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Cover:
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Asia-Pacific Broadcasting Union

TECHNICAL REVIEW

From the Editor's Desk



The last three months were a very busy time for ABU Technology. In addition to a number of contributions made to events, this year we also organised the first summit on Climate Change, ICTs Disaster Risk Reduction (CCDRR) hosted by Ministry of Information and communication in Indonesia. Over 30 presenters spoke in seven summit sessions and four workshop sessions over three days. More than 200 delegates from 32 countries attended the event. The technologies that help to mitigate loss due to disasters were discussed, emphasising the work carried out by ABU Technology on preparedness, early warning broadcasting and the role of media.

With other broadcasting unions, at the WBU-TC meetings held in Prague on 10th June a common statement reflecting the position on spectrum allocation associated with WRC-15 was agreed. Over the air broadcasting is threatened by a lack of frequencies available to offer new and future services such as 4K. The ABU, together with other partners, is making efforts to secure access to broadcast spectrum to maintain plurality and access to information.

Among the three major articles in the journal, the article on HEVC briefly explains the compression gains that have been achieved in the new source coding standard. The other two articles cover disaster management and archiving technologies. Other reports on CCDRR, ABU engineering award, WBU-ISOG and BCA-2014 provide information on the activities that ABU Technology has carried out this quarter.



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HEVC and Broadcast Content

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abstract

High Efficiency Video Coding (HEVC), the video compression format that effectively doubles the data compression rate compared to H.265/MPEG-4 AVC at the same level of video quality.

HEVC will be used first in applications where bandwidth is a problem today, where the client device can easily be updated to support HEVC, either because it is a device that users replace frequently, such as smartphones, or because it is flexible to support HEVC. Contribution applications will come later, and require more robust complex implementations of the standard than what can be offered by compression vendors at this time.

ATEME is widely known for its pioneering commitment to standards and two decades of continued research investment. Its homegrown algorithms are the pride of the company and include MPEG-2, MPEG-4 AVC/H.265 and HEVC/H.265 codecs.

HEVC has been found to be a very efficient codec for all content types including interlaced content; if you think otherwise, this paper will help you understand where the misconception that HEVC is only for progressive was initiated. Today, ATEME products offer HEVC with interlaced coding performance and the company is poised to facilitate the ever-increasing demand as the codec is developed for use along the entire delivery chain.

Index Terms

Digital video broadcasting, Satellite broadcasting, TV broadcasting, Video codecs, Video compression, High definition video, HEVC/H.265, 4K, UHD TV, ITU-T, ISO/IEC.

I. Introduction

2013 saw the advent of H.265/HEVC (High Efficiency Video Coding) as the successor of H.264/AVC for all kinds of video compression applications. Broadcasters and operators objectives remain the same: reduce transport costs, reach more customers and improve the TV viewing experience. Ten years after the beginning of the SD to HD transition, history is about to be repeated once again. With the 50% bitrate savings promised by the new HEVC (High Efficiency Video Coding) standard, these compression gains will not only reduce bandwidth but, more importantly, will allow us to improve the viewing experience, conveying more information and emotional impact though higher spatial and temporal resolution.

The new algorithm aims at dividing compressed bitrates by a factor of two, compared to what the previous codec could achieve. It is the result of nine years of unprecedented international effort to significantly improve video coding efficiency while binding encoding and decoding complexity to economically viable levels. The new standard was approved by the ITU (International Telecommunication Union) in April and published in June 2013.

New video consumption usage like multi-screen delivery and the premises of Ultra-High Definition has driven the codec development toward progressive formats only. Therefore,

unlike H.262/MPEG-2 and H.264/AVC, H.265/HEVC lacks tools specifically designed for interlaced content. However, since the beginning of television, most broadcast content is interlaced or transmitted as interlaced. This opens the question of the relevance of this new codec to SD & HD broadcast applications.

One way to overcome this issue, and take advantage of the benefits of this new codec, could be for broadcasters to switch to progressive formats only. Unfortunately, this is a very expensive process, as most equipment would have to be replaced. Another approach could be to de-interlace the content so encoders and decoders could process only progressive video, but this creates other challenges. The last method is to exploit all capabilities of the H.265/HEVC, specifically signaling information conveyed in the compressed stream to build an efficient solution for interlaced content. This paper will present our findings related to the various methods devised to leverage the coding efficiency benefits of H.265/HEVC in 'traditional' television applications.

II. HEVC/H.265 Status

Just like H.264/AVC, the new codec H.265/HEVC is a joint development by ISO/IEC Moving Picture Experts Group (MPEG) and ITU-T Video Coding Experts Group (VCEG). The

first revision of the international standard was published by ITU in June 2013, and ISO/IEC publication is expected to follow. It primarily targets consumer applications as pixel formats are limited to 4:2:0 8-bit and 4:2:0 10-bit.

The initial goal was to significantly improve the coding efficiency over H.264/AVC, but with only a minor increase in decoding complexity. To achieve this, concepts that were developed with H.262/MPEG-2 and H.264/AVC were extended and improved. Therefore, H.265/HEVC is still a video compression algorithm based on transmitting the residual part of blocks that could be predicted from areas pointed by motion vectors in previously decoded pictures. However, as a two-fold improvement of H.264/AVC was expected, many new and more specialised tools have been added. Table 1 gives an overview of the toolsets and differences between the three generations of video codecs.

A. HEVC Range Extension

The Joint Collaborative Team on Video Coding (JCT-VC) has completed several standardisations of range extensions for the High Efficiency Video Coding (HEVC).

Range Extension has been added to HEVC at the last MPEG meeting in Valencia (April 2014, 108th meeting), it is now in FDIS (Final Draft International Standard). 10 new profiles have been added: 4:0:0 10bits, 4:0:0 16bits, Main 4:2:0 12bits, Main 4:2:2 10bits, Main 4:2:2 12bits, Main 4:4:4 8bits, Main 4:4:4 10bits, Main 4:4:4 12bits, All Intra 4:4:4 16bits, Still Picture 4:4:4 16bits.

The modifications are mostly on the syntax support of the new colors/bit depth with minor additional modifications (Implicit RDPCM, Explicit RDPCM, Residual Rotation, Single ctx for Transform Skip, Rice Parameter Adaptation, Cross Component Decorrelation, and CU chroma QP offset).

The HEVC range extensions lets high-end users and on-set production crews fulfil their high-quality video coding requirements by providing support for such features as colour depth beyond 10 bits per sample to facilitate rich colour reproduction, and 4:2:2/4:4:4 chroma sampling to make possible smooth colour expression.

These features enable maintenance of high image quality during the shooting, editing and output of high-definition 4K and 8K video footage.

B. What about legacy content?

About 70% of the high definition television content broadcast digitally around the globe is interlaced. The format, universally in use, is 1080i: 1080 lines of 1920 pixels interlaced at 50 or 59.94 fields per second. The entire broadcast chain, from cameras to television sets, is designed to support this format.

An alternative progressive format is used by 30% of the broadcast industry, 720p, made of 720 lines of 1280 pixels at a frame rate of 50 or 59.94 pictures per second. As it is progressive, this format is incompatible with the widely

used 1080i, and to support it all video equipment has to be specially designed and configured.

Therefore, switching from 1080i to 720p is a complex and expensive process. For instance all archives have to be converted and mixing live and recorded content could cause numerous issues. This explains why it is almost certain that broadcasters will not easily make a transition from an interlaced to a progressive format.

In addition, standard definition (480i or 576i) is only broadcast as an interlaced format. This legacy format is still the dominant format in the world and it has no progressive alternative, therefore, broadcasters willing to switch to a progressive mode must also convert their entire production infrastructure to High Definition, which is a very expensive process.

The new H.265/HEVC video codec offers attractive compression benefits, but lacks any specific tools designed for interlaced formats. H.264/AVC enabled a very efficient field coding mode and proposed two powerful tools to handle interlaced content: PAFF (Picture Adaptive Frame-Field) and MBAFF (Macroblock Adaptive Frame-Field) to handle field and frame coding at the picture or the macroblock level respectively. H.265/HEVC does not provide any of those compression capabilities and was designed with progressive applications in mind.

Table 1
MPEG-2/MPEG-4/HEVC Toolsets Differences

	MPEG-2	H.264/AVC	HEVC
Partition size	Macroblock 16x16	Macroblock 16x16	Coding Unit 8x8 to 64x64
Partitioning	Inter 16x8, Intra 8x8	Sub-block down to 4x4	Prediction Unit Quadtree down to 4x4 Square, symmetric and asymmetric (only square for Intra)
Transform	Floating DCT	Integer DCT 8x8, 4x4	Transform Unit square IDCT from 32x32 to 4x4 + DST Luma Intra 4x4
Intra prediction	DC predictor	Up to 9 predictors	35 predictors
Motion prediction	Vector from one Neighbor	Spatial Median (3 blocks)	Advanced Motion Vector Prediction AMVP (spatial + temporal)
« Motion-copy »	/	Direct mode	Merge mode
Motion precision	½ Pixel bilinear	½ Pixel 6-tap, ¼ Pixel bilinear	¼ Pixel 7or 8-tap, 1/8 Pixel 4-tap chroma
Entropy coding	VLC	CABAC, CAVLC	CABAC
Filters	/	Deblocking Filter	Deblocking Filter Sample Adaptive Offset

As most of television content is currently interlaced, and the broadcast chain cannot be easily converted to progressive only, it remains to be seen if H.265/HEVC can be used efficiently for most television applications.

III. Encoding Interlaced Content

Even without specific compression tools, H.265/HEVC can of course be used to compress interlaced content. Four methods, some of them relying on signaling, have been developed for this purpose:

- Encoding interlaced as progressive

- Using de-interlacing algorithms before encoding
- Field coding: Assuming fields are half-size frames at a doubled frame-rate
- SAFF (Sequence Adaptive Frame Field): Switching between field and frame coding at sequence boundaries

ATEME's research team has been dedicated in its efforts to thoroughly evaluate all of the above methods, using broadcast content sequences that have been a reference for the evaluation of MPEG-2 and H.264/AVC compression technologies.

From the very beginning of our studies, it was apparent that the reference software encoder called HM (HEVC test Model), provided by JCT-VC (Joint Collaborative Team on Video Coding), and was designed solely to compress progressive material. Results obtained on interlaced content were misleading for the following reasons.

A. 4 Reasons Why the JCT-VC HM (HEVC test model) Could Be Misleading on Interlaced Content

1. GOP structures that can be configured are far from being optimal when encoding fields instead of frames. The succession of top and bottom fields needs to be considered as a pair of pictures, which is not an option provided by HM. The result is a significant loss of coding efficiency that creates a bias when assessing the efficiency of interlaced content compression.
2. The reference selection algorithm applied in HM is not well suited to interlaced compression, as field parity (top or bottom) plays a significant role when choosing optimal references, especially in B-frames. This again results in a disadvantage toward interlaced coding when using HM to compress interlaced content.
3. Chroma planes are located differently in source frames when the content is progressive or interlaced. They are shifted vertically by 1/2 pixel in top fields and 1/2 pixel in bottom fields, compared to progressive frames. However, the H.265/HEVC encoding algorithm does not offer the ability to assume a shift between luma and Chroma fields, resulting in Chroma artifacts at low bitrates. Various authors in the course of the standard development have discovered this issue and several solutions have been envisioned. ATEME has recommended a new patent pending method that solves this problem without requiring any additional compression tool, thus offering complete compatibility with progressive compression. Signaling has been added to the standard for any developer to use in order to improve Chroma planes video quality.
4. Interlaced coding requires specific signaling to help the receiver to reconstruct properly the video stream after decompression. This signaling was not available in the HM until version 12, thus further preventing proper evaluation of field coding efficiency.

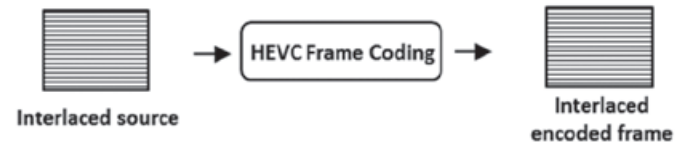
To overcome these problems, ATEME has contributed a modified version of the HM 12 reference software that adds full support of interlaced coding.

For readers interested in using this modified version of the HM, it may be downloaded from ATEME's ftp site under HM license:

ftp://mood.ateme.com/HEVC_Interlaced/fullCode_Interlaced_Application_Software_HM12_ATEME.zip

IV. Encoding Interlaced as Progressive

The simplest method is to ignore the interlaced nature of the content, and compress frames:



While it could give satisfactory results at high bitrates, or when there is no motion, the coding efficiency provided by this method is very low on typical interlaced content and it is significantly less efficient than H.264/AVC. In addition, at low bitrates, vertical low-pass filtering caused by compression induces artifacts on the television: the TV de-interlacer does not know how to “decipher” the merged fields. This issue is annoying on slow moving 3:2 pull-down content where it may be seen as juddering.

In addition, H.265/HEVC does not provide a way to signal that the encoded frames comprise two fields. This can cause problems since the receiver has no way to know the field order or the Chroma pixel location. This could create additional artifacts such as stuttering or color bleeding.

A. De-interlacing prior to encoding

Another option is to de-interlace the content prior to encoding and transmit it as a progressive compressed stream:



It is usually beneficial to double the frame-rate in order to keep motion fluidity and limit temporal instabilities. This is especially true for sport content where motion is a major aspect of the user experience. This process, sometimes called “bobbing”, converts every field in full-size progressive frame. Its advantages have made it a frequent method to display progressive pictures on a flat-panel TV screen. This is also why the ATEME team considered this algorithm to evaluate the advantages of de-interlacing when using H.265/HEVC compression technology.

