TECHNICAL REFERENCE MANUAL

Version 16.1 - February 2019

XT VIA

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Table of Contents

What's New?

In the Technical Reference manual, the icon NEW ! has been added on the left margin to highlight information on new and updated features.

The changes linked to new features in version 16.1 are listed below:

New DNxHR codec supported

- See section "Presentation" on page 1
- See section "Supported Codecs" on page 12
- See section "Internal Bandwidth" on page 15

New internal multiviewer MV4X module

- See section "Hardware Edition History" on page 58
- See section "Multiviewer " on page 35
- See section "MTPC Board" on page 75
- See section "H4X Board" on page 69

Audio digital outputs DA-15 available as an option

- See section "Rear Panel Layout" on page 33
- See section "Audio Channels" on page 41
- See section "Digital Audio DA-15 Pinout" on page 42

PTP to replace Genlock and LTC

- See section "Timecode and Video Ref Connectors " on page 37

Supported XHub-VIA version

- See section "Network Architectures" on page 44

The following changes unrelated to new features for release 16.1 have been brought to this technical reference manual. They are not highlighted with the **New** icon:

Warning on 10G SFP+ video connectors

- See section "SFP+ Video Connectors" on page 40

Updated recording capacities

- See section "Recording Capacities" on page 20

1. Overview

1.1. Presentation

Welcome to the EVS range of products and thank you for using an EVS XT-VIA server. We will do our best to satisfy your video production needs and we look forward to continuing working with you.

The XT-VIA server is the Live Production server that meets the needs of broadcasters, content creators and OB truck facility companies who focus mainly on UHD-4K productions and look for a future proof HD/1080p server with versatile SDI and IP connectivity.

NEW ! It provides up to 6 channels of UHD-4K (XAVC-4K, DNxHR) or 12 channels of Full-HD 1080p or HD (XAVC-I, AVC-I, DNxHD, or ProRes 422) via an SDI or IP interface. The Mix on one channel feature is supported in all configurations in 720p, 1080i and 1080p. It offers more internal bandwidth to fully support UHD-4K file transfers and operations.

In addition to the EVS Loop Recording technology, XNet SDTI support and onboard XNet-VIA IP networking for the future, XT-VIA provides support of Super Motion cameras, slow motion replays and multi-channel playback with server-to-server transfer options.

With support of multiple options, the XT-VIA meets your business needs whether you are starting at 3G-SDI, evolving to 12G-SDI, or building a next generation facility using IP protocols using ST 2110 and NMOS.

XT-VIA comes with interfaces that allow to integrate it in a production network made of previous generation XT3 or XT4K and at the same time sets the foundations for the new interactivity that will be enabled by the VIA technology platform.

2. Safety and Compliance

2.1. Safety

This equipment has been designed and tested to meet the requirements of the following:

- EN 60950 (European): Safety of information technology equipment including business equipment.
- IEC 950 (International): Safety of information technology equipment including business equipment.

In addition, this equipment has been designed to meet the following:

- UL 1950 - USA (USA): Safety of information technology equipment including business equipment.

2.2. Compliance Standards

This equipment complies with following EMC standards:

Standard	Area	Title
EN 55022	European	Emission Standard
EN 55024	European	Information Technology Equipment - Immunity characteristics - Limits and methods of measurement

This equipment complies with following TÜV standards:

Standard	Area	Title
IS 13252-1 **IEC 60950-1**	Indian International	Information Technology Equipment - Safety Part 1: General requirements

2.3. EMC Warning

Changes or modifications not expressly approved by the manufacturer for compliance could void the user's authority to operate the equipment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

2.4. CE Marking

The CE marking is affixed to indicate compliance with the following directives:

- 89/336//EEC of 3 May 1989 on the approximation of the laws of the Members States to electromagnetic compatibility.
- 73/23/EEC of 19 February 1973 on the harmonization of the laws of the Members States relating to electrical equipment designed for use within certain voltage limits.
- 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

3. Hardware Specifications

3.1. Mechanical Dimensions and Weights

3.1.1. Rack Mount 6U Main Frame

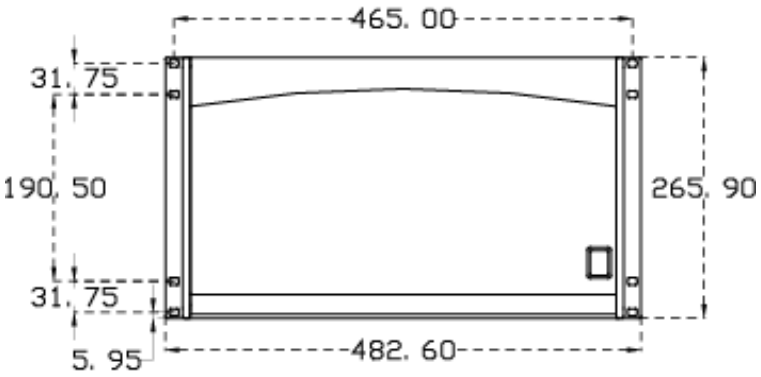
Weight

Disk Configuration	Weight
6U - 19 inches chassis with 6 HDD on hot swap rack	37 kg / 81.6 lb
6U - 19 inches chassis with 12 HDD on hot swap rack	39 kg / 86.0 lb

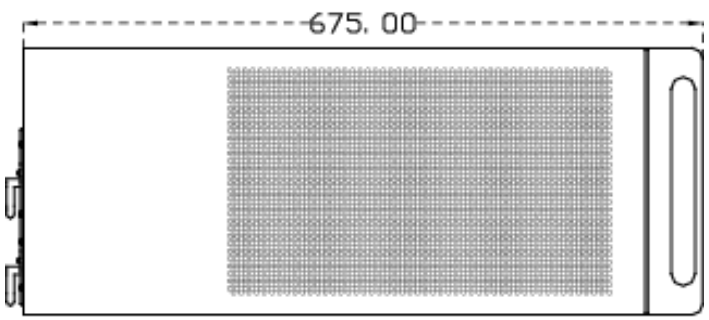
Dimensions

The following drawings provide the various dimensions, in mm, of the XT-VIA server with a 6U chassis.

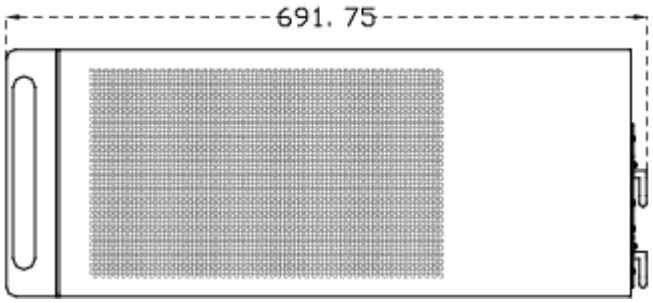
Front view



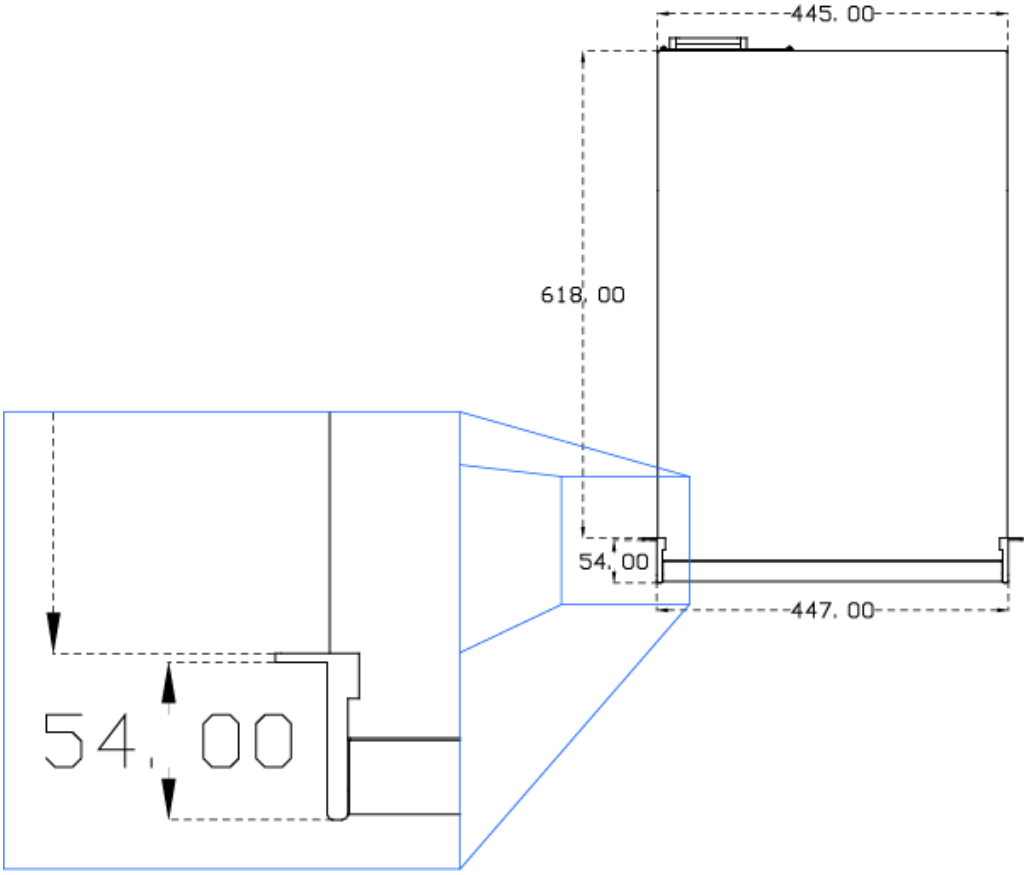
Left view



Right view

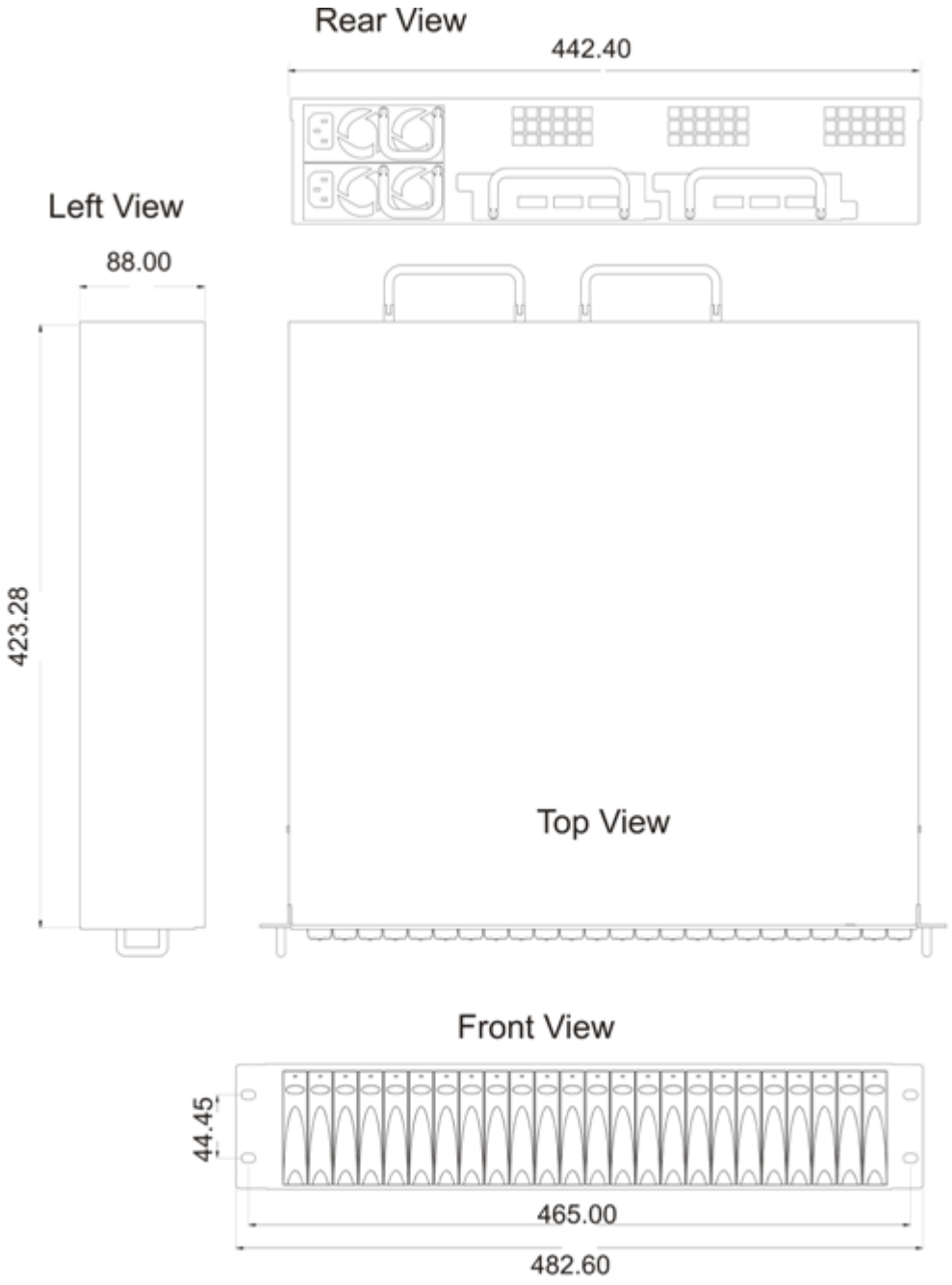


Top view



3.1.2. SAS-HDX Unit

The following drawings provide the various dimensions, in mm, of the SAS-HDX external array.

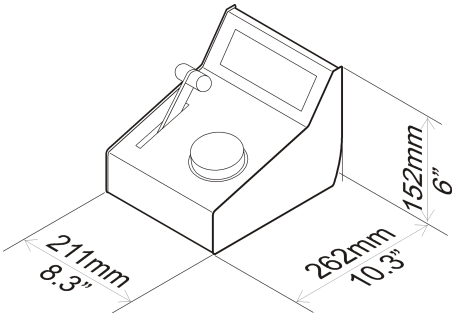


3.1.3. Control Devices

The following control devices can optionally be connected to your server to control it.

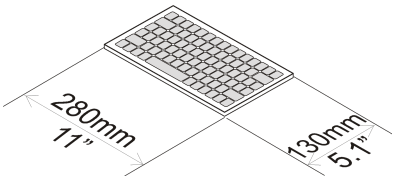
LSM Remote Control Panel

Weight: 2.9 kg / 6.3 lb.



Keyboard

Weight: 0.4 kg / 0.9 lb.



3.2. Power Supply

Redundant Power Supply

The server is fitted with two auto switching and hot-swappable power supplies.

The secondary hot-swappable power supply should be connected to the mains to allow automatic power switching to this second power supply should the first one fail.

Grounding

WARNING

The protective earth must be connected to the ground before powering up the unit.
Ensure the disk recorder unit is properly grounded at all times to avoid electrical shock hazard.

Electrical Specifications

Rated voltage: 115 to 240 VAC (single phase)

Rated frequency: 47-63 Hz

Input connector: CEE 22/IEC 320 3-pin male receptacle

Connection to supply: Pluggable equipment Type A (EN 60950 §1.2.5): Equipment which is intended for connection to the building power supply wiring via a non-industrial plug and socket-outlet or a non-industrial appliance coupler or both. Correct mains polarity must always be observed. Do not use reversible power plugs with this equipment.

Class of equipment: Class 1 equipment (EN 60950 § 1.2.5): electric shock protection by basic insulation and protective earth.

Electrical Consumption

The following electrical specifications are valid for the XT-VIA server:

Data Type	Voltage	Value
Inrush current (PSU plugged on power grid)	230 V	2.0 A
Maximal current (full load)	230 V	1.9 A
Inrush current (PSU plugged on power grid)	120 V	4.0 A
Maximal current (full load)	120 V	3.8 A
Maximal power consumption (full load)		430 W

3.3. Environmental Conditions

Operating

- Temperature: 10°C to + 40°C (50°F to 104°F) ambient with free air flow
- Relative humidity: 0% to 90% (non-condensing)
- Cooling requirements: Forced cooling air flow from right to left when looking at the EVS server from the back panel.
- Handling/movement: Designed for fixed use when in operation

Storage and Transport

- Temperature: 0°C to +70°C (32°F to 158°F)
- Relative humidity: 0% to 90% (non-condensing)

4. Software Specifications

4.1. Video Specifications

Video Standards

The following table lists the video specifications in HD and UHD-4K formats for your XT-VIA server.

	High Definition	UHD-4K
Video Formats	720p 50/59.9 fields/sec 1080i 50/59.94 fields/sec 1080p 50/59.94 fields/sec (3G)	UHDTV-4K 50/59.94 fields/sec
Digital Interface	10-bit 4:2:2 Serial (ST 292-1:2011). Full frame synchronizer at input.	10-bit 4:2:2 Serial (ST 292-1:2011). Full frame synchronizer at input.
Number of Channels	up to 12 channels, reversible REC/PLAY	up to 6 channels, reversible REC/PLAY
Monitoring & Down-converters	1 SDI output per channel, with OSD	1-built in down-converter per channel. 1 3G-SDI or IP output per channel with OSD.
Reference	Analog Black Burst and HD Tri-Level Sync	Analog Black Burst and HD Tri-Level Sync

SMPTE Standards

The following table lists the SMPTE standards supported by your server.

