Karios: IP networks and software-defined tools are levelling the AV/broadcast playing field.

AV and broadcast – is there any difference?

Spurred on by health and safety measures stemming from the global pandemic, there's been a healthy amount of innovative cross-pollination between broadcast and AV industries, says Adrian Pennington.

The technologies and workflows differentiating AV from broadcast have traditionally been deployed as their own silos and viewed as distinct markets. Today many of these elements have become a singular environment. "The difference is shrinking rapidly," says Marc Risby, MD, Boxer Systems, a supplier and integrator which covers both markets. "What we define as broadcast has evolved, technical standards have equalised and the quality of kit has gone up across the board."

He adds: "Broadcast used to mean having an aerial on the roof. Now you just need an internet connection. The requirements are broadly the same. The last job we did for an investment bank was built to a higher standard - in 4K - than a local news studio."

According to Mike Grieve, commercial director of Mo-Sys Engineering, when broadcast and film equipment was expensive corporates had to go lower cost and the quality was not as good. "Over time, the gear has become a lot less expensive and it means a company like M&S can afford to buy the same kit as a local ITV channel."

Covid has accelerated the cross-pollination of tech and workflows. Simply put, we have watched as remote meeting tools evolved more robustly into broadcast tools – and, equally, as broadcast tools began to be utilised more frequently in video conferencing.

Major corporate customers with internal AV departments, such as Google or Nomura Bank "would traditionally have limited understanding of the most complex broadcast practices," says Bob Boster, president, Clear-Com, "but largely because of Covid, they have been doing more and more media production workflows, like live streaming meetings, trainings and other events."

Boster says these new workflows require more sophisticated intercom requirements due to tighter deadlines, team members required to operate remotely, and even multi-site presenters (in broadcast known as 'talent'). "While there has been a downturn in room-based technology, local

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> **Marc Risby, Boxer Systems**

green-screen studios are being built to accommodate more intensive streaming demands. Intercom has become more crucial because it can enable decentralised operations to run smoothly as if everyone is in one location."

Broadcasters have been using intercom since the 1970s including to facilitate forms of remote (outside) broadcasts. With more people working from home, AV teams have learned from broadcast that communications is key to the entire show - coordinating switching, lighting, audio, and cameras.

Video-over-internet solutions developer, Intinor also has its roots in broadcast, but is increasingly seeing live events productions adopting a more broadcast-centric approach. "Corporates and live events organisations which previously relied on third-party suppliers to support their live events, including lighting and audio, are now asking these providers to also deliver the capability to support live streaming that is not unlike a small to medium-sized live sports production," says CEO, Roland Axelsson. "There's also been a simultaneous rise in demand for higher quality video and audio, and the ability to deliver a more broadcast-like experience. As a result, the lines are increasingly being blurred."

To see this in action, consider the common examples of a corporate meeting room, university lecture hall, or worship space. "Over the past 18 months we have seen each of these environments embrace a 'broadcast' mentality by seeking ways to involve more virtual participants," says Liam Hayter, senior solutions architect at NewTek. "The nature of back-and-forth interactivity in these spaces has been brought back to broadcast. Today, a videocall powered by a webcam and laptop into a live broadcast is considered commonplace and has been widely accepted by viewers."

Another notable recent AV-to-broadcast technology exchange are LED screens. Shows like Netflix's forthcoming '1899' use virtual production techniques in which live action photography is shot on stages ringed by LED backdrops. "LED screens have been a staple of AV for ages but LED manufacturers are now selling into broadcast and film studios where demand is high. Mo-Sys camera tracking systems keep the virtual backdrops whether on blue/green screen or LED volumes in sync with camera movements," says Hayter.

Roland Axelsson, CEO, Intinor: "Many live events now use production companies to deliver a remote production that is not unlike a small to medium-sized live sports production." (Pictured: The 2021 Iditarod Dog Sled Race).

AV-over-IP

The convergence of AV with broadcast in tech terms is fundamentally about the migration of audio visual media to IP networks. "While the AV-over-IP stampede started with AV installations, it was propelled significantly with the broadcast market's advancement of video on demand (VoD) and the push for higher efficiency codecs and ways to work within less reliable IP networks," says Ron Berty, business development manager, Matrox Video.

Faced with increasing competition and the imperative to reduce infrastructure costs the broadcast industry is moving away from proprietary equipment toward AV-over-IP standards that support interoperability between products. This is currently influencing AV technology.

