

ABU DBS 2021

INSPIRE, ENGAGE & ENHANCE

5 - 8 APRIL VIRTUAL EVENT



DIGITAL BROADCASTING SYMPOSIUM 2021

FULL REPORT INSIDE

ALSO INSIDE

A Microservice-based architecture for developing OTT services

SONY

All in the details

Introducing the new TRIMASTER 4K HDR Picture Monitor range

When it comes to critical colour reproduction, Sony TRIMASTER monitors blow the competition away. The proud tradition of redefining accuracy and consistency continues with our new range of TRIMASTER high-grade picture monitors.

- TRIMASTER technology delivers precise greyscale and accurate colour reproduction, achieving 100% colour gamut coverage of the industry-leading BVM-HX310 master monitor
 - New Black Detail High/Mid/Low reproduces the correct colours and gradations in low-luminance areas
 - New Dynamic Contrast Drive backlight driving system dynamically changes the backlight luminance to adapt for a scene of a frame
 - PVML-HSX1* optional license enables conversion function for HDR-SDR, 4K to HD down-conversion and conversion for colour space and OETF
- * PVM-X1800/X2400 monitors must first be updated to V2.0



PVM-X2400
24-inch TRIMASTER
4K HDR Picture Monitor

New! PVM-X3200
32-inch TRIMASTER
4K HDR Picture Monitor

PVM-X1800
18.4-inch TRIMASTER
4K HDR Picture Monitor



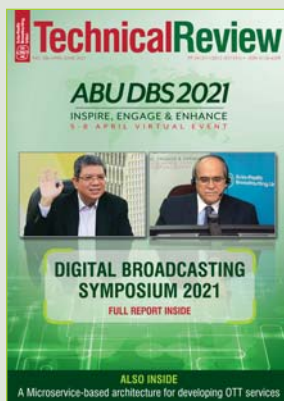
For more information,
please visit

[www.](http://www.pro.sony)

pro.sony

from The Editor

- 02 A Microservice-based architecture for developing OTT services
- 08 DRM STANDARD
Some Guidelines for a Successful Roll-out
- 10 DBS 2021 | Thank you to our sponsors and supporters
- 11 DBS 2021 | Broadcasters urged to adopt new technologies
- 12 DBS 2021 | A Full Report
- 21 DBS 2021 | Industry Debate - How Asian broadcasters faced the pandemic
- 22 DBS 2021 | Workshops
- 24 DRM Digital Radio Standard is Ready for Local Services
- 30 Webinar on IP Infrastructure & Applications in Broadcasting
- 34 NHK STRL 2021 Open House
WBU-Technical Committee Meeting June 2021
EBU Technical Assembly 2021
- 35 News from the ABU Region
- 37 Digital Broadcasting Updates
- 40 Equipment Trends
- 43 DBS 2021 Team
- 44-45 Personalities & Posts
- 46 Richard Barton Farewell
- Calendar of Events



Cover: ABU DBS2021 Virtual Event

Hope you and your families are doing well and keeping safe. We are happy to bring to you the 2nd edition of this year's Technical Review. As promised this edition will focus largely on the ABU DBS2021 virtual event, which was held on 5-8 April.

Our biggest annual event, the ABU's Digital Broadcasting Symposium was, for the first time, organised as a virtual event due to the ongoing pandemic. We are extremely grateful for the support from our members and our industry partners in organising the event. The 4-day event consisted of 13 sessions, including three workshops, which were presented by close to 50 experts from around the world. It addressed many topics and themes related to broadcast technology including the move to digital as well as more advanced topics such as 5G, AI and IP applications. You will find a detailed report on the proceedings and the topics inside. Once again, we would like to extend our gratitude and appreciation for all those who joined and supported the DBS2021 virtual event.

This edition also carries two feature articles contributed by IRIB-Iran and the DRM Consortium. The article with the title "A Microservice-based architecture for developing OTT services" reviews existing reference architectural models and proposes a combined microservice-based model for developing OTT services.

The second article titled "DRM Standard – Some Guidelines for a Successful Roll-out" provides some key points and strategies in planning and rollout of a digital radio service. Although the article discusses the DRM Standard these strategies are generally applicable to any standard.

This edition also includes highlights from activities organised by ABU Technology during the last few months. The edition concludes with our regular highlights from industry news, digital updates and the latest in equipment trends. We hope you will benefit from the information and materials included within the pages. Stay safe and take care.

Ahmed Nadeem
nadeem@abu.org.my

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

The ABU Technical Review is published in March, June, September and December of each year.

The reproduction of articles published in this Review is not permitted, except with the prior consent of the Editor. News items may be reproduced provided that the source is acknowledged.

Responsibility for contributed articles published rests solely with the authors and the views expressed are not necessarily those of the ABU.

Subscription rates (annual, 4 issues): Asia-Pacific US\$40.00; the rest of the world US\$45.00. Advertising and Editorial offices at Kuala Lumpur.

Published by
Ahmed Nadeem
ABU Technology

The Asia-Pacific Broadcasting Union
2nd Floor, IPPTAR Building, Angkasapuri, 50614 Kuala Lumpur, Malaysia
Telephone: (60-3) 2282 3108 Fax: (60-3) 2282 5292

For advertising inquiries, contact
Hamidah Rani
email: hamidah@abu.org.my

Design & Layout by: **The Vermillion Trading**
Printed by: **Kinta Premier Print Sdn Bhd**
30 Jalan Nadchatiram, Taman Taynton View Cheras, 56000 Kuala Lumpur, Malaysia
Tel: (60-3) 9133 2828 Fax: (60-3) 9133 2323

A Microservice-based architecture for developing OTT services

Abstract: Architecture is one of the most important issues in developing large-scale software systems. Software architecture describes software system components and the communication among them. Because of the critical impact of architecture on the success of a software development project, it has become one of the most important fields in software engineering. Today, OTT services throughout the world have found a new position on a very large scale. The development of a large-scale software system with quality features, such as high performance, fault-tolerance, speed and security, requires the provision of a proper architecture. In this paper, we first review the reference architectures in the field of OTT services and media (e.g. SAM, FIMS, and MCMA) and pay attention to their strengths and weaknesses; we then propose an appropriate architecture for developing OTT services. This architecture is based on the microservice architecture pattern and includes various services such as asset management, content gateway, content linking, content distribution, semantic services, and analytics.

Keywords: Service oriented architecture, Microservice architecture, Cloud-native architecture, OTT service, Distributed service

INTRODUCTION

Architecture is thinking in advance. It can be viewed from various aspects. System architecture, software architecture and enterprise architecture are different types of architecture. In the software world, architecture is significant. Software architecture is the structure of a system which consists of software components, the externally visible properties of those components, and the relationship between them. Microservices are the latest trend in software service design, development, and delivery, and microservice-based architecture is a distributed application in which all the components are microservices.

In this article, we present a microservice-based architecture for developing OTT services by using reference architecture models and software development patterns. The article is organised as follows. First, an overview of the reference architectures is given in Section 1. Section 2 then reviews the software development patterns. The pros and cons of related architectures are given in Section 3, and Section 4 presents the proposed architecture and details of its components. Section 5 concludes the article and identifies future work.

1. REFERENCE ARCHITECTURES

We review three reference architectures, SAM, FIMS, and MCMA. These models are defined and implemented in EC and EBU projects.

1.1. SAM: Socialising around Media
SAM – Dynamic Social and Media Content Syndication for 2nd Screen – is a project funded by the Seventh Framework Programme (FP7) of the European Commission. SAM develops a social media delivery platform that provides open, standardised ways of characterising, discovering, and syndicating media content items

interactively. SAM focuses on the development of a unified platform for the creation, delivery and usage of “second screen” Internet companion device experiences for television programmes.

The SAM goals are organised around three main pillars, as described below:

- **Content Syndication:** This is the base of the SAM project. Based on content syndication techniques, different types of content providers prepare their assets, so that they can be associated with specific media and context. SAM provides the mechanism so that these assets can be discovered, associated with the user activity, and delivered in the expected format to be consumed in the user context. Content syndication in SAM is concerned with content management, content selection, and content delivery of complementary content to end-users.
- **Social Media:** Social interaction around the media items provide the context in which the syndicated content will be consumed.
- **Multi-Device Representation and 2nd Screen:** The SAM Platform provides the syndicated information, in the right format, so that it can be consumed by different types of device. Multi-screen interaction involves the representation of multiple devices and the integration of first and second screens.

SAM uses a Service Oriented Architecture (SOA) approach in which the different functional components will implement coherent functionalities and thus the composition of all these interrelated components will comprise the complete SAM architecture. SAM consists of several components split into four architectural layers (Data Management, Control, Communication, and Interaction). The

SAM architecture is also based on the presence of a central communication bus, that is used by the different SAM components to exchange information.

As described, the architecture of the SAM Platform contains the following logical layers:

- **Data Management:** This layer includes interconnections for data import and acquisition from external data sources and third-party systems. It also contains the cloud data storage service component, and those components that realise the storage of different data types. It provides support to communication with 3rd party systems and external social components. The components in charge of these functionalities are the Content Gateway and Social Components, respectively.
- **Control:** This layer hosts all the components that offer control over the platform. In this layer, it is possible to find Semantic Services, Context Control, Identity and Security Services, Brand and Consumer Protection Services, and the Syndicator.
- **Communication:** The communication layer is realised with the Interconnection Bus. It plays a central role in the communication among the different components of the platform as it allows reliable transmission of information between them.
- **Interaction:** This layer performs all interactions and realises the user interfaces with the platform stakeholders. The components at the interaction layer provide user interfaces (UIs) so that the various human actors can access them. Dashboard, Analytics, Linker, and Marketplace are such components. The architecture is shown in **Figure 1**.

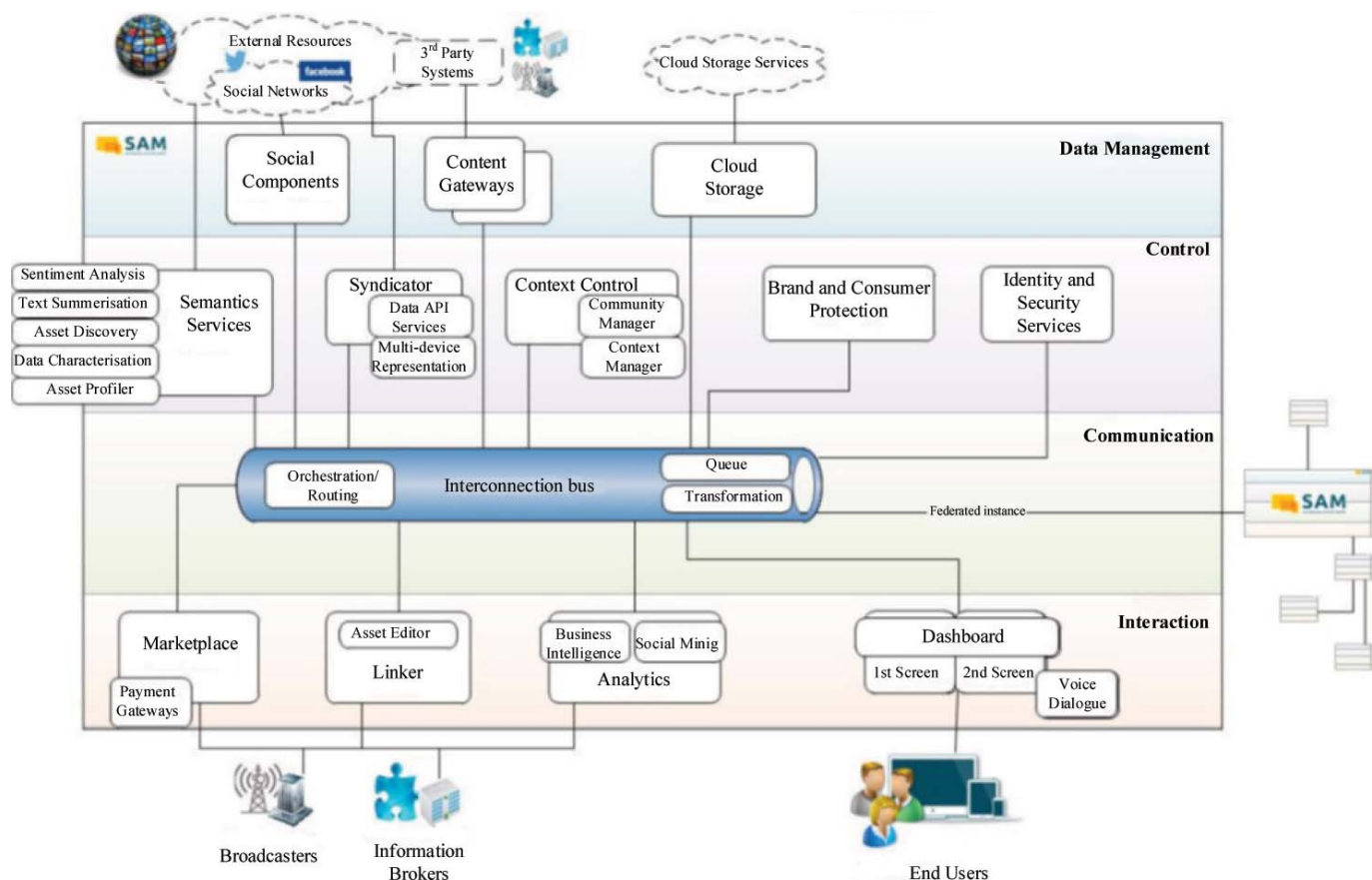


Figure 1 : SAM Architecture

1.2. FIMS: Framework for Interoperable Media Services

FIMS is a collaborative project between the Advanced Media Workflow Association (AMWA) and the European Broadcasting Union (EBU). This project has developed standards for a framework to implement a media-friendly SOA. The FIMS solution aims to provide a flexible and cost-effective solution that is reliable and future proof. It should allow the best of breed content processing products to be integrated with media business systems.

The FIMS team released V1.3.1 as an EBU specification, Tech 3356. Ingest,

transfer, transform, quality analysis (QA) and content repository are FIMS media services. The project has expanded on the conventional SOA with additional features to meet the needs of media operations. Specifically, FIMS adds:

- **Asynchronous operation:** allows for long-running services. A media process may take hours or days, whereas conventional SOAs allow for processes that complete in seconds or minutes. This places specific persistence requirements on the SOA BPM platform.
- **Resource management:** allows

process and resource scheduling to be cognisant of very long-running media processes. SOA typically is based on an ESB that carries XML messages between services.

- **A media bus:** operates in parallel to the ESB to transport the large media files between services.
- **Security:** includes authorisation and access control, but for media operations, it may well include digital rights management or watermarking of content files. The enterprise nature of SOA and ESB will make the need for security policies. The architecture is shown in **Figure 2**.

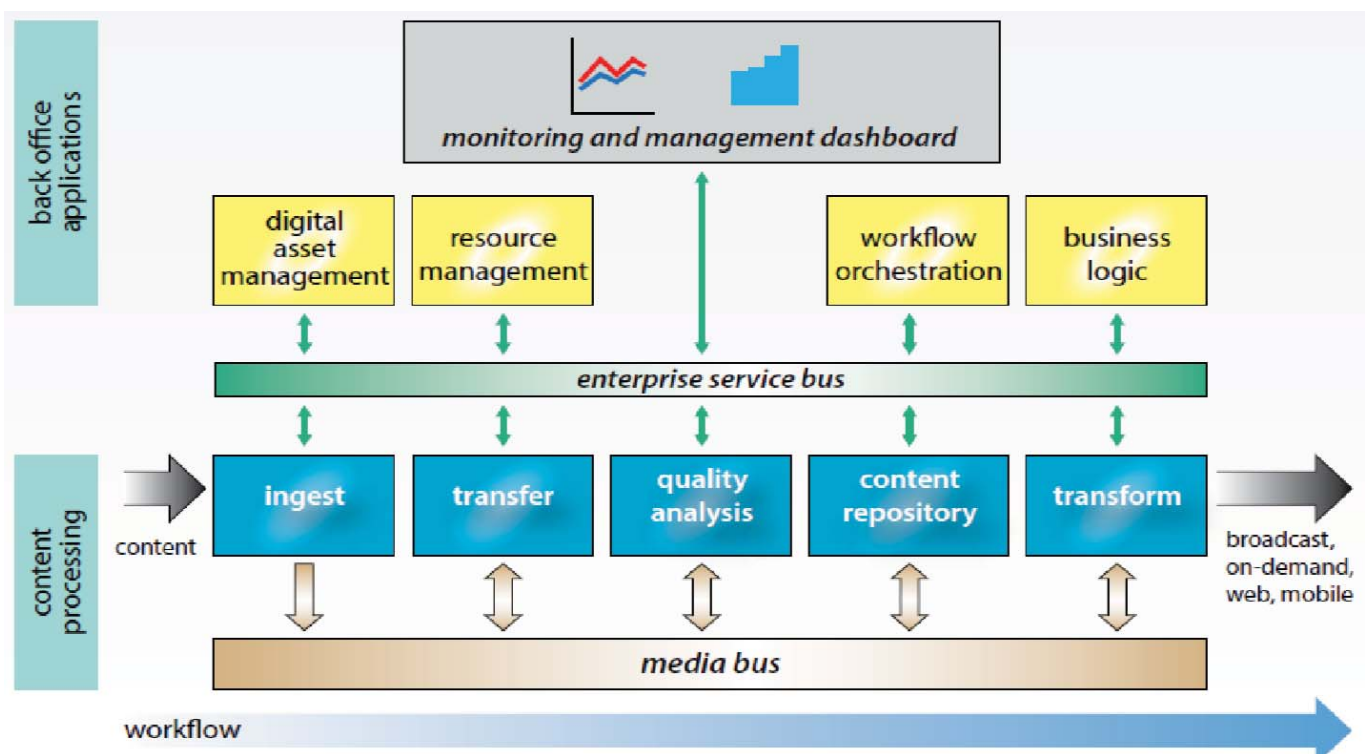


Figure 2 : FIMS Architecture

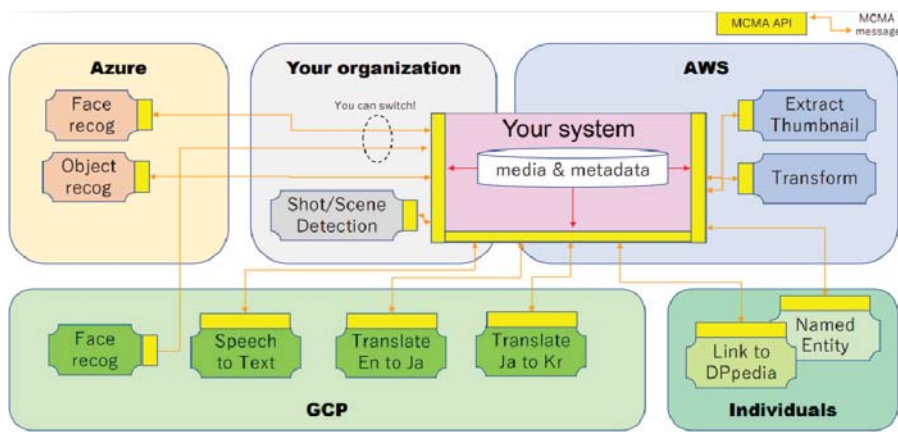


Figure 3 : MCMA Architecture

1.3. MCMA: Media Cloud and Microservice Architecture

MCMA builds on and continues, the services developed as part of the Framework for Interoperable Media Services (FIMS). MCMA is a project of the EBU Strategic Program on Media Information Management and Artificial Intelligence.

The MCMA Objectives are as follows:

- Developing a set of simplified REST APIs with minimum payload, to allow integrating workflows, combining microservices in the cloud with other in-house services and processes.
- Sharing libraries containing glue code between the high-level APIs and low-level (e.g., cloud) platforms.

Also, it can use the AI services of public clouds, such as Microsoft Azure, Amazon AWS, and Google Cloud Platform (GCP).

Google cloud platform (GCP) services, such as face detection, speech-to-text, text translation (e.g., English to Japanese, or Japanese to Korean), face detection and detection services of Microsoft Azure, and services for extracting thumbnail images and conversions (e.g., transcoding, etc.) on the Amazon Cloud Platform (AWS) are accessible. Because microservices are directly linked to artificial intelligence services, and because of the scalability which that provides in cloud platforms, this architecture is a combination of artificial intelligence

services implemented via microservices over cloud platforms.

Using MCMA architecture, simultaneous use of face detection on two different clouds (e.g., Azure and GCP) is possible. Media organisations can use the features provided by different clouds in their media workflow. The relationship between the various services can be organised through the MCMA API.

Figure 3 illustrates the media services environment with the MCMA.

2. THE SOFTWARE DEVELOPMENT APPROACHES

Software development approaches are categorised by monolithic, SOA, microservices, and cloud-native approaches. In this section, the features and characteristics of these approaches are discussed, after which their similarities and differences are examined.

2.1. Monolithic

In this approach, each software program consists of components that cannot be implemented independently, and the existence of a single framework is required. In a monolithic architecture, everything is bundled together. If you want to upgrade or update just one service, the entire app must be updated. So, monolithic is so-called 'tightly coupled'.

A monolithic application is built as a single unit. Enterprise Applications

are often built in three main parts: a client-side user interface (consisting of HTML pages and JavaScript running in a browser on the user's machine), a database (consisting of many tables inserted into a common, and usually relational, database management system), and a server-side application. This server-side application is a monolith - a single logical executable. Any changes to the system involve building and deploying a new version of the server-side application.

2.2. Service-Oriented Architecture (SOA)

SOA is a design approach where multiple services together provide a set of capabilities. SOA was initially developed as a solution to overcome the issues with monolithic applications. Reusability and loose coupling are the fundamental principles of SOA. SOA is made of main components such as SOA services, EBS or Enterprise Service Bus and Service management and monitoring.

2.3. Microservice

Microservices is an architectural style that aims to realise software systems as a package of small services, each deployable on a different platform, and running its process while communicating through lightweight mechanisms like RESTful APIs. In this setting, each service is a business capability that can utilise various programming languages and data stores. A system has a microservices architecture when that system is composed of several services without any centralised control.

The microservices approach is a way of dividing an application into components with well-defined interfaces, each performing one and only one business function. These components (or microservices) are independently deployed and operated by a small team that owns the entire lifecycle of the service.

Figure 4 shows a comparison of monolithic architecture and microservice architecture.

2.4. Cloud-native

A cloud-native application is an application built to take advantage of cloud computing models, to increase speed, flexibility, and quality while reducing deployment risks. Despite its name, a cloud-native approach is not focused on where applications are deployed, but instead on how applications are built, deployed, and managed. In other words, cloud-native is the name of a particular approach to designing, building, and running applications based on infrastructure-as-a-service (IaaS), combined with new operational tools and services

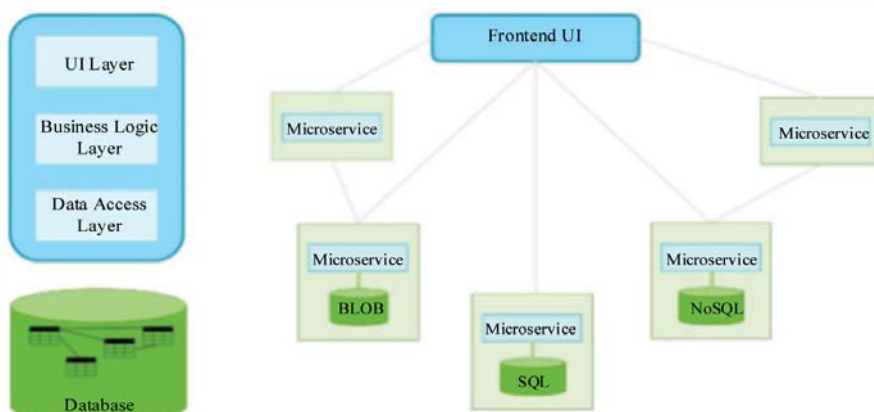


Figure 4 : Comparison of monolithic architecture and microservice architecture

like continuous integration, container engines, and orchestrators. The overall objective is to improve speed and scalability, and ultimately, margin.