The receiver behavior could be to reconstruct a standard interlaced stream; or keep it progressive, because 1080p, 480p and 576p are standard formats supported by HDMI connected television sets. Those two options are compliant with industry standards and could accommodate different use-cases.

De-interlacing while doubling the frame-rate also alleviates signaling issues since it removes the need to inform the

receiver about the frame order. It only has to output a standard progressive stream in decode order.

Unfortunately, de-interlacing has its own drawbacks. First, de-interlacing artifacts are visible in most cases, specifically on horizontal lines and highly contrasted moving details. The next figure shows one of these typical defects.

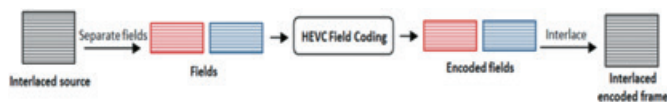


The creation of unwanted spurious artifacts by the de-interlacer adds a significant complexity to the encoding process. The main reasons are an increase of spatial high frequencies, often supplemented by slight temporal instabilities.

The result is a reduced coding efficiency compared to a pure interlaced processing method: field coding.

B. Field Coding

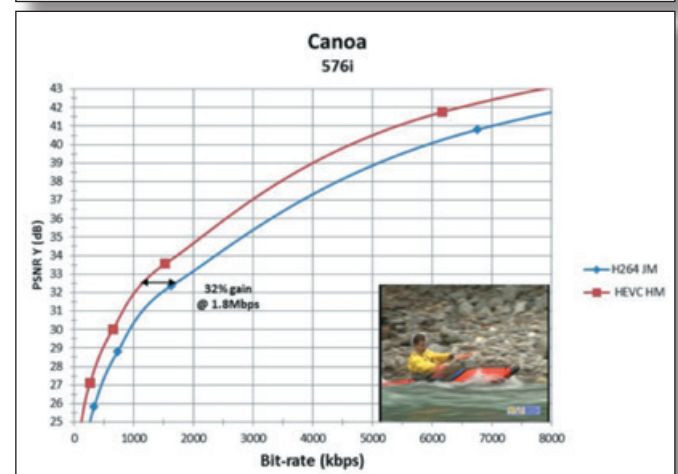
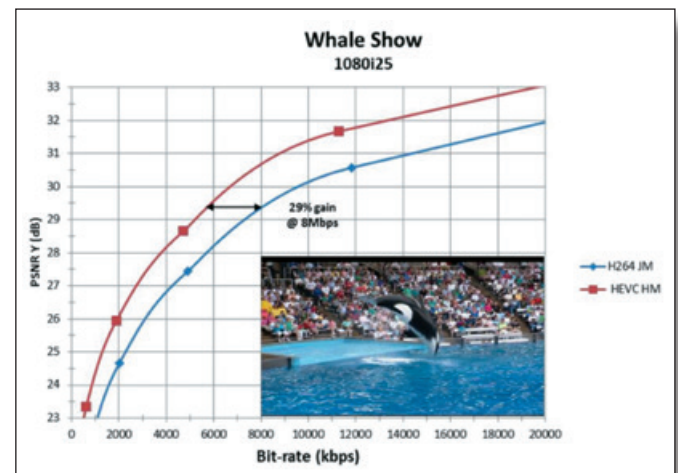
In field coding, the two fields contained in each frame are encoded as half-size progressive pictures.



To ensure a proper video reconstruction after decoding at the receiver side, signaling of top and bottom fields is necessary. This information is transmitted in a standardised SEI (Supplemental Enhancement Information) message specifically designed for interlaced coding.

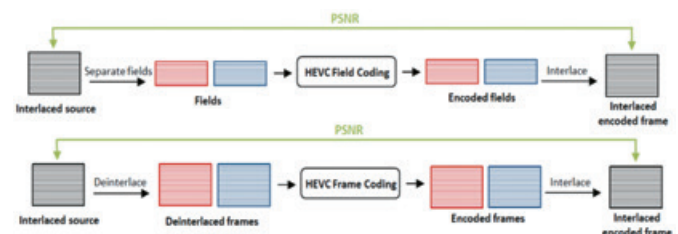
Encoding fields as if they were just progressive frames enables the best use of the H.265/HEVC encoder. However, fields are not exactly as progressive frames for two reasons. First, they are obtained by a vertical subsampling, which may introduce aliases artifacts. Even if H.265/HEVC lacks tools to cope with this, it has been observed that the coding efficiency penalty is very minimal. Secondly, the Chroma location is different for top and bottom fields. Fortunately, the interlaced SEI message adds information to help the receiver correctly position the Chroma planes which greatly reduce potential Chroma defects.

We have evaluated the benefit of this configuration [1] and it appears that measured gains are similar to what is obtained with pure progressive content: about 30% rate-reduction over H.264/AVC¹. Interestingly, field coding seems to provide the same bitrate reduction in HD and SD.



C. De-interlacing vs. Field Coding

To provide a benchmark of the gain offered by H.265/HEVC in field coding, we evaluated the potential benefit of the de-interlacing method compared to this simpler algorithm.



De-interlacing “creates” new pixels (as a matter of fact, it doubled the pixel rate) and may modify pixels already in the source. For this reason, the de-interlacing chain efficiency is highly dependent on the video quality provided by the de-interlacer. We evaluated various states of the art de-interlacing algorithms, using PSNR objective measurements,

¹ It should be noted that this comparison is made without using the H.264/AVC MABFF tool, which enables the encoder to choose the best encoding mode (field or frame) on a macro block basis. When it is used, the coding efficiency of H.264/AVC is significantly increased on almost progressive frames, which happens when there is very little motion. But in that case, the video is very easy to compress. Improving coding efficiency on simple sequences is usually not useful as the video quality is already very high compared to high motion sequences

which provides insights into the challenges of de-interlacing, however it was found that it is flawed in more ways than one and did not lead to definitive conclusions.

The most relevant results were published [2] and are presented in Table II. This table confirms the large variation of the bitrate gain (or loss) sequence by sequence, and depending on what de-interlacer is used, compared to the field coding method.

How to read this table: For the Church sequence, for a given quality level when encoding in field mode at 10 Mbps, encoding in progressive after de-interlacing with ATEME's de-interlacer will require 13.1 Mbps.

These figures highlight the fact that coding efficiency is highly dependent on both de-interlacing algorithm and the content itself. In a best-case scenario, de-interlacing provides a marginal gain compared to field coding. However, when the same sequences are presented to a sample audience for subjective testing, the ranking of this selection of de-interlacers changes completely, due to annoying artefacts that are not picked up in the PSNR calculations.

De-interlacer 2 is a pure mathematical model and has not yet been implemented in industrial products, because it performs well in PSNR but poorly in subjective testing.

At the end of the day, even using the best de-interlacers available as industrial implementations, the strategy of de-interlacing before encoding in HEVC is risky, complex to implement and most likely will be less efficient than a proper field coding method.

D. SAFF (Sequence Adaptive Frame Field) Coding

H.265/HEVC field coding is an efficient method when the content is truly interlaced, which is the case when there is motion. When motion is low, or on movie content, progressive coding may provide better results. Typical broadcast content is made of a mix of progressive and interlaced content. Therefore, switching methods on the content basis is the most effective way of leveraging the benefits of H.265/HEVC codec.

Table II
BD-Rate Result When Comparing HEVC
De-Interlaced and Field Coding

	ATEME's Deinterlacer	Deinterlacer 1	Deinterlacer 2
Church	31,0%	76,1%	0,2%
Marching in	-18,5%	-14,2%	-20,5%
Walk through the square	-4,6%	-14,4%	-27,6%
Whale show	6,9%	2,2%	-0,6%
Overall	3,71%	12,42%	-12,12%

SAFF is a method to provide the best of both worlds: after having evaluated the best method to use, the encoder switches between progressive and field coding at GOP boundaries. This concept is similar to the H.264/AVC PAFF (Picture Adaptive Frame-Field) tool except that switching has to be done on key frames to ensure H.265/HEVC compliancy.

A subjective evaluation of the SAFF algorithm was conducted by the 4Ever Consortium, using a software encoder designed by ATEME [3].

Eight 1080i test sequences were chosen to represent typical television content, including sports and TV shows. The results, validated by 28 non-expert viewers were:

- When a mixture of progressive and interlaced content is used, PSNR results are always better with SAFF compared with Field or Frame coding
- Current implementation of SAFF could provide slightly worse results on interlaced-only or progressive-only content. This is believed to change with better SAFF implementation
- For the same perceived video quality HEVC reduces video bitrates by a factor of 2 in comparison with AVC in average.

V. Conclusion

While being designed solely for progressive content, the new H.265/HEVC may also be used efficiently on interlaced television content. Various techniques have been evaluated and it was found that switching encoding modes, between progressive and field coding, provides in all cases the expected bit-rate gain. Compared to H.264/AVC, the bitrate is divided by two keeping the same subjective video quality. When using PSNR as an objective measurement, approximately 30% bitrate is saved compared to the current benchmark in H.264 coding performance.

However, this evaluation process also showed that encoding television content is more complex than progressive content like movies, and needs to be carefully designed. While there were some doubts that H.265/HEVC could be an efficient successor of MPEG-2 and H.264/AVC when processing legacy television content, it appears that the addition of interlaced signaling can provide enough information to leverage the full benefit of H.265/HEVC on all types of video content.

ATEME's TITAN product line, including TITAN Live, TITAN File and TITAN KFE, supports HEVC encoding and can be used to benchmark HEVC coding performance on any type of content, including interlaced.

A. References

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Pierre Larbier is ATEME's Chief Technology Officer and a renowned expert in the field of algorithmic design and MPEG / H.264 video compression. He has specifically dealt with video encoder architecture and designs for a wide range of platforms and applications: from low-power single DSP solutions to ultra-high quality FPGA based HD broadcast encoders. Pierre obtained his engineering degree from INSA, Rennes, France, with a specialisation in electronics. He is an active member of DVB & SMPTE



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Sensor Networks Supporting Fire Emergency Response

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abstract

Numerous previous studies recognize the importance of providing real-time information to first responders during fire emergencies. However with current Emergency Response (ER) there exists a significant gap with regard to capturing, distributing and presenting real-time contextual information related to incident and wireless sensor networks have shown great potential in addressing this gap. As such, this paper discusses the opportunities and challenges of implementing viable wireless sensor network to support firefighters before, during and after their response work. This discussion is based on the findings of SafetyNet; a research project which investigated information and telecommunication technologies supporting fire emergency response in UK.

Index Terms

Wireless Sensor Networks, Emergency Response, Fire Emergency

I. Information Need of Firefighters

From the time an emergency call is received at the control room of the fire & rescue services (FRS). Till the post incident investigation carried out at the end of a fire emergency, timely and accurate information is vital to save the lives of firefighters and the victims [1]. Findings of the SafetyNet project with regard to the information needs of fire fighters revealed that crucial firefighter job roles including, incident commanders, sector command officers, entry control officers and front line firefighters would benefit from real-time, dynamic information from inside and surroundings of an incident building before, during and after the response operations [2]. Detailed analysis of identified information needs of core fire fighter job roles revealed that information about environment, human resources, victim, and equipment resources enhances the situation awareness of most of the front line firefighter job roles leading to more accurate and timely decision making and improved operational performance[3].

II. Sensors Supporting Fire Emergencies

The findings of the SafetyNet project indicates the strong need for having sensor based devices and networks to capture and transmit various location and contextual information related to the environment, casualties and

firefighters. These sensors could be possibly 1) attached to the building walls or located on the building floor, 2) attached to various equipment and installations and 3) attached to the firefighters moving inside or outside the building.

When it comes to the selection of appropriate sensors, this study has considered several important criteria [4] prior to selecting the most appropriate devices to be deployed in extreme environments:

- Processing capability required
- Level of self-organising capability required
- Level of power consumption
- Form factor (size)
- Ease of application development
- Programmability
- Mechanical actuation
- Externally executed application
- Cost

Apart from the above generic characteristics several additional criteria emerge when it comes to successful use of sensors in fire affected environments:

- Survivability (Up to what temperatures these devices can operate satisfactorily)
- Operational Duration (for how long sensors are capable of capturing accurate information)

Having evaluated the feasibility of various popular sensor platforms against the above identified criteria, the following are identified as suitable for further considerations:

- Berkeley Mote Platform
- Smart-ITS Platform
- PHIDGETS
- ATLAS Platform

Although it is not strictly a sensor platform, the RFID platform is also identified as a popular wireless platform that is commonly used in various emergency domains.

III. Sensor-based Networks

In addition to considering suitable sensor platforms, it is also important to identify the most appropriate type of networks, networking technologies and protocols and communication technologies to connect various types of sensors.

A. Networks

Most of the available sensor networks are based on a wired infrastructure in which all the sensors are connected by wires to a central data logging unit that is protected from the fire [5]. This approach is not generally feasible for actual deployment in a large building as the wiring costs are not expected to go down, the arrangement is bulky, inflexible and vulnerable to the fire [5]. Therefore, there is a major impetus in developing Wireless Sensor Networks (WSN) to capture various contextual and location information in large built-up environments [6][7]. A WSN is a network consisting of sensor motes capable of self-configuring, self-networking, self-diagnosing and self-healing [8]. These characteristics have made WSN a very attractive solution for a wide range of environmental monitoring, distributed surveillance, health care and control application. However, the findings of SafetyNet indicate that firefighters do not like to depend on the information provided by the sensors of a WSN fixed in the building infrastructure. Firefighters interviewed during the study pointed out that they do not like to rely on pre-installed infrastructure of sensors exclusively, but like tools that they can operate and maintain themselves.

