Technical Reference Hardware

Version 10.05 - July 2011

XT·3

Production & Playout Server

EVS

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The latest version of the user manual, if any, and other user manuals on EVS products can be found on the EVS download center, on the following webpage: http://www.evs.tv/downloadcenter

REGIONAL CONTACTS

The address and phone number of the EVS headquarters are usually mentioned in the Help > About menu in the user interface.

You will find the full list of addresses and phone numbers at the following page on the EVS website: http://www.evs.tv/contacts

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1. Overview

Welcome in the EVS range of products and thank you for using an EVS XT3 server. We will do our best to satisfy your video production needs and we look forward to continuing working with you.

The EVS XT3 servers are full digital in PAL (625i), NTSC (525i), 720p, 1080p or 1080i standards. These multi-channel, disk-based video servers are ideal for a wide range of broadcast applications, from sports and live production to playout and transmission.

XT3 servers are available in 6U or 4U chassis. They offer flexible configurations with up to 8 channels in SD/HD (6 in V10.05) or up to 6 channels in 3D/1080p (4 in V10.05). They support natively a wide range of codecs.

XT3 servers work with SAS disks: they are equipped with internal SAS disk array and/or can be connected to a SAS-HDX external SAS disk array.

1.1 XT3 HIGH-RESOLUTION SERVER

The XT3 server is typically used as a high-resolution server with various third party controllers, applications and automation systems using industry-standard protocols such as Sony BVW75, VDCP, Odetics, DD35, or EVS' AVSP, EditRec, LinX API. XT3 series servers can also be controlled by EVS applications:

Live Slow Motion (LSM) for sports production, including replays, highlights editing, and analysis tools like Split Screen to compare 2 synchronized actions side by side, Target Tracking and Painting to highlight a particular detail or provide tactical explanations.

IPDirector: a suite of Windows software applications designed to manage networked EVS video servers. Its applications make it possible to control multiple channels within the XNet2 network, as well as to log an event, to create and manage clips and play-lists with advanced functions, among others to extract clips from a VTR. It also provides extensive database search features.

1.2 XT3 PROXY SERVER

A low-resolution option can be set up to use the XT3 server as a proxy server only. The Proxy servers can be run on large production events as the counterparts of the high-resolution servers. In this case, they need to be included in an XNet2 network distinct from the high-resolution XNet2 network.

The XT3 proxy servers are used for browsing purposes and can be controlled by IPDirector or EVS' own API (AVSP) protocols.

1.3 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.

1.4 DIMENSIONS

1.4.1 VIDEO DISK RECORDER MAIN FRAME 19 INCHES

RACK MOUNT 6U

Weight

Disk Configuration	Weight
6U chassis with 6 HDD on RCTL board (fix mounted)	35 kg / 77.2 lb
6U chassis with 12 HDD on RCTL board (fix mounted)	37 kg / 81.6 lb
6U chassis with 6 HDD on hot swap rack	37 kg / 81.6 lb
6U 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 XT3 server with a 6U chassis.

Figure 1: Front view

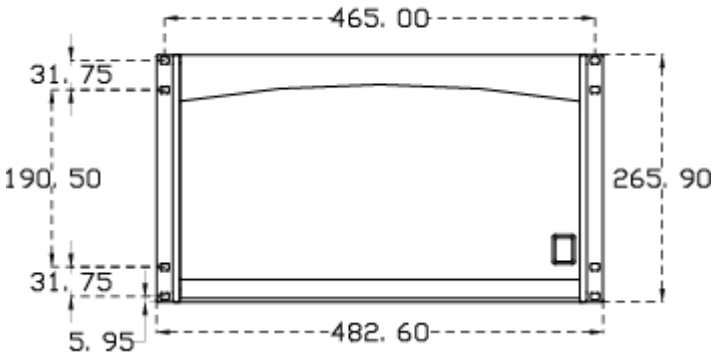


Figure 2: Left view

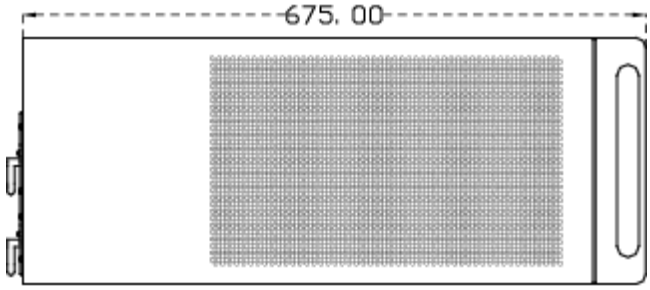


Figure 3: Right view

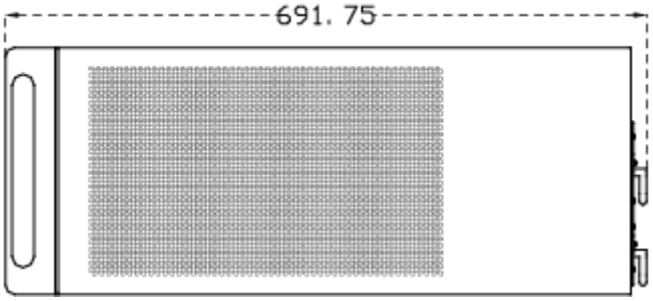
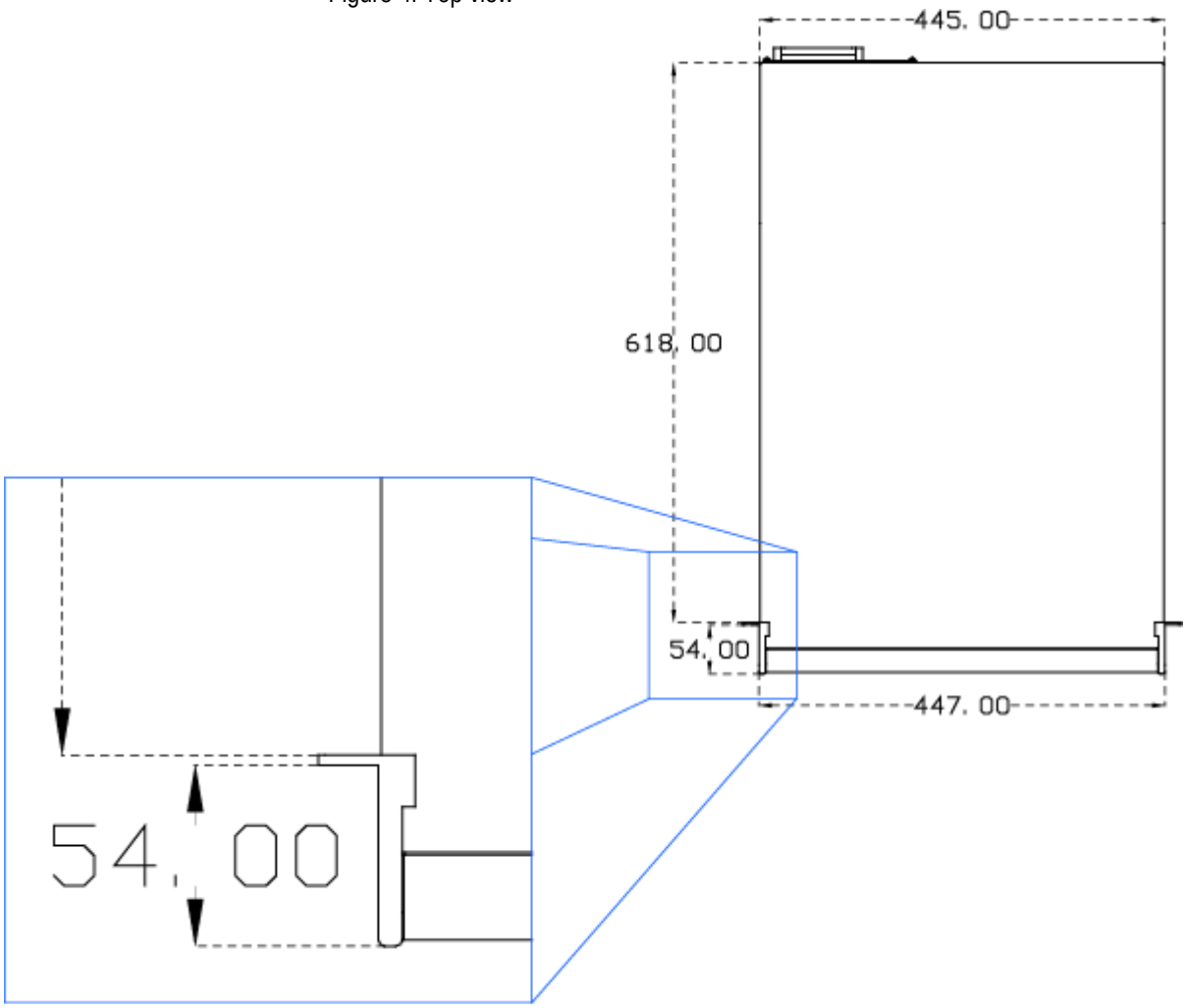


Figure 4: Top view



RACK MOUNT 4U

Weight

4U chassis with 6 HDD on RCTL board 31 kg / 68.3 lb

Dimensions

The following drawings provide the various dimensions, in mm, of the XT3 server with a 4U chassis.

Figure 5: Front view

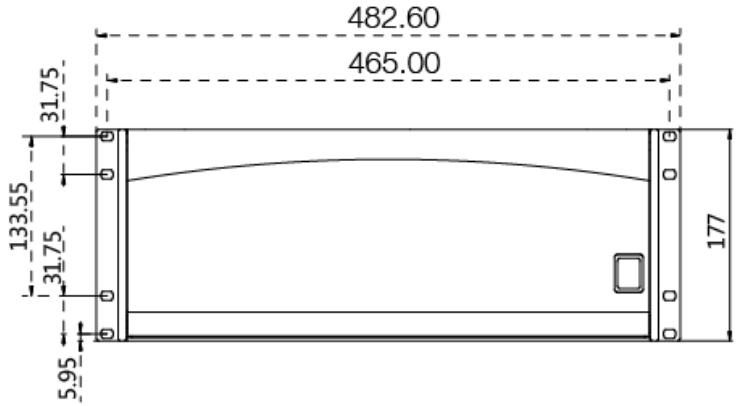


Figure 6: Left view

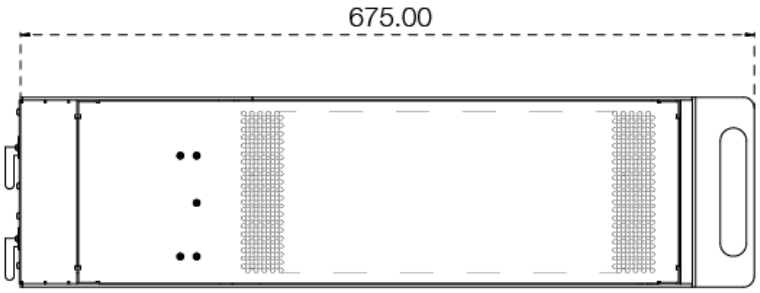


Figure 7: Right view

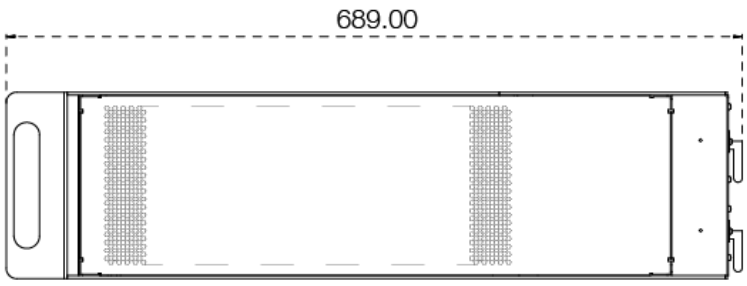
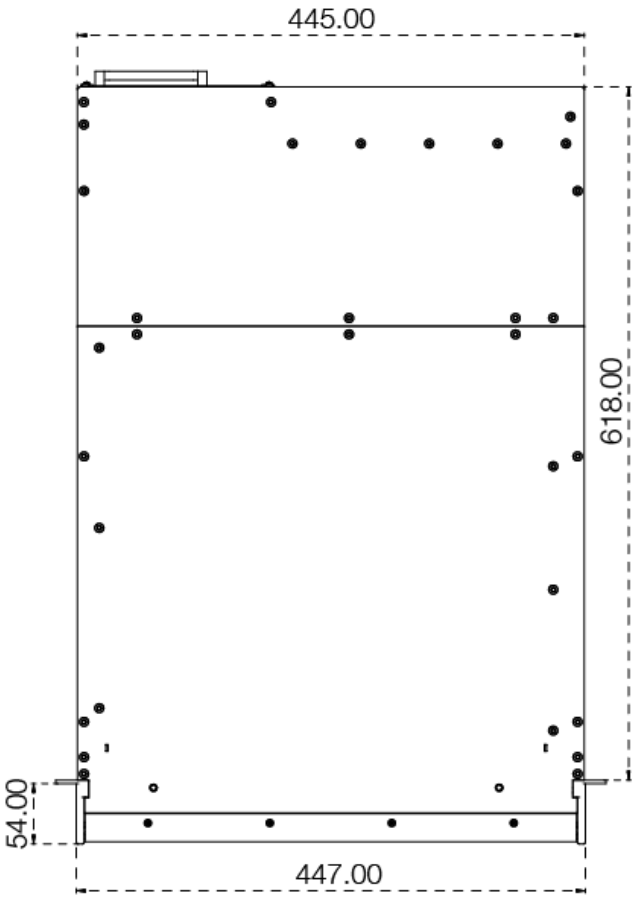
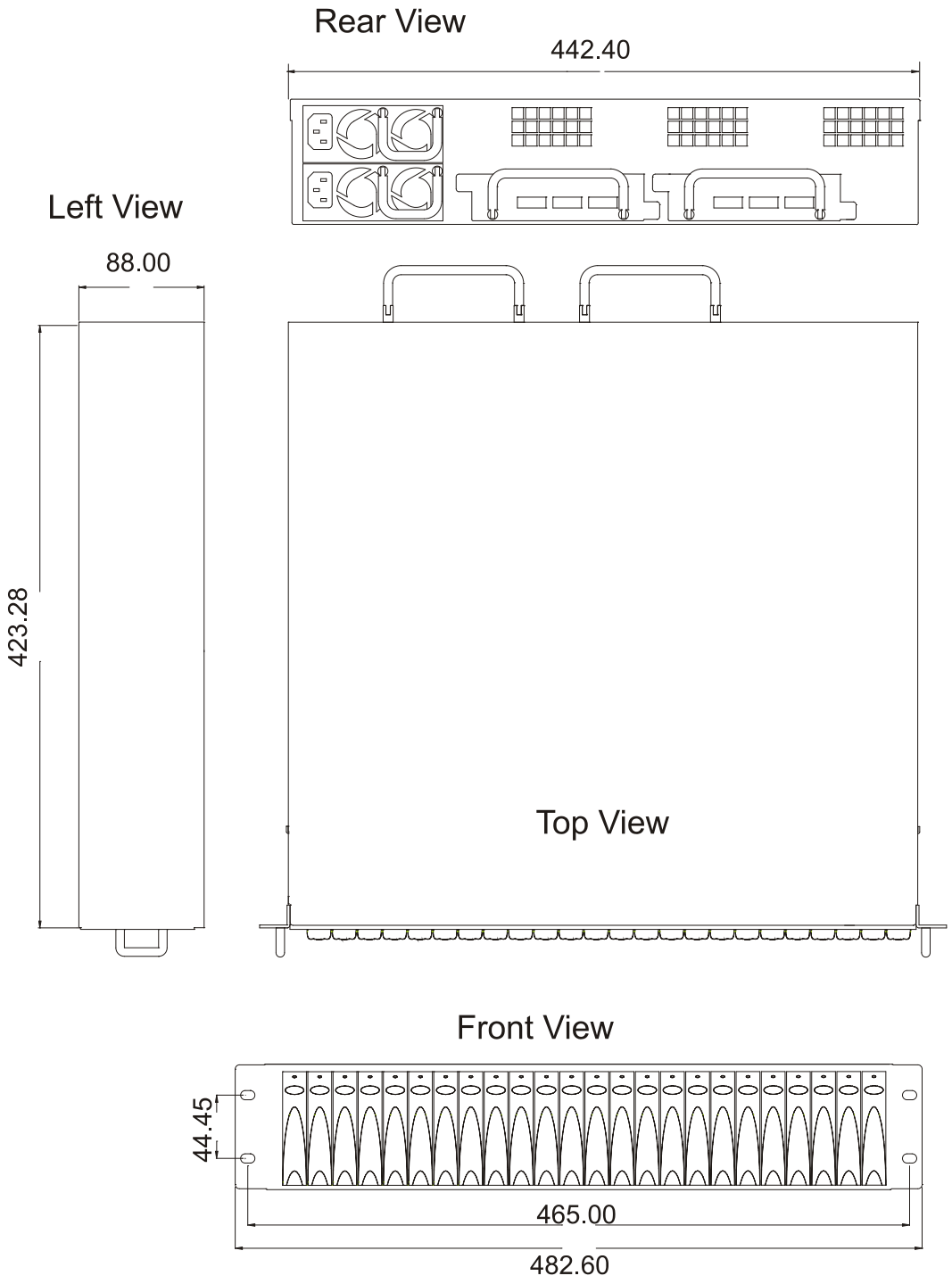


