

# EBU

OPERATING EUROVISION AND EURORADIO

# MEDIA TECHNOLOGY PULSE

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## **EUROPEAN BROADCASTING UNION**

The European Broadcasting Union (EBU) is the world's foremost alliance of public service media (PSM). Our mission is to make PSM indispensable.

We have 73 Members in 56 countries in Europe, and an additional 33 Associates in Asia, Africa and the Americas.

Our Members operate nearly 2,000 television and radio channels, together with numerous online platforms, broadcasting in more than 120 different languages. They reach audiences of more than one billion people around the world.

We have offices in Brussels, Rome, Dubai, Moscow, New York, Washington DC, Singapore, and Beijing. Our headquarters are in Geneva, Switzerland.

Discover more about the EBU on [www.ebu.ch](http://www.ebu.ch) and [tech.ebu.ch](http://tech.ebu.ch)

# INTRODUCTION

Public service media need to take a balanced view of the future, based on an open-minded assessment of emerging technologies, their impact, and their relevance for more efficient and diverse content production and delivery. We could recall, for example, that for 20 years, 'media gurus' have claimed broadcasting is dead, superseded by the internet, that programme production will use equipment bought at the local discount store, and that YouTube and the like will replace conventional media formats and journalism. This is evidently not the case. We need a degree of open-minded scepticism about the predictions of 'gurus'.

As we in EBU Technology & Innovation see the landscape, there are ten key technology trends that public service media should be aware of. This report explains why.

Individual Members have different circumstances that will influence the actions they could or should take. When deciding policies, always consult your local technical managers.



**Simon Fell**  
Director, EBU Technology & Innovation

## THE MOST CRITICAL MEDIA TECHNOLOGY CHALLENGES FOR EBU MEMBERS

EBU Technology & Innovation's Media Technology Pulse aims to offer EBU Members' senior non-technical and technical management brief insights into the major technological trends in broadcasting and related technologies. In this report, EBU Technology & Innovation<sup>1</sup> outlines representative opinions about the best strategies to adopt and the technologies that merit the highest priority. EBU Members may know that the EBU Technical Committee's main activity is to organize a series of 'Strategic Programme Groups' (SPGs), each with a 2-year workplan. They examine the technical and economic aspects of relevant new technologies.

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<sup>1</sup> Advised by the EBU Technical Committee and the EBU Technical Liaison Officers



# 5G

## A wireless broadband revolution?

The new wireless broadband technology, 5G, set to be launched in the next five to ten years, may provide many new types of service to consumers, and one of them may be a complement to today's terrestrial and satellite broadcasting systems.

New wireless broadband technology follows a pattern of generations (xG). Currently 3G or 4G is used in Western Europe. In the next five years, the technical specifications will be available for a 5G system. If it lives up to the expectations of its

proponents, it will have many advantages over the current 4G systems, including very low costs for subscribers and enormous data capacity. Whether it will actually be used depends on whether network operators decide it is in their financial interest to install it, but there is industry pressure to move forward with it.

5G might be used not just for the consumer; it will also be useful for programme production.

### WHY IT MATTERS

The maximum data rates available from wireless broadband have progressively increased over the last 20 years, making possible ever more sophisticated uses of mobile phones and tablets.

The real available data rate of such systems depends on how many users are using the service at a given time: the total bit rate available is shared between users. Despite the not always constant technical quality, wireless broadband capacity and usage is rising and it can readily be used for delivering video to consumers today via VoD or OTT services, potentially drawing audiences away from broadcasting.

The new 5G systems are being designed so that they can readily carry what is now broadcast content. Whether 5G will be used in Europe, and for what services, is not yet known, though there are many trials. Interest in 5G in China is very great, and much research and development is underway, as it is in Korea. 5G will have, if it works, very large data capacity, so it would open the door to a range of new services.



## MATURITY

The technical specifications for 5G are currently being drawn up, and it is planned that the specification will be available in 2018.

We won't know how important it will be until there are real-world implementations of a technology very much still under development. While the initial 5G standards are expected to be completed before 2020, network deployment will depend on market demand, with a substantial large area coverage expected around 2025 or later.

The predecessor of 5G, LTE (or 4G) is currently rolling out across Europe, it is now the most important mobile network technology. The evolved Multimedia Broadcast Multicast Service (eMBMS), a broadcast mode in LTE, can – in theory at least – deliver broadcast quality video to multiple users similarly to digital terrestrial television systems. The same technology could be used in 5G. But there remains the issue of consumer costs: unlike DVB-T or DVB-T2, using broadband services requires a subscription by the consumer.