The extensive field work and discussions carried out across various fire brigades in the East Midlands area of the UK clearly suggest that it is important to have the support of both pre-installed sensors and sensors that could be deployed by a moving firefighter to form the backbone of the WSN suitable for IS proposed. Most of the firefighters believed that the capturing of hazard related information, location of hazard items and assets, which are mobile such as acetylene cylinders in a chemical plant and highly prized heritage articles located in a site like museum, could be carried out with the support of sensors. According to the regulations of the UK FRS, there are always pre-discussed and pre-approved safety plans for high-risk fire sites. These plans are made under the supervision and approval of the safety officers of the FRS. Hence, participants believe that the planning and installation of sensors can be done

under the same scheme and can be pre-installed under the supervision of their safety officers. Although FRS does not intend to take the burden of the cost of installing the sensors in the buildings, firefighters agreed that it is essential for them to carry some sensors and deploy them appropriately to:

- Strengthen the information flow coming out of the sensors in situations when some of the pre-installed sensors fail due to high temperatures or other hazardous conditions or due to run out of its power.
- Capture information related to newly identified hazard, item or casualty. This can be useful for the firefighters who carry out operations subsequently (Example: Sending a backup rescue team to rescue casualties who were left at a safe location by the firefighters who rescued them earlier).

Hence, it could be argued that firefighters need the support of a WSN consisting of both pre-installed sensors and sensors, which are dynamically deployed by the firefighters.

The WSN should be built in and around the incident premises to capture and communicate various contextual information, such as smoke, temperature, location of physical items and hazards. Apart from capturing various contextual information, it is also important to capture information related to firefighters themselves. This includes firefighter location, their body temperature, pulse rate, breathing, etc. When it comes to capturing of such information related to frontline firefighter, there is a possibility that they may have to carry several sensors attached to their body armor. Therefore, mobile firefighters should become part of the WSN.

It was also identified that apart from carrying sensors attached to their body armor, it is also essential for firefighters to carry other pervasive devices such as Head Mounted Displays (HMDs), throat operated microphones and speakers for their own use. These devices should be able to communicate to each other continuously. Thus, there is a need for a reliable Body Area Network (BAN), especially for the frontline firefighters. Furthermore, since there could be constant communication between team members of frontline firefighters, there is a need for a reliable Person Area Network (PAN). A BAN typically connects sensors and other devices on the body with the wearable computer's central unit [5] [9]. Usually, BAN sensors transmit very little data and will not require high speed transmission channels. However, to achieve the expected level of human computer interaction there is a need of having wearable audio and visual display devices. According to Dvorak [9], a BAN consisting of this type of components may require speeds up to 2Mbps. A PAN is a computer network used for communication among devices in proximity to an individual's body [9]. The devices may or may not belong to the person in question. The reach of a PAN is typically a few meters. When it comes to PAN, it should maintain the communication between the wearable computer and the local environment and in some cases directly between wearable system nodes and the environment, without going through the computer's central unit. In some situations, a PAN may have to maintain the communication between the BANs of two or more nearby frontline firefighters.

Apart from capturing contextual and location information, successful reach of high level of firefighter situation awareness will depend on the accessibility of information related to various other building installations such as sprinklers, lighting, HVAC (Humidity, Ventilation, Air Conditioning) and CCTV cameras. Ideally this information should also be available for all the potential end-users of the IS proposed. Currently, in most of the large-scale modern buildings, information related to these systems is available via Intelligent Building Systems (IBS) [10]. Hence, it will be very important that IBS become part of the sensor network. Currently the most commonly available networking platform for IBSs takes the form of either a Local Area Network (LAN) or a Wireless Local Area Network (WLAN). Therefore, communication between the WSN, which is proposed to capture the contextual data and the WLAN/LAN belonging to the IBS of particular premises, is essential. This will be very much easier since both types of networks belong to the same premises and the same owner.

B. Network Protocols

Having identified the networks, various available network protocols are compared in Table 1 with the aim of selecting the most appropriate.

Table 1
Characteristics of Network Protocols

	ZigBee	802.11 (Wi-Fi)	Bluetooth	UWB (Ultra Wide Band)	Wireless USB	IR Wireless
Data Rate	20, 40, and 250 Kbits/s	11 & 54 Mbits/sec	1 Mbits/s	100-500 Mbits/s	62.5 Kbits/s	20-40 Kbits/s 115 Kbits/s 4 & 16 Mbits/s
Range	10-100 meters	50-100 meters	10 meters	<10 meters	10 meters	<10 meters (line of sight)
Networking Topology	Ad-hoc, peer to peer, star, or mesh	Point to hub	Ad-hoc, very small networks	Point to point	Point to point	Point to point
Operating Frequency	868 MHz (Europe) 900-928 MHz (NA), 2.4 GHz (worldwide)	2.4 and 5 GHz	2.4 GHz	3.1-10.6 GHz	2.4 GHz	800-900 nm
Complexity (Device and application impact)	Low	High	High	Medium	Low	Low
Power Consumption (Battery option and life)	Very low (low power is a design goal)	High	Medium	Low	Low	Low
Security	128 AES plus application layer security		64 and 128 bit encryption			
Other Information	Devices can join an existing network in under 30ms	Device connection requires 3-5 seconds	Device connection requires up to 10 seconds			
Typical Applications	Industrial control and monitoring, sensor networks, building automation, home control and automation, toys, games	Wireless LAN connectivity, broadband internet access	Wireless connectivity between devices such as phones, PDA, laptops, headsets	Streaming video, home entertainment applications	PC peripheral connections	Remote controls, PC, PDA, phone, laptop links

It can be seen that the Zigbee protocol is suitable to form the sensor-based networks due to its low power, low cost, considerably high amount of data speeds and its capability of forming ad-hoc networks. Therefore, Zigbee is recommended as one of the better protocols to form the WSN, PAN and BAN of the moving firefighters. Although, Ultra Wide Band (UWB) could be the best option to form

the BAN [9], Zigbee is preferred due to its suitability to form multiple networks: BAN, WSN and PAN. As an added advantage, most of the sensor platforms now embed the Zigbee as their network protocol. The use of Zigbee to form the firefighter BAN and PAN together with the WSN will further strengthen the communication reliability of the overall network as all the firefighters will become sensor nodes of the network, and so increase the network redundancy. Furthermore, there is greater potential WSN to form the backbone of the future IBSs. Therefore, in the future, proposed type of WSNs and most components of the IBS, except the channels that need higher data rates such as for CCTV, could merge into a single network, communicating with a protocol similar to the Zigbee.

IV. Implementation Barriers and Opportunity to Future Research

The support of the above described sensors and sensor-based networks are essential to form more appropriate network supporting firefighters and their operations. However, when consider the specifications and characteristics of the above considered sensors and sensor-based networks, it is evident that their practical application in the context of fire emergency faces some immediate challenges and barriers.

Findings of the SafetyNet explains that due to its rare and unpredictable nature of occurrence, sensor networks which only supports fire emergency situations is not a investment priority for the owners of the buildings. Furthermore implementation of building sensor networks capable of providing comprehensive support to firefighters may become an attractive investment only if the sensor network is equally capable of providing significant support to manage various day to day building services and operations. Furthermore, it is evident that realistic implementation of such type of sensor networks may need the indispensable participation of three major stake holders; namely the FRS, the owners of the buildings and the insurance companies that provide fire related safety insurance for high-risk buildings.

Although the cost of sensor motes and accessories related to popular WSN platforms based on popular networking protocols such as Zigbee has come down considerably, its cost is considered to be one of the main barriers to make it an attractive option for the end-user. Impact of the cost implications could be severe when consider the large number of sensor motes required to provide the level of support expected by the firefighters. For example, to provide high data savvy graphical illustrations to present information on the spread of temperature or any other similar parameter with a satisfactory level of accuracy, a WSN fixed in a particular floor of a building may need the support of a large number of sensors. Therefore, if sensor motes to become a viable and attractive device in the fire emergency context there is an immediate need of further research to find solutions to reduce their manufacturing costs. The running costs of the sensors could also make WSN an unattractive solution for the clients. Primarily the running cost of sensors is the cost of replacing its power source. This could be a high percentage of the overall cost,

when consider the number of sensors required. When it comes to minimising the running costs and making them commercially viable, it is also vital to conduct further research to reduce the power consumption levels of the sensors so that they can become energy efficient. Currently, this is one of the most active areas in sensor related research. However, there is very little evidence available where such research addresses the needs during a fire emergency and the progress made in this area of research lags behind the minimum satisfactory levels expected.

One other main limitation is the physical size and the weight of the sensor nodes. When considering the application of sensors in fire emergency context, physical characteristics of most of the available sensors could become a major obstacle. When a WSN is attached to the buildings, it can create implications ranging from physical appearance of the buildings to installation of sensors. In addition, when consider the sensors of the BAN of the firefighters and deployment of sensors carried by firefighters, there could be serious issues related to flexibility of handling them. Although this is an active research area, the progress made so far to obtain the support of the sensors in contexts similar to fire emergency is negligible. Therefore, there is an essential and immediate need to carry out more focused research to improve the physical characteristics of sensors used in the conditions applicable for fire emergencies.

Apart from future research to minimise the above limitations, this study proposed to seek the possibility of merging with other low-cost devices and technologies to form more heterogeneous sensor networks rather than depending on a one particular platform. For example, RFID and WSN based on sensor nodes are two important wireless technologies that have a wide variety of applications with unlimited future potentials. RFID technology facilitates detection and identification of objects that are not easily detectable or distinguishable by using current sensor technologies [11] (Liu et al., 2008). The size and weight of RFID tags makes it much easier to handle. In addition, RFID is a very low-cost technology compared to any other ad-hoc sensor node platforms [8]. However, it does not provide information about the condition of the objects it detects. In contrast, sensor nodes can provide information about the condition of the objects as well as the environment. In addition, operational range of sensor nodes is comparatively much bigger than the RFID tags due to its flexible mesh networking ability [12]. Although RFID is not actual contextual sensor, it can be integrated with sensor nodes to form a low cost heterogeneous network. Hence, integration of these two technologies will expand their overall functionality and capacity. This network will be capable of location tracking and contextual sensing compared to a network, which is exclusively comprised of sensor nodes. Consequently, from the building owner's point of view, especially for the exclusive purposes of location tracking, the use of RFID could be much cheaper and appropriate compared to a sensor node. One classical example is to tag artefacts of an art gallery or a museum. Also from the FRS's point of view RFID tags could be much preferred as it is less expensive and easier to handle if firefighters have to carry them. Therefore, it will be very important to consider merging wireless sensors with RFID together in the same network.

Another challenge is whether the sensor nodes can maintain their accuracy in harsh environments and high temperatures with uninterrupted networkability. Currently, none of the commercially available sensors are capable of withstanding the high temperatures expected in a progressive fire. Hence with current capabilities, firefighters may not benefit from the network for long durations. This will be one of the main challenges faced by the sensor manufacturers in the future. To overcome the above challenges, in relation to this particular study, the following can be proposed to consider as new areas of research.

- Research related to sensor manufacturing is necessary to increase the life time of the sensor nodes so that they can withstand much higher temperatures expected in fire locations.
- Research is necessary to develop algorithms which are capable of correcting or adjusting the accuracy of the readings of sensors that deteriorate its sensitivity and accuracy due to harsh environments.
- To a certain level, the profile of the sensor deterioration itself can be used as information to indicate the contextual progress. Hence, it will be useful to investigate such concepts to utilise the services of deteriorating sensor nodes for longer durations in the contexts of fires.

As well as problems related to operating in the extreme environments, there is also a doubt whether the commercially available sensor devices are capable of providing the level of accuracy expected by the firefighters even when they are operated under the normal circumstances. However, as discovered in the evaluation part of this research the accuracy required for a selected piece of information can vary from job role to job role, incident progress and type of operation. Hence, it is evident that appropriate use of sensors could provide considerable support during a fire emergency with their current level of performance. For example, with the current level of performance, sensors are capable of detecting the start of an actual fire. This is identified as a vital piece of information for the firefighters who are first to arrive at the incident. However, this is not true with regard to some of the other information needs of firefighters. For example, the level of accuracy of the outcome of previous research such as "LifeNet" [13][14] and "CADMS" [15] do not meet the level of accuracy expected by the frontline firefighters to navigate them during their operations. Thus, there is a need for further research related to improving sensor related algorithms and communication protocols, if they are to reach the accuracy expected for some of the information needs of firefighters.

The selection of Zigbee as a communication protocol is recommended in some of the previous research such as "Fire" Project [16]. However, the lower data rates of Zigbee based sensor devices may create a bottleneck in forming the BAN of firefighters where it may have to embed with devices such as wireless thermal image cameras or HMDs to display higher amount of graphical data. Data speeds required for these possible wearable audio and visual display components of the BAN may require higher data rates within the BAN as well as communicating with other External Servers. For example, although previous similar research such as the

“Fire” project proposed the use of HMDs embedded with the devices supported by Zigbee protocol, it is not clear the amount of graphical data handled. The argument is that if this data is to be transmitted from an outside device to the BAN of an individual firefighter then the data rates of Zigbee based devices may not be sufficient. Therefore, it is crucial to find a solution to overcome such constraints. These requirements suggest that some improvements and further research related to the data speed and bandwidth are essential to satisfy the expectations of the end-users. As an initial step towards a solution for Zigbee based networks, this study proposes following options for future consideration.