"While AV is likely ahead of traditional broadcast in terms of the implementation of AV-over-IP, it is looking to broadcast standards - like ST 2110 and NMOS - that can provide it with interoperability and refine into an AV technology standard like IPMX," says Berty. "The common goal is interoperability and the resultant loss of single-source/technology dependence."

Going the other way, the introduction of NDI and

SRT have enabled usage of infrastructure commonly found in AV to be used to broadcast content on a massive scale. "These protocols have enabled end-to-end solutions that weren't necessarily designed to work within a system together to work in situ," says Ollie Newland, field marketing manager, Panasonic.

An example of this is the PTZ camera installation completed at the UK's Supreme Court for broadcasting hearings. The IT team found NDI robust enough for them to live stream court cases to audiences of up to 10 million a day.

Broadcast Pix CEO, Graham Sharp points to the influence of younger content creators entering AV who have been brought up using smartphones and PCs. "There is an inherent knowledge of IT operating systems and an expectation of ease of use. The explosion in the use of video in non-broadcast markets is driving the growth and volume, and broadcast technology is now following AV, not necessarily driving the market.

Robust, highly scalable and operable AV-over-IP kit has reached a price point that broadcasters can no longer afford to ignore, he adds. "With the huge downward pressure on broadcaster budgets, plus broadcaster's acceptance of 'just good enough', the same IP-based technology now easily serves both markets. However, AV solutions tend to be easier to install and use. AV suppliers are more used to serving an IT-competent user base, rather than users trained in historical broadcast technologies and workflows."

The Mix Effects bus on a switcher for example had its user interface and workflow developed in the sixties to cater for analogue video. "That's illogical in our digital world," says Sharp. "Many users can barely switch a show, perhaps using less than five per cent of the M/E's capabilities."

So, while the toolsets of both industries are broadly the same, the level or training and even the philosophy toward operating equipment is different. "Professional broadcast, such as sound mixing, has always required highly skilled and technical operators," says Axelsson. "By contrast, something like video conferencing technology and tools, while it requires skills to create, is designed to be as easy to use as possible.

> *"The AV market will likely keep some elements of its new workflows beyond the pandemic."*
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"Now both these areas need skills from the other. Broadcast technology needs to be able to integrate VC and AV companies need to be able to manage high end video and audio quality rather than just relying on in-built microphones. While there is no requirement for production teams to know everything about both these areas, AV staff now need to have a greater understanding of live broadcast skills to meet the shifting needs of this sector."

Mutual learning can benefit both markets, agrees Boster. "Content can be elevated with more sophisticated technology, and the AV market will likely keep some elements of its new workflows beyond the pandemic.

"The House of Worship market is probably the closest area of convergence between the two. It's the best example of a category of business that lives between AV and broadcast and incorporates elements of both these things."

Differences remain

There are other differences too. "There is still a high end of technology and technique in film in particular," notes Risby, such as the use of camera arrays or AI-driven VFX and colour grading. "Broadcast and streaming drama shows also lead in terms of High Dynamic Range (HDR) which is virtually non-existent in AV, not least because the process is time-consuming and complicated by competing standards."

Additionally, says Berty, broadcast technology evolved to emphasise outputting the camera-based video signals using the YUV 4:2:2, 10-bit colour space. The pro AV market must balance the need to display camera-based content with computer-generated content, which is almost universally RGB 4:4:4, 8-bit content.

That said, 4K UHD remains as niche for broadcasters as it does in AV. Even if final output is HD, most digital cameras are capable of 4K, affording production teams the option of reframing content shot in 4K without losing quality.

At least one general difference in the AV-over-IP space might be the pro AV market's wide and varied use of AV-over-IP versus broadcast's more concentrated and specific approach. "In live broadcast, the timing of different sources and destinations of audio, video, and ancillary data over IP have to be kept in exact synchronisation, even if those content flows travel over different paths and equipment," says Berty. "Broadcast tends to require the flows to be millisecond, even microsecond, accurate. In most cases in pro AV timing requirements are not nearly as strict and allow for more flexible and modest IP network requirements."

This is one of the key elements that the proposed IPMX standard allows for while also keeping open the option for the stricter timing requirements of the broadcast environment.

The two industries are unlikely to converge completely, feels Newland, "due to specific requirements made within broadcast that are not necessarily requested by the AV market. "An example of this would be the need for super low latency or none at all, which the ST2110 standard provides using uncompressed video signalling."

On the other hand as kit costs reduce to democratise access, Grieve says "there's no reason why the majority of kit used for broadcast is any different to that in a corporate."

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