4K PRODUCTION
FOR VIDEO
BACKGROUND

The vast majority of the world’s outside broadcast trucks and multi-camera studios are equipped with servers from EVS. As the market leader, it clearly falls to EVS to deliver a solution for 4k recording and replay. Getting more from your content, whether it is better quality, higher resolution productions or adding value to existing services, is what’s really driving the need for 4k productions. Understanding these challenges faced by the industry, EVS provides solutions to enable an enriched live production environment to ensure quality content is delivered more quickly, more creatively and more efficiently to the consumer.

THE MOVE TO 4K

The idea of video at 4k resolution has been around for 20 years or more, since the early days of digital intermediate post production for film-originated projects. It was felt that a scanning resolution of around 4000 pixels across the frame was required to capture the full detail of 35mm film.

Today digital cinematography cameras predominate, and movie-makers use a lot of resolutions, including 4k, in their projects. The result is that there is already an existing extensive catalogue of projects originated in 4k. It is likely that they will have been finalized in 2k resolution, but if a market for 4k sprang up, then it would be a relatively simple matter to re-conform them in the higher resolution.

The situation is changing rapidly, with all the leading consumer electronics manufacturers now offering 4k-capable television screens. Prototypes were demonstrated in 2012, and market-ready models dominated the 2013 CES exhibition [50 different models according to some estimates].

Alongside this, there is also a requirement for delivery. Red, previously known as an innovative manufacturer of digital cinematography cameras, has developed a delivery platform including codecs and a consumer player, Redray. Online movie rental company Netflix has given strong hints that it will offer selected content in 4k later in 2013 or early 2014: its own 2013 production House of Cards was shot in 4k (although posted in HD).

The display and delivery technology is in place. Whether it is widely adopted by consumers will depend upon the availability of content. For this reason, broadcast manufacturers are developing products all along the content chain, giving producers the tools they need to create programming in all genres.

STANDARDS

In 2012 the ITU published its recommendation 2020, which codified “ultra HD” formats [as the consumer electronics industry calls them]. As well as 4k, rec 2020 also covers the 8k system developed by broadcasters led by NHK of Japan, Super Hi-Vision.

The standard defines 4k television as 3840 pixels on 2160 lines: double HD resolution in each direction. It only recognises progressive scanning, so the basic 4k resolution has eight times the bandwidth requirements of today’s HD, or four times 1080p.

Rec 2020 includes a number of frame rates up to 120 fps, and colour sampling bit depths of 10 or 12 bits, the latter giving an extended colour gamut.
In practice, current developments in 4k creation and manipulation are for 3840 x 2160, 50 or 59.94 progressive frames a second, and 10 bit 4:2:2 colour sampling. This means signals can be transported as a bundle of four 3G HD-SDI signals, allowing existing infrastructures to be retained just as two HD-SDI signals were bundled to provide 1080p architectures before 3G capabilities were developed.

It’s worth noting that the ITU definition of 4k for broadcast applications is significantly different to the Digital Cinema Initiative’s DCI standard for 4k movies, which is a widescreen 4096 x 2160 aspect ratio, with 4:4:4 12 bit colour sampling.

THE CURRENT LANDSCAPE

4k cameras have been on the market for some time, aimed at the digital cinematography market. Broadcast drama, entertainment and documentaries are beginning to use them to future-proof their content. A recent survey in the UK conducted by hire company Procam found that 36% of producers said they expect to film some 4k content in 2013, rising to 49% by the end of 2014.

The same 4k digital cinematography cameras are now finding applications in broadcast television, not least because they effectively over-sample the picture allowing framing to be adjusted in post. In the US, Fox Sports has been using a Sony F65 to cover football, because its 4k resolution is nine times that of the channel’s native 720p delivery so it can zoom in for crisp replays.

Manufacturers are now turning their attention to broadcast system cameras and camcorders capable of 4k resolution. First models were announced at NAB in 2012, and the first cameras are now being used for trial broadcasts on real, live events. Cameras are just one part of the infrastructure. They are only of value when the rest of the chain is present.

For any television innovation, the main driver is always sport. If it allows you to create better, clearer, more engaging sports coverage then the innovation has a good chance of succeeding in the consumer marketplace.

Sport on television has developed dramatically over the last decade, with a clearly established language. It depends on large numbers of cameras, and importantly on multiple replays from those cameras. Sports fans expect to see key action points from different angles and at different speeds, to understand what happened and to appreciate the skills involved.

The same techniques are often now employed in entertainment programming; dance sequences are discussed from different angles, for example and highlights packages built up with slow motion.