2.5. Comparing the software development approaches

Regarding the software development approaches, this section addresses the strengths and weaknesses of these approaches compared with microservices.

Microservices is a novel architectural style, that has been proposed to overcome the shortcomings of a monolithic architecture in which the application logic is within one deployable unit.

SOA is often associated with web services protocols, tools, and formats such as SOAP, WSDL (Web Services Description Language), and the WS-* family of standards. In contrast, microservices typically rely on REST (Representational State Transfer) and HTTP or other formats perceived as being lightweight and native for web development. It is viewed mostly as an integration solution, whereas microservices are typically applied to build individual software.

Enterprise Service Bus (ESB) is the main part of SOA architectures responsible for message routing, choreography, transformation, and applying business rules; in contrast, microservices use smart endpoints and dumb pipes as a lightweight message bus. The infrastructure chosen is typically dumb (dumb as in, acts as a message router only). Simple implementations such as RabbitMQ or ZeroMQ don't do much more than provide a reliable asynchronous fabric. The smarts still live in the endpoints that are producing and

consuming messages, in the services.

Cloud-native approaches are similar to microservices architectures. However, although microservices can be one of the outcomes of building cloud-native applications, there are many steps to reach the level of maturity for managing microservices in production. Microservices are not required to take advantage of all the benefits provided by cloud-native apps. Many organisations achieve the benefits of cloud-native approaches by focusing on building better modular monoliths using the same principles.

3. COMPARISON OF REFERENCE ARCHITECTURES BASED ON SOFTWARE DEVELOPMENT APPROACHES

SAM architecture follows the SOA architecture model. This model covers all the requirements of OTT services such as storage, distribution, analysis, delivery, etc. It is assumed that content production is done before. As this architecture considers the media workflow and is suitable for developing new OTT services, the core of the proposed architecture is mostly SAM components.

FIMS architecture, similar to SAM follows the SOA architecture model and due to the use of components such as ingest, transfer, quality analysis, content repository, and transform is proper for the archive department. The ESB and Media bus is used for orchestration and messaging between services.

MCMA architecture is based on microservices and uses artificial intelligence services of public clouds. So, this architecture can be used in combination with the media workflow of organisations.

In the proposed architecture, we prefer to deploy services on our private cloud, we use the benefits of SAM components and MCMA architecture approach (i.e., microservices) as well as RESTful API. Considering the results of the review of the international reference models in the field of media and their software development approaches, we will present the proposed architecture for OTT applications in the next section.

4. THE PROPOSED ARCHITECTURE FOR DEVELOPING NEW OTT SERVICES

The proposed architecture in this section is a combination of SAM and MCMA reference architectures. The components and services with the same functionality of the SAM architecture model are used. Furthermore, we use the microservice architecture model that originates from MCMA architecture for full compatibility with cloud models, avoiding the ESB overheads caused by SOA architecture models, and facilitating future developments.

This architecture has three main layers, data gathering, management and orchestration, and presentation; all components being distributed in these three layers. Also, a cross-layer is considered to provide security and authentication of components. All of the components and services provided are microservices and they interact with each other through RESTful APIs. The task of orchestrating and managing communications between components is the responsibility of the API Gateway, so the components are not interacting directly. The overview of the proposed architecture is shown in **Figure 5**.

The data gathering layer contains cloud storage (i.e., to store data and support different types of databases), content gateway (i.e., to interact with external resources of other systems), and social media interface (i.e., to communicate with social networks). Internal contents and services are provided through social networks and other on-premise systems in the broadcaster's private cloud, like IRIB (such as EPG, archive, etc.). Additionally included in the orchestration and management layer are; BPMS (i.e. to handle the processes), content distribution (i.e. to provide the correct output format for presentation to end-users), context control (i.e. to control the context of users), brand and consumer protection (i.e. to protect brands from unauthorised use and protect users from being harmed by unexpected content) and semantic services (i.e. to provide AI services). Moreover, included in the presentation layer are the asset management component, which

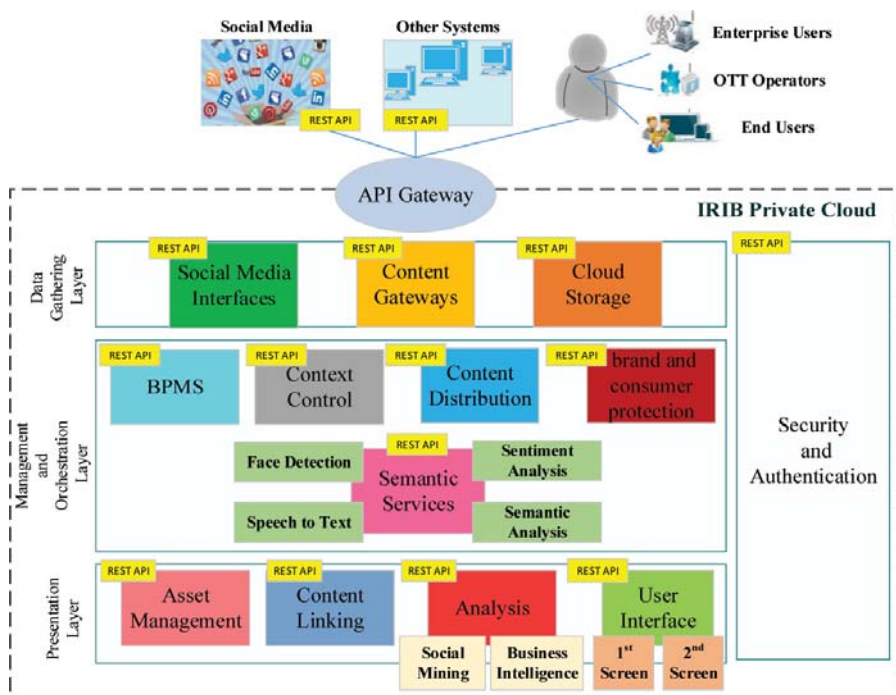


Figure 5 : Proposed architecture for developing new OTT services

moderates interfaces for enterprise users, OTT operators, a content linking component, which links related contents, an analysis component, that analyses data and generates reports, and the end-user interface. Authentication and security services control user access to related content.

The API Gateway is located on the border of the system, and so can be managing and orchestrating internal component communications, external resources, and users. The system assumes that content has already been produced, and this system only deals with managing assets, discovering their relationships with each other, providing AI services for richer content and distributing them based on end-user needs.

From a user's point of view, the system usage scenario is that enterprise users or OTT operators log in to the system through the asset management interface. This interface allows the user to import content, content characterisation, metadata, and so on. On importing content (e.g., archive material) and its related information to the system, it is stored in cloud storage. Then, any content related to archive content can be discovered using a content linking component and semantic service and

is again retained in cloud storage. The content linking component uses semantic services to discover and suggest related content. Also, it can use artificial intelligence services, such as face recognition, speech-to-text, sentiment analysis, semantic analysis, etc. Since data analysis processes, such as business intelligence and social mining are carried out through the data analysis component, this component generates analytical reports for enterprise users and operators. End-users can access the system, via a web browser on smart TVs (as a first screen) or smartphones (as a second screen). They can request and view specific content and any related material. Also, they can use widgets that the system provides for them based on context.

5. CONCLUSION

In this article, we present a microservice-based architecture for developing OTT services. We reviewed the three reference architectures: SAM, FIMS, and MCMA. After reviewing the reference architectures, their strengths and weaknesses were analysed based on software development approaches and a brief overview of these models was presented. We intend to implement our proposed architecture and evaluate its performance as future work. ■

Authors:



Seyed Hossein Alavi Soltani is a Senior Researcher at the IRIB R&D Department. His specialty is software development, BI systems, self-

adaptive systems, and distributed systems. He is the Director of the New Media Technologies Department of IRIB R&D, and also he is a Ph.D. candidate in computer engineering.



Mansoureh Ghasemi is a Senior Engineer, IRIB R&D Department. Mansoureh Ghasemi works as an IT engineer at IRIB R&D. She

received her Masters of Science Degree in Information Technology Engineering from Iran University of Science and Technology in 2014. In 2015, she joined the New Media Technology Department of IRIB R&D. Her research and technical experiences are SocialTV, software architecture, HbbTV services, cloud-based multimedia services, and IoT.

Want to know more about IRIB R&D? Be sure to follow our LinkedIn account, where we'll keep you up-to-date on IRIB R&D News and Events, Latest Technology News, and More!

Join us on LinkedIn to be a part of a growing community.



<https://ir.linkedin.com/company/iribrd>

FOLLOW US!

IRIB Research & Development (IRIB R&D) Leading in Media and Technology

The IRIB R&D, the main research department of the IRIB, began its activities in 1997. It is a supporting unit that encourages the self-sufficiency and innovation culture among internal experts, institutes, and knowledge-based companies and it develops innovative, new products and technologies in the broadcast/broadband industry that will shape the future.

Thanks to cooperating with our experts, IRIB R&D also has responsibility for carrying out original research in many emerging media services and platforms including hybrid broadcast-broadband television (HbbTV), IP-based content production and distribution systems, and cloud-enabled networking. Also, recent developments in deep learning and AI based services, novel audio and video processing projects as well as intelligent OTT services are few examples of our recent activities.

📍 Jamejam St., Valiasr St., Tehran, Iran

🌐 rd.irib.ir/en ☎ (+98-21)-22164060



ABU
ENGINEERING AWARDS
2021

***WE INVITE YOU
TO SUBMIT
YOUR ENTRIES***

**BROADCAST
ENGINEERING
EXCELLENCE**

**ENGINEERING
INDUSTRY
EXCELLENCE**

**GREEN
BROADCAST
ENGINEERING**

**DEVELOPING
BROADCASTERS'
EXCELLENCE**

<https://www.abu.org.my/engineering-awards>

DRM STANDARD

Some Guidelines for a Successful Roll-out

Radio broadcasters around the world are grappling with the task of digitising their free-to-air radio transmissions, in order to provide more diverse programme content, in much better audio quality to both their domestic and international audiences, while saving spectrum and energy.

The Digital Radio Mondiale (DRM) standard is the only open, non-proprietary digital terrestrial broadcasting system used in all frequency bands (both in the AM and in the VHF bands, including FM). DRM can uniquely offer full-country coverage guaranteeing each citizen's access to a modern, more diversified digital radio experience, in high quality sound, with images and multi-lingual text on their radio screens in cars, in portable radios or on mobile phones.

Radio digitisation is a major challenge. Therefore, we believe that it would be useful to share some recommendations for a successful DRM roll-out, as each broadcaster will have its own implementation strategy and will operate within its own national and regulatory environment.

The steps outlined below are only a broad guide, with more details included in the DRM Handbook to be found at : handbook.drm.org (on the website www.drm.org).

PUTTING AN IMPLEMENTATION PLAN TOGETHER

The first step for the digitisation process is the important decision to create a roll-out plan. This should follow from an already approved and adopted broadcaster's overall strategy to bring new and exciting digital radio content to all the citizens of a country, as often mandated by the government directly or through a regulatory body.

Roll-out plans can be developed either separately, or as a mixture of several options, such as:

A national plan for setting up a new transmitter network for achieving full country coverage, which might mean the installation of a few high-power DRM transmitters (with Single Frequency Network - SFN capability, optionally).

A regional plan aimed at upgrading existing regional services to the DRM standard, thus eliminating now potentially redundant transmitters.

A regional to national migration plan which can gradually extend the possibilities of the regional plan by adding new high-power DRM transmitters.

A local coverage plan for big cities, usually with a crowded FM spectrum, aimed at migrating analogue to digital radio by inserting DRM transmissions in the FM band, even when the spectrum seems completely saturated with FM stations and/or adding VHF band-III coverage.

A local coverage plan for small towns and villages aimed at digitising a few FM services, thus reducing transmission costs and enhancing the radio experience of the listeners.

A combination of all scenarios above, by producing a very comprehensive **national digital DRM roll-out plan**. This will

be extremely useful for large and very large, geographically diverse countries.

A simple plan, or a combination of plans, is one thing but putting all these plans into practice is another and, to achieve this, several key stakeholders need to become seriously involved.

INVOLVEMENT OF KEY STAKEHOLDERS

To achieve their purpose, major players need to be united in a **Stakeholders' Group** right from the start.

The national Stakeholders' Group will include the Ministry of Telecommunications / Information / Communication, the national Regulator (if not already a department of the Ministry), the local manufacturing industry, network operators, public and commercial broadcasters, possibly major distributors and retailers. At each stage, the Stakeholders' Group needs to study and implement the best solutions for rolling out DRM digital radio.

The Group needs to assign a **Project Leader** whose mission it is to drive the process and organise the regular meetings with all the stakeholders (ideally, monthly).

The Project Leader, in co-operation with the entire Stakeholders' Group team, needs to produce a comprehensive **Project Plan**, with precise tasks, responsibilities and deadlines. Some of the key items will be related to network planning, DRM demonstrations, requests for full broadcast licences, acquisition of transmitters or their upgrade, others to the procurement of DRM receivers, the digital radio launch date (not to be mistaken with a switch-off date, a completely different matter!).

Let us examine each of these elements individually.

Network planning. Based on the coverage research done by broadcasters, a detailed transmitter network configuration needs to be developed. Broadcasters can do such an exercise either by themselves, or they can use specialist companies able to offer such a service using sophisticated computer programmes.

Decide Budgets and Time Frames. For a successful DRM roll-out, financial resources, as well as strict time frames for all the important steps, need to be included and adhered to in the Project Plan.

Broadcast Licence. Quite early in the process broadcasters should ask the National Regulator to allocate broadcast licences for DRM demonstrations or for permanent use. The request for such licences could be a mini project in itself.

A Service ID management body will also need to be set up. The DRM Service ID is a worldwide identifier assigned to every DRM programme, allowing a receiver to find and identify a selected programme even if the frequency has changed. It is the broadcaster's responsibility to assign a unique identifier to each of its DRM services. This happens in the background and is not used by the listener for service programme selection, nor is it shown on consumer receivers.

Approach to Transmitter/Antenna manufacturers. Once the above steps have been followed, broadcasters need to either acquire new transmitters and possibly new antennas, or additional equipment to upgrade existing transmitters. DRM ContentServers are the additional studio equipment for encoding and managing the DRM signals sent to the DRM-capable transmitters. These are commercial decisions and discussions and cannot be influenced by the not-for-profit DRM Consortium. The Consortium can however offer the names of companies which are Consortium members which may be approached directly, if a tender is envisaged. This process should include, if possible, the acquisition of receivers, too.

Set up a DRM demonstration for key national stakeholders. Such demonstrations / trials are not intended to test the DRM standard, which has been already endorsed by international organisations (ITU and ETSI) many years ago. Such demonstrations are only intended to familiarise broadcasters and other stakeholders with the DRM digital radio features and benefits. The actual value of the demonstrations is to train broadcasters how to install equipment and operate digital radio before the full DRM roll-out in the country. Professional receivers help broadcasters to take precise measurements of the transmissions, thus helping them to adjust parameters and all the settings for a perfect DRM reception over the desired coverage area. (Sometimes the DRM Consortium has been asked to assist with such demonstrations and has lent its expert support).

Technical setup. All details need to be discussed by the stakeholders' technical teams. The Consortium has sometimes been consulted and asked to help, too.

New and exciting programme content. No digital radio project will be successful, if the broadcaster's content creation departments are not fully involved. These departments need to be represented in the Stakeholders' Group right from the start. The best way to ensure the take-up of digital radio by listeners is to provide exclusive digital contents (music, sports, arts, news, specialised or localised content, education etc). This will also encourage and speed up the process of producing and selling digital receivers (for cars, portable radio sets and mobile phones).

EFFECTIVE COMMUNICATION

The final decision to roll out DRM in a country must be communicated officially and effectively on a national and even international level. Here the key stakeholder is **the manufacturing industry**. The Government needs to indicate a precise date when digital radio (i.e., the digital broadcasts) will be launched and digital transmissions will be on the air. This is the key for the success of any digital radio project.

It is important to note that when the tender for DRM transmission equipment is announced, broadcasters should also include in that tender a substantial number of desktop radios, portable consumer, as well as professional receivers, which will be an essential part of the successful roll-out project.

The official **launch date** communication is a major step and should be planned very carefully. Why is this so important?

The manufacturing industry – desktop and portable radio manufacturers, OEMs, Tier 1 car manufacturers, mobile phone manufacturers, will become aware of the vast commercial potential of digital radio for their businesses. Manufacturers need to trust the government and broadcasters that the digital radio roll-out is not just "a rumour" but a reality with a precise launch date. This is the only real trigger and guarantee for manufacturers interested in starting the DRM receiver

production to make the huge investments which they will want to recoup and have a return from.

Distributors and retailers will also become aware of this great digital radio business opportunity. The more receivers are ordered and sold, the lower their price will be, as the receivers' price will always depend on **volumes sold** and not on volumes produced.

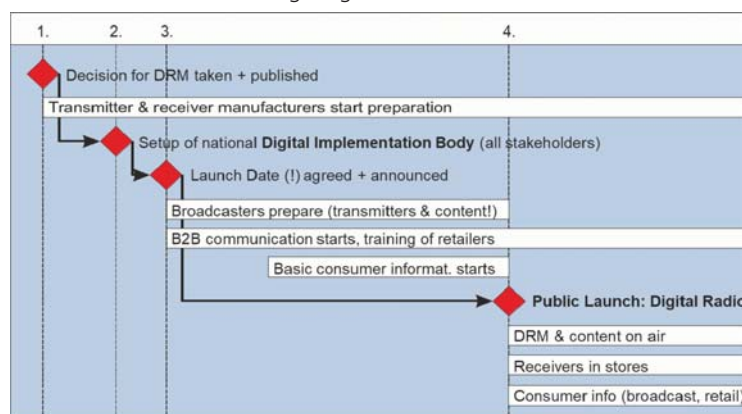
Listeners should be informed about the benefits of the upcoming digital radio broadcasts **only a few months (3-6) before the actual launch date**, not earlier so that no unrealistic expectations are raised. By the time the communication reaches the listeners, retailers need to have acquired receivers and placed them in shops or advertised them online. In parallel, car manufacturers would have placed DRM radios in their vehicles, too.

Through regular advertising and media communications, listeners will learn about the benefits of the new modern digital radios (cars, desktop/portable radios, possibly phones):

- more programmes with clear undistorted sound, no matter which frequency band is used;
- text information and pictures on radio screens, enabled by the advanced text service called Journaline;
- multi-lingual content;
- emergency warnings in case of disasters;
- education and health information; and
- traffic announcements

Listeners need to get excited about these modern devices, which are much more than the traditional analogue radios and more new multi-digital platforms. They should become "objects of desire", widely available in shops, online and in cars.

This communication strategy and its key steps can be summarised in the following diagram:



This is a rollout plan that has already been successfully tried and tested in several countries. It takes effort, money, time and a lot of dedication. When the project turns into reality, then the media landscape of a country is enhanced and enriched for many years to come, while radio is future-proofed. This is an effort worth making!

For more information on DRM implementation please go to www.drm.org and/or contact: projectoffice@drm.org ■



by **Radu Obreja**
Marketing Director
Digital Radio Mondiale Consortium

We extend our appreciation and thanks to the following for their invaluable support for DBS2021

MAJOR SPONSOR



WORKSHOP SPONSORS



MEDIA PARTNERS



AND THANK YOU TO OUR SPEAKERS, PRESENTERS AND MODERATORS



KEMENTERIAN KOMUNIKASI
DAN MULTIMEDIA MALAYSIA



Broadcasters urged to adopt new technologies

Embrace new technologies – this was the message from Malaysia's Minister of Communications and Multimedia when he opened the 2021 ABU Digital Broadcasting Symposium on 5 April.



YB Dato' Saifuddin Abdullah, Minister of Communications & Multimedia, Malaysia

Dato' Saifuddin Abdullah said media professionals knew that going digital was a journey for the development of a better world.

Broadcasters were facing unprecedented times, he said, with new players, formats and usage patterns continuing to evolve daily.

"We not only face a technology boom, but we also face the democratisation of creative content, where content can be produced by anyone, anywhere, at any time, far cheaper than ever before. There are so many more alternatives to TV and radio with a plethora of products and platforms available for entertainment

on a global basis, with consumers using a variety of devices to enjoy new forms of over the top (OTT) video and music streaming services. All this, while also facing a global pandemic where the spread and broadcast of reliable, accurate and trusted information has never before been more crucial for our survival."

He said the global pandemic was forcing many broadcasters to move more quickly to digital platforms. Malaysia's national broadcaster, Radio Televisyen Malaysia, had embarked on its own digital plan.

"Transformation plans at RTM are designed every decade to ensure services are up-to-date, with research conducted

to serve changes in the broadcasting industry especially when it concerns users and audience preferences."

Dato' Saifuddin said the Malaysian government had recently launched MYDIGITAL, a new and comprehensive approach designed to anchor the country's digital economy by 2030.

Over the next five years, a total of RM70 billion (US\$17 billion) was expected to be invested in digital infrastructure. This included local and international connectivity, cloud services and data centres.

The minister praised the ABU for making DBS 2021 happen despite the pandemic.

"It is timely that we come together this week to discuss our experiences after just over a year of having experienced the new normal."

The ABU Secretary-General, **Dr Javad Mottaghi**, said broadcasters around the globe, big or small, public or commercial, were going through a difficult time because of the pandemic.

"However, regardless of all challenges that media professionals are facing, our responsibility as broadcasters to inform, educate and entertain our audiences has not been changed. We have to think of creative and innovative ways to continue our services to our audiences in such a competitive media environment. We have to trust our most valuable asset, our staff and colleagues, who were able to quickly turn to virtual solutions to keep the show running and to serve the public. By this, we can win the trust of the people which is the most important asset for any broadcaster."

Dr Mottaghi said the ABU had delivered more than 150 online events since the pandemic began, including training, sports, webinars and a music exchange service. ■

(Thank you to Mr Tan Sian Hoo, Press Secretary, KKMM and Mr Alex Reza Shariman, Head - International Relations Department, RTM)



Dr Javad Mottaghi, Secretary-General, ABU

INSPIRE, ENGAGE AND ENHANCE

The 2021 ABU Digital Broadcasting Symposium was held virtually on 5-8 April 2021 and streamed to participants worldwide from the Asia-Pacific Broadcasting Union (ABU) building in Kuala Lumpur.

This annual symposium, which is usually held physically in Kuala Lumpur, had to be conducted virtually this year because of the ongoing pandemic.

Welcoming remarks were made by **Dr Javad Mottaghi**, Secretary-General, ABU, and the opening address was delivered by Dato' Saifuddin Abdullah, Minister of Communications and Multimedia, Malaysia.

The four-day symposium, aptly the themed, '**Inspire, Engage and Enhance**', provided a unique opportunity for participants to gain access to information on a wide variety of aspects of broadcasting, ranging from terrestrial to IP. The symposium attracted many participants representing broadcasters, telcos, regulators, manufacturers and other industry players.

ADVANCED TECHNOLOGIES AND INDUSTRY DEVELOPMENTS

The first session was moderated by **Masashi Kamei**, NHK Science & Technology Research Laboratories and the panellists were **Yukihiro Nishida**, NHK; **Lindsay Cornell**, BBC Digital; and **Mardhiah Nasir**, IPSB Technology.

