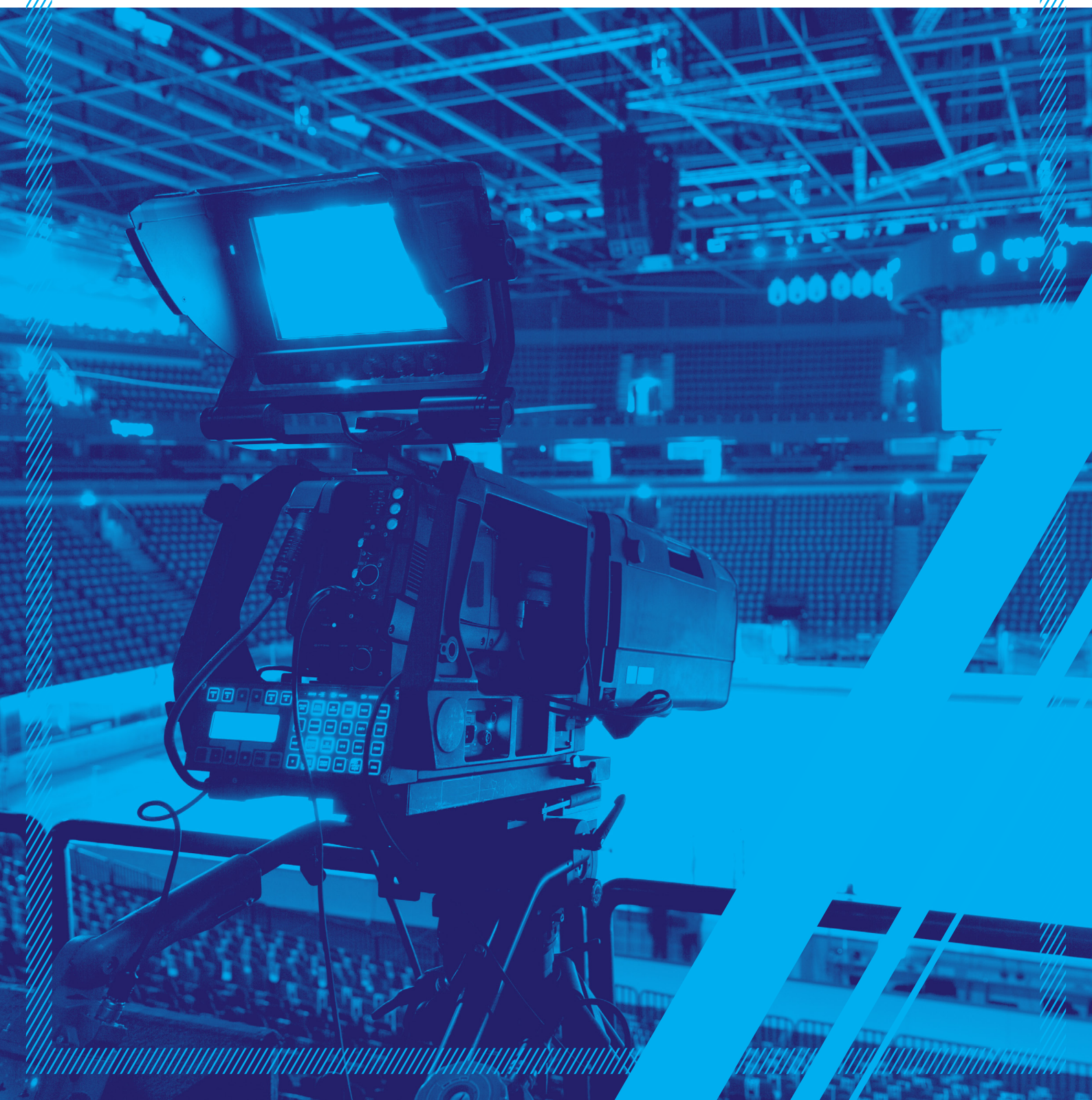




Operations for all camera formats and frame rates as of Multicam 15.1



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TECHNICAL SUPPORT

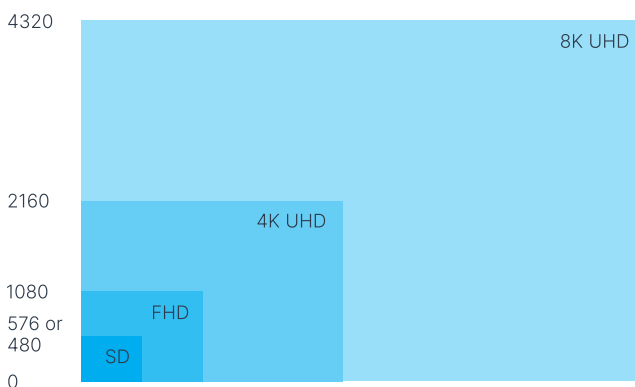
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Introduction

Today's professionals in live video production have a broad range of camera formats to choose from.