Figure 8: Top view



1.4.2 SAS-HDX

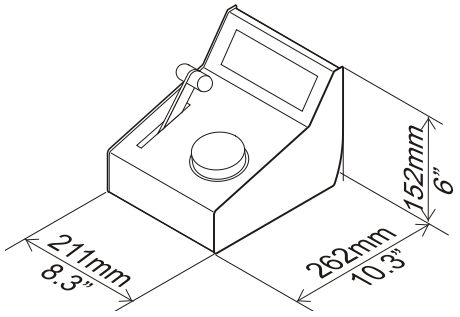
The following drawings provide the various dimensions, in mm, of the SAS-HDX external array.



For more information on the SAS-HDX, refer to section 3.4.3 “External RAID Array SAS-HDX for XT3 Servers”, on page 72.

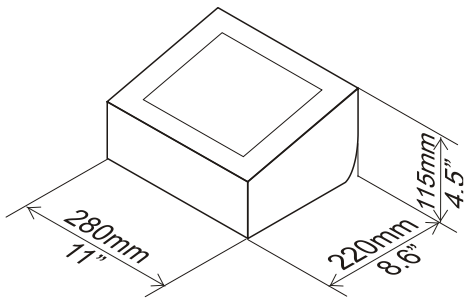
1.4.3 REMOTE CONTROL PANEL

Weight: 2.9 Kg / 6.3 Lbs.



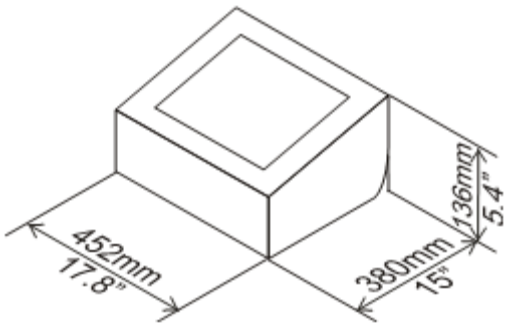
1.4.4 10” TOUCH SCREEN VIDEO MONITOR

Weight: 3.6 Kg / 7.8 Lbs.



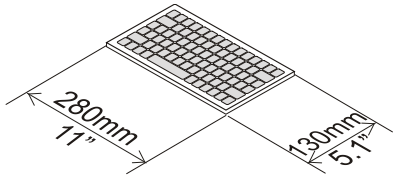
1.4.5 18” TOUCH SCREEN VIDEO MONITOR

Weight: 11.0 Kg / 23.9 Lbs.



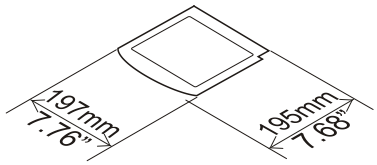
1.4.6 KEYBOARD

Weight: 0.4 Kg / 0.9 Lbs.



1.4.7 TABLET

Weight: 0.3 Kg / 6.6 Lbs. Ref: Wacom® CTF-430 Bamboo One



1.5 INSTALLATION

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.

1.6 SAFETY, COMPLIANCE AND OPERATING CONDITIONS

1.6.1 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	Interna-tional	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

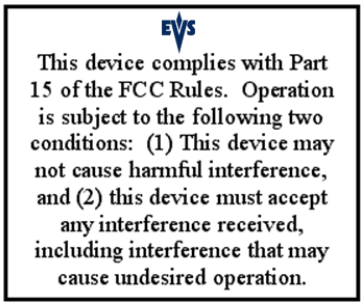
1.6.2 EMC STANDARDS

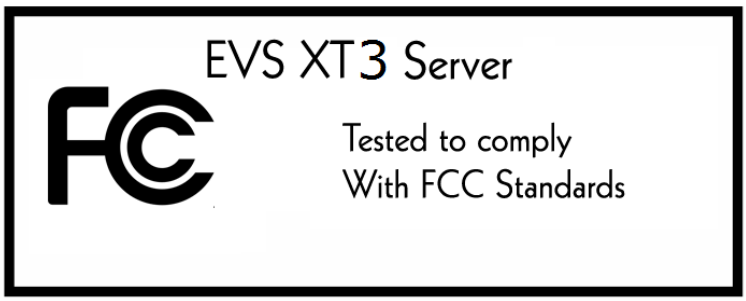
EN 55022	European	Emission Standard
EN 61000-3-2	European	Electromagnetic Compatibility (EMC) Part 3 (Limits); Section2 ; limits for harmonic current emissions (equipment input current <16A per phase)
EN 61000-3-3	European	European Electromagnetic Compatibility (EMC) Part 3 (Limits), Section 3; limitation of voltage fluctuation and flicker in low-voltage supply systems for equipment with rated current of 16 A.
EN 61000-4-3	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 3; Testing and measurement techniques - Radiated, radio-Frequency, electromagnetic field immunity test.
EN 61000-4-4	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 4; Testing and measurement techniques - Electrical fast transient/burst immunity test.
EN 61000-4-5	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 5; Testing and measurement techniques - Surge immunity test.
EN 61000-4-6	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits); Section 6 ; Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.
EN 61000-4-7	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 7; harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto.
EN 61000-4-11	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits); Section 11 ; Voltage dips, short interruptions and voltage variations immunity tests.
EN 50082-1	European	European Generic Immunity Standard – Part 1: Domestic, commercial and light industry environment.
FCC	USA	Conducted and radiated emission limits for a Class A digital device, pursuant to the Code of Federal Regulations (CFR) Title 47 – Telecommunications, Part 15: Radio Frequency devices, subpart B-Unintentional Radiators.

1.6.3 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 has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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





1.6.4 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.

1.6.5 POWER SUPPLY

The XT3 server is fitted with two auto switching and hot-swappable power supplies.

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

Important

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.

SPECIFICATIONS

Connection to supply: Pluggable equipment Type A (EN60950 §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 (EN60950 § 1.2.5): electric shock protection by basic insulation and protective earth.

Electric Supply

Rated voltage: 115 to 240 Vac (single phase)

Rated frequency: 47-63 Hz

Related Current: 8 A (100 to 120 Vac range) 4 A (220 to 240 Vac range)

Input connector: CEE22/IEC 320 3-pin male receptacle

ENVIRONMENTAL CONDITIONS

Temperature: 10°C to + 50°C (50°F to 122°F) ambient with free air flow

Relative humidity: 0% to 90% (non-condensing)

Cooling requirements: Forced air cooling air flow from front to back

Handling/movement: Designed for fixed use when in operation

Storage and transportation temperature: 0°C to +70°C (32°F to 158°F)

Storage and transportation relative humidity: 0% to 90% (non-condensing)

1.7 VENTILATION & RACK MOUNTING

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

Important

- 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 XT3 chassis, support guides are required for this unit into the rack mount. The front ears of the XT3 unit are not designed to support its full weight. Applying full weight on these might result in bending the metal plate.

1.8 XT3 SERVER MAIN SPECIFICATIONS

1.8.1 ELECTRIC SPECIFICATIONS

The following electrical specifications are valid for the XT3 6U server:

Data Type	Voltage	Values
Inrush current (PSU plugged on power grid)	230 V	3.8 A
Maximal current (full load, CPU at 100%)	230 V	1.7 A
Inrush current (PSU plugged on power grid)	110 V	7.9 A
Maximal current (full load, CPU at 100%)	110 V	3.6 A
Maximal power consumption (full load, CPU at 100%)	-	400 W

1.8.2 VIDEO SPECIFICATIONS

	XT3 Server	
	Standard Definition	High Definition
Video Formats	525i 59.94fps (NTSC) 625i 60fps (PAL)	720p 50/59.94fps 1080i 50/59.94fps 1080p 50/59.94fps (DualLink)
Digital Interface	10-bit 4:2:2 Serial (SMPTE259M). Full frame synchronizer at input. Dual output for PLAY channels.	10-bit 4:2:2 Serial (SMPTE292M). Full frame synchronizer at input. Dual output for PLAY channels.
Number of channels	2, 4 or 6 channels, reversible REC/PLAY	2, 4 or 6 channels, reversible REC/PLAY
Monitoring & Down-converters	1 CVBS or SDI (software select) per channel, with OSD	1 built-in down-converter per channel, CVBS or SDI output (software select) with OSD + additional clean SDI output. 1 dedicated HD SDI output with OSD per channel
Reference	Analogue Black Burst	Analogue Black Burst and HD Tri-Level Sync
Graphics Board	n.a.	n.a.

1.8.3 AUDIO SPECIFICATIONS

AUDIO ANALOG AND DIGITAL CONFIGURATIONS

- up to 8+8 analogue balanced input & output channels
- up to 16+16 (8 pairs + 8 pairs) AES/EBU or Dolby E input & output channels
- up to 64 channels embedded audio
- Max. 6*8 audio per video in XT3 6U, and 4*16 audio per video in XT3 4U
- 4 additional analogue balanced output channels for monitoring (XLR)
- all audio connectors on mainframe

AUDIO PROCESSING

- uncompressed audio
- 24 bit processing and storage
- sample rate converter from 25-55 kHz to 48KHz
- audio scrub
- audio mix

1.8.4 VIDEO CODECS & BITRATES

SUPPORTED CODECS

The EVS XT3 server uses an intra-frame video encoding technique.

The XT3 server supports natively the following video codecs:

Codec	SD	HD	Code Protection
M-JPEG	√	√	No
DVCPro 50	√	-	Code 9
IMX	√	-	No
Intra-frame MPEG-2	-	√	No
Avid DNxHD®	-	√	Code 5
Apple ProRes 422	-	√	Code 6
Apple ProRes 422 HQ	-	√	Code 6
Apple ProRes 422 LT	-	√	Code 6
DVCPro HD	-	√	Code 8
AVC-Intra 100	-	√	Code 13

TARGET BITRATE RANGE AND DEFAULT VALUES

The target bitrate of the encoded video stream can be set by the user within the accepted range: 8 to 100Mbps for standard definition, 40 to 250Mbps for high definition with the exception of Apple ProRes, Avid DNxHD® and DVCPro codecs working with defined bitrates.

The default values are M-JPEG 30Mbps for standard definition and M-JPEG 100Mbps for high definition.

The code-protected codecs are solely available when the corresponding code is valid.

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 in the XT3:

	Encoding	File Header
DNxHD 120/145	8-bit	8-bit
DNxHD 185/220	8-bit	8-bit
DNxHD 185x DNxHD 220x	10-bit	10-bit
ProRes 120/145	8-bit	10-bit
ProRes 185/220	8-bit or 10-bit	10-bit
DVCPro HD	8-bit	8-bit
M-JPEG	8-bit	8-bit
MPEG	8-bit	8-bit
AVC-Intra 100	10-bit	10-bit

Note

When encoding in 10-bit, it is not possible to use the graphic functionality: Paint, Target, Logo Insertion and manual offside line.

1.8.5 RECORDING CAPACITY FOR XT3 SERVERS

DISK STORAGE

The disk storage, on SAS disks, can be as follows, with a total of up to 84 disks:

- internal storage only: 6 or 12 x 300 GB or 900 GB SAS disks
- external storage only: up to 4 arrays with 24 x 300 GB or 900 GB SAS disks, with or without spare disks
- both internal and external storage.

Important

The sum of internal and external disk storage on an XT3 server cannot exceed 20 TB.

FIGURES IN RECORDING CAPACITY TABLES

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

- 1 record channel, that is 1 video + 4 stereo audio tracks in SD; 1 video + 8 stereo audio tracks in HD.
- with the Operational Disk Size parameter set to 100%.
- with arrays of 300 GB disks.

Note

The table figures should be multiplied by 3 for 900 GB disk arrays.

