliminating intermediary fees.

The Age of Autonomous Vehicles & Radio Broadcasting

Professor of Dept. of Multimedia, Namseoul University | **Lee Sang-Woon**

The age of autonomous vehicles is just around the corner. Their emergence - not yet completely autonomous but operable under limited conditions - is on the rise. Although there have been a few accidents involving pilot self-driving vehicles, not many doubt there will soon come a day when drivers can travel from point A to point B with their hands off the steering wheel and wholly dependent on the vehicle's own driving system.

It is widely anticipated that 5G will act as the fundamental network in this coming age, which explains the intense competition among mobile carriers to prepare. If so, what is 5G to autonomous vehicles? Such vehicles will be able to reach their destination without accidents only if they can detect road conditions and respond quickly and accurately on their own without any involvement by the driver. This will require the application of a variety of cutting-edge technologies, such as the ability to receive GPS signals to identify its position and any facilities, vehicles, and pedestrians nearby, and video imaging, LIDAR, radar, ultrasonic sensors and a multitude of other such systems, to stay within its lane. The steering device and brakes must be connected to these sensors and kick in on time and accurately.

The U.S., which already possesses advanced autonomous vehicle technology and has conducted many test drives, has recently witnessed several fatal traffic accidents involving these vehicles, which are expected to make obtaining testing licenses more difficult. ADAS (Advanced Driver Assistance Systems) are being supplied to the market as a lead up to the release of autonomous vehicles. The system's advantages include the fact that the vehicle (not the driver) detects objects nearby and its surrounding environment, enabling it to avoid probable accidents and increase safety as it does not deal with driver fatigue. South Korea has also constructed a test area for autonomous vehicles, and I had the chance to ride some of these domestically-developed machines and acquire some direct and indirect experience with a variety of connected cars through overseas conferences.

The core technologies for both autonomous vehicles and ADAS are those related to sensing capabilities, which allow recognition of the situation around the vehicle, and those related to telecommunications, which allow the receiving and transmission of information. Herein lies the reason telecommunications companies are promoting 5G, claiming that it will be pivotal in autonomous and connected vehicles, which will all "be manufactured in the future with mobile telecommunications modules embedded".

It may be only natural to apply mobile systems to sensing and operations necessary for safe autonomous driving, but what the broadcasting community is also taking note of are the possibilities for entertainment services targeting people in the car who no longer have to drive. Mobile carriers of course want these services to be delivered mainly via their mobile telecommunications network. These mobile carriers share a mutual interest with platform and content companies such as Apple in accelerating the provision of media services using high-speed mobile networks instead of the currently-installed radio receivers.

Ground wave propagation as a monopolizing broadcasting service is a glamorous technology that is quickly fading with the emergence of comprehensive programming channels, acceleration of Internet access speeds, increased mobility and competing forms of media. What is more regretful is that ground wave broadcasters are not making the effort needed to utilize, promote, and market their network advantage and how it differs from mobile telecommunications networks. This is in stark contrast to how mobile carriers are working to present a future vision for their own technology and services they can provide and apply to diverse fields.

Of ground wave services, radio broadcasting is a differentiated mobile medium which can be relied on to provide disaster warnings, among other services, when mobile carriers cannot, such as in the event of earthquakes and typhoons. What's more, it has a considerable advantage in providing high-precision location information and real-time traffic information services vital for autonomous vehicles. Related technologies include RDS (Radio Data System), which is an FM data radio service method, and DARC (Data Radio Channel), while digital radio delivered over DMB, DAB, and HD Radio can offer a greater variety of data services.

In the U.S. and Europe, hybrid radio services that include radio reception in smartphones are gaining popularity, and there are many voices calling domestically for its adoption, which Samsung and LG are expected to do, beginning with their exclusive models.

There is also a move to adopt the WAVE (Wireless Air-Media for Vehicular Environment) network, a form of public network, in preparation for the coming age of autonomous vehicles and connected cars. But in contrast to broadcasting networks, WAVE and 5G may not operate properly in the event of a disaster or accident due to damage to or inundation of roadside telecommunications facilities. Furthermore, the issue of pricing for vehicle 5G services remains a question, which will probably increase the burden of already-high telecommunications expenses for the average household.

Will ground wave radio broadcasting lose its place as the most popular medium for vehicles due to the emergence of 5G, or will it increase its audience and provide high added value, such as through highly-precise location and real-time traffic information, critical to autonomous driving and connected cars? Will it maintain its honored position as a reliable disaster warning medium for citizens until right before the actual moment of disaster? This is an important issue worth thinking about.