Configuration	SMPTE standard
HD SDI	ST 292-1:2011, ST 292:2012 (720p 50 and 59.94 Hz; 1080i 50 and 59.94 Hz)
Embedded audio HD	ST 299-0:2010, ST 299-1:2009
AES/EBU audio	ST 272:2004
LTC	ST 12-1:2008, ST12-2:2008
D-VITC	ST 266:2012
Ancillary TC in HD	RP 188
Vertical Ancillary Data	ST 334:2000
VC-3	ST 2019-1:2008
Mapping of Audio Metadata into Vertical Ancillary data	ST 2020-2:2008, ST 2020-3:2008
3G SDI	ST 424:2006
3G SDI – Data mapping	ST 425-B:2008
Image Format and Ancillary Data Mapping for the Quad Link 3 Gb/s Serial Interface	ST 425-5:2014
12G-SDI Bit-Serial Interfaces	ST 2082
Transport of High Bit Rate Media Signals over IP Networks	ST 2022-6:2012
Interoperation of ST 2022-6 streams	ST 2022-8
Professional Media Over Managed IP Networks: System Timing	ST 2110-10
Professional Media Over Managed IP Networks: Uncompressed Video	ST 2110-20
Professional Media Over Managed IP Networks: Traffic Shaping Uncompressed Video	ST 2110-21
Professional Media Over Managed IP Networks: PCM Audio	ST 2110-30

4.2. Audio Specifications

General Specifications

See section "Audio Channels" on page 41 for an overview on the possible audio hardware configurations.

- 4 additional analog balanced output channels for monitoring
- All audio connectors on mainframe
- The MADI interface supports 64 synchronous audio tracks @ 48KHz.
- In 4K configurations, the embedded audio will be processed from the first channel (Top Left).

Maximum Number of Embedded or MADI Audio Channels

The 6U servers provide the following maximum number of embedded or MADI audio channels per video channel with intra codecs:

Configuration Mode	Embedded	MADI
2-channel configurations	2*16 audio mono (= 32 tracks)	2*16 audio mono (= 32 tracks)
4-channel configurations	4*16 audio mono (= 64 tracks)	4*16 audio mono (= 64 tracks)
6-channel configurations	6*16 audio mono (= 96 tracks)	6*16 audio mono (= 96 tracks)
8-channel configurations	8*16 audio mono (= 128 tracks)	8*16 audio mono (= 128 tracks)
10-channel configurations	10*16 mono (=160 tracks)	10*16 mono (=160 tracks)
12-channel configurations	12*16 mono (=192 tracks)	12*16 mono (=192 tracks) if # IN ≤ 8 + LoRes 12*8 mono (= 96 tracks) if # IN > 8 + LoRes
UHD-4K	6*16 audio mono (=96 tracks)	6*16 audio mono (=96 tracks)

Audio Processing

- Uncompressed audio
- 24 bit processing and storage
- Sample rate converter from 25-55 kHz to 48 kHz
- Audio scrub
- Audio mix

4.3. Video Codecs and Bitrates

4.3.1. Supported Codecs

Codecs and Related License Codes

The XT-VIA server supports natively the video codecs presented in the table below when the required license code is valid.

Proxy codecs	V4X Codec Board
Mjpeg	code 32

HD codecs	V4X Codec Board
Avid DNxHD®	code 5
Apple ProRes 422, 422 LT, 422 HQ	code 6
AVC-Intra	code 13
XAVC-Intra HD	code 15

UHD codecs	V4X Codec Board
DNxHR 4K	code 16
XAVC-Intra 4K	code 19

NEW !

Content Transfer Encoding and File Header

It is possible to perform the encoding process in 8-bit or 10-bit and to write a 10-bit file on selected codecs.

The following table summarizes the proposed configurations, valid for encoding and file header:

HD Codecs	Encoding & File Header
DNxHD 120/145	8-bit
DNxHD 185/220	8-bit
DNxHD 185x/220x	10-bit
ProRes LT	10-bit
ProRes SQ	10-bit
ProRes HQ	10-bit
AVC-Intra	10-bit
XAVC-Intra HD	10-bit

UHD Codecs	Encoding & File Header
NEW ! **DNxHR SQ/HQ**	8 bit
NEW ! **DNxHR HQx**	10 bit
XAVC-Intra 4K	10-bit

4.3.2. Maximum Bitrates

These maximum values are valid for XT-VIA servers running Multicam version 16.00 or higher. They guarantee a smooth play and a browse at 100% speed on all channels simultaneously.

Codec	Format	2-12 ch (720p/1080i)	2-12 ch (1080p)
Avid DNxHD®	PAL	185	367
	NTSC	220	440
Apple ProRes 422	PAL	185	367
	NTSC	220	293
AVC-Intra 100	PAL	111	222
	NTSC	111	222

Codec	Format	2-12 ch (720p/1080i)	2-12 ch (1080p)
XAVC-Intra 100	PAL	111	222
	NTSC	111	222

Codec	Format	≤ 3 ch	4-6 ch
XAVC-Intra 4K	PAL	800	500
	NTSC	960	600

NEW ! With a (10+1) RAID, the following maximum bitrates (hence codec flavors) are supported:

Codec	Format	3 ch	4 ch	5 ch	6 ch
DNxHR	PAL	1455 (HQ/HQx)	1455 (HQ/HQx)	1455 (HQ/HQx)	965 (SQ)
	NTSC	1745 (HQ/HQx)	1745 (HQ/HQx)	1155 (SQ)	1155 (SQ)

4.3.3. Internal Bandwidth

General Description

This section helps you select the most appropriate bitrate for the native codec(s) on the EVS server, on the basis of the internal bandwidth, the channel configuration, and the calculated number of real-time channels at the EVS server level.

The section therefore presents tables including the following parameters:

1. **Video Bitrate:** codec bitrate set by the user in the **Codec** section of the **Server** tab in the Multicam Configuration window.
2. **Fields/Block:** numbers of video fields that can be stored in one disk block, taking into account 8 audio tracks, in 1080i and UHD-4K.
3. **Actual Bandwidth:** actual disk/network bandwidth required for the real-time record or real-time playback of one video stream and its associated audio tracks.
4. **Max. RT Channels:** maximum number of video channels (real-time record or real-time playback) that one EVS server can support for a given frame rate and bitrate.

   For a server running in a configuration with a given number of video channels, any additional real-time access can be used for transfers over the XNet (SDTI) network.

   The RT Channels calculation is based on the use of Seagate disks of 900 GB (10K9) configured in 10+1 raids. Such disks are able to write 800 MB/s.

Bandwidth and RT Channels at 50 Hz (PAL)

Codec	Field Rate (Hz)	Video Bitrate (Mbps)	Fields/ Block	Block-based bandwidth (MB/s)	Max. RT Channels
Apple ProRes 422 LT	50.00	85	34	11.7	68
AVC-Intra 100	50.00	111	27	14.8	54
XAVC-Intra HD	50.00	111	27	14.8	54
Avid DNxHD® 120	50.00	120	24	16.6	48
Apple ProRes 422 SQ	50.00	120	24	16.6	48
Avid DNxHD® 185	50.00	185	16	25.0	32
Apple ProRes 422 HQ	50.00	185	16	25.0	32
XAVC-Intra 4K class 300	50.00	500	6	66.6	12
XAVC-Intra 4K class 480	50.00	800	4	100.0	8
NEW ! **DNxHR SQ**	50.00	965	3	133.3	6
NEW ! **DNxHR HQ/HQX**	50.00	1455	2	200.0	4

Bandwidth and RT Channels at 100 Hz (PAL SLSM 2x)

Codec	Field Rate (Hz)	Video Bitrate (Mbps)	Fields/ Block	Block-based bandwidth (MB/s)	Max. RT Channels
XAVC-Intra 4K class 300	100.00	500	3	133	6

Bandwidth and RT Channels at 150 Hz (PAL SLSM 3x)

Codec	Field Rate (Hz)	Video Bitrate (Mbps)	Fields/ Block	Block-based bandwidth (MB/s)	Max. RT Channels
Apple ProRes 422 LT	150.00	85	11	35.3	22
AVC-Intra 100	150.00	111	9	44.4	18
XAVC-Intra HD	150.00	111	9	44.4	18
Avid DNxHD® 120	150.00	120	8	50.0	16
Apple ProRes 422 SQ	150.00	120	8	50.0	16
Avid DNxHD® 185	150.00	185	5	75.0	10
Apple ProRes 422 HQ	150.00	185	5	80.0	10

Bandwidth and RT Channels at 59.94 Hz (NTSC)

Codec	Field Rate (Hz)	Video Bitrate (Mbps)	Fields/ Block	Block-based bandwidth (MB/s)	Max. RT Channels
Apple ProRes 422 LT	59.94	100	34	14.1	56
AVC-Intra 100	59.94	111	33	14.5	55
XAVC-Intra HD	59.94	111	33	14.5	55
Avid DNxHD® 145	59.94	145	23	20.8	38
Apple ProRes 422 SQ	59.94	145	25	19.2	41
Avid DNxHD® 220	59.94	220	16	30.0	26
Apple ProRes 422 HQ	59.94	220	16	30.0	26
XAVC-Intra 4K class 300	59.94	600	7	68.5	11
XAVC-Intra 4K class 480	59.94	960	6	79.9	10
NEW ! **DNxHR SQ**	59.94	1155	3	159.8	5
NEW ! **DNxHR HQ/HQX**	59.94	1745	2	239.7	3

Bandwidth and RT Channels at 120 Hz (NTSC SLSM 2x)

Codec	Field Rate (Hz)	Video Bitrate (Mbps)	Fields/ Block	Block-based bandwidth (MB/s)	Max. RT Channels
XAVC-Intra 4K class 300	119.88	600	3	160	5.0

Bandwidth and RT Channels at 180 Hz (NTSC SLSM 3x)

Codec	Field Rate (Hz)	Video Bitrate (Mbps)	Fields/ Block	Block-based bandwidth (MB/s)	Max. RT Channels
Apple ProRes 422 LT	179.82	85	11	42.3	18
AVC-Intra 100	179.82	111	11	43.6	18
XAVC-Intra HD	179.82	111	11	43.6	18
Avid DNxHD®	179.82	145	8	62.5	12
Apple ProRes 422 SQ	179.82	145	8	57.4	13
Avid DNxHD®	179.82	220	5	89.9	8
Apple ProRes 422 HQ	179.82	220	5	89.9	8

Real-Time Channel Calculation

The maximum server bandwidth depends on the disks. Based on the assumption that Seagate disks of 900 GB (10K9) are used in 10+1 raids, the disks will be able to write 800 MB/s, and the maximum server bandwidth is therefore 800 MB/s.

For a mixed configuration with standard and super motion channels on the same EVS server, the following calculation must be used to ensure that the settings do not exceed the maximum bandwidth of the server, that is to say 800 MB/s:

```
    (nbr of standard channels x their block-based bandwidth)
+ (nbr of super motion channels x their block-based bandwidth)
```

4.3.4. Recording Capacities

Disk Storage

The disk storage, on SAS disks, can be as follows:

- internal storage only: 6 or 12 x 900 GB or 1.8 TB SAS disks

Warning
The sum of internal disk storage on an XT-VIA server cannot exceed 40 TB.

RAID Level: 3

The video RAID uses striping process across 5, 6 or 11 disk drives. The video and audio data is striped over the first 4, 5 or 10 drives while the parity information is saved on the remaining drive.

If one drive is damaged, the video RAID can use the parity information to recover the missing information, so that operation can continue seamlessly without bandwidth loss.

Recording Capacity Figures

The tables below show the recording capacity, in hours, for different video bitrates in the following conditions:

- In HD and UHD-4K, one record channel corresponds to 1 video + 8 stereo audio tracks.
- With the Operational Disk Size parameter set to 100%.
- With arrays of 900 GB disks.
- Without activating the SMPTE 334M packages.

Tip
The table figures should be multiplied by 2 for 1.8 TB disk arrays.

Recording Capacity in Hours for 5 Disks (4+1) RAID Configuration – 50Hz

# RAID Units	AVC-Intra 100 XAVC-Intra HD	Avid DNxHD® 120 Apple ProRes 422 SQ	Avid DNxHD® 185 Apple ProRes 422 HQ	XAVC-Intra 4K
1	63	56	37	14
2	127	113	74	28

Recording Capacity in Hours for 6 Disks (5+1) RAID Configuration – 50Hz

# RAID Units	AVC-Intra 100 XAVC-Intra HD	Avid DNxHD® 120 Apple ProRes 422 SQ	Avid DNxHD® 185 Apple ProRes 422 HQ	XAVC-Intra 4K
1	79	70	46	18
2	159	141	92	36

Recording Capacity in Hours for 11 Disks (10+1) RAID Configuration – 50Hz

# RAID Units	AVC-Intra 100 XAVC-Intra HD	Avid DNxHD® 120 Apple ProRes 422 SQ	Avid DNxHD® 185 Apple ProRes 422 HQ	XAVC-Intra 4K
1	158	140	92	36

Recording Capacity in Hours for 5 Disks (4+1) RAID Configuration – 59.94Hz

# RAID Units	AVC-Intra 100 XAVC-Intra HD	Avid DNxHD® 145 Apple ProRes 422 SQ	Avid DNxHD® 220 Apple ProRes 422 HQ	XAVC-Intra 4K
1	64	47	31	12
2	128	94	62	24

Recording Capacity in Hours for 6 Disks (5+1) RAID Configuration – 59.94Hz

# RAID Units	AVC-Intra 100 XAVC-Intra HD	Avid DNxHD® 145 Apple ProRes 422 SQ	Avid DNxHD® 220 Apple ProRes 422 HQ	XAVC-Intra 4K
1	80	58	39	15
2	160	116	78	30

Recording Capacity in Hours for 11 Disks (10+1) RAID Configuration – 59.94Hz

# RAID Units	AVC-Intra 100 XAVC-Intra HD	Avid DNxHD® 145 Apple ProRes 422 SQ	Avid DNxHD® 220 Apple ProRes 422 HQ	XAVC-Intra 4K
1	160	116	78	30

4.4. Network Transfers

4.4.1. XNet Transfers

Rule

This section provides figures on transfer speeds for jobs processed by the XNet (SDTI) network.

The section presents data in tables including the following parameters:

1. **Field Rate:** field frequency used, or number of video fields transferred per second.
2. **Video Bitrate:** codec bitrate set by the user in the **Codec** section of the **Server** tab in the Multicam Configuration window.
3. **RT Transfers:** maximum number of simultaneous transfers of A/V data that can be processed for the given frame rate and video bitrate through the SDTI network.

   Calculation formula: `Maximum SDTI bandwidth / actual block-based bandwidth = real-time transfers`

When A/V data is transferred through the XNet network, you should take into account the following maximum bandwidths on an SDTI 3 Gbps network:

- 240 MB/s for transfers between EVS server having only H4X boards.

Example in HD

How many real time transfers can I do over an XNet network if I work with Apple ProRes 422 at 120 Mbps in PAL?

Calculation: Maximum SDTI bandwidth / Actual bandwidth = real time transfers

240 MB/s / 16.6 MB/s = 14.4 real time transfers for SDTI 3 Gbps

This is the maximum real-time transfers the network connection can support.

Example in UHD-4K

How many real time transfers can I do over an XNet network if I work with XAVC-Intra 4K at 500 Mbps in PAL?

Calculation: Maximum SDTI bandwidth / Actual Bandwidth = real time transfers

240 MB/s / 66.6 MB/s = 3.6 real time transfers for SDTI 3 Gbps.

This is the maximum real-time transfers the network connection can support.

It is obviously also necessary that the XT-VIA where the material is stored has enough local disk bandwidth to feed the network accesses, on top of its own local channels (see Max. RT Channels).

XNet Transfers

The maximum number of real-time channels between EVS servers through the SDTI ports of the XT-VIA server are summarized in the following table.

The following tables take into account a field rate of 50.00 Hz, the resolution HD 1080i and UHD-4K, without SLSM REC, and the maximum reference bandwidth of 240 MB/s on an SDTI network of 3 Gbps.

NOTE

The transfer speed in real-time for a single A/V stream is 10% lower compared to the number of real-time transfers.
For example, a single transfer will be processed 18.3x faster than real-time for Apple ProRes 422 LT.

Codec	Field Rate	Video Bitrate (Mbps)	Block-Based Bandwidth (MB/s)	RT Transfers (3G SDTI)
Apple ProRes 422 LT	50.00 Hz	85	11.7	20
AVC-Intra 100	50.00 Hz	111	14.8	14
XAVC-Intra HD	50.00 Hz	111	14.8	14
Avid DNxHD® 120	50.00 Hz	120	16.6	12
Apple ProRes 422 SQ	50.00 Hz	120	16.6	12
Avid DNxHD® 185	50.00 Hz	185	25.0	9
Apple ProRes 422 HQ	50.00 Hz	185	25.0	9
XAVC-Intra 4K	50.00 Hz	500	66.6	3

4.4.2. Gigabit Ethernet Transfers

General Description

This section provides empirical figures on real-time transfers for backup and restore jobs processed by the GbE network. The GbE bandwidth however relies on the customer network behavior, which depends on external conditions, and partly on the EVS servers.

WARNING

The observations and data focus on steady rates: the transfer performances with small clips will be lower as they generate a lot of starts and ends of sessions.

The section presents data in tables including the following parameters:

1. **Field Rate:** field frequency used, or number of video fields transferred per second.
2. **Video Bitrate:** codec bitrate set by the user in the **Codec** section of the **Server** tab in the Multicam Configuration window.
3. **RT Transfers:** maximum number of simultaneous transfers of A/V data that can be processed for the given frame rate and video bitrate through the GbE network.