The International Telecommunication Union Radiocommunication Sector (ITU-R), through its Study Group 6, plays a major role in the international standardisation of the end-to-end broadcast chain, from the production of programmes to the delivery of content to the user. The activities of ITU-R Study Group 6 are conducted by three working parties (WP) and a task group (TG). WP6A covers areas of terrestrial broadcast delivery, including channel coding, antennas and emergency broadcasting. WP6B encompasses the domains of

broadcast service assembly and access, such as metadata and file formats. WP6C studies areas of programme production and quality assessment, including recording and archiving. TG 6/1 was established to review the spectrum utilisation of existing services in the Band 470-960 MHz in Region 1. TG 6/1 is also considering regulatory actions in the Band 470-694 MHz, in that region, on the basis of a review in accordance with resolution 235 of the World Radiocommunication Conference 2015 (WRC-15).

Broadcasting has been continuously improved in order to offer better services to the end user. Terrestrial TV broadcasting started with analogue standards in the forms of NTSC, PAL and SECAM. In the early 1990's, migration to Digital Terrestrial TV Broadcasting (DTTB) began in the forms of 1st generation



Moderator, **Masashi Kamei**, NHK Science & Technology Research Laboratories, **Mardhiah Nasir**, IPSB Technology, **Yukihiro Nishida**, NHK and **Lindsay Cornell**, BBC Digital.

ATSC, DVB-T, ISDB-T and DTMB standards specified under ITU-R BT.1306 Recommendations. Those DTTB standards have now evolved into 2nd generation ATSC 3.0, DVB-T2 and DTMB-A standards specified under ITU-R BT.1877 Recommendations. Proposed extension to the 2nd generation DTTB standards is envisaged, to accommodate 5G.

Terrestrial Sound and Multimedia Broadcasting have evolved from analogue AM and FM Radio into Digital Sound Broadcasting specified under ITU-R BS.1514 Recommendations for the LF/MF/HF Bands and ITU-R BS.1114 Recommendations for the VHF/UHF Band. In the case of Multimedia Broadcasting, ITU-R BT.2016 Recommendations have been drawn up to include standards such as T-DMB, AT-DMB and ISDB-Tmm.

Video Systems have made progress from analogue to digital standards as laid out in Rec. ITU-R BT.601 for Standard Definition TV (SDTV) and Rec. ITU-R BT.709 for High Definition TV (HDTV). Progress in video systems still continues, with Rec ITU-R BT.2020 for Ultra High Definition TV (UHD TV) and Rec ITU-R BT.2100 for High Dynamic Range TV (HDR TV). The ITU is also studying immersive user experience, by specifying Rec ITU-R BT.2123 for Advanced Immersive Sensory Media. Sound systems progressed from monophonic to stereo sound, and later to 5.1 surround channels as laid out in Rec ITU-R BS.775. The advanced sound systems from 7.1 channels to 22.2 three-dimensional surround channels are specified under Rec ITU-R BS.2051.

During World Radiocommunication Conference 2023 (WRC-23), the ITU will discuss the protection of spectrum for broadcasters, as the UHF Band (470-698 MHz) is under threat from IMT and mobile services. Furthermore, additional spectrum is needed for new broadcast services such as 3DTV and UHD TV.

Most DAB receivers were tested using ETSI standard ES 103 461 which was drafted in 2017. However, DAB expansion beyond Europe and progress in technology, required an update in this standard, and a new version was published in October 2020. The European Union (EU) has mandated the installation of DAB receivers in cars and the All-Europe regional profile is specifically mentioned. Cars are also making longer journeys through the European continent, thus requiring the receivers to respond accurately to emergency alarm announcements. As DAB spreads to countries outside Europe, extra core technology tests ensure that receivers are able to display non-Latin text. In the

case of Digital Radio Mondiale (DRM), hierarchical modulation modes have been removed from the technical specifications and a new simplified version of ETSI ES 201 960 has been published.

BUSINESS STRATEGIES AND APPROACHES FOR BROADCAST AND MEDIA

The Moderator was **Mardhiah Nasir**, IPSB Technology with the panellists comprising, **Joan Warner**, Commercial Radio Australia; **Ruxandra Obreja**, DRM Consortium; **Prashant Butani**, MEASAT Satellite Systems and **Wang Lei**, NRTA-China.



Moderator, **Mardhiah Nasir**, IPSB Technology

Commercial Radio in Australia reached a record high audience with 95% of Australians listening to radio each week. Radio stations have evolved into multiplatform content providers which enable users to access radio anytime and anywhere. This strategy has delivered strong results during the pandemic, when listeners have turned to their car receivers or home receivers to obtain the latest news. There has been substantial increase in radio listeners using smartphones, tablets and smart speakers.

Key partnerships with Google and Amazon have improved the accessibility of radio. Artificial Intelligence (AI), makes radio easier to listen on mobile phones; voice assisted devices like smart speakers and cloud based assistants. More than 400 Australian AM, FM and DAB+ digital radio stations are easily accessible on Google Nest devices via voice command. In 2019, time spent listening to podcasts overtook owned music for the first time. The Australian Podcast Ranker was launched in October 2019 in order to increase podcast consumption. In 2020, there was a total of 420.8 million podcast downloads with radio show catch ups being the most popular genre.

There are an estimated six billion radio sets in use globally but there still remains 3.5 billion people who are 'not connected' in any way and cannot access the latest news. DRM can reach audiences without relying on local infrastructure, as it can cross borders and

offer lifeline services. This has resulted in India, Pakistan, South Africa and Brazil adopting DRM to reach their populations, not only in the cities but also the rural communities in distant areas. Using a single technical standard is a logical solution for local, regional, national and international radio coverage. This is due to the fact that DRM operates in the AM bands for medium/large area coverage as well as the FM Band for local/regional coverage. It is also possible to activate a DRM receiver to receive emergency alert warning of an impending disaster. During these times of pandemic, DRM can extend education to remote areas.

In 1992, Malaysia East Asia Satellite (MEASAT) was founded and has since launched seven satellites reaching over 150 countries, with a global population of 5.8 billion. MEASAT forms an integral part of Malaysia's ICT infrastructure and the future launch of MEASAT 3d will mark a tenfold increase in satellite broadband capacity. In 2020, TV consumption increased significantly, as viewers had to stay at home during the pandemic.



Prashant Butani, MEASAT Satellite Systems

The market size of linear TV remains large, but OTT is catching up. Although linear TV providers are facing increasing competition from OTT video services, nearly two thirds of all residential TV households still subscribe to linear TV services. As broadband penetration increases, so does peak traffic congestion, hampering the viewing experience. Linear TV and OTT are converging and becoming extension of each other, with similar content options and features.

OTT & IBB TECHNOLOGIES

The session was moderated by **Prashant Butani**, MEASAT Satellite Systems and the panellists were **Shinya Abe**, NHK Science & Technology Research Laboratories; **Ivan Verbesselt**, Mediagenix and **Maryam Sedaghat**, IRIB-Iran.

Integrated Broadcast Broadband System (IBB) or Hybrid Broadcast System is comprised of two different standards, namely Hybridcast in Japan and Hybrid



Broadcast Broadband TV2 (HbbTV2) in Europe. Hybridcast and HbbTV2 are both HTML5 based IBB systems and similar in structure, but their applications are incompatible. The incompatibilities originate from additional Application Programming Interfaces (APIs) making it essential to have applications that operate on both Hybridcast and HbbTV2. IBB services can then be accessible to more viewers, and useful software can be shared easily. Hence, harmonisation of additional APIs defined in each system is a key requirement. Since both systems are based on HTML5, multilingual capability is ensured, for use in other countries.

OTT- Broadcast (OTT-B) is being developed as a specification for native IP over DVB-x2 (2nd generation DVB-T2, DVB-S2/S2-x and DVB-C2). The main purpose of OTT-B is to use IP capabilities in DVB-T2 and it is based on existing standards and web technologies. OTT-B offers new interactive broadcast services that reach all types of screens at home, personalised content on multiple devices, and emergency alerts.

ATSC 3.0 inspired the development of OTT-B to attain an all-IP system offering new opportunities for broadcasters and ad-based models. ATSC3.0 incorporates advanced techniques in form of error correction coding, compression algorithms, higher modulation schemes and exploits the convergence of broadband and IP connectivity. DVB-T2 is widely used but its full potential has not been realised. DVB- Generic Stream Encapsulation (DVB-GSE) has the capability to deliver native IP but has been underutilised and only used for certain professional satellite tracking systems. In OTT-B, native IP over GSE is expected

to replace the MPEG-2 Transport Stream (MPEG-2 TS).

GSE is a data link layer protocol where network layer packets are encapsulated in one or more GSE packets. The encapsulation process adds control information, such as network protocol type and address label. DVB-Internet (DVB-I) is a recent addition to the DVB family and allows the receiver to display the complete list of broadband and broadcast services. Since OTT-B is IP based, it can support DVB-I and take advantage of it. OTT-B also supports Low Latency HTTP Live Streaming (LL-HLS) by Apple Inc. and Dynamic Adaptive Streaming over HTTP –Low Latency by DASH Industry Forum. Both these recent standards achieve low latency transmission by dividing content into chunks. Low latency reduces delay when viewing OTT live content.

Standards supported by OTT-B are, Real Time Object Delivery Over Unidirectional (ROUTE), Multicast Adaptive Rate (mABR)

and Quick UDP Internet Connection (QUIC). Traditional HTTP/TCP works well for broadband delivery but is not appropriate for broadcast. ROUTE offers a better solution for hybrid broadcast and broadband services and it can deliver Real Time (RT) and Non Real Time (NRT) through broadcast channels. Multicast Adaptive Rate (mABR) decreases the load of servers when the same content is delivered to some viewers simultaneously. It enables network operators to better manage congested traffic whilst meeting viewer demands. QUIC is a transport layer network protocol designed by Google, to make HTTP traffic more efficient, secure and faster. QUIC has combined the best qualities of TCP connections and TLS encryption and implemented it on UDP.

CLOUD REVOLUTION IN THE MEDIA INDUSTRY

The Moderator was **Hamid Dehghan Nayeri**, IRIB-Iran and the panellists were **Lars-Peder Lundgren**, Paneda; **Colin Prior**, ENENSYS Technologies and **Shweta Jain**, Amazon Web Services, Singapore.



A DAB+ headend consists of several audio encoders, a data generator and a multiplexer. The audio signals are connected to the audio encoders, whilst metadata, text and pictures are connected to the data generator. The basic principle of the headend is to multiplex these separate signals into a single output which is then channelled to the transmission network. There are 3 ways to realise a DAB headend, namely by traditional hardware setup with complete all-in-one hardware system; a server based platform which is an in-house cloud system or a cloud system using Google or Amazon Data centres installed around the world. The cloud system is secure, cost effective and requires no hardware. At present 10% of broadcasters are using the traditional hardware setup, 80% are using an in-house cloud system and another 10% are using an external cloud system.

The DAB Headend can be centralised, in which case the encoders and multiplexer are located in one place. The advantages are that it is simplified, requires less maintenance and existing IP infrastructure can be used. The disadvantage is maintaining the signal quality when feeding the audio over long distances. The other method is the decentralised approach, where the multiplexer is centralised, but the encoders are decentralised and located at the studios. This approach offers the best quality, as the audio is directly connected to the encoder. However, it has the disadvantage that more equipment is needed and therefore requires more maintenance.

DTTB can be considered a fragmented market, with many different incompatible standards in the form ATSC 3.0, ATSC 1.0, DVB-T2, DVB-T, ISDB-T, and DTMB. In France, DTTB with IPTV STB has a market share of 49.6 % whilst DTTB only has a market share of 21.9 %. There are 7 multiplexes with a total of 57 services. Upgrading from DVB-T to DVB-T2 is taking place in Italy, with 20 national multiplex and 450 local multiplexes. The infrastructure caters for National TV with 120 programmes on SD and 20 programmes on HD, as well as Local YTV with 3000 programmes. On the other hand, Switzerland has switched off its terrestrial transmission in favour of cable distribution. In the USA, 'cord cutting' consumers are unsubscribing from Pay TV and switching to streaming services using internet, but still watch live TV via terrestrial TV.

The key drivers for Artificial Intelligence (AI) in the media industry are lower costs, improved customer experience and drive revenues. Machine Learning (ML) is utilised in creating a rich metadata



search index and can offer content-based recommendations. ML is used in addressing subtitling and accessibility requirements, boosting user engagement. Another category of ML application is compliance and moderation, as it is necessary to detect inappropriate content and automate quality control. In order to have content monetisation, ML can increase revenue with metadata, optimise advertising and provide reporting with analytics.

MEDIA SECURITY & DISASTER PREPAREDNESS

The session was moderated by **Dr Veysel Binbay**, ABU Technology and the panellists were **Ben Vandenberghe**, Skyline Communications; **Yasuji Sakaguchi**, Japan Telecommunications Engineering and Consulting Service and **Negin Ayoughi**, IRIB-Iran.

With the digital transformation of ICT media & broadband service providers, security has emerged as a serious issue. Threats arise on many fronts, including state-sponsored organisations, campaigning organisations, terrorist organisations, hacker collectives and lone wolves. Attacks can be politically, economically or ideologically motivated, but in all cases the end result can be a disaster for the media company. The threat level can range from silent information collection to deliberate maximum damage to reputation, data and infrastructure or paying a huge ransom for release. Cyber threats are growing more sophisticated in tandem with geo-political evolutions. Security is not only about external bad intent, but also about protecting the media from internal threats.

Hackers regard media broadcast stations as high-profile targets which can gain the public's attention almost instantly. The level of exposure is increasing continuously and very rapidly with the technology evolution of media & broadcast industry technologies such as all-IP and cloud services. The impact of security incidents can be massive and may take a station days to recover from. This

was demonstrated when hackers almost destroyed France's TV5 with a well-prepared and highly targeted attack. All 12 channels were instantly taken off-air, accompanied by the posting of a message on TV5 social media. The attack, which was targeted at the encoding systems, resulted in five million Euro in direct damages, with no identifiable motive. ISDB-T has been adopted in more than 20 countries including Latin America and one of its main points of attraction is the incorporation of an Emergency Warning Broadcast System (EWBS). EWBS is easy to install as it uses existing ISDB infrastructure, which has wide coverage, robust transmission and mobile reception. Public media broadcasting is accessible to everyone and transmissions reach the most remote part of a nation. It is reliable one-way communication that has no traffic congestion and is resistant to cyber threats. A joint project between Latin America and Japan is connecting EWBS with Earthquake Early Warning in Central America (ERWANICA). Another method of sending emergency alert signals is by Data Radio Channel (DARC) which is transmitted as part of the existing analogue FM Stereo multiplex.

One of the standards for Public Warning Systems is ITU-T X. 1303 Common Alerting Protocol (CAP), which is a digital format for exchanging emergency alerts, allowing a consistent alert message to be disseminated over various networks. The CAP data structure can convey flexible geographic shapes in three dimensions, multilingual and multi audience messaging. An example of a broadcasting alarm system is Alert4All which improves the effectiveness of alert and communication to the population during crises, within the context of the European Union. The Alert4All Project includes communications system architecture and protocols allowing dissemination of alert messages over diverse means of communication, such as satellite and new media. Another system from Japan is J-Alert, a satellite-based system that allows authorities to quickly broadcast alerts to local media and citizens directly, via a system of nationwide television,



Asaad Sameer Bagharib, Director, Thinking Tub Media



Joe Goddard, James & Wilkinson Media



Sam Bogoch, axle ai

radio and cell broadcast. J-Alert provides citizens with evacuation instructions or advice from local governments, flood alerts and radiation reports in the event of a nuclear accident.

AI AND BIG DATA APPLICATIONS IN MEDIA

The moderator was **Asaad Sameer Bagharib**, Director, Thinking Tub Media and the panellists comprised, **Mohammad Nozari Pak**, IRIB-Iran; **Sam Bogoch**, axle ai; **Michael Moss**, Promo Mii; **Joe Goddard**, James & Wilkinson Media and **Amir Lakizadeh**, IRIB-Iran.

AI is being continually researched in many parts of worlds and one prominent aspect is the interpretation of full-body human movements for human computer interaction (HCI). This is undertaken by tracking the reconstructive skeleton of a user's body parts, and recognising the motion. Three processes must be solved in real time, namely user and computer vision algorithms; kinematical 3D skeleton and interpretation of patterns, using AI techniques. The motivation is to build machines capable of emulating human behaviours so that they can replace the work of real people.

Deep learning (DL) is part of a broader family of machine learning methods based on artificial neural networks with learning which can be supervised, semi supervised or unsupervised. DL is also considered as a class of machine learning algorithm, using multiple layers to progressively extract higher level features from the raw input. In image processing, lower layers may identify edges, while higher layers may identify digits, letters, or concepts relevant to humans, such as faces.

Deep Learning is also used to improve voice conversion techniques. Voice conversion is a technique for transferring non-linguistic information contained in speech while preserving its linguistic information. The idea of speaking in someone else's voice is fascinating in movies and it has found practical application in the creative industry. Voice conversion involves modifying speech from a source speaker to match the vocal qualities of a target speaker. Voice conversion refers to digital cloning of a person's voice, in which the audio



Michael Moss, Promo Mii

waveform is modified so that it appears as if spoken by someone other than the original speaker.

Using conventional methods, up to 40% of total video editing time is wasted in locating the right material. AI searches for video content efficiently, using various techniques, including face recognition, object recognition and speech transcription. As an added bonus, AI also enables editors to work remotely, especially in these times of pandemic, and works with existing formats and storage media.

TECHNOLOGIES AND STRATEGIES FOR SUCCESSFUL DIGITAL RADIO ROLLOUT

The session was moderated by **Steve Ahern**, ABU Media Academy and the panellists were **Dr Les Sabel**, WorldDAB ; **Alexander Zink**, Fraunhofer; **Yogendra Pal**, DRM India Chapter and **Philipp Schmid**, Nautel.

Smart radio or Hybrid Radio is the latest evolution of radio, using digital broadcasting coupled with IP connectivity



Amir Lakizadeh, IRIB-Iran

to deliver advanced features. DAB+ Smart radio provides all the benefits of standard DAB+, which are high quality audio, text and images, announcements and emergency warnings. All these features are delivered in a one-to-many delivery system that is not only cost efficient, but also acts as a green broadcast system.

Strategies for the implementation of DAB+ Smart radio depend on the current capabilities of the radio industry in each country. New markets, without existing DAB infrastructure should plan to include hybrid radio delivery alongside DAB+ broadcast rollout. This maximises the impact of digital radio service delivery from day one, and at the same time minimises the cost of implementation, as both DAB+ and IP infrastructure are developed simultaneously. The plan should be to adjust existing workflows so that metadata is provided for DAB+ smart radio. However, this approach may involve repurposing existing data and workflows that can service existing IP stations.

DRM offers more choice for listeners,





as up to 3 programmes are delivered on a single frequency channel. Stereo and 5.1 surround sound can be offered with excellent audio quality and with no distortion. Multimedia applications provide great listener benefits and extra revenue opportunities for broadcasters. DRM covers a wide area and supports Single Frequency Network (SFN), which is spectrum efficient and results in a green and energy efficient broadcast system. Automatic tuning is available by station name and no longer by frequency, enabling the receiver to retune when leaving the coverage area.

DRM is an appropriate choice to replace analogue FM Radio as it offers many advantages. It can reach all citizens in a country, whether they live in bigger cities, in villages, on hills or in valleys. Using a single technical standard is the optimum solution for local, regional, national and international radio services. This results in efficient spectrum usage at much reduced cost and, with multilingual and on demand content, makes radio the digital media hub for modern listeners.

India has one of world's largest DRM deployments with 35 Medium Wave transmitters and 3 Short Wave transmitters providing coverage for 0.9 billion people. The car industry in India has rolled out digital radio with the fitting of DRM sets in the assembly line of 3 million cars. Chipsets can accommodate all standards and the car manufacturers are not charging extra to consumers for DRM receivers. The fact that more international car brands are adding DRM in their cars is another encouraging sign.

DRM is best suited to the FM band in India for several reasons. Digitalisation

can be implemented without disturbing existing analogue FM services. Existing DRM receivers catering for the AM band can be easily firmware upgraded to receive signals in the FM band. Android phones can receive DRM in the FM band using off the shelf dongles and radio Apps. Lastly, a made-in-India chipset is another plus factor given the country's vast knowhow, especially in digital radio design.

IP TECHNOLOGIES AND REMOTE PRODUCTION

The session was moderated by **Aale Raza**, Whiteways Systems and the panellists were **Rahul Goyal**, Dalet; **Peter Bruce**, Elevate Broadcast and **Yew Jin Cheong**, Rohde & Shwarz.

The pandemic has triggered the move to remote productions. During the pre-Covid era, remote workflow was a nice-to-have feature, allowing employees the option of working from home. However, the Covid era has forced remote operations to become an immediate requirement to keep business continuity. After a year, it is now a standard requirement to make a businesses more agile and lower the total cost of operations and infrastructure.

Remote production can be conducted with the media on-premise, in cloud storage or online. The media can be located in several storage spaces, spread over different regions of the globe and the editors themselves may be at different locations, working in high resolution and operating with a mix of local and remote content. The media might be scalable, with access requirements from production teams who want to immediately edit the first phases of their projects. An editing project

might begin in a certain location and be completed in another. Agility is needed, with access to editing suites with simple browse and search content catalogues. Both on premise and remote editing are required to support high resolution and proxy editing.

There are many real-life instances of remote production innovation, especially during Covid-19. For example, when pandemic caused lockdown in the Philippines, problems were created for a sports presenter who was required to operate his programme, 'On the Ball', as a YouTube channel. The aim was also to make the live show more exciting than the standard "Zoom" interviews, but with minimum costs. The successful solution was to stream the event directly to the internet and target it to mobile phones.

Also during the pandemic, Philippine Government regulations implemented restrictions on audience and production staffing, with only the setup crew and camera people allowed in a stadium. OB vans were also banned from the stadium grounds, making broadcast of an event a tough proposition. The solution used was to locate the OB Van 20 km away and to arrange seamless remote connectivity via fibre, with the production facilities at the stadium.

The business model for broadcasters is changing with IP becoming the trend. IT and cloud technology have brought more benefits and opportunities to the broadcasters. UHDTV has brought not only innovations, but new demands on infrastructure. IP allows for greater flexibility as it adapts to changing workflows more easily and scales up



solutions more seamlessly. IP improves manpower efficiency, hence lowering the total cost of ownership. An IP environment is also future proof, as it allows for upgrading to emerging technologies as they are brought to the market.

ADVANCED AUDIO & STREAMING TECHNOLOGIES

The session was moderated by **Dr Les Sabel**, WorldDAB and the panellists were **Mohammad Reza Hasanabadi**, IRIB-Iran; **Aditya Summanwar**, Triton Digital and **Geoffrey Low**, Dolby.

The concept of Object Based Audio occurs when sound sources are regarded as separate sound objects. Next Generation Audio (NGA) features personalisation, where NGA allows a choice of what and how to hear the content or Interactive Media. Dialogue enhancement, Immersive 3D audio and interaction with audio objects are among aspects subject to personalisation. Personalisation can be used for persons with auditory inabilities, allowing them to select and adjust the sounds they want to hear. It can also be used by viewers who prefer to prioritise certain sounds, such as a commentator's voice, in a noisy, crowded stadium.

At present, the conventional approach is channel-based audio, in which later adaptation is not possible and production is limited to only a single format. This happens when the audio signals from the microphones are mixed before being sent to the audience. The process of mixing is fixed and done at the production end. There is no possibility for the audience to select the preferred sound sources. In the new approach, two

extra elements, namely Renderer and Metadata are added to the audio system. Metadata is a vector representation of the sounds and shows the position of the signal. The renderer distinguishes the different signals and chooses the audio object. The hardware and software of Object Based Audio consists of the Serial Digital Interface (SDI) containing up to 16 channels and each audio object comprises two parts, Signal and Metadata.