Radio broadcasting must deal with a rapidly-changing technological environment to be ready with services demanded today. It needs to close the holes in its coverage so that the services it provides can be received anywhere a vehicle can reach. Only then can it look forward to the imminence of the autonomous vehicle age.

<Qualcomm's 5G for Autonomous Driving>
Sources : Accelerating C-V2X Toward 5G for Autonomous Driving, LightReading, 2017

<Entertainment in Autonomous Vehicles>
Sources : Parker Wilhelm January 04, 2016 Car tech C.C. Weiss, January 8th, 2017

Radio Data Analysis Using the Gorealra Application

Director of SBS Media Research Institute | **Lee Kyung-Ryul**

Although big data and artificial intelligence (AI) emerged a few years ago, more people began to recognize these terms after the go match between AlphaGo and Lee Se-Dol in 2016. Although an AI future may be fearful, as it is more intelligent than humans, there is great opportunity for us as long as we use it properly. I mention AI before I present my theme on data analysis because big data analysis is a large part of AI. Now data is one of the most important factors determining the success of any activity.

Traditional broadcasting uses radio waves, meaning audience usage and information cannot be identified or measured precisely. Sample surveys through People Meter, an audience measurement tool developed by A.C. Nielsen, or other audience surveys conducted by research institutions or broadcasting companies, are used as indirect means to investigate audience types and usage. However, due to difficulty in securing a sufficient number of random samples and analysis relying on memory, analytic accuracy can hardly be obtained. There are other limitations including time delays between the survey and application of its findings. Even as broadband has made the distribution of such content more active, it is technically possible to identify consumer usage through application log data. However, due to the interests of big media platform-based content providers (web portal services, telecom companies, and OTT services) and constraints like personal privacy policies, it is difficult to access data needed by broadcasters on audiences and their use of content and the related patterns.

Before television began to compete in distribution of broadcasting content, broadcasting companies established their own radio platforms and offered services over the Internet - "Gorealra" of SBS, "Mini" of MBC, "Kong" of KBS, and "Rainbow" of CBS. Possibly because radio does not draw as much attention as television does, it has not evolved into a media platform with diverse audience groups as much as television, and delivers programs for its own audiences through exclusive smartphone applications over the Internet. Due to lower numbers of online users than users via radio waves, these online radio platforms have not drawn much attention. But the number of listeners through smartphone applications has gradually increased, reaching 20% of all radio listeners in 2017.

SBS requires users to enter their gender, age and occupation to open the Gorealra app. About 150,000 listeners per day are consenting to this provision of their personal information (logs of users who do not consent are not collected). Based on log data that records audience behavioral patterns, the number of listeners per minute can be tallied in real time. Analysis reveals who and when each began and stopped listening. Producers use this data in allocating and improving their programs. Through such user information, producers of a specific program can make it even more suited for a targeted audience, instead of relying on their intuition. And the effect of the appearance of a specific guest or discussion of certain issues can be detected immediately. The hypothesis that the appearance of very popular celebrities (members of EXO or Wanna One for example) actually increases the number of listeners is validated by data, and SBS production teams are currently using this analysis to deliver better content to audiences. The results of listener analysis are offered to agencies for radio advertising and promotion as well as production of radio programs to make the radio business more efficient. Gorealra Radio's targeted advertising for each audience and program can increase revenue. Data analysis can also complement periodic surveys in terms of broadcast programming. As analysis of application logs has the advantages of immediacy and accuracy similar to a complete enumeration, SBS has found some benefit to using application data analysis in production, programming and advertising as well as complementing existing surveys.

However, analysis of application log data is fundamentally limited to analysis of listeners via smart applications and analysis of own programs. To overcome this, efforts are being made to secure radio usage data from a variety of broadband-based media platforms such as smart speakers with AI. I suggest that domestic radio broadcasters present cases of how to analyze and use application log data, share them, and conduct integrated log data analysis through establishment of a collaborative radio platform. Conflicting interests may arise as the ranking of program popularity for each radio broadcaster is disclosed, but there is more to gain than lose. Besides real-time radio broadcasting, podcasts and reruns have emerged as a new genre. Platforms are diversifying into such arenas as smart speakers with AI. Another round of challenges and competition is coming.

