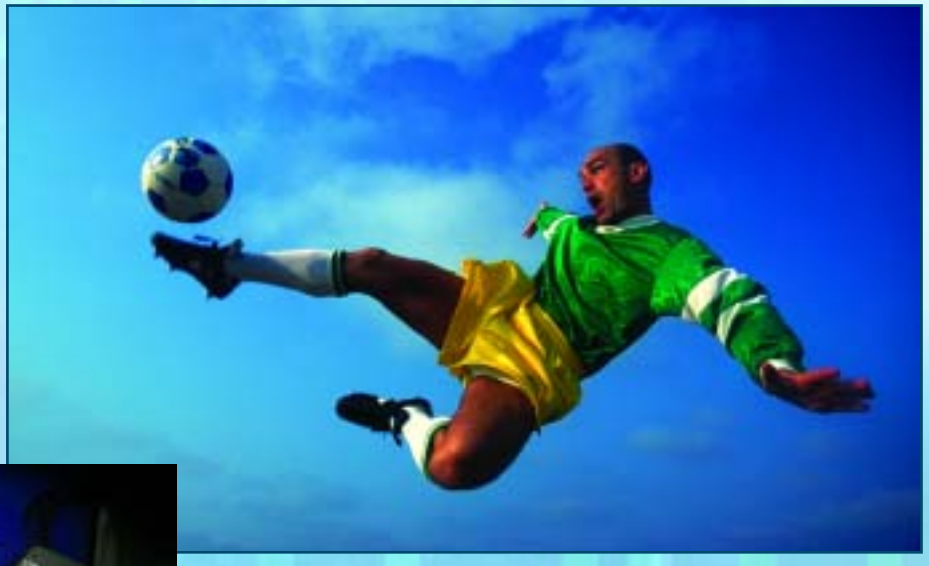
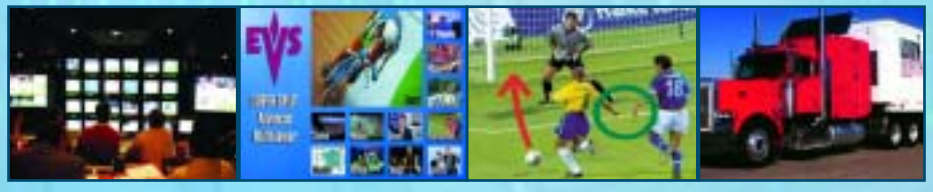
EVS BROADCAST EQUIPMENT

LSM-XT



Networked Servers
for Live Slow Motion
and Highlights Editing



Slow motion replays, why ?

Live sports broadcasting...

...continues to gain importance in the media business worldwide. This goes on a par with the standard of live television coverage, which has already reached unprecedented heights. And the production crews are continuously challenged to find new ways to present their television audiences with better views than a stadium visitor could obtain by the naked eye.

Speed

Action often occurs very fast in sports, so that spectators are likely to miss vital details. Television directors therefore adopted the concept of SLOW MOTION REPLAYS eagerly, as soon as VTRs became capable of variable speed playback. And it does work, but the linear nature of the VTR implies several limitations: a VTR either records, **OR** it plays back. And in between, the operator needs to press the **STOP** button first. Meaning that if, during an ice hockey match, the puck hits the net while you are replaying a close-up of a "high-stick stroke", then you simply missed that goal, forever. Unless, of course, multiple VTRs, each attended by a specialist operator, are at hand. And then, tape still needs to be rewound before anything can be reproduced to begin with.

Highlights editing

Résumés for broadcasting immediately at the end of a match, or during half time in football, are another effective way to retain television viewer's undivided attention. But if all your beautiful shots are on different reels of tape, then you may not be ready in time...

Camera angles

Sports coverage nowadays also sees an increasing number of cameras deployed, covering the action with as many angles of view as possible. The more angles we record for slow motion replay, the better, particularly when broadcasting interactive DTV. But how can we centralize all these shots for the benefit of Highlights Editing?

Slow motion replays, how ?