They may be required to shoot in standard definition; in HD (720p or 1080i) as interlaced or progressive; in Full-HD (1080p) or in higher resolution formats such as Ultra HD-4K (2160p) or Ultra HD-8K (4320p).



The production may also need live slow-motion replays, which require high-speed camera capture. This could be super slo-mo (ranging from 2x to 16x the standard framerates) or it could be much higher frame rates from specialty cameras.

To ensure secure operations, it is vital that whatever the camera input or the program output, the control of replays should be handled in precisely the same way. The operator should not be forced, in the heat of the live production, to rethink the way of working because of a specific camera format.

The EVS XT series of live production servers (XT-VIA, XT4K, XT3 and XT-GO) can ingest and replay many different formats. The user interface controls of these respective servers (LSM-VIA, LSM and LSM-GO) allow operators to swiftly select content with an "in" and "out" and instantly replay this content at variable speeds while the servers continue to record the live feeds.

Standard cameras

SDI connections

Any camera providing standard SDI outputs can be easily connected to single input channels of the XT-VIA, XT-GO, XS4K or XT3 servers, and this includes 1080p which connects with 3G-SDI.

Ultra HD-4K cameras (3840 x 2160 progressive) can use Quad-SDI (four 3G-SDI) or 12G-SDI server inputs to the server. In case of Quad-SDI (square-division or 2-sample interleave), the signals are the entry point of the full UHD-4K landscape, and handled by the LSM operator as a normal camera input.

In each case, the camera or other content requires a single channel of the live server, and is selected and controlled as a single channel by the LSM operator without the need for any other configuration.

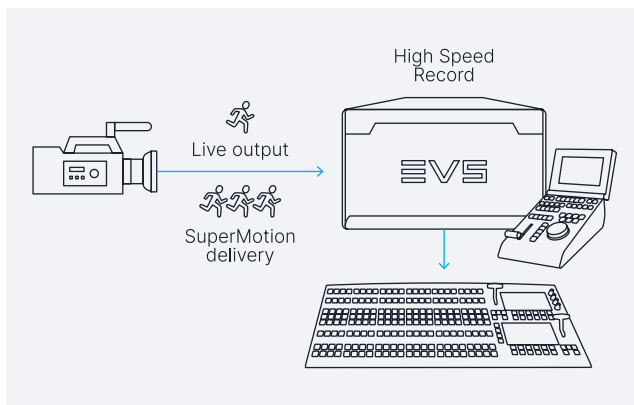
Live IP connections

Any cameras supporting Live IP interfaces (ST 2110) for conveying signals may also be utilized with XT-VIA, XT-GO and XT4K servers. This I/O has been validated by JT-NM to ensure an easy integration with any camera on the market.

Gateway convertors are available for SDI-based series of servers for IP I/O. For more information on this, please check the [Neuron page](#).

High speed cameras

To achieve high-quality slow-motion replays, it is common to use cameras that acquire video faster than the normal production frame rate, to allow the replay to be slowed down without impairing quality. Although different camera vendors have different product names for their systems, the products are generally grouped into two categories.

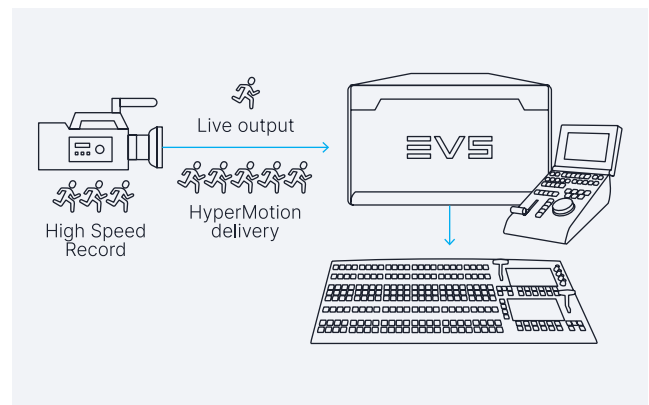


Super Motion or Super Slo-Mo

Cameras operating between two times (100~120 fps) and 16 times (800~960fps) the normal frame rate, and being continuously recorder in the production server.

Delivery of content: Super motion cameras have multiple video outputs on their CCU, referred to as 'phases'. The delivery of these phases enables temporal content towards an EVS replay server and provides the high quality 'SuperMotion' replays that the industry and TV audiences appreciate. Every single frame is retained during the recording, giving operators flexible access to every video frame for playback. The operator can playback at the normal live playback rate of 100%, or playback at any speed from 100% to 1600% playback speeds.