As Crisell argued, radio is a blind medium beloved by listeners thanks to the intimacy and friendliness achieved through the convenience of sole dependence on auditory signals and interaction with presenters. In the face of crisis, radio broadcasters have sought a breakthrough by striving to bring their programming and organization closer to the daily lives and lifestyles of their listeners. This suggests the importance of precisely identifying target audiences and closely examining their listening behavior to bring competitiveness back to radio. This is now possible through analysis of application log data.

Log data analysis offers us much to gain.

MBC's Online Content Distribution System

Senior Engineer of MBC System Engineering Team | **Lee Yong-Seong**

In the past, general audiences have had access to video content only through analogue TV programs or VHS video if it was not a filmed movie. However, the rapid development of media technology diversified the distribution of broadcast and video content through network TV, cable TV, internet protocol television (IPTV), over the top (OTT) service, and various video clip platforms. In addition, increasingly international exchanges allow audiences to enjoy popular TV series made overseas instead of only domestic content. Accordingly, consumers of video content, confined in the past to real-time broadcasts, can now purchase and watch video content in a variety of ways.

The change of trends in consumption of media content has also brought about diversification in advertising channels and a consequential loss of advertising revenue growth for network TV. The rapid growth of the VOD market has created new revenue streams, and network TV can only survive with constant effort to build up sales of their online content to make up for the losses incurred by decreasing TV advertising revenue. And media businesses that do not create their own products need to ensure a stable supply of new content. In line with the evolving media environment, MBC created and continues to improve its own media content platform known as "Content Gateway," through which it transmits its own content to media operators at home and abroad quickly and effectively.

The below diagram shows how Content Gateway works. The content collection module gathers media content in a variety of formats. The automatic recording function serves for the supply of newly produced content. The delivery-connection module gathers real-time broadcast information and provides titles and previews. The platform also includes a metadata collection module that supplements the essence content. All modules are connected to the archive system, which can supply products that are steady sellers.

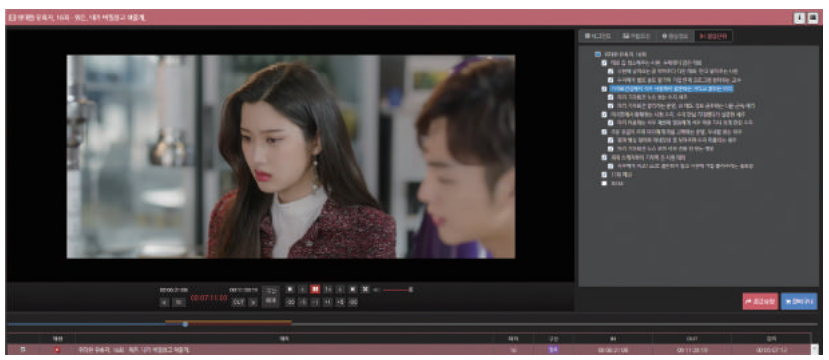
The received and collected media files and metadata are processed in a variety of ways through the CMS module. The reservation/supply management function allows each media operator who holds a contract with MBC to register on the system, while the data/volume management module prevents data loss. The user web allows access to the CMS monitoring system and creation of a variety of tasks.

External supply features functions that ensure efficient delivery of content to individual media operators. Domestic operators receive through transmission servers since Korea has a high-quality network infrastructure. Overseas clients or occasional customers can download the content through their web. The metadata API provides content and epilogue information for each serial content.

This infrastructure is fundamental to the Content Gateway system. A variety of metadata and task information is stored in the database, while essence are kept in large-volume storage. Software programs dealing with transmission and task process act on the server, while the terminals are used to monitor the system and task registration. All of these functions are connected through a high-function network.

Content Collection	CMS	External Supply	Infrastructure
Archive-Connection	Reservation/Supply Management	Transmission Servers	Database
Automatic Recording/ Delivery-Connection	Data/Volume Management	Download Web	Storage & Network
Metadata Collection	User Web	Metadata Supplying API	Servers & Terminals

Components of Content Gateway



Screen Captuer of Content Details

The above described features act on software programs and databases. For optimal performance, functions controlling equipment and managing files are operated by independent applications. Those that are controllable by metadata processing are designed to be activated following the procedures and jobs on the database. Users from content departments can have easy access to and manage relevant functions through web. Excluding a few solutions included in the platform, most functions are designed and developed by professional media IT developers, who also control source code levels. This allows the developers to promptly respond to any problem arising with regard to content delivery.