While there are currently a number of eMBMS trials, it remains to be seen whether the technology will see wider market adoption. LTE has already found a use in EBU member contribution links for newsgathering and other applications, providing a lower cost and lower complexity alternative to satellite based ENG.

What more would 5G promise for broadcasters? The first applications are likely to be in the production domain with the advent of super fast, low latency and high quality channels for wireless camera and microphone links. Such technology could help alleviate the pressures on PMSE infrastructure, provided the technology is as powerful and as cost-effective as promised.

Most regulatory and political interest centres on whether 5G could eventually be used as a mainstream media distribution technology. For this reason, EBU Members are working to ensure that the standardization process takes broadcaster requirements into consideration.

## GOING FORWARD

Probably the most important step for broadcasters to take today is to monitor progress in the development

of the new systems, and the plans of network operators to provide them.

## WHAT THE EBU IS DOING

EBU Technology & Innovation is following developments in 5G carefully, and working with international bodies so that if 5G is used to deliver

what are currently broadcast services to the home, they will be matched to the technical formats of broadcast systems such as HDTV and UHD TV.

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# UHD

## The new normal for TV – but when?

Ultra-High Definition (UHD) television is next generation image quality for broadcast and broadband distribution. It provides better image resolution, colour depth and dynamic range. UHD can also be used with improved audio services, including Object-Based Audio. Together, this produces a user experience that is superior in every way.

However, studies by the EBU and others have demonstrated that simply increasing the image resolution ("4K") alone brings little or no improvement when compared to good HDTV. It is the additional features that make UHD a game changer for quality.

The most recent feature, High Dynamic Range (HDR), gives images a more natural look with more 'sparkle' in highlights and better detail in dark areas. Viewers need a television set that can display these images in HDR.

Unfortunately, there are several incompatible options for HDR distribution. The reason is that UHD features are being introduced in a fragmentary way. The inconsistent implementation in CE devices makes it difficult for broadcasters to decide which standards to use.

### WHY IT MATTERS

UHD services are already being offered by broadband OTT providers such as Amazon, Apple and Netflix as well as by Pay-TV broadcast services. This will inevitably influence audience expectations. Public service media may eventually risk losing viewers to other services if they don't follow suit.

International programme sales now often require UHD formats, and several key global sporting events will be produced in UHD in the coming years.

Sports content in particular can benefit very strongly from UHD. The next feature on the horizon, High Frame Rate (HFR), significantly reduces motion blur. This is particularly useful for sports content with a lot of fast movement.

Several EBU Members have already created UHD content. The BBC has shown the successful series Blue Planet II in UHD with HDR via its iPlayer online service.



## MATURITY

UHD receiver technology in its simplest form is mature and is offered by set makers today. TV sets at and above 50 inch size will all be UHD in the near future, but not all will include the same feature set.

This market fragmentation due to inconsistent implementation of standards makes it difficult to predict when enough UHD televisions of any

particular kind will be available in Europe to justify broadcast services.

Meanwhile, the UHD technology evolution has already moved past 4K and on to “8K” resolution in some markets, which will bring yet higher quality with four times the picture detail of 4K. This might be available in Europe some years after 2020, when it will be used in Japan for coverage of the Olympics.

## GOING FORWARD

Broadcasters should plan their investment strategies with UHD-capable infrastructures in mind. A compelling approach to UHD in the early stages, reflecting that taken at the introduction of widescreen and HDTV, is to produce key dramas and high value shows in UHD. It’s quite easy to do on a small scale, and stimulating for your creative and technical staff. It also future-proofs the content and demonstrates a forward-looking attitude. In the meantime, this UHD produced content can be scaled down to HDTV for use on existing channels.

No one knows if and when UHD will be used for free-to-air broadcasting. Some public service media will wait and see, possibly starting UHD broadcasts from 2019.

There is also the option to distribute content in the standard HDTV (1080p) resolution, but with HDR, better colour and HFR enabled. This approach allows

broadcasters to move to UHD distribution in a gradual and more manageable way. Such “extended 1080p” broadcasts could start as early as 2018.

Delivery of UHD to the consumer will require the use of new video compression formats for broadband, satellite or terrestrial. Standards already exist for this, and most TV sets already include the ability to decode them. Broadcasters might use non-linear delivery (e.g. via HbbTV) first and add occasional live events via satellite. The required bit rates may double until future codecs are produced.

The cost of drama and documentary productions with UHD cameras and post-production could be up to 50 percent higher in the first years, but this is likely to fall rapidly. Using the “extended 1080p” format would add a comparatively small premium on top of current HD production costs, and the

## WHAT THE EBU IS DOING

distribution costs would remain virtually the same. Industry experts gathered in the EBU Strategic Programme on Video Systems are working to clarify

the different UHD issues, influencing the standardization and helping Members with practical issues.