LSM-XT, live production servers

Live Slow Motion

LSM-XT is a 6-channel instant access server capable of simultaneous recording and playback. The recording process runs, on multiple channels, in continuous "loop-mode": When the disks are full, the oldest frames are over-written. The remaining playback channels are used at the same time to search, cue and replay the best scenes, at any speed and without interrupting the recording process at any time. Playback can commence instantly, without the need for the operator to place any cue-markings. The operator uses "in" and "out" points only to mark the scenes that are to be preserved. This protects the selected clips, as the recording process will jump whenever it comes up to an "in" mark.

Editing

LSM-XT also is an efficient non-linear editor, operational during the recording of a live event. Intuitive cut & paste functionality makes Play-list editing very fast and features mix & wipe effects. **LSM-XT** offers smooth analogue-sounding scrub audio during search mode and split audio editing, across multiple audio tracks, enhances the editor's performance even further. Playback channels can be driven by a switcher or edit controller using RS-422/BVW/Louth/Odetics protocol. **LSM-XT** can thus be part of a hybrid editing set-up, or feed "fill" and "key" signals synchronically into a graphics/effects system.

SportNet

The **SportNet** option networks **LSM-XT** systems into a fully integrated production environment. Any clip, recorded by any device on the network, is available instantly for editing or play-out to any other operator. The centralized editing of "highlights" sequences may include angles from all cameras, without needing to copy them first. International productions may benefit from **SportNet** when producing multiple feeds from a single venue: **SportNet** accommodates multiple replay operators offering different directors individual replay facilities from the same cameras.

LSM-XT, key features

- Easy selection of many operational configurations
- Intuitive control panel / unified operator interface
- Multi-user and networkable
- PGM / PVW channel swapping
- RS-422 Louth/Odetics/BVW (extended-) remote control
- Compatible with all known Super Motion cameras
- Super Motion and normal mode simultaneously

eXTreme technology

The fastest slow-motion and editing server, ever.

Flexibility

An **LSM-XT** offers up to 6 channels and can operate in many different camera/output configurations, some of which include PGM/PVW mode for fast sequencing. Images from a Super Motion camera can be recorded alongside normal feeds at the same time. Normal clips and Super-Motion material can be mixed & wiped during playlist editing/replay mode.

User interface

The compact and responsive remote control unit offers the operator instant access to all **LSM-XT** functions intuitively. The transition from Live (E-to-E) to slow motion replay occurs seamlessly and may be used on-air. Automatic channel synchronization contributes to speed of operation. The range of the varispeed lever is user selectable and may include reverse playback.

Creating and saving of clips

Cue points are set either on a live feed or on the current replay picture. Also the rough material in the current record loop is being stored when saving clips. The Auto-Save feature guarantees a fully operational recovery from a power failure, including the last operational configuration.

Editing & audio

Integrated Playlist editing supports up to 1800 clips and 50 playlists and features intuitive cut & paste functionality. An Auto-Fill command is available to collect all currently marked clips onto a list with a simple keystroke (for an easy dump to tape). **LSM-XT** offers smooth analogue sounding scrub audio during slow motion replay and search mode, as well as split audio editing across multiple tracks.

Control options

Up to 4 remote control panels are supported simultaneously. Several playback channels can be driven by a switcher or an external edit controller using RS-422/Louth/Odetics/BVW (extended-) protocol. Fill & key signals can be sourced synchronically to an external graphics/effect system.

Illustration options

SPLITSCREEN (either vertically or horizontally) rolls two clips synchroneously at variable speed and allows to compare performances recorded at different moments but on the same trajectory. **TELESTRATOR** allows a commentator to draw on a picture using a Tablet or a Touch Screen to illustrate his explanations. **TARGET-TRACK** puts a circle, highlight or a virtual "magnifying glass" over an important detail. The target can be tracked in action by setting a few keyframes.

Super Motion mode

Capturing the action with 3 times the accuracy

LSM-XT is compatible with all super (slow) motion cameras on the market. These special cameras scan images at 3 times the normal rate (150 fields per second in a PAL environment or 180 for NTSC). The increased temporal resolution obtained this way enables slow motion replays of unequalled smoothness. The individual frames are also much sharper; they suffer less from motion blur, because of the shorter exposure time. Super motion technology reveals detail to the television spectator, invisible to the naked eye. All the athletes' emotions: pain, joy, doubt, happiness... It's all there, crisp and clear, even when in reality it occurred only during a split second. Also advertisements on billboards may become visible more clearly during a replay, resulting in smiling sponsors.