MPEG-H, Dolby ATMOS and Dolby AC-4 are examples of Next Generation Audio (NGA) Systems. MPEG-H has been in operation in South Korea since 2017 whereas Dolby AC-4 has been on air since ATSC 3.0 started on air, in 2020. A relevant document on both standards is available as EBU BPN117 entitled Comparative Analysis of Next Generation Audio (NGA) Systems. MPEG H audio is not currently implemented in any TV sets in Europe, however basic AC-4 support is

available in more than 80% of UHDTVs. If immersive audio delivery is the target for a broadcaster, both systems offer convincing solutions.

Object Based Audio offers a richer immersive experience with better control by audiences, who can use a variety of set-ups, from simple headphones to the 22.2 audio format. The disadvantages of OBA is its complexity as it needs extra components, which in turn leads to more power consumption.

5G DEVELOPMENTS AND APPLICATIONS IN MEDIA

The session was moderated by **Peter Bruce**, Director of Business Development, Elevate Broadcast and the panellists were **Dr Peter Siebert**, IEEE BTS; **Parag Naik**, Saankhya Labs and **Sepideh Ghandali**, IRIB-Iran.

A topic currently being debated is whether 5G Broadcast can be a



replacement for DVB T2. The 3GPP Release 14/16 enables features relevant to broadcasters and are received only without SIM card and Multimedia Broadcast Multicast Service (MBMS). Other features are increased Inter-site distance, mobile reception at high speeds and MBMS bearer type, which support MPEG2 Transport Stream (MPEG2-TS).

5G Broadcast enables High Power High Tower (HPHT) broadcast and can be regarded as a 2nd generation DTT solution, similar to DVB T2 or ATSC3.0. However, it is not as spectrally efficient as DVB T2 or ATSC 3.0, and the service layer is not specified by 3GPP. 5G Broadcast does not perform better than either DVB T2 or ATSC3.0 for reaching handheld devices with a HPHT network. However, this drawback can be partly compensated by using more robust modes that result in lower data rates.

At present, 5G Broadcast has specified bandwidths of 1.4, 3, 5, 10, 15 and 20 MHz with European 5G services to be offered in designated frequency bands of 700 MHz, 3.4 GHz, 3.8 GHz, and 26 GHz. For broadcast applications 700 MHz is the best choice while in ITU Region 1, 470-694 MHz band is allocated for broadcast services with a channel raster of 8 MHz. A recent work item was created in 3GPP to add 6/7/8 MHz bandwidths for 5G Broadcast.

A service layer for 5G Broadcast is yet to be defined by 3GPP and the missing elements include Video and Audio codecs, multiplexing and service information. DVB is looking into specifying a 5G Broadcast service layer

starting with DVB-Internet (DVB-I) for service discovery and selection. Spectral performance of 5G is less than DVB T2 or ATSC3.0 and handheld indoor reception from HPHT network is critical. Although 8 MHz bandwidth is not specified for the time being, this is subject to change by 3GPP. Service Layer is left open by 3GPP, but DVB may be able to provide this layer. Consumer-level receive devices are not yet available and 5G Broadcast cannot replace DVB T2 completely.

6G research is starting even before we have 5G because each standard roughly takes a decade to develop, and so the formalisation of 6G standards is being targeted for 2030. 6G will be better than 5G in all performance related aspects as the peak data rate proposed for 5G is 20 Gb/s whereas it is 1Tb/s for 6G. The 5G latency of 1ms would be further reduced to the order of μ s in 6G, while device densities and IoT connectivity will be much denser. More AI and machine learning applications will be installed in 6G. Security is expected to be much better in 6G when compared with 5G, as quantum communication and cryptography are expected to be deployed. A new service that is envisaged is holographic communication. This would employ multiple view cameras, demanding data rates in the order of Tera bps, which are not supported by 5G.

NEXTGEN TECHNOLOGY IMPLEMENTATION

The Moderator was **Hamdhoon Rashad**, ABU with the panel comprised of **Dr Mohieddin Moradi**, IRIB-Iran; **Yoshi Tsurimaki**, T-NET JAPAN and **Anuradha Agarwal**, Prasar Bharati, India.

There are many different types of video artifact in the baseband and compressed domain, ranging from blockiness to noisiness. Video Quality Measurement (VQA) can be measured subjectively by the human eye or objectively by machine. Subjective measurement consists of two metrics, namely Mean Opinion Score (MOS) and Differential Mean Opinion Score (DMOS).

MOS is obtained from the observation of a sample of invited viewers who are asked to rank the quality of a video clip. The ranking is on a scale of 1 to 5, from which the average value of the score is calculated. In MOS, only a distorted video clip is shown to the viewers. The second, and preferred, method is DMOS where the viewers are first shown an undistorted reference video clip and then later the distorted video. They are asked to compare and allocate the scores based on the difference between the raw quality of the reference and the distorted video. Objective measurement is conducted by machines utilising algorithms such as Peak Signal to Noise Ratio (PSNR) and Structural Similarity Index (SSIM).

Broadcasting is undergoing a revolutionary change due to digitalisation which is affecting every part of the broadcast chain. Broadcasters are undertaking either a total digital makeover or progressive upgradation of their chains, such as newsrooms, non-linear editing facilities, and play out facilities. The workflow changes needed with introduction of digitalisation, contribute to the lengthy time taken for conversion. The biggest change



comes from the impact of convergence of broadcast and telecommunication technologies. Today's broadcasters now have access to new telecommunication-based platforms such as mobile TV, internet, broadband IP networks and cellular networks, in addition to their traditional terrestrial and satellite broadcast platforms.

Prasar Bharathi, India has completed digitalisation of its TV Broadcasting network. All the studios at New Delhi, which host international & national channels, are being migrated for full-fledged HD capable stations. HD Mobile Production Facilities and DSNs have also been provided at Major Kendras. All 127 AIR studios have been digitised and streaming of 271 AIR channels has started on the News on AIR app. MW and SW transmitters are being digitised but the receiver ecosystem is yet to be developed, due to non-availability of affordable receivers.

Cloud broadcasting is another emerging technology and is available in the form of public, private and hybrid infrastructure. Public cloud infrastructure is available in the form of utility services, that are used by businesses to buy computing, storage and bandwidth resources on-demand. Private clouds are for companies that want to manage their data and processes in an environment with exclusive access to their own resources. Hybrid clouds are a mix of both public and private clouds with business functions split across their infrastructure, depending on the security needs of the various functions.

High resolution content is sourced from multiple locations into a broadcaster's content store for processing and distribution. Post-production of content uploaded to a secure cloud is performed on low-resolution versions sent to post-production locations where the editing is done. Once the edits on the low-resolution version have been reviewed and accepted, these changes are applied to the high-resolution version and restored in the cloud. The edited content is connected to public Internet connections and controlled remotely. Play-out content is delivered to multiple platforms for distribution.

ADVANCES IN MEDIA DELIVERY – PLATFORMS AND STRATEGIES

The session was moderated by **Bernie O'Neill**, WorldDAB and the panellists were **Emily Dubs**, DVB; **Yin Loong CHAO**, Akamai and **Greg Armshaw**, Brightcove.

DVB is a market driven, industry led consortium, initially created for the standardisation of digital media



Bernie O'Neill, WorldDAB



Emily Dubs, DVB



Greg Armshaw, Brightcove



Yin Loong CHAO, Akamai

distribution as replacement for analogue TV. The start of the millennium saw the migration from analogue TV to digital TV with the initial introduction of DVB-S, DVB-T, DVB-C and followed by second generation DVB-S2, DVB-T2 and DVB-C2. During the 2010's, Standard Definition TV (SD) was upgraded to High Definition (HD) with the aid of second-generation DVB family of standards. During the 2020's, the move will be from fragmented distribution, where the industry is working in silos, to a unified and seamless system enabling hybrid modes.

Before the Internet was used for delivery of services, the main market issue was the need for reliable and efficient distribution pipes for digitalisation or Digital Switchover (DSO); more programmes and increasing resolution from SD to HD or UHD. DVB used to define physical layers for the first and second generation of Digital TV standards. Solutions have been launched throughout the world and these distribution platforms have relied on the MPEG2 Transport Based Layer. Such services have been typically accessed via DVB Set Top Boxes, but this has recently changed.

With the advent of the Internet, fragmentation has shaken the industry and forced it on the migration road to all-hybrid. However, access to the services is a now real issue in this new context. New distribution paths have arisen, each having its own fragmentation, strengths and weaknesses. Various formats such as MPEG based, and IP based with their disparate encoding and packaging standards have had to coexist. Thus, service is now a central issue and broadcasters must address many challenges in reaching the new devices and competing with streaming platform

services. Broadcasters must ensure their own service prominence in a competitive industry as well tackle the transition towards a truly seamless hybrid offering.

A unified hybrid delivery ecosystem enables Intelligent use of the unique characteristics of both broadcast and broadband networks. Seamless switching of bearers, including Native IP over broadcast, is achievable. New prospects for broadcasting exist in the form of targeted advertising and personalised content. This where DVB-Internet (DVB-I) comes in by DVB-I breaking down the barriers between broadcast and broadband worlds.

DVB-I is an Internet-based replacement of traditional linear TV based services. Broadcasters are able to deploy common services across a wide range of devices without the need for dedicated integrations. Italy is considering adopting DVB-I as the means to clear channels from the DTT platform and using the freed capacity for UHD broadcasting. It is noteworthy to mention that DTG of UK has commissioned Ofcom to survey the feasibility of using DVB-I for the migration of DTT towards IP-based delivery. ■



Report on DBS by **Jeewa Vengadasalam**, Specialist II, Department of Electrical & Electronic Engineering, Lee Kok Chiang, Faculty of Engineering & Sciences, University Tunku Abdul Rahman, Malaysia.

Industry Debate

How Asian broadcasters faced the pandemic

In a highlight of the **Digital Broadcasting Symposium**, senior broadcasters from across Asia have described how they tackled the challenges of the pandemic. Broadcast engineers from Hong Kong-China, India, Singapore, Sri Lanka, Turkey and Vietnam – all members of the ABU Technical Bureau – spoke of fulfilling their obligations to their audiences while dealing with staff restrictions, falling revenue and other issues.



Shivane Thapa Basnyat,
Senior News Editor,
Nepal Television

Nepal Television journalist and presenter, **Shivane Thapa Basnyat** moderated the Industry Debate, held virtually on 8 April. The topic was Overcoming the Pandemic and Learning from Experience.

Describing the pandemic as one of the greatest crises of modern times, she said it had had a multi-dimensional impact on the broadcasting industry. She invited the panelists to talk about how their organisations had coped.



Mr Sunil, Additional
Director General
(Engineering) & Head
International Relations,
Prasar Bharati – India &
ABU Technical Committee
Vice-Chairman

Sunil of Indian public broadcaster, **Prasar Bharati** said that as the pandemic spread, broadcasting had been the only way to keep people properly informed. This had forced broadcasters to reinvent and transform themselves. "All the meetings used to be physical. We could never have thought of any progress on any development without a physical meeting," he said. Meetings were now held in video conference mode and staff had quickly adapted to the change, regardless of their age or work roles.

Since TV production in India had been curtailed, Prasar Bharati had been replaying iconic TV episodes recorded almost 3 decades years earlier. The shows attracted a huge audience and kept people entertained during the lockdown.



Dr Tharaka Mohotty,
Director Engineering, MBC
Networks & MTV Channel,
Sri Lanka

Dr Tharaka Mohotty of MBC-Sri Lanka said the organisation had learned to operate with limited staff and little income. It had given priority to news coverage of the pandemic. "We fulfilled our duties rather than thinking of the financial aspects," he said. Normal advertisers left but new ones came in, such as the health sector. MBC tried to manage its expenses, at least to break even.



Peh Beng Yeow, Lead,
Technology Operations,
Mediacorp, Singapore

Peh Beng Yeow of Singapore's Mediacorp said that for safety reasons the broadcaster set up three teams of staff who were not allowed to meet each other. He said technology upgrade was a constant regardless of whether there was a pandemic or not, so switching to more online work was not difficult. "Most people in Singapore have a computer or some other connected device at home. So

remote meetings can be arranged quite easily." Asked whether cyber security had been an issue during the pandemic, he said it had been a top priority at Mediacorp for several years. There was a procedure to prevent threats to the system. The challenge during the pandemic had been arranging staff.



Terence Yiu, Deputy
Director of Engineering,
Phoenix Satellite Television,
Hong Kong-China

Terence Yiu of Phoenix Satellite Television, Hong Kong-China, said the most important challenge was maintaining broadcast continuity. Staff had to learn new skills quickly. "Our first priority was staff safety," he said.

The broadcaster set up a small, temporary, live studio in case its main live studio became infected and needed to close for one or two days for cleaning.

Revenue dropped, he said, but the broadcaster was able to reduce some of its operating costs, including those of overseas travel.

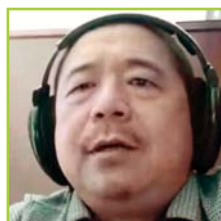


Kazim Pektas, Chief
Engineer, Studio Planning
Department, Turkish Radio
Television Corporation,
Turkey

Kazim Pektas of Turkish Radio Television Corporation said the national broadcaster had been hard hit by the pandemic despite having emergency plans in place. "The worst case was worse than we had imagined," he said.

"As a public broadcaster, we have more responsibilities than others. We should consider all of our audience's requirements and expectations."

As part of its aim of providing trusted and accurate information, TRT set up three new TV stations at the start of the pandemic for online education.



Nguyen Duc Tue, Deputy
Director, Technical Centre,
Vietnam Television

Nguyen Duc Tue of Vietnam Television said the broadcaster had had to change and adapt to the new normal, which included a reduction in income. It increased its remote producing and set up two teams to avoid an outbreak of the virus. One worked in the field and the other in the office. Those in the office were not allowed to go out to work.

The moderator, Ms Basnyat, said that for broadcasters, agility had become a byword during the pandemic. "We are in the process of adapting and evolving and innovating."

She said Nepal Television had faced a lot of challenges because of the health risks for its staff and the relatively unsophisticated technological setup.

It had cut down on the number of staff working each day and introduced a rotation system. It had been unable to shoot some programmes because of the lockdown. The movement of news reporters had been restricted.

The good thing was that it had opened new opportunities on an individual level. "Individual workers are awakened to the fact that we have to adapt to technology and upgrade our skills," she said. ■

DBS 2021 WORKSHOPS

DAB+, DRM+ and Dalet workshops, that were conducted in conjunction with the conference, provided in-depth knowledge of some of the latest developments and opportunities in the digital broadcast industry.

BUILDING RADIO AUDIENCES WITH DAB+



DAB+ is about planning for a sustainable future for the radio industry, particularly in light of the global pandemic, together with very real threats from large global digital platforms. The update from Australia is that 77% of new cars were sold with DAB+, up from the figure of 60% in 2018. Vehicle sales increased because of pent-up demand and consumers purchasing cars for interstate road trips, as result of a ban on international travel. Australia's first major highway tunnels supporting DAB+, the M4 and NorthConnex in Sydney were opened in 2019. This was a result of New South Wales state government passing legislation requiring all new tunnels to have DAB+.



Joan Warner, WorldDAB Vice President and Chair of the WorldDAB Asia-Pacific Committee

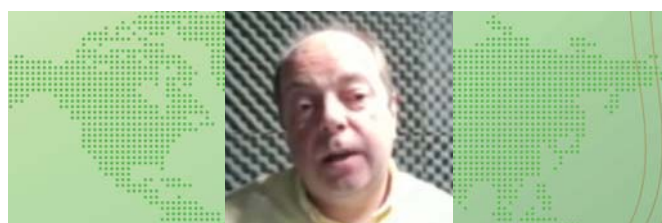
In Thailand, the Bangkok DAB+ trial continues with a DAB+ rollout by the National Broadcasting Telecommunications Commission (NBTC) Thailand. The 20-month trial commenced in April 2019 with 11 radio stations and is still in operation today. The NBTC plan is to extend the DAB+ trial in Bangkok for a further 3 years. The aim is to expand DAB+ trial services and coverage to regional areas in the North, North-East, Central, and South Thailand. Full national coverage planning has been completed with commercial rollout plans to be determined.



Patrick Hannon, President, WorldDAB and VP Corporate Development, Frontier Smart Technologies

Effective from December 2020, all new car radios in the European Union (EU), must be able to receive digital terrestrial radio. DAB receivers are now a mass market product and 90 million receivers have been sold with prices as low as US\$20. DAB+ is emerging as a global standard for radio, with many

countries adopting it. The key drivers are that DAB+ offers greater choice, as there is six times more service capacity than analogue FM. Since a single DAB multiplex can deliver more than 6 programmes, there is an opportunity to innovate, with brand extensions catering for different types of music, ranging from classic rock to jazz.



Lindsay Cornell, Principal Systems Architect, BBC Digital and Chairman, WorldDAB Technical Committee



Dr Les Sabel, Chair, WorldDAB Asia Pacific Technical Group, and S-Comm Technologies



Ron Schiffelers, Senior Director Program Management, NXP Semiconductors

DAB drove commercial revenues in UK by more than 30% over the past six years, reaching £702million in 2019 compared to £537million in 2013. DAB+ offers 80% lower annual operating cost compared to FM, with a key factor being that DAB+ consumes less energy. This has been confirmed by a BBC study that showed DAB to be 33% more efficient than FM. DAB+ is also reliable in times of emergency, with alarm announcements specified as part of DAB+ standards.

There is a need for each country to develop a local DAB receiver industry and a cost-effective DAB engine should be chosen. A good DAB engine must be fully compliant with ETSI EN 300 401 standards with a high integration of the basic components comprising the OFDM decoder, AAC+ decoder and Peripheral Controllers. Built in processors must be available for customers to design codes and there should enough General-Purpose Input/Output (GPIO) pins to accommodate various customer needs.

DIGITAL RADIO DRM ENABLES DISTANCE LEARNING



Due to COVID-19, there has been education disruption from school closures in 105 countries, affecting 1 billion students. Alternative teaching methods in the form of online education has been hampered by technology divide and poor infrastructure which are lack of internet as well as poor or no mobile coverage. However, DRM can be used as it provides access to information, education, entertainment and Emergency Warning Functionality (EWF).

DRM offers more than audio as its data transmission possibilities gives it an extra dimension. DRM incorporates multimedia applications that provide great listener benefits, bringing extra revenue opportunities for broadcasters. It can offer free information to people wherever they are, without the need for Internet. DRM receivers can cache information for convenient

access at any time, which is convenient for school documents collected over night. Lessons and textbook content via Journaline are always available on demand. There are options for student interactivity with Journaline quizzes and Questions & Answers rebroadcast.

The Journaline text-based information service supports all classes of receivers with interactivity and geo-awareness. Journaline is specifically designed for digital broadcast services restricted by low bitrate requirement for example 200 kbps. Existing data sources are reused for broadcasters (RSS, XML) and are internationally applicable (Unicode/UTF-8). Journaline is optimised for inexpensive consumer receivers which have low decoder and user interface requirements. Besides free distance-learning education, there are commercial benefits because of innovative targeted advertisement placements taking into account language preference, region selection and topic of Interest.

The role of the broadcaster is to define the overall Journaline service structure with menus, and topics. Lesson materials are converted to Journaline XML and the DRM broadcast signal is configured and scheduled. As such DRM can provide education to remote areas or during a pandemic.



Ruxandra Obreja, Chairman, DRM Consortium



Markus Tauber, Professional System Engineer, DRMIDAB ContentServer (CS)



Alexander Zink, Senior Business Development Manager, Digital Radio & Streaming Applications, Fraunhofer IIS



Guido Leisker, Consultant Engineer

DALET REMOTE EDITING – EDIT & COLLABORATE FROM ANYWHERE



Dalet provides several options for broadcasters to expand the current system to include remote operations, especially in pandemic circumstances, where work at home is the rule. In order to overcome the challenges of remote operation, Dalet has provided a cloud-based workflow with the concept of intermediate media which can help to increase efficiency and allow users to work from home. This is a game changer as it

allows users to address performance issues at home when there is a disconnection.

Dalet has multiple tools to allow users to browse an entire media catalogue based on rights to access the content and directly work on it. In addition, a mobile app is available by which the user can browse content while he is on the move, at any time or any place around the globe. The idea behind the solution is to provide agility, which means deploying and supporting various types of cloud solutions, and mobility, which means allowing the user direct access through mobile or web interfaces. The end result is that business is flexible and total cost of ownership is lowered.

The Dalet virtual workshop was conducted in a practical hands-on demonstration mode with visual presentations of the workflow. ■



DRM Digital Radio Standard is Ready for Local Services

Successful demonstration and trial of DRM in the FM-band in India

DRM in the FM band is ready for India's mass market. The Indian car industry has rolled-out DRM enabled radio sets in the millions and proven during the trial that, after a simple firmware upgrade, those receiver models will support DRM in the FM band with the full feature set. Stakeholders are eagerly waiting for the Indian Government to urgently announce a much-awaited policy, recommending the adoption of DRM in the FM band for public service and private broadcasters in India.

DIGITAL RADIO BROADCASTING IN INDIA

AIR has already adopted and rolled-out nation-wide the DRM digital radio standard for its large-area services in the MF and HF bands. Today, India has successfully established the largest digital radio network in the world; it possesses a fleet of over 3 million cars with line-fit DRM reception capability and is host to the world-leading chipset industry for DRM reception.

Telecom Regulatory Authority of India (TRAI), the regulator for broadcasting, has recommended to the Ministry of Information and Broadcasting Government of India that digital broadcasting in the FM band should also be allowed in the unused white spaces, without disturbing the existing analogue transmissions. The Regulator has not specified the digital standard to be used.

TRIAL OF DRM DIGITAL RADIO BROADCASTING IN THE FM BAND IN INDIA

Considering the TRAI recommendations, the Ministry asked Prasar Bharati/AIR to test the various digital standards approved by ITU and recommend the one best suited for digitising the FM band after taking into consideration the existing state of FM broadcasting and the infrastructure in the country.

To address the task Prasar Bharati constituted a special Committee. After carrying out the trial of HD Radio, the Committee asked the DRM Consortium to demonstrate all the features of DRM in the FM band from a standalone broadcast antenna in Delhi and then in Jaipur, in the 600 kHz whitespace between the two analogue FM stations.

TEST PLAN AND DURATION

The first phase of the DRM trial was in Delhi, from 24th Feb to 18th Mar 2021. Its aim was to demonstrate and test the key features of DRM, its coverage efficiency potential and flexible on-air signal configurations.

The second phase from 22nd to 24th Mar 2021 was in Jaipur. It was designed to prove the compatibility of DRM with the FM band "channelisation" in India, where DRM fills the otherwise unusable gaps between existing analogue FM services, as well as its compliance with the existing CTI (shared FM transmitter infrastructure) sites.

The DRM standard in the FM band (VHF band-II) occupies

Site	Delhi	Jaipur
Location	Akashwani Bhawan, Parliament Street, New Delhi (77° 12' 39" E, 28° 37' 20" N)	Common Transmission Infrastructure (CTI), All India Radio, Transmitter Campus, Vaishali Nagar, Jaipur (26°54'38.80"N, 75°44'58.55"E)
Antenna Height above ground level	80 meters	77 meters
Transmitting Frequency	100.7 MHz	93.9 MHz
Transmitter Total Output Power (TOP)	100 W	
Transmitting Aerial	4-bay, circular polarization	
Space between existing CTI antenna and DRM showcase antenna	-	13 meters below the CTI antenna
ContentServer	RFmondial DRM ContentServer R7 Professional, based on Fraunhofer DRM ContentServer technology	
Modulator	RFmondial DRM Modulator	
Transmitter	Nautek 2.5 kW VS series	

a fixed amount of spectrum: 96 kHz of bandwidth per 'block' (i.e., DRM transmission signal).