   Calculation formula: `Maximum GbE bandwidth / actual block-based bandwidth = real-time transfers`
4. **Transfer Speed:** transfer speed for a single transfer expressed in faster than-real time speed. The calculation formula is the same with a reference GbE bandwidth that is slightly smaller.

Reference Bandwidth

The table below specifies the reference GbE bandwidth used for calculations in this section. However, the effective bandwidth depends on network behavior, which only partly relies on the EVS server.

Gigabit Connection Type	Real-Time Transfers		Single Transfer Speed	
	Backup	Restore	Backup	Restore
1GbE (GbE board)	90 MB/s	70 MB/s	80 MB/s	70 MB/s
2GbE (LACP teaming)	180 MB/s	140 MB/s	80 MB/s	70 MB/s
10GbE (GbE board)	220 MB/s	140 MB/s	150 MB/s	80 MB/s

Backup Transfers

The maximum transfer speed through one port the GbE board on an XT-VIA server in 1080i and UHD-4K, without SLSM REC, are summarized in the following tables.

The data is available for:

- one 1GbE and 10 GbE port of the GbE board
- field rates of 50.00Hz (PAL) and 59.94Hz (NTSC)

1GbE Connection (PAL)

Codec	Video Bitrate (Mbps)	Block-Based Bandwidth (MB/s)	Transfer Speed (faster than RT)
Apple ProRes 422 LT	85	11.7	7.6x
AVC-Intra 100	111	14.8	6.0x
XAVC-Intra HD	111	14.8	6.0x
Avid DNxHD® 120	120	16.6	5.4x
Apple ProRes 422 SQ	120	16.6	5.4x
Avid DNxHD® 185	185	25.0	3.6x
Apple ProRes 422 HQ	185	25.0	3.6x
XAVC-Intra 4K	500	66.6	1.3x

1GbE Connection (NTSC)

Codec	Video Bitrate (Mbps)	Block-Based Bandwidth (MB/s)	Transfer Speed (faster than RT)
Apple ProRes 422 LT	100	14.1	6.4x
AVC-Intra 100	111	14.5	6.2x
XAVC-Intra HD	111	14.5	6.2x
Avid DNxHD® 145	145	20.8	4.3x
Apple ProRes 422 SQ	145	19.2	4.7x
Avid DNxHD® 220	220	30.0	3.0x
Apple ProRes 422 HQ	220	30.0	3.0x
XAVC-Intra 4K	600	68.5	1.3x

10GbE Connection (PAL)

Codec	Video Bitrate (Mbps)	Block-Based Bandwidth (MB/s)	RT Transfers	Transfer Speed (faster than RT)
Apple ProRes 422 LT	85	11.7	18.7	17.0x
AVC-Intra 100	111	14.8	14.8	13.5x
XAVC-Intra HD	111	14.8	14.8	13.5x
Avid DNxHD® 120	120	16.6	13.2	12x
Apple ProRes 422 SQ	120	16.6	13.2	12x
Avid DNxHD® 185	185	25.0	8.8	8x
Apple ProRes 422 HQ	185	25.0	8.8	8x
XAVC-Intra 4K	500	66.6	3.3	3x

10 GbE Connection (NTSC)

Codec	Video Bitrate (Mbps)	Block-Based Bandwidth (MB/s)	RT Transfers	Transfer Speed (faster than RT)
Apple ProRes 422 LT	100	14.1	15.6	14.1x
AVC-Intra 100	111	14.5	15.1	13.7x
XAVC-Intra HD	111	14.5	15.1	13.7x
Avid DNxHD® 145	145	20.8	10.5	9.6x
Apple ProRes 422 SQ	145	19.2	11.4	10.4x
Avid DNxHD® 220	220	30.0	7.3	6.6x
Apple ProRes 422 HQ	220	30.0	7.3	6.6x
XAVC-Intra 4K	600	68.5	3.2	2.9x

Restore Transfers

The maximum transfer speed through one port the GbE board on an XT-VIA server in 1080i and UHD-4K, without SLSM REC, are summarized in the following tables.

The data are available for:

- one 1GbE and 10 GbE port of the GbE board
- field rates of 50.00Hz (PAL) and 59.94Hz (NTSC)

1GbE Connection (PAL)

Codec	Video Bitrate (Mbps)	Block-Based Bandwidth (MB/s)	Transfer Speed (faster than RT)
Apple ProRes 422 LT	85	11.7	5.9x
AVC-Intra 100	111	14.8	4.7x
XAVC-Intra HD	111	14.8	4.7x
Avid DNxHD® 120	120	16.6	4.2x
Apple ProRes 422 SQ	120	16.6	4.2x
Avid DNxHD® 185	185	25.0	2.8x
Apple ProRes 422 HQ	185	25.0	2.8x
XAVC-Intra 4K	500	66.6	1.0x

1GbE Connection (NTSC)

Codec	Video Bitrate (Mbps)	Block-Based Bandwidth (MB/s)	Transfer Speed (faster than RT)
Apple ProRes 422 LT	100	14.1	4.9x
AVC-Intra 100	111	14.5	4.8x
XAVC-Intra HD	111	14.5	4.8x
Avid DNxHD® 145	145	20.8	3.3x
Apple ProRes 422 SQ	145	19.2	3.6x
Avid DNxHD® 220	220	30.0	2.3x
Apple ProRes 422 HQ	220	30.0	2.3x
XAVC-Intra 4K	600	68.5	1.0x

10GbE Connection (PAL)

Codec	Video Bitrate (Mbps)	Block-based Bandwidth (MB/s)	RT Transfers	Transfer Speed (faster than RT)
Apple ProRes 422 LT	85	11.7	11.9	6.8x
AVC-Intra 100	111	14.8	9.4	5.4x
XAVC-Intra HD	111	14.8	9.4	5.4x
Avid DNxHD® 120	120	16.6	8.4	4.8x
Apple ProRes 422 SQ	120	16.6	8.4	4.8x
Avid DNxHD® 185	185	25.0	5.6	3.2x
Apple ProRes 422 HQ	185	25.0	5.6	3.2x
XAVC-Intra 4K	500	66.6	2.1	1.2x

10GbE Connection (NTSC)

Codec	Video Bitrate (Mbps)	Block-based Bandwidth (MB/s)	RT Transfers	Transfer Speed (faster than RT)
Apple ProRes 422 LT	100	14.1	9.9	5.6x
AVC-Intra 100	111	14.5	9.6	5.5x
XAVC-Intra HD	111	14.5	9.6	5.5x
Avid DNxHD® 145	145	20.8	6.7	3.8x
Apple ProRes 422 SQ	145	19.2	7.3	4.1x
Avid DNxHD® 220	220	30.0	4.6	2.6x
Apple ProRes 422 HQ	220	30.0	4.6	2.6x
XAVC-Intra 4K	600	68.5	2.0	1.1x

Simultaneous Backup and Restore

The backup sessions reach higher bandwidth and pre-empt the bandwidth against the restore sessions. On a ‘per session’ base, the system allocates between 3.75 and 6 times more bandwidth to backup session than to restore session.

4.5. Video Interpolation

Introduction

The playing back of smooth slow motion pictures carries specific issues: since some fields must be repeated at regular interval to provide the video at the playback speed required by the operator, parity violation appears regularly on the output video signal. This issue is specific to interlaced formats (525i, 625i and 1080i) and does not concern progressive formats (720p and 1080p).

If O and E represent respectively the odd and even fields of a standard video signal (50/60 Hz), we have:

The original video signal:

- O E O E O E O E O E O E O E O E

The output video signal at 50% speed:

- O **O** **E** E O **O** **E** E O **O** **E** E O **O** **E** E

The output video signal at 33% speed:

- O **O** O E **E** E O **O** O E **E** E O **O** O E

The output video signal at 25% speed :

- O **O** O **O** **E** E **E** E O **O** O **O** **E** E **E** E

Fields with parity violation are shown in bold, underlined letters. As it appears from the above table, whatever the playback speed (with the exception of the normal 100% playback speed), a number of fields violate the normal parity of the output signal. This parity violation induces a 1-line shift of the field, resulting in a vertical jitter of the picture. The jitter frequency depends upon the chosen playback speed.

To avoid this phenomenon and provide a stable output picture, EVS developed 2 types of line interpolator: 2-line and 4-line interpolators. The interpolation process can be enabled or disabled by the operator on all EVS slow motion systems.

2-Line Interpolator

The 2-line interpolator actually generates a new field, when the original field is in parity violation. Each line of this new field is calculated by a weighted average of the 2 neighboring lines. This process solves the problem of parity violation and vertical jitter, but the drawback is a reduction of the vertical resolution on the interpolated fields, that appear unfocused. Another side effect is the alternation of original fields (perfectly focused) and interpolated fields (unfocused), resulting in a "pumping" video signal.

4-Line Interpolator

The 4-line interpolator uses a more sophisticated calculation based on the 4 neighboring lines. By using suitable coefficients for the weight of each line in the resulting calculation, we apply this interpolation to all fields. The final result is a permanently, slightly unfocused picture. The advantage is a stable output signal with no jitter and no "pumping", but the vertical bandwidth is even more reduced.

The interpolator is of course always disabled at 100% playback speed, because there is no parity violation.

EVS uses the same techniques with the Super Slow Motion disk recorder, working with all models of Super Motion cameras (150/180 Hz). The only difference between the processing of Super Motion and normal scan (50/60 Hz) signals is that the interpolator is always disabled at 33% playback speed, because the Super Motion signal does not cause parity violation at this particular speed.

Whatever the choice, the resulting picture is thus always a compromise between stability and resolution. With EVS systems, the operator always has the choice between any of the 3 above described techniques: no interpolation, 2-line interpolation or 4-line interpolation. Even if the operator chooses to use the interpolation, this process will be automatically disabled when not necessary (100% playback for 50/60 Hz signal, 33% and 100% playback for 150/180 Hz signal).

NOTE

All professional VTRs use line interpolation in PlayVar mode to avoid vertical jitters.
Default value is interpolator off for all configurations except SLSM configurations in which 4-line interpolator mode is enabled.

5. Hardware Installation and Cabling

5.1. Rack Installation

Unpacking

Upon receipt of the equipment examine packing for obvious signs of damage. If damaged, do not unpack and inform the carrier immediately. Check thanks to the included packing list if all the items are present and if they show any mechanical damage. If yes, report damage or the missing parts to EVS or their appropriate representative.

Ventilation and Rack Mounting

Adequate ventilation is obviously required for optimum performance. As a result of this consideration, ensure that no other equipment is located close to the mainframe.

WARNING

- Remember that fans are used to air cool the equipment and protect it from overheating.
- Do not block fans intakes during operations.

Having regard to the weight of the server chassis, support guides are required for this unit into the rack mount. The front ears of the unit are not designed to support its full weight. Applying full weight on these might result in bending the metal plate.

Boards Checking

The main power switch is located at the front side (lower right corner) of the unit.

Before turning on the power, open the front door of Video disk recorder unit to check if all boards fit into their guides. If a board is out of its guides, remove carefully the board and replace it in the same slot.

5.2. Rear Panel Description

5.2.1. Rear Panel Configurations

The XT-VIA server comes in the following rear panel variants:

- 6U rack with SDI connectors (called SDI rear panel)
- 6U rack with mixed SDI and XIP connectors (called XIP rear panel).

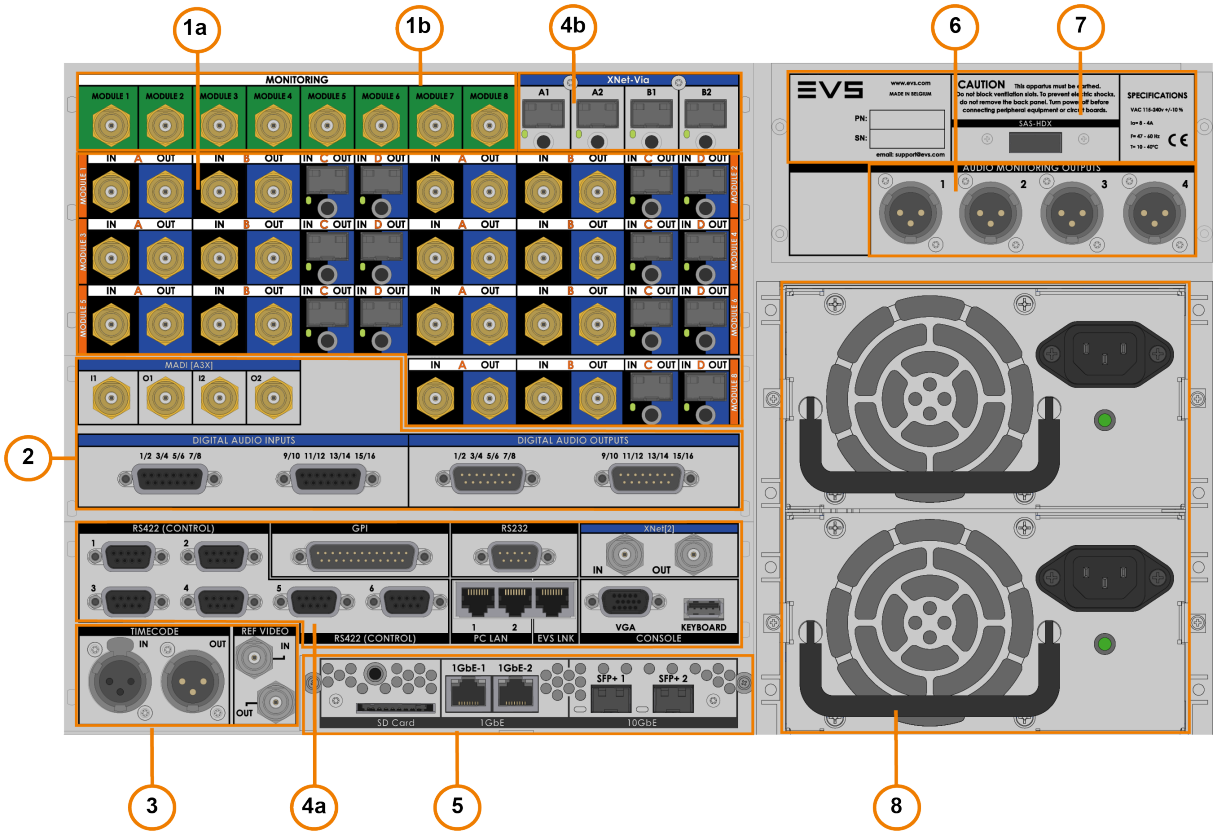
The various parts of the rear panel are described in the following topics.

5.2.2. Rear Panel Layout

Rear Panel Areas

The following drawing represents an example of a rear panel available on XT-VIA server.

The various areas of the rear panel are highlighted in the drawing and their respective variants are listed in the sections below along with a short description of the related connectors.



Video and Codecs 1a

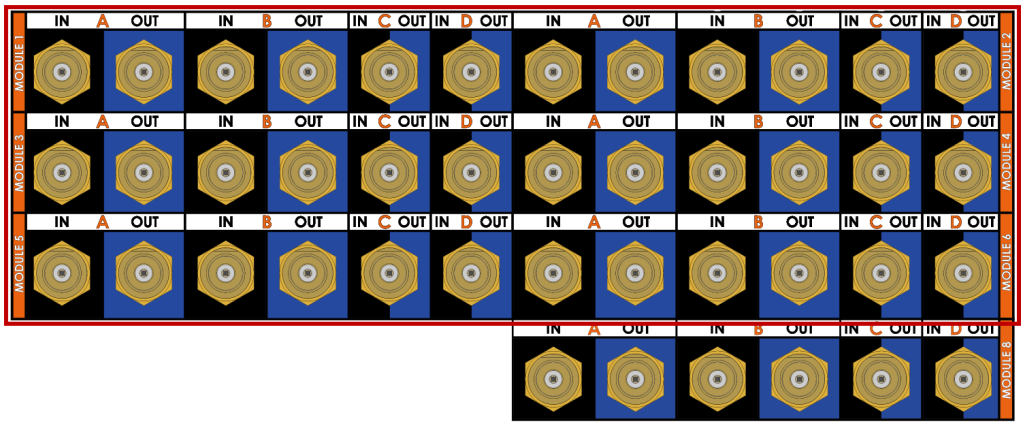
The codec modules allow connections for recording and playback of video material.

See section "V4X Video and Reference Boards" on page 59 for more details on each connector specific usage according to the different configurations.

The video and codec connector layout available with the XT-VIA server includes 6 codec modules (codec module 1 to codec module 6) with one of the following layout **on each codec module**:

- 6 BNC ports for 3G-SDI connectivity

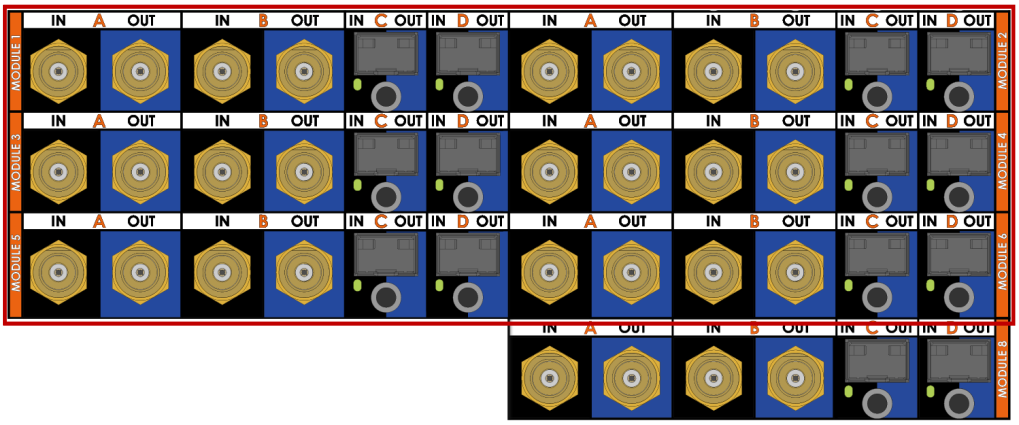
The IN and OUT A ports are 12G-SDI capable.