The camera interface

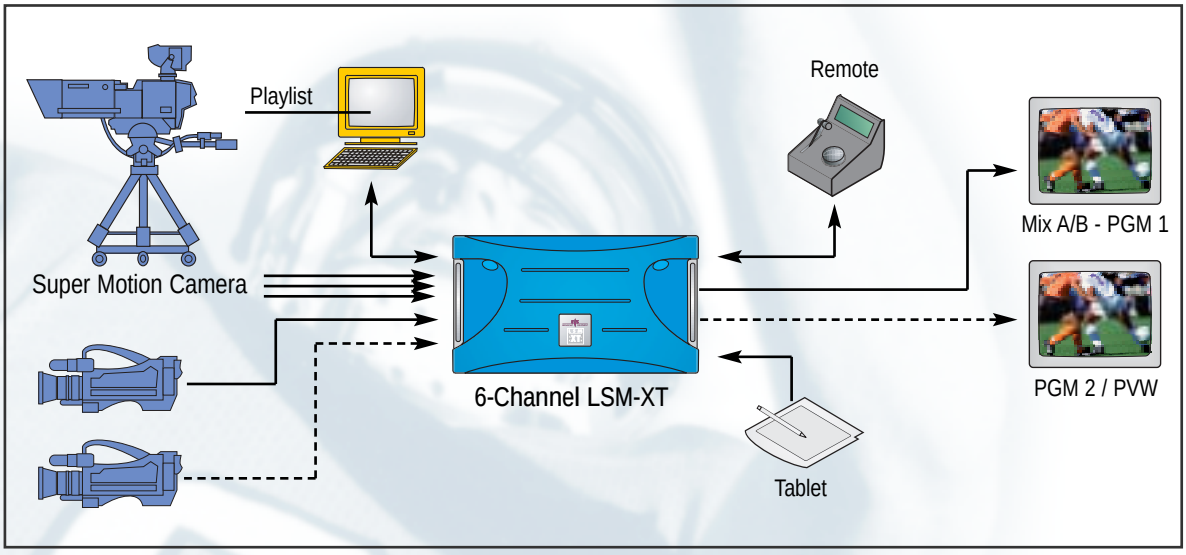
The operator simply selects one of the super motion modes from the configuration menu. PGM/PVW modes are available on 5- and 6-channel systems. Super motion video comes in from the camera's base station on 3 parallel SDI links. The **LSM-XT** interleaves these 3 signals into a single picture flow, in addition to which up to 2 normal feeds can be recorded at the same time.

To the operator

The replay speed of super motion clips can be varied from 0 - 100 %, just as ordinary video. Normal clips and super motion material may co-reside in one system and can be mixed & wiped when in play-list mode. Using the PVW channel, the next replay can be cued while airing another one, seamlessly chaining different types of clips. All clips are preserved when switching to another configuration.

Lip-sync

Audio remains in perfect synchronization, all the way down to the extreme decelerations afforded by super motion mode. This is particularly useful when airing cricket, baseball or similar sports.