The system is utilized to provide media operators outside Korea with our media content. Popular dramas, variety shows, and other TV programs are supplied to IPTVs and cable system operators. Affiliated companies that use our content or companies that have partnerships with MBC receive products through Content Gateway, which also delivers to media operators in Southeast Asia, Japan, Hong Kong, Taiwan, and New Zealand. In addition, towards preventing illegal distribution of media content, video clips or finger prints are registered in various content protection systems in a way similar to what is done for VOD distribution.

The supply of transmittable supporting data products is expanded in line with global market trends where essence and metadata content are traded in sets. In the past, only essence video content was supplied, but currently titles, teasers, trailers, program information about staff, casts, genre, episodes, and other metadata can be added. Also provided are program posters, main character photos, stills, and synopses to assist media operators with content promotion. To promote export of content and assist hearing-impaired viewers, subtitles in Korean and other languages are also collected and provided. Organized delivery of content for each series and episode requires systematic management of metadata, which allows stable content supply without disruption. Content Gateway helps register metadata that is necessary for airing this content.

One of the strongest aspects of Content Gateway is its user-friendly interface which allows each content management staff member to register the details of content supply. Any operational conflicts are avoided as the platform is mapped to ensure each user can manage only the information of the clients they are responsible for, and unnecessary requests are blocked in advance. Communication is kept efficient, thereby improving productivity.

In the archive system at MBC headquarters, a huge number of programs (video files and metadata for each scene) that have been aired over decades are stored with useful production sources. The metadata is indexed in the search engine for quick search. Essence content is divided and provided by section. As seen in the below screen capture, each scene of a file is accompanied by classified and stratified metadata. Users can pick up certain sections only and create video clips by section and deliver them at once.

Media content delivery is divided into two categories for old and new products. Like fresh produce, newly-created media content can generate larger revenues when it is quickly made available to viewers. To make this possible, MBC's new media products are encoded on a real-time basis in formats used by major media operators and transformed into VOD content. Encoders are controlled in line with the automatic program controller (APC) schedule. Old programs are connected to the platform archive so users can search and transmit content desired by media operators.

As society changes rapidly, media products demanded by viewers have diversified. Each generation, gender, and region have their own preference for media content, and a variety of products are needed to meet this demand. The content delivery system should also evolve constantly to provide more products to more media operators for the lowest cost. MBC's Content Gateway system will undergo ceaseless development in line with the ever-changing media environment.

Production of UHD International Signals for the PyeongChang 2018 Olympic Winter Games

Deputy Manager of KBS Sports Planning Div. | **Song Hae-Dong**

The PyeongChang 2018 Olympic Winter Games, one of the top three world sports events and the largest to be held in Korea after the 2014 Incheon Asian Games, was held with great success in February this year. As a matter of common knowledge, large-scale sports events such as the Olympic Games and the World Cup are no longer participated in by athletes alone or only for the spectators of the games. Anyone working in this field will agree that sport is transforming into a medium for promotion of brands and a marketing venue for global corporations seeking to generate added value, while also a competitive battlefield for the world's media stations that broadcast and report on these events.

Sports is becoming a field where global media stations seek to "one-up" each other to better express the dynamism of the athletes and ponder how to better comprise a system that will more vividly convey the excitement and tension in the arena to the viewers.

In this light, the supervising broadcasting station that produces and transmits the overall event becomes increasingly more important and unprecedentedly large. Its international signals utilize new and advanced technology to broadcast each event, while the amount of resources injected into production continue to astound viewers and media workers alike.

Inside the Arena for Curling

In contrast to how UHD broadcasting, dubbed as the next-generation broadcasting service, was test-produced and provided to the Rio 2016 and games in the past, it was officially serviced to all individual broadcasters in the PyeongChang Olympic Winter Games.

From the perspective of Olympic Broadcasting Services (OBS), HD production had the higher priority; however, it is clear that UHD (Ultra-High-Definition) production will account for a greater proportion of broadcasts from the Tokyo 2020 Olympic Games on.

This can be inferred from how major Japanese broadcasting companies produced UHD broadcasts on-site throughout the PyeongChang Olympic Winter Games, and from my conversations with an OBS manager.

Three groundwave broadcasters, including KBS, worked ceaselessly with the supervising broadcaster, OBS, in step with the original airing in UHD in May 2017, and took part as supervising broadcasters in the PyeongChang Olympic Winter Games to produce international UHD signals.

The three groundwave broadcasters cooperated with OBS with ten or so outside broadcast (OB) vans installed with 4K cameras. KBS was entrusted with broadcasting curling, MBC with ice hockey and SBS with speed skating, and all of whom faithfully completed the production of related 4K international signals.