- Pre-install the relevant map data in a wearable computer attached to the BAN of the moving firefighters and continue with Zigbee to 1) form the BAN communication, 2) communicate with external servers and 3) WSN. Use a protocol such as Bluetooth or UWB to communicate between audio, video devices and the central processing unit (CPU) of the Wearable computer if data speed or bandwidth needs to exceed the capabilities of Zigbee. By processing graphical data locally at the BAN, Zigbee capable motes can be used more effectively to capture various contextual information generated within the BAN (Example: Heart rate and Body temperature of a firefighter). In addition, the Zigbee enabled CPU of the wearable computer will be able to communicate with computers outside the BAN and the WSN to acquire contextual and location information. In addition, information storage and processing capability of Zigbee motes may also improve the information processing at the CPU of the BAN.
- To have a BAN, working on the Wi-Fi platform with much higher data rates to communicate with the outside servers via pre-installed wireless routers fixed inside the building or located at the bridgehead. High bandwidth Wi-Fi protocol allows dynamically transmitting and receiving graphical and contextual data from the outside servers. Therefore, with this option map data can be installed in a server located outside the BAN rather than installed in a device belongs to the BAN. Similar to the previous option, communication within the BAN can be via either Zigbee or combination of Bluetooth/UWB and Zigbee in combination. However, this particular option brings additional challenges of connectivity. For example, with the incident progress, most of the pre-installed routers may fail due to harsh environments.

The above discussion clearly suggests that there is an immediate and essential need of conducting much vigorous research related to the above explained challenges if sensors and sensor-based networks are to support fire emergency context satisfactorily.

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Frederico Alexandre
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Twenty-one ABU members took part in the Technical Bureau mid-year meeting in Kota Kinabalu, Malaysia, on 29-30 May.

The key issues discussed included reserving spectrum for future broadcasting, loudness, integrated broadcast-broadband systems, training and digitalisation in the region.

The bureau Chairman, Dato' Abu Bakar bin Ab Rahim of RTM-Malaysia, praised the work done by NHK-Japan which led to an ITU standard in sound for Ultra High Definition TV.



Takahiro Izumoto
NHK-Japan

ITU-R BS.2051-0 was released in February 2014 presenting an advanced sound system for programme production.

The bureau discussed carrying out surveys on the current status of spectrum requirements, digitalisation and the use of loudness control activities of broadcasters in the Asia-Pacific region.

Members agreed that a task force would conduct further studies with the assistance of ABU Technology to assess the use of loudness control, the value of respective target loudness in LKFS and awareness of the issue. The bureau noted the success of the annual ABU Digital Broadcast Symposium in March 2014.

Radio Television Malaysia hosted a dinner for the delegates and also provided an excursion to witness the harvest celebrations in Kota Kinabalu.



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SONY Study Tour

Report By **Mr Tharaka Mohotty**

At Sony headquarters Shinagawa I met with Mr Norihisa Mizuno, Mr Koichi Murakami, Mr Ryuji Kato and Mr Evan Lim.

The Sony team gave an Introduction to the different workflow options offered by the SONY CineAlta 4K super 35mm family of digital motion picture camera systems. It was learned that Sony's new F65 digital motion picture camera combines true 4K resolution with an expanded dynamic range that enables a more nuanced reproduction of fine textural and tonal details.

We also had discussions on Sony's products and solutions for the FIFA world cup, including its CineAlta 4K live camera "PMW-F55", 4K multi-port AV storage unit "PWS-4400", 4K LCD monitor "PVM-X300", and 4K multi-format switcher "MVS-7000X.

During the visit, I had a chance to view the show reel of *The Amazing Spider-Man 2*; lensed on 35mm film and scanned in 4K for finishing.

The F65 camera uses Sony unique 8K sensor, which will deliver pristine HD, 2K, and true 4K resolution today – and will go far beyond 4K in the future, as industry needs evolve. The Sony imager is also the first to provide a dedicated green photo site for each pixel in the 4K output image. This is twice the amount of green resolution compared with traditional 4K Bayer pattern sensors, providing a significant improvement in image resolution that is ideal for VFX processing.

Further discussions on a new professional solution from Sony which allows broadcasters to capture side-by-side 4K video at a sporting event, then use a standard camera zoom device to select small portions of each feed for 720p or 1080i output. On the receiving end one can see a live image that looks indistinguishable from something captured with a moving camera, with a few extra benefits to boot.

Sony has developed new control protocols and ways of structuring the packets to ensure the delivery of high-definition images over an existing Ethernet network. The NXL-IP55 is a cost-effective IP live production solution designed to simplify multi-camera live production by alleviating complex cabling requirements and instead utilizes IP connectivity between two locations.

This IP production unit has a built-in genlock function to allow all essential broadcast signals to be synchronised



over an IP network as well as to transmit full HD video and audio with very low latency of less than one field (1/2 frame) delay time for a fully coordinated live production.

During our visit to the Sony manufacturing facility in Kosai, I met Mr Katsuhiro Toyoda, Mr Hideyuki Wada, Mr Kiminari Shiratori, Mr Yoshiaki Takahashi, and Mr Yasuhisa Obi.

Sony's Kosai site is an impressive state-of-the-art manufacturing facility. The company's factory production capability is devoted to digital-cinema projectors and servers, Sony broadcast HD cameras, recorders and other related components. A separate quality-control team works independently of the production line, randomly testing the output.



I also visited the TBS Broadcasting Center in Akasaka, and met Mr Shuji Inaba and Mr Masanobu Iwamoto. At this Broadcast Centre they produce their variety programmes and live broadcasts. The key discussions were on the migration of broadcast/ production technologies to next generations. TBS is working on converting the medium of their programme data from video tape to data stored in file based editing systems and servers. TBS has also completed the design of new digital systems for sports and news. Also they have implemented new image capture system for sports.

At TBS they are in the process of upgrading the audio systems of Studio A and the cameras and audio and video systems of Studio B to enhance the overall functionality and stability for HD infrastructure.

During the visit I experienced the Trial 4K TV broadcasts which started in Japan on June 2 amid high expectations from the government and pessimism among TV stations due to the high costs of creating and viewing ultra-high resolution shows. 4K broadcasts offer four times the pixel count of current full high-definition images. They use Elemental video processing for the live 4K Ultra HD high-efficiency video coding (H.265/HEVC) transmission.





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- Establishment of Cable TV systems and HITS (Head End in The Sky).
- Custom design of interiors and acoustics of conference rooms, auditoriums and broadcast studios to conform to international standards.
- Turnkey Solution for Establishing Community Radio Stations.
- Electronic Media Monitoring solutions (Radio & TV Terrestrial or Satellite) and security related Surveillance Setups for GSM, CDMA & VSAT.

- Sales and support for all type of broadcast engineering equipments/ system.
- Design and integration of outside broadcast vans (DSNG) with state-of-the-art technology.
- Providing O&M services for various type of Broadcasting setups.

Major Achievements

- Establishment of Multiplexed FM Transmission at 87 centres across the country for 245 Private FM channels of Phase-II scheme as System Integrator.
- Revamping and Restoration of Print Media, Radio and Television Network in Afghanistan.
- Design and establishment of State of the Art Electronic Media Monitoring Centre for 24x7x365 monitoring and logging of 300 Satellite TV channels.
- Designed, integrated and supplied Ku/C-band DSNG Van to Doordarshan, India.
- Supply of security equipment like Laser Range Finder, Real Time Viewing System, VSAT Monitoring etc. to Para Military, Military, State Police Depts. Etc.
- Establishment of TV studio for IGNC, Educat setup for Delhi Technical University and Sangeet Natak Academy.

- Manpower outsourcing for specialised service to Doordarshan and AIR News Unit Delhi, RNUs and EMMC.
- Establishment of Main Press Centre of Commonwealth Games 2010 for PIB.
- Designed and created broadcast compounds & facilities for Prasar Bharati, the host Broad-caster of Commonwealth Games 2010.
- Supply & installation of studios production equipment for Bangladesh TV for an amount of US \$ 2.1 Million.

On Going Projects

- Supply & commissioning of 2 nos. of 1000 kW MW AM DRM Operational Super Power Transmitters to AIR for their external services.
- Upgradation of 3 Camera T.V. Studio at Jamia Milia Islamia University.
- Supply, upgradation & commissioning of combiner cable and antenna system, including strengthening of tower aperture at 4 metro & 15 other site for DD.
- Setting up of Video Recording Studio, PCR, MCR & Post Production Facility for NIOS.
- Supply, installation, testing & commissioning of HDTV Studio setup for Rajya Sabha's RSTV Channel.
- SITC of Log Periodic Antennas between 3 to 30 MHz for monitoring setup at three (3) sites of ARC.



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Contact: Shri K Subramanian, CMD, Email: k.subramanian@becil.com / Shri Ishwar Singh Mehla, Director, Email: is.mehla@becil.com

Email : contactus@becil.com, Website : www.becil.com

WBU-ISOG Meets in Tokyo

Interference to broadcasters' satellite signals and the latest IP technologies for newsgathering were among issues addressed at an international forum in Tokyo in April. The meeting of the World Broadcasting Unions International Satellite Operations Group (WBU-ISOG) on 29-30 April was hosted by Japan's public broadcaster, NHK. Chaired by Akira Ogawa, Director of Circuit Planning and Management in NHK's News Department, it attracted more than 100 participants. Mr Ogawa paid tribute to WBU-ISOG's former

Chairman, Dick Tauber of CNN, who retired last year after providing the group with many years of effective leadership.

The ABU's Director Technology, Dr Amal Punchihewa, represented the ABU Secretariat at the meeting. He provided an overview of the ABU's key activities, including the 2014 Digital Broadcasting Symposium in Kuala Lumpur in March and the ABU's work with members and sister unions to preserve spectrum for free-to-air broadcasting. Other issues addressed included the marriage between the Internet and broadcasters. Participants discussed how viewers, no longer wedded to their TVs, were watching video on many different devices and how broadcasters were adapting.

Organised by the world's regional broadcasting unions including the ABU, WBU-ISOG brings together broadcasters, satellite operators and other broadcasting service providers to discuss issues of common interest.

WBU-TC Meets in Prague

A meeting of the World Broadcasting Unions Technical Committee (WBU-TC) took place in Prague on 10 June 2014, in conjunction with the EBU Technical Committee meeting. The Director ABU Technology, Dr Amal Punchihewa, participated on behalf of the ABU Secretariat. The broadcasting unions represented agreed in principle on a common position on the spectrum used today broadcasting in the band below 700MHz. They felt no changes should be made to the current rules for usage of the band. On the future of contribution networks, the WBU-TC noted that doors may be open in future to more efficient contribution circuit technology (HEVC), to higher quality images and sound, and to the used of file based contribution networks. The unions agreed that the principle of working together to encourage the inclusion of a radio facility in smart phones and tablets is needed urgently.

New EBU Technical Committee

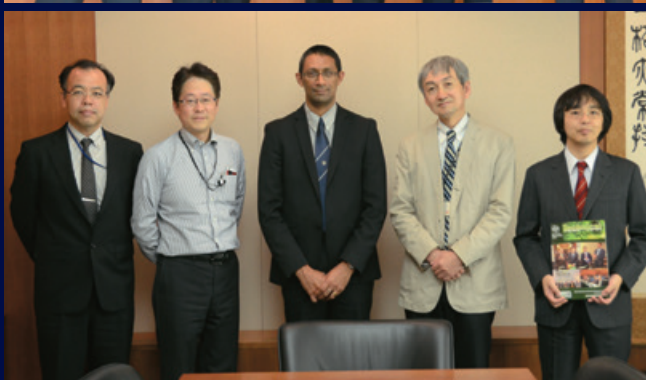
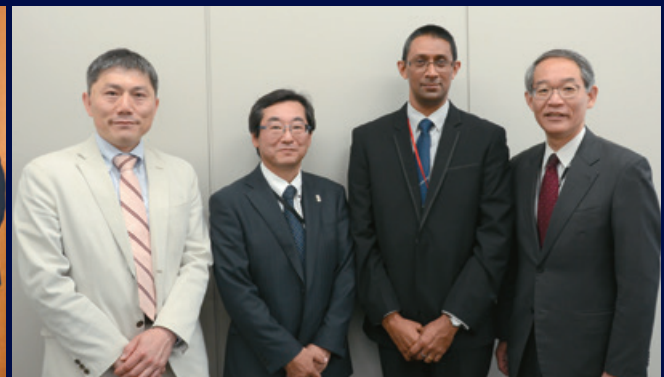
A new team was elected as the EBU's Senior Technical Committee recently. Egon Verharen, Research and Development Manager at NPO-Netherlands is the new Chair and the Vice Chairs are Klaus Illgner-Fehns, Managing Director of IRT and Andy Bower of BBC Research and Development. Among the nine other committee members is Dr Galina Federova, Deputy Director of the Distribution

Network Department at RTR-Russia who is the first lady to join the EBU's Technical Committee.

The tasks of the Technical Committee will include putting into practice the conclusions of the EBU's substantive study of the media environment, Vision 2020, and ensuring that EBU Members are well prepared technologically for the future.



Visit to NHK and TBS, Japan



While in Tokyo to attend the World Broadcasting Unions International Satellite Operations Group in April, Dr Amal Punchihewa took the opportunity to visit NHK's Headquarters, the NHK Science & Technical Research Laboratories and TBS.

Meetings were held with relevant parties to discuss the involvement of NHK International in the upcoming Pacific Media Conference which will be held in November in Fiji. Discussions were also held on standardisations of Hybridcast, Colourimetry and audio for UHDTV and advanced imaging research for next generation (Dynamic range and colourimetry).

RAI Amsterdam

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IBC2014 Dates:

Conference: 11-15 September 2014
Exhibition: 12-16 September 2014

IBC Content Everywhere Europe
12-16 September 2014, Amsterdam

IBC Content Everywhere MENA
18-20 November 2014, Dubai

IBC Content Everywhere LATAM
Date TBC 2015, Sao Paulo

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INDONESIA

Hosts Climate Change Summit

The ABU Technology Department was closely involved in the inaugural ABU Media Summit on Climate Change, ICTs and Disaster Risk Reduction, which took place in Jakarta on 4-6 June.



Prof Dr Boediono, MEc, Vice President, Republic of Indonesia

The summit attracted more than 200 participants and was opened by the Vice President of Indonesia, Dr Boediono.