SportNet

A live production network

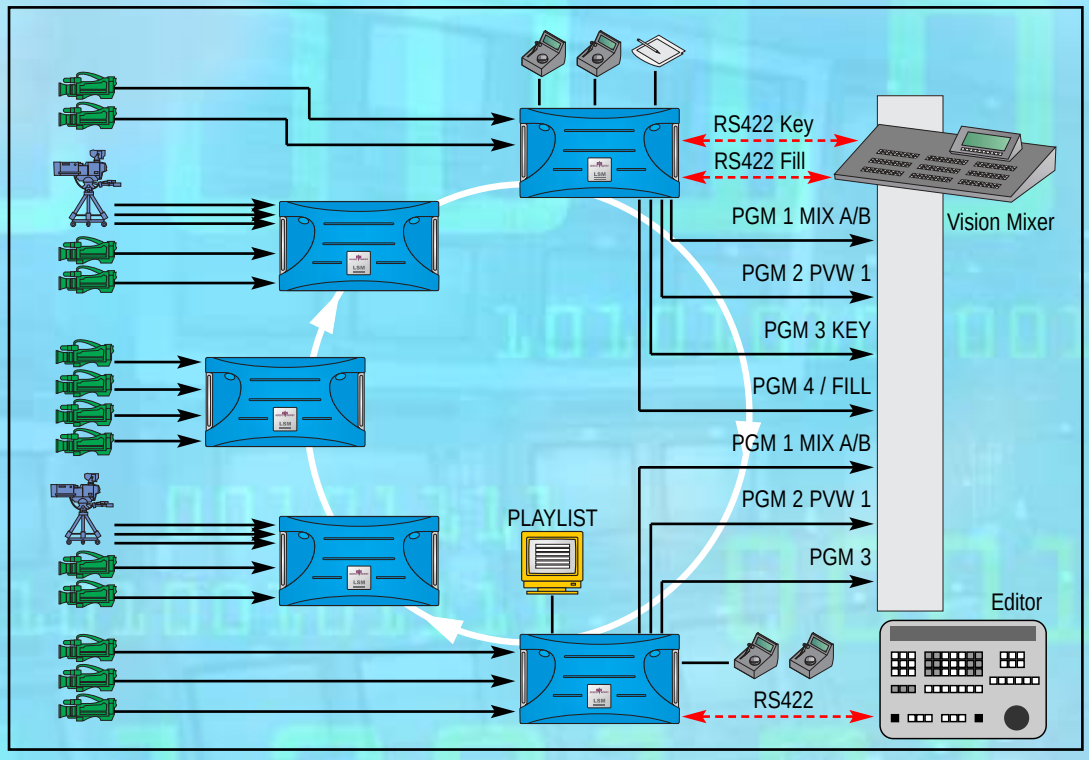
LSM-XT servers can now be networked to become a fully integrated production environment for sports or other live events. Any clip, recorded by any device on the network, is available **instantly** for editing or playout to all operators, even while the recording process of that particular clip is still in progress. All I/O channels remain free for production, not a single one needs to be sacrificed for transfers.

To the operator

The network functions are straightforward and available through additional menu layers on the remote control unit. Neighbouring **LSM-XTs** are numbered automatically, but personal names can be programmed for easy identification. Once a remote server is selected, all usual transport and playlist functions are available, just as if the clip was "local". When using clips from remote machines, the number and name of the source **LSM-XT** are keyed into the monitoring. Clips used in remote playlists are automatically "locked" on the source machine to prevent accidental switching off.

The technology

The physical interface is by the SDTI standard, permitting the use of familiar and inexpensive 75 Ohm/BNC cables and routing components. The network topology is a ring; if only 2 **LSMs** need to be connected together, then 2 cables are used between them. For 3 systems on the network, a 3rd cable is added to form a triangle. And so on, up to 31 **LSM-XTs**, each of which may be a 6-channel system... The nominal bandwidth of the network is 540 Mbps, which supports up to 12 real-time transfers simultaneously. But it also works when routing through passive 270 Mbps components.



SportNet applications

Centralized highlights editing

One dedicated operator can now create highlights sequences, using the familiar playlist editing functions, but containing clips from all machines on site, including Super Motion material, without the need to copy them first! Losing time during transfers, co-ordinating operators, changing router configurations: all these are now themes of the past! Airing attractive highlights packages has never been so easy, so fast, so efficient.

Central replay station

Similarly, is it possible to set aside one **LSM-XT** to replay also the camera angles recorded by other machines on the network. Thus, only a few outputs from this central replay **LSM-XT** need to be connected to the vision mixer.

Multi-feed production

Larger international productions are often required to produce more than one feed simultaneously for various destinations around the globe. **SportNet** accommodates multiple replay stations to offer different directors individual replay and editing facilities, taking full advantage of all the available camera sources in real time.

Central archive station

Backup easily all precious iso shots from the entire network to videotape, through a single **LSM-XT** without disturbing the ongoing production. Only one operator finishes off this job upon closing of the event.

AirBox, production server with integrated playout automation

AirBox is a cost-effective and user-friendly multi-channel broadcast server with integrated play-out automation of up to 6 channels. Simple to operate, **AirBox** is the ideal tool to build and roll comprehensive playlists benefiting from all clips available from remote **LSM-XTs** via **SportNet**.

The **AirBox** control and automation software runs on a Windows NT workstation, using an intuitive graphic interface and dedicated remote panel to guarantee a short operator learning curve. Clips sorting tools and user programmable filters allow quick retrieval of clips from anywhere on the **SportNet**. Control for an external switcher and a VTR easily accommodate the combination of taped material with local clips or from remote **LSM-XTs** in a single playout session.