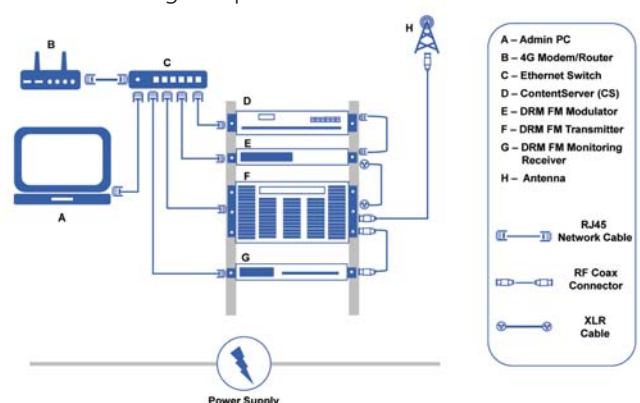
Every DRM signal can carry up to four services; typically, up to three DRM Audio Services including PAD (programme associated data) and one DRM Data Service (such as Journaline).

The following features were introduced to the committee and then demonstrated during the trial. On-the-road measurements were also carried out in every case:

- Pure Digital operation for
 - Single DRM signal
 - Multi-DRM configuration
- Simulcast (DRM and analogue FM) operation
- Multi-DRM in FM white spaces

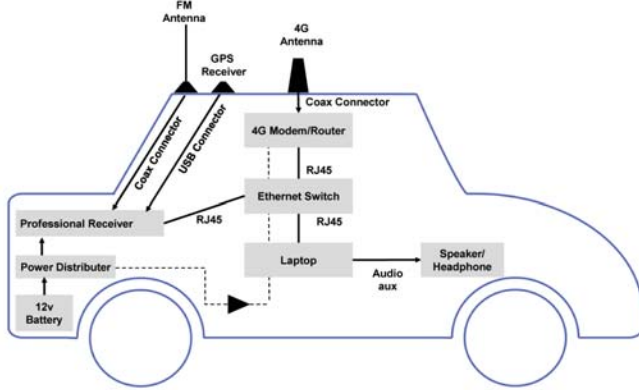
TRANSMITTING SETUP

The transmitting setup was as below:



RECEIVING/TEST SETUP

A measurement vehicle, arranged and equipped by the DRM Consortium, was fitted with the receiving set up as shown in the graphic, with a professional DRM monitoring receiver by RFmondial (RF-SE) plus the Fraunhofer DRM MultimediaPlayer Radio App at its core. This setup recorded the transmission parameters and reception signal quality.



DEMONSTRATIONS CARRIED OUT DURING THE TEST PERIOD

1. DRM Features

The following features of DRM were demonstrated:

a. Basic Features

- Transmission of **up to 3 audio services and 1 multimedia service**
- Service Labels** (Unicode) including Hindi and other official Indian scripts
- Service description** indicating audio programme type, language and country of origin
- Graphical Station Logo** for every audio and data service
- DRM text messages**, which can accompany every audio service
- Journaline**, the advanced text application of DRM digital radio services, fully based on Unicode, and which provides hierarchically structured information, to access information on-demand without the need for internet or mobile networks
- DRM Online hybrid and interactivity functionality** through Journaline



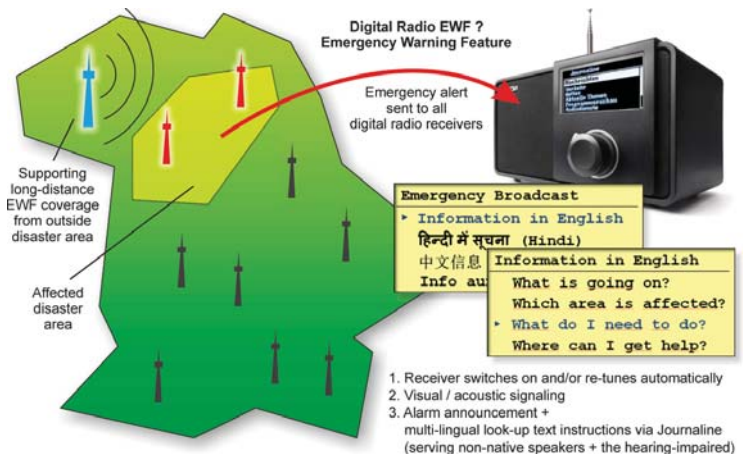
b. Transmission of live content

Possibility to transmit AIR News Channel and Mann ki Baat programme, originated from online services, was demonstrated, in audio and Journaline text.

c. Emergency Warning Functionality (EWF)

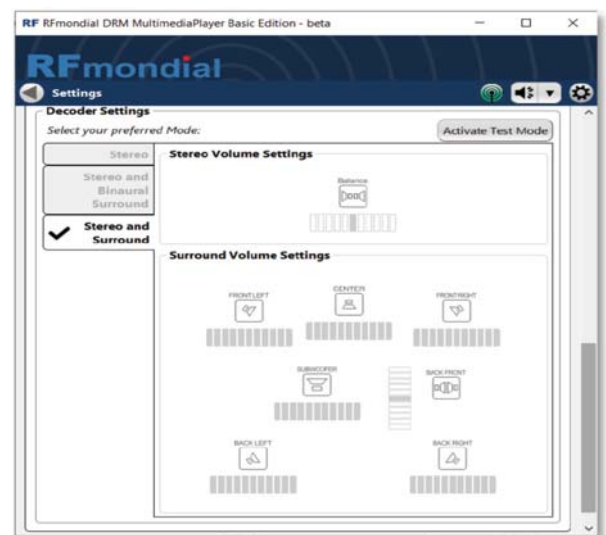
DRM's fully integrated disaster and early warning service, the aim of which is to inform the general public (and relevant authorities) about impending disasters, with maximum speed and reach.

It was shown that, on triggering the alarm signal, all running DRM receivers picked up the alarm signal from the currently tuned DRM service, switching to the emergency broadcast. All DRM receivers presented the audio content of the emergency broadcast, text headlines (DRM text messages) plus detailed multilingual information, based on Journaline, to serve hearing impaired users. It was also demonstrated that receivers, which were turned off during the EWF test, were switched on automatically to access the emergency messages.



d. 5.1 Surround Sound Capability

DRM's capability to transmit 5.1 surround sound services with full backward compatibility to mono/stereo-only commercial receivers was demonstrated.



e. Advanced Applications

• Radio Schooling/Distance Learning

Radio Schooling or Distance Learning, another DRM application that uses Journaline as a core element, was demonstrated. It was shown that educational content can be broadcast to pupils and students, without the need for an internet connection. Besides spoken

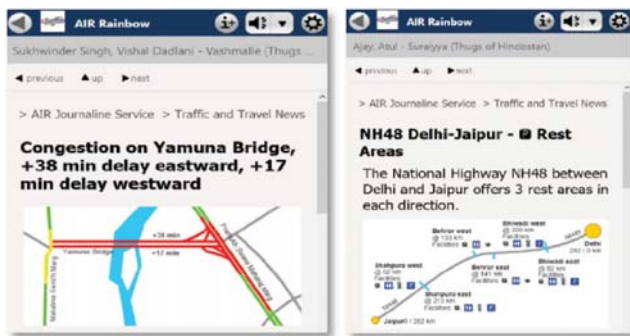
lessons as an audio service, classes with enriched Journaline texts, quizzes and solution pages were also demonstrated.



These screenshots of the "DRM Multimedia Player Radio App" show an example for a radio schooling service.

• Traffic and Travel Information and Programme Schedules (EPG information)

The possibility of transmitting Traffic/Travel Information and Programme Schedules (EPG information) was demonstrated.



• Public Signage

This use-case was demonstrated, enabled by DRM based on regular Journaline content plus the DRM-EWF feature.



• Slide Show

Slide Show, the transmission of sequence of images, which a multimedia enabled DRM receiver displays in response to a trigger set by the broadcaster, was demonstrated by transmitting logos of Prasar Bharati, AIR and DRM; and a picture of Akashwani Bhawan Delhi.



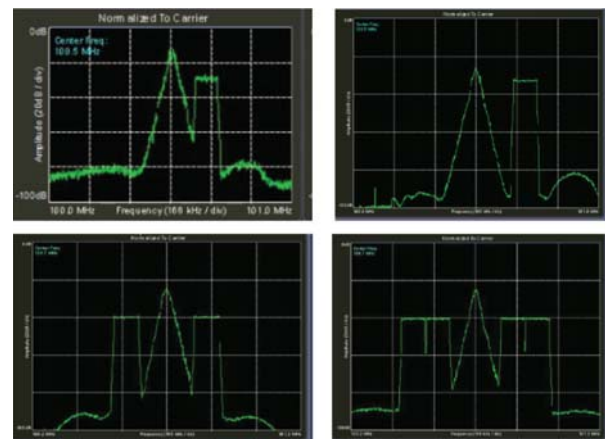
The screenshot of the "DRM Multimedia Player Radio App" shows an example for a SlideShow service component.

2. Simulcast (FM and DRM) operation

DRM supports transmission of analogue FM services along with digital DRM signals (blocks) from the same FM transmitter. The number of DRM blocks depends upon the bandwidth of the transmitter.

The RFmondial DRM modulator was used to prepare combined DRM/FM signals in various configurations for this demo. The VS series Nautel transmitter amplified this combined signal up to its maximum bandwidth of 600 kHz.

Six different simulcast configurations were demonstrated in Delhi from the single transmitter:



Test case	Transmitter		Signal Configuration and Receiver Tuning Frequency (MHz)											
	Center (MHz)	Power (W)	100.35	100.4	100.45	100.5	100.55	100.6	100.65	100.7	100.75	100.8	100.85	100.9
Test case 1: "Simulcast Showcase A"	100.5	1100		FM	10%									
Test case 2: "Simulcast Showcase B"	100.5	1100		loud processed FM	10%									
Test case 3: "Simulcast Showcase C"	100.5	400		equal			equal							
Test case 4: "Simulcast Showcase D"	100.5	400		FM	10%			10%						
Test case 5: "Simulcast Showcase E"	100.7	400								FM	10%			
Test case 6: "Simulcast Showcase F"	100.7	400										FM	10%	10%

Colour code: DRM analogue FM

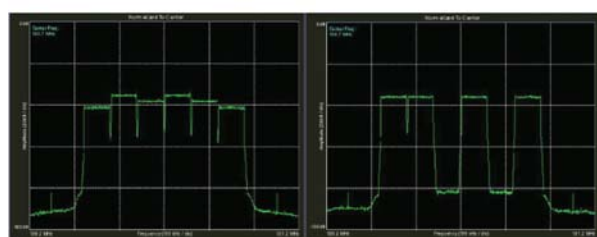
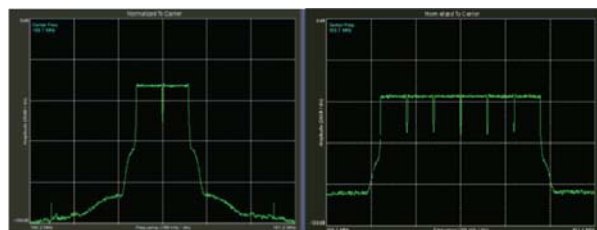
3. Multi-DRM operation

Multiple DRM signals (blocks) can be transmitted from a single FM transmitter. Every DRM signal can have its individual power level and even gaps in the spectrum are feasible. Individual SFN networks per DRM signal are also possible.

Every DRM signal can originate from an individual broadcaster, who remains in full control over both content and the on-air configuration (e.g. DRM modulation parameters and content elements).

Transmission of up to 6 DRM digital blocks (18 Audio + 6 Multimedia Journaline services) was demonstrated from the VS series Nautel transmitter, which has 600 kHz bandwidth, enabled by the RFmondial DRM modulator.

Following 4 configurations of multi-DRM were showcased:



Test case	Transmitter		Signal Configuration and Receiver Tuning Frequency (MHz)													
	Center (MHz)	Power (W)														
			100.35	100.4	100.45	100.5	100.55	100.6	100.65	100.7	100.75	100.8	100.85	100.9	100.95	
Test case 1: "Multi-DRM Showcase A"	100.65	200						100%	100%							
Test case 2: "Multi-DRM Showcase B"	100.65	600	100%	100%			100%	100%		100%	100%	100%	100%	100%	100%	
Test case 3: "Multi-DRM Showcase C"	100.65	100	25%	100%	50%		100%	50%	100%	50%	100%	50%	25%			
Test case 4: "Multi-DRM Showcase D"	100.65	100	100%	100%			100%									

Colour code: DRM analogue FM

4. DRM in analogue-FM white spaces

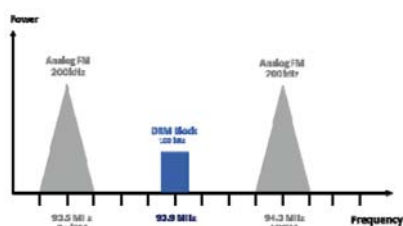
Six private FM stations operate from the CTI tower at Jaipur at frequencies of 91.1, 93.5, 94.3, 95.0, 98.3 and 104.0 MHz. These transmit from a single antenna with the help of an FM combiner. Each analogue FM signal occupies a bandwidth of 200 kHz, with a transmitter power of 10 kW.

There is unused white space of 600 kHz between the stations operating at 93.5 and 94.3 MHz and DRM digital transmission was carried out in this white space. The following 5 cases were demonstrated:

Single-block DRM transmission @ 100 W

DRM Configuration: 3 audio services + 1 multimedia service

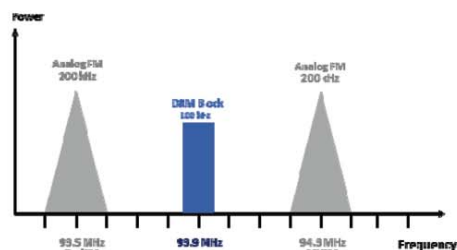
Gap to each existing analogue FM signal: 250 kHz
DRM tuning frequency: 93.9 MHz



Single-block DRM transmission @ 600 W

DRM Configuration: 3 audio services + 1 multimedia service

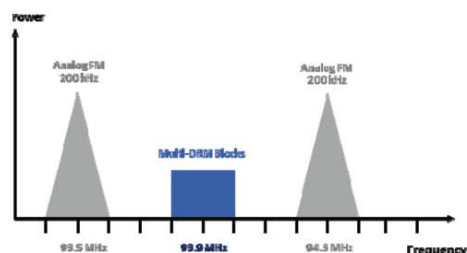
Gap to each existing analogue FM signal: 250 kHz
DRM tuning frequency: 93.9 MHz



Dual-block Multi-DRM transmission @ 200 W total

DRM Configuration: 6 audio services + 2 multimedia service

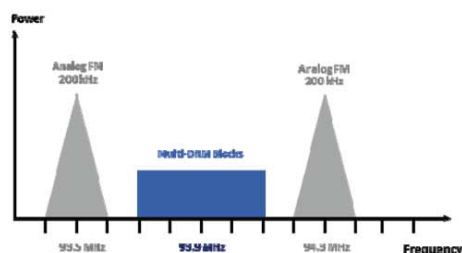
Gap to each existing analogue FM signal: 200 kHz
DRM tuning frequencies: 93.85, 93.95 MHz



4-block Multi-DRM transmission @ 400 W total

DRM Configuration: 12 audio services + 4 multimedia service

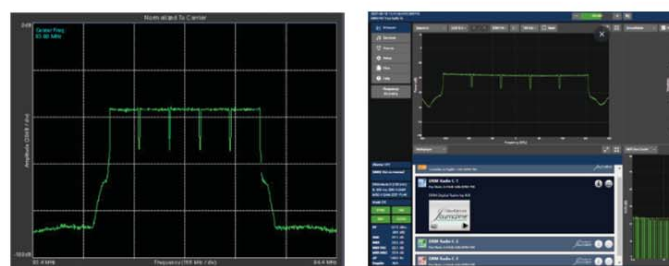
Gap to each existing analogue FM signal: 100 kHz
DRM tuning frequencies: 93.75, 93.85, 93.95, 94.05 MHz



5-block Multi-DRM transmission @ 500 W total

DRM Configuration: 15 audio services + 5 multimedia service

Gap to each existing analogue FM signal: 50 kHz
DRM tuning frequencies: 93.7, 93.8, 93.9, 94.0, 94.1 MHz



DRM DIGITAL RECEIVERS USED FOR THE DEMOS

A number of receiver brands made their DRM receiver solutions available for this trial. Receiver models included desktop and portable radio sets, automotive line-fit head-units, automotive after-market models and upgrade kits, Android-based mobile phones and Windows based tablets, laptops and desktop computers.

Professional Monitoring Receivers

RFmondial



RF-SE 19



RF-SE 12

Standalone/Desktop Receivers from Gossell and Starwaves

Gossell



Starwaves



W293

In-Car Receivers

Line-fit Dashboard Receivers

Mobis (Hyundai)



Harman (Maruti-Suzuki)



Car Box Radio

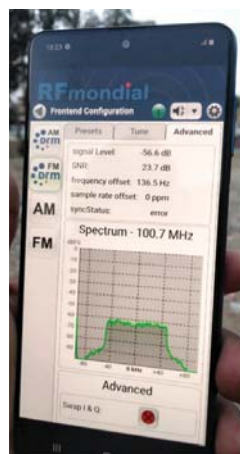
Starwaves



The receivers, which were being used for the regular DRM services on-air throughout India, were upgraded to receive DRM services in the FM band.

Mobile Phones (Android), Window Tablets, Laptops and Desktops as Radio Receivers, with USB Dongles

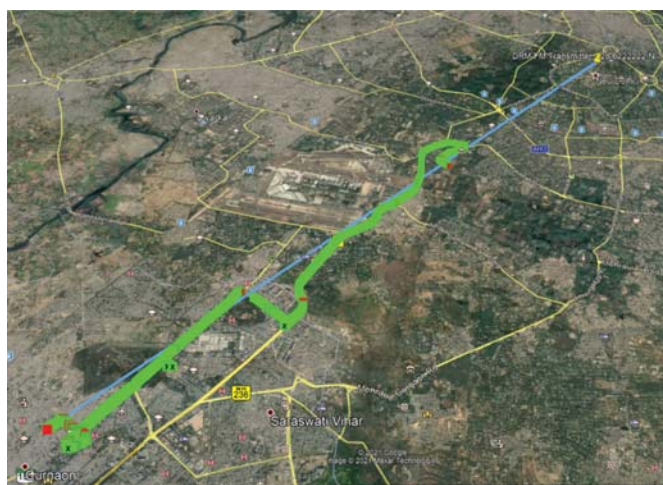
Samsung Galaxy M51 with Fraunhofer DRM MultimediaPlayer RadioApp (analogue) FM USB-dongles



MEASUREMENTS

Field measurements were carried out in 8 directions in Delhi and 2 directions in Jaipur. Recording of the reception parameters was carried out by the DRM Consortium using the RFmondial professional receiver RF-SE 12 with the mobile setup described above. It was observed that the coverage of 100W DRM signals was better than that of 1 kW analogue FM signals.

Coverage of DRM as plotted for in south-east direction in Delhi is as below:



In the coverage measurement shown, the 100 W low-power DRM signal provided perfect DRM coverage for at least 25 km.

It was also observed that the reception of DRM signals is excellent on mobile phones. Reception on standalone/desktop receivers varied from model to model. Excellent uninterrupted reception was observed on the Mobis car receiver fitted in a Hyundai Verna car which was driven around Delhi.

DEMONSTRATION WAS ORGANISED BY DRM CONSORTIUM WITH INDUSTRY-WIDE SUPPORT

The trial and demos of the DRM digital radio standard were successfully completed by the DRM Consortium with the joint collaborative effort and support of Technomedia, BECIL, Fraunhofer IIS, Nautel, NXP, RFmondial, the DRM Indian Platform, the DRM Automotive India Workgroup, Gossell and Starwaves receiver manufacturers and automotive Tier-1 companies Mobis (Hyundai) and Harman (Maruti-Suzuki).



DRM IN FM BAND IS BEST SUITED FOR THE INDIAN ENVIRONMENT

The Committee constituted by the Prasar Bharati has allegedly already submitted its own test report, but this has, so far, not been made public. The demonstration of DRM services in the FM band is a 'feast of firsts' for digital radio services and features in India, including the multi-DRM transmissions on a single transmitter and distance learning enabled by the non-proprietary, open-to-all, DRM radio standard. After successful international trials we are confident that the DRM standard is best suited for the Indian environment also in the FM band for local and regional services:

- i. **Ease in implementation** – DRM is a truly flexible standard. It can be implemented very easily and can be deployed as an individual signal, multi-DRM shared transmitter setup, simulcast with analogue FM services and/or efficient utilisation of FM band white-spaces.
- ii. **Digitalisation without disturbing existing analogue FM services** – Digitalisation in the FM band using DRM can be introduced without disturbing existing analogue FM services.
- iii. **Backward compatibility** – DRM works in all broadcast bands. It is one single standard for all radio broadcast bands.
- iv. **Existing DRM receivers can be easily firmware upgraded** – Existing standalone as well as car DRM radios could be easily firmware upgraded without any changes in the hardware.
- v. **DRM on existing Android phones** – It was demonstrated that all the Android phones could receive DRM in the FM band using off-the-shelf dongles and the Fraunhofer DRM MultimediaPlayer Radio App.

A consumer version of this app can now be downloaded from the Google Play Store and the Amazon Appstore under the brand name "STARWAVES DRM SoftRadio". The App can also be installed on Windows, Linux, MacOS and Android based

tablets, laptops as well as desktop computers.



- vi. **No additional royalties** – DRM in the FM band, being the same digital radio standard already used in MW & SW bands today in India, no additional IP royalties are required to be paid.
- vii. **Make in India** – DRM in FM band fulfils the 'Make in India' mission of the Hon. Prime Minister.
- viii. **Unmatched spectrum efficiency** – maximising the number of digital audio services in the given spectrum.
- ix. **DRM Tuning frequency is within the allocated frequency band** – DRM tuning frequency for each DRM signal (block) falls within the allocated frequency band in all cases, even in the multi-DRM case.
- x. **Additional Journaline service in multiple Indian languages** – DRM is ideal to provide EWF and online teaching capabilities, without the need for Internet and is free-to-air for everybody.
- xi. **Fully compliant with regulator's (TRAI) recommendations & existing analogue FM spectrum licensing** – Private Broadcasters would be able to broadcast up to 2 DRM digital blocks (i.e. up to 8 services) in digital in the already allocated bandwidth of 200 kHz.
- xii. **Commercial Potential** – DRM in FM band provides additional revenue streams for the broadcasters through Journaline interactive and sponsored content, more audio programmes/ content for additional audience groups, option for pop-up stations.

TO SUM UP

DRM in the FM band is ready for India's mass market, being based on the vast in-country know-how, accumulated over many years; especially in chipset design and production. Adopting DRM in the FM-band, thanks to its flexibility, backward compatibility and to the fact that it is evidently part of a single standard for one nation, will only fast track the digitisation process and will be embraced by the industry and broadcasters alike.

The Indian car industry has rolled-out DRM enabled radio sets in the millions and proved during the trial that, after a simple firmware upgrade, those receiver models will support DRM in the FM band with the full feature set. We are eagerly awaiting the official announcement of DRM for FM in India. ■



Yogendra Pal, Hon Chairman, India Chapter of DRM Consortium

Yogendra Pal is the Honorary Chairman of the India Chapter of DRM Consortium, the international not-for-profit organisation which has been created for the development and implementation of the DRM standard for the digitisation of the terrestrial radio transmissions. He is also the honorary member of Board of DRM Consortium.