Configurations in normal characters are the recommended ones without hot spare disks.

Configurations in bold characters are the recommended ones with hot spare disks.

RECORDING CAPACITY IN HOURS FOR 5 DISKS (4+1) RAID CONFIGURATION – 50HZ

		(4+1)								
# Disks	# Ext array	# RAIDS	# Spares	30Mbps 4 audios	40Mbps 4 audios	50Mbps 4 audios	100Mbps 8 audios	110Mbps 8 audios	120Mbps 8 audios	185Mbps 8 audios
5	1	1	0	75	58	48	23	22	19	13
6	**1**	**1**	**1**	**75**	**58**	**48**	**23**	**22**	**19**	**13**
10	1	2	0	152	117	96	47	44	39	26
11	**1**	**2**	**1**	**152**	**117**	**96**	**47**	**44**	**39**	**26**
15	1	3	0	228	176	145	71	66	59	40
16	**1**	**3**	**1**	**228**	**176**	**145**	**71**	**66**	**59**	**40**
20	1	4	0	304	234	193	95	88	79	53
21	**1**	**4**	**1**	**304**	**234**	**193**	**95**	**88**	**79**	**53**
25	2	5	0	380	293	242	119	111	99	67
27	**2**	**5**	**2**	**380**	**293**	**242**	**119**	**111**	**99**	**67**
30	2	6	0	457	352	290	142	133	119	80
32	**2**	**6**	**2**	**457**	**352**	**290**	**142**	**133**	**119**	**80**
35	2	7	0	533	411	339	166	155	138	94
37	**2**	**7**	**2**	**533**	**411**	**339**	**166**	**155**	**138**	**94**
40	2	8	0	609	470	387	190	177	158	107
42	**2**	**8**	**2**	**609**	**470**	**387**	**190**	**177**	**158**	**107**
45	2	9	0	686	528	435	214	200	178	121
47	**2**	**9**	**2**	**686**	**528**	**435**	**214**	**200**	**178**	**121**
50	3	10	0	762	587	484	238	222	198	135
53	**3**	**10**	**3**	**762**	**587**	**484**	**238**	**222**	**198**	**135**
55	3	11	0	838	646	532	262	244	218	148
58	**3**	**11**	**3**	**838**	**646**	**532**	**262**	**244**	**218**	**148**
60	3	12	0	914	705	581	285	266	238	162
63	**3**	**12**	**3**	**914**	**705**	**581**	**285**	**266**	**238**	**162**
65	3	13	0	991	764	629	309	289	258	175
68	**3**	**13**	**3**	**991**	**764**	**629**	**309**	**289**	**258**	**175**
70	3	14	0	1067	822	678	333	311	278	189
74	**4**	**14**	**4**	**1067**	**822**	**678**	**333**	**311**	**278**	**189**
75	4	15	0	1143	881	726	357	333	297	202
79	**4**	**15**	**4**	**1143**	**881**	**726**	**357**	**333**	**297**	**202**
80	4	16	0	1220	940	775	381	355	317	216
84	**4**	**16**	**4**	**1220**	**940**	**775**	**381**	**355**	**317**	**216**

RECORDING CAPACITY IN HOURS FOR 6 DISK (5+1) RAID CONFIGURATION – 50HZ

		(5+1)								
# Disks	# Ext array	# RAIDS	# Spares	30Mbps 4 audios	40Mbps 4 audios	50Mbps 4 audios	100Mbps 8 audios	110Mbps 8 audios	120Mbps 8 audios	185Mbps 8 audios
6	1	1	0	94	73	60	29	27	24	16
7	**1**	**1**	**1**	**94**	**73**	**60**	**29**	**27**	**24**	**16**
12	1	2	0	190	146	120	59	55	49	33
13	**1**	**2**	**1**	**190**	**146**	120	**59**	**55**	**49**	**33**
18	1	3	0	285	220	181	89	83	74	50
19	**1**	**3**	**1**	**285**	**220**	181	**89**	**83**	**74**	**50**
24	1	4	0	380	293	242	119	111	99	67
26	**2**	**4**	**2**	**380**	**293**	242	**119**	**111**	**99**	**67**
30	2	5	0	476	367	302	148	138	124	84
32	**2**	**5**	**2**	**476**	**367**	302	**148**	**138**	**124**	**84**
36	2	6	0	571	440	363	178	166	148	101
38	**2**	**6**	**2**	**571**	**440**	363	**178**	**166**	**148**	**101**
42	2	7	0	667	514	423	208	194	173	118
44	**2**	**7**	**2**	**667**	**514**	423	**208**	**194**	**173**	**118**
48	2	8	0	762	587	484	238	222	198	135
51	**3**	**8**	**3**	**762**	**587**	484	**238**	**222**	**198**	**135**
54	3	9	0	857	661	545	268	250	223	151
57	**3**	**9**	**3**	**857**	**661**	545	**268**	**250**	**223**	**151**
60	3	10	0	953	734	605	297	277	248	168
63	**3**	**10**	**3**	**953**	**734**	605	**297**	**277**	**248**	**168**
66	3	11	0	1048	808	666	327	305	273	185
69	**3**	**11**	**3**	**1048**	**808**	666	**327**	**305**	**273**	**185**
72	3	12	0	1143	881	726	357	333	297	202
76	**4**	**12**	**4**	**1143**	**881**	726	**357**	**333**	**297**	**202**
78	4	13	0	1220	940	775	381	355	317	216
82	**4**	**13**	**4**	**1220**	**940**	775	**381**	**355**	**317**	**216**

RECORDING CAPACITY IN HOURS FOR 5 DISK (4+1) RAID CONFIGURATION – 59.94HZ

		(4+1)								
# Disks	# Ext array	# RAIDS	# Spares	30Mbps 4 audios	40Mbps 4 audios	50Mbps 4 audios	100Mbps 8 audios	110 Mbps 8 audios	145Mbps 8 audios	220Mbps 8 audios
5	1	1	0	75	58	48	23	21	16	11
6	**1**	**1**	**1**	**75**	**58**	**48**	**23**	**21**	**16**	**11**
10	1	2	0	151	117	96	47	43	33	22
11	**1**	**2**	**1**	**151**	**117**	**96**	**47**	**43**	**33**	**22**
15	1	3	0	228	176	144	71	65	49	33
16	**1**	**3**	**1**	**228**	**176**	**144**	**71**	**65**	**49**	**33**
20	1	4	0	304	235	193	95	87	66	45
21	**1**	**4**	**1**	**304**	**235**	**193**	**95**	**87**	**66**	**45**
25	2	5	0	380	294	241	119	109	82	56
27	**2**	**5**	**2**	**380**	**294**	**241**	**119**	**109**	**82**	**56**
30	2	6	0	456	353	290	143	131	99	67
32	**2**	**6**	**2**	**456**	**353**	**290**	**143**	**131**	**99**	**67**
35	2	7	0	533	412	338	166	152	115	78
37	**2**	**7**	**2**	**533**	**412**	**338**	**166**	**152**	**115**	**78**
40	2	8	0	609	471	386	190	174	132	90
42	**2**	**8**	**2**	**609**	**471**	**386**	**190**	**174**	**132**	**90**
45	2	9	0	685	530	435	214	196	149	101
47	**2**	**9**	**2**	**685**	**530**	**435**	**214**	**196**	**149**	**101**
50	3	10	0	761	589	483	238	218	165	112
53	**3**	**10**	**3**	**761**	**589**	**483**	**238**	**218**	**165**	**112**
55	3	11	0	838	648	531	262	240	182	123
58	**3**	**11**	**3**	**838**	**648**	**531**	**262**	**240**	**182**	**123**
60	3	12	0	914	707	580	286	262	198	135
63	**3**	**12**	**3**	**914**	**707**	**580**	**286**	**262**	**198**	**135**
65	3	13	0	990	766	628	310	284	215	146
68	**3**	**13**	**3**	**990**	**766**	**628**	**310**	**284**	**215**	**146**
70	3	14	0	1066	825	677	333	306	231	157
74	**4**	**14**	**4**	**1066**	**825**	**677**	**333**	**306**	**231**	**157**
75	4	15	0	1143	884	725	357	328	248	168
79	**4**	**15**	**4**	**1143**	**884**	**725**	**357**	**328**	**248**	**168**
80	4	16	0	1219	943	773	381	349	265	180
84	**4**	**16**	**4**	**1219**	**943**	**773**	**381**	**349**	**265**	**180**

RECORDING CAPACITY IN HOURS FOR 6 DISK (5+1) RAID CONFIGURATION – 59.94HZ

		(5+1)								
# Disks	# Ext array	# RAIDS	# Spares	30Mbps 4 audios	40Mbps 4 audios	50Mbps 4 audios	100Mbps 8 audios	110Mbps 8 audios	145Mbps 8 audios	220Mbps 8 audios
6	1	1	0	94	73	60	29	27	20	14
7	**1**	**1**	**1**	**94**	**73**	**60**	**29**	**27**	**20**	**14**
12	1	2	0	190	147	120	59	54	41	28
13	**1**	**2**	**1**	**190**	**147**	**120**	**59**	**54**	**41**	**28**
18	1	3	0	285	220	181	89	81	62	42
19	**1**	**3**	**1**	**285**	**220**	**181**	**89**	**81**	**62**	**42**
24	1	4	0	380	294	241	119	109	82	56
26	**2**	**4**	**2**	**380**	**294**	**241**	**119**	**109**	**82**	**56**
30	2	5	0	475	368	302	148	136	103	70
32	**2**	**5**	**2**	**475**	**368**	**302**	**148**	**136**	**103**	**70**
36	2	6	0	571	442	362	178	163	124	84
38	**2**	**6**	**2**	**571**	**442**	**362**	**178**	**163**	**124**	**84**
42	2	7	0	666	515	423	208	191	144	98
44	**2**	**7**	**2**	**666**	**515**	**423**	**208**	**191**	**144**	**98**
48	2	8	0	761	589	483	238	218	165	112
51	**3**	**8**	**3**	**761**	**589**	**483**	**238**	**218**	**165**	**112**
54	3	9	0	857	663	544	268	245	186	126
57	**3**	**9**	**3**	**857**	**663**	**544**	**268**	**245**	**186**	**126**
60	3	10	0	952	737	604	298	273	207	140
63	**3**	**10**	**3**	**952**	**737**	**604**	**298**	**273**	**207**	**140**
66	3	11	0	1047	810	665	327	300	227	154
69	**3**	**11**	**3**	**1047**	**810**	**665**	**327**	**300**	**227**	**154**
72	3	12	0	1143	884	725	357	328	248	168
76	**4**	**12**	**4**	**1143**	**884**	**725**	**357**	**328**	**248**	**168**
78	4	13	0	1219	943	773	381	349	265	180
82	**4**	**13**	**4**	**1219**	**943**	**773**	**381**	**349**	**265**	**180**

1.8.6 SUPPORTED SMPTE STANDARDS

The following standards are supported:

SD SDI	SMPTE 259M (525i 59.94Hz; 625i 50Hz)
HD SDI	SMPTE 292M (720p 50 and 59.94Hz; 1080i 50 and 59.94Hz)
Embedded audio HD	SMPTE 299M
AES/EBU audio	SMPTE 272M
LTC	SMPTE 12M
D-VITC	SMPTE 266M
Ancillary TC in HD	RP 188
Vertical Ancillary Data	SMPTE 334M
VC-3	SMPTE 2019-1
IMX D-10	SMPTE 356M
1080p 50 and 59.94Hz	SMPTE 372M
Mapping of Audio Metadata into Vertical Ancillary data	SMPTE 2020

1.8.7 MAXIMUM BITRATE VALUES

These maximum values are valid for XT3 servers running Multicam version 10.05. They guarantee a smooth play and a browse at 100% speed on all channels simultaneously.

		2 ch	4 ch	4ch (3D)	4ch (1080p)	4ch (3D SLSM 3x)	6 ch
SD JPEG	PAL	100	100	N/A	N/A	N/A	100
	NTSC	100	100	N/A	N/A	N/A	100
HD JPEG	PAL	225	225	110	110	100	160
	NTSC	250	250	110	110	100	160
HD MPEG	PAL	225	225	110	110	100	160
	NTSC	250	250	110	110	100	160

		2 ch	4 ch	4ch (3D)	4ch (1080p)	4ch (3D SLSM 3x)	6 ch
Avid DNxHD®	PAL	185	185	100	100	100	120
	NTSC	220	220	100	100	100	145
Apple ProRes 422	PAL	185	185	85	85	85	120
	NTSC	220	220	102	102	102	145
DVCPro 50	PAL	50	50	N/A	N/A	N/A	50
	NTSC	50	50	N/A	N/A	N/A	50
DVCPro HD	PAL	100	100	100	100	100	100
	NTSC	100	100	100	100	100	100
AVC-Intra 100	PAL	111	111	110	110	N/A	111
	NTSC	111	111	110	110	N/A	111

1.8.8 AVID DNXHD ® AND APPLE PRORES 422

INTRODUCTION

EVS XT3 servers feature a native implementation of the Avid DNxHD® and Apple ProRes 422 high definition video codecs. This enables native audio and video file transfers in either direction between the EVS XT3 servers, and Avid and Apple post-production tools in High Definition. This document explains the impact of using Avid DNxHD® and Apple ProRes codecs on XT3 servers, on the XNet2 SDTI network and on the XF2 in terms of storage capacity, number of usable video channels and network transfers.

For details on how to setup a direct connection between an HD XT3 server and an Avid or Apple server, please refer to the specific documents (EVS_AvidTM_integration_v3.01 or EVS_Apple_integration_v.3.01).

VIDEO BITRATE COMPATIBILITY WITH AVID AND APPLE PRODUCTS

Avid DNxHD® is standardized at specific bitrates according to 2 profiles:

- Standard profile: 120Mbps in “PAL” (50Hz) and 145Mbps in “NTSC” (59.94Hz)
- High Level profile: 185Mbps in “PAL” (50Hz) and 220Mbps in “NTSC” (59.94Hz)

Although Avid DNxHD® is standardized at the specific bitrates mentioned here above, Avid products can seamlessly read DNxHD® files and streams at other bitrates. DNxHD® pictures at other bitrates than those defined by the 2 official Avid profiles can also be referred to as “VC-3” as defined in SMPTE 1019.

To allow users to determine the best balance between picture quality, storage capacity, number of video channels per server, and network speed, EVS XT3 servers can generate Avid DNxHD® files and streams at any given bitrate between 20Mbps and 220Mbps. These files and streams should remain compatible with Avid production tools.