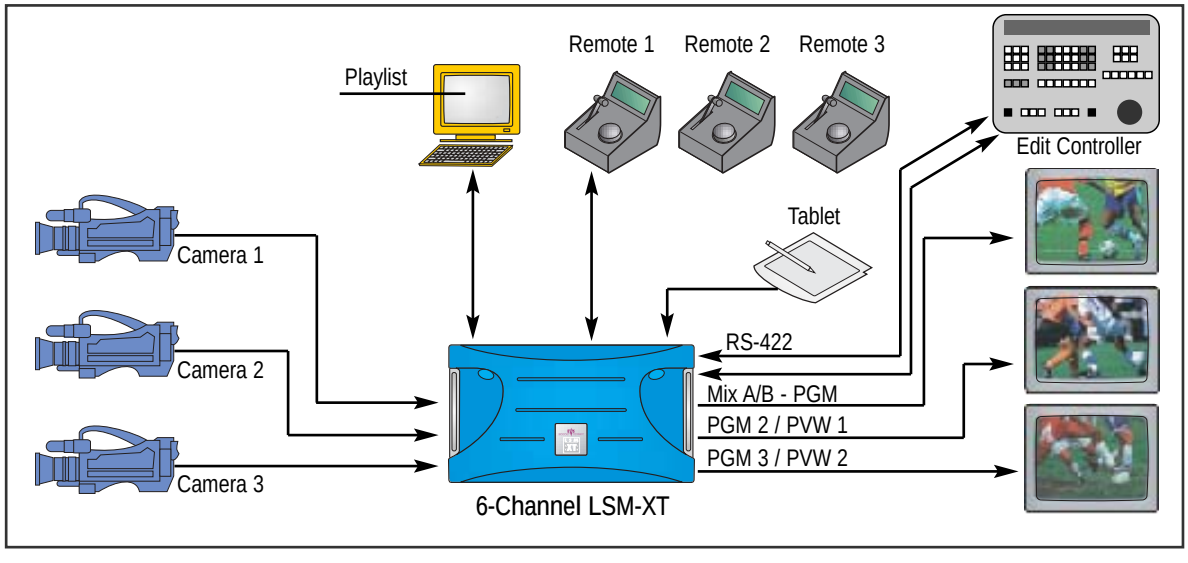
Flexibility

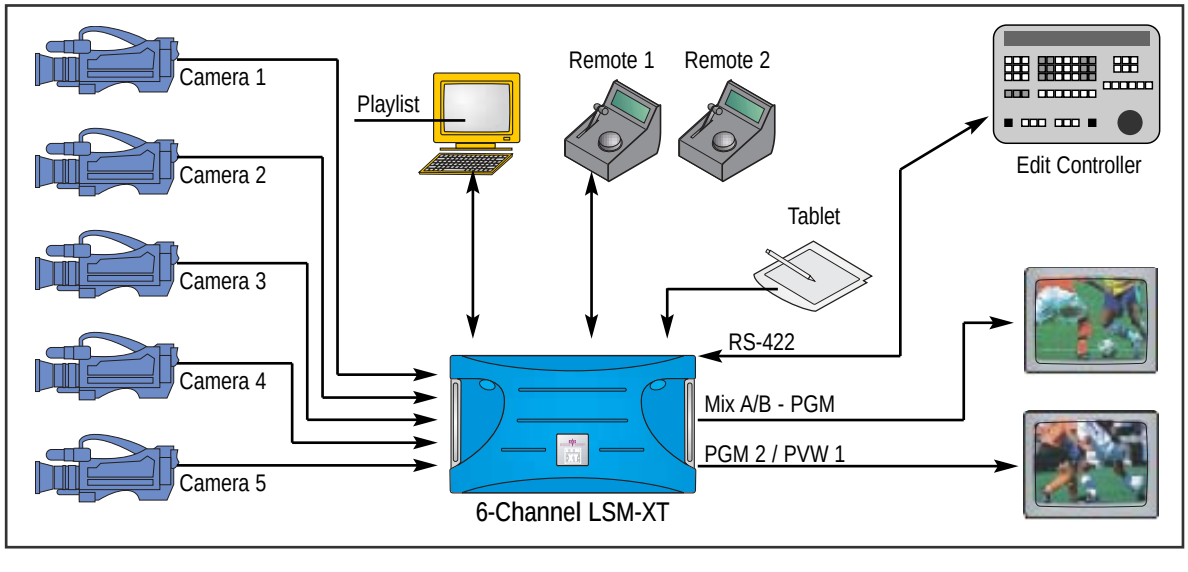
The sports director's favourite

The **LSM-XT** hardware is available in different versions ranging from an entry-level 2-channel system all the way to a full blown 6-channel powerhouse. Numerous multi-camera configurations are offered to accommodate even the most demanding live production requirements. Up to 3 operators can take control via remote panels and playback channels can be operated from the vision mixer or editor via RS-422 using Louth/Odetics/BVW (extended-) protocols.

Configurations

The operator simply selects the required configuration during boot up and can change during the day as needs alter. Super Motion is available on 5- and 6- channel systems and a Super Motion camera can be connected next to 1 or 2 normal ones. Today, there are 22 configurations available, the most comprehensive of which being illustrated below.





HD LSM-XT configurations