- 4 BNC ports for 3G-SDI or 12G-SDI connectivity

  AND

- 2 SFP+ ports (10GbE ports) for IP connectivity



NOTE

When the SFP+ is used, the BNC connectors are no longer operational, and vice versa. See the XT-VIA configuration manual for more information.

NOTE

When using a 12G-SDI interface on a codec module, cable only the IN A or OUT A connector of the codec module.

NEW !

Multiviewer 1a

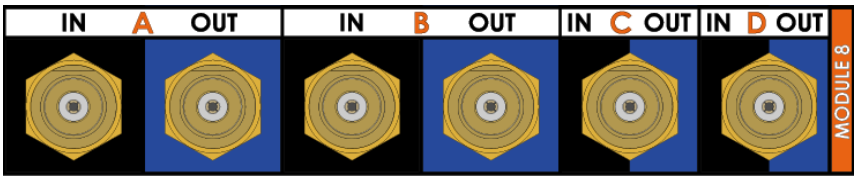
The codec module 8 is used for the internal Multiviewer (MV4X).

On an **SDI** rear panel, it provides:

- 2 OUT connectors (A and B)
- 2 IN/OUT connectors (C and D) that can only be used as OUT connectors

  to connect monitors directly to the server, and display PGM and REC channels on the monitors
- 2 IN connectors (A and B)

  to connect an external source and display it as an individual channel on the monitors.



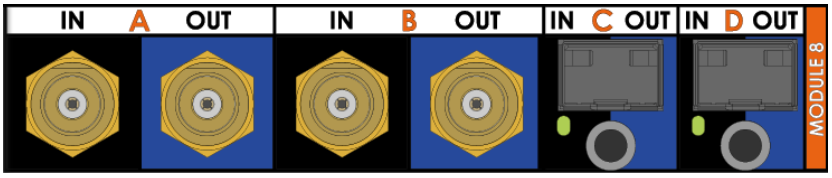
On an **IP** rear panel, it provides:

- 2 OUT connectors (A and B)

  to connect monitors directly to the server, and display PGM and REC channels on the monitors
- 2 IN connectors (A and B)

  to connect an external source and display it as an individual channel on the monitors.

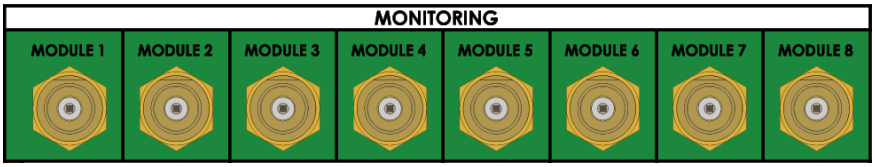
The C and D connectors cannot currently be used.



The Multiviewer monitor display is configured in the Multicam Configuration window, Monitoring tab, Multiviewer page. See the Multicam Configuration manual for a description of the configuration parameters.

Monitoring 1b

These BNC connectors provide 1080p monitoring of the UHD input or output channels.



Audio 2

NOTE

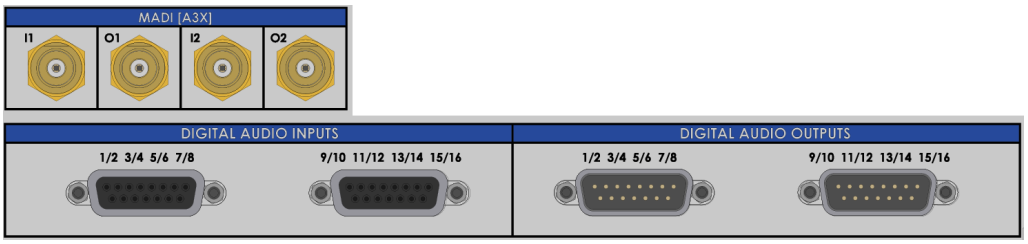
The MADI connectors are available by default on every XT-VIA server.
Other audio connectors are sold as options.

See section "Audio Specifications" on page 11 for more details on the available audio configurations.

See section "Audio Connections" on page 41 for more details on the DA-15 connectors pinout depending on the configuration.

MADI BNC + Digital DA-15

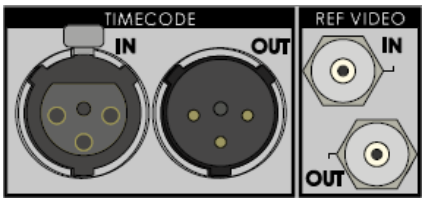
- MADI audio: 4 BNC connectors (2 in and 2 out)
- NEW ! Digital audio: 4 multi-pin DA-15 connectors (2 in and 2 out)



Timecode and Video Ref Connectors 3

The **Timecode** connectors allow the server to receive the LTC timecode reference signal and send the LTC timecode that corresponds to PGM1.

The **Ref Video** connectors allow the server to receive or send back the analog genlock reference signal.

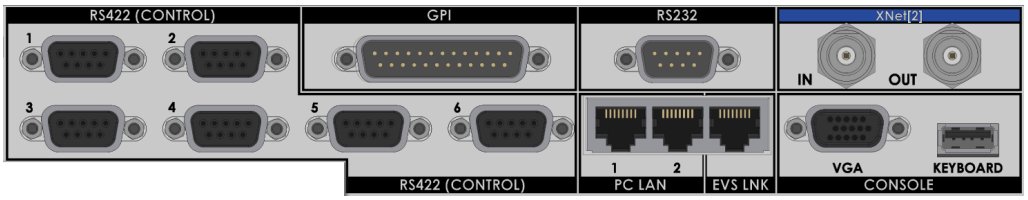


NEW !

NOTE

If the PTP is used to generate the Timecode and Genlock signals, these connectors do not have to be cabled. In this case, the Timecode and Genlock signals are generated from the PTP information received on the codec module 1 connector C.

Controls and Communications 4



This rear panel part, located below the audio connectors, presents connectors that allow the EVS server to communicate with other devices.

The connectors are described from top left to bottom right:

The **RS422 ports** allow the server to be remotely controlled through remote panels or third-party control devices. When a remote panel is used, it should be connected on the first RS422 port.

The **GPI** connector allows GPI (General Purpose Interface) devices to send or receive electric pulses that will trigger commands on the server or to be connected with third-party devices.

The **RS232** connector allows a tablet to be connected to the server.

The **XNet** connectors allow the interconnection of EVS servers in an XNet2 network. The IN connector of a server is connected to the OUT connector of another server, and so on to form a closed loop network.

Two **PC LAN** connectors allow connection of the PC LAN interface of the EVS server to an Ethernet network. Refer to the XT-VIA Configuration manual for more information on PC LAN redundancy.

The **EVS Link** connector is reserved for internal use.

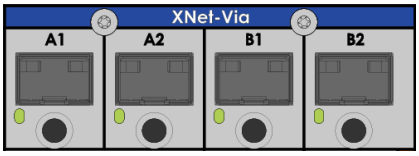
The **Console** connectors allow a monitor and a keyboard to be connected to the server.

NEW !

NOTE

If your XT-VIA server is fitted with MV4 multiviewer connectors, they will be ignored from Multicam version 16.1 onwards. Instead, you need to cable the MV4X multiviewer which corresponds to the codec module 8. See section "Multiviewer " on page 35.

Located on the right above the codec modules, the **XNet Via** connectors are not currently used as this new connectivity feature will be available in a future release:



Gigabit Ethernet Connectors Module 5

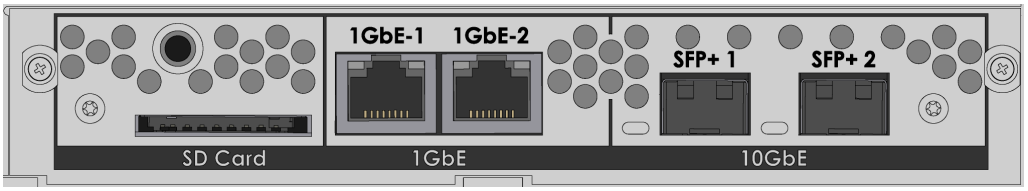
The Gigabit Ethernet Connector module of the GbE board is located at the bottom center of the rear panel.

This area can have one of the following layouts:

- It hosts the **full** Gigabit connector module.

  The **Gigabit Ethernet** connector module allows the interconnection of servers, other EVS, and/or third-party systems into a Gigabit Ethernet network via:

  - 2 SFP+ connectors, each offering a global bandwidth of 10 GbE
  - 2 RJ45 connectors, each offering a global bandwidth of 1 GbE
  - SD card slot



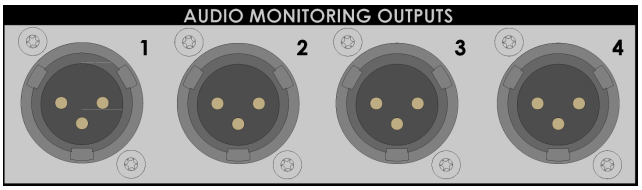
NOTE

The 10 GbE and 1GbE connectors cannot be used at the same time.

Audio Monitoring Connectors 6

This connector is located on the top right part of the rear panel, above the PSU.

The **Audio Monitoring Outputs** connectors are analog XLR connectors that allow audio output connections for monitoring purposes.



SAS-HDX Connector 7

This connector is located on the top right part of the rear panel, above the PSU.

This is not currently used.

Power Supplies 8

The server power supply is made of two hot-swappable units. Both of these units are connected to allow automatic power switching to the second power supply should the first one fail.

5.3. Video Connections

You fill find full details on video connections in the Configuration manual, in the chapter "Supported Configurations".

5.3.1. SFP+ Video Connectors

Supported SFP+ Connectors

The SFP+ connectors of 10GBASE-SR type have been tested and validated as video connectors:

Brand	Connector Reference
Skylane	SPP85P30100D
Arista	ETH-SFP-10G-SR
Intel	ESSFP-I-10G-SR
Cisco	ESSFP-C-10G-SR

WARNING

SFP+ 10G connectors with a single rate are recommended. Should the SFP+ video connectors be dual rate connectors, 10G has to be set as default speed.

5.4. Audio Connections

5.4.1. Audio Channels

The XT-VIA server manages up to 192 audio channels.

The embedded audio modules and codecs can be used as input or output channels for embedded, digital (AES/EBU) signals.

Depending on the server chassis or configuration, you can find the following audio connectors on the rear panel:

- Digital audio:
  - DA-15 connectors: 16 inputs (8 pairs) and 16 outputs (8 pairs) (110 Ohm balanced).

NEW !

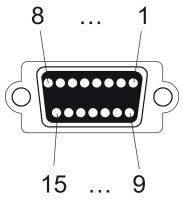
- MADI Digital audio (always available):
  - BNC connectors: 2 inputs and 2 outputs (75 Ohm unbalanced).

See also section "Audio Specifications" on page 11 for full information on the available audio hardware configurations.

5.4.2. Digital Audio DA-15 Pinout

NEW !

The digital audio DA-15 connector is illustrated hereunder (connector installed on the rear panel and viewed from outside). Its pinout is described in the following table where each column corresponds to one of the 4 available connectors.



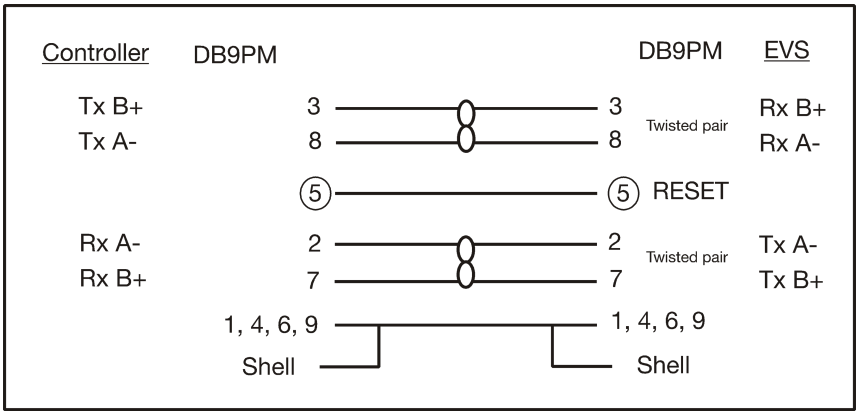
Pin #	DA-15 connector #1 Inputs 1-8 (mono)	DA-15 connector #2 Inputs 9-16 (mono)	DA-15 connector #3 Outputs 1-8 (mono)	DA-15 connector #4 Outputs 9-16 (mono)
1	Gnd	Gnd	Gnd	Gnd
2	AES input 1/2 +	AES input 9/10 +	AES output 1/2 +	AES output 9/10 +
3	Gnd	Gnd	Gnd	Gnd
4	AES input 3/4 +	AES input 11/12 +	AES output 3/4 +	AES output 11/12 +
5	Gnd	Gnd	Gnd	Gnd
6	AES input 5/6 +	AES input 13/14 +	AES output 5/6 +	AES output 13/14 +
7	Gnd	Gnd	Gnd	Gnd
8	AES input 7/8 +	AES input 15/16 +	AES output 7/8 +	AES output 15/16 +
9	AES input 1/2 -	AES input 9/10 -	AES output 1/2 -	AES output 9/10 -
10	Gnd	Gnd	Gnd	Gnd
11	AES input 3/4 -	AES input 11/12 -	AES output 3/4 -	AES output 11/12 -
12	Gnd	Gnd	Gnd	Gnd
13	AES input 5/6 -	AES input 13/14 -	AES output 5/6 -	AES output 13/14 -
14	Gnd	Gnd	Gnd	Gnd
15	AES input 7/8 -	AES input 15/16 -	AES output 7/8 -	AES output 15/16 -

5.5. RS422 Connections

5.5.1. RS422 Connector Pinout

The RS422 connectors are used to connect a remote control (from EVS or third party) to your server.

The cable wiring is a straightforward pin-to-pin connection as illustrated in the following diagram. You should use a shielded cable to avoid electromagnetic interference on long distances.



WARNING

The RESET command line from the remote control is sent through the pin 5 of the RS422 connector. This function should be disabled when the controller on connector #1 is not an EVS controller.

The technical specification for the RS422 link is as follows:

- 19200 bauds
- No parity
- 8 data bits
- 1 stop bit

5.6. XNet Network

5.6.1. Introduction

The XNet network consists of several EVS video servers or other EVS hardware all connected with a 75-Ohm coaxial cable (BNC).

The data exchange between systems is operated through the SDTI interface at 2970 Mbps (3 Gbps), with non-relay connectors.

The SDTI loop is closed only when the Multicam software is started. As non-relay connectors are used, it is recommended to use XHub to avoid network interruptions.

The XNet requires a network server dedicated to the management of the database shared among all EVS video servers. This is assigned to one of the EVS servers on the network. The EVS server acting as the network server can of course be used for standard server operations.

5.6.2. Network Architectures

Introduction

To set up an XNet network, EVS servers may be connected directly in a closed loop architecture. Using a dedicated hub, they may be connected in a star architecture as illustrated in the following figure.

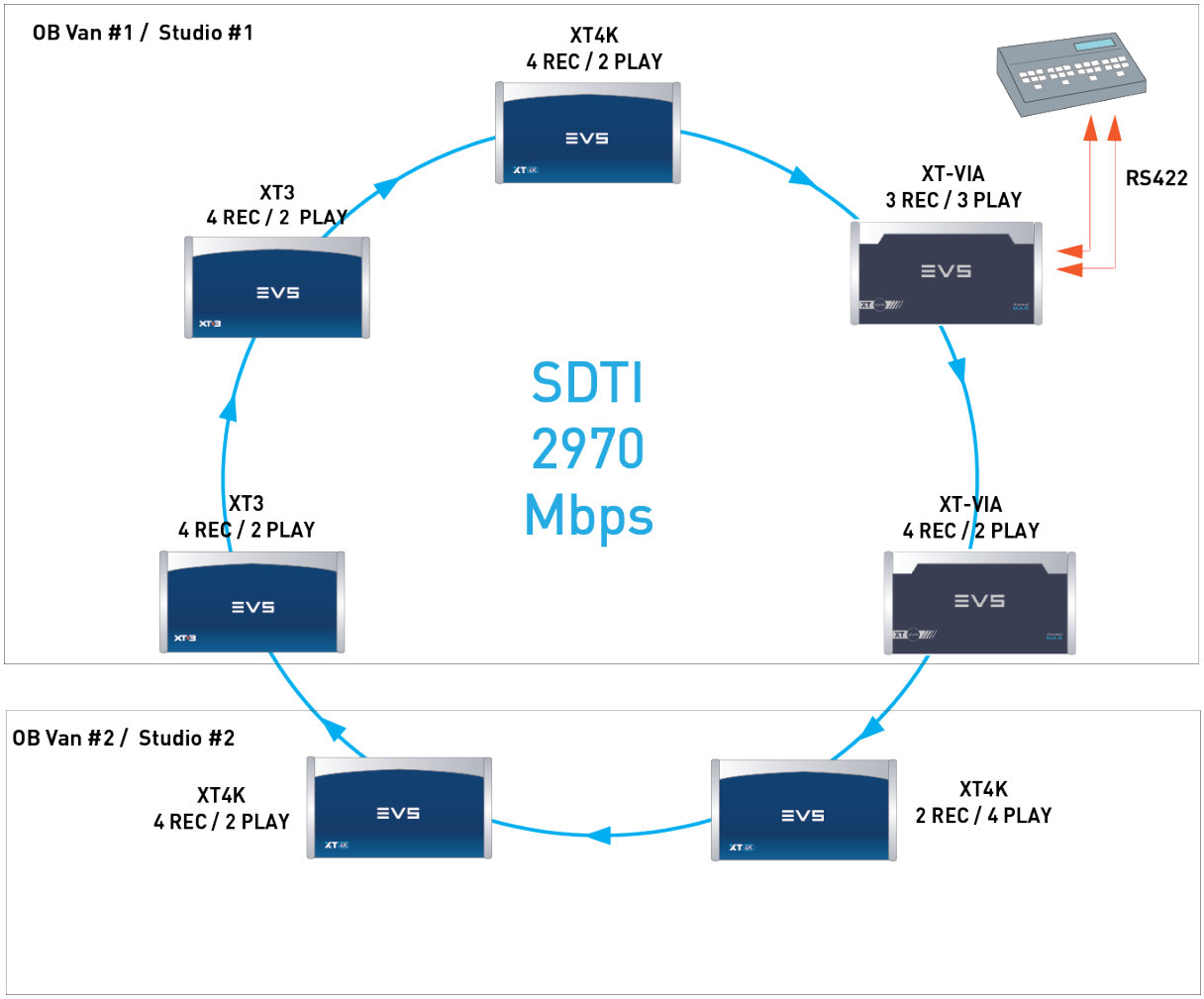
NEW !