Apple ProRes 422 is also standardized at specific bitrates according to 3 profiles:

1. Apple ProRes 422 (also sometimes referred to as Apple ProRes 422 SQ): 120Mbps in "PAL" (50Hz) and 145Mbps in "NTSC" (59.94Hz)
2. Apple ProRes 422 HQ: 185Mbps in "PAL" (50Hz) and 220Mbps in "NTSC" (59.94Hz)
3. Apple ProRes 422 LT: 85Mbps in "PAL" (50Hz) and 102Mbps in "NTSC" (59.94Hz)

Apple ProRes 422 on EVS XT3 servers is only available at these bitrates.

CHOICES OF BITRATES WHEN USING AVID DNxHD® OR APPLE PRORES 422 WITH EVS XT3 SERVERS

How to Read the Following Tables?

1. Video Bitrate: value set by the user in the advanced parameters window of the XT3 server
2. Fields/Block: numbers of video fields that can be stored in one disk block of 8MB, taking into account 8 audio tracks.
3. Actual Bandwidth: this is the actual disk/network bandwidth that is required for the real time record or real time playback of one video stream and its associated audio tracks.
4. Max. RT Channels: this is the maximum number of video channels (real time record or real time playback) that one XT3 server can support for a given frame rate and bitrate. Since an XT3 server can have a maximum of 6 local video channels, any value higher than 6 means that these additional real time access can be used over the XNet2 SDTI network.

   For mixed configuration with standard and super motion channels on the same server, the following rule must be used to ensure that the settings do not exceed the maximum bandwidth of the server : (nbr of standard channels x their actual bandwidth) + (nbr of super motion channels x their actual bandwidth) must be lower than or equal to 205 MB/s.
   Example: Can I run an XT3 server with 2 records (1 super motion + 1 standard) + 2 play (1 super motion + 1 standard) in Avid DNxHD® with a video bitrate of 100Mbps in "PAL" ?
   Calculation: 1 standard rec/play at 100Mbps uses 13.3 MB/s ; 1 super motion record/play at 100Mbps uses 40.0 MB/s; 2 x 13.3 + 2 x 40.0 = 126.6 MB/s.
   Conclusion: this configuration is supported.
5. Network transfers: the maximum bandwidth over the XNet2 SDTI network is approximately 110 MB/s. To determine the number of real time transfers that can occur simultaneously over the network, this number must be divided by the actual bandwidth given in the table for a selected bitrate.

   Example: How many real time transfers can I do over an XNet2 SDTI network (set at 1485Mbps) if I work with Apple ProRes 422 at 145Mbps in "NTSC" ?

Calculation:
Maximum SDTI bandwidth / Actual Bandwidth = real time transfers:
110MB/s / 18.4MB/s = 6 real time transfers.
Note: This number is the maximum that the network connection can support. Of course it is also necessary that the XT3 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)

To get information on the recording capacity of the servers according to the video bitrates, refer to section 1.8.5 'Recording Capacity for XT3 Servers' on page 17.

Avid DNxHD® & Apple ProRes 422 at 50Hz ("PAL")

Codec	Video Bitrate	Fields /Block	Actual Bandwidth	Max. RT Channels	XF2 Storage Capacity (in hours and minutes)			
					250GB	500GB	750GB	1TB
Avid DNxHD®	85 Mbps	35	11.43 MB/s	17.94	5.36	11.24	17.11	22.48
Avid DNxHD®	100 Mbps	30	13.33 MB/s	15.38	4.48	9.46	14.44	19.32
Avid DNxHD® Apple ProRes 422	120 Mbps	26	15.38 MB/s	13.33	4.09	8.28	12.46	16.56
Avid DNxHD® Apple ProRes 422 HQ	185 Mbps	17	23.53 MB/s	8.71	2.43	5.32	8.21	11.04

Avid DNxHD® & Apple ProRes 422 at 150Hz ("PAL Super Motion 3x")

Codec	Video Bitrate	Fields /Block	Actual Bandwidth	Max. RT Channels	XF2 Storage Capacity (in hours and minutes)			
					250GB	500GB	750GB	1TB
Avid DNxHD®	85 Mbps	12	33.33 MB/s	6.15	1.55	3.54	5.53	7.48
Avid DNxHD®	100 Mbps	10	40.00 MB/s	5.13	1.36	3.15	4.54	6.30
Avid DNxHD® Apple ProRes 422	120 Mbps	9	44.44 MB/s	4.61	1.26	2.56	4.25	5.52
Avid DNxHD® Apple ProRes 422 HQ	185 Mbps	5	66.67 MB/s	3.08	0.57	1.57	2.57	3.54

Avid DNxHD® & Apple ProRes 422 at 59.94Hz ("NTSC")

Codec	Video Bitrate	Fields /Block	Actual Bandwidth	Max. RT Channels	XF2 Storage Capacity (in hours and minutes)			
					250GB	500GB	750GB	1TB
Avid DNxHD®	85 Mbps	42	11.42 MB/s	17.96	5.36	11.24	17.12	22.48
Avid DNxHD®	100 Mbps	36	13.32 MB/s	15.39	4.48	9.47	14.45	19.34
Avid DNxHD® Apple ProRes 422	145 Mbps	26	18.44 MB/s	11.12	3.28	7.03	10.39	14.06
Avid DNxHD® Apple ProRes 422 HQ	220 Mbps	17	28.21 MB/s	7.27	2.16	4.37	6.57	9.14

Avid DNxHD® & Apple ProRes 422 at 180Hz ("NTSC Super Motion 3x")

Codec	Video Bitrate	Fields /Block	Actual Bandwidth	Max. RT Channels	XF2 Storage Capacity (in hours and minutes)			
					250GB	500GB	750GB	1TB
Avid DNxHD®	85 Mbps	15	31.97 MB/s	6.41	2.00	4.04	6.09	8.08
Avid DNxHD®	100 Mbps	12	39.96 MB/s	5.13	1.36	3.15	4.55	6.30
Avid DNxHD® Apple ProRes 422	145 Mbps	9	53.28 MB/s	3.85	1.12	2.26	3.41	4.52
Avid DNxHD® Apple ProRes 422 HQ	220 Mbps	6	79.92 MB/s	2.57	0.48	1.38	2.27	3.16

XF2 Transfers for Avid DNXHD® and Apple ProRes 422

XF2 bandwidth for backup is 50MB/s and 32MB/s for restore.

Therefore, it can support in backup mode:

- 4.0 real time transfers with Avid DNxHD® 85Mbps
- 3.5 real time transfers with Avid DNxHD® 100Mbps
- 3.0 real time transfers with Avid DNxHD® or Apple ProRes 422 at 120Mbps (PAL)
- 2.5 real time transfers with Avid DNxHD® or Apple ProRes 422 at 145Mbps (NTSC)

Therefore it can support in restore mode:

- 2.8 real time transfers with Avid DNxHD® 85Mbps
- 2.4 real time transfers with Avid DNxHD® 100Mbps
- 2.0 real time transfers with Avid DNxHD® or Apple ProRes 422 at 120Mbps (PAL)
- 1.7 real time transfers with Avid DNxHD® or Apple ProRes 422 at 145Mbps (NTSC)

Gigabit Ethernet Transfers with XT3 Servers for Avid DNXHD® and Apple ProRes 422

Preliminary note

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

BACKUP

Maximum transfer speeds through the Gigabit ports of the XT3 server:

- 6 simultaneous real time transfers with Avid DNxHD® 85Mbps
- 6.2 x faster than real time on a single transfers with Avid DNxHD® 85Mbps
- 6 simultaneous real time transfers with Avid DNxHD® 100Mbps
- 5.3 x faster than real time on a single transfers with Avid DNxHD® 100Mbps
- 5.8 simultaneous real time transfers with Avid DNxHD® or Apple ProRes 422 at 120Mbps (PAL)
- 4.6 x faster than real time on a single transfers with Avid DNxHD® or Apple ProRes 422 at 120Mbps (PAL)
- 4.8 simultaneous real time transfers with Avid DNxHD® or Apple ProRes 422 at 145Mbps (NTSC)
- 3.8 x faster than real time on a single transfers with Avid DNxHD® or Apple ProRes 422 at 145Mbps (NTSC)

RESTORE

Maximum transfer speeds through the Gigabit ports of the XT3 server:

- 6 simultaneous real time transfers with Avid DNxHD® 85Mbps
- 4x faster than real time on a single transfers with Avid DNxHD® 85Mbps
- 5.7 simultaneous real time transfers with Avid DNxHD® 100Mbps
- 3.4 x faster than real time on a single transfers with Avid DNxHD® 100Mbps
- 5 simultaneous real time transfers with Avid DNxHD® or Apple ProRes 422 at 120Mbps (PAL)
- 3 x faster than real time on a single transfers with Avid DNxHD® or Apple ProRes 422 at 120Mbps (PAL)
- 4.1 simultaneous real time transfers with Avid DNxHD® or Apple ProRes 422 at 145Mbps (NTSC)
- 2.5 x faster than real time on a single transfers with Avid DNxHD® or Apple ProRes 422 at 145Mbps (NTSC)

SIMULTANEOUS BACKUP AND RESTORE

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

IMPORTANT RECOMMENDATIONS

- For 6-channel configuration, maximum bitrates for Avid DNxHD® or Apple ProRes 422 should be 220Mbps (NTSC) or 185Mbps (PAL).
- "Super Motion + 1 Cam" configuration (i.e. 1 Super Motion REC + 1 Std REC + 1 Super Motion PLAY + 1 Std PLAY): maximum bitrates for Avid DNxHD® or Apple ProRes 422 should be 145Mbps (NTSC) or 185Mbps (PAL).
- When using the Avid DNxHD® codec, we advise to work at 100Mbps if the picture quality is satisfactory → the XT3 can sustain 6 local channels + 5 network transfers.
- The 4ch configurations with 3D, 1080p or 3D SLSM 3x are only possible with Avid DNxHD® 100 Mbps or Apple ProRes 422 LT.

1.8.9 RAID LEVEL: 3

The Video Raid uses striping process across 5 or 6 disk drives. The video and audio data is striped over the first 4 or 5 drives while the parity information is saved on the fifth or sixth 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.

For more information on online rebuild, refer to the section dedicated to this subject in the XT3 Software Technical Reference manual.

1.8.10 INTERPOLATION

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 by-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 use 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 got 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 SuperLSM configuration in which 4-line interpolator mode is enabled.

2. Cabling

2.1 XT3 REAR PANEL

2.1.1 OVERVIEW ON REAR PANEL CONFIGURATIONS

The XT3 server comes in a variety of rear panel configurations.

The variants linked to the workflows and codec modules are presented below.

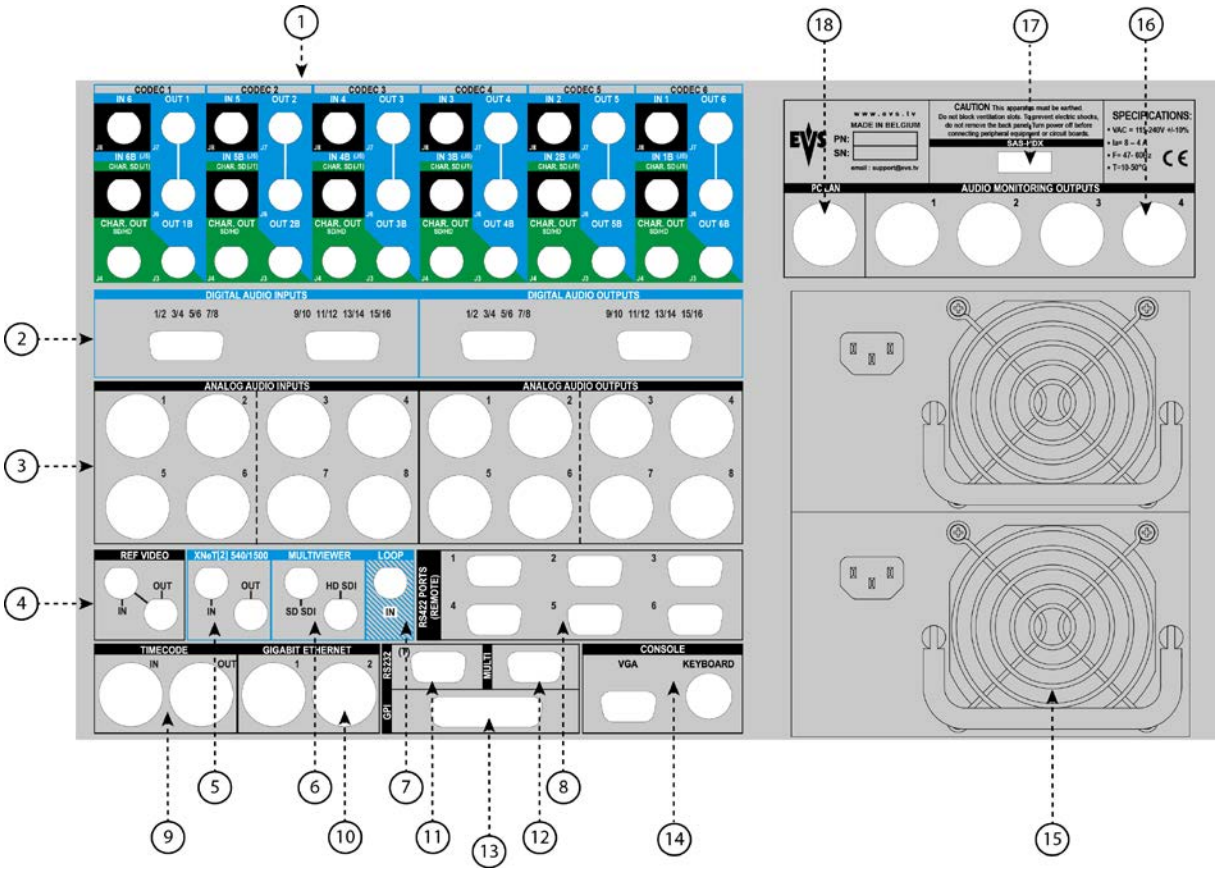
The variants related to the audio connectors are not presented, as they are similar to all servers.

The XT3 server comes as:

- A 4U server with V3X boards, available in 2 or 4 channel configurations.
- A 6U server with V3X boards available in 2, 4 or 6 channel configurations.

2.1.2 REAR PANEL DESCRIPTION

The following drawing represents a rear panel of an XT3 6U in the standard 6 channel configuration. The various areas are highlighted in the drawing. They are named and shortly described in the table below.