Bring your sports coverage to new heights

The ***HD*** **LSM-XT** is available in 2- or 4-channel versions and operates exactly like a standard definition **LSM-XT**, but delivers impeccable 1080i video. Slow motion replay speed is variable from -200% to +200% and integrated down-converters permit the use of SD monitoring. The ***HD*** **LSM-XT** supports up to 16 analogue balanced and/or 32 AES/EBU audio channels, and 4 additional analogue balanced outputs for monitoring.

Control options and editing

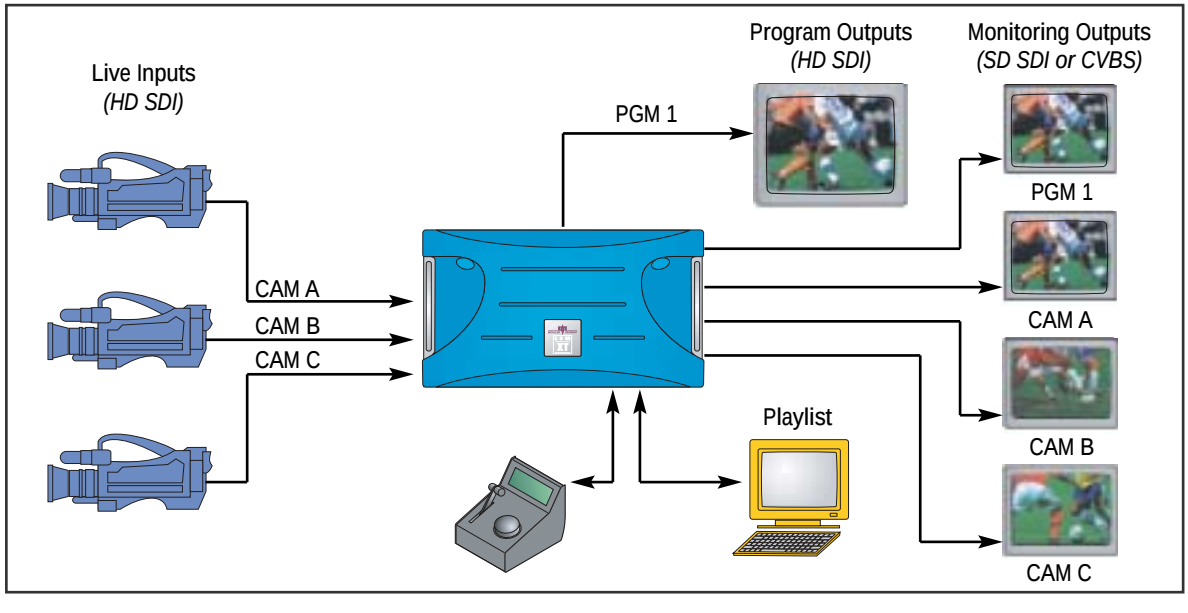
The ***HD*** **LSM-XT** features analogue sounding scrub audio during search mode and intuitive non-linear editing tools. The ***HD*** **LSM-XT** therefore is not only the choice by excellence for sports production in HD, but is equally very attractive for applications in the HD editing suite. Two playback channels can also be controlled via RS-422, enabling fill & key signals to be sourced synchronically to an external graphics/effect system.