NOTE

From Multicam 16.1 onwards, XHub v4.01 only is supported if the XNet network include XT-VIA or XS-VIA servers. Otherwise, XHub v4.00 is still supported.

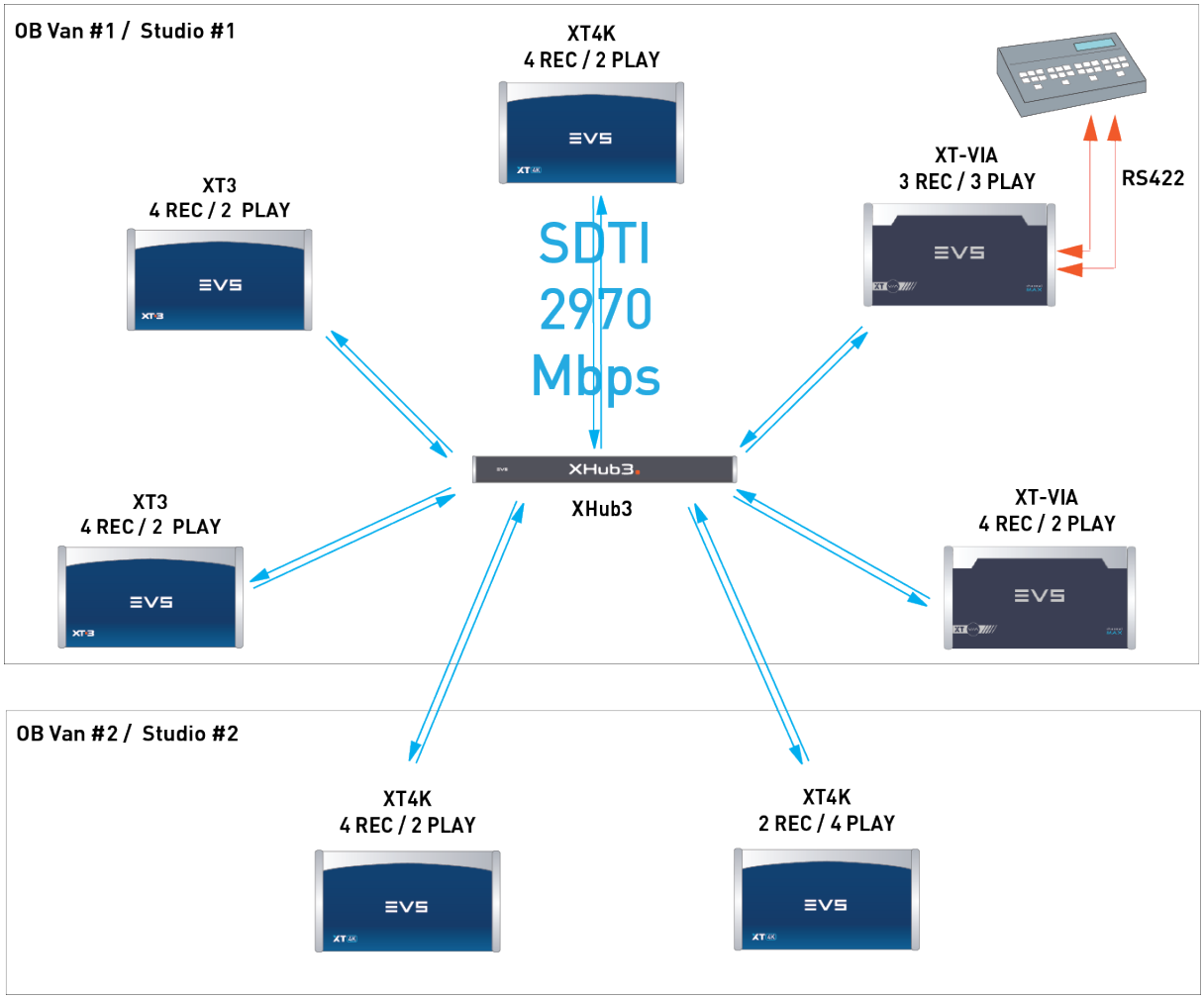
Connection Diagram Without EVS XHub SDTI Hub

Example of XNet network without XHub:



Connection Diagram With EVS XHub SDTI Hub

Example of XNet network with an SDTI hub:



5.6.3. Required Conditions to Set up and Run XNet

1. The EVS video servers XT3, XS3, XT4K, XS4K, XT-VIA, XS-VIA and XHub all need to be interoperable on the SDTI network.
2. The SDTI advanced option code (for network client, master, or server modes) shall be validated in the options list.
3. They shall all be running compatible software versions. Otherwise, warning message is displayed.
4. The SDTI speed parameter shall have the same value on all EVS servers (**Network** page, **SDTI** section).
5. The EVS video servers shall operate the same multi-essence configuration.

6. The EVS video servers shall operate the same codec for video material to be fully interoperable between EVS video servers.
7. The network type must be set to "Server" on one and only one EVS video server on the network. The others must be set to either "Master" (to share clips and view others clips) or "Client" (to share clips only).
8. A different network number must be specified for each EVS video server that you want to connect to the network. If the same network number is assigned to 2 different systems, the second one will not be able to connect and a warning message will be displayed.
9. All EVS video servers must be connected with a good quality BNC 75 Ohm cable to form a closed loop.

   Connect the SDTI OUT connector of the first EVS video server to the SDTI IN connector of the second one, etc until the loop is closed by connecting the SDTI OUT connector of the last EVS video server to the SDTI IN connector of the first one.

   The SDTI loop must be closed at all times during network operation. If for any reason the loop is open, all network communication will be interrupted and all systems will automatically switch to stand alone mode. When the loop is closed again, network operation will resume automatically. This problem can be avoided or limited using an XHub.
10. The distance shown in the table below is the maximum cable length between two active EVS servers, or 2 SDTI reclockers, on an XNet SDTI network, using a single piece of cable between 2 servers or 2 reclockers.

    Intermediate connectors, patch panels, etc., might degrade these figures. Depending on the number of servers connected on the network, the location of the master server, the presence or not of an XHub SDTI hub, the actual maximum values may be higher than indicated. If longer distances between servers are required, SDTI to Fiber converters can be used, allowing distances over thousands of meters if necessary.

    EVS has validated the following SDI-fiber converters:

    - BlueBell BC313T and BC313R (Single channel) or BC323TR (Dual channel)

      (www.bluebell.tv)
    - Barnfind BarnMini-01 (Dual channel)

      (www.barnfind.no)
    - Yellobrik OBD 1810 (multiplexer), OTR 1810 & OTR1840 (transceiver)

      (www.yellobrik.com)
    - Extron FOX 3G HD-SDI P

      (www.extron.com)
    - Multidyne HD 3000 TRX

      (www.multidyne.com)

Cable type	@ 2970 Mbps
RG59	30 m / 98 ft
RG6	70 m / 230 ft
RG11	85 m / 279 ft
Fiber	55 km (*)

(*) 55 km is the total length of the return path, i.e. the actual distances between the 2 servers connected via the fiber link is half of this value, i.e. 22.5 km @ 2970 Mbps.

NOTE

When reclockers are used, the total delay induced by these reclockers between 2 active servers on the network may not exceed 15 µs.

5.6.4. Starting XNet

1. When all above conditions are fulfilled and the cabling is correct, turn on the "Server" EVS video server.
2. Make sure the value to **Server** in the **Type** field in the **SDTI** section on the **Network** page. Then start Multicam.
3. Turn on all "Master" and "Client" EVS video servers, and make sure the appropriate value is selected in the Type field in the SDTI section.
4. Start Multicam on all of the Master and Client EVS servers.

They should see the "Server" on the network and they will connect automatically. Connection takes a few seconds (usually between 2 and 5 sec) for each EVS video server.

5.7. Gigabit Network

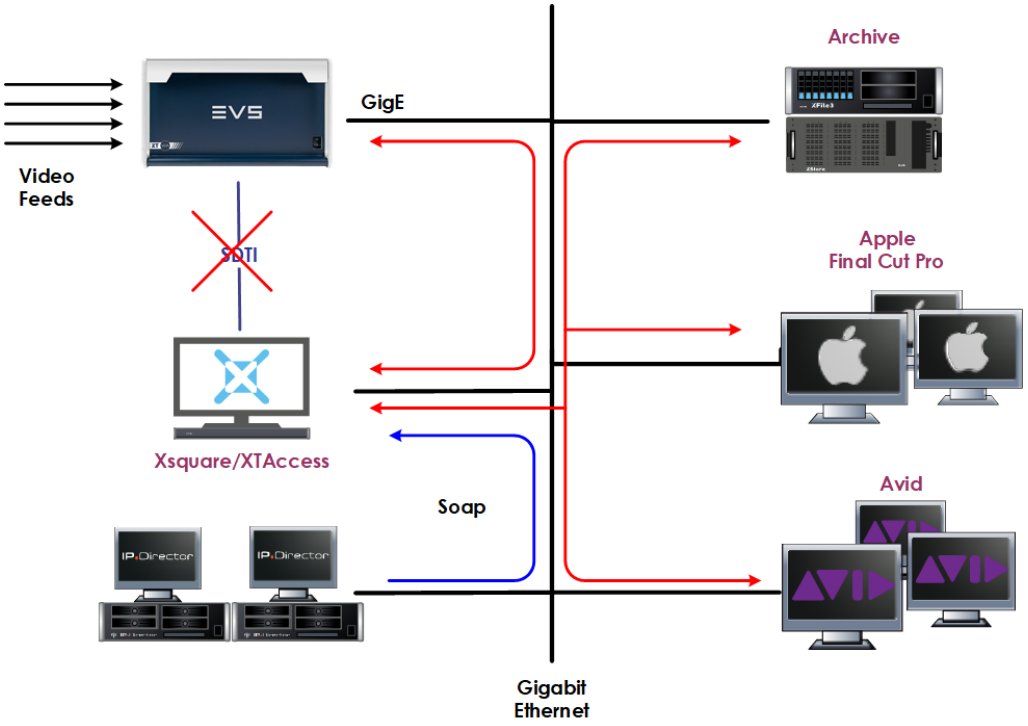
5.7.1. Functional Overview

The Gigabit connection makes it possible to transfer video and audio material from your XT-VIA server to external systems via the TCP/IP network.

The external systems can be the following:

- A storage system or an archiving system, such as XStore.
- A non-linear editing system, such as Apple Final Cut Pro, or Avid.

However, the external systems cannot read the raw files coming from an XT-VIA server. For this reason, Xsquare/XTAccess are used as a "gateway" between your server and the IT world. In this architecture, the Xsquare application plays the role of XTAccess orchestrator on the Gigabit network, communicating via the PC LAN connection.



Xsquare is directly connected to the XT-VIA server through the Gigabit network via an FTP client. It runs on a Windows workstation and is mainly controlled by the external systems (no user interface) via soap requests or other processes.

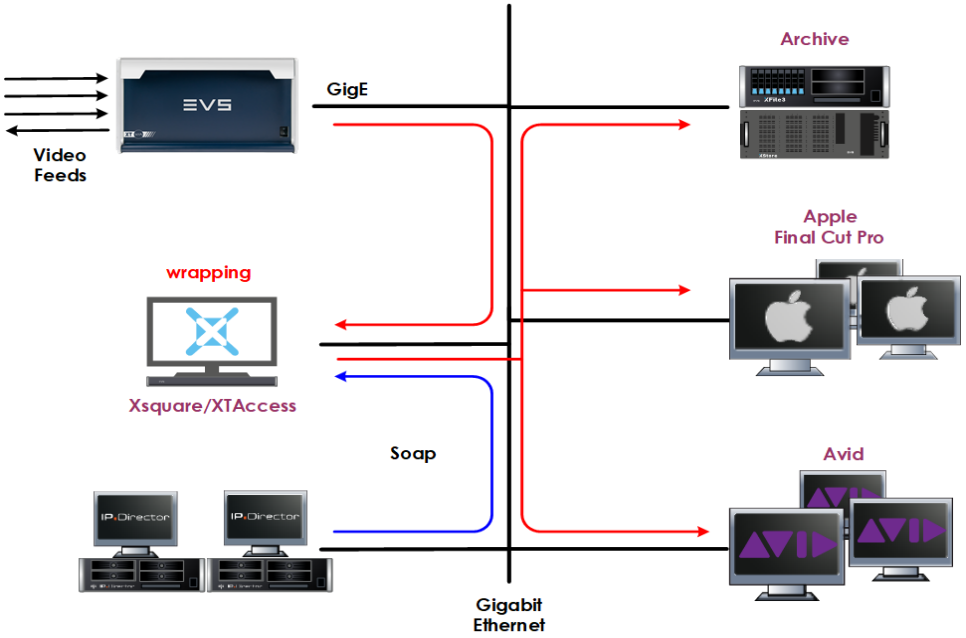
The Gigabit connection fulfills the following functions in relation with the XT-VIA server:

- Backup of clips from an XT-VIA server.
- Restore of clips to an XT-VIA server.
- Transfer of clips between servers.

5.7.2. Backup of Clips

Overview

The following schema shows how the backup of clips is performed with the Gigabit connection and Xsquare/XTAccess:



Workflow

1. An external system, for example IP Director, sends a soap request to Xsquare to request the backup of a given clip created on XT-VIA server .
2. Xsquare processes the soap request:
   - It gets the clip content that has to be backed up from the server.
   - It generates a backup file of the clip in the format specified by the external system (no transcoding feature, only native codec).
   - It stores the backup file in the target folder specified by the external system.

5.7.3. Restore of Clips

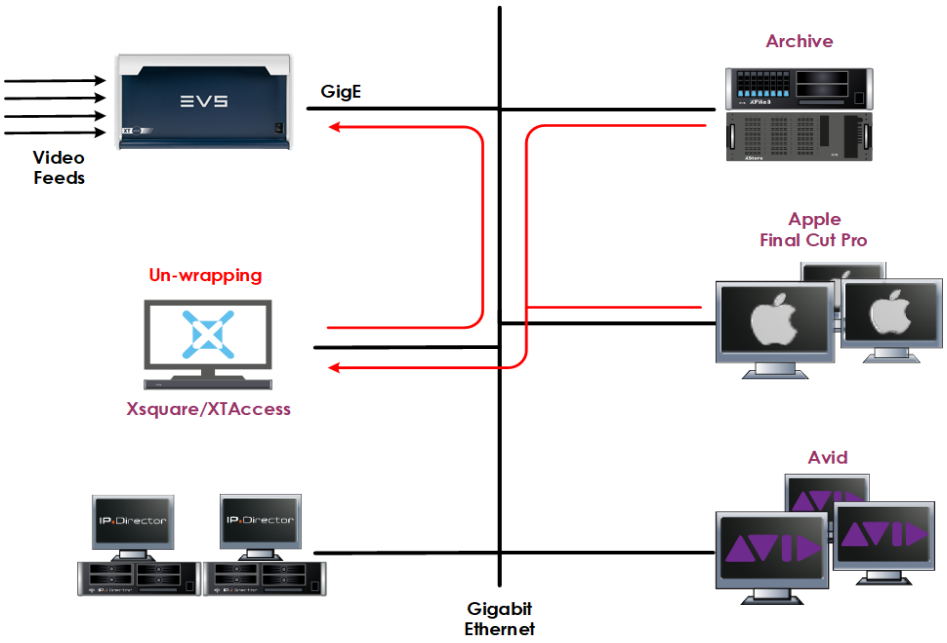
Overview

Clips having one of the supported formats can be restored. Refer to the Xsquare release notes for more information about supported formats.

The restore process can be set up in two different ways:

- via a soap request sent by the external application.
- via folder scan.