The following table lists the various components of the rear panel of an XT3 server:

#	Connectors	Description
1.	Codec Modules	Allow connections for recording and playback of video material. Each connector on a codec module is connected to the corresponding J connector on the V3X COD A or COD B module of a V3X board.
2.	Digital Audio Inputs / Outputs	Multi-pin connectors (DB15) (as presented), BNC or XLR connectors for audio inputs and outputs in digital format.
3.	Analog Audio Inputs / Outputs	AES XLR connectors for audio input and outputs in analog format.
4.	Ref Video	Allows the EVS server to receive or send back the analog genlock reference signal.
5.	XNet2	Allows the interconnection of EVS servers, XF2 and/or XStore 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 network.

#	Connectors	Description
6.	Multiviewer	Allows a monitor to be connected directly to the EVS server, and to display PGM and REC channels as configured in the Multicam setup. For more information, refer to the Multicam Setup user manual.
7.	Loop IN	Allows the loop of PGM1 on REC1 to be able to use the loop feature.
8.	RS422 ports	Allow the EVS server to be remotely controlled through Remote panels or third-party control devices. In a Spotbox mode, in combination with the use of the Remote Panel, the Remote Panel should be connected on the first RS422 port.
9.	Timecode	Allows the EVS server to receive or send back the LTC timecode reference signal.
10.	Gigabit Ethernet	Allow the interconnection of EVS servers, other EVS and/or third-party systems into a Gigabit Ethernet network.
11.	RS232	Allows a tablet to be connected to the EVS server.
12.	Multi	Provides a Multiviewer output in DB15, that can be configured in CVBS, RGB HD or YUV HD.
13.	GPI	Allow GPI (General Purpose Interface) devices to send or receive electric pulses that will trigger commands on the server or connected third-party devices.
14.	Console	Allows a monitor and keyboard to be connected to the EVS server.
15.	Power Supply	Two hot-swappable power supply units. Both are connected to allow automatic power switching to the second power supply should the first one fail.
16.	Audio Monitoring Outputs	AES XLR connectors for audio output for monitoring purposes.
17.	SAS-HDX	Allows connection to the external disk array SAS-HDX.
18.	PC LAN	XLR connector that enables the connection to the PC LAN network.

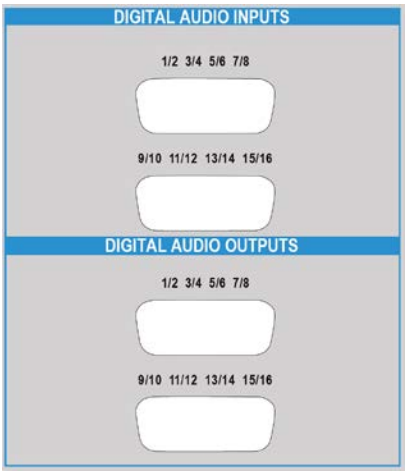
2.1.3 CONFIGURATIONS ON XT3

AVAILABLE AUDIO CONNECTIVITY

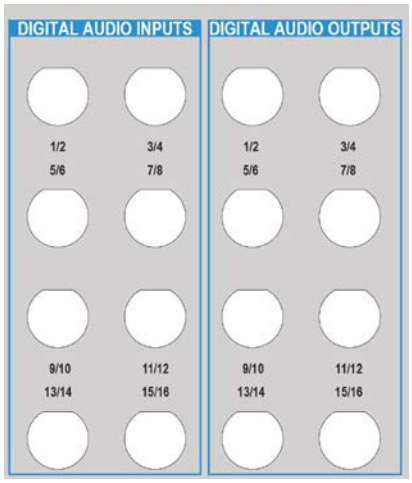
On XT3 6U and 4U servers, the audio connectors are optional and available as described in this section:

- The digital audio connectors are available:
  - On XT3 6U servers, as 4 multipin SUB-DB15, 16 BNC, or 16 XLR connectors (instead of analogue audio inputs/outputs). See schema below.
  - On XT3 4U servers, as 4 multipin SUB-DB15 or 16 BNC connectors.

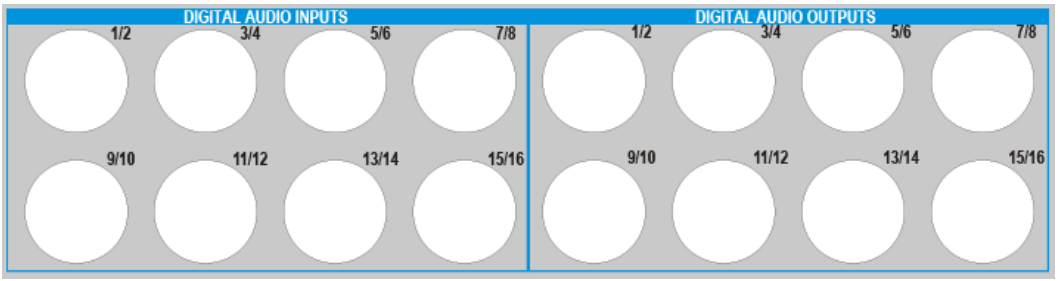
SUB-DB15



BNC



XLR (not on XT3 4U)



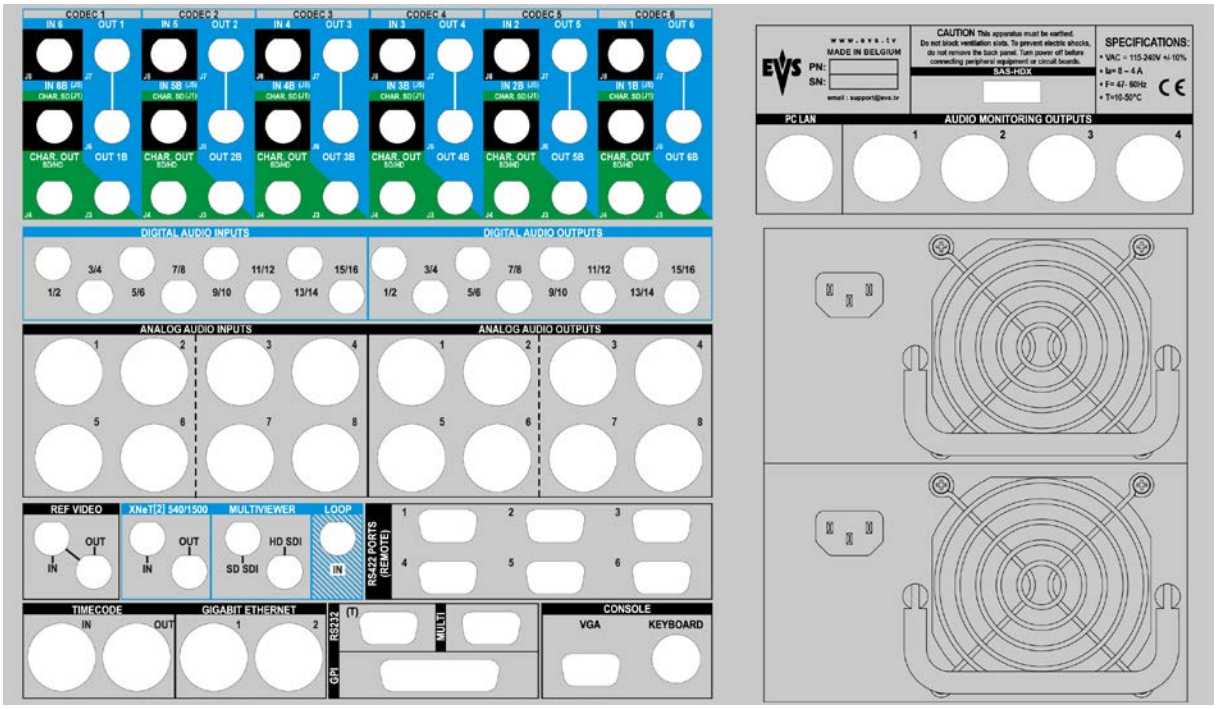
- The analogue audio connectors are available:
  - On XT3 6U servers, as 16 AES XLR connectors.
  - On XT3 4U servers, as 4 multipin SUB-DB15 connectors.

XT3 6U WITH 6-CHANNEL CONFIGURATION

The 6-channel configuration is presented with the optional AES on BNC connectors.

The 4-channel configuration is a variant of the 6-channel configuration where the codec modules 5 and 6 have been removed.

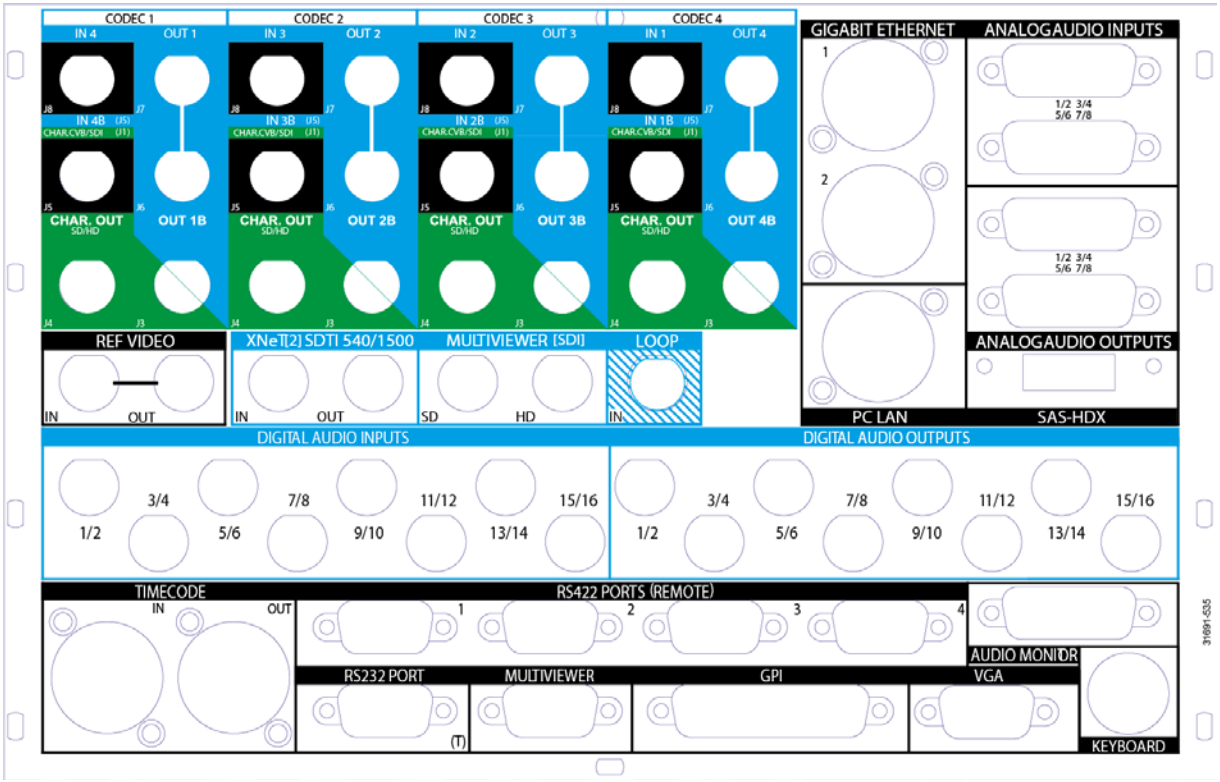
The 2-channel configuration is a variant of the 6-channel configuration where the codec modules 3, 4, 5 and 6 have been removed.



XT3 4U WITH 4-CHANNEL CONFIGURATION

The 4-channel configuration is presented with the optional AES on BNC connectors.

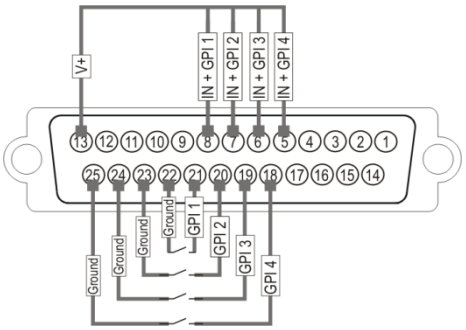
The 2-channel configuration is a variant of the 4-channel configuration where the codec modules 3 and 4 have been removed.



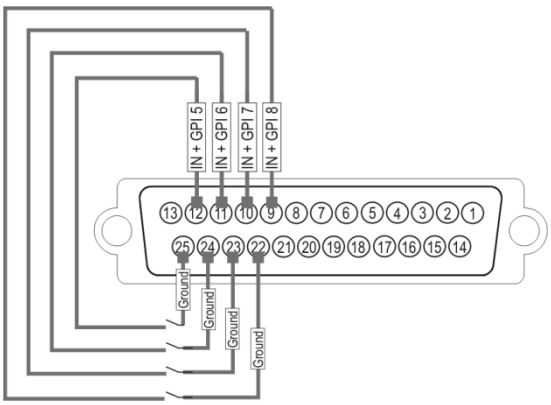
2.2 GPI IN CONNECTIONS

On XT3 servers, GPI triggers are available. Refer to the Multicam user manuals for GPI allocation.

2.2.1 RELAY → OPTO INPUTS ON THE XT3 SERVER (GPI INPUTS 1, 2, 3, 4)

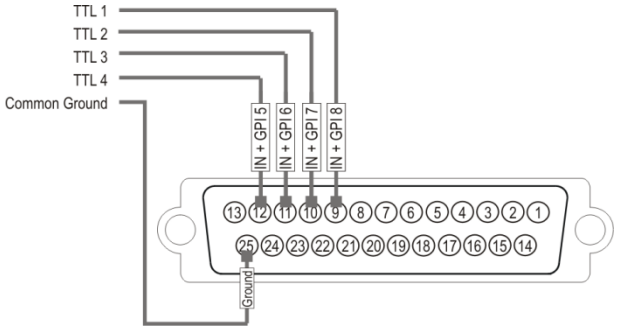


2.2.2 RELAY → TTL INPUTS ON THE XT3 SERVER (GPI INPUTS 5, 6, 7, 8)



The relay must be connected between the ground and the corresponding TTL input on the DB25.