SDTI networking option

The **SportNet** option networks ***HD*** **LSM-XT** systems into a multi-operator production environment. Any clip, recorded by any device on the network, is instantly available to any other operator for editing or play-out. The centralized editing of "highlights" sequences may now include angles from all cameras, without interrupting the recording of live action.

HD & SD Simulcasting

Monitoring output signals can be made available in analogue ***HD***, or the internal down-converters can be used to provide standard definition feeds in either digital (SDI) or analogue (CVBS) formats. Timecode and channel status information are normally superimposed for system monitoring purposes. But these insertions can easily be removed in order to obtain clean SD feeds for simulcasting, straight out of the ***HD*** LSM-XT.



LSM-XT system performance

Standard definition

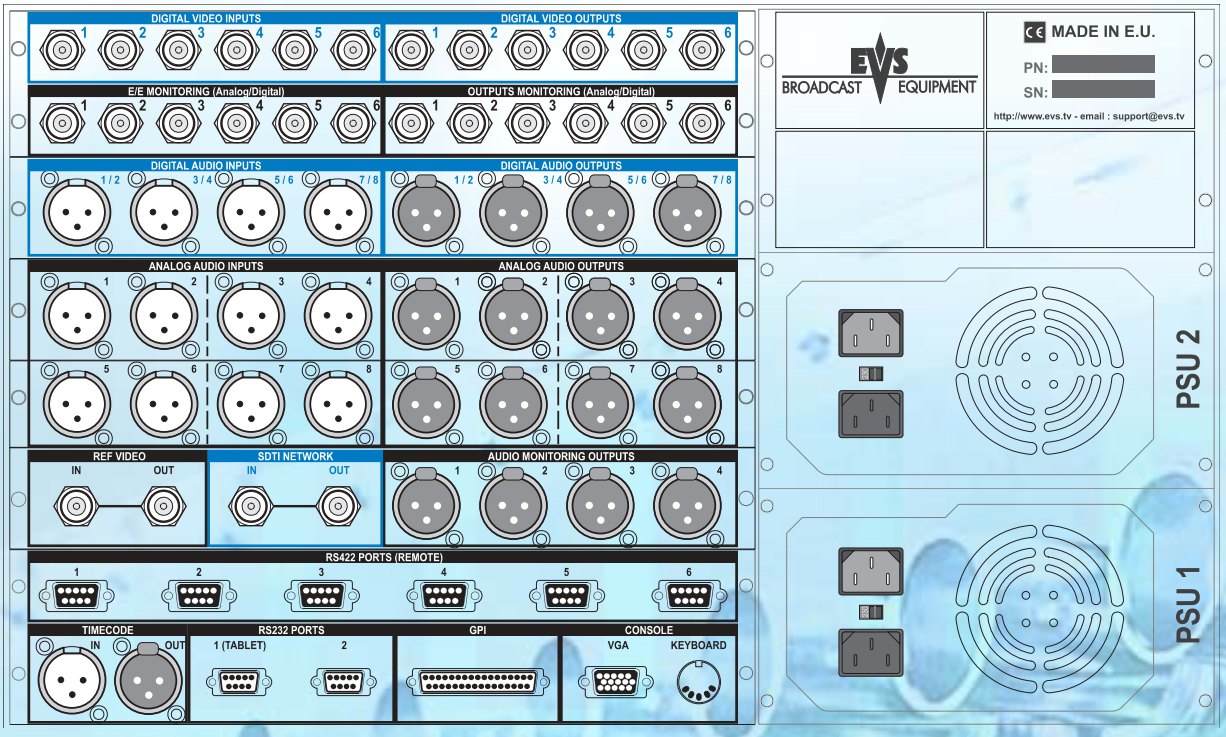
VIDEO SYSTEM	4:2:2 SMPTE / CCIR 601 digital 10 bits NTSC / 525 mode: 720H - 484V, or 496V including vertical blanking PAL / 625 mode: 720H - 576V, or 592V including vertical blanking
AUDIO SYSTEM	24 channels of non-compressed @ 24 bits / 48 KHz Sample rate conversion from 25 - 55 KHz to 48 KHz
RECORDING CAPACITY	10x internal 73 GB drives offer 22 hours @ 50 Mbps, RAID3 redundancy
VIDEO COMPRESSION	Intra-frame, 8 - 100 Mbps, user selectable
INPUTS, VIDEO	SDI (Serial Digital Component) @ 270 Mbps Full Frame Synchronizers at all inputs
INPUTS, AUDIO	8 analogue balanced or 16 (8 stereo pairs) AES/EBU or 2 stereo pairs embedded per SDI video
OUTPUTS, VIDEO	SDI (Serial Digital Component) @ 270 Mbps Jitter < 740ps p-p
MONITORING, VIDEO	SDI / CVBS switchable monitoring for all inputs & outputs, with super-imposed TC and status information
OUTPUTS, AUDIO	8 analogue balanced or 16 (8 stereo pairs) AES/EBU or 2 stereo pair embedded per SDI video
MONITORING, AUDIO	4 analogue balanced monitoring outputs
GENLOCK INPUT	Analogue Black & Burst
TIMECODE	LTC, 1x input & 1x output, balanced on XLR connectors
FRAME BUFFER	Video: 2x Full Frame CCIR601 10 bits (720 x 625/525) 16 million colours Graphics: 2x Frame 4 bits 16 colours (for Target Tracking and Painting options)
KEYER, MIXER	Downstream Keyer with 1024 levels of transparency