He was Advisor with the Ministry of Information & Broadcasting, for the implementation of Digitisation Addressable System (DAS) in the Cable TV network in the country and was closely associated with the strengthening of the Community Radio network in the country. He superannuated from All India Radio & Doordarshan as Additional Director General after over 36 years of glorious service and was associated with implementation of state-of-the-art fully digital studio setup (New Broadcasting House) in Delhi; News-on-Phone, Internet and AIRNET services and networking of AIR stations.

He is the life fellow of Broadcast Engineering Society (India) and Institution of Electronics & Telecommunication Engineers.

Webinar on IP Infrastructure & Applications in Broadcasting

10-12 May 2021

ABU Technology hosted a three-day webinar series on IP Infrastructure & Applications in Broadcasting, from 10th to 12th May 2021. The webinar sessions looked into OSI & TCP/IP layered architecture, SMPTE standards and other industry specifications for implementing All-IP Infrastructure. Other areas covered were, practical issues for migrating to IP in a broadcast environment and typical IP-based solutions & applications. Well-known speakers, from IRIB-Iran, KBS-Korea, Rohde & Schwarz-Singapore, Sony-Hong Kong and AEQ-Europe, shared insights and industry experience of preparations for moving to All-IP infrastructures at broadcast facilities. During the webinar a total of 488 attendees participated, representing 181 organisations from Asia-Pacific and elsewhere.

IP NETWORKS, MODELS AND STANDARDS FOR ALL-IP INFRASTRUCTURE



Dr Mohieddin Moradi,
Senior Researcher, IRIB, R&D

The first day of the series covered fundamentals & working of Internet Protocol across networks, and details of different standards, globally available.

The Open System Interconnection (OSI) model is the main backbone and reference protocol for all types of data communication via

digital networks. Its architecture consists of seven layers, namely (from top to bottom): Application, Presentation, Session, Transport, Network, Data Link and Physical. Each layer at the receiving end device talks with that at the sender's end through unique protocols. Protocols at the application layer are HTTP, FTP, SMTP etc.; at the presentation layer there are different compression/ encryption protocols; at the session layer are SDP, SIP, P 2P etc.; TCP/UDP operate at the transport layer; Ipv4/Ipv6, ICMP, IGMP at the network layer; Ethernet protocol is used at the data link layer, and finally wired and wireless media technologies such as RS232, UTP, DSL, ATM etc. operate at the physical layer.

On the other hand, the TCP/IP model consists of 5 layers only; corresponding to the application, transport, network, data link and physical layers of the OSI model. Hypertext Transfer Protocol (HTTP) governs the interaction between a web server and web client. It is a set of rules for exchanging text, graphic images, sound, video, and other multimedia files on the web. Transmission Control Protocol (TCP) manages the individual conversations and enables reliable communication between processes

running on separate hosts. It provides reliable, acknowledged transmissions that confirm successful delivery. Internet Protocol (IP) is responsible for delivering messages from the sender to the receiver. It receives message segments from the transport layer, divides messages into packets and addresses those packets for end-to-end delivery over the network.

Ethernet protocol is responsible for the delivery of messages from one network interface card (NIC) to another NIC on the same Ethernet LAN. Ethernet and WLAN define the rules for wiring and signalling standards of the wired and wireless access media.

During transmission and reception, the payload data are encapsulated & decapsulated and take different forms at each layer, namely as segments/datagrams in the transport layer, as packets in network layer, as frames in datalink layer and as bits in physical layer. During sending, they are padded with headers or footers from top to bottom layer and correspondingly, while being extracted at the receiving end, these are unpacked sequentially from bottom to top, ultimately to be recovered, as the original data, at the application layer.

The organisations involved with the development and support of TCP/IP include IANA and ICANN. IANA is responsible for overseeing and managing IP address allocation, domain name management and protocol identifiers for ICANN. ICANN coordinates IP address allocation, management of domain names and assignment of other information used in TCP/IP protocols.

There are several standards organisations, standards and industry specifications for implementing All-IP infrastructure. Enabling media networking solutions, the VSF (Video Services Forum) is an international association comprised of service providers, users and manufacturers dedicated to interoperability, quality metrics and education in media networking technologies. The Society of Motion Picture and Television Engineers, SMPTE, is a global professional association of engineers, technologists, and executives working in the media and entertainment industry. The Audio Engineering Society (AES) is a professional body for engineers, scientists and other individuals with interest or involvement in the professional audio industry. The European Broadcasting Union (EBU) is an alliance of public service media organisations in Europe. AIMS (Alliance for IP Media Solutions) was established to speed adoption of the work of these organisations with regard to IP interoperability. The Advanced Media Workflow Association (AMWA)

has NMOS specifications related to networked media for professional applications.

SMPTE's ST-2022 suite take payloads from specialised electrical interfaces and puts them on IP using Real-time Transport Protocol (RTP). Here, the electrical interfaces are ASI and SDI. ST 2022-6 is the SDI over RTP standard. RTP is a protocol for the transport of real time data, including audio and video over multicast or unicast network services. It provides time stamping, sequence numbering, and other mechanisms to take care of timing issues. Through these mechanisms, RTP provides end-to-end transport for real time data over a datagram network. SMPTE 2022-6 is the most common uncompressed video format. It contains all the elements of current SDI video, audio and data must be embedded before being packetised. For audio processing, the audio must therefore be de-embedded and then re-embedded.

NMOS is a family of open specifications that enable interoperability between media devices in an IP infrastructure. Among several specifications, the main functions are discovery and registration, device connection management and SDP. Session Description Protocol (SDP) describes the contents of a multicast transmission, such as IP address, audio type, video type & resolution. The broadcast controller is the overall policy control point for all media endpoints and sessions. IS-06 NMOS network control enables a broadcast controller to modify and view a network. It lets broadcast control applications manage what happens on the network itself. The network controller abstracts the details of the network from the broadcast controller and provides an API for all required network services. The API interfaces the broadcast controller and the network controller to modify and view the network.

In media service management and orchestration, the Orchestrator glues the entire operation together and sets up the workflows, such as multiple possible connections, edge equipment control, bandwidth control, redundancy, security, enabling virtualisation etc.

JT-NM (Joint Task Force on Networked Media) – an alliance of AMWA/EBU/SMPTE/VSF - was formed in the context of the transition from purpose built broadcast equipment and interfaces (AES, cross point switcher, etc.) to IT based packet networks (IP, servers, storage, cloud, etc.)

AES67 is a standard which enables high performance audio over IP streaming interoperability between the various IP based audio networking products currently available, based on existing standards such as Dante, Livewire, QLAN and Ravenna. Dante, and Ravenna use AES67 which is the uncompressed audio adopted prevalent in 1 Gbps Ethernet fabric with 48 KHz sampling and multiple channels.

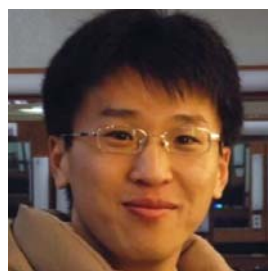
The SMPTE ST-2110 suite can be thought of as interfacility, much like baseband SDI in broadcast, satellite and cable facilities. Here all the signals are carried separately. Video, audio and data are all separate streams using RTP. For audio processing, the audio is simply picked up, processed and sent outbound, so that it doesn't

require inherent embedding and de-embedding.

SMPTE ST-2059 describe a specific media based PTP profile required to use PTP based equipment in the professional broadcast and media industry. In traditional SDI systems, the video and audio signals are synchronised to a continuous reference source, and delay blocks are added to correct for lip sync errors. In packetised IP systems, the packets experience different delays through a network, resulting in disruption of the packet sequence. The data must be continually time stamped for re-alignment downstream to allow realignment of the data types at the receiving host. So, PTP (Precision-Timing-Protocol) is used for synchronisation here. The goal of the PTP timing system is to synchronise all the clocks such that the absolute time difference between any two clocks (i.e., their accuracy) is within a specified limit. This is typically about 1µs, which is more than adequate for broadcast and media applications that are primarily aimed at maintaining audio/video lip-sync.

For All-IP infrastructure, the core design elements are switches and routers. The network switch topology options are fixed monolithic and spine & leaf distributed switches. Routing in IP networks takes place either automatically or via software defined network (SDN) management. Commercial-Off-The-Shelf switches employ SDN configuration and non-blocked routing (NBM). These are preferred to be IGMP compliant and in protocol independent multicast (PIM) mode with source specific multicast between router subnets. Routers and switches need to handle very large bandwidth and be availed with redundant switches. Minimum user requirements to build and manage an IP network is defined by the EBU Media Node Pyramid. In an All-IP infrastructure, the media nodes should have clear specifications on all levels: media transport, time and sync, discovery and registration, configuration & monitoring, and security.

PREPARATIONS FOR IP-BASED SYSTEM DEPLOYMENT



Hae-Jung Kim,
Deputy Director, KBS-Korea

Korean Broadcasting System (KBS) started operating an IP-based UHD system in July 2018. Two IP-studio control rooms were set-up to control six production studios. These control rooms were equipped with network switch, IP gateway, broadcast controller, UHD camera, UHD video mixer, audio mixer, workflow controller etc. The IP-based

UHD system has 3 networks: media network to transmit and receive video/audio/data that replaces the SDI based content flow; control network to control and operate different broadcast product equipment such as mixers, cameras; and data network for file-based workflow.

Generally, three different network topologies are deployed. The simplest structure is where all broadcasting equipment is connected to a single switch. The second topology is a configuration with a leaf and spine structure that is commonly used in the big and distributed studios. The third topology is a hybrid leaf and spine set-up.

To prepare for migration, key steps to follow are, first understanding the workflow and essentials of SDI-based production systems. Then, gaining skillsets to manage network switches, making technical teams aware of why an IP system is needed and providing them advance training on relevant equipment. Lastly, being in regular contact with the suppliers'/manufacturers' support teams. Proof of concept has to be in place to observe compatibility between network switch and broadcast controller and between end-devices and broadcast controller. Suitable equipment is required for monitoring solutions.

Obstacles faced by KBS in planning the next migration, to a UHD-ST2110 set-up, are compatibility issues between NMOS devices and existing nodes, insufficient availability of UHD native IP devices and, currently, the greater relative cost of implementing the IP system.

IP BROADCAST CONTROL WITHIN AN SMPTE-2110 ENVIRONMENT



Yew-jin Cheong,
Director, Rohde & Schwarz



Ong Kah Keong,
Solutions Architect, Rohde & Schwarz

Broadcasters should adapt to changing trends such as 5G, driving mobile content consumption and IT & cloud technology, bringing huge convenience and new possibilities to broadcast media. 4K, HDR, HFR, WCG, AR & VR have not only brought innovation but new requirements for broadcast infrastructures. IP brings benefits such as flexibility and scalability. IP-based ST 2110 is format agnostic, improves manpower efficiency, provides faster go-live, engenders future-proofing & better system management. Maintenance is more efficient and total cost of ownership is lower overall.

A typical project set-up by Rohde & Schwarz uses its VENICE solution for 4K IP studios. It is compatible with standards ST2110, ST2022 and NMOS. The set-up supports VDCP over IP, 16-channel audio routing and HLG-HDR devices with OP Atom editing format. It works in SNMP configuration within 100Gb/10Gb/1Gb networks. Additional to this deployment, other third-party vendor integrations include Aveco Automation server, Sony LSM, GeFei API, LAWO Multiviewer, Sony IP camera, EVS Playout Server, Tektronix PTP / NTP server, Sony Central Switcher, Mellanox 100Gb Switch, HuaWei 100Gb/10Gb Switch, and Dayang Gateway.

During the installation, challenges encountered involved network planning and configuration issues while setting up subnets. Integrating with multiple manufacturers, it needed to be ensured that all nodes were ST-2110 & ST-2022 standards supported. Finding a solution with multicasting functionality with blocking provision through

all UHD/HD fast-switching, IP and SDI fast-switching nodes, was a tough task. For such an IP-based setup, video servers needed to comply with PTP, NMOS IS-04/-05, NTP, IP stream requirements, support BT2020 colour space and 16-track audio routing configuration. IP networks needed to be planned with switches and devices such as gateways to interface with SDI I/Os, camera, multiviewer and CG, with main and backup IP signal routing systems. VENICE-S has provision for SDI and IP interchangeability.

NMOS enabled ST-2110 equipment provides seamless interoperation across vendors & facilities and brings push-button simplicity to video over IP routing. While ST-2110 alone does not specify how to detect, connect and control devices, Discovery and Registration component of IS-04 allows control and monitoring applications to find the resources on a network. Device Connection Management (IS-05) provides a transport-independent way of connecting media nodes. Other new specifications allow audio mapping, grouping, system discovery, security, authorization of API functions.

In the NMOS workflow, the system has two main functional layers, first for registration and second for orchestration through the servers, to stream into different channels. On playout, the automation server sets up playout parameters (raster, audio channel, ANC etc.) and playout application manages clips and rundown. For the ingest function, connection is established using an IS-05 orchestration tool that sends commands to receiver and sender, it is also connected to an SDP file with IP address, transport parameters like multicast IP address, and content description etc. The server node sets input parameters accordingly and recording starts using the automation server or native ingest application. NMOS thus enables a move to a more flexible and dynamic architecture and supports a strategic approach for secure, end-to-end IP and automation infrastructures.

IP ECO-SYSTEM VISION AND SOLUTIONS



Tomas Chen,
Marketing Manager, Sony

Sony has solutions to fulfil the vision of high quality live production. One is the IP Live system that brings innovation to sports, entertainment and news production workflows. The benefits of remote production are, minimised on-site equipment & staff production costs, increased productivity etc. Another solution is shared production,

that maximises the utilisation of facilities, flexibility in studio or control room combination and dynamic resource assignment. For an end-to-end IP Live production platform, all that is needed is IP connectivity, and this is achieved by appropriately layered architecture.

The basic architecture has components such as facility management application, broadcast controller, orchestration and SDN control. These allow linking the facilities at remote sites, broadcast stations at the

headquarters and elsewhere, via WAN and LAN networks. The Facility Management System (FMS) allows live workflow-centric configuration and monitoring, unified device configuration and monitoring. The broadcast controller provides routing, tally and name management, logical & physical matrix management. Orchestration and SDN control allow the management of network configuration, SD flow control and monitoring.

The facility management system has a recall function with pre-sets, to reallocate resources with single button operation. It is an application that provides efficiency for production workflow and improves system availability. This makes production more efficient by sharing the control room and processor resources among multiple studios. It can provide a very simple and efficient operation, for example when an OB Truck needs to change its configuration for the next event; minimising the cost of system change and increasing the utilisation rate. Once pre-setting has been configured in the FMS, an operator just needs to press the button to make the change. Any simple or complex setting can be assigned to the hardware panel and GUI. Monitoring PTP status is one of the crucial things to keep the IP Live production system stable. FMS should be able to gather all the related status information across multiple devices such as PTP grand master, network switches and end devices.

A broadcast controller is used for system configuration, video and audio routing and tally capability, network monitoring, system maintenance functionality etc. On the other hand, orchestration and SDN control promises future network scalability, solid resiliency, and vendor neutrality. It is the key functionality of SDI to IP migration. Orchestration is also the dynamic management of media services over the entire IP infrastructure. Traffic control for multicast routing options is either routing intelligence built into the network components or centralised routing intelligence, as in the SDN. SDN control avoids over-subscription, bandwidth management, deterministic routing and quality of service, flow-based access control and policing. It also enables scheduling of services, fast and clean switching (MBB/BBM), LAN/WAN convergence, and security using flow-based access control and policing.

IP Live production modes include; remote production, in-facility shared production, inter-facilities shared production, or OB-Van shared production. Sony & Neve's joint offering has such solutions for end-to-end IP acquisition, production and the display of video, audio and data.

ROUTING AND MIXING OF AUDIO OVER IP FOR RADIO

Dante, by Audinate, is a software, hardware, and network protocol combination solution that enables sharing of digital audio over a standard Ethernet network using layer-3 IP packets. The standard offers uncompressed, multichannel, deterministic and low latency audio which is highly scalable and controllable. It also supports AES67 technology for interoperability with equipment that does not support Dante. A Dante enabled device has associated transmission and reception channels. A



Roberto Tejero,
Product Manager, AEQ



Antonio Perez,
Sales Manager, AEQ

transmission channel can be sent to several receivers at the same time through unicast or multicast. Each receiving channel will receive audio through the network from only one transmission channel. Dante runs on Gigabit Ethernet switches such as Cisco, Netgear, Dlink, TPLink, Avaya, HP etc.

Dante Controller can be installed on one or more computers on the network, and is the most frequently used tool to make connections between device channels. Dante Domain Manager enables user access control, logging and sharing audio between audio zones. AoIP usage scenarios for radio are in three configurations:

one is for two studios via Dante routing with NETBOX 8 interface. Next is for four studio scenarios via RTC Routing with AoIP NETBOX 32 interface. A third scenario is for connecting several studios with X Core IP routing and a TDM routing matrix.

AEQ has launched several Dante enabled devices: TALENT, an essential IP audio codec, to make radio from anywhere and ATRIUM, a mixing console specially designed for broadcast audio production for Radio and TV. Radio equipment that can be AoIP networked includes, audio mixing consoles, audio matrices, audio I/O terminals to the IP network, commentary systems, audio codecs and IP phone and talk show systems for broadcasting and PC based play out automation systems. ATRIUM modular consoles handle up to 1024 audio inputs and outputs. They can incorporate any number of Dante AoIP cards with 64 input and output channels each. Other modular consoles- FORUM Split, FORUM Lite and CAPITOL- manage up to 180 audio inputs and outputs. They can incorporate up to two Dante AoIP cards with 32 input and output channels each. NETBOX 32, NETBOX DSP, X_CORE modular matrices handle up to 64 audio inputs and outputs. NETBOX 32 compact matrices handle total 64 audio inputs and outputs.

Audio input and output interfaces are deployed for the adaptation of audio signals to IP networks for multichannel networking. They are essential to insert audio signals from remote sources, voice booths, central controls and other studios into consoles and matrices with IP connectivity. In the case of commentary units with IP connectivity, any device with AoIP Dante or AES 67 connectivity can share incoming or outgoing audio with Olympia 3 devices. With AoIP Dante connectivity, automation system for production and playout may be handled without the need for sound cards or USB connectivity. ■

NHK STRL Holds Open House Online



<https://www.nhk.or.jp/strl/english/open2021/>

1 – 30 June Online event

Pursuing science and technology. Enriching your experience.

STRL OPEN HOUSE 2021

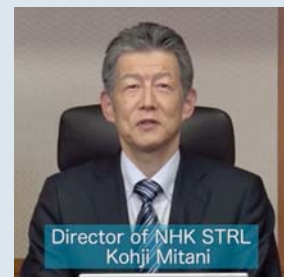
The NHK Science & Technology Research Laboratories (NHK STRL) showcased their latest research results at their 2021 Open House, held online from 1 to 30 June.

The Open House gave visitors a close look at broadcast technology research that they would not ordinarily be exposed to.

With the theme “Pursuing science and technology. Enriching your experience”, NHK STRL created video and experiential content that could be seen on the event website: <https://www.nhk.or.jp/strl/english/open2021/>

Researchers worked hard to find ways to convey details of their latest research in terms that were easy to understand, creating web pages for each exhibit.

“With the great changes occurring in broadcast media environments, we have set our major objective going forward to be to create media environments that deliver new experiences and new excitement to all people,” the Director of NHK STRL, **Kohji Mitani**, said.



Director of NHK STRL
Kohji Mitani



Judy Parnall
BBC Research & Development

“Anticipating what media environments will be like in the years 2030-2040, we have also set targets and directions for NHK STRL, as the research centre for NHK, and these are described in ‘Future Vision 2030-2040’.”

Judy Parnall, Head of Standards and Industry, BBC R&D, and Chair of the Technical Committee of the European Broadcasting Union (EBU), presented views from Europe for the future.

These were from both the BBC’s Research & Development Department and a group of public service R&D laboratories that come together through the EBU. ■

Cybersecurity a key topic at WBU-TC

World
Broadcasting
Unions



Cybersecurity was among the issues discussed when the Technical Committee of the World Broadcasting Unions (WBU-TC) met online on 7 June 2021.

The two-hour meeting took place on Zoom, chaired by John Lee of the North American Broadcasters Association, NABA. The WBU represents all the world’s major regional broadcasting unions.

WBU member unions shared their work on such issues as cloud security, anti-phishing and cyber protection for people working in the field.

They have also conducted research on how much a broadcaster should allocate for cybersecurity in its budget.

The meeting also looked at spectrum issues and heard reports from member unions including the ABU, which was represented by its Director Technology and Innovation, **Ahmed Nadeem**. ■

EBU Technical Assembly looks at technology trends

The European Broadcasting Union’s 2021 Technical Assembly took place online on 9-10 June.

The assembly meets annually to take stock of current and future media technology trends and the work of EBU project groups.

The meeting began with two keynote sessions: ‘AI and public service media – a story of collaboration’ and ‘Teaming up broadcast and broadband: the DVB-I and HbbTV landscape’.

The agenda included 5G in production and distribution, the future of UHF and a session on ‘Technology vs Content vs Audience – what drives what?’

The assembly also looked at innovative new services and media technology innovations created by EBU members. ■



News from The ABU Region

SOLOMON TELEKOM TV OTT SERVICE POWERED BY SWITCH MEDIA

Switch Media, the provider of online video technology, recently secured a contract with Solomon Telekom Company Limited (STCL) to provide an online streaming service for its free-to-air television network, Telekom Television (TTV). Recently launched, the offering, which utilises Switch Media's MediaHQ Lite online video platform, provides subscribers with a two-channel service that is available online across multiple devices including Chromecast streaming technology.

The recent completion of an undersea cable between Australia, the Solomon Islands and Papua New Guinea has significantly increased connectivity, creating new technology opportunities for communities on these islands. The new over-the-top (OTT) service will provide a combination of free-access and subscription, with subscribers receiving unlimited data via their ISP. Billing is carried out via mobile phones and users will have the opportunity to purchase vouchers to access the service from local retailers.

Using MediaHQ Lite, TTV have a cost-effective, fast-to-market online video solution that enables them to push content to the market quickly and inexpensively. MediaHQ Lite is a best-of-breed solution that allows content providers to extend their reach, free up operational resources and adapt to the changing OTT landscape and consumer expectations. This means an OTT service can be launched quickly and easily without any kind of customisation, other than adapting to the company's own branding. MediaHQ Lite includes a pathway to enhanced monetisation, such as a full-featured dynamic ad insertion (DAI) integration, allowing uncompromised addressable ad experiences.

MediaHQ Lite features include secure VOD and live streaming with DRM, a global CDN service, real time analytics reports, comprehensive metadata, high definition ABR encoding, dynamic ad-insertion and a range of ready-to-go applications across every screen. [Content+Technology]

OLED ELECTRON INJECTION MECHANISM EXPLAINED

NHK Science & Technology Research Laboratories (NHK STRL) announced that

it is conducting R&D on organic light-emitting-diode (OLED) devices, with the goal of realising flexible, large-screen displays that can be folded or rolled up. To extend the lifetime of flexible displays and reduce power consumption, NHK STRL has developed an electron injection layer (EIL) material, which injects electrons from the cathode into the light emitting layer.

To inject electrons into the light-emitting layer in an OLED device, the energy difference of approximately 2eV between the cathode and the light-emitting layer must be reduced to zero. These discoveries have shown that with the new EIL material, the electron transport material is no longer needed, and it can inject electrons directly into the light-emitting layer. The new EIL material will contribute to extending the lifetime and reducing power consumption of OLED devices and also simplify their structure, since the electron transport material is no longer needed. These research results were published in the May 11 edition of Nature Communications Journal. [NHK STRL]

MEDIA PRIMA GROWS DIGITAL AUDIENCE WITH GRABYO

Media Prima Berhad, Malaysia's largest integrated media group, has partnered with Grabyo to enhance its social video strategy and bolster its dominance in Malaysia's digital content market. Ranked as Malaysia's number one choice for mobile content, ahead of Google and Facebook, Media Prima delivers content across a variety of free-to-air TV and radio channels, print publications and digital content platforms nationwide.