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# OTT SERVICES

## Emerging platforms for media delivery

Today, while the majority of viewing is still done via broadcast television, viewing via OTT (over-the-top) services on the internet is growing. OTT services already provide both non-linear *and* linear content, and this will affect public service media audiences. OTT has used television sets, computers and mobile devices

to exploit a broadband connection for the provision of on-demand services like movies and serialized drama. More recently the big US players like Amazon and Netflix have announced the acquisition of major live sports rights. Broadcasters need to be aware of this evolution and take appropriate action.

### WHY IT MATTERS

OTT will have a direct impact on broadcasters' future. Public service media organizations have been aware for many years of the public value of on-demand offerings. The simultaneous support of both linear broadcast and online delivery is a daunting task for an individual broadcaster in any territory. In the last decade, a number of free-to-air television broadcasters sought to provide harmonized catch-up offerings that aggregated different providers' content into a single consumer proposition, together with search and recommendation systems. The national initiatives for grouping were, however, not supported by their respective regulatory authorities. Arguably, this left the door more open for Netflix and other

international companies to offer attractive consumer propositions.

For public service media organizations to retain their audiences, a strong initiative in the OTT domain is needed. Together with popular linear distribution propositions, broadcasters need to occupy the OTT space through strategic positioning, intelligent acquisitions and leading technical developments. The strengths of linear television today include live news, current affairs and live events. This situation may not last forever. OTT will mature into a live as well as an on-demand service, and the unique selling proposition of linear delivery will weaken.



## MATURITY

The evolution of high-speed broadband has reached a stage where reliable delivery of HD and possibly 4K UHD content is feasible in most developed markets. OTT is now widely available in many countries, dominated by international companies. These companies, often US based, have internationally

attractive content, but they have lacked local content in their non-home markets. This has sparked a push to generate such content in-house, and to enter into exclusive distribution deals, with the potential to weaken the local public service media proposition.

## GOING FORWARD

Broadcasters need a comprehensive online strategy including a strong OTT offer. The future of public service media may depend on this.

## WHAT THE EBU IS DOING

The EBU provides a forum for the co-development of systems for OTT. EBU Members have jointly developed a personalization system, including a recommendation engine and single-sign-on. To bring affordable and reliable broadband content delivery services to all EBU Members, EBU has

developed a set of CDN switching (multi-CDN) and quality-of-experience (QoE) tools. In addition, the EBU hosts the core technical development associations: HbbTV and DVB.

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# PERSONALIZATION

## A paradigm change for broadcasters

Personalization is everywhere in the growing internet-delivery world: it determines what content internet users are exposed to on YouTube, on their Facebook feeds, in the push notifications they receive from news apps or in the Discover Weekly playlist in Spotify. These services run recommendation engines to leverage user data

and address audience members as unique users with individual interests. Services that encourage or require users to sign in are able to collect less ambiguous usage data and to deliver a better personalized experience. Broadcasters can provide their own recommendation services using similar tools.

### WHY IT MATTERS

Mobile technologies, social media and video-on-demand services are not only changing consumption patterns, but also the way media companies compete for screen time. In order to remain visible and relevant, broadcasters will need to address their audiences in new ways. Users increasingly expect to be able to shape their digital experience around their own interests and to be presented with the best content selection available.

Global digital platforms heavily invest in personalization features and are changing the expectations users have of their media experience. In 2017, 81 percent of all European internet users aged 16 to 64 used YouTube, 70 percent used Facebook and 16.3 percent watch shows on Netflix.

1.5 billion users worldwide sign in on YouTube and 2.01 billion on Facebook. Netflix had more than 109 million subscribers worldwide in Q3 2017, up from 86 million one year before.

Personalization shifts the emphasis away from "audiences" and towards individual "users". It will begin to inform editorial and production decisions upstream, influencing what content is produced, in what shape, for which user and on which distribution channel. The potential rewards are great: broadcasters can deliver the best content to meet their users' needs and deliver it anytime, anywhere and on all devices. The potential downsides are equally great, making it especially important for broadcasters to take control of their users' future media experience.



## MATURITY

Most large online media companies use relatively sophisticated recommendation systems and are beginning to make use of Machine Learning algorithms. Significant advances are being made in areas such as image or facial recognition for automatic labelling, greatly increasing the quantity of content-related information (metadata) available to be used by recommendation systems. These technologies will continue to evolve.

Personalization is more than a technology add-on – it is a journey towards a better user experience. How effective it is also depends on an organization's ability to deliver individualized experiences and relevant content.