The following schema shows how the restore of clips is performed with the Gigabit connection and Xsquare:



Workflow (Restore via Soap)

1. An external system (which can generate soap requests for restoring clips, for example IPDirector) sends a soap request to Xsquare for restoring (copy) the clips from an archiving or backup system to a given XT-VIA server.
2. Xsquare processes the soap request:
   - It gets the clip file to restore from the external system.
   - It restores, i.e. copies, the clip on the server specified in the soap request.

Workflow (Restore via Folder Scan)

1. Based on the parameters defined in Xsquare, this application scans specific folders on external backup or archiving systems.
2. When a clip file has been written to the scanned folder, Xsquare creates a copy of the clip on the server specified in the Xsquare parameters.

   The restored clip receives a new UmID and LSM ID:

   - Multicam automatically assigns a UmID to the restored clip.
   - A start LSM ID is specified in Xsquare and incremented as defined for each new clip that is restored in order to find an empty location on the server.

   The restored clip contains the clip metadata.
3. The restored clip is moved from the scanned folder to one of the following subfolders on the external archiving or backup system:
   - \Restore.done\: folder where the files are moved to when they are successfully restored.
   - \Restore.error\: folder where files are moved to when they failed to restore.

5.7.4. Important Rules

Gigabit networks including EVS servers need to abide by the following rules:

- The hardware used on GbE networks with EVS servers need to support jumbo frames.
- Both GbE ports of an EVS server need to be defined on different sub-networks.
- This is not possible to implement failover through the GbE network.
- The two GbE ports available on the internal switch (PC LAN) are 1000 Base-T ports.

The GbE ports are used for monitoring purposes (XNet Monitor) or for the communication with other applications (LinX).

NOTE

Contact the Support or Pre-Sales team to select the appropriate switches for your setup.

5.8. GPIO Connections

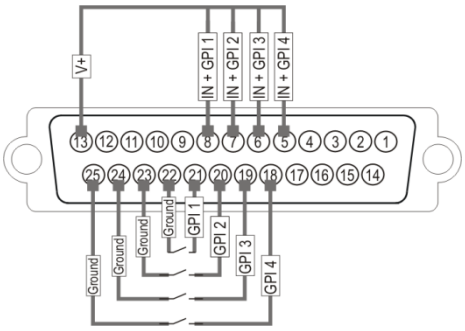
5.8.1. GP In Connections

GPI Triggers

The allocation of the XT-VIA server GPI triggers is performed in the Multicam Configuration window, in the GPI tab. See the Configuration manual for detailed information on allocating GPI triggers.

Opto isolated Inputs (GP In 1, 2, 3, 4)

Pin-Out



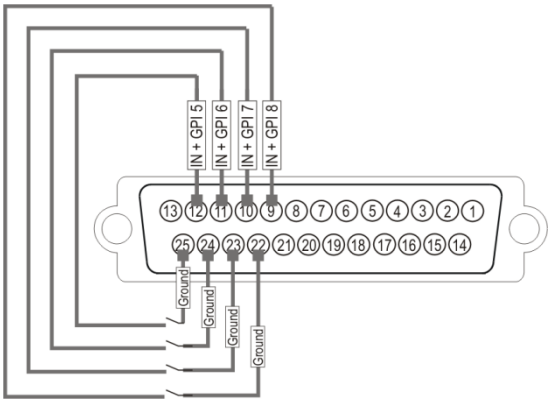
Specifications

- The input consists in an opto diode (VF @ 1.1 Volt) in series with a 470 ohm resistor.
- Typical switching point @ 1.4 mA, for secure operation:
  - i=0 to 0.5 mA -> opto OFF
  - i=2.5 to 30 mA -> opto ON
  - imax= 30 mA
- Direct connection to a TTL/CMOS signal possible (Pin opto - to GND and pin opto + to the TTL/CMOS signal).

  Typical switching point @ 1.6 Volts, for secure operation:
  - Vin< 0.8 Volts -> opto OFF
  - Vin> 2.2 Volts @ 2 mA -> opto ON
  - Vin max (without external resistor) = 15 Volts

TTL Inputs (GP In 5, 6, 7, 8)

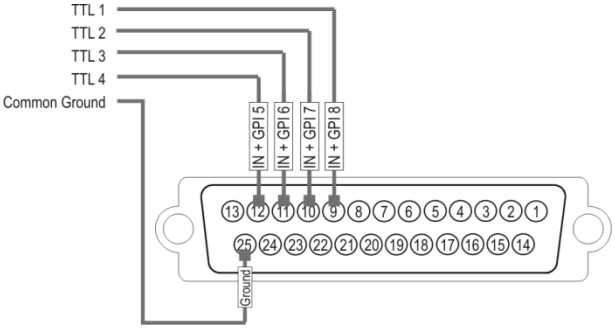
Relay Inputs Pin-Out



The relay must be connected between the ground and the corresponding TTL input on the DB-25.

TTL Inputs Pin-Out

Each TTL input on the DB-25 is directly connected to the pin of the TTL connector on the device triggering the GPI. The ground must be common between the DB-25 connector of the XT-VIA server and the external device.



Specifications

- each pin can be individually configured as an output or an input
- internal 4K7 pull up to +5 V
- low level Vi < 1.5 Volt (U12 = 74HC245)
- high level Vi > 3.5 Volt (U12 = 74HC245)
- optional TTL compatible level (U12 = 74HCT245)

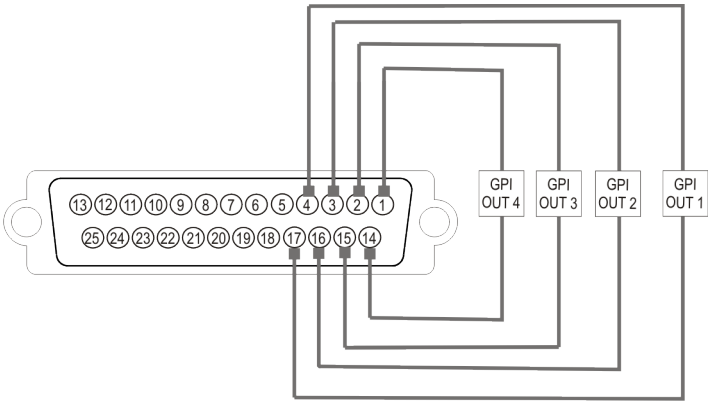
5.8.2. GP Out Connections

Relay Isolated Outputs (GP Out 1, 2, 3, 4)

Pin-Out

The user can define the functions, types and settings associated to the GPI outs in the following applications:

- Setup menu of the Remote Panel
- IP Director settings (GPI and Auxiliary Track tab)

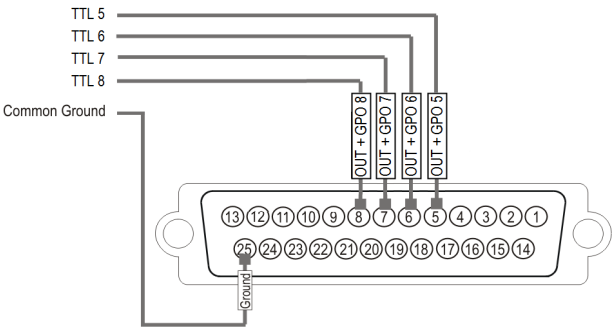


Specifications

- normally open contact (power off -> open)
- maximum 1 A
- maximum 50 Volts
- typical life time: 100.000.000 switchings

TTL Outputs (GP Out 5, 6, 7, 8)

Pin-Out



Specifications

- each pin can be individually configured as an output or an input
- internal 4K7 pull up to +5 V
- low level Vi < 1.5 Volt (U12 = 74HC245)
- high level Vi > 3.5 Volt (U12 = 74HC245)
- optional TTL compatible level (U12 = 74HCT245)

6. Boards Description

6.1. Boards and Slots Configuration

The XT-VIA server is equipped with several boards that are all developed by EVS:

Slot #	Installed boards
	6 x UHD-4K video channels
7	R4X
6	H4X
5	A3X (Audio Codec)
4	—
3	V4X #2
2	V4X #1 Genlock
1	MTPC

6.2. Hardware Edition History

The following table lists the various hardware editions, with the boards and hardware options available for each edition. The table aims at giving guidelines to differentiate one revision to the other. However, other hardware combinations are possible.

The table lists the hardware editions regardless of the date when a given EVS server was first commercialized. Consequently, any hardware revision earlier than the hardware revision of the first commercialization should be disregarded.

Hardware Edition	MTPC	Multiviewer	Controller Board	Audio	Video Base	Video Module	TGE	Rear Panel	Internal LAN	Multicam Version
6.00	HS-873	MV4 & MV4X	H4X	A3X	V4X A4	6 x V4X	10G	XT-VIA	Yes	16
NEW ! 6.20	HS-873	MV4X	H4X	A3X	V4X A4	6 x V4X	10G	XT-VIA	Yes	16

6.3. V4X Video and Reference Boards

6.3.1. Description

Overview

The V4X board is divided in several parts:

- a base board identified as V4X base
- four modules identified as V4X A, B, C and D

The XT-VIA server is equipped with 2 V4X boards:

- one V4X board has all 4 modules installed
- one V4X board has only 3 modules installed

WARNING

It is highly advised not to remove a V4X board from your EVS server. Should you have to do so, manipulate the board very carefully, making sure it is not exposed to mechanical or electric shocks.

COD Modules

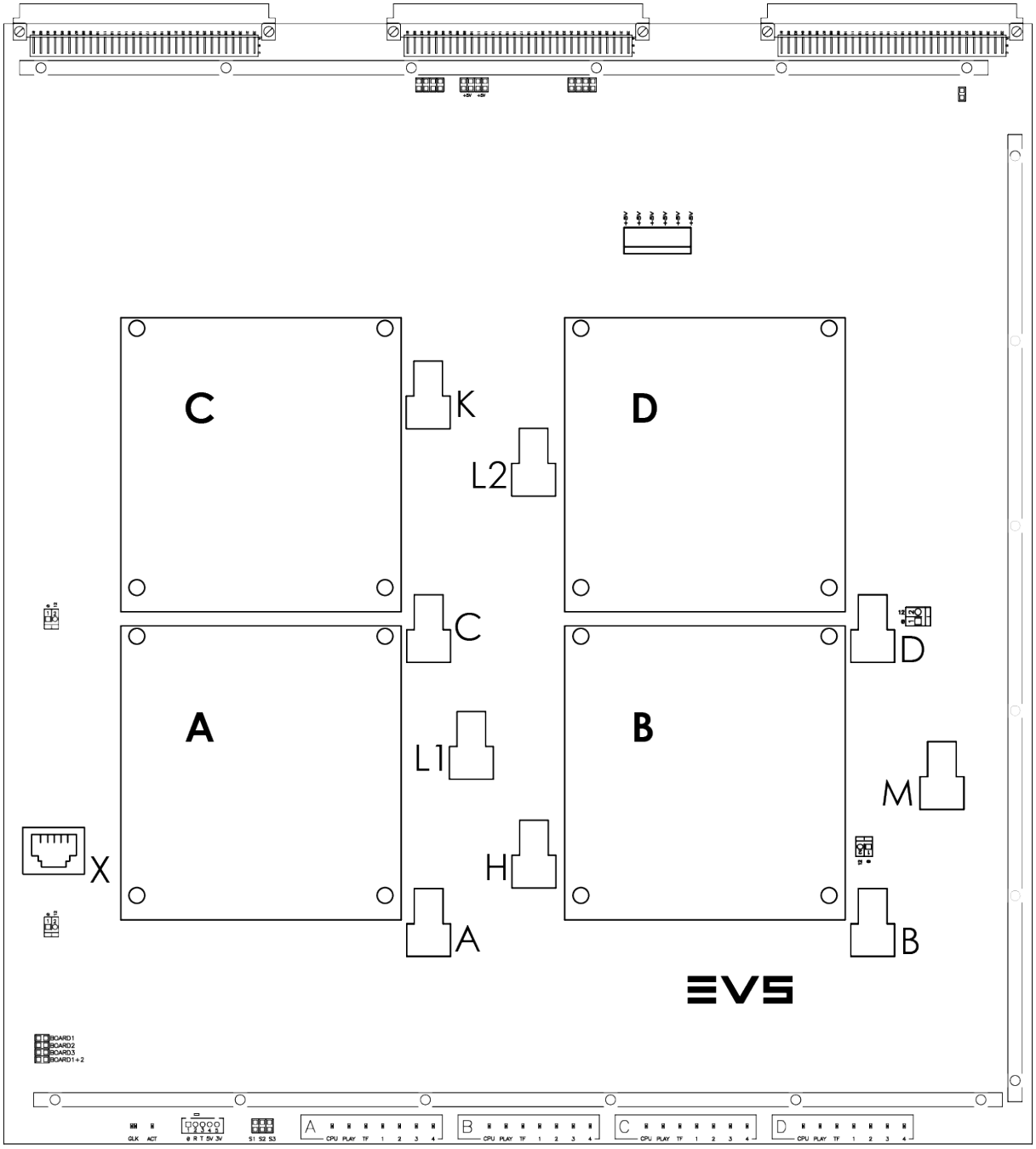
V4X modules are the actual codec modules, each of them being able to be configured by software either as an encoder (for a record channel) or as a decoder (for a play channel).

They support the following features:

- UHD-4K on a single V4X module
- 720p / 1080i / 1080p 50/59.94 Hz video standards

Block Diagram

The block diagram of the V4X board is illustrated hereunder with the connectors, and LEDs location:



Connectors

The following table lists the connectors and their respective function:

Connector	Function
A	Rear panel connection for codec 1 or 5
B	Rear panel connection for codec 2 or 6
C	Rear panel connection for codec 3 (not present on second V4X board)
D	Rear panel connection for codec 4 or 8
M	Rear panel connection for monitoring
H	Link to H4X board
K	K connector of the 1st V4X connected to K connector of the 2nd V4X
L1	L1 connector of the 1st V4X connected to L2 connector of the 2nd V4X
L2	L1 connector of the 1st V4X connected to L2 connector of the 2nd V4X
X	RJ45 connected to a black connector on the switch module of the H4X board

LEDs

The table below lists the LEDs available with the genlock functionality. These are functional whatever the genlock source.

WARNING

It is crucial to have a continuous and stable genlock signal when the server is in operation. In case of interferences on the genlock signal that would cause parity violations, the recorders will automatically be restarted to maintain data integrity.

LED	Color	Status	Function
GLK	—	Off	The genlock module is not initialized.
	Green	Blinking	The genlock module is properly initialized, but no valid genlock signal is detected.
		On	The module is initialized and a valid genlock signal is detected.
	Red	Blinking	There is a genlock problem.
		On	A resync is needed.

V4X Modules LEDs

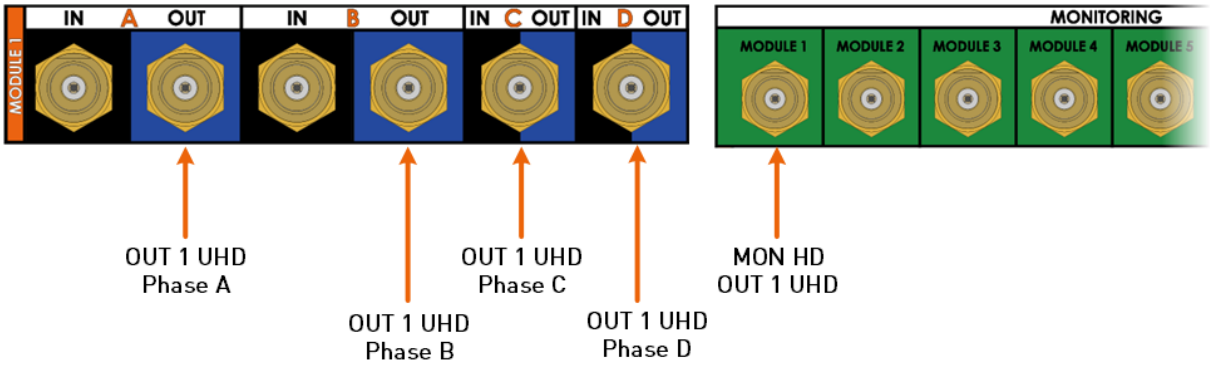
The following table lists the LEDs available on then V4X modules (from left to right):

LED	Color	Status	Function
CPU	Green	Blinking	Indicates CPU activity.
		On	There is a problem with the module processor.
PLAY	Green	On	The module is set in play mode by the software.
		Off	The module is set in record mode.
TF (transfer)	Green	Blinking	Data transfers occur between the module and the H4X board.
1	—	—	Not used.
2			
3			
4			

6.3.2. COD Connectivity in UHD-4K

SDI Panels

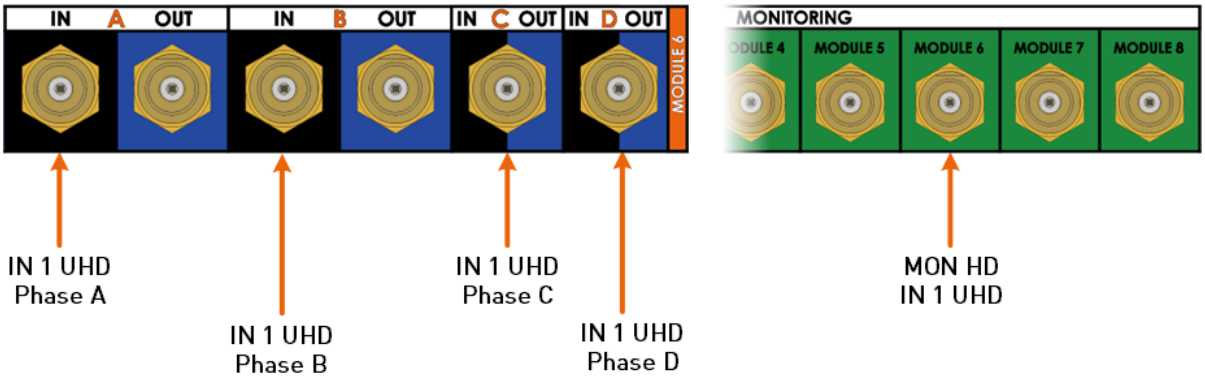
OUT Channels



Connector label	UHD-4K in 3G-SDI
OUT 1A	3G-SDI output of the top left frame (square division) or 3G-SDI output of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)
OUT 1B	3G-SDI output of the top right frame (square division) or 3G-SDI output of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)

Connector label	UHD-4K in 3G-SDI
OUT 1C	3G-SDI output of the bottom left frame (square division) or 3G-SDI output of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)
OUT 1D	3G-SDI output of the bottom right frame (square division) or 3G-SDI output of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)
UHD MON 1	HD (1080p) monitoring of UHD OUT1 The monitoring output results from a mean of the 4 corresponding UHD-4K pixels.