Before the beginning of the PyeongChang Olympic Winter Games, curling was not a popular sport in Korea, but by the end of the Games, it had become one of the most watched winter sport and every Korean was shouting "Young-mi!". The staff members broadcasting the Games were swept up in the excitement of the atmosphere and, despite a variety of difficulties, managed to successfully fulfill their responsibilities.

KBS UHD OB vans are comprised of 10 (8+2) 4K cameras, one SONY MVS-7000X, and one EVS XT-4. However, when we were procuring the vans, there were not enough 4K products to replace HD products in special cameras that can offer diverse screen compositions and LSM for the replays essential to sports broadcasts. This was a reality that all three groundwave broadcasters and OBS had no choice but to acknowledge. As mentioned above, there was a shortage of resources since HD production was the higher priority for the PyeongChang Olympic Winter Games. It was a challenging environment to produce and service programs that were 100% UHD.

There was a total of four sheets at the games venue, the Gangneung Curling Centre, and the HD International Signal Team installed more than 30 cameras to cover the entire event. The UHD Production Team made it a principle to cover Sheet B where the qualifying rounds and finals were mostly held, and utilized a total of five 4K cameras. Furthermore, the ceiling robotic camera, which is crucial for broadcasting the curling games, could not be installed, so instead, the HD International Signal Team received sources from three cameras that covered the sheet and underwent up-conversion. In the end, a total of eight cameras were used for the 4K production.

If we compare the resources input for each sheet, the HD International Team utilized 14 cameras (nine exclusive and five common-use) to broadcast the semi-finals, and as mentioned above, utilized a total of eight cameras, including three up-converted camera sources.

For audio, the Team received distributions of sources captured on microphones installed in the arena through MADI, and were produced at 5.1ch after tailoring for UHD video.

KBS adopted UHD OB vans immediately before the Games (December 2017) for the UHD production of curling. There was not enough time to stabilize the OB vans before the Games, but with the commitment of OB van staff, production was successful and without even the smallest of incidents.

Upon retrospect, there were several challenges throughout the Games, but the chance to participate as part of the team to produce international signals at the Olympic Games, which is the greatest standard in international signals, was a rich experience. I am happy to share some of my experiences since first participating in the discussions leading up to the production of UHD international signals until my return to the office after finding success in what I had been assigned to do.

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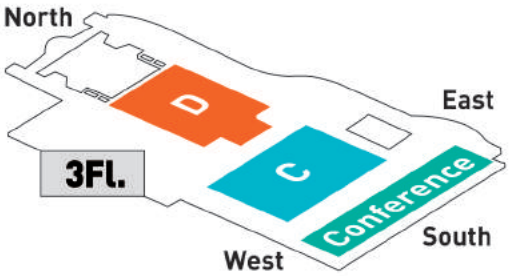

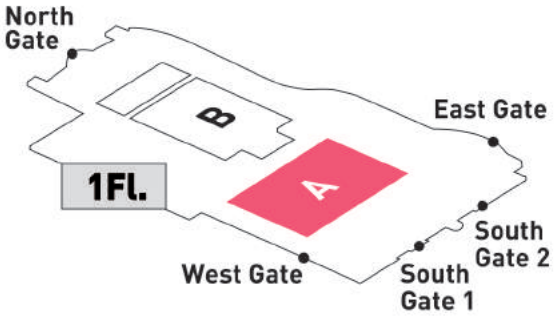

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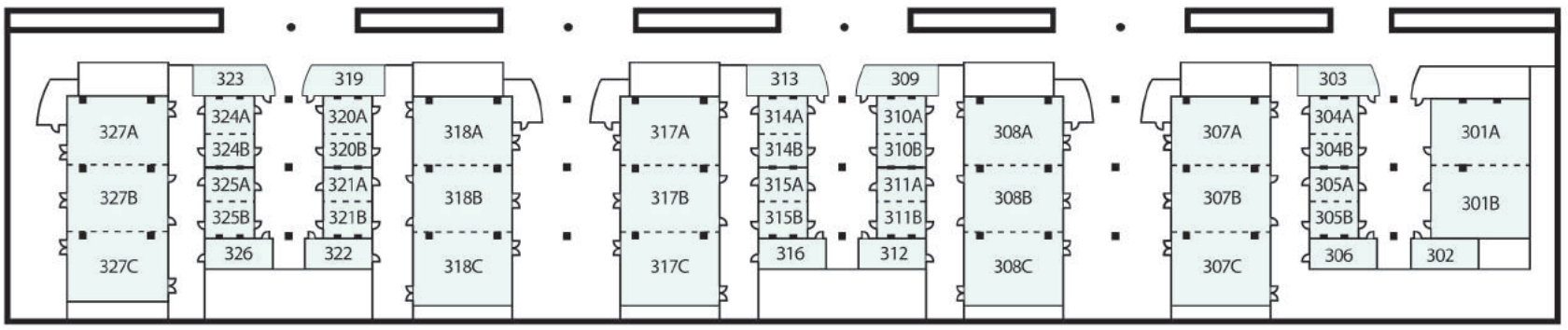