## GOING FORWARD

On a technical level, broadcasters can take several steps to support a personalized media experience by allowing users to create profiles, providing cross-device access, collecting data about user preferences, analysing data to gather insights about their users' interaction with content, and by integrating algorithms to help shape a distinctive experience. Preserving the user's right to privacy should be a central consideration in the implementation of these functions.

Broadcasters will need to rethink scheduling processes and acquire capabilities that lie outside of the traditional skillsets for broadcast production and distribution. Data science, for example, will be central in order to extract relevant insights from large amounts of raw information.

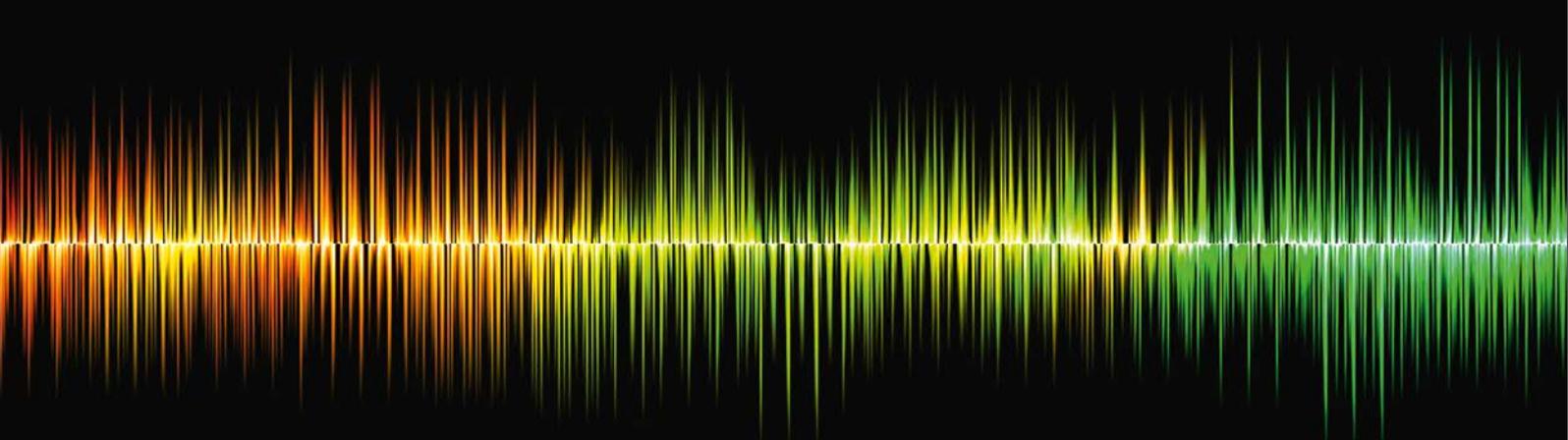
## WHAT THE EBU IS DOING

Several European public service media organizations have joined forces around the PEACH project to co-develop powerful solutions for user management, data collection, processing and recommendation, with the aim of delivering a unique media experience to every single user. The solutions have already been

deployed in several European countries. The project also serves as a platform to share new ideas, experiences and lessons learned from failed or successful attempts, as well as algorithms, code and components.

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# SMART ASSISTANTS

## The new challenge to radio?

Voice-controlled and internet-connected “Smart Assistants” provide new ways for audiences to interact with, and request, audio content. This will bring challenges and opportunities for radio broadcasters, and may affect the consumption

of radio in future. How far they will be used, and the languages that will be available, is not yet known. They may eventually affect how broadcasters structure their services, and how they engage with their audiences.

### WHY IT MATTERS

Radio is at the core of modern mass media in Europe, with 87% of citizens listen each week. The majority still listens through the traditional home device and in the car.

A new generation of connected and integrated voice control devices are emerging from Amazon, Google and others. They could have a significant impact on how people consume audio. For example, despite such devices only being launched in the UK in autumn 2016, a recent industry study claims over 9 percent of households own one or more. Future projections show that this may increase significantly.

The devices themselves are not the only selling point. Each of the major companies aim to be a universal digital companion, as evidenced by Amazon’s “Alexa Everywhere” and Google’s “AI-first” strategies. Device penetration can also be the means of extending the dominance of their mobile internet services in everyday life.



## MATURITY

The Amazon Alexa range of devices is the most mature, followed by Google. Other large internet service providers are following closely behind. Maturity in this domain is not only indicated by device penetration, but also by the “service layer” in a range of devices. An ecosystem is offered, centred around voice control, supported by a range of additional services tied to a user profile. The platforms seek to build lasting relationships with users.