The cloud video platform will now enable Media Prima to expand and innovate its live and 'real-time' social video strategy around its popular TV channels TV3, 8TV, ntv7 and TV9. Video clips delivered in real-time achieve the most engagement of any type of social media content. The rapid clipping, video editing and production tools will enable Media Prima to be first to market with content, positioning its social channels as the 'go-to' destinations for breaking news, lifestyle and entertainment videos.

This strategy will enrich viewer experience by offering supplementary content that sits alongside its broadcast programming, strengthening its growth trajectory

across digital media and supporting tune-in for traditional media channels. Integrated browser-based tools will enable the media group to clip, edit and publish videos from TV channels directly to social media in seconds; combined with a powerful new live video offering using Grabyo's advanced live streaming platform. [Grabyo.com]

PAKISTAN TELEVISION PTV CAMERAS TO TURN HIGH DEFINITION FROM JUNE 2021

With the evolution of the technological world, PTV has seen many major technological revolutions and advancements in the technological realm, except its cameras. It has been a daydream of every single Pakistani since National TV inception to watch PTV dramas, news, sports and other entertainment programmes in high definition.

Finally, these wishes have been heard by the Information and Broadcasting Minister Chaudhry Fawad Hussain who has announced lately that PTV will go full HD from 1 June. He took to Twitter to announce, "PTV has been given a deadline to turn full HD from 1 June, the reform which has been pending since 2019. In same years PTV Sports will also go full HD". [defence.pk]

MALAYSIA'S RTM INSTALLS DENSITRON IDS

Densitron, the global leader in innovative Human Machine Interaction (HMI) and display technology, has announced that Radio Televisyen Malaysia (RTM), has installed a comprehensive Intelligent Display System (IDS) from Densitron for its broadcast facilities in Kuala Lumpur. IDS is a vendor agnostic control and display layer that integrates with, and controls, all critical media technology infrastructure products, such as playout, automation, scheduling, building management and AV systems. The simplicity of IDS is its strength. The elegant UI allows users at any level to engage with IDS to deliver multiple complex applications at the touch of a button.

The installation at RTM, specified and completed by Malaysia-based system integrator, Mahajak Trio Electronics, is comprised of 135 IDS devices located throughout RTM's TV and radio studios and control rooms, edit suites, and public spaces. The installation, which includes displays, display drivers, servers, I/O interfaces, table lamps, touchscreens, and wall lamps gives RTM a comprehensive range of visual information and control options for each area in which IDS operates. RTM came to Mahajak Trio Electronics with a must-have list for its

display and control needs.

In addition to 43 IDS large format displays, IDS touch panel controls were also required for RTM's primary control rooms. The panels are able to display mic live, on air, and indicate if a telephone is connected or ringing. With the IDS control system, screen design layouts, branding logos, and backgrounds can be switched and updated via an easy-to-use web interface. Scrolling, and prioritised text messages can be shared with all displays if required, or with specific groups on the system for a pre-determined amount of time. Each studio that uses IDS takes advantage of reference quality pip tones from the world-standard Greenwich Time Signal. The system provided to RTM also gives an overview camera display outside each studio, so what is taking place inside can be observed without disruption. It also offers visibility of all security cameras if necessary. The touchscreens in the control rooms also provide for situational awareness and interaction with each studio as necessary. [densitron.com]

CHINA MEDIA GROUP LAUNCHES 8K-UHD PUBLIC SERVICE PLATFORM

The China Media Group has announced the launch of an 8K ultra-high-definition television platform for public service. This follows an earlier launch of 4K and 8K channels by national broadcaster China Central Television. Industry experts say 5G-powered ultra-high-definition TV is the future of displays and a source of growth in China. They say competition has been fierce among high-end TV makers for market share. [CGTN News]

DVB-T2 NATIONWIDE COVERAGE PROJECT IN THAILAND AWARDED TO JAMPRO

Thailand has awarded a DVB-T2 expansion contract for a Broadband Terrestrial Nationwide Network to Jampro, adding the DVB-T2 combiner/mask filters to the existing nationwide network that Jampro delivered and installed in 2017.

Further to the additional RCEC Constant Impedance Mask Filter/Combiner modules, Jampro is retuning many field tunable modules. This allows new channel assignments for the spectrum clearance project in Thailand. The Jampro RCEC DVB-T module's design also allows field tuning over the UHF bands. Moreover, this flexibility is essential in the ever-evolving terrestrial transmission networks. [Jampro]

TELSTRA EXPANDING 5G HOME BROADBAND AND IMPLEMENTING MMWAVE

While many households have the right

broadband connection to enjoy the ability to play games, stream movies to their TV, or conduct video meetings for work seamlessly, there are households who can't get this great experience for a variety of reasons. For these people, Telstra has announced expansion of fast 5G Home Internet to more places and doubling the data limit in Australia. It first launched 5G Home Internet at the end of last year for selected customers whose fixed connection might not have been capable of delivering to their needs. Telstra received some awesome feedback from these early customers and were committed to providing the best experience for customers' home internet no matter the technology type.

Throughout the coming months 5G Home Internet service will be made available to even more places. The 5G network is well on track to reach 75% of Aussies by the end of June. They have enough users on the network now to get an accurate look at the performance customers can expect on 5G Home Internet. They have also been refining the service and network, bumping up average download speeds by 19%.

Telstra recently announced that they have acquired the mmWave spectrum needed across Australia to power the next evolution of our 5G network. They have already begun deploying 5G mmWave in selected sites in 5 capital cities and achieved record-breaking download speeds using this technology in testing earlier this year.

5G mmWave gives unparalleled opportunity to provide a home broadband service over 5G which will meet the performance and capacity as everyone's data and internet needs continue to grow. [Telstra]

DOORDARSHAN PLANS TO LAUNCH DD INTERNATIONAL TO PRESENT 'INDIA STORY'

State broadcaster Doordarshan is planning to set up a new channel DD International to "project India's point of view" to the world. Doordarshan floated an Expression of Interest (EOI), seeking applications for a consultancy service to provide a detailed project report for establishing the channel.

As per the EOI document, the idea is to "build a global presence for Doordarshan and to establish an international voice for India". The EOI says the channel will present India's point of view on contemporary issues of both global and domestic significance. Officials said it was felt that India's perspective was getting lost in the noise. The EOI also mentions that the channel will specifically tell

"the India story to a global audience". Doordarshan's global outreach is primarily through bilateral distribution arrangements with select broadcasters in other countries, apart from live streaming through Prasar Bharati's global digital platform. [thehindu.com]

ABC SIGNS LETTERS OF INTENT WITH GOOGLE, FACEBOOK

ABC Managing Director, David Anderson has announced that the ABC has signed letters of intent with both Google and Facebook. Speaking at an Australian Federal Government Senate Estimates hearing, the ABC MD said that when these commercial deals are concluded, they will enable the ABC to make new and significant investments in regional services. These investments will provide a huge boost to the regions at a time when many areas of regional and rural Australia have experienced a withdrawal of media services. The ABC's commitment to serving regional Australia and connecting all parts of the nation is unmatched by any other media organisation.

The ABC is also expanding its community presence throughout Australia. David Anderson also reported that, all around Australia, ABC teams are getting out in the community, reporting local stories important to Australians living beyond the capital cities. [Content+Technology]

IBC CONFIRMS DECEMBER DATES FOR AMSTERDAM EVENT

IBC has confirmed that IBC2021 will take place on 3 December at the RAI in Amsterdam. The announcement follows a decision at IBC Partnership Board meeting to move the event from its usual September slot.

Health and safety were highlighted as key factors behind the decision, with the IBC operations team focused on creating a safe environment that participants can trust. Over the past few weeks, IBC has surveyed visitors and exhibitors, and two thirds of respondents said assurance of robust onsite health and safety protocols would encourage them to attend, with vaccination passport entry by far the most popular measure.

Also, some 86% of survey respondents said they were very likely, and 13% likely to have been vaccinated by December. Exhibitor and visitor feedback also shows a keen desire for a live show in 2021; only one in ten of the visitors surveyed said they would not attend a December event. [IBC News] ■

DIGITAL BROADCASTING *Updates*

MPEG VALIDATES LCEVC PERFORMANCE

MPEG has announced results of verification tests for the new LCEVC and VVC video compression standards, as well as a standard on neural network compression. The MPEG group continues to make progress in relation to new codecs and their uses related to immersive media, as well as its new focus on neural networks and video coding for machines.

At its 134th MPEG meeting, held online in late April, MPEG Video made a number of announcements, including its first official results of LCEVC verification tests. The LCEVC standard was introduced in October 2020, acting as an enhancement layer to existing codecs, both legacy (AVC, HEVC) and next-gen (VVC, EVC).

By measuring the benefits of enhancing four generations of these MPEG codecs, they all showed that LCEVC contributes significantly to boosting average bit rate savings for both UHD and HD with each codec, thereby increasing compression efficiency and in turn opening new opportunities and business cases.

A first set of tests compared LCEVC-enhanced encoding with full-resolution single-layer anchors. According to MPEG, the average bit rate saving produced by LCEVC when enhancing AVC were determined to be approximately 46% for UHD and 28% for HD; and when enhancing HEVC approximately 31% for UHD and 24% for HD. Test results also tend to indicate an overall benefit when using LCEVC to enhance EVC and VVC. A second set of tests confirmed that LCEVC provided a more efficient means of resolution enhancement of half resolution anchors than unguided up-sampling.

Verification tests were also revealed for more application cases of Versatile Video Coding (VVC). The second round

of verification testing for the new VVC / H.266 codec has been completed. In 360° video for equirectangular and cubemap formats, VVC shows on average more than 50% bit rate reduction compared to HEVC. In low-delay applications such as compression of conversational (teleconferencing) and gaming content, the compression benefit is about 40% on average. In HD video streaming, the average bit rate reduction of close to 50%. A previous set of tests for 4K UHD content completed in October 2020 had showed similar gains.

Further subjective testing of VVC capability is also planned for additional use cases, including the coding of high dynamic range (HDR) video content. Also, with VVC, standardisation work on Version 2 of VVC has begun entering the formal standardisation phase. Profiles in version 2 of VVC will support video with bit depth larger than 10 bits, and new tools have been added to further increase compression performance at extremely high bit rates. [\[CSI Magazine\]](#)

HBBTV TEST SUITE UPDATED

HbbTV has released an updated test suite and a set of test descriptions to further support conformance of TV receivers. The HbbTV Association, a global initiative dedicated to providing open standards for advanced interactive TV services through broadcast and broadband networks to connected TV sets and set-top boxes, is pleased to announce the simultaneous release of the 2021-1 version of the HbbTV Conformance Test Suite and the Test Assertions Repository (TAR).

The new version is called v2021-1c, and it is the first major release of the Test Suite in 2021. The release contains 2,963 test cases in total, an increase by 142 test cases since the v2020-3 release.

The new release includes new tests developed for the HbbTV specification for Targeted Advertising (HbbTV-TA) and the first test cases for the new version 2.0.3 of the HbbTV specification. The remaining test cases will be delivered during 2021 and should form part of the Test Suite release v2021-2.

The HbbTV Conformance Test Suite is an important tool for device manufacturers to verify compliance of their products with the most current HbbTV specifications, ensuring that applications

and content from broadcasters and content owners can work flawlessly across TVs and set-top boxes from all manufacturers. The Test Suite is available to all HbbTV members, and through the registered HbbTV test centres.

HbbTV is also releasing a set of test descriptions ("Test Assertions") which can be referred by any organisation running a conformance regime for HbbTV compliance when a definition of compliance is needed. The test assertions are publicly available through a Test Assertion Repository (TAR) which can be found on the HbbTV website, accompanied by explaining notes. [\[HbbTV\]](#)

SVOD SUBS TO REACH 1.5BN BY 2026

2021 is set to be the year when gross subscription video-on-demand (SVOD) service sales will cross the 1 billion mark, and this number is set to grow by 591 million between 2020 and 2026 to reach 1.495 billion, according to a study from Digital TV Research.

The Global SVOD Forecasts study tracked SVOD uptake in 138 countries and calculated growth in the 2020-2026 period to be 65%. The key trend in the report is just how many users subscribe to multiple SVOD services. Indeed, SVOD subscription growth was found to be considerably higher than that for SVOD subscribers. The average SVOD subscriber is set pay for 2.14 SVOD subscriptions by 2026, up from 1.74 in 2020 and 1.84 in 2021.

In addition, Digital TV Research predicted that there will be 700 million SVOD subscribers by 2026, up by 35% from 518 million at end-2020. This predicted total for 2026 would represent 39% of TV households, an increase from 30% in 2020.

Geographically, the US is forecast to overtake China as the subscription leader in 2021. China and the US will together account for 48% of the global total by 2026; down from 59% in 2020. This, said the Global SVOD Forecasts study, indicated that other countries are growing faster. For example, SVOD subscriptions in India are set to nearly triple between 2020 and 2026 to 155 million – representing 10% of the world's total. [\[Rapiddtvnews\]](#)

DRM OFFICIAL IN SOUTH AFRICA ON BOTH AM AND FM

The Independent Communications Authority (ICASA) published, on April

23rd, in the Government Gazette 44469, the Digital Sound Broadcasting (DSB) Services Regulations. Their objective is to set out the framework for introducing the Digital Sound Broadcasting (DRM and DAB+) services and to present the procedure for applicants to obtain the licences and permissions to roll out DSB.

The evaluation and demonstration of the various digital audio broadcasting standards started in South Africa over 20 years ago. In 2014 Radio Pulpit conducted a successful DRM for AM (mediumwave) trial followed by the successful DRM in FM trial of community radio station Kofifi FM 97.2 kHz by WECODEC in Westbury/ Johannesburg supported by South African organisations and Consortium members. Both have been adopted now as exemplary ITU reports.

In July 2020 the South African government took a great step forward and issued its radio digitalisation policy direction announcing DRM (in AM and VHF band II FM) and DAB+ as its preferred digital sound broadcasting (DSB) standards. The ICASA regulations are following the letter of the policy i.e., that DSB services must complement analogue services using DRM in AM (535.5 – 1606.5 kHz) and FM Band (87.5 – 108 MHz) and DAB+ in the band 214-240 MHz.

The current document sets out the framework for the introduction of Digital Sound Broadcasting services as well as the procedures to be followed by the applicants – including public, commercial and community broadcasters, as well as multi-channel signal distributors. Broadcasters can use muxes or simply provide digital signal distribution on their own. DRM distribution does not require muxes and leaves broadcasters in control of their transmission and content, encouraging in the process, the development of skills and citizen / SMME empowerment, even at community level.

The next stage for the industry is the practical implementation of Digital Sound Broadcasting. In preparation for the final regulations, the South African DRM Group was relaunched last month, joining the ranks of other DRM national platforms (in Germany, India, Brazil, Russia and USA) engaged in pushing the rollout of the DRM standard across not only the BRICS countries but also the whole world.

The recently relaunched SA DRM Group and the DRM Consortium have made known their readiness to serve and advise the DSB technical advisory group, DTAG, to be set up by ICASA for the smooth process of introducing DSB. [DRM]

SHORTLIST FOR EBU TECHNOLOGY & INNOVATION AWARD 2021 ANNOUNCED

Four projects have been shortlisted from among the 24 nominated for this year's EBU Technology & Innovation Award. The shortlist includes two projects from the BBC (UK), one from Sveriges Radio (Sweden), and one from Rai (Italy). The judging panel, comprised of members of the EBU Technical Committee, assessed the projects independently, according to fixed criteria.

BBC News Virtual Production Tools - BBC, UK

When the COVID-19 pandemic made it incredibly difficult to gather and broadcast news as normal, BBC's UK Operations engineers developed three virtual tools to help face the challenge. The tools have transformed newsgathering and broadcasting for BBC's news teams, making workflows easier. The three tools developed were: Toucan, for fast-turnaround remote TV interviews; Pre Rec, for quality audio on pre-recorded distanced discussions; and Virtual Audience, for connecting audiences with studios.

BBC Sounds: an integrated audio platform - BBC, UK

Sounds is the new home for radio, music and podcasts at the BBC, giving listeners a personal, relevant experience and offering them more control and flexibility. Launched in 2018, it has become the leading homegrown audio platform in the UK, providing access to over 80,000 hours of audio content from the BBC across the web, mobile, connected TVs and Amazon Alexa. It has continued to evolve, adding new features like live pause, rewind and restart for live radio, support for Android Auto and Apple CarPlay, and a new international version of the app that was launched for overseas listeners in late 2020.

An avatar for sign language applications - Rai, Italy

The Rai Virtual LIS (Italian Sign Language) platform uses a virtual actor (avatar) to create new opportunities and services for Deaf people in contexts where human LIS interpreters are not

provided. It relies on the latest 3D computer graphics technologies. In the past year, the platform has been enriched with two software modules. The first allows students to learn LIS and generate new content in sign language, and the second downloads daily weather forecasts from the Rai Teletext service and performs an automatic translation into LIS, delivered in the form of a video.

News values – the public service algorithm - Sveriges Radio, Sweden

Sveriges Radio constructed a new editorial algorithm with the aim of giving users a more personalised mix of news stories while at the same time promoting the values of outstanding public service journalism. The algorithm, which is used to automate SR's news playlists, centres on "news values" – a display in the content management system where editors rate each of the hundreds of news stories produced every day. They assess the magnitude of a story and its life span but also how well it fulfils the public service mission. The algorithm gives prominence to stories rated as having high public service value. [EBU News]

THE MBT 2021 CONFERENCE FOCUSED ON DAB+ AND THE FUTURE OF TERRESTRIAL BROADCASTING

This year's MBT looked at how to run a successful DAB project from the perspective of network operators and broadcasters and provided an opportunity to share knowledge and experiences related to the deployment of commercial DAB+ services in southern Europe. Speaking in the keynote session, WorldDAB president, Patrick Hannon, outlined the current rollout status of DAB+ in the region, where a significant number of countries have already rolled out regular and/or trial DAB+ services. DAB+ is now well established as the core future platform for radio across Europe, with over 90 million receivers sold worldwide and prices starting from as little as 20 euro. He explained that the key factors driving the growth of DAB+ are:

Choice – there are now on average six times as many national services on DAB+ as on FM.

Revenue – DAB+ drives up commercial radio revenues and advertising interest through the growth of national brands.

Low-cost solutions – DAB+ offers

reduced distribution costs and availability of low-cost solutions for smaller stations, allowing local and community stations the possibility of getting on air.

The environmental aspect – DAB consumes significantly less energy than FM, as pointed out by a recent BBC study.

Reliability in emergencies – emergency warning has been introduced into DAB minimum specifications which are available now to broadcasters in any market.

According to Hannon, collaboration amongst key stakeholders from across the radio ecosystem is essential to successfully deploy DAB+ digital radio. [WorldDAB]

EFFICIENT MANAGEMENT OF RADIO-FREQUENCY SPECTRUM IS KEY TO DELIVERING BENEFITS

The radio-frequency spectrum across the Americas requires efficient management to deliver the full benefits of the digital revolution, observed delegates to the region's foremost annual radiocommunication seminar in early May.

The ITU Regional Radiocommunication Seminar 2021 for the Americas Region (RRS-21 Americas), held virtually from 26 April to 7 May, formed part of a capacity building programme by the International Telecommunication Union (ITU), focused on the use of the radio-frequency spectrum and satellite orbits.

The seminar emphasised the application of the Radio Regulations, the international treaty regulating radiocommunication services and the utilisation of radio frequencies worldwide.

The ITU convened the annual meeting of experts at the regional level in collaboration with the Inter-American Telecommunication Commission (CITEL) and the Colombian National Spectrum Agency (ANE).

Participants reviewed updates to ITU's latest set of Radio Regulations, adopted by the 2019 World Radiocommunication Conference (WRC-19), as well as the items on the agenda for the next WRC in 2023. The seminar also examined international spectrum management and the procedures for recording frequency assignments in the Master International

Frequency Register (MIFR).

The programme included basic training on tools developed by ITU for frequency notices and the technical examinations. Through various tutorials, participants gained experience with ITU notification procedures, as well as with the software and electronic publications made available by the ITU Radiocommunication Bureau to Member States and ITU Radiocommunication Sector (ITU-R) Members. [ITU News]

MPEG VIDEO RATIFIES THE FIRST INTERNATIONAL STANDARD ON NEURAL NETWORK COMPRESSION FOR MULTIMEDIA APPLICATIONS

Artificial neural networks have been adopted for a broad range of tasks in multimedia analysis and processing, such as visual and acoustic classification, speech recognition, and extraction of multimedia descriptors. Their potential is also being explored for other uses, such as image and video coding. The trained neural networks for these applications contain many parameters (i.e., weights), resulting in a considerable amount of data necessary to represent the neural network. Thus, transferring a neural network representation to several clients (e.g., mobile phones, smart cameras) can benefit from using a compressed representation of the neural network.

At the 134th MPEG meeting, MPEG Video completed the first international standards on Neural Network Compression for Multimedia Applications (ISO/IEC 15938-17), designed as a toolbox of compression technologies. The specification contains different (i) parameter reduction (e.g., pruning, sparsification, matrix decomposition), (ii) parameter transformation (e.g., quantisation), and (iii) entropy coding methods that can be assembled to encoding pipelines combining one or more (in the case of reduction) methods from each group. The results show that trained neural networks for many multimedia problems such as image or audio classification or image compression can be compressed by a factor of 10-20 with no performance loss and even by more than a factor of 30 with some performance trade-off. The new standard is not limited to a particular neural network architecture and is independent of choice of the neural network exchange format. Interoperability with common neural network exchange formats is described

in the annexes of the standard. [MPEG News]

NEXTGEN TV: BITPATH, CAST. ERA AND ONE MEDIA DEMO 'ENHANCED GPS'

In an important demonstration of some of the new services that NextGen TV can offer, BitPath, CAST.ERA and ONE Media have delivered "Enhanced GPS" broadcasts that could provide a major new tool for autonomous vehicle navigation and other applications.

The demo broadcast of "Enhanced GPS" (eGPS) data, using ATSC 3.0, showed it could deliver positional accuracy within a few centimetres. That kind of accuracy could be very important in a number of applications, besides autonomous vehicle navigation.

Additionally, a drone incorporating eGPS and a 5G radio was used to show the potential of "Beyond Visual Line of Sight" observation and live imagery. This demo delivered a near-real-time broadcast of gathered live images that could be very useful for news, first responders and other applications. [ATSC]

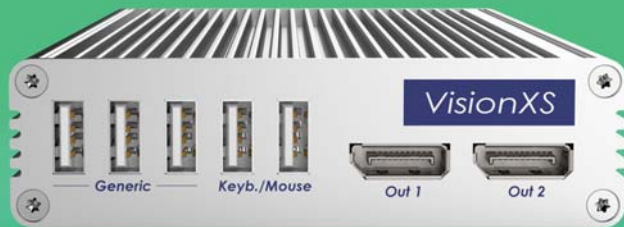
NAB 2021 REGISTRATION IS OPEN

Registration is open for the 2021 NAB Show, the premier convention for broadcasters and the broader media, entertainment and technology industries, taking place on October 9-13, 2021 in Las Vegas. NAB Show co-located events, including the Radio Show and NAB's Sales and Management Television Exchange (SMTE), have also launched registration.