So outside broadcast trucks now routinely include large numbers of server channels to provide these replays, including slow motion playback. Audiences are going to expect the same production elements and will reject 4k if it means they have to lose these insights. Server recording and replay of multiple camera channels is a vital requirement.
THE EVS SOLUTION

The EVS XT3 server platform was developed from the beginning to be future-proof and was designed with massive internal bandwidth and processing power. Most importantly, it was built to be flexible in configuration, allowing bandwidth, I/O and storage capacity to be determined to suit the application. This allows it to be configured to treat four 3G SDI feeds as a single logical channel, and is the form in which 4k signals are being carried from Sony’s broadcast system cameras.

Importantly, the flexible configuration of the XT3 server means the four channels are bonded, so a standard LSM control panel is used to control 4k recording and replay. LSM operators will need no further training, and will notice absolutely no difference in working with 4k content, apart from better pictures on the monitors.

Use of the standard XT3 platform means that all the functionality of the server remains available, including off-speed playback for slow motion replays. The solution also addresses the option of zooming in to a 4k picture, identified as a key benefit. EVS servers have long supported a feature called Target Track, which allows an operator to identify an area of the picture and zoom in to it. This function will soon evolve to be available even when physical server channels are grouped into a single logical channel to support 4k.

At NAB 2013, the XT3 4k solution was demonstrated in conjunction with a Sony F55 camera. For the purposes of the demonstration it was configured as a one in, one out system, allowing continuous recording of the camera output while simultaneously providing random access replays to any 4k content on the server.

The processing capacity of the XT3 is sufficient to support three 4k channels, either two records and one replay or one record and two replays.

The NAB technology demonstration was staged to show how EVS architecture can deliver 4k capabilities as soon as they are required by practical productions. What can be delivered today – and could become a routine requirement – is the ability to support one or two ISO 4k cameras for zoomed replays into HD.
FUTURE CAPABILITIES

Demonstration broadcasts of live 4k production, including replays, are already happening. EVS took part in one such production in January 2013, working with Kyodo TV. A report in Asahi Shimbun, widely covered in the press worldwide, suggests that Japan will bring in coverage of the 2014 Fifa World Cup from Brazil via satellite.

Delivering 4k signals to the consumer remains a challenge. The ITU standard recommends the H.265 high efficiency video codec, but good delivery quality still equates to around 10GB an hour, which would be demanding for current infrastructures.

While all the major consumer electronics manufacturers have 4k televisions in their catalogues, currently they are at the premium end of the price range, costing in the tens of thousands of dollars.

EVS has server and live replay technology ready to fit into 4k workflows, but other critical elements remain missing.

Taken all in, at present routine 4k production for broadcast, particularly of live sports and entertainment, seems some distance off. On that basis, broadcasters may be reluctant to move quickly.

On the other hand, there has always been a sound argument for future-proofing content, particularly landmark events including major sports. So there will be considerable demand for 4k production, with niche applications such as the post-zoomable camera finding immediate use and bigger production infrastructures coming into use as the missing parts of the workflow are filled.

The EVS XT3 server platform, designed for continuous development to cover new demands, is demonstrably 4k-ready. Future enhancements already on the roadmap, such as external 10-gigabit ethernet, will make it even easier to fit it into the workflow, ensuring it retains its place as the live production server of choice.
CUSTOMER SUPPORT & TRAINING

Our clients range from TV stations to video equipment rental companies and production houses worldwide. EVS’ key priority is to make sure that its clients keep performing at the highest possible level. We listen to our customers, identify operating workflows, anticipate needs, and suggest effective and reliable solutions, so that they in turn can offer top-quality productions to millions of TV viewers across the globe.

CUSTOMER SUPPORT

EVS is dedicated to making sure its products are functioning in a way that meets your needs and expectations. We offer technical support 24/7 from each of our regional offices, so you can rest assured that someone will always be available to answer any question that may arise.

All members of EVS’ technical support team are qualified technicians with a solid background in broadcasting. They understand your requirements and can provide you with the best solution available.

TRAINING

Do you want to learn how to operate EVS systems and applications or enhance your skills in using our tools?

EVS Training offers a series of courses on how to operate its products, taught in-house by industry professionals. Some of the training sessions are conducted by the EVS team via a Web interface, so that you get hands-on instruction even at a distance. EVS User Guides and technical documents are available free-of-charge on our Website.

Corporate
+32 4 361 7080

North & Latin America
+1 973 575 7811

Asia & Pacific
+852 2914 2501

Other regional offices
www.evs.com/contact

EVS Broadcast Equipment is continuously adapting and improving its products in accordance with the ever-changing requirements of the Broadcast Industry. The data contained herein is therefore subject to change without prior notice. Corporate and product names are trademarks or registered trademarks of their respective companies.