Radio listening time has been gradually declining over the last 15 years. This coincides with the use

of internet services and an increasing diversification of where and how audiences consume audio. This has resulted in younger listeners moving from being above average consumers of radio, to below average.

While this shift is less than for other media such as TV or print, it suggests that younger generations are becoming less engaged with radio and are not growing up with the same connection to radio content as previous generations. This may affect the prominence of public service media, and the direct relationship between them and their audiences.

## GOING FORWARD

Broadcasters should be careful about the relationships they build with individual platform companies. While the prospects of wider reach on these platforms may be enticing, the long-term effects on audiences must be considered.

Building skills within their teams on new platforms is important, as is providing additional user experiences across all platforms, including broadcast.

For example, broadcasters can invest in “Open Hybrid Metadata”, which supports linear and non-linear audio services, making possible personalization and recommendation systems that enhance the offering to audiences. The use of open standards ensures that a new radio user experience is robust, stable, and able to be enjoyed by future generations of audiences.

## WHAT THE EBU IS DOING

The EBU is working to define how the radio user experience can be revitalized and refreshed with experiences above and beyond that currently provided by pure broadcast. It does this by promoting and developing Open Hybrid Radio standards, accessible for all, to foster a pluralistic and competitive content landscape that fits with public service media. This is partly implemented through the EBU’s platform for Hybrid Metadata, enabling its members to support new user experiences on a

range of platforms, including voice-controlled devices.

The EBU also engages with platform companies through the VOX group, which seeks to inform those companies about public service media requirements and how EBU Members can integrate with them to maintain their direct relationship with audiences, free from gatekeepers.

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# ARTIFICIAL INTELLIGENCE

## Hype, which you should not ignore

Artificial Intelligence (AI) is commonly used as a group term for highly complex computer programmes designed to have a talent for specific tasks, such as image recognition, that go beyond what standard algorithms are capable of. AI is not a silver bullet and perhaps over-hyped – though rapid developments are taking place.

There is a distinction between different types: Machine Learning (ML), Deep Learning (DL), Artificial Intelligence proper (AI) and Generalized Artificial Intelligence (GAI).

The computer programs used for ML and DL are typically designed to develop their skills by being fed with learning data about what to do in different circumstances. GAI describes a program with a multitude of capabilities that approach what a human brain can do. But this is still a long way off.

Certain types of AI/ML/DL are being used in personal assistants (e.g. Amazon Alexa and others), self-driving car technologies, and systems for the personalization of media.

## WHY IT MATTERS

The industry is only beginning to understand the possible applications of AI, ML and DL, and the consequences of their use, in broadcast media. AI powers increasingly capable tools that will streamline and even automate entire workflows in production. AI-driven technologies will help to deliver better services to the audience, such as access services through improved speech recognition and automatically generated avatars for signing (sign language). Research is also being done on identifying fake news in social media

and on other ways to improve the quality of PSM content with the help of AI.

The impact on creative staff, in content generation, and on engineering staff is likely to be significant. Newsroom, social media and archive applications are the first areas to be affected. But many questions will arise, including ethical ones, about the extent to which machines should replace the “human touch”.



## MATURITY

Applications powered by ML and DL are starting to be used by Members – particularly in personalization and production. ML and DL tools are used to automatically generate metadata for archives using image and audio recognition, to perform text semantic (word) analysis, create transcripts or to do simultaneous multi-language translations to assist journalists in the newsroom. Applications such as optimization of video compression, image quality control and better data routing through networks are being investigated.

Many AI, ML and DL algorithms use the cloud's processing power, and consequently, cloud industry companies are key proponents of the technology. Cloud-based services are being at different price points depending on the volume of content. Several EBU Members have started to experiment with services provided by the major cloud providers. Some Members are experimenting with their own tools and have found similar performance at lower cost. This is an opportunity for further co-development and collaboration between Members to benefit the PSM community.

## GOING FORWARD

New and specific skillsets need to be developed. Experimenting and gradually building skills in the area is key for broadcasters. Depending on the application, the technologies often require specific computer skills, data science and fundamental media know-how (including metadata) to be used effectively. Members should start to educate their

technical staff and follow EBU activities. Programme and creative staff such as journalists should be trained through hands-on demonstrations to understand how applications based on ML, DL and AI can assist in their daily work. Understanding the ethical implications and risks, with regard to trust in public service media for example, is important too.

## WHAT THE EBU IS DOING

The EBU has started to address various aspects of the topic: a first workshop on Cloud Intelligence was held in 2017 and the findings are now being processed in the Strategic Programmes on Media Information Management and Production Infrastructures. The MIM-AI programme, which deals with metadata, semantic web and automatic

metadata extraction, will examine how AI can enhance programme making. The EBU also operates a Data Science group. Finally, the EBU Broadcast Technology Futures group is moderating an ad hoc group for potential joint projects between the R&D centres of several Members.