It was organised by the ABU and hosted by Indonesia's Ministry of Communications and Information Technology (MCIT).



Dr Javad Mottaghi & Mr Freddy Tulung

Mr Freddy H Tulung, the ministry's Director General of Information and Public Communication, played a key role. The ministry arranged for Indonesian experts to speak, provided all the facilities and refreshments and laid on a dinner and entertainment for participants. Mr Tifatul Sembiring, the Minister of Communication and Information Technology, Indonesia, hosted the dinner and also welcomed the participants at the opening session of the summit.

Broadcasting delegates issued a declaration at the end of the summit pledging to do more to inform their citizens of impending disasters and to help in recovery.

The Jakarta Statement spoke of ensuring the media are better prepared to deliver life-saving information and support in times of emergency and disaster.

It recognised the need for greater collaboration on reporting on climate change and disaster risk reduction, developing more programme content about climate change and disasters and improving training for staff coping with the issues.



Mr Tifatul Sembiring, Hon. Minister of Communication and Information of the Republic of Indonesia



Mr Sunarya Ruslan of RRI-Indonesia



Dr Wen Qiuyang of the National Emergency Broadcasting Center, China
National Radio-China



Prof. Guoyu Wang of the Chongqing University of China

Among the highlights of the summit was a workshop on the opening day at which Japan's public broadcaster, NHK,

explained how it responds to disasters and carries out emergency broadcasts.

The workshop heard how key staff at NHK are ready to respond within seconds if a disaster strikes the country.



Mr Joao Pinto of the Macau Journalist Association

Senior journalists described how NHK covered the March 2011 earthquake and tsunami. The broadcaster holds newsroom drills with staff every day at midnight, at which they test all their systems and run “as live” broadcasts to train their staff how to handle unfolding crises.

The summit heard how NHK has invested in the best possible equipment for covering unfolding disasters under difficult condition. These include remote indoor and outdoor cameras, helicopters equipped with the latest cameras and transmitters and special equipment to process footage filmed at distances up to 30 kilometres away.



Mr Kenji Sugai of NHK-Japan



Ms Sayaka Irie of NHK-Japan

Toshiyuki Sato, Special Controller at NHK International, said a key word for natural disaster coverage was “redundancy”. “If A doesn’t work, we introduce system B,” he said. “If that doesn’t work we introduce system C. That is how we work. We have to have many redundancies in the system.”

In another session, which Mr Sato moderated, disaster experts urged broadcasters to develop clearer and more consistent ways of communicating with their viewers and listeners at times of crisis.

Anothai Udomsilp, Director of the Academic Institute of Public Media at Thai Public Broadcasting Service (TPBS), said people trusted the media to save them from harm before, during and after a crisis.



Mr Toshiyuki Sato of NHK-Japan



Mr Anothai Udomsilp of ThaiPBS-Thailand

Before the summit opened, a group of participants visited the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management to take a look at how Southeast Asian countries are coordinating disaster management.

ASEAN established the centre in November 2011 to facilitate coordination among member states on disaster management and emergency response in the region. Its two primary roles are disaster monitoring, and preparedness and response.



Participants at the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management

Phuket 2016

TPBS-Thailand will host the next in ABU Media Summit on Climate Change, ICTs and Disaster Risk Reduction in Phuket in 2016.

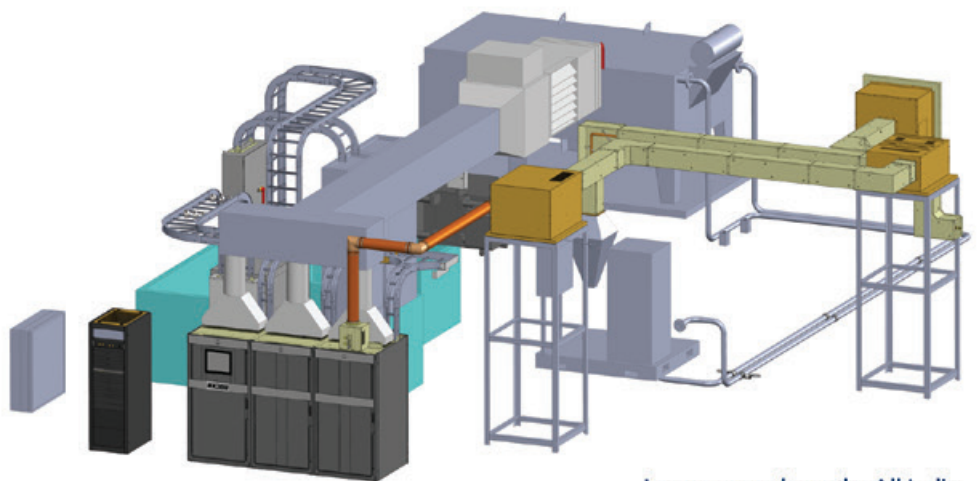


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Spectrum for Broadcasting

Digital transition – especially for transmissions by broadcasters – is driven by technology push and a demand for spectrum from telecom markets. Countries having congested radio and television broadcast spectrums can benefit from digitalisation. Multiple channels compressed and multiplexed to the lower parts of the spectrum will free some frequency bands in the upper part of the radio and TV spectrum. These can then be utilised to offer new services by both telco and broadcast operators. Telco services lead to high demand for frequencies, which fetch high prices for what is a scarce and economic resource. Making available the entire freed-up spectrum to telcos will create fewer hindrances to digitalisation, but will lessen the opportunities for broadcast operators if they do not have enough spectrum for new broadcast services in current formats or in future formats. For example, 4k broadcast services are gaining popularity, with more content being produced and displays being made available. The bottleneck arises because, even with the latest codecs such as High Efficiency Video Coding (HEVC) performing over 30% compression efficiency, fourfold increases in data rate will demand more bandwidth. Over-the-air (OTA) broadcasters will suffer if they do not have spectrum for such future services. If consumers try to access these services on broadband networks, it will increase the cost of

their data allocation or put a strain even on fibre networks to deliver non-broadcast services.

At the ABU we are working with the WBU to create awareness about this issue of preserving spectrum for future broadcast services. In 2012, WBU adopted the recommendations of the ABU and we are working with the WBU and other parties concerned to create awareness of this issue. The ABU will organise a preparatory meeting with ABU members in late July 2014 to make representations at WRC-15. The ABU has also been working with spectrum regulators. A preliminary study has shown that broadcast services deliver more benefits to the economy than traditional telco services. As a result of digitalisation in the communication sectors, we have observed convergence in technologies and services and some countries are already operating with a single converged broadcast and telecom regulator.

ABU collectively agreed with WBU that the use of radio-frequency spectrum by broadcasters remains an important vehicle for the efficient and scalable delivery of high-quality media content and emergency alerting services to both fixed and mobile audiences, specifically relying on digital television services & systems and satellite distribution systems.

From Amal, Nadeem, Kyaw Zaw, Nam, Geraldine, Hamidah and Ramlah

ABU Technology Calendar of Events

Date	Event	Venue
2014		
21-22 July	WRC-15 Preparatory Meeting	Kuala Lumpur
12 Aug-11 Sep	Technology Webinar Festival 2013	Kuala Lumpur
August	ABU Regional Seminar on Archiving	New Delhi
3-5 Sep	HBf-ABU Regional Workshop on the Role of Broadcast Media in Disaster Mitigation and Management	Kuala Lumpur
9-10 Sep	ABU-ITU-ICT Trends in Providing Interactive and Pay Television Services	Vietnam
11-16 Sep	International Broadcasting Convention – IBC 2014	Amsterdam
22-26 Sep	ABU-IPPTAR Radio and Television Engineering Basic Training	Kuala Lumpur
29 Sep-1 Oct	Regional Workshop on OTT and IBB (Intergrated Broadcast Broadband) Technology for Broadcasters	Kuala Lumpur
22-28 Oct	ABU General Assembly	Macau
26-27 Nov	Saudi Media Forum	Jeddah
17-19 Nov	Pacific Media Partnership Conference	Fiji
19-21 Nov	InterBee 2014	Tokyo
2-10 Dec	ABU-ASBU Training in IPTV and Networking Technologies	Jordan
2015		
15-17 Jan	BES 2015	India
Jan	ABU-HFCC Regional Conference	Kuala Lumpur
10-14 Jan	ABU-STI-DDI-Workshop and Training on Digital Television Broadcasting Technologies	New Delhi
3-6 Feb	ABU-NBTC-WorldDMB DAB+ Technology Workshop and Trial	Bangkok
26-28 March	CCBN-2015	Beijing, China
3-6 Mar	ABU Digital Broadcasting Symposium 2015	Kuala Lumpur

Technical Advisory Service in SUDAN

Training was conducted with collaboration between the National Sudanese Radio Corporation and Asia Pacific Broadcasting Union from 16th to 20th March 2014. The purpose of the training was to increase the technical knowledge of National Sudanese Radio Corporation staff. The training was facilitated by Hussain Shah, Male', Maldives.



The objective of the training was to increase efficiency in managing Sudanese radio IT infrastructure. A large number of staff at the station did not have any technical education in their respective fields. Daily tasks were carried out based on their experience and self-learning. This training provided formal technical education for these personnel on how to plan, manage, configure and administer the Sudanese Radio IT infrastructure.

Following are the topics covered in the training.

- **Networking:** Managing, maintaining, troubleshooting, operating, and configuring basic network infrastructure

- **Active Directory:** Active directory was taught from ground up, including Planning, Managing, configuring and administering the active directory 2008 environment.

Before initiating the training programme the skills and education levels of the students were tested to identify any areas of weakness. This enabled the trainer to focus more on such areas of need and tailor the training according to the needs of the participants.

Both practice and theory was covered in the training, which allowed students to understand and ask questions in both these aspects. This increased the students' learning experience and resulted in better understanding of the topics covered. Furthermore, students were divided into groups of 3 within the training sessions to help increase their ability to engage with other participants, efficiently and effectively to identify problems and find solutions.

All students of the programme were able to fully understand the topics that were taught and pass the course. The students participated in both practical and theoretical activities, which allowed them to increase their skills and knowledge and better identify those areas of most difficulty for them.

The TAS mission identified the following as some areas that need attention:

- To identify and set prerequisites for a training activity to ensure that all students are of similar skill levels.
- To identify and install necessary hardware and software needed for the training. On this occasion a fair amount of time was wasted due to lack of necessary hardware resources.



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The theme of the 2014 BroadcastAsia conference was “Discover the Right Business Model to Harness Technology and Monetise Content”. Key topics discussed included: Successful case studies and applications of OTT – What are some of the broadcasters’ successes and pitfalls?, Case studies on how to implement a multiplatform strategy to engage customers on the second screen to reduce churn and increase ad spend, Second screen as the future in the non-linear TV, OTT space, DVB Implementation in Asia – Insights into new extensions and how to leverage new opportunities presented, Business case for 4K investment – Is this the time for it?, Media Asset Management – Balancing the cost and performance equation, Radio Broadcasting in the digital space.

One track addressed the issues, challenges and solutions in general and the other was more specific to the broadcast engineering and technology issues and developments.

OTT was a hot topic in the conference. Sessions addressed the issue of how OTT is changing the competitive landscape of the broadcasting space in a global perspective. The sessions discussed what OTT is, viewing behaviour of home viewing, disruptive trends and emerging OTT markets. In a panel discussion, co-existence of OTT, business cases for

OTT adoption and challenges on the traditional business model were reviewed.

In the latest TV preposition, high definition, 4K, Ultrahigh definition and hybrid technologies were presented with their capabilities to achieve high spectrum efficiency. HEVC as the next evolution in video encoding technology was discussed looking at how HEVC can transform 4k and multi-screen opportunities possible. A panel discussion was held on 4K transmission as the missing link for 4K adoption.

The broadcast engineering and technology track focused on DVB in Asia & Advanced broadcast solutions. Presentations were made on current and future developments from DVB, set top boxes and DVB CI+ standardisation, the possibility of using DVB-T2 for terrestrial transmission of UHD-2 (or commonly known as 4K) content. A panel discussion, moderated by Dr. Amal Punchihewa, Director, ABU Technology, was held to share some of the experiences from the region and to highlight key opportunities for broadcasters. Panellists included the Chairman of the National Broadcasting and Telecommunication Commission of Thailand, Vice-President MediaCorp, Director MCMC Malaysia, and the French regulator CSA.



Visit to MediaCorp, Singapore

During BroadcastAsia-2014, the Director ABU Technology visited MediaCorp, Singapore's leading Media Company. They offer media in a number of platforms including TV, radio, newspapers, magazines, movies and interactive media. MediaCorp began in analogue radio broadcasting in 1936 and today it offers digital radio and television on latest generations.

They are in the process of digitising its archive and their workflow will be on a file-based system. They are in the process of modernising its facilities and the ABU members will be able to hear about how they have over come some of the challenges in setting up their new facility and the concept behind it.

During the visit to MediaCorp, the Director ABU Technology had discussions with Mr Yeo Kim Pow, Mr Lau Hing Tung and Ms Nicole Ho on technology matters and future developments and collaborations which included a tour of the broadcast facility including outside broadcast vehicle.



50th
ANNIVERSARY
Inter BEE 2014
International Broadcast Equipment Exhibition

The Japan Electronics and Information Technology Industries Association (JEITA: Chairman: Norio Sasaki, Representative Corporate Executive Officer and Vice President of Toshiba Corporation) will present the 50th International Broadcast Equipment Exhibition (Inter BEE 2014) at Makuhari Messe (Mihama Ward, city of Chiba) from Wednesday, November 19 to Friday, November 21, 2014.

Inter BEE is Japan's foremost exhibition for professionals in audio, video and communications, bringing together the latest in broadcasting, video, acoustic and lighting equipment, as well as ICT and cross-media solutions, in a single hall. This year marks the 50th anniversary of Inter BEE, which has been held each year since the inaugural event in 1965.