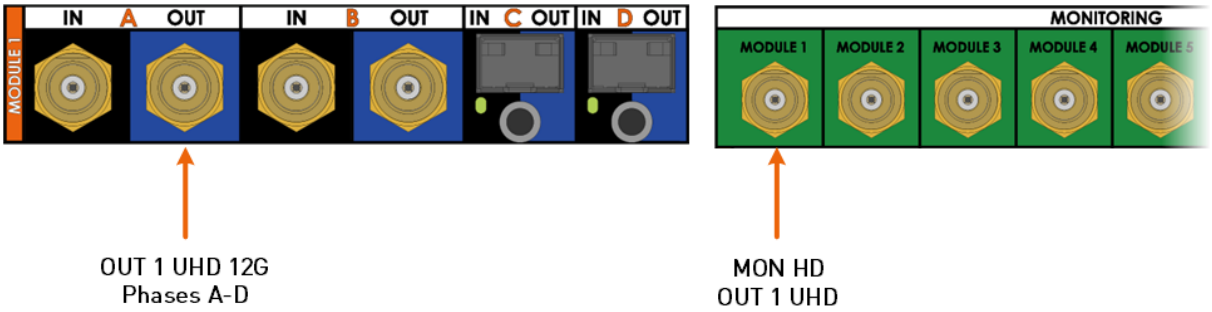
IN Channels



Connector label	UHD-4K 3G-SDI
IN 1A	3G-SDI input of the top left frame (square division) or 3G-SDI input of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)
IN 1B	3G-SDI input of the top right frame (square division) or 3G-SDI input of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)
IN 1C	3G-SDI input of the bottom left frame (square division) or 3G-SDI input of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)
IN 1D	3G-SDI input of the bottom right frame (square division) or 3G-SDI input of a 1080p frame at 1/4 of 4K resolution (two-sample interleave)
UHD MON 1	HD (1080p) monitoring of UHD IN1 The monitoring output results from a mean of the 4 corresponding UHD-4K pixels.

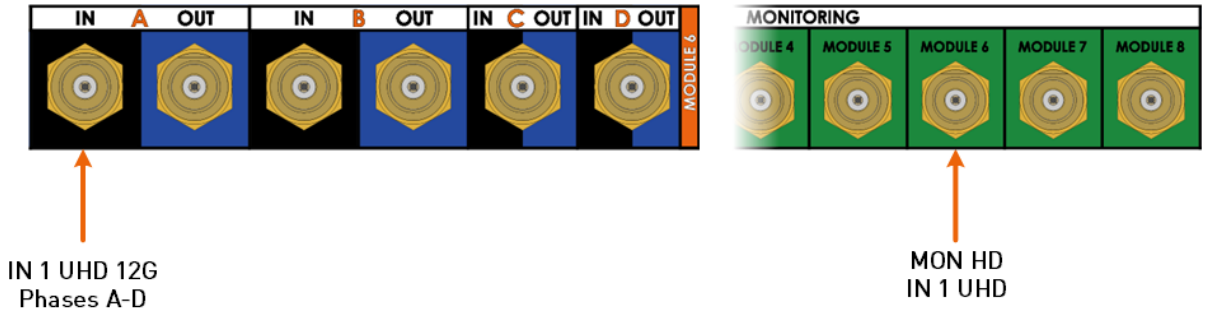
XIP Panels

OUT Channels



Connector label	UHD-4K 12G-SDI
OUT 1A	12G-SDI output of the UHD-4K image
UHD MON1	HD (1080p) monitoring of UHD OUT1 The monitoring output results from a mean of the 4 corresponding UHD-4K pixels.

IN Channels



Connector label	UHD-4K 12G-SDI
IN 1A	12G-SDI input of the UHD-4K image
UHD MON1	HD (1080p) monitoring of UHD IN1A The monitoring output results from a mean of the 4 corresponding UHD-4K pixels.

6.3.3. COD Connectivity in HD

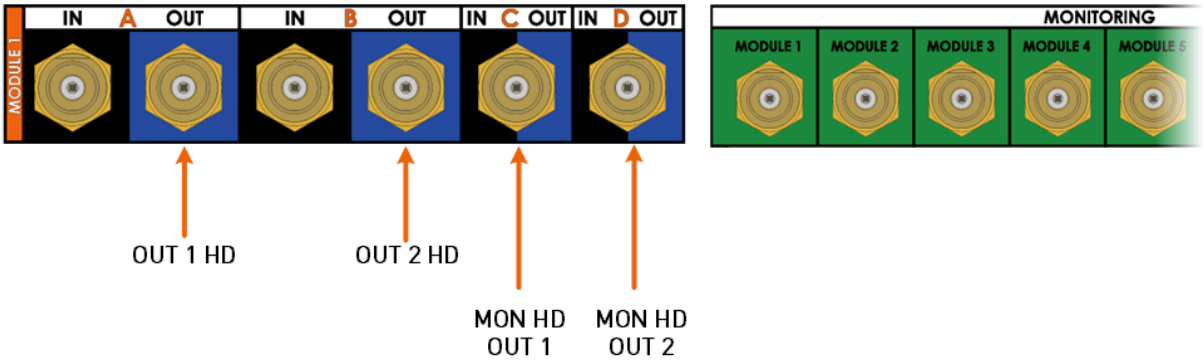
SDI Panels

In a 1st step, the OUT channels are cabled first starting from top to bottom, using only the first two connectors of the codec modules.

In a 2nd step, the IN channels are cabled starting from bottom to top, using the first two connectors of each available codec module.

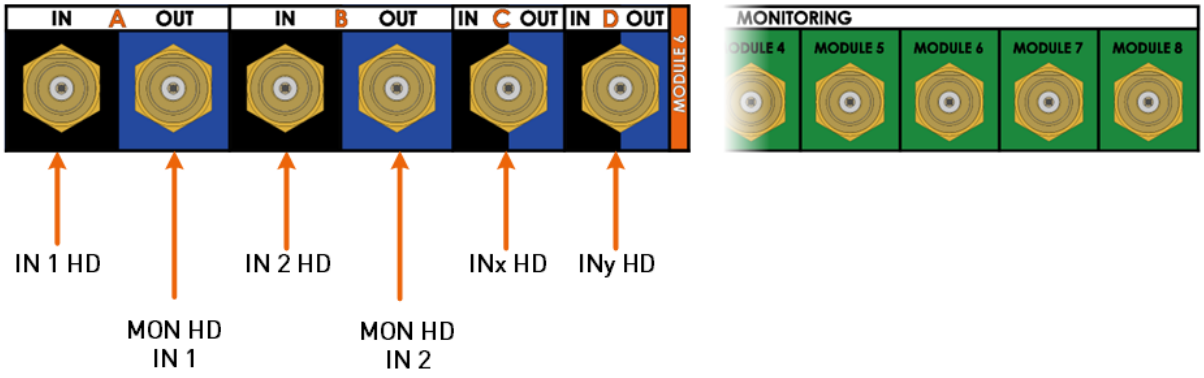
The remaining IN channels can only be cabled on the connectors C and D of the codec modules on which HD IN channels are already cabled.

OUT Channels



Connector label	HD Mode
OUT 1A	SDI output of the OUT1 channel.
OUT 1B	SDI output of the OUT2 channel.
OUT 1C	SDI monitoring output of the OUT1 channel.
OUT 1D	SDI monitoring output of the OUT2 channel.

IN Channels



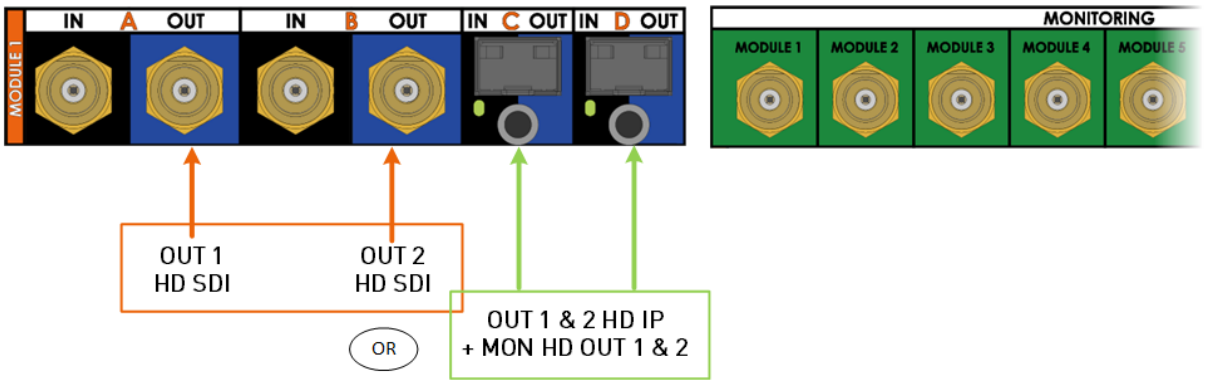
Connector label	HD Mode
IN 6A	SDI input of the IN1 channel.
IN 6B	SDI input of the IN2 channel.
IN 6C	SDI input of another IN channel or SLSM phase (only in SLSM configurations). In this case, no discrete monitoring on this channel.
IN 6D	SDI input of another IN channel or SLSM phase (only in SLSM configurations). In this case, no discrete monitoring on this channel.
OUT 6A	SDI monitoring output of the IN1 channel.
OUT 6B	SDI monitoring output of the IN2 channel.

XIP Panels

On hybrid panels, you can use either the SDI connectors or the IP connectors, but not both connector types concurrently. The cabling principles on hybrid panels are the same as on SDI panels.

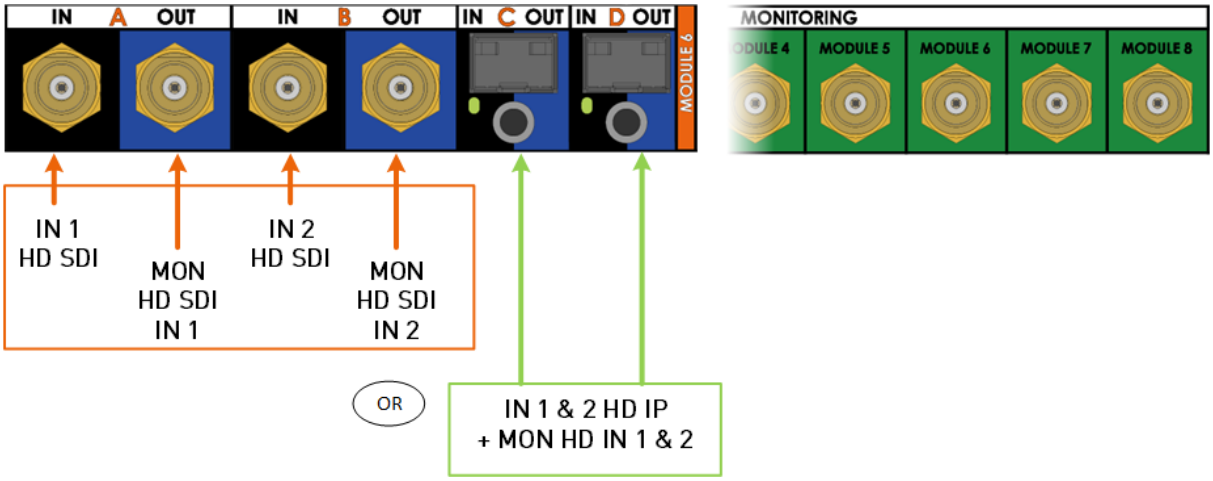
The hybrid panels can accommodate configurations with maximum 8 channels using the 4 codec modules on the SDI or IP interface.

OUT Channels



Connector label	HD Mode
OUT 1A	SDI output of the OUT1 channel (no SDI monitoring).
OUT 1B	SDI output of the OUT2 channel (no SDI monitoring).
OR	
SFP 1C	IP output of the OUT1&2 channels **and** IP monitoring of the OUT1&2 channels
SFP 1D	

IN Channels



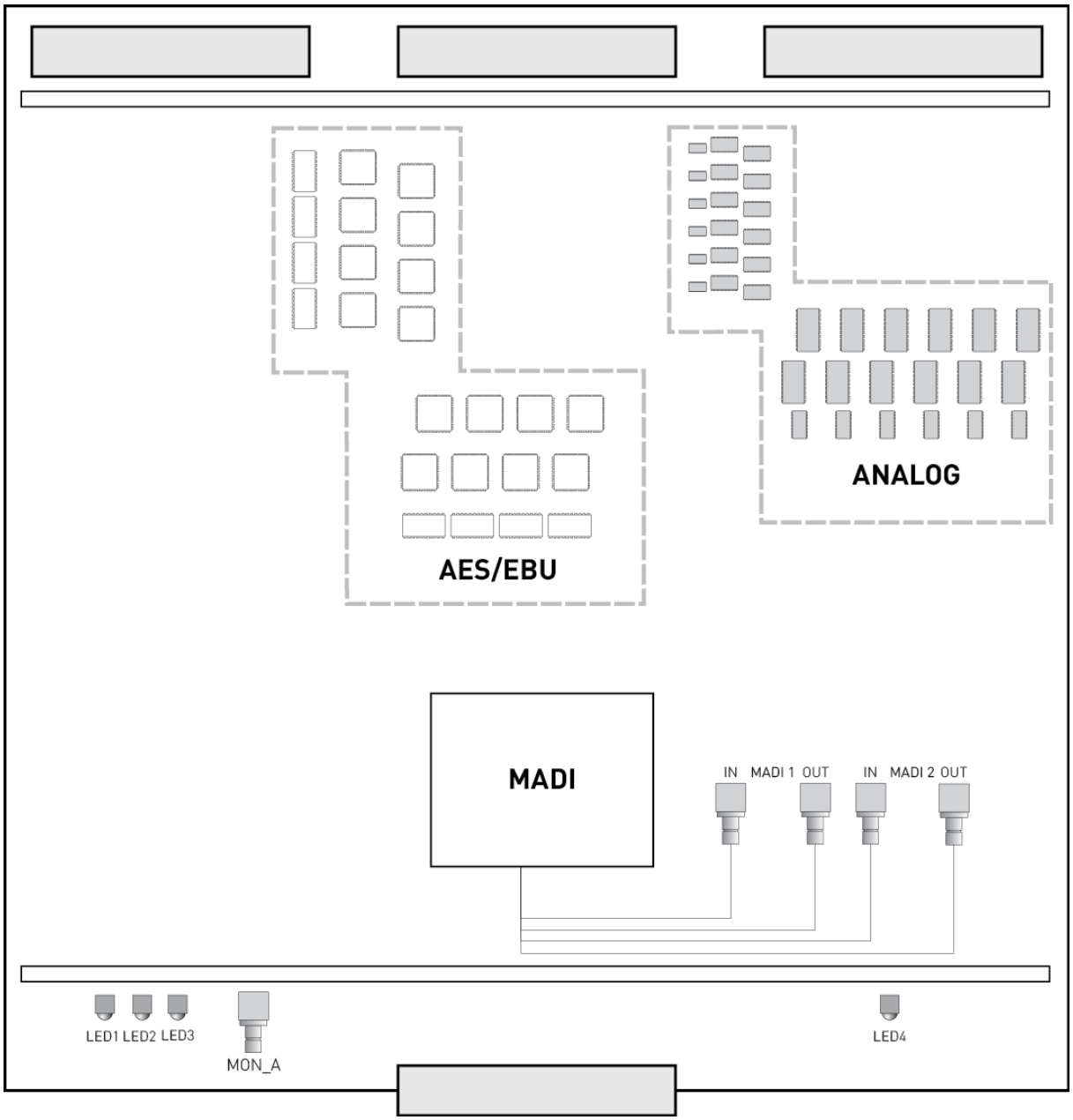
Connector label	HD Mode
IN 6A	SDI input of the IN1 channel.
IN 6B	SDI input of the IN2 channel.
OUT 6A	SDI monitoring output of the IN1 channel.
OUT 6B	SDI monitoring output of the IN2 channel.
OR	
SFP 6C	IP input of the IN1&2 channels **and** IP monitoring of the IN1&2 channels
SFP 6D	

6.4. Audio Codec Board

The audio codec board (A3X) is the audio interface between the V4X boards and the H4X board. Video codec and audio codec boards are tied to the H4X board with one bus connector on the front side. Different audio configurations are available with the audio codec board. See section "Audio Connections" on page 41 for details.