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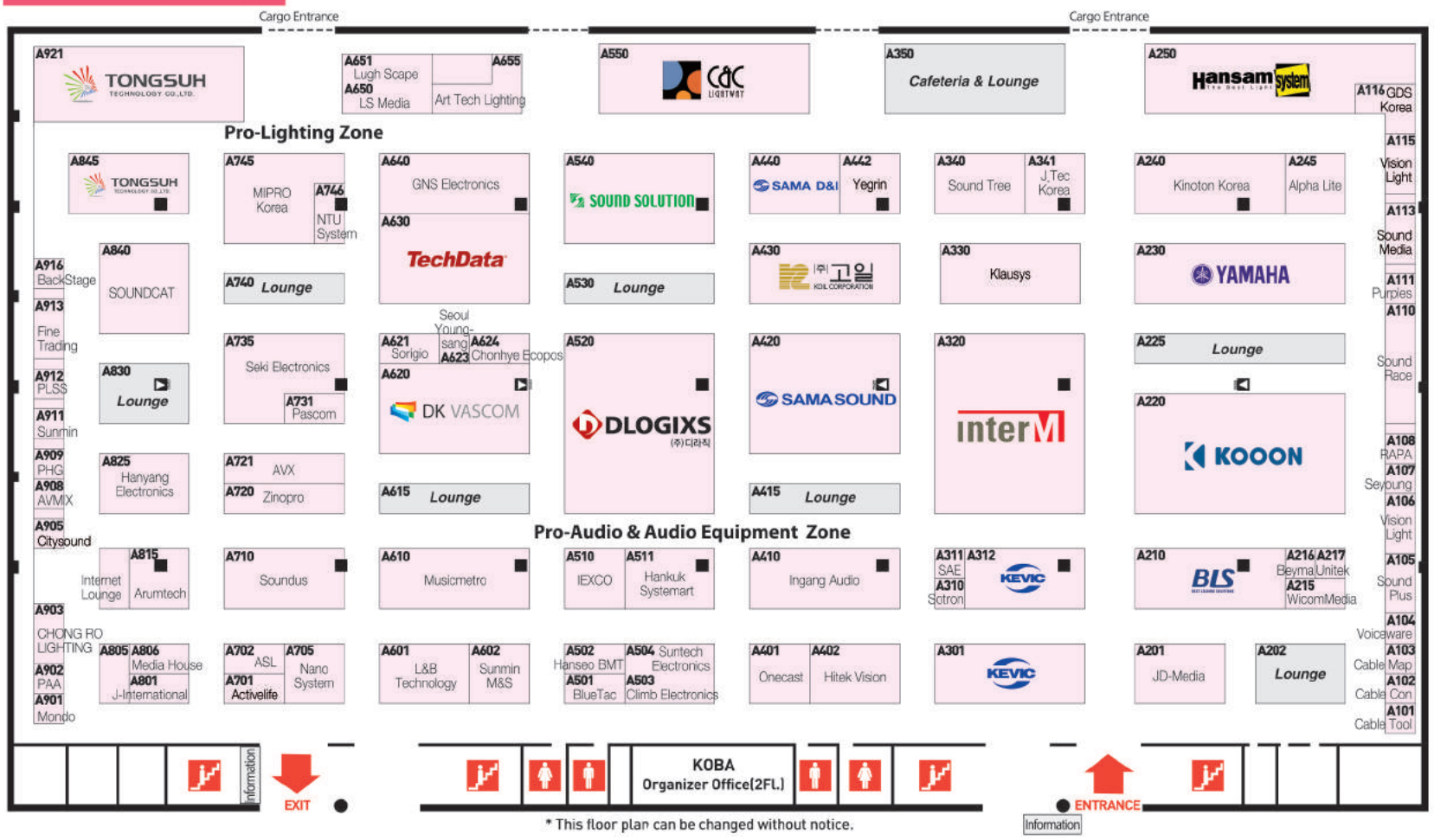

* This floor plan can be changed without notice.