For more information, please see
<http://www.inter-bee.com/en/>

How the ICT Application Can Improve Management of Archiving Systems

by Alireza Bahadori

IRIB Iran

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Nowadays, the media (Radio, TV, Cinema, Press, etc.) have a fundamental role in the advancement of human culture via exchange of thoughts and ideas, sharing new knowledge and skills and changing public thinking.

Radio and Television are two of the most important communication media, which significantly change social behaviours by broadcasting a wide range of ideas, approaches and presentations. Audiences from every stratum, separated by a variety of cultures and customs, use these media.

Media, by developing specific patterns which influence the development and promotion of norms and behaviour patterns, introduce the required information by producing interactive applications, together with artistic and audience-friendly programmes.

Since production is an expensive and complex process, producers need to have rich information, resources and documentation to achieve their main targets, such as increasing audiences, creating innovations and publishing clear information.

In this respect, audiovisual archives, as a main source and supporter of programmes, can supply valuable information and content for radio and television producers and broadcast networks via audio-visual resources, preservation and restoration of archived content and the organisation and digitisation of valuable assets for quick and easy access.

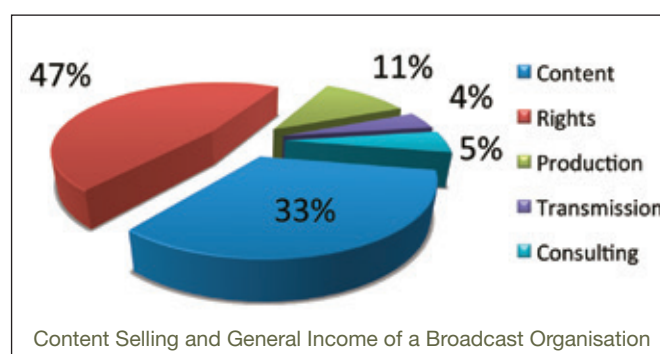
So, audiovisual assets are one of the newly emerging assets from the recent century and today the human race is trying to preserve this wealth. Most of this is accumulated by the media and archives are at the heart of any media organisation trying to maintain these important resources.

Modern societies need modern media and modern media need modern assets and archives. In a similar way, modern archives need modern management, using modern tools and equipment. This article attempts to show how information and communication technology can help us to manage modern archives.

First of all, let us review how modern archives can be created. Initially the following steps are recommended:

- Gathering of facts by targeted studies
- Analysing and defining requirements

- Learning the various standards and properties
- Perceiving different objective models
- Reviewing a variety of case studies
- Choosing the best creative approach



So we need to know more about the situation of existing archives and the parameters which affect the strategies and approaches. Subjects like: Content; (type, amount, quality of preservation, formats, container media, etc.) Servicing; (based on service types and who receives them): Effective Parameters; (changing organisation charts and staff line-ups or workflows.) Improving staff skills and hiring expert technicians. Having a good approach to initial user resistance): Impacting Subject; (initial lack of desired skills, current workflows and services, variety of users and procedures, sporadic archives, huge analogue assets, etc.) and lastly Financial Matters; (big initial investments, additional integrations costs, maintenance and running expenses, updating and redeveloping costs.)

After gaining more understanding of the current system, planning the new system, choosing development approaches and finalising strategies, we are ready to create a modern archive. The recommended steps to create the required systems are listed below:

- Building a core system (central archive site)
- Founding a digitising site and backup for main assets.
- Building a spare site, & building the first distribution branch
- Connection to related systems and automation
- Expanding all distribution branches
- Developing enhanced services and facilities

To implement the abovementioned steps it is better to follow a standard approach to launching a project, as below:

- Define executive phases
- Divide activities into phases
- Draft out critical paths
- Consider user resistance
- Specify an executive group for the whole project
- Facilitate feedback and updates

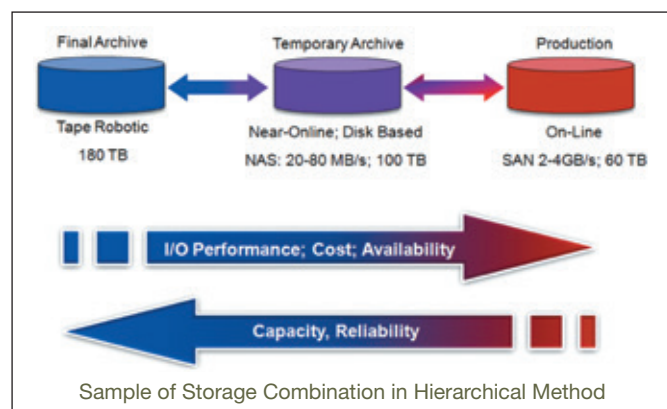
The new system will be founded on the following subsystems, components and constituent processes. And, by managing these you control whole system:

- Storage and Storage Management
- Content Management or Media Asset Management
- Converter and Transcoder Farm
- Video servers and peripherals
- Intermediate systems and gateways
- Business Process Management system (BPM)
- Content Delivery Network
- Traffic System with Rights Management
- Media Processing Management

Storage and Storage Management

Hierarchical Storage Management (HSM) or similar systems such as information life management (ILM) help managers to improve the capacity and availability of treasure storage with reasonable cost and a scalable method.

Improving I/O performance and availability of content increase the costs. Capacity volume and reliability is another parameter to be considered. By using HSM, managers are available to combine different kinds of storage, which combine capacity, reliability, performance and availability in a unique system with reasonable cost. Managers are available to define priority for content; high priority content is reachable via on-line storage and rarely accessed items are kept in off-line storage. HSM will manage the migration of content between different storage areas and environments automatically.



Content Management or Media Asset Management

- Interplay MAM (Media Archive) for clients, services and workflows

- Infrastructure and Interfaces
- Administration of proxies, Mid-Res and High Quality

Media Asset Management (MAM), or Digital Asset Management (DAM), which is also known as Content Management (CM) is recognised as an essential part of any digital archive system. It controls storage, cataloguing, search, delivery and management of digital resources.

Interoperation with hierarchical storage management (HSM), storage and file systems, media processing management (MPM), authentication systems, databases and cataloguing by advanced text search and audio-video retrieval systems, plus interactions with other broadcast systems, make it a core system of the archive.

Requirements for MAM functions in different applications

Applications Functions	Broadcast Programmes	Broadcast News	Historical Film Stock	Film Stock for Broadcast
Online catalogue	+	+	+	+
Browsing	+	+	-	+/-
Short Access Time	+	++	-	+/-
Simultaneous Access	+/-	++	-	+/-
Networking Compression	+	++	-	+/-
Size of files	↑ ↑	↑	↑ ↑	↑
Play out via Disk Server	++	++	-	+/-
Frequency of Access	+	++	-	+/-

++ : Very Important

+ : Important

+/- : Less Important

- : Not Important

↑ ↑ : Big

↑ : Medium

Converter and Transcoder Farm

The archive system serves a broad spectrum of users with different requirements and should cater for content in variety of different formats, so it is possible to receive or provide content in different formats and convert any non-uniform content to the desired formats. Transcoding servers and software, using server clustering, cloud computing and server farms, can convert different formats simultaneously in the minimum amount of time and develop the system's agile response to user requirements for different formats.



Video Servers and Peripherals

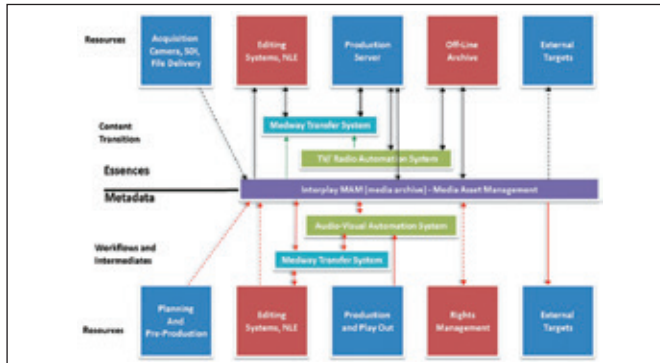
- Video servers
- Fileserver
- Playout stations for DVD, digital beta and XDCAM
- Ingest stations for digitising analogue media

Workstations, client and peripheral equipment, as part of input/output and processing functions, provide direct services to users of the archiving system. Inserting and

enriching metadata, monitoring, quality control, browsing and technical approval of content, content search and retrieval are available for user workstations, based on ICT applications.

Intermediate Systems and Gateways

- Post-production gateways
- Broadcasting and traffic systems
- Interactive TV gateways
- Non-homogenous mid-way engines



Connection and interoperation of non-homogenous systems and their integration into a unique systems through a desired workflow is possible via intermediate systems and gateways.

Business Process Management System (BPM)

- Make the system broadcast and production oriented
- Implementation of:
- Broadcast workflows (automation, rundowns, etc)
- Acquisition workflows (ingest, subtitling, versioning)
- Promo workflows (graphics, editing, etc)



Content Delivery Network

Content Delivery Network (CDN) systems are an important part of the voluminous content distribution of an archiving system, which deliver content to operating and production environments quickly and simultaneously via communications and network infrastructures.

Independence of physical media and using secure streaming methods and CAS delivery systems through the ICT infrastructure, provide content security and also enable copyright compliance.



Traffic System and Rights Management

The copyright, copyleft and other applicable permission systems based on different authors, users, locations and contents content are vital requirements of a modern archiving system. By definition of levels of access and conditional access services, conservative or security categories, the system simultaneously provides ease of use and security

Media Processing Management

Media Processing Management (MPM) also known as Enterprise Application Interoperability Services (EAIS) is in charge of task definition, planning and monitoring the data flow and metadata in a heterogeneous environment.

Media processing management via trans-code analysis and rewrapping files, using the media operator and workflow engine, and management of external equipment in all areas of the network, integrates the system.

Standards and General Rules

A modern archiving system should be characterised by standards. Working to standards makes a system manageable and developable. Some general rules which improve the structure of the archiving are listed below:



Local Autonomy

Each part or subsystem of the archiving system will provide local autonomy. Local archives will manage content for daily and most of the monthly content. Only historical or some monthly content recovery will be requested from core system. With local autonomy, archives are able to enhance

their services to customers, and also permit environmental constraints to be defined. Additionally any failure in the core system, or latency in responses, will not stop individual archive subsystem services, or those of the core system.

No Reliance on Single Centre

Not only should avoidance of single point of failure be considered in design and implementation, but also no task must relate to a single centre, such as the core system, or any one archive subsystem. If any, such critical points are revealed then it is necessary to make another centre available as a spare or hot-redundant centre to substitute quickly and transparently in case of failure.

Continuous Operation

It is essential to have a distributed and a redundant system to provide high availability and fault tolerance. Upon any failure in a subsystem, a predefined mechanism automatically takes over the role and makes the operation failsafe. During failure status, another system takes over the crashed subsystem's roles and the archiving system should always be in the right state. To provide such functionality requires no potential single points of failure at all levels of the architecture, that is, cluster database, application managers and services, and system processing elements.

Fragmentation Independence

An archiving System should provide the ability to store and localise related content in the core system or archive subsystems. The primary copy of content may be located in different sites or centres. This fragmentation should be transparent to the users. By administration decisions or the system's auto tune-up facility, data will be transferred from one location to another. Such movement should be hidden from the users' sight and have no noticeable effect upon archiving services.

Distributed Query Processing

The core system and archive subsystems will be integrated in order to provide transparent local and remote query processing. Queries will be performed locally at the first stage and sent to the central archive if no local content is found. There are distributed systems for query processing in the central archive and no single system will manage all queries.

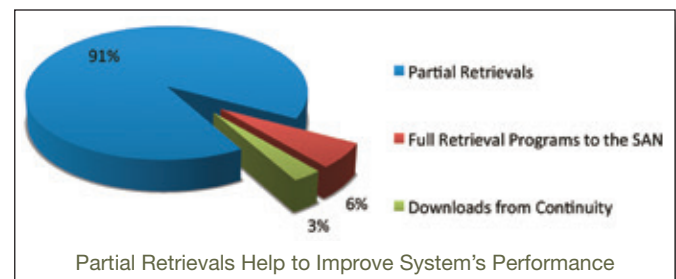
Distributed Transaction Management

Upon a receiving a request for content located in the Archiving System, the core system will keep track of the content until completion of delivery. If a request requires running transactions, then distributed transaction management, located in different centres, avoids single points of failure. On the other hand core system responses to several archive subsystems are located in a same region for executing

transactions. In the case of a failure another available system takes over the role of these archive subsystems.

Hardware Independency

Real world computer installations typically involve a multiplicity of different machines such as IBM, Fujitsu or HP machines and PCs and workstations of various kinds. There is a real need to be able to integrate the data on all of those systems and present the user with a "Single System Image". Thus it is desirable to be able to run the same archiving system on different hardware platforms and furthermore to have those different machines all participate as equal partners in a distributed system.



The solution provided must be hardware independent and not depend on any one brand. Scalability of the solution, based on the addition of new hardware elements, is desirable. Ideally all hardware should be new, not refurbished and suitable for 24/7 usage.

Operating Systems Independency

Web based applications are also desirable, to obtain the operating system independency required for the access to contents from all the areas involved and with full integration with the MAM.

Network Independency

A system should be able to support many disparate sites, with disparate hardware and disparate operating systems. It's obviously desirable to be able to support a variety of disparate communication networks also. Supporting all types of network topology and connections yet with independence between them is required, considering that a network may not be reliable, secure and homogeneous. The topology may change, bandwidth may be limited and transport cost may be a limiting factor.

Transparency in Total Archiving System

Users do not need to be informed about all the actions which occur internally in the archiving system and the system should have transparency of the following feature to both users and producers, unless the system administrator allows users to be informed concerning system actions.