2.2.3 TTL → TTL INPUTS ON THE XT3 SERVER (GPI INPUT 5, 6, 7, 8)

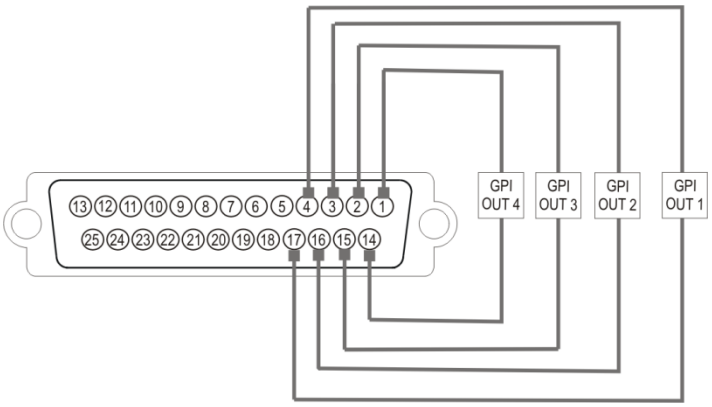


Each TTL input on the DB25 is directly connected to the pin of the TTL connector on the device triggering the GPI. The ground must be common between the DB25 connector of the XT3 and the external device.

2.3 GPI OUT SETTINGS

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

- Setup menu of the Remote Panel (pages 8.3 & 8.4)
- IP Director settings (GPI and Auxiliary Track tab)



2.4 MTPC GPIO CONNECTOR 15/10/02

2.4.1 GPIO CONNECTOR: SUB-D 25-PINS MALE

1	Relay Out 4	14	Relay Out 4
2	Relay Out 3	15	Relay Out 3
3	Relay Out 2	16	Relay Out 2
4	Relay Out 1	17	Relay Out 1
5	IN + opto 4	18	IN - opto 4
6	IN + opto 3	19	IN - opto 3
7	IN + opto 2	20	IN - opto 2
8	IN + opto 1	21	IN - opto 1
9	I/O TTL 8	22	GND (Return I/O 8)
10	I/O TTL 7	23	GND (Return I/O 7)
11	I/O TTL 6	24	GND (Return I/O 6)
12	I/O TTL 5	25	GND (Return I/O 5)
13	+ 5V 50mA max.		

2.4.2 GPIO HARDWARE SPECIFICATION

4 X Relay isolated output:

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

4 X Opto isolated input:

- 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.

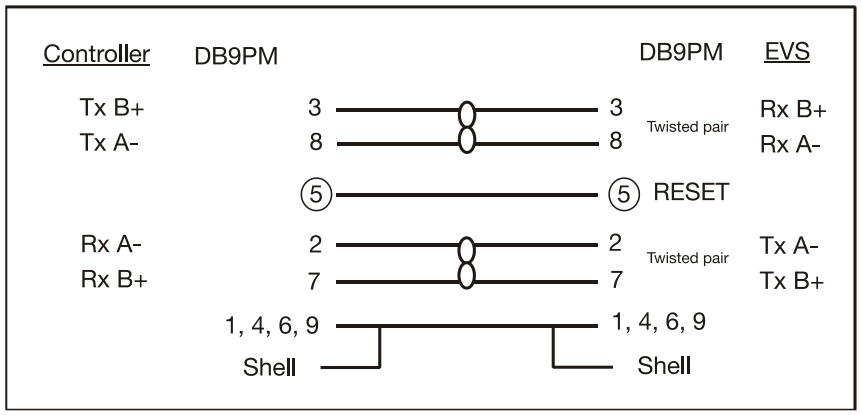
  Typical switching point @ 1.6 Volts, for secure operation:

  - Vin< 0.8 Volts -> opto OFF
  - Vin> 2.2 Volts @ 2 mA -> opto ON
  - Vin max (without external resistor) = 15 Volts

4 X CMOS input/output:

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

2.5 RS422 CONNECTOR



The RS 422 cable must be wired PIN TO PIN following the above diagram. Use shielded cable to avoid electromagnetic interference on long distances.

Important

The Reset command from the Remote is sent through the Pin n°5 of RS422 connector. This function should be disabled when the controller on RS422 #1 is not an EVS controller (refer to the section 'MTPC Board' on page 74 of this manual).

The technical specifications for the RS422 connector are the following:

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

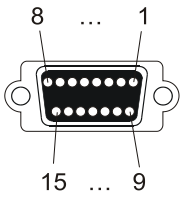
2.6 AUDIO CONFIGURATIONS

2.6.1 CODA FOR XT3

Internal Audio Module: Embedded + AES/EBU + Analogue Balanced

- Embedded Audio 64 channels (input or output)
- AES/EBU Audio 16 inputs + 16 outputs (110 Ohm balanced on SUB-DB15, breakout cable with 4 XLR IN/OUT available optionally OR 75 Ohm unbalanced on BNC or 16 XLR - on XT3 6U)
- Analogue Balanced audio 8 inputs + 8 outputs (110 Ohm balanced on SUB-DB15, breakout cable with 4 XLR IN/OUT available optionally OR XLR)
- Audio monitoring : 4 analogue balanced mono outputs (XLR)

2.6.2 PIN ASSIGNMENT ON SUB-DB15 CONNECTORS



AES DB15 Connectors

Pin #	Sub-DB15 #1 Inputs 1-8 (mono)	Sub-DB15 #2 Inputs 9-16 (mono)	Sub-DB15 #3 Outputs 1-8 (mono)	Sub-DB15 #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 -

Pin #	Sub-DB15 #1 Inputs 1-8 (mono)	Sub-DB15 #2 Inputs 9-16 (mono)	Sub-DB15 #3 Outputs 1-8 (mono)	Sub-DB15 #4 Outputs 9-16 (mono)
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 -

Analogue DB15 Connectors

Pin #	Sub-DB15 #1 Inputs 1-4 (mono)	Sub-DB15 #2 Inputs 5-8 (mono)	Sub-DB15 #3 Outputs 1-4 (mono)	Sub-DB15 #4 Outputs 5-8 (mono)
1	GND	GND	GND	GND
2	Analogue input 1 +	Analogue input 5 +	Analogue output 1 +	Analogue output 5 +
3	GND	GND	GND	GND
4	Analogue input 2 +	Analogue input 6 +	Analogue output 2 +	Analogue output 6 +
5	GND	GND	GND	GND
6	Analogue input 3 +	Analogue input 7 +	Analogue output 3 +	Analogue output 7 +
7	GND	GND	GND	GND
8	Analogue input 4 +	Analogue input 8 +	Analogue output 4 +	Analogue output 8 +
9	Analogue input 1 -	Analogue input 5 -	Analogue output 1 -	Analogue output 5 -
10	GND	GND	GND	GND
11	Analogue input 2 -	Analogue input 6 -	Analogue output 2 -	Analogue output 6 -
12	GND	GND	GND	GND
13	Analogue input 3 -	Analogue input 7 -	Analogue output 3 -	Analogue output 7 -
14	GND	GND	GND	GND
15	Analogue input 4 -	Analogue input 8 -	Analogue output 4 -	Analogue output 8 -

2.7 CONNECTING MULTIPLE EVS VIDEO SERVERS ON XNET

The XNet2 network is composed by several EVS video servers all connected with a 75-Ohm coaxial cable (BNC).

The exchange between systems is operated through the SDTI interface at 1485 Mbps.

On XT3 servers there is one pair of SDTI connectors: XNet2 Non-Relay connectors that can be used at 1485 Mbps.

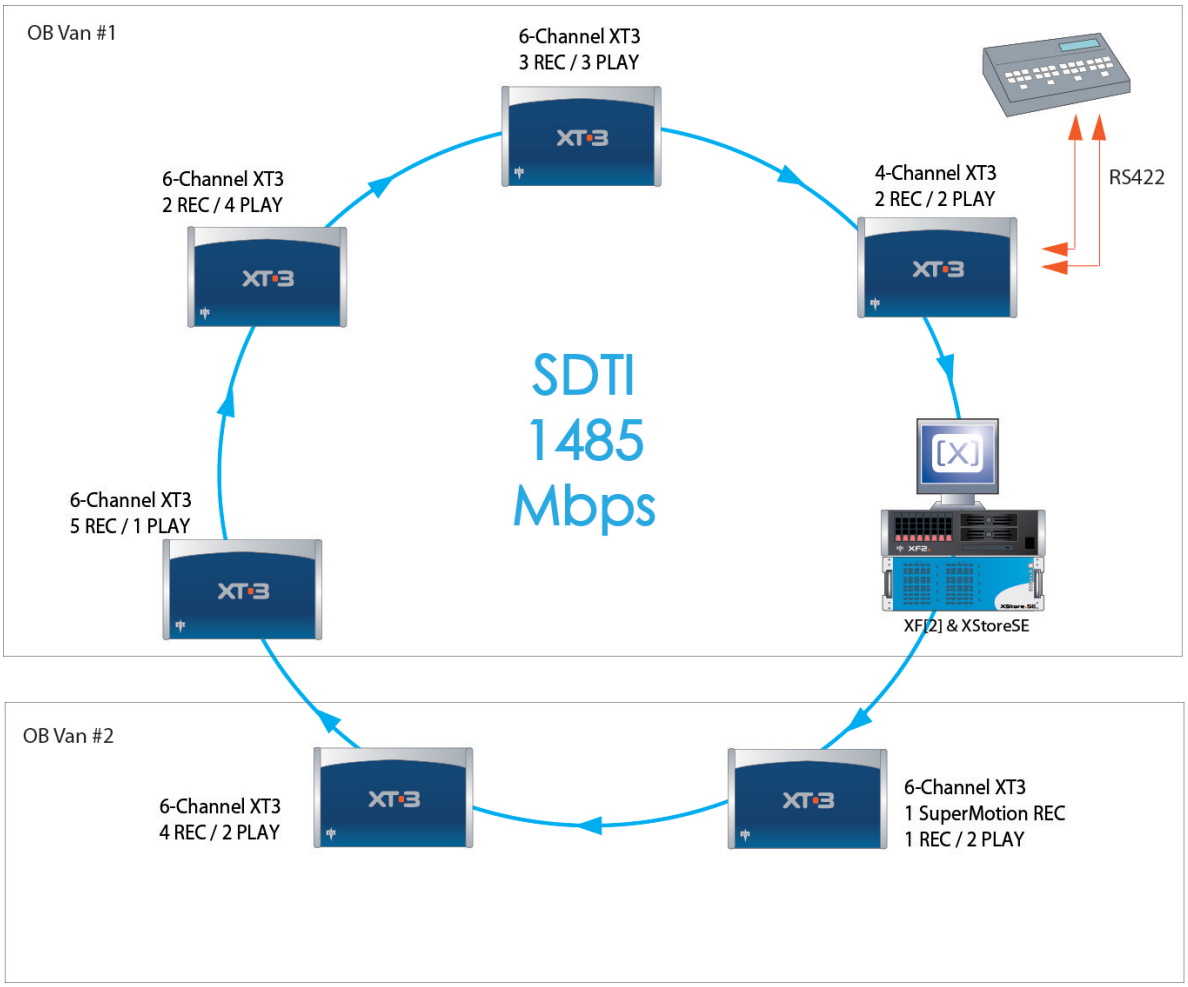
The SDTI loop is closed only when the Multicam software is started. It is therefore recommended to use XHub when using Non-Relay connectors to avoid network interruptions.

The XNet2 requires a network server dedicated to the management of the Database shared among all LSM-EVS video servers. This is assigned to one of the LSM-EVS servers on the network. The EVS server acting as the network server can of course be used for standard LSM/video server operation.

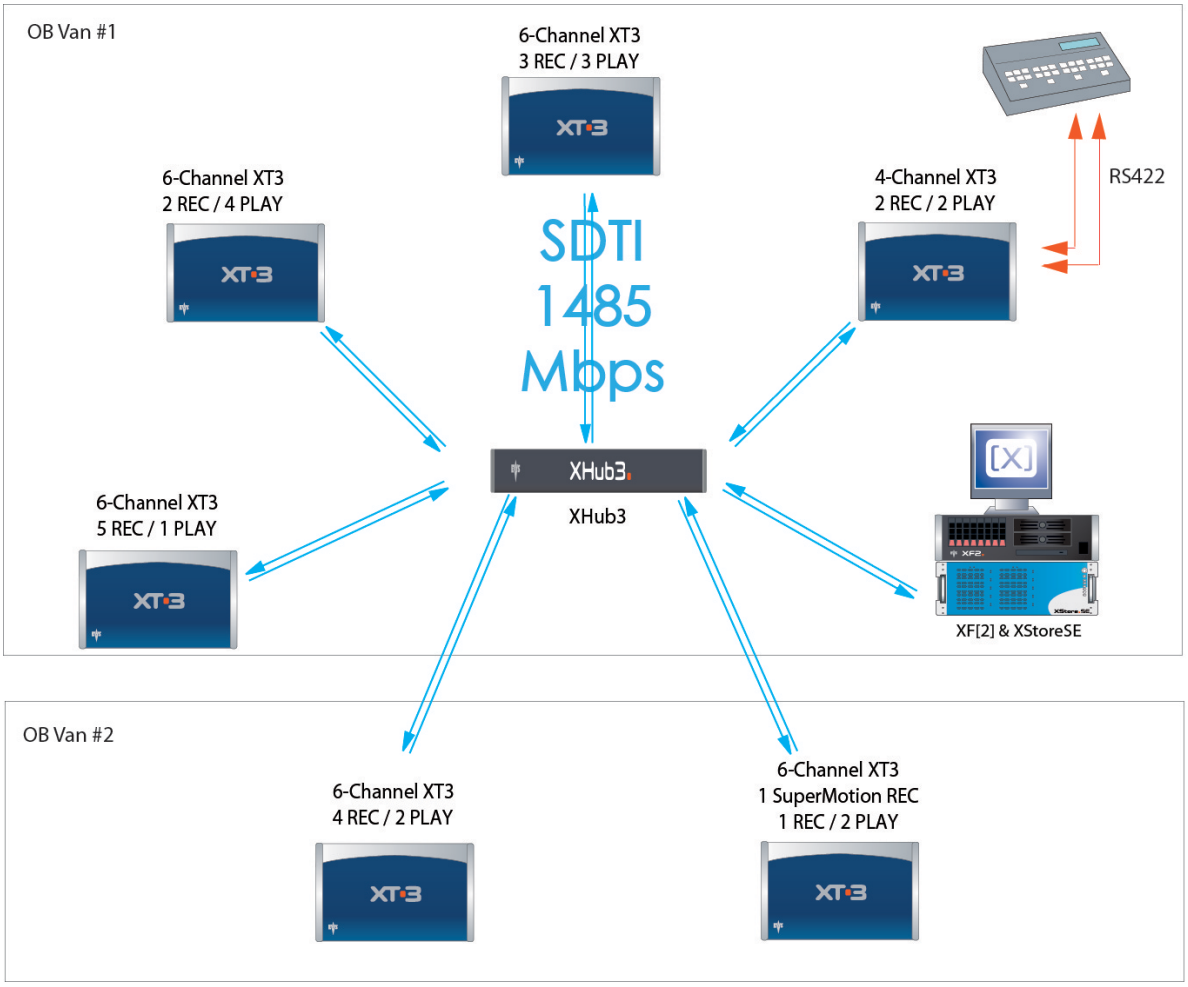
Note

If an XT3 must be connected to other XT2 or XS family servers with SCSI or SAS disks, these servers must run at least Multicam version 10.05.