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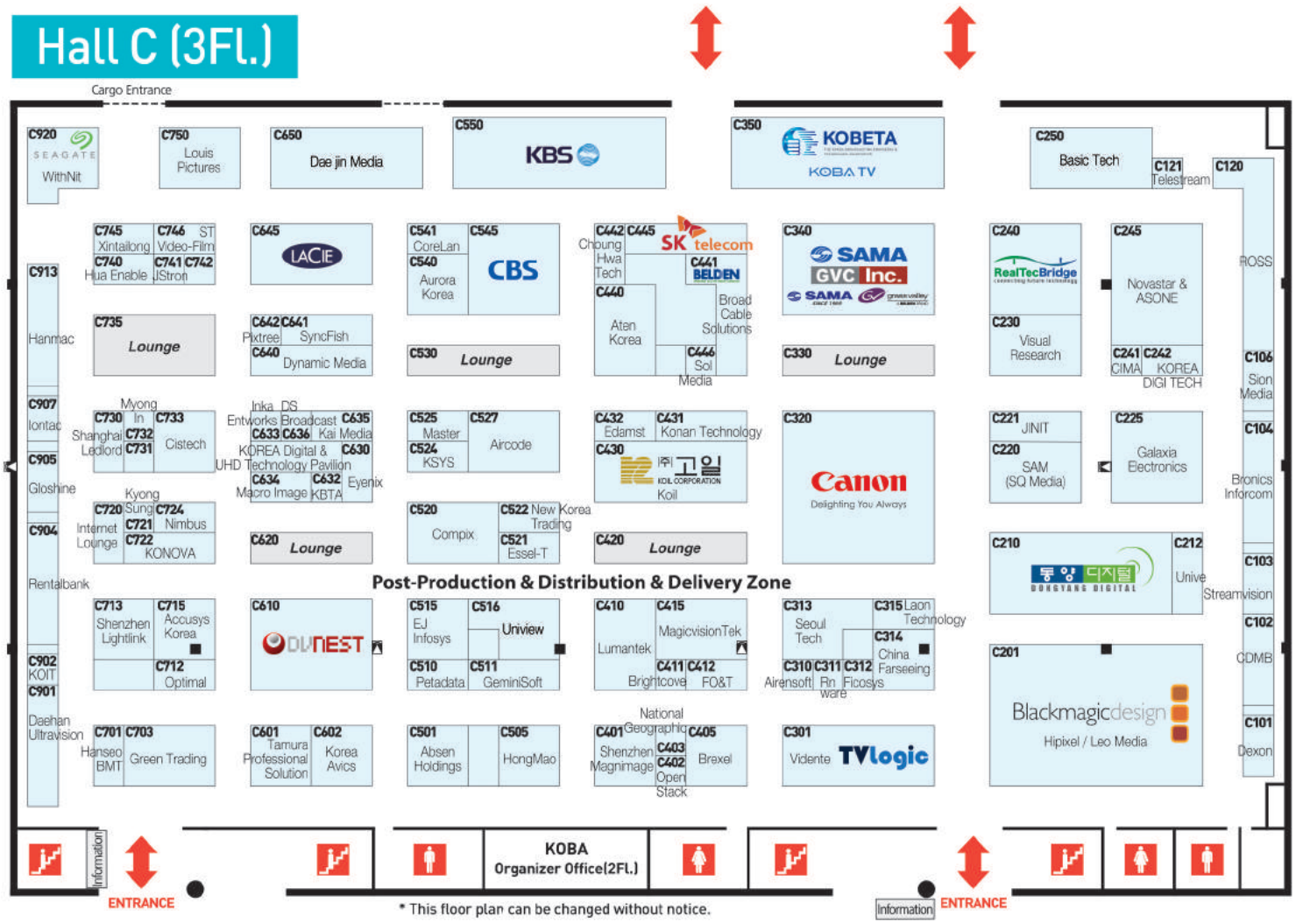

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· Exhibits Categories

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Pro-Audio - Amplifiers, Speakers Microphones, PA, SR, Console
Pro-Lighting - Studio/Stage/LED/Out-door/Indoor Lighting, Lighting Control System, Laser Technology, Effector
Stage Equipment - Stage System, Stage Design, Truss Technology
Church Facilities, Musical Instruments