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# NEW REALITIES

## VR down, AR up

Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) are technologies that provide viewers with an audiovisual experience that goes beyond simply capturing what is in front of the camera or microphone. They have a strong immersive effect.

The simplest forms of VR are 360 and 180 degree videos, which can be viewed on computer screens and hand-held devices. VR is more commonly associated with headsets, which create an immersive experience that disconnects the viewer from the physical world. Headsets can be used to view all kinds of VR – 2D, 3D, video-based or computer-generated.

AR provides an overlay over an image of the real world, augmenting it with elements such as infographics or virtual characters. Examples of AR are typically 2D. The technology is often used in televised sports coverage, but is now also available on many smartphones, using the built-in camera as a video source.

MR combines the immersive quality of VR and the integration with the real world of AR, by using headsets equipped with cameras for example. The most well-known example of this is the Microsoft HoloLens.

## WHY IT MATTERS

These technologies open up possibilities for content and storytelling that go beyond what can be achieved with traditional television. In VR, the two-dimensional TV screen is pulled from between the observer and the action, allowing media creators to convey experiences in a more

immediate and powerful way. In AR and MR, entirely new forms of services and content, such as enriched experiences and interactive storytelling, become possible. There is also a large potential audience: millions of people now have access to AR-enabled devices and platforms.



## MATURITY

With the exception of 360 degree video, which can be used on 2D screens as well, VR is currently not a mass-market technology – mostly because headsets are cumbersome to wear, complicated to set up and, for higher-end models, expensive. In terms of the user experience, nausea (motion sickness) is an issue. Also, the complete immersion provided by VR may not be socially desired, especially for longer periods of time. For now, this limits the appeal of VR to relatively narrow target audiences and to professional applications, museums or gaming.

A big problem in VR is also the resolution, which is currently nowhere near a television experience. Users can observe only a part of the full image required to cover 360 horizontal and 180 vertical degrees at a time. With typical Fields of View (FoV) not much higher than 90 degrees in head-mounted displays, the result is similar to zooming in on an image: eventually, pixels become obvious. In this way,

the visible resolution of a Ultra-High Definition source image with 3840 x 1920 pixels is effectively reduced to 960 x 960 pixels. That is not enough detail to “saturate” the eye, which requires about 60 pixels per degree (PPD).

The higher the PPD value, the better the image quality experience will be, and for that, higher resolutions are necessary: with 12k 360 degree video, the perceived resolution becomes 3072 x 3072 pixels with 33.4 PPD. But a 16k display is needed to achieve about 60 PPD.

The story for AR is different. From the user’s perspective, AR isn’t as challenged in terms of resolution or inconvenience as VR. Also, since the inclusion of AR capabilities in major platforms and mobile devices in 2017, the installed base has increased dramatically.

## GOING FORWARD

Broadcasters wanting to acquire skills around computer-generated graphics or to explore new services can begin experimenting with AR, where the entry barriers are relatively low. In order to overlay graphics on the live image of a smartphone camera or to create content inspired by Pokémon GO, only some elements need to be generated. The creation of compelling and animated 3D content does require skills different from traditional TV graphics though.

Creating VR content can be significantly more involved and expensive, as it requires the creation of a complete virtual world – unless usable, basic content already exists, as is the case with certain games or computer animated television programmes.