Access

Hiding differences in content or resource representation and

how content or a resource is accessed. Access transparency deals with concealment of differences in data representation and the way that resources can be accessed by users. At a basic level the system should hide differences in archiving system architectures, but more important is to attain a unique layout of how data is to be represented by different archive centres and applications.

Location

Maintaining location independency and hiding where content or a resource is located. Location transparency refers to the fact that typical users cannot perceive where a resource is physically located in the system. In particular, location transparency can be achieved by assigning only logical names to resources, that is, names in which the location of a resource is not embedded.

Migration

Hiding the fact that content or a resource may move to another location or storage. Migration transparency provides features in the core system or subsystems for resources to be moved without affecting how those resources can be accessed in different locations or from different storage locations.

Relocation

Transparency of relocation means content or resource is always available regardless of location; although users may be situated in another location. Even more important is the situation in which resources can be relocated while they are being accessed without the user or application noticing anything, unless the administrator consents to inform them.

Replication

Maintaining replication independency and hiding that content or resources are replicated. Replication plays a very important role in an archiving system. Resources may be replicated to increase availability or to improve performance by placing a copy close to the place where it is accessed. Replication transparency deals with hiding the fact that several copies of a resource exist. To hide replication from users, it is necessary that all replicas have the same name.

Concurrency

Hiding that content or resources may be shared or stored by several competitive producers. In some cases, producers in IRIB don't have exclusive rights to content and to avoid producing similar programmes the system must inform them if they are using resources or content being used simultaneously by others.



Failure

Hiding the failure and recovery of content or a resource. Making the archiving system 'failure transparent' means that a user does not notice that a resource or archive centre (which the user has possibly never heard of) has failed to work properly, and that the system subsequently recovered from that failure.

System Openness

The Archiving System should offer services according to standard rules that describe the syntax and semantics of those services. Also it should be easy to configure the system out of different components (possibly from different developers). Additionally, it should be easy to add new components or replace existing ones without affecting remaining components. To achieve this functionality system definition should separate policy from mechanism. If a component does not provide the optimal policy for a specific user or application it should be easy to change it.



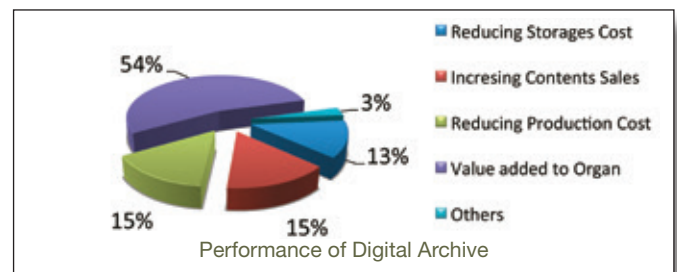
Scalability

The scalability of the system should be designed and implemented in at least three different dimensions:

First: Size, A system should be scalable with respect to its size, meaning that we can easily add more users and resources to the system.

Second: Geographically, The users and resources may be located far apart in the archiving system.

Third: Administration, The system should be administratively scalable. In fact it should still be easy to manage even if it spans many independent administrative organisations.



Finally, it is necessary to point out that the features mentioned, which are based on information and communication technology, can provide a new and modern archiving system with excellent abilities for management. Each subsystem has its own tools and rules to manage desired areas and can not only provide wide-ranging and significant advantages to the users but can also improve audience satisfaction.

author



Alireza Bahadori
IRIB Iran

Alireza Bahadori is Senior Technical Engineer and Project Manager at IRIB (Islamic Republic of Iran Broadcasting). He was Chairman of the several committees in IRIB such as "Radio Automation and Digital Archives Regulatory", "Audio and Text Profiles", "Total Radio Automation Reforming" and "Video and Graphic Profiles". He is a member of SMPTE, IEEE, IrExperts and ABU Training and Services Topic Area. He joined IRIB in 2003 after receiving his B.S in Computer Engineering from Technical and Engineering Faculty of IAU, Tehran, Iran. He is currently in charge of developing "Total Archiving System" and founding "6 New TV Channels" projects. He started his technical advisory for ABU by "Low Cost Radio Production Systems Development" workshop in 2005 as resource trainer and continued by some other workshops such as "Low Cost Digital TV Studio Facilities" in 2006, "Integration of Digital Archives and Radio/TV Automations" in 2007 and "Media Management in Archiving" in 2013. He is one of authors of "Cost Effective Digital TV Facilities" and "Low Cost Radio Production Systems" reference books published by ABU.



The graphic is a complex collage on a dark background. It features a grid of blue squares, some containing icons and others containing text. The text '65 TV Channels' is prominently displayed in a large, white, stylized font. Below it, '63 RadioChannels' is also in a large, white, stylized font. In the bottom right corner, the 'IRIB' logo is shown in a large, white, stylized font. Other text elements include 'TRUST on Technical Advisory' and 'Media Technology and Development Islamic Republic of IRAN Broadcasting'. The collage also includes several small images of television screens and studio equipment.

ABU ENGINEERING EXCELLENCE AWARDS

PANEL OF JUDGES

ABU BROADCAST ENGINEERING EXCELLENCE AWARD ABU DEVELOPING BROADCASTERS' EXCELLENCE AWARD



Dato' Abu Bakar bin Ab Rahim, Deputy Director-General of Broadcasting (Engineering), Radio Television Malaysia (RTM-Malaysia). Dato' Abu Bakar is currently the Chairman of the ABU Technical Committee.



Chris Grey, General Manager, Broadcast & Content Creation Solutions Asia Pacific Division, Business & Professional Products Asia Pacific (A division company of Sony Corporation of Hong Kong Ltd) representing the sponsor of this award and appointed a member of the panel in 2010.



SONY
make.believe

Paul Worman, Senior Solutions Architect, APAC, Imagine Communications, appointed a member of the panel in May 2014.



Mr Seon Wong Kim, ABU Technical Liaison Officer, Korean Broadcasting System, appointed a member of the panel in March 2013.



KBS 한국방송

Mr Raşit BAŞTAŞ Acting Head of Studios and Programme Transmission Systems Department, Turkish Radio Television Corporation (TRT-Turkey), appointed to the panel in March 2013.



ABU ENGINEERING INDUSTRY EXCELLENCE AWARD ABU GREEN BROADCAST ENGINEERING AWARD

Masakazu Iwaki, Senior Manager, Planning & Coordination Division, Science & Technology Research Laboratories, Nippon Hoso Kyokai, Japan, appointed as Panel Chairman in April 2011. Mr Iwaki is currently a Vice-Chairman of the ABU Technical Committee.



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



Ikegami



Sunarya Ruslan, Member of Radio Republik Indonesia's Supervisory Board and a member of the ABU Technical Bureau, has served on the panel since 2009.



Lim Chin Siang, Director, Infrastructure and Technology Division, Media Development Authority, Singapore, appointed a member of the panel in 2010.



Professor Du Baichuan, Vice Chairman of the Science & Technology Committee of the State Administration of Radio, Film and TV (SARFT) and a member of the ABU Technical Bureau, appointed a member of the panel in April 2011.



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



Digital Broadcasting Update

NRSC Adopts Updated Guideline On RDS Usage

The National Radio Systems Committee (NRSC) adopted an updated NRSC Usage Guideline that focuses on recommendations for broadcasters and receiver manufacturers in the use of the Radio Data System (RDS) data broadcasting technology.

NRSC-G300-A, RDS Usage Guideline was adopted by the Radio Broadcasting Data System (RBDS) Subcommittee, chaired by Dan Mansergh, director of engineering, KQED Public Radio, San Francisco, CA. Roughly 70 pages in length, G300-A adds significant additional information that focuses on emergency alerting using the RDS subcarrier.

(CEA)

H.265/HEVC Decoder For 4K TV Broadcasting And Video Delivery

NTT Advanced Technology Corp announced that it will launch in August 2014 the "H.265/HEVC Decoder Appliance" (tentative name) ready for the 4K "Range Extensions" Profile (4:2:2 sampling and 10-bit video). Fitted with a DVB-ASI input terminal and four 3G-SDI output terminals, necessary for digital broadcasting systems such as a reception monitor for retransmitting 4K broadcast waves, the product will meet rising demand from broadcasting stations and various service providers in the wake of the start of experimental 4K broadcasting.

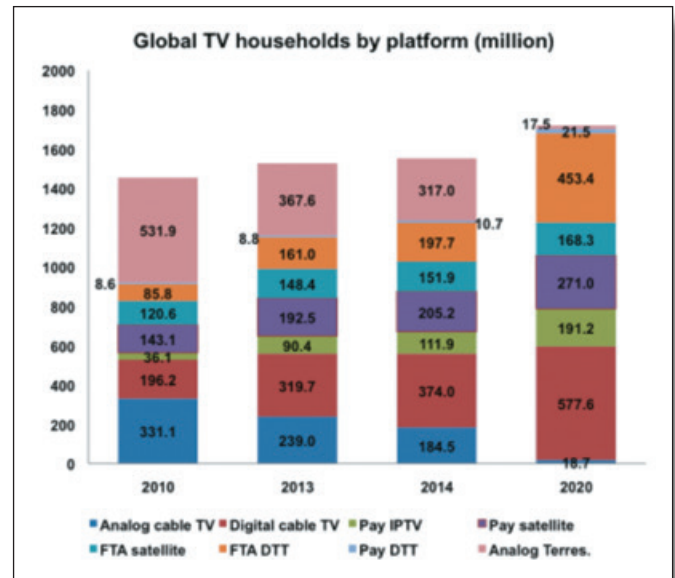
NTT-AT has developed video coding products, compatible with a wide variety of formats, for global markets, successfully building a large installed customer base for its high-efficiency video coding products. As 4K broadcasting and video delivery services continue to expand, the company is developing to offer the "H.265/HEVC Decoder Appliance" ready for 4K Range Extensions Profile (4:2:2, 10bit), contributing further to the development of the broadcasting and video delivery service markets.

(Digitalbroadcasting)

Global Digital TV Conversion Almost Complete by 2020

Based on forecasts for 138 countries, the number of digital TV homes will increase by more than 1 billion between 2010 and 2020 to 1.68 billion – or up by 185%, according to a new report from Digital TV Research. The Digital TV World Household Forecasts report estimates that the digital TV total will climb by 131 million in 2014 alone.

Global digital TV penetration will reach 97.9% of television households by end-2020, up from 40.5% at end-2010 and 67.7% at end-2014. By 2020, 94 countries will be completely digital compared with only 12 at end-2013.



About 124 countries will have more than 90% digital penetration by 2020.

Of the 762 million digital TV homes to be added between 2013 and 2020, 258 million will come from digital cable. Primary FTA DTT [homes taking DTT but not subscribing to cable, DTH or IPTV] will acquire an additional 292 million. Pay IPTV will more than double to 191 million, with pay DTH up by 79 million.

The number of digital TV households in Asia Pacific will more than double between 2013 and 2020, with 88 million added in 2014 alone. The region will supply 501 million (66%) of the 762 million digital TV household additions between 2013 and 2020. Sub-Saharan Africa will more than triple its base over the same period.

(Broadbandtvnews)

Ultra HD TV Panels Hit 1 Million Shipments



The market for Ultra HD (4K) TV panels reached a significant new benchmark in March when global shipments exceeded

1 million units for the first time. The market was driven by vastly increased deliveries from the industry's three largest makers of the high-end panels, according to a new report from IHS Technology.

UHD TV panel shipments amounted to 1.1 million units in March, nearly a threefold increase from 384,300 units a month earlier in February, as shown in the attached table. The gains are even more spectacular when measured from the same time a year ago in March 2013, when total UHD TV panels had not yet cracked the 150,000 mark.

Shipments of UHD panels are likely to increase faster than the total TV panel market. Demand for UHD panels will grow to 68.4 million units by 2018, up 350% from 2014, IHS predicts. In comparison, TV panel shipments in general will rise just 12%.

(IHS)

Global Pay-TV Market Surpasses 900 Million

The global pay-TV subscriber base increased over 5% in 2013, raising the total to 901.1 million, according to ABI Research. However the average revenue per user (ARPU) dropped slightly to \$23.80 in 2013 from \$24.10 in 2012.

Subscription of HD-TV services continue to grow in 2013 accounting for 41% of total pay-TV subscriber base in 2013. ABI Research forecasts that the subscriber base of HD-TV services will continue to increase to 57% of total pay-TV subscribers in 2019. As competition in the pay-TV market has increased, operators continue to offer more HD programming services, advanced set-top boxes and innovative services to boost pay-TV ARPU.

ABI Research anticipates that the worldwide pay-TV subscriber base will reach 1.1 billion subscribers in 2019. Increasing broadband connectivity will help IPTV market growth.

(ABIResearch)

HbbTV Already Supported by 93% of Connected TVs



Today approximately 93% of the connected televisions for sale support HbbTV and HbbTV services are being deployed by broadcasters throughout Europe. Audience research shows that users appreciate HbbTV, not just to access on-demand

video, but also to find out more about a specific programme or even to browse through the extended EPG-like data.

The success of HbbTV shows that the EBU needs to continue to invest in standardisation efforts that allow broadcasters to run their own cost efficient services and stay in direct contact with their audience in the future. Currently the EBU is focusing on HbbTV v2, which is being developed in close cooperation with the industry. It will enable the use of new popular browser technology (HTML5), an improved streaming format (DASH) and pairing with second screens. These extensions will guarantee the growing popularity of the standard in the future. HbbTV 2.0 is expected to be finalised later this year, and to appear in products soon after.

(EBU)

EBU's Agile Standardisation Approach Delivers First Result



Practical example: a DAB radio displaying a CPA code

After six months of close collaboration, the EBU Cross Platform Authentication group (CPA), has finalised its first draft specification: CPA v0.1. It addresses how to associate a media device with limited input capabilities (e.g. a radio) with an online account. The specification is unique in the sense that it approaches device personalisation from the hardware side.