The following LEDs are available on the audio codec board:

- LED 1-3: internal EVS information only.
- LED 4: transfer activity to/from the H4X board.

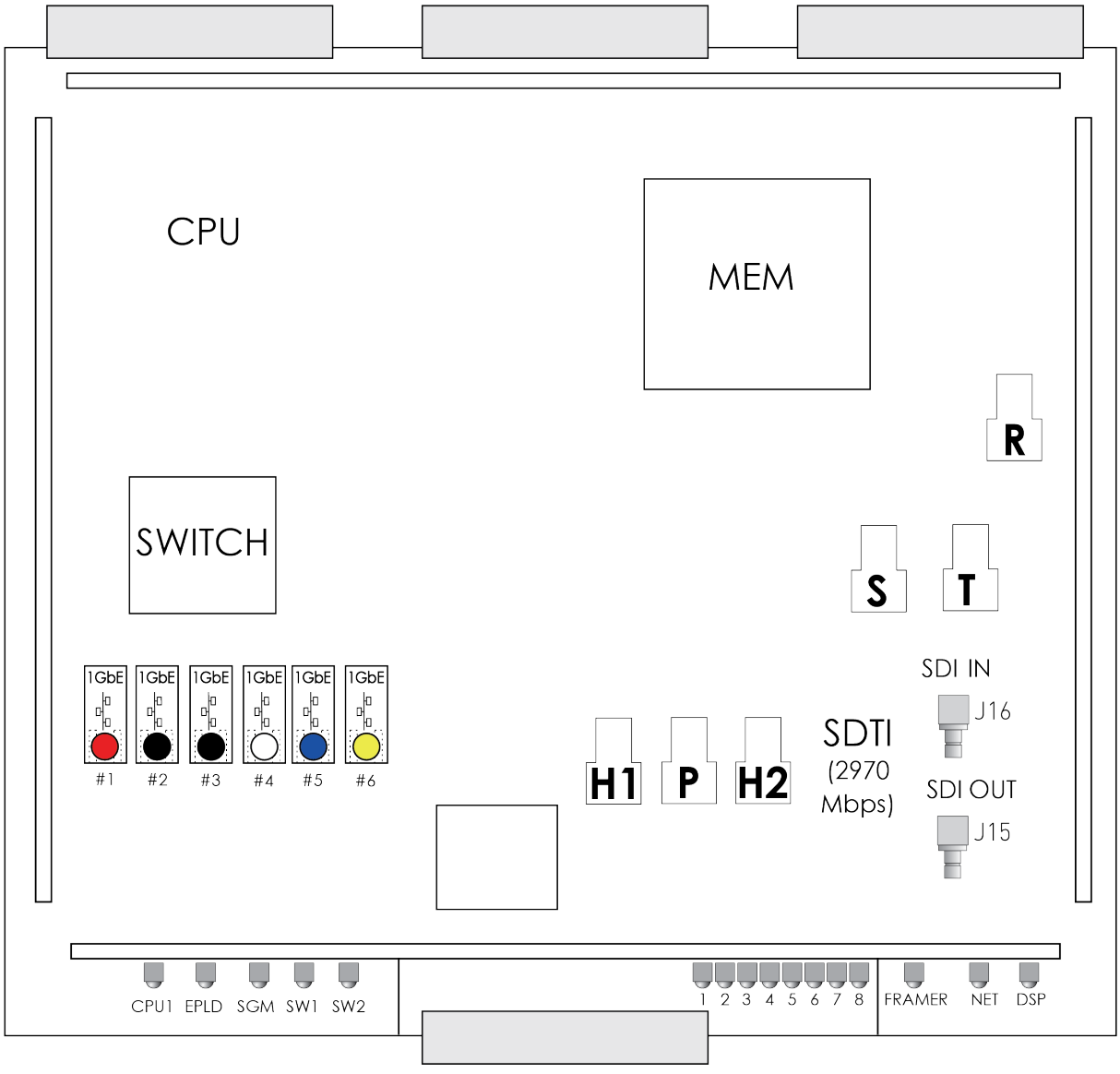


6.5. Controller Boards

6.5.1. H4X Board

The H4X board is divided in 3 parts:

- Back: CPU module and its memory modules.
- Front left: Internal switch module.
- Front right: SDTI module.



LEDs Function

The available LEDs linked to the CPU module are, from left to right:

LED	Color	Status	Function
CPU1 EPLD	Green	Blinking	These LEDs blink to indicate that the processor is running.
Other LEDs	—	—	For EVS internal use only.

The available LEDs linked to the SDTI controller module are, from left to right:

LED	Color	Status	Function
LED 1	Green	On	Ok.
	Red	On	An error occurred while booting the H4X board.
LED 2 to LED 8	—	—	For EVS internal use only.
FRAMER	Green	On	The signal on the XNet IN connector is a valid EVS SDTI signal.
NET	Green	On	The XNet SDTI network is established (SDTI loop closed, correct speed, etc).
DSP	Green	Blinking	Indicates DSP activity (audio processing).

Connectors

The following connectors are available on the XNet (SDTI) module:

J15	OUT connector for XNet (SDTI network 2970 Mbps without relay).
J16	IN connector for XNet (SDTI network 2970 Mbps without relay).

NEW !

Switch Cabling

The internal switch module provides a more efficient communication between the H4X board on one hand and the MTPC board on the other hand.

The internal switch relies on the internal LAN, an IP-based network inside the EVS server.

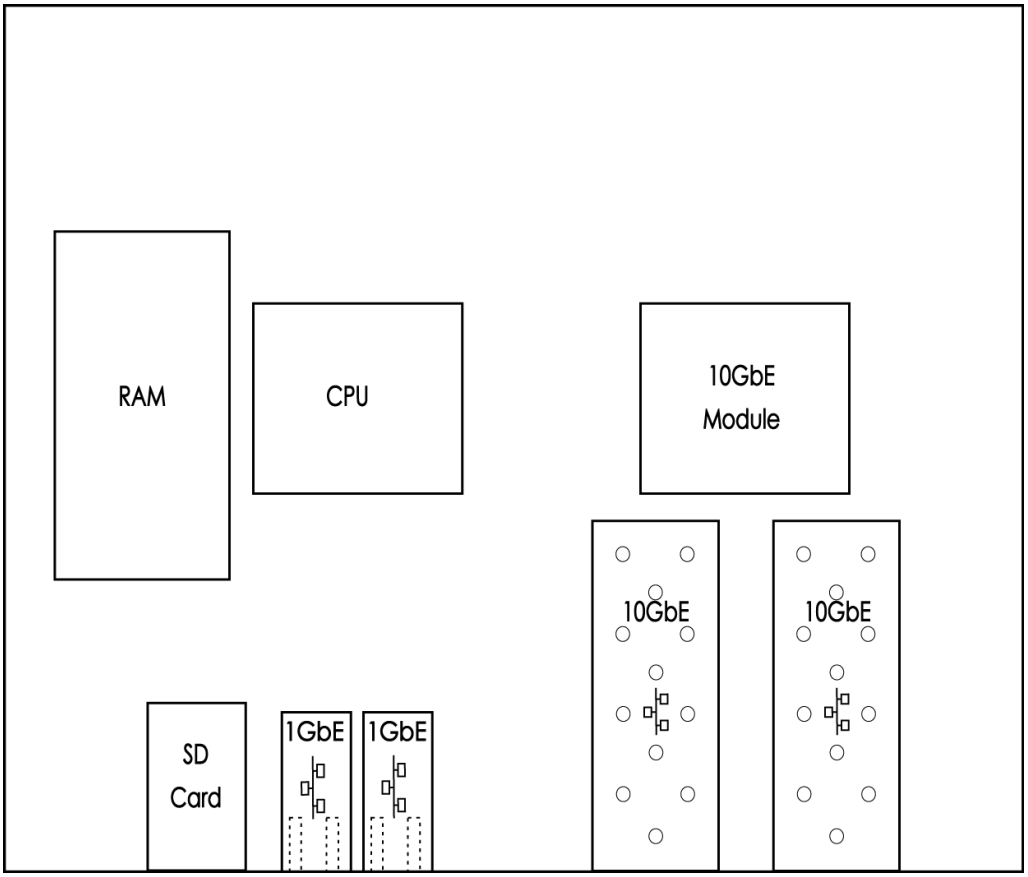
The following connectors are available on the internal switch module and are cabled as described below:

Connector	Cable Color	Connection
#1	Red	Connection to the HS873 motherboard on the MTPC board
#2	Black	Connection to the V4X board #2
#3	Black	Connection to the V4X board #1
#4	White	Connection to the EVS LNK connector on the rear panel (not currently used)
#5	Blue	Connection to the PCLAN 1 connector on the rear panel
#6	Yellow	Connection to the PCLAN 2 connector on the rear panel

6.6. GbE Board

Schema

The following schema shows the 10GbE board and its main components on an XT-VIA server:



Connectors

The SD card is connected to a slot on the 10GbE module of the EVS server backplane.

The two 1GbE connectors are connected to the two backplane 1GbE ports.

The two 10GbE connectors are connected to the two backplane 10GbE ports.

The Gigabit connectors must be on a network that supports Jumbo Frames of (at least) 9014 bytes Ethernet frames.

You can set up the GbE IP addresses in the Multicam Configuration window, in the Network tab, Gigabit Ethernet section. See the Configuration manual for more information.

SFP+ Modules

The following 10 GbE SFP+ modules are compatible with the 10GbE connectors of the GbE board:

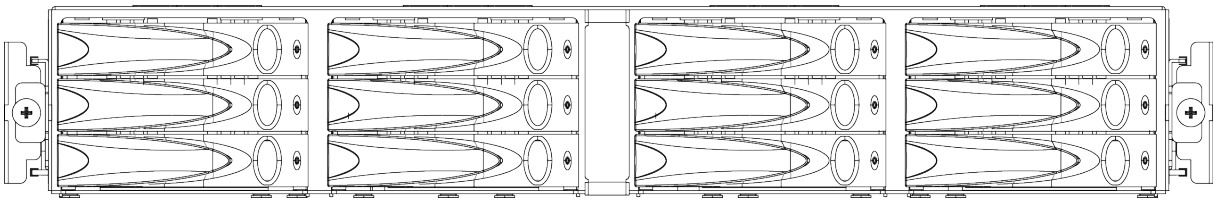
- Intel® Ethernet SFP+ SR Optic (E10GSFPSR)
- Intel® Ethernet SFP+ LR Optic (E10GSFPLR)

6.7. RAID Controller Boards

6.7.1. R4X Board with Hot-Swappable Disks

Overview

The internal hot-swappable disk array is available on XT-VIA servers with 6 or 12 SAS HDDs.



An array of six hot-swappable SAS disks consists of two stacked series of three disks, mounted from left to right.

An array of 12 hot-swappable SAS disks consists of four stacked series of three disks, mounted from left to right.

It is connected to the server via a dedicated SAS cable on the rear panel of the server, provided that the X-ESAS connection module has been placed inside the server.

LEDs Status and Function

For each disk, a blue LED and a red LED are present behind a single light display:

Status		Function
Blue LED	**Red LED**	
Off	On (steady)	Defect drive – must be replaced.
Blinking	Off	Connected, disk being written to / read from.
On (steady)	Off	Connected, disk not currently written to / read from.
On (steady)	On, slowly blinking	Spare disk - the corresponding disk is started and used in the RAID array. Blue and red blinking light makes the LED look purple.
Off	Off	The corresponding disk is not present.

6.8. MTPC Board

NEW ! Introduction

The function of the PC board is mainly the control of the video hardware and the interface of the peripheral equipment (such as a remote controller) with the video hardware.

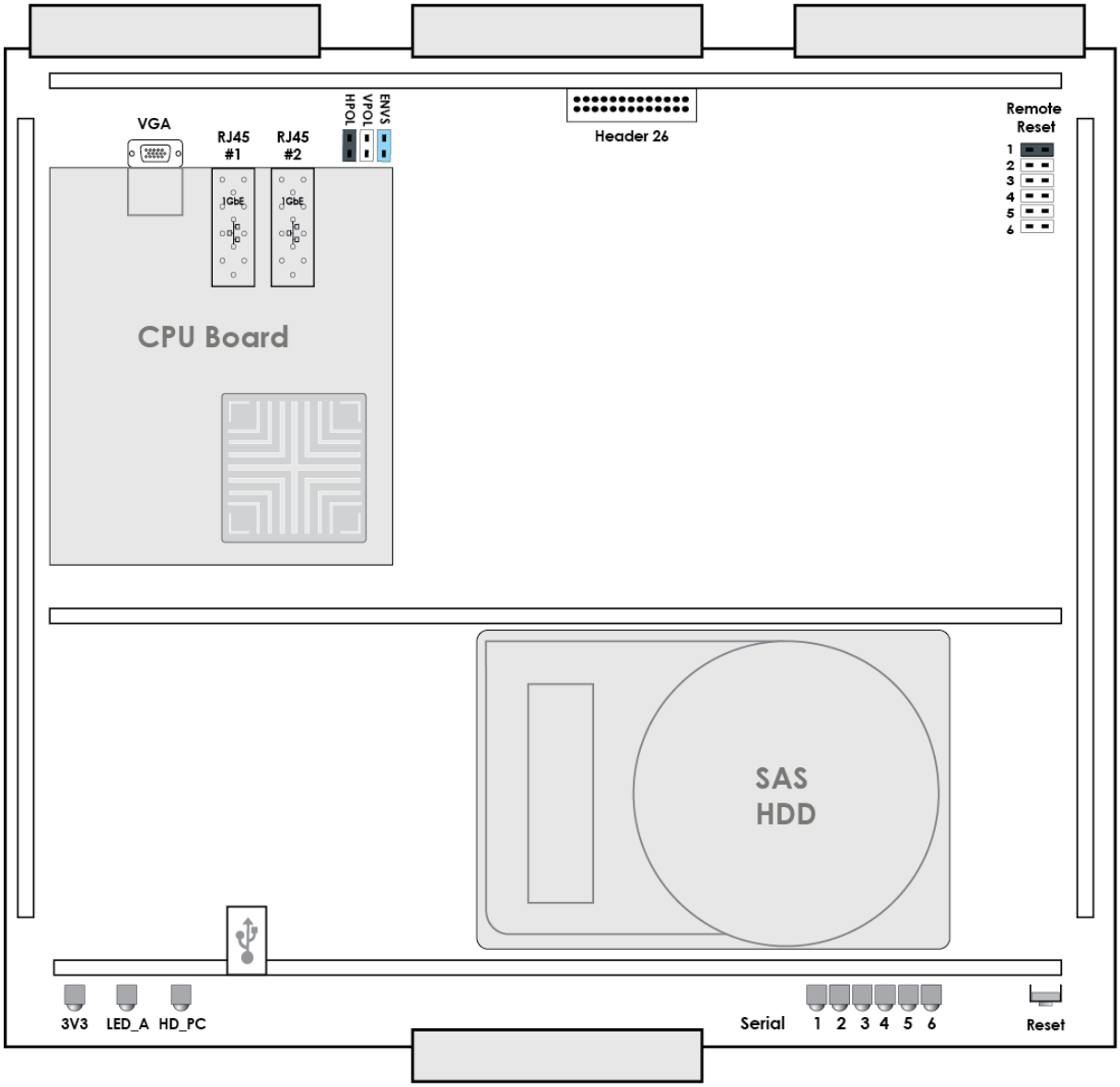
The following MTPC board is used:

- Revision A3/A6 with COMMEL HS873 motherboard and a new time code management module (with bootable USB).

In standard configuration the PC hardware is composed of:

- One mounting PC board, with serial ports, LTC reader and generator, is controlled by the motherboard.
- SAS System Hard disk: the SAS disk drive is used for storing the EVS software and the operating system. Neither audio nor video data is saved on this disk. The capacity of this drive may vary depending on market availability, but two system partitions are defined:
  - one system partition of 2 GB for Multicam versions up to 14.XX.
  - one system partition of the remaining disk capacity for Multicam versions from 15.00.

Illustration



CPU (HS873)

Connectors	Function
VGA	The VGA connector is connected to the VGA connector on the rear panel.
GbE #1 (left)	The GbE #1 connector (RJ45) is connected to the red cable coming from the GbE #1 connector on the H4X board.
GbE #2 (right)	The GbE #2 connector (RJ45) is not used.

LED Information

Internal EVS information.

Board Configuration

HPOL, VPOL and ENVS are used to configure the composite sync generator used in LSM TV mode (no effect if the server is only used with a VGA monitor).

The HPOL jumper can be used to invert or not the VGA HS signal (Horizontal Sync) to generate the composite output signal (TV mode).

The VPOL jumper can be used to invert or not the VGA VS signal (Vertical Sync) to generate the composite output signal (TV mode).

The ENVS jumper can be used to enable or not the presence of the VGA VS signal (Vertical Sync) in the composite output signal (TV mode).

If the LSM TV mode is used, these jumpers must be set up according to EVS recommendations, which depend on software version and CPU board model/revision:

Set up the jumpers as follows:

- HPOL=On; VPOL=Off; ENVS=On

REMOTE RESET jumpers are available to designate the remote(s) from which the RESET command can be sent.

This command resets the whole system: PC and video hardware.

In standard configuration only Remote one (on RS422 port 1) is allowed to reset the system.

WARNING

This jumper should be removed if the device connected to the RS422 port is NOT an EVS controller. Maximum voltage on pin 5 of an RS422 port of the server should not exceed 5 Volt when the corresponding jumper is engaged. Applying a higher voltage on pin 5 when the corresponding jumper is engaged will result in permanent electronic damage to the board.

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