2.7.1 CONNECTION DIAGRAM WITHOUT EVS XHUB SDTI HUB



2.7.2 CONNECTION DIAGRAM WITH EVS XHUB SDTI HUB



2.7.3 REQUIRED CONDITIONS TO SET UP AND RUN XNET

1. All systems on the network must be XT2, XT3 or XS family servers, XF2, XStoreSE, XHub2 or XHub3.
2. The SDTI advanced option code (for network client, master or server modes) must be validated in the options list.
3. They should all be running compatible software version. A warning message is displayed when trying to connect an EVS video server with a software version that is not compatible with the network server.
4. The following parameters must be similar on all systems: SDTI Speed (1485Mbps, from Hardware Configuration menu)
5. Network Type must be set to "Server" on 1 EVS video server (and only 1) on the network. The others must be set to either "Master" (to share clips and view others' clips) or "Client" (to share clips only).
6. 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.
7. All EVS video servers must be connected with a good quality BNC 75Ohm 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 EVS XHub SDTI hub.
8. The distance shown in the table below is the maximum cable length between two active EVS servers, or 2 SDTI reclockers, on an XNet2 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-Fibre converters:
    a. Stratos Lightwave Media Converter TX/RX VMC-T-H-2/VMC-R-H-2 (www.stratoslightwave.com)
    b. Telecast TX/RX292 (www.telecast-fiber.com)
    c. Network Electronics SDI-EO-13T (electrical to optical) / SDI-OE-S (optical to electrical) (www.network-electronics.com)
    d. Network Electronics HD-EO-13T (electrical to optical / HD-OE (optical to electrical)
    e. BlueBell BB320T (TX) and BB320R (RX) (www.bluebell.tv)

Cable type	@ 1485 Mbps
RG59	45m / 148ft
RG6	90m / 484ft
RG11	120m / 393ft
Super HiQ	150m / 492ft
Fiber	80km(*)

(*) 80km/200km 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. 40 km @ 1485Mbps.

Note

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

2.7.4 STARTING XNET

1. When all above conditions are fulfilled, turn on the “Server” EVS video server and start the Multicam application.
2. Turn on all “Masters” and “Clients” EVS video servers, and make sure the Multicam application is started on all of them. 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.

2.7.5 XNET PERFORMANCES & TROUBLESHOOTING

1. With the default settings, 10 real-time transfers can be achieved on the network with standard definition pictures in normal conditions, and 3 real-time transfers with super motion pictures. Copy of a clip between 2 servers on the network can be made up to 5 times faster than real time, depending on network load.

   With high definition pictures, these numbers are reduced to 3-4 real-time transfers and copy clip 2 times faster than real time.
   These performances are also limited by the disk bandwidth available from the EVS server where the clips are stored. If the EVS server “owning” the clips is doing multiple playbacks at the same time, freezes can occur on the remote EVS server using those clips. Priority levels have been implemented to maximize network bandwidth efficiency: PLAY requests have a higher priority than SEARCH/BROWSE requests, which in turn have a higher priority than COPY requests. Note that “Live” (E2E) mode on a remote record train has the same priority level as a SEARCH/BROWSE request.
2. Note that when working at 1485Mbps, only passive SDI routing equipment may be used. The use of active SDI equipment should be avoided, because they

could cause additional line delays and prevent the proper operation of XNet2.

3. If the start-up of the network at a specific speed does not work properly and all machines are apparently configured properly and the Multicam is actually started on all of them, this can be due to the fact that the selected cables to connect all EVS servers together are not suitable or too long to operate at such a speed. You can decrease the speed of the SDTI network on all machines and try working in this mode. The number of simultaneous real-time transfers you can achieve is of course reduced.
4. While working at 1485 Mbps, if the connection cannot be established, please make sure that all equipments are set to the same speed and connected to the non-relay connectors. All equipments should be started if not connected to an XHub.
5. It is recommended to use XHub if the network speed is set to 1485 Mbps.
6. Once the network has been established, if the system acting as the network server is disconnected or shut down, another system will automatically be assigned to act as a new network server. The switch is automatic. The next machine to be automatically assigned as new network server is the one with the highest serial number in the SDTI network.

2.8 GIGABIT NETWORK

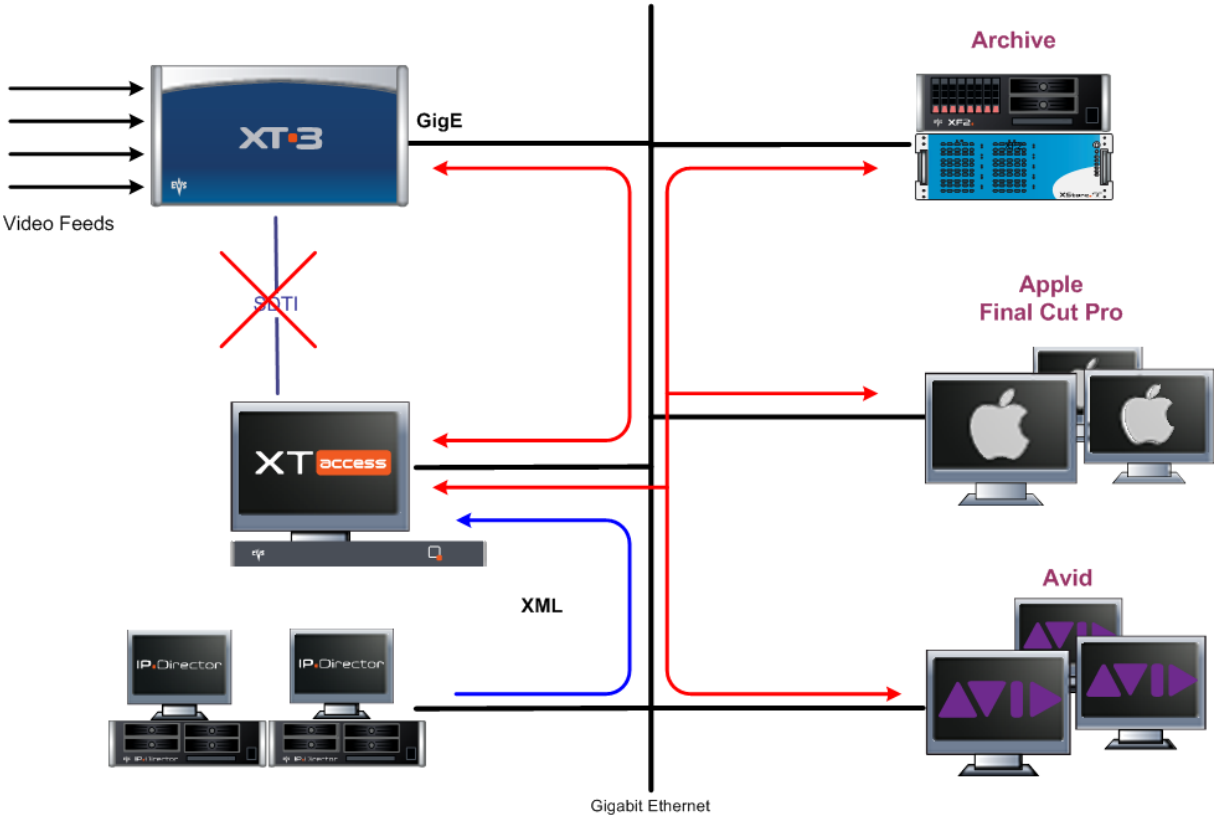
2.8.1 FUNCTIONAL OVERVIEW

The Gigabit connection makes it possible to transfer video and audio material from the XT3 servers 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 or XF2.
- A non-linear Editing system, such as Xedio, Apple Final Cut Pro or Avid.

However, the external systems cannot read the raw files coming from the XT3 servers. For this reason, XTAccess is used as a “gateway” between the XT3 and the IT world. It takes up the role of gateway used so far by XFile/XStream as it creates file formats compliant with external systems.



XTAccess is directly connected to the XT3 servers through the Gigabit network via an FTP client. It runs on an XP workstation and is mainly controlled by the external systems (no user interface) via XML files or other processes.

The Gigabit connection fulfills the following functions in relation with the XT3 servers:

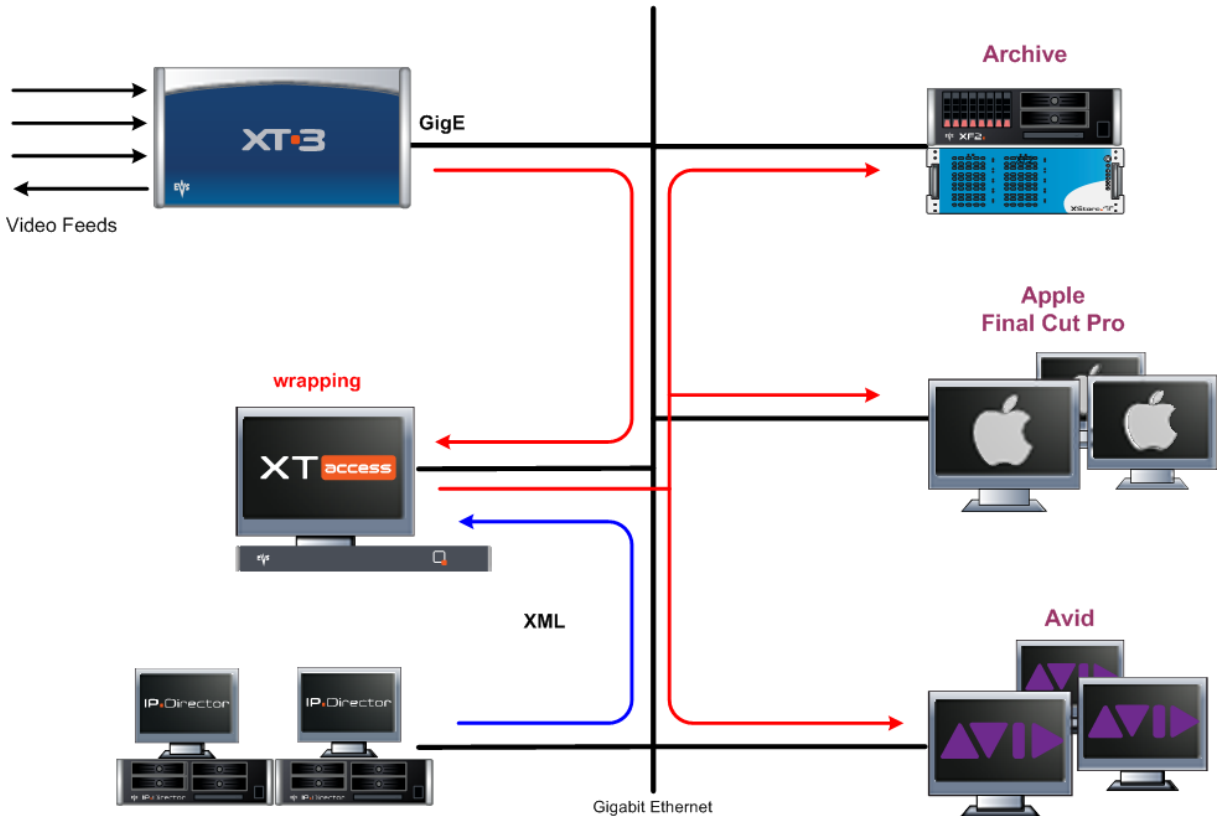
- Backup of clips from an XT3 server
- Restore of clips to an XT3 server
- Transfer of clips between servers

The sections below briefly present the backup and restore of clips through the Gigabit connection. Please refer to the XTAccess user manual for full information about the possible workflows with third-party systems.

2.8.2 BACKUP OF CLIPS

Overview

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



Workflow

1. An external system, for example IP Director, sends an XML file to XTAccess to request the backup of a given clip created on an XT3 server.
2. XTAccess processes the XML file:
   a. It gets the clip content that has to be backed up from the XT3 server.
   b. It generates a backup file of the clip in the format specified by the external system (no transcoding feature, only native codec). The following formats are supported: EVS MXF, AVI, Avid MXF OPAtom, MXF OP-1A, Quick Time, Quick Time Ref (depending on the video codec).
   c. It stores the backup file in the target folder specified by the external system. The metadata of the clip are either included in the file (in EVS MXF) or sent via an XML file.

2.8.3 RESTORE OF CLIPS

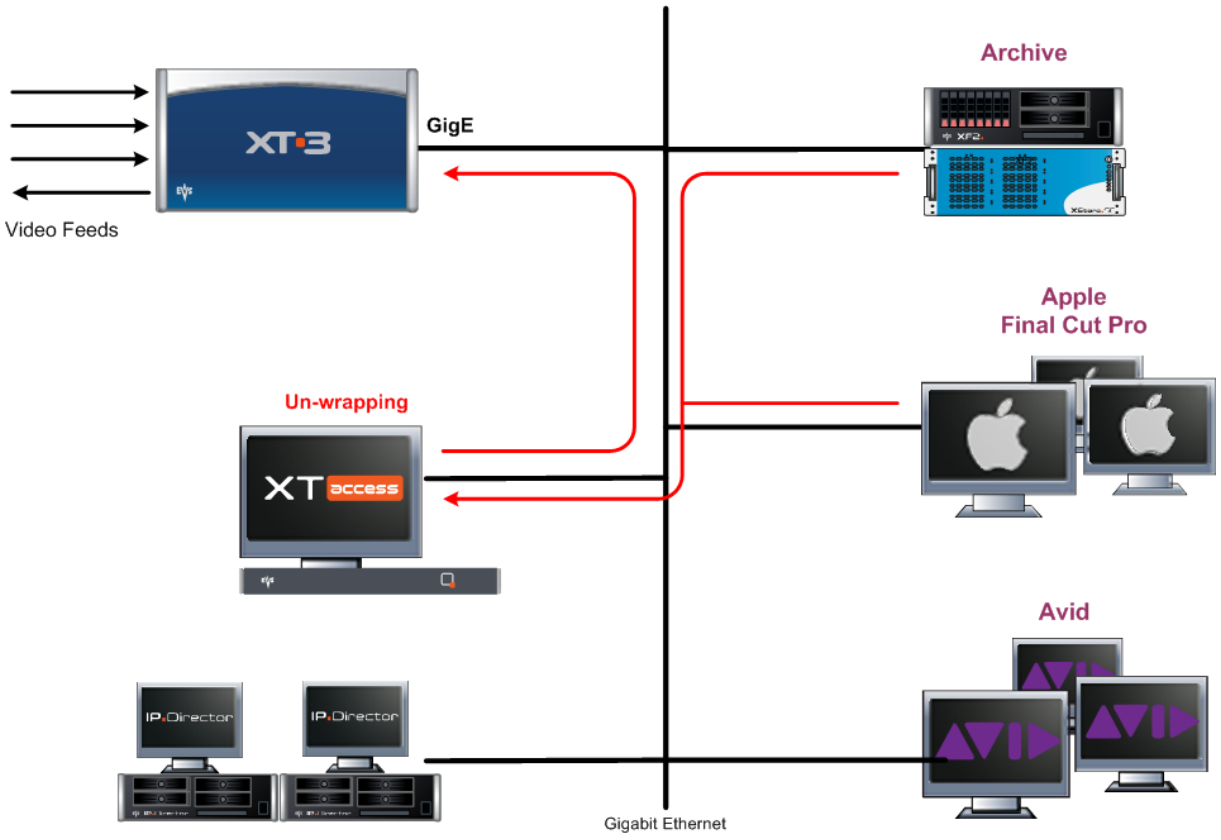
Overview

Only clips having one of the following formats can be restored: EVS MXF, MXF OP-1A or Quick Time (depending on the video codec).