Out of the Box

Guaranteeing out-of-the-box operation is an important requirement from manufacturers. With CPA a user can immediately start using the device and only later create an online account to go with it, for example to enjoy personalisation of content across different media devices.

CPA can operate in three different modes: anonymous, device and user. These simple modes hide a series of complex background interactions with service and authentication providers, some of which are still being worked on in the CPA group.

Agile Standardisation

The EBU CPA Group is composed of mainly software engineers, who quickly agreed to use development techniques proven in the Open Source community, with the aim of simplifying collaboration and minimising 'paperwork'.

(EBU)

Equipment Trends

GV Director



The GV Director™ Nonlinear Live Production System is the ultimate multipurpose tool for live production. Integrating video switching, multi-layer effects, animated graphics, multiviewer monitoring, and more – all in a single, intuitive, and highly creative system.

GV Director brings it all together – switcher, video server, graphics generator, and multiviewer display-in a simple, powerful, and creative workspace for live monitoring and switching. GV Director's interface gives you the choice of how you want to work. There's a smart control surface with touchscreen panel, assignable buttons, a T-bar, and a multiviewer, as well as a keyboard, mouse, and computer monitor for maximum operational flexibility.

(Grassvalley)

World's First 8K Shared Storage System' at Broadcast Asia



GB Labs has introduced Space SSD Ultimate, which the company says is the first networked storage system for 8K grading, editing, compositing and motion graphics. GB Labs says its new Space SSD Ultimate offers broadcasters and post production companies a storage system with more than double the performance offered by previous SSD RAID systems.

It is tuned and configured to provide significantly improved IOPs (Input/output Operations per Second) for simultaneous read and write operations without degrading performance. Its 6000 MBps can handle up to 44 streams of uncompressed HD, 10 streams of 4K DPX or four streams of 8K video, with multiple workstations addressing the storage over 40Gb Ethernet connections.

(Tvtechnology)

New PESA Xstream C22 Compact Streaming System

The C22 can be configured as a two port video encoder or two port decoder, or can include one of each. It includes HDMI, coax and Ethernet (for an IP-based camera) video inputs, and optional SFP modules allow multiple configurations (fiber, HD-BNC, A-to-D, D-to-A and other SFP modules) for expanded connectivity. The C22 also supports two external audio sources, which can be synchronised to either or both video streams during an event.



With built-in genlock, video signals can be locked to an external source for glitch-free video switching in broadcast and pro AV applications. An HDMI-out allows for local preview, while an integrated Web server allows full remote control, so no personnel are required on site for streaming content to a production facility. Multiple C22 units can be used to allow AV professionals to compress, stream and share high-quality content between locations and enable streaming in existing video distribution. The C22 is also an ideal bi-directional content sharing solution. Two C22 units can be configured with one encoder to send video and one decoder to receive video, allowing live interaction between sites.

(Pesaxstream)

Codex launches Action CAM Point, Shoot, and Post Package



The camera is designed for use as an Action | Witness | POV camera system on commercials, TV and movie productions as a companion camera when regular camera packages are too large for the situation or location in which the production is trying to shoot.

(Codexdigital)

Mobile Audio Editing Tool for Radio-Assist

iSnippet audio editing tool for iPhone(R) and iPad(R) devices is now available on the iTunes(R) App Store.



Sharing the same look and ergonomic principles as the Snippet desktop interface available within NETIA's acclaimed Radio-Assist(TM) radio automation software suite, iSnippet allows iOS device users not only to edit and index media from their mobile devices, but also to record and export ready-to-broadcast assets from the in-studio Radio-Assist database.

Supporting AAC, ALAC, and LPCM audio formats, iSnippet allows users to record, edit, and export their audio files to the studio. During recording, the user may adjust the recording volume, insert markers, and activate screen locking. Edit capabilities include vertical and horizontal zoom, playout of audio from inside or outside markers, insertion of audio from the app's cutting bin, and file insertion. The edited files themselves may be sent raw or as a master file (MP2/AAC/ALAC/AIFF/WAVE) to an FTP server, or directly to the Radio-Assist database along with an index file.

(Netia)

The Digital Secure Wireless System



Featuring AES-256-CTR (Advanced Encryption Standard) encryption technology, the new Digital Secure Wireless system is ideal for use in environments where privacy is of paramount concern, such as corporate boardrooms, shareholder meetings, and government facilities. As a rugged and high-quality wireless microphone system, the new products will also find a home in theatres, film making, touring and other demanding applications.

The new Lectrosonics Digital Secure Wireless system consists of the DR digital wireless receiver frame, the individual DRM digital receiver modules, and the DB digital wireless beltback transmitter. Analog and digital (AES/EBU) XLR outputs are selectable on the device menu. The frame supports wideband reception (470.100 to 691.175 MHz), 50 Ohm BNC antenna inputs, and outputs for cascading up to 3 additional frames (24 channels total) on one set of antennas, without an external multi-coupler. The clock input and output enables the DR to be the master clock

in a digital audio system or to be the slave to an external master clock. A 1/4-inch headphone output can be fed from a mixture of channel signals, or from isolated channels.

(Lectrosonics)

MAF 1.4 Metre Autoseeking Flyaway



MAF 1.4 metre motorised flyaway antenna incorporates fully automatic satellite acquisition. Based on the unique Hiltron HSACU SNG antenna controller, it allows a satellite to be found in less than two minutes, from any location and at any time.

The antenna can be accommodated in five IATA-compliant cases comprising three for the antenna plus one each for the control electronics and high power amplifier. Hiltron's award-winning HMCS SNG management software allows fast and easy setup of the uplink without need for deep technical knowledge.

(Hiltron)

CopperHead 3404K Camera Transceiver



Designed to take advantage of lightweight, easy to install fibre, the 4K UHDTV-ready CopperHead 3404K transceiver requires only two strands of fiber optic cable to carry all bi-directional signals, including four 3Gb/s HD/SDI paths, from camera locations to truck or control room or around a remote production site. The dual-strand bi-directional system enables 4K cameras to be easily multi-purposed for ENG, digital cinematography and studio applications without the constraints imposed by copper connections.

The CopperHead 3404K system includes the camera-mountable transceiver, base station and remote camera control panel, which collectively enable a range of high-end cameras to be fully connected and remotely controlled via SMPTE 311M fiber.

(Belden)

Personalities & Posts

Changes in Engineering Awards Judging Panel



Paul Worman

Mr Paul Worman
Senior Solutions Architect
APAC, Imagine Communications

Paul Worman, Senior Solutions Architect, APAC, Imagine Communications (previously Harris Broadcast) has taken over from Simon Lockington as a judge on the Panel for the ABU Broadcast Engineering Excellence Award and the ABU Developing Broadcasters' Excellence Award.



Simon Lockington

Mr Worman is currently one of the Senior Solutions Architects within the growing Imagine Communications Solution Architecture team primarily focused on the APAC region, but also providing support to other regions as needed.

The ABU is pleased to welcome Mr Worman aboard the panel and also wishes to express its grateful thanks to Mr Lockington for his contribution since he joined the panel in 2012.



Fintan Mc Kiernan

Mr Fintan Mc Kiernan
CEO
Ideal Systems Singapore

Our thanks and appreciation also to Mr Ray Sanders of Gencom, New Zealand who has served as a judge on the panel for the ABU Engineering Industry Excellence Award ABU Green Broadcast Engineering Award since 2011.



Ray Sanders

Mr Sanders is being replaced by Fintan Mc Kiernan, CEO, Ideal Systems Singapore. Fintan joined Ideal Systems Group in 2011 to establish a SEA hub office in Singapore, which now includes offices in Kuala Lumpur and Jakarta. Ideal (SEA) has delivered broadcast projects to operators including Sony Pictures, Fox Sports, Astro and Globecast, Encompass, SingTel, Brand New Media and MediaCorp. In January 2014

Fintan launched SoftCast Technologies, a new software based broadcast product ecosystem for the Asia market.

Toshiaki Hara
New Technical Liaison Officer
for NHK-Japan



Toshiaki Hara

Toshiaki Hara has been appointed the new ABU Technical Liaison Officer for NHK-Japan. Mr Hara has 29 years of experience at NHK as a broadcasting engineer. Most of his work has been in the planning, development and operations of broadcasting facilities, and recently he has been in charge of datacasting services with emphasis on convergence of broadcasting and telecommunications. Mr Hara was appointed Senior Manager in the NHK World Department in June 2014.

IBC President John Wilson Dies



John Wilson
President and Former
Chairman
International Broadcasting
Convention (IBC)

John Wilson, the President and former Chairman of the International Broadcasting Convention (IBC), has died at the age of 82.

Mr Wilson was regarded as the architect of IBC as it is today.

In 1990 he helped move the convention from its old home of Brighton and brought in six partners – IABM, IEEE, IET, RTS, SCTE and SMPTE – to restructure the organisation. He became Chairman and later President of the new-look organisation. Since 1992, IBC has been held in Amsterdam.

"John Wilson was always the perfect gentleman who in his own quiet way worked extremely hard for the benefit of IBC and the broadcast industry in general," said David McGregor, founder of integrated broadcast systems firm TSL and a veteran of every IBC.

"His chairmanship transformed IBC into the well-drilled organisation it is today."

Before working for IBC, Mr Wilson was Sales Director at Link Electronics and founded a displays business called Anna Valley.

A memorial service to celebrate his life took place in Upper Clatford, Hampshire, England, on 24 June.

New Members

Additional Full Member

Solomon Islands Broadcasting Corporation, Solomon Islands

Solomon Islands Broadcasting Corporation (SIBC) is a state-owned enterprise established in Honiara, Solomon Islands on 1 January 1977. Solomon Islands radio station was first launched in September 1952 and later operated television services. The In 2007 the government of the Solomon Islands enacted a State Owned Enterprises Act and SIBC is among several institutions now known as a State Owned Enterprise, which must abide by stringent rules and regulations of the SOE Act. SIBC has a Board of Directors appointed by the Prime Minister of the Solomon Islands in accordance with the guidelines laid down in the State Owned Enterprises Act, 2007.

SIBC produces and broadcasts approximately 75 percent of its programmes using quality equipment and transmitters. It is a free-to-air national broadcaster, offering programmes on worthwhile information, education, entertainment, health issues, self-development, cultural, sports, religious, commercial and community based programmes.

SIBC aims to provide 18 hours of daily radio service with longer hours during times of disaster, beginning in the First Quarter of 2014. It has carried out surveys and intends to produce programmes to cater to different age groups as well as provide an online live-streaming service. The Corporation also plans to expand its FM network transmission to more areas on the island.

In the second quarter of 2014 SIBC will launch a national television service to serve viewers from provincial centres which will constitute a minimum of 50 percent expansion to all major villages by 1 January 2016. Another goal SIBC hopes to achieve is to harness the quality of digital radio and television to keep abreast with the progress in transmission and reception of digital transmissions and to quickly adopt practical and applicable technology to reduce reliance on analogue transmissions, which have high power cost.

Affiliate Member

Tata Communications Ltd, Singapore (12.5.2014)

Tata Communications Ltd, a public listed company, was incorporated on 7 January 2004 in the Republic of Singapore. Their headquarters share operations between Mumbai, India and Singapore. The Tata Group comprises over 100 operating companies in seven business sectors: communications and information technology, engineering, materials, services, energy, consumer products and chemicals. The group has operations in more than 80 countries across six continents, and its companies export products and services to 85 countries, employing over 450,000 people worldwide. The major Tata companies are Tata Steel, Tata Motors, Tata Consultancy Services (TCS), Tata Power, Tata Chemicals, Tata Global Beverages, Tata Teleservices, Titan, Tata Communications and Indian Hotels.

Tata Communications is a provider of media optimised services and applications for the global movement and management of sport content. Since February 2012, they have been the Official Connectivity Provider of Formula 1™, Official Web Hosting and CDN Provider of Formula1.com.

Leveraging their global network infrastructure and technology partnerships with leading media and service providers, they offer solutions and services for Media Movement – Video Connect – A fibre-based global media transport network that is pre-connected to over 300 media hotspots across 125 cities.

The company provides platforms on which global service providers rely. From Voice, IP, Mobile, Data and transmission, it is seen as an innovator that keeps its business current, relevant and in-tune with market and customer demands. It provides high speed connections and global MPLS virtual private networks, the world's largest network of Telepresence services, the world's most extensive DDoS mitigation and detection service, content delivery networks and cloud offerings.

Media Development Centre / Birzeit University, Palestine (26.5.2014)

Media Development Centre / Birzeit University is a non-governmental, educational and academic organisation founded in 1999 in Birzeit, Palestine. It is dedicated to playing a leading role in developing and sustaining an environment of media freedom, independence and pluralism in Palestine. MDC / Birzeit University is a training centre for media career journalists and students. Within its 5-storey building, it operates a radio station (Radio Birzeit), a monthly newspaper (Al Hal) and it has its own radio and television productions that are distributed to local Palestinian radio and television stations. The centre is currently leading a national team for developing the national media strategy for Palestine in cooperation with 45 media partners.

The centre consist of five units – TV, Radio, Print/New Media, Media Research and policy and gender unit, offering workshops and courses in technical and practical areas such as internet and photo journalism, news and investigative reporting and documentary production. Committed to clear governance, the MDC / Birzeit University also aims at developing media houses' capacity to raise professional and ethical standards to empower journalists (especially the female gender) in new and classical journalism fields to raise general media awareness and to contribute to the enactment of legislative frameworks ensuring media fundamental rights.

The Centre's main partners are Swedish International Development Agency (SIDA), Heinrich Böll Foundation (HBF) and UNESCO, Canal France International (CFI) and the Australian Development Agency (AusAID).

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