Speed and Reaction: Thanks to EVS' loop recording technology and the fact that the server is always recording, operators can playback content during recording, which consequently provides swift access to every replay during the live.



Hyper Motion

Cameras operating at 1000 fps or more, and recording in short bursts onto an internal camera memory buffer which must be processed and subsequently transferred from camera to the server

Hyper motion cameras operate at very high frame rates (up to 3000 fps). The limitations of data communication implies that these cannot be streamed in real time from the camera. Instead, the high-speed content is stored in a memory buffer inside the camera or its CCU.

The buffer is constantly refreshed in a first-in/first-out (FIFO) system so the operator always has access to the most recent material. To create a clip, the operator simply stops recording to preserve the content of the buffer. This can be performed at the CCU, or from the LSM-VIA controller to define a new playback from this buffer.

The content is then processed and streamed in a linear fashion into the EVS server's record channel. Once recorded, it is available for replay in exactly the same way as any other clip, except at a much greater level of replay speed. Because of their very long replay times – a five second event shot at 1000 fps is equivalent to over 100 seconds – hyper motion replays are often used for "beauty" replays, after the main action or in extended breaks.

The ability to show extreme slow motion replays of action is very popular with audiences, particularly in building emotion and enthusiasm around an event.

Super Motion wiring

Considering the example of a 3x super slo-mo camera, the CCU delivers the camera over three outputs: one for frame 1, one for frame 2 and one for frame 3 in the group which occupies the time taken by a single standard camera frame (see configuration example 1 below).

In case the camera supports an equal amount of phases, the camera can combine two phases into a single 3G-SDI using a method called Dual-Stream. This allows the delivery of more content with less cables, and in turn allows more flexible configurations (see configuration example 2 below).

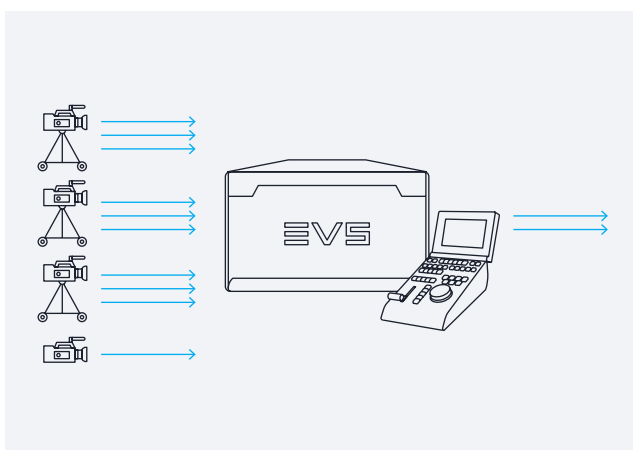
By routing the combined output of the CCU to the production switcher, the camera can also be used live as part of the main broadcast coverage. The popular super motion cameras are built on the same optics and signal processing as standard cameras, meaning that their outputs are a good match and can be intercut with live cameras. This eliminates the need for additional operators while providing good coverage of all parts of the field of play. It also reduces the number of seats lost from sale to accommodate the camera and cameraman.

Since the camera is creating more frames than with standard cameras, the replay can be slowed down significantly and display more temporal quality. Referring to a six times super motion camera as an example, the action can be slowed to one-sixth of real time without repeating any frames of playback, thus translating into better perceived quality for slow motion.

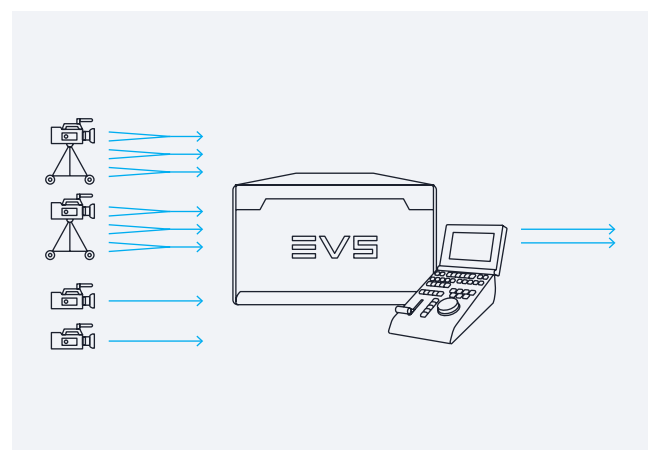
This is very important, particularly in live sports productions. It allows the viewer to appreciate the skills of the athletes but also to understand the incident that has just occurred. Viewers particularly enjoy slow motion replays, and the clean image quality from super motion cameras makes the experience even better for live storytelling.

When a replay is performed, the LSM-VIA operator identifies the content required. Even though physically it involves more than one server channel for input, logically they are managed together so the operator performs precisely the same actions and keystrokes selecting a super motion replay as a replay from a standard camera.