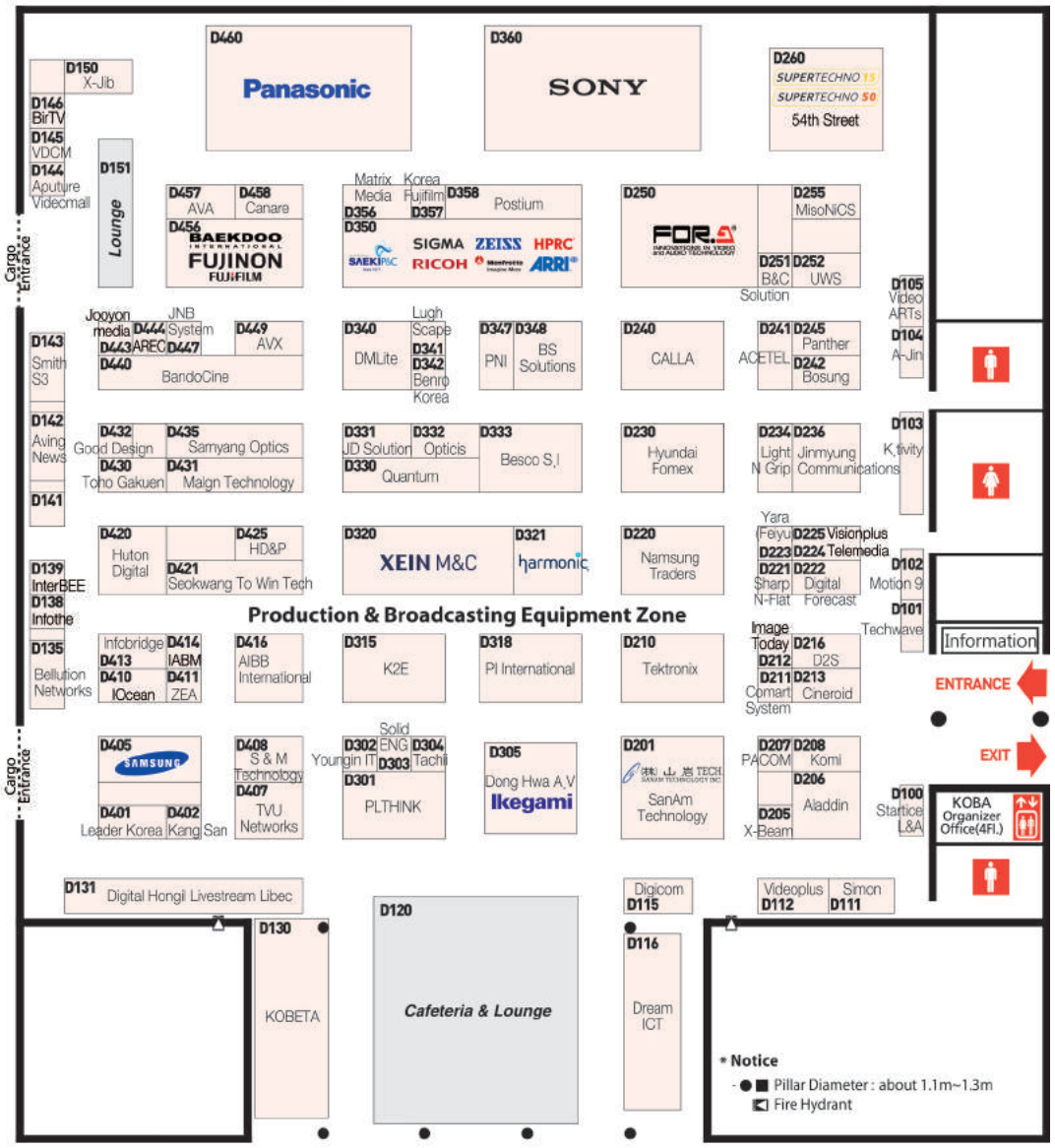
Hall C

Post-Production - Editing Devices, Non-liner Editing System, Encoder, Media Converter, Title Production System, VR/AR Technology
Distribution & Delivery - Wifi/WiMAX, 4G, 5G, LTE, IPTV, Output & Transmission
Digital Contents - TV, Mobile, Movie
Electric Display, Electric Power Unit, Measuring Equipment

Hall D

Production - Camera, Camcorder, Recording Lenses, Storage, Server Data Compression Technology
Broadcasting Equipment

Hall D (3Fl.)



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