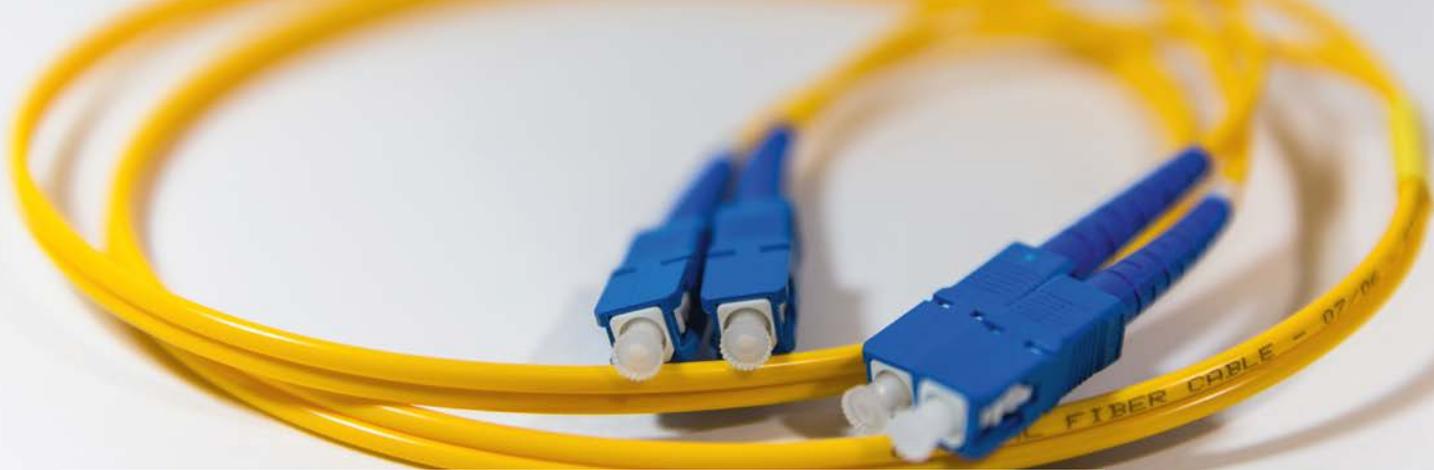
## WHAT THE EBU IS DOING

The EBU Virtual Reality Initiative (#EBUVR) helps Members by facilitating the exchange of VR-related knowledge. The EBU VR user group focuses on technical requirements and use cases, and provides input to the VR-IF (Industry Forum), which is defining the end-to-end guidelines for the production, distribution and consumption of VR content.

The EBU has surveyed its Members on the relevance of AR and is collecting use cases for public service media in order to draft technical requirements for AR standardization. The EBU Technology & Innovation department has created a Biathlon AR concept with Eurovision Sports and developed several proofs-of-concept based on Facebook AR Studio, Apple ARKit and Google ARcore.

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# IP-BASED FACILITIES

## Future-proofing your infrastructure

IP technology is already used on a massive scale around the world and holds great promise for media production. The EBU believes that tried and trusted SDI-based systems will gradually be replaced by IP-based networks for live media production. Ever-increasing network bandwidth

and computing power, along with the development of standards that facilitate the requirements of media organizations, mean that IP will become the technology of choice for new or renovated media production facilities.

### WHY IT MATTERS

PSM are today expected to do more with less: to produce more content for a wider range of devices and platforms, with the same or fewer resources. A move away from dedicated SDI-based infrastructure towards IP-based production environments can enable new, more efficient workflows and provide the potential to automate more processes.

Using IP networks for media allows resources to be centralized and shared across multiple activities, including remote production, even being reassigned on the fly as new needs arise. They can be assigned to any kind of content format, being agnostic with regard to what they carry. All of this, combined with the ability to use commodity IT infrastructure, promises reduced capital and operational costs in the long term.



## MATURITY

The first fully IP-based production facilities are in construction right now. Pioneers include Switzerland's SRF, whose new IP-based OB truck (built by tpc) will be on the road in 2018, and the BBC, through their Cardiff Central Square project in Wales.

Early proofs-of-concept used the SMPTE standard for transport of SDI over IP (ST 2022-6), but it is the recent publication of a standard for elementary streams (ST 2110) that enables a complete shift to IP.

The ability to manage elementary streams separately – video, audio and ancillary data carried as individual elements – delivers the necessary flexibility and also helps with bandwidth optimization.

IP is not yet a less expensive option than SDI. However, the fast pace of development and the wide use of IP technology means that costs are likely to be reduced in the coming years.

## GOING FORWARD

IP-based facilities are an investment in the future. But a shift from traditional dedicated broadcast hardware to IP and software-based approaches also requires new skillsets at media organizations, and sometimes a staged approach, as the IP production puzzle is still missing some final pieces.

Standards for auto-provisioning are being finalized, to ensure that media companies can manage their IP facilities more efficiently. These standards, being developed by AMWA, will ensure that media

equipment plugged into a network is recognized and integrated in a seamless way.

Beyond auto-provisioning, the other key area of activity is around “dematerialized facilities”. This is about moving processing from dedicated physical units to virtual resources such as the cloud, fully leveraging the inherent flexibility of IP-based production infrastructures. Best practices in this area are still under investigation.

## WHAT THE EBU IS DOING

The EBU takes a leadership role in standardization activities, working with SMPTE, AMWA, the Video Services Forum, AES and others to ensure that a vendor-agnostic standards eco-system is put in place for IP production. The Joint Task Force on Networked Media (JT-NM) is the main vehicle for this work. Its roadmap, available from the EBU website, provides a snapshot of the current status of standardization activities.