As in any replay, the T-bar of the LSM-VIA controller is used to smoothly vary the speed of the replay instant by instant, providing them the same operational interface regardless of the speed of the camera being used.



Configuration example 1: 3 SLSM 3x + 1 IN + 2 OUT



Configuration example 2: 2 SLSM 6x 3G + 2 IN + 2 OUT

Benefits

Live event producers have ever more creative ways of engaging with their audiences, including high-resolution cameras and most importantly high-quality slow motion replays, from two or three times slower than normal to 20 or more. These are being used to add production value to live events, which attract and retain audiences.

Continuous support

The EVS server infrastructure is continually being developed and receives software updates to support all cameras in the industry as well as those to be developed in the future.

Same UI for every supported camera

The real key benefit is that the EVS hardware supports these different technologies, but with largely uniform operations. The LSM-VIA controller removes the complexity from the real time operator who uses the same functionality whatever the application: identify the clip, setting in and out points if necessary; cuing the playback;

and using the T-bar to vary the speed of the replay. The same actions apply whether the LSM-VIA is controlling one or multiple server channels.

The result is fast, responsive and accurate playback of any channel, including stunning slow motion replays at any time.

Native Super Motion archive

In combination with XFile3, EVS' on the fly transcoding and media exchange solution, Super Motion clips can be backed up and later restored while preserving the native high-speed content from the camera.

High speed cameras supported

Super Motion

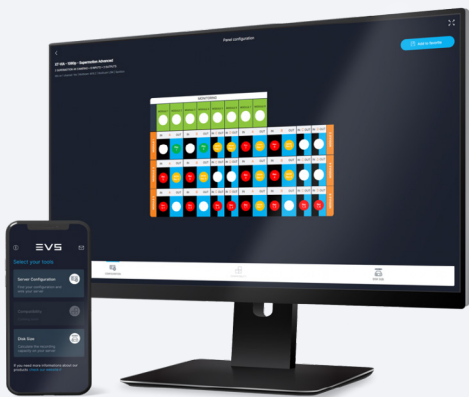
Manufacturer	Model	720p / 1080i single stream	720p / 1080i 3G dual stream	1080p	UHD-4K
Grass Valley	LDX-100 series	3x (1080i only)	-	3x	3x
Grass Valley	LDX-86N	3x	6x 3G	3x	1x
Grass Valley	LDX-86	3x	6x 3G	3x	1x
Grass Valley	LDK-8300	3x	-	-	-
Grass Valley	AK-HC5000	-	-	4x	-
Sony	HDC-5500	2x / 3x / 4x / 6x / 8x	2x 3G / 4x 3G / 6x 3G / 8x 3G	2x / 3x / 4x / 6x / 8x	2x
Sony	HDC-4800	2x / 3x / 4x / 6x / 8x	2x 3G / 4x 3G / 6x 3G / 8x 3G	2x / 3x / 4x / 6x / 8x	2x
Sony	HDC-4300	2x / 3x / 4x / 6x / 8x	2x 3G / 4x 3G / 6x 3G / 8x 3G	2x / 3x / 4x / 6x / 8x	-
Sony	PMW-F55	4x / 6x	4x 3G / 6x 3G	4x / 6x	-
Sony	HDC-2500	2x	2x 3G	-	-
Sony	HDC-3300	3x	-	-	-

Sony	HDC-3500	2x	2x 3G	-	-
Hitachi	SK-HD1500	3x	-	-	-
I-Movix	X10	6x / 10x	-	6x	2x
Panasonic	VariCam HS	-	-	4x	-
Panasonic	AK-UC4000	2x / 3x / 4x	-	-	-
Panasonic	AK-HC5000	-	-	4x	-
DreamChip	ATOM one SSM500	2x / 3x / 4x	-	2x / 3x / 4x	-

Hyper Motion

Manufacturer	Model	720p	1080i	1080p	UHD-4K
Vision Research	Phantom Flex4K	3000fps	2000fps	2000fps	-
For-A	FT-One	-	-	-	900fps
NAC / Ikegami	Hi-Motion II	1000fps	1000fps	-	-
DVS	Super Loupe	2500fps	2500fps	-	-
I-Movix	X10	3000fps	2000fps	2000fps	1000fps
DreamChip	ATOM one SSM500	-	500fps	500fps	-

Please keep in mind that the amount and type of cameras listed above could still be different depending on which licenses you have on the EVS server. **For more details, please refer to the configuration manual.**



EVS Toolbox application

To help you choose the right server configuration for your camera setup, EVS developed an application called EVS Toolbox which allows you to easily find out the required configurations and software versions for each device, determine the codec which is needed and review the overall performance of the network. For more information about EVS Toolbox, visit our website at evs.com/toolbox.



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