SMTE, October 8-9, is the industry's only national conference focused on innovative revenue-generating strategies for small and medium market television stations, and kicks off one day prior to the start of NAB Show. The Radio Show, October 13-14, co-produced by the Radio Advertising Bureau, offers comprehensive sessions, networking opportunities and technology presentations for the audio community to explore all aspects of radio, podcasting and streaming.

The NAB Show encompasses media, entertainment and technology and is the ultimate marketplace for those seeking to create superior audio and video experiences from creation to consumption, across multiple platforms. It is where global visionaries convene to bring content to life in new and exciting ways. [CSI Magazine] ■

Equipment Trends



G&D LAUNCHES VISIONXS

The KVM manufacturer Guntermann & Drunck (G&D) has launched a new high-end extender product series, VisionXS.

G&D has developed this compact multi-purpose KVM tool following the motto "smaller, more compact, more powerful". It provides a wide range of functions in the smallest possible housing.

The new VisionXS systems are high-performance KVM extenders with a bandwidth of 10G and video

transmission for resolutions up to 4K.

Especially fast videos and frequently changing image content now require significantly less compression thus improving the user experience many times over.

Initially, the German manufacturer will provide extender modules for KVM-over-IP, followed by solutions for classic KVM systems for direct transmission.

More information on the new product series is available at <https://www.gdsys.de/en>

The lenses can be combined with the focus position demand unit "FUJINON EPD-51A-D02/F03" (optional), which facilitates focus adjustments at hand, to achieve precise focusing.



The FUJINON HP12x7.6ERD-S9

The lenses also feature a high-performance optical image stabilisation mechanism, a feature of FUJIFILM's high-magnification zooms. It accurately corrects image blurs caused by wind or shaking of the footing without any time lag, providing added stability in video shooting.

The use of 9-blade diaphragm achieves an aperture shape closer to a perfect circle, allowing users to incorporate natural bokeh into their video expressions. The lenses come stock-standard with a 16-bit encoder, enabling high resolution output of lens data including zoom and focus positions. It enables connection with various systems such as a virtual studio for combining computer graphics with live video footage.

Visit www.fujifilm.com.au
[Content+Technology magazine]

ARRI UNVEILS REMOTE SOLUTIONS TOOLKIT

ARRI HAS ANNOUNCED Remote Solutions, a toolkit that can be customised to meet near-set and off-set workflows. This remote production ecosystem allows professionals to safely and immediately get back to work without compromising operational and creative control.

With a complete system of connected ARRI cameras, lights, remote heads, and accessories, ARRI Remote Solutions offers workflows that enable safe social distancing between talent and crew as well as between crew members. The ARRI Remote Solution enables professionals to:

- Remotely control ARRI cameras, lights, remote heads, and accessories;
- Leverage proven technology; and
- Produce premium, cinematic quality with near-set and off-set workflows for broadcast, cinema, live events, corporate, sports, music video production, fashion, and more.

8K UHD BROADCAST LENSES FROM FUJIFILM

FUJIFILM HAS LAUNCHED two broadcast zoom lenses, the 'FUJINON HP66x15.2-ESM' (HP66x15.2) and the 'FUJINON HP12x7.6ERD-S9' (HP12x7.6). The two new lenses use cutting-edge optical technology to capture dynamic 8K video at ultra-high resolution. The HP66x15.2 is a box type zoom lens reaching a focal length of 1000mm and offering a zoom



The FUJINON HP66x15.2-ESM

FUJIFILM has applied its high-precision forming technology that can polish the surface of lens elements on the order of nanometers as well as mechanical designing and assembling technologies that accurately place multiple lens groups into a lens barrel. The vivid colour reproduction and strong contrast of the new lenses result in rich tonal gradation in high dynamic range (HDR). They also feature the new "Remote Back Focus" function, which enables adjusting the back focus remotely, e.g. from a broadcast van, to streamline video shooting.

Aspherical and fluorite lens elements control image distortion and light fall-off at image corners as much as possible. In addition, the use of the floating focus system, which controls multiple lens groups according to the shooting distance, minimises fluctuations in optical performance that occur as the shooting distance changes, thus maintaining sharpness across all shooting distances from close-up to infinity.

FUJIFILM's proprietary 'HT-EBC (High Transmittance Electron Beam Coating)' multi-layer coating technology is applied to lens surfaces to enhance light transmittance for vivid colour reproduction and high contrast. This results in rich tonal gradation in HDR.

magnification of 66x. The HP12x7.6 is a portable type zoom lens covering the focal length range from 17.6mm to 91mm in telephoto. The HP66x15.2 and HP12x7.6 will complete a seven-model line-up of FUJIFILM's broadcast lenses to cater for 8K video production.

Applications such as Stellar, the intelligent lighting control app from ARRI, provides a smart and innovative way to control professional lighting. It allows gaffers to change colour temperature and output without touching lights or approaching talent. Products such as the WCU-4 and the ERM (External Radio Module) allow crews to control focus and camera movement from a greater distance and through barriers such as concrete floors or walls while the SRH (Stabilised Remote Head) enables cinematic movement of the camera and can be combined with a robotic dolly for near-set movement without approaching talent. Simultaneously, web control allows cinematographers and gaffers to creatively and technically control the camera and lighting from another room or even another continent. The result is cinematic quality, no matter the crew's distance or location.

"The pandemic has accelerated change and forced productions to adapt. With travel limitations and new requirements for social distancing onset, our connected ecosystem of industry-proven tools can be customised to create safe sets, whether working near-set or off-set, without compromising the creativity or technical control of production. This is just another way we at ARRI are enabling and supporting filmmakers," says Stephan Schenk, General Manager Global Sales and Solutions.

Visit <https://www.arri.com>
[Content+Technology magazine]

SONY FX3 FULL-FRAME CAMERA

SONY'S FX3 (model ILME-FX3) camera features a full-frame, back-illuminated Exmor R CMOS sensor with full-frame 10.2 megapixel (approx. effective) count for movie recording (and 12.1 effective megapixels for stills), as well as the BIONZ XR image processing engine to ensure high sensitivity with low noise. The standard ISO range is 80 to 102,400 (expandable to 409,600 when shooting a movie), and dynamic range is an impressively wide 15+ stops.

Part of Sony's Cinema Line, the FX3 allows users to create a cinematic look without



post-production, using S-Cinetone. Based on the colour science of Sony's flagship VENICE camera, S-Cinetone delivers natural mid-tones, plus soft colours and smooth highlights.

The FX3 also features 4K recording at up to 120 frames per second, and produces slow-motion imagery (up to 5x) at QFHD (3840 x 2160) resolution with autofocus. The FX3 weighs just 715 grams, including the battery and memory cards, and the body is 77.8 mm high, 129.7 mm wide and 84.5 mm deep.

The FX3's body features five thread holes (1/4- 20 UNC) to attach compatible accessories. The supplied XLR handle unit securely attaches to the body via the Multi Interface Shoe without any special tools, and provides three additional thread holes for accessories: two on the top and one on the end.

To enable high quality audio, the XLR handle unit includes two XLR/TRS audio inputs to the FX3. Camera settings provide audio recording formats, including four-channel 24-bit recording.

The FX3 offers Fast Hybrid autofocus (AF) by using the 627 points focal plane phase-detection system during movie recording, as well as Touch Tracking (Real-time Tracking) where touching the subject on the monitor screen initiates auto focus and tracking. Precise focus is maintained with Real-time Eye AF – technology that pinpoints the eye, even when subjects are looking away. Other AF features include AF Transition Speed, AF Subject Shift Sensitivity, intuitive control and AF support when focusing manually.

High precision 5-axis optical in-body image stabilisation and gyro sensors enable an 'Active Mode' dedicated to movie shooting in different formats, including 4K. The FX3 also records image stabilisation metadata that can be applied to captured footage during post-production.

Buttons frequently used in movie shooting, such as ISO, iris and white balance adjustment, are located on the grip, and on the top of the body. In addition, 140 functions assignable to 15 custom keys allow for efficiency.

The zoom lever located on the top of the grip not only controls compatible powered zoom lenses, but also allows Clear Image Zoom to also be used with unpowered zoom and prime lenses. The lever also enables smooth zooming.

Recording lamps (tally) are provided on the upper front and rear of the camera. A side-opening vari-angle touch-panel

LCD monitor allows for easy operation and is suitable for gimbal-mounted shots, handheld operation, etc. Flexible Exposure Mode allows the FX3 to have a similar Auto/ Manual switch operation as other FX series cameras for aperture (iris), shutter speed, and ISO.

The FX3 is compatible with several recording functions including S-Log3 gamma with S-Gamut3.Cine colour space to preserve rich colour and gradation, that can record in a high dynamic range and wide colour gamut. It also supports internal recording in XAVC S and XAVC S-I formats in 4K (QFHD) and FHD, and XAVC HS (MPEG-H HEVC/H.265, 4K only) format. 4K 60p video in 10-bit 4:2:2 or 16-bit RAW format can be output to an external device via the FX3 HDMI Type-A jack.

The FX3 also offers two media slots for CFexpress Type A cards. The same data can be simultaneously recorded to both cards for backup. A "relay" mode will automatically switch to the second media card when the first media card becomes full.

The camera also has high-speed wireless LAN functionality (2.4 GHz or 5 GHz band) and wired LAN connection via a compatible USB-to-Ethernet adaptor for remote shooting.

Visit <https://scene.sonyanz.com/au/cameras>
[Content+Technology magazine]

ROHDE & SCHWARZ EXPANDS SPYCERNODE STORAGE FAMILY

ROHDE & SCHWARZ has announced the introduction of a new member of its SpycerNode media storage family. Completely Ethernet-based, the R&S SpycerNode SC targets the storage



requirements of both broadcast and post production workflows. SpycerNode SC is designed to fulfil the requirements of modern post production teams, where performance is a higher priority than redundancy, but reliability, compact design and affordability are key requirements.

Based on the latest HPC technology SpycerNode SC is capable of delivering a data rate of up to 22GB/s within a single device. Rohde & Schwarz production asset management software, SpycerPAM, can

run natively on SpycerNode SC eliminating the need for separate infrastructure or further interoperability. All SpycerNode products use 100 Gb ethernet connectivity to enable both SAN and NAS operation within a single system. Ease of set-up, ease of integration and ease of maintenance were key design goal to reduce IT complexity or intervention.

“Creative teams need to collaborate without fear of technology limitations dictating awkward workflows,” commented Andreas Loges, Vice President Media Technologies at Rohde & Schwarz. “The powerful, unique performance and redundancy features of SpycerNode SC ensures that talented content creators can access assets fast and work with confidence.”

SpycerNode SC can accommodate up to 60 drives configurable in sets of 30 spinning or flash. Fully equipped the net capacity in a single unit is 800 TB spinning or 430 TB flash.

SpycerNode SC can perform as a stand-alone unit or configurable within larger clusters of a SpycerNode system. Using Rohde & Schwarz's metro cluster technology, SpycerNodeSC can be used in environments with high redundancy requirements, such as broadcast production and playout workflows.

Visit www.rohde-schwarz.com [Content+Technology magazine]

SENNHEISER RE-INVENTS MKE 400 SHOTGUN MIC

SENNHEISER HAS LAUNCHED the new MKE 400 – a highly directional compact shotgun microphone designed to bring compelling audio to DSLR/Ms and mobile devices alike.



The MKE 400 achieves its directionality with an acoustic interference tube, providing a supercardioid polar pattern that ensures pick-up from the direction in which the camera is facing while cancelling out distracting noise from the sides. The result: dialogue recordings with presence and clarity that will help bring your content to life.

The MKE 400's shock-mounted capsule minimises handling noise, while the microphone housing doubles as a standard

windscreen. For outdoor use, a furry windshield is included. The microphone's low-cut filter also does its part in removing problematic low frequencies like the hum from air-conditioning systems or the rumble from wind.

The MKE 400 is not only fitted with a low-cut filter and three-step sensitivity switch to fine-tune sound but also has a headphone monitoring output and integrated 8-step digital volume control, as not every camera has its own audio output. Users can plug any headphone with a 3.5 mm (1/8") jack directly into the MKE 400 and conveniently check levels and audio performance while rolling.

The MKE 400 includes 3.5 mm TRS and TRRS locking cables to be used with DSLR/M cameras or mobile devices, ensuring that switching from one device to another is accomplished with ease. The mic's cold-shoe mount with 1/4-20 thread allows for universal mounting atop of cameras, gimbals or even at the end of a boom pole.

The MKE 400 takes two AAA batteries to power the microphone for up to 100 hours of continuous audio capture. A low battery indicator warns users three hours before the batteries run flat. When connected to DSLR/M cameras, the MKE 400 automatically powers on/off with the camera. So your mic is ready the instant your camera is, and helps you save energy when you're not rolling.

Power detection also works with many smartphone models: if you remove the MKE 400, it will automatically turn off. A manual power button is provided too, featuring an off-delay to avoid any accidental operation. The MKE 400 is also available as "MKE 400 Mobile Kit" which additionally includes a Sennheiser Smartphone Clamp and Manfrotto PIXI Mini Tripod in a convenient package for your camera bag or mobile set-up.

Visit <https://en-au.sennheiser.com> [Content+Technology magazine]

TELESRIPT SUPPORTS CONTENT DELIVERY OVER IP VIA NDI

The Network Device Interface (NDI) technology will continue to grow throughout many industries and essentially become the standard in sending content over IP, declared Jim Murphy, Product Specialist & Development at Telescript International. Murphy said this as Telescript announced that both its teleprompter and standalone displays are now supporting IP content using NDI. Specifically, NDI has been integrated into Telescript's 4x3 prompter monitors and 16x9 1080p standalone reference displays.



Telescript's IP monitors auto-sense full bandwidth NDI and NDI|HX protocols and users can select NDI sources via the easy-to-use browser-based interface, or by the source selection buttons directly on the monitor. Additionally, NDI tally data is available via the external tally port on the displays.

NDI is a brand of the Vizrt Group and a royalty-free technology that allows video, audio and data sources to be shared bi-directionally across a standard network. This eliminates costly direct connections, expensive cable runs, and infrastructure upgrades while turning every source into a destination instantly available anywhere on the network.

Michael Kornet, Vice-President for NDI, added, "There has been a built-up demand from content creators wanting the elegance and simplicity of NDI-enabled displays. Now with the addition of both the IP teleprompters and IP standard reference 1080p displays with NDI and NDI|HX, the benefits for customers and systems integrators of IP cameras, converters and now displays has greatly increased." [APB+ magazine]

SELENIO NETWORK PROCESSOR

The Selenio Network Processor (SNP) is a 1RU, network-attached device with four independent processors designed to assist with synchronization, SDI/IP conversions, colorspace processing and conversions, including HDR, video scan format and production multiviews.



A new software update brings support to SNP for DR/FR style 100G QSFPs. With this, connection of four SNP units can be made to a single 400G network switchport through straightforward optics. Future software updates are expected to add processing personalities for JPEG XS compression.

visit www.imaginecommunications.com [www.tvtech.com]

DBS 2021 Team

The team was led by **Mr Ahmed Nadeem**, who initiated a new platform to cater to the specific needs for running DBS 2021.

The ABU Technology opted for the Restream Studio platform which provided a studio production-like environment to bring together its speakers and presenters. Restream provides a cloud based Restream Studio application which allows multiple layers of customisation, including custom backgrounds, captions, logo insertion etc. and different presenter layouts to arrange multiple speakers within the screen/window.

In addition, the OBS Studio (Open Broadcaster Software), a free and open-source software suite for production, recording and live streaming applications, was used to combine the live sessions with promo clips, titles, timer etc.

The ABU's Asia-Pacific View (APV) platform which is built on the AWS cloud infrastructure was used for live streaming and as a content repository for promo clips and recorded sessions.

Slido, an easy-to-use online Q&A and polling app, was embedded on the conference webpage and this allowed participants to interact and engage during presentations. ■



Ahmed Nadeem, Director ABU Technology



Dr Veysel Binbay, Senior Engineer – Broadcast Systems



Siva Kumar,
Manager IT Department



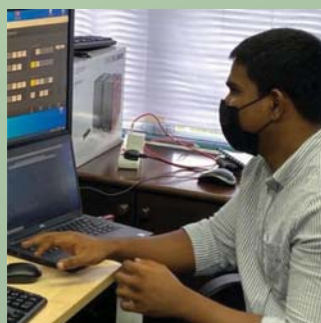
Saravanakuma,
Project Manager – Media
Streaming and Web Applications



Shree Bhadra Wagle, Manager Production & Delivery Technologies



Muhammad Hafiz Samsudin,
System Support Officer



Mohamed Inaz Farouq,
Project Assistant



Geraldine Peters-Williams,
Project Coordinator



Hamidah Rani,
Team Assistant

Personalities & Posts

Mr Sunil of Prasar Bharati elected BES President



Mr Sunil of India's public broadcaster Prasar Bharati has been elected President of the country's Broadcast Engineering Society (BES) for 2021 to 2023.

Mr Sunil is Prasar Bharati's Additional Director General (Global Outreach). He was elected to the BES position unopposed.

Established in 1987, BES has its headquarters in New Delhi and 12 local chapters spread across India. It promotes the advancement and dissemination of knowledge and practices of broadcasting in the field of radio, television and other media, to enhance the knowledge of broadcast engineering professionals.

The society conducts conferences, seminars, tutorials and exhibitions regularly. Its signature event, BES Expo, an international conference and exhibition, is held every year in New Delhi.

Prasar Bharati oversees the operations of All India Radio (AIR) and India's public television broadcaster, Doordarshan.

Mr Sunil has 33 years of experience in broadcasting. In addition to his role at Prasar Bharati, he holds several key positions at AIR including Head of International Relations, Marketing and Global Distribution. He has wide experience in implementing broadcasting projects in India and overseas.

Mr Sunil is also Vice Chairman of the ABU Technical Committee. He won the ABU Broadcast Engineering Excellence Award in 2018 for his important contributions to the modernisation and development of Doordarshan.

He received the IETE S N Mitra Memorial Award in 2016. He serves on the international jury of the Association of International Broadcasters (AIB). ■

BroadcastAsia 2021 goes virtual



BroadcastAsia, a major trade show for the broadcasting industry, will take place virtually this year on 14-16 July.

It will feature live content covering IoT in Broadcasting, IP Broadcasting, Livestreaming and more.

The annual event is usually held in Singapore.

Registration is free.

To register, see <https://www.connectechasia.com/broadcast-asia/> ■

Keiji Kodama appointed NHK Senior Director, Chief of Engineering



Mr Keiji Kodama has been appointed Senior Director, Chief of Engineering, at Japan's public broadcaster, NHK.

Mr Kodama had been Director of the Engineering Administration Department since June 2019. He took

up his new position on 25 April 2021.

He joined NHK in 1987 and worked at NHK Kochi Station before joining the Engineering Administration Department in 1991.

He became the department's Deputy Head in 2016, and subsequently Director of the Information Systems Department in 2018.

Many ABU members met Mr Kodama at the annual ABU Technical Committee Meeting in Tokyo in November 2019, where he gave a welcome address at the Opening Session. In his address, he urged members to share their experiences and solutions to meet the challenges brought about by rapid technological changes in broadcasting and content delivery.

We congratulate Mr Kodama on his appointment and look forward to continuing to work closely with him. ■

NHK Technical Liaison Officer



Mr Akira Negishi, Senior Manager - Global Strategy Division, NHK World Dept, will end his role as ABU Technical Liaison Officer on 2 July.

Mr Negishi has served as the ABU TLO for NHK since 2017 and has actively

supported the Technology Department.

He has made many presentations at meetings organised by ABU Technology. He has also moderated important sessions including the DBS Industry Debate and the panel

sessions at the annual technical committee meetings.

Mr Negishi's input to the Technical Bureau and his support to the ABU Technology in organising the TC meetings in Tokyo in 2019 will always be remembered.



His replacement will be appointed later in the year. In the meantime **Ms Mika Kuroiwa**, Senior Manager - International Relations, Global Strategy Division, NHK WORLD Dept, will act as Interim TLO. ■

G&D Asia Business Group Expands



The KVM manufacturer Guntermann & Drunck (G&D) has expanded its Asia Business Group.

The group has two new employees, **Julia Zhang** in Shanghai and Alex Chen in Guangzhou, to provide customers in China with

even better local service.

Both are control room experts with many years of KVM experience and will be able to provide G&D's customers with closer individual consulting and support.



Samuel Chen, G&D's long-time employee and Sales Director, will manage the G&D Asia Business Group from Taipei.

"We are excited to have such an experienced team at our side and are already planning additional measures to further strengthen our focus on Asia," Jochen Bauer, G&D Director Sales & Marketing, said. ■

Richard Barton

Farewell to a 'champion for the TV industry'



Richard Barton, former Director of Engineering at the Federation of Australian Commercial Television Stations (FACTS), died on 21 April 2021. Mr Barton took an active role in many ABU activities and was a member of the ABU

Technical Bureau for several years.

He won the ABU Broadcast Engineering Excellence Award in 2004. The award is given annually for outstanding contributions to broadcasting engineering.

He was Director of Engineering at FACTS (now known as Free TV) from 1981 to 2001. He earlier worked as a broadcast engineer at TV stations in New South Wales, Queensland and South Australia. Mr Barton's expertise in the area of digital television standards was critical to Australia's move from analogue to digital broadcasting.

His skills were internationally recognised in many forums, including being requested by the United Nations International Telecommunications Union to chair the 1999 preparatory meeting for the World Radio Conference in 2000.

Free TV's Director of Engineering, Roger Bunch, said: "Dick Barton set a great example of the high values for accuracy required in science and technology to ensure standardisation achieved the intended scope and objectives for the end users. He will be remembered internationally as an excellent ambassador for Australia in his ITU activities and a dear friend to many in the broadcasting industries in many countries, particularly in the Asia Pacific region."

Free TV's Chief Executive Officer, Bridget Fair, said: "Dick Barton loved television and devoted his career to ensuring that every Australian could enjoy a world class service. He was a formidable champion for the industry over many years at the national and international level." ■

ABU TECHNOLOGY CALENDAR *of Events* ... 2021

1-30 JUNE **ONLINE**
NHK STRL Open House

JUNE/JULY **ONLINE**
Webinar on Advances in Transmission and Delivery Technologies

JULY **ONLINE**
Training Course on Engineering Fundamentals for Broadcasters

27-28 JULY **ONLINE**
ABU Technical Bureau mid-year Meeting

TBA **ONLINE**
Webinar on Archiving and Media Management

14-16 JULY **ONLINE**
BroadcastAsia 2021

AUGUST-SEPTEMBER **ONLINE**
Annual Webinar Series 2021

OCTOBER **HANOI**
ABU Technical Bureau Annual Meeting

OCTOBER **HANOI**
ABU Technical Committee Meeting

OCTOBER **HANOI**
ABU General Assembly

17-19 NOVEMBER **JAPAN**
Inter BEE 2021

3-6 DECEMBER **AMSTERDAM**
IBC 2021

★ New DRM Energy Efficiency Calculator

“Savings at Your Fingertips”

A new tool with instant savings calculations and reports

Zoom launch on 30th June (10.00 GMT)

Register: projectoffice@drm.org

★ DRM Benefits for All

“A User's Experience”

A new video illustrating key DRM benefits

Clear sound, Multimedia content,
Education, Emergency warnings,
Additional revenue source



www.drm.org



How Much Can You **SAVE?**



NXSeries

3 kW–2,000 kW Digital/Analog
Medium Wave Transmitters

SAVE up to \$100,000 USD each year with Nautel

Replacing legacy technology with Nautel NX Series MW transmitters running MDCL can yield significant energy savings. With exceptional efficiency and low maintenance overhead, these transmitters are extremely cost effective to own and operate.

▶ Calculate **YOUR SAVINGS**
at nautel.com/NXsavings