High definition

VIDEO SYSTEM	1080i / 720 p, 50 or 59.94 fps, 10 bits
VIDEO COMPRESSION	Intra-frame, 40 - 160 Mbps, advanced filtering options
AUDIO SYSTEM	8 or 16 channels (4 per video channel) of non-compressed @ 24 bits / 48 KHz Sample rate conversion from 25 - 55 KHz to 48 KHz
RECORDING CAPACITY	5x internal 73 GB drives offer 5 hours @ 100 Mbps, RAID3 redundancy
INPUTS, VIDEO	Up to 3x 1.485 Gb/s SMPTE 292, resolution 8 or 10 bits, auto-detect Each input equipped with a Full Frame Synchronizer
INPUTS, AUDIO	8 analogue balanced or 16 (8 stereo pairs) AES/EBU
OUTPUTS, VIDEO	1x or 2x 1.485 Gb/s SMPTE 292, resolution 10 bit
MONITORING, VIDEO	Down-converted SDI / CVBS switchable monitoring for all inputs & outputs, with super-imposed TC and status information
HD MONITORING OPTION	Analogue HD (1U external rack)
OUTPUTS, AUDIO	8 analogue balanced or 16 (8 stereo pairs) AES/EBU
MONITORING, AUDIO	4 analogue balanced monitoring outputs
GENLOCK INPUT	Analogue Black & Burst or tri-level sync
TIMECODE	LTC, balanced input & output on XLR connectors

EVS Broadcast Equipment is continuously adapting and improving its products in accordance with the ever changing requirements of the Television Industry, as a result of which all data contained herein are subject to change without prior notice.

Hardware specifications



Other audio configurations available.

PHYSICAL DIMENSIONS

6U 19 inches rackmount, including fully featured connector panel
H : 266mm (10.5''), D : 600mm (23.6''), W : 438mm (17.2'')
all audio connectors on board, 5 different options available

WEIGHT

30 Kg / 66 Lbs (subject to slight variation due to inclusion of options)

CONTROL UNIT

Small footprint; W 211 mm, D 262 mm, H (top) 125 mm
Large backlit LCD display.

POWER REQUIREMENTS

Power supply : 110-240 V +/-15%, 47-63 Hz. 400W maximum
On-board redundant power supply (cold swap)

ENVIRONMENTAL CONDITIONS

Temperature, Operating: 5 to 35°C
Temperature, Storage: -40 to 70°C
Humidity <90% non condensing

NETWORKING

SDTI 540 Mbps "SportNet", 2x BNC connectors "in" and "out"

SERIAL CONNECTIONS

2x RS-232 for tablet or similar options

REMOTE CONTROL

6x RS-422 for EVS user control panels or touch screen
or remote control from editor or switcher
through Louth / Odetics / VDCP / (extended-) BVW protocol
12x GPI relays

EVS BROADCAST EQUIPMENT

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