Education and dissemination of information is also a key activity. The EBU Network Technology Seminar is an annual focal point, along with regular IP Master Classes. Advice is provided directly to EBU Members who are embarking on IP production projects.

Finally, through the Strategic Programme on Production Infrastructures and the New Buildings Initiative, the EBU provides opportunities for Members to share experiences and develop best practices around IP production technology and facilities.

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One solution for broadcasters may be a private cloud approach – using an in-house data centre. In this case the actual data and management software remain within the organization. While building a private cloud may be a more secure and in some ways easier solution – and one that may resolve privacy concerns – it requires continuous investment over many years.

Hybrid solutions are also possible, for example combining on-premises archive storage with public cloud-based metadata extraction.

## GOING FORWARD

New and specific skillsets need to be developed in the engineering teams supporting and integrating these new systems. Cloud technologies are developing rapidly and new tools and solutions become available every day. Research, development and training have never been more important.

Broadcasters may consider starting small by virtualizing certain production workflows in a private cloud, scaling them later through trials and testing. A pilot project could involve enabling a single studio for IP production and gathering feedback from engineering and editorial teams.

## WHAT THE EBU IS DOING

The EBU continues to take a leading role in the JT-NM (Joint Task Force on Networked Media), which maintains a comprehensive roadmap towards dematerialized IP-based infrastructures. The EBU conducts regular workshops and masterclasses for broadcasters that would like to adopt these new technologies in their facilities.

Working jointly with AMWA<sup>1</sup> (Advanced Media Workflow Association), the EBU has enabled

Fims<sup>2</sup> (Framework for Interoperable Media Services) microservices to be interfaced to various cloud services, as demonstrated at NAB and IBC 2017. In Amsterdam, for example, NHK demonstrated automated metadata extraction on ingest.

In 2017 the EBU published R 146, a Recommendation on Cloud Security for Media Companies, providing practical guidance to help broadcasters keep control as they move their technology and data to the cloud.

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### References:

<sup>1</sup> "Advanced Media Workflow Association",  
amwa.tv

<sup>2</sup> "Framework for Interoperable Media Services",  
<https://tech.ebu.ch/>



# CYBER-SECURITY IN THE CLOUD

## Understanding and managing risks

Broadcasters have never been more exposed to potential cyber-attacks than today. Almost every electronic system is connected to the internet in one way or another, many using embedded systems that are not always up-to-date.

Furthermore, the cloud has become mission-critical for many processes and is habitually used to store sensitive information. This has made the cloud an enticing target for hackers, and another key asset for broadcasters to protect.

### WHY IT MATTERS

Maintaining the public's trust in public service media goes beyond producing quality content. Maintaining access to all services and protecting information, especially that of users, is of paramount importance. Cyber-security is also a critical operational issue, as illustrated by several cases that saw broadcasters going off the air for several days due to malicious attacks.

With cloud computing and storage services increasingly at the core of operations, the number of potential vulnerabilities is growing. Cloud services solve common operational problems, but are often deployed in an uncontrolled manner, foregoing due diligence with regard to cyber-security and data privacy.

Their widespread use across many businesses makes cloud services a potentially lucrative target for attackers. Several cloud service providers have been at the centre of major data leaks (Dropbox, Cloudflare), and security experts are observing a trend of cyber-hacktivist groups targeting cloud service providers to get access to specific enterprise networks. One example is the Chinese

APT10 group, which hacked several cloud providers to access human resources departments and sensitive corporate files of various global companies.

Apart from the significant business risks associated with data leaks (damage to brand image, data loss), new legal requirements mean broadcasters can face steep fines if cyber-security principles are not respected: from May 2018, under the EU General Data Protection Regulation (GDPR), media companies that fail to adhere to a series of requirements when it comes to securing the data of EU citizens can be fined up to 20 million euros or four percent of the preceding year's revenues (whichever is higher).

The GDPR regulation concerns any company based in the European Union or providing services to EU citizens. It mandates all companies collecting, storing and processing personal user data to comply with a set of rules, and guarantees individuals the right to anonymity, the right to data erasure and the right to data portability.



## GOING FORWARD

In order to properly manage cyber-security risks, broadcasters need to establish the appropriate leadership and governance structures. In order to mitigate the potential risks associated with the use of cloud services, broadcasters should classify their data sets by level of importance and the risks

associated with a potential leakage. This will help to select cloud providers based on the required security level and the specified distribution of responsibility for cyber-security. Depending on the type of cloud service, the responsibility may be shared with the service provider.

## WHAT THE EBU IS DOING

The EBU Media Security group has published EBU R 146 - Cloud Security for Media Companies to help media companies establish appropriate

processes and assess the suitability of cloud service providers.

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