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

- via XML file sent by the external application.
- via folder scan.

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



Workflow (Restore via XML File)

1. An external system (which can generate XML files for restoring clips, for example MediaXChange or IPDirector) sends an XML file to XTAccess to request the restore (copy) of clips from an archiving or backup system to a given XT3 server.
2. XTAccess processes the XML file:
   a. It gets the clip file to restore from the external system.
   b. It restores, i.e. copies, the clip on the XT3 server specified in the XML file.

Workflow (Restore via Folder Scan)

1. Based on the parameters defined in XTAccess, this application scans specific folders on external backup or archiving systems.
2. When a clip file has been written to the scanned folder, XTAccess creates a copy of the clip on the XT3 server specified in the XTAccess 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 XTAccess and incremented as defined for each new clip that is restored in order to find an empty location on the XT3 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.

2.8.4 IMPORTANT RULES

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

- The hardware used on GigE networks with EVS servers need to support jumbo frames.
- Both GigE ports of an EVS server need to be defined on different sub-networks.
- Teaming between the GigE1 and GigE2 ports is not possible.
- This is not possible to implement failover through the GigE network.
- The GigE port available on the MTPC board (PC LAN) is a 100Base-T port.

  This is used for monitoring purposes (XNet Monitor) or for the communication with other applications (LinX). This can be in the same sub-network as the GigE port.

2.8.5 SWITCHES

SUPPORTED SWITCHES

All switches used on the GigE networks of EVS systems need to support jumbo frames (Ethernet frames with more than 1,500 bytes of payload). Three models of 19-inch Gigabit switches have been validated for use with EVS workflows:

- HP Procurve 2510G-24
- Cisco Catalyst 2960G-24TC
- Cisco Catalyst 3750E-24TD/3750E-48TD

COMPARISON

The HP Procurve 2510G-24 and Cisco Catalyst 2960G-24TC can be used for small setups where no inter-VLAN routing is needed.

On larger setups, both GigE ports of the XT3 servers or/and several ports on the XF2 are often used to increase the bandwidth or to allow redundancy. Since both GigE ports of an XT3 server cannot be used on the same sub-network, virtual LANs need to be created. To allow the transfer of packets between the virtual LANs, layer 3 switches are required. You need to select a layer 3 switch that is able to route jumbo frames.

A switch of the Cisco Catalyst 3750E series should be used on larger setups as they support jumbo frames, allow traffic to be routed between different VLANs and provide stacking capabilities.

The following table gives an overview on the supported switches:

Model	RU	Layer	Gb ports	SFP	10Gb (X2)	JF switching	JF routing	Stacking
HP Procurve 2510G-24	1	2	20(+4)	4	0	Y	N	N
Cisco Catalyst 2960G-24TC	1	2	20	4	0	Y	N	N
Cisco Catalyst 3750E-24TD	1	3	24	(up to 4)	2	Y	Y	Y
Cisco Catalyst 3750E-48TD	1	3	48	(up to 4)	2	Y	Y	Y

A layer 2 device can be used when all machines are configured to be on the same LAN, when another layer 3 device is present to do the routing if needed, or when no routing between VLANs is needed.

ADDITIONAL INFORMATION

HP switches have a lifetime guarantee with next-business-day advance replacement with no additional contract purchase.

HP switches are not compatible with Cisco's proprietary protocols (ISL, PagP, PVST, etc.) which could be a problem for integration in some legacy Cisco environment. However, such a case is quite unlikely to arise and most of the time workarounds can be found.

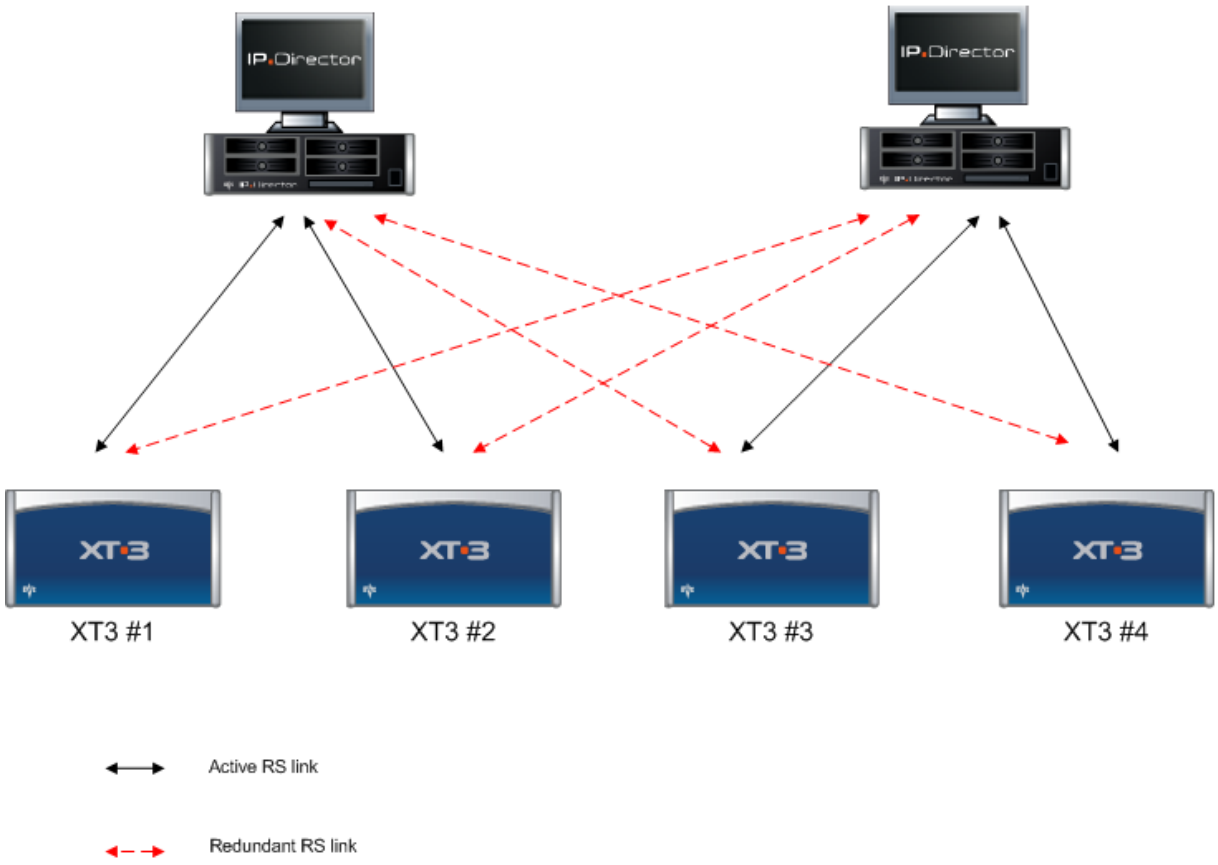
The stacking possibilities of the Cisco 3750E series permit to have fully active LACP teams for redundancy to the hosts.

2.9 REDUNDANT IPDP SERIAL LINK

The IPDirector communicates with the XT3 server via one serial link. If that link fails, the XT3 server can no longer be controlled by any IPDirector.

A failover mechanism has been put into place: it switches the IPDirector link from one port of an XT3 server to another port on another XT3 server.

To ensure the failover, the backup links between IPDirector workstations and the XT3 servers need to be physically cabled to a second RS422 port, as shown on the following schema:



The serial link redundancy will ensure that there is no single point of failure in the setup. However, you need to put into place a thoroughly thought through IPDP configuration for the SynchroDB to continue working correctly. This can be achieved, for example, by defining an IPDirector workstation in Network mode.

3. Hardware Description

3.1 BOARDS AND SLOT CONFIGURATIONS

The XT3 server contains all EVS developed boards. The XT3 server can be fitted with V3X video boards. The board configuration will slightly vary depending on the type of video board used.

3.1.1 SLOT CONFIGURATION

Slot #	XT3 SD (HD Ready), HD or HD/SD
7	RSAS
6	H3X
5	CODA (Audio Codec)
4	V3X (SD/HD) #3
3	V3X (SD/HD) #2
2	V3X (SD/HD) #1 Genlock
1	MTPC

3.2 VIDEO AND REFERENCE BOARDS

3.2.1 V3X BOARD "DUAL POWER"

Important

It highly advised not to remove a V3X board from the EVS server. Should you have to do so, manipulate the board very carefully, making sure it is not exposed to mechanical or electric shocks.

DESCRIPTION

The V3X board is divided in 3 parts: a base board identified as COHX base (rear section and center extension), and two modules identified as COD A V3X (front left), and COD B V3X (front right).

The COD A V3X and COD B V3X 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). The COD V3X modules are SD, HD and 3 Gbps capable.

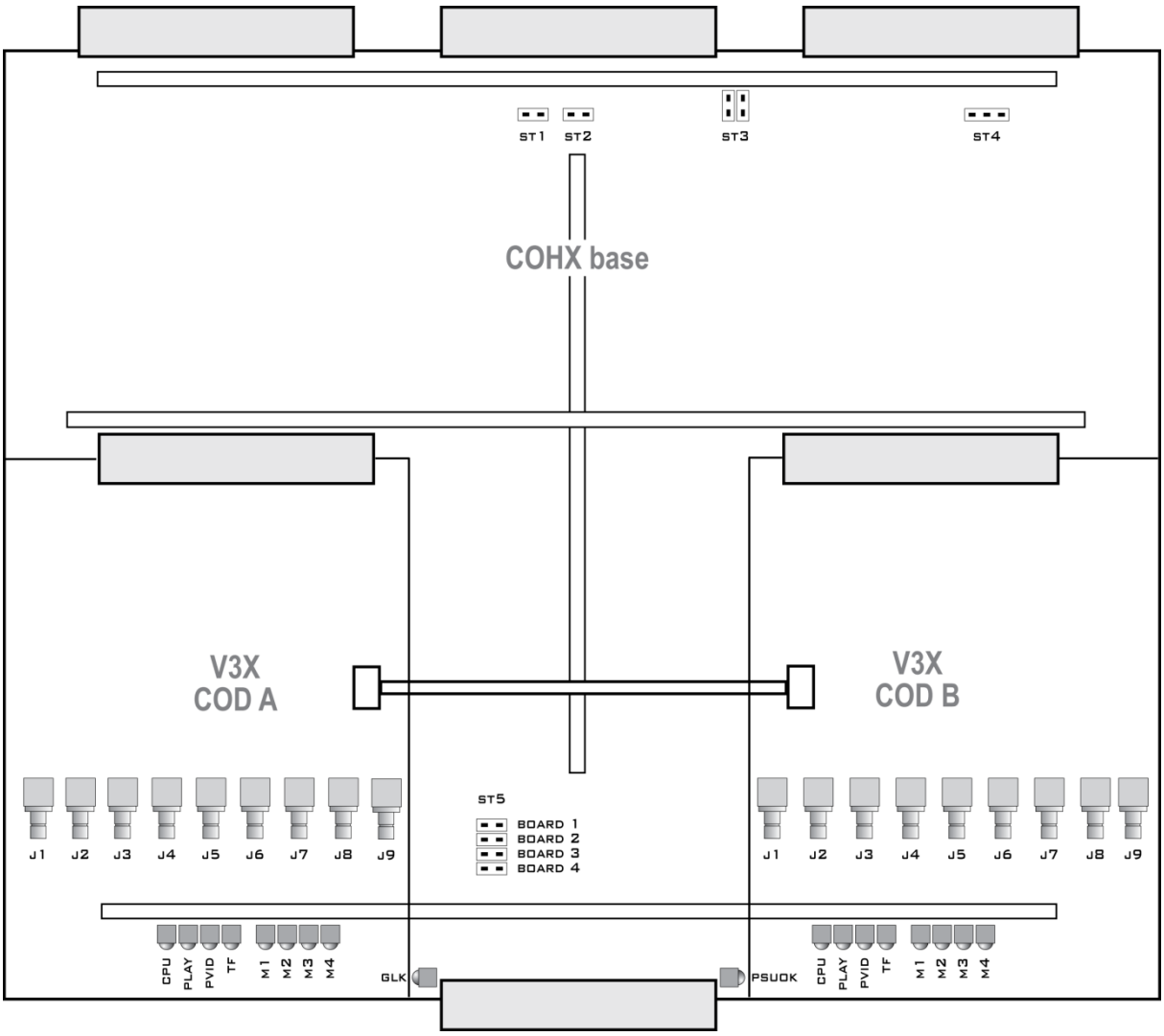
They support the following new features:

- Full resolution 3D HD on a single V3X module (Dual Link HD SDI or single link 3Gbps)
- 1080p 50/59.94Hz video standard on a single V3X module (Dual Link HD SDI or single link 3Gbps)

There are 2 versions of the V3X board: one with genlock, one without genlock.

The genlock model can easily be identified by the presence of 3 quartz synthesizer at the back of the COHX base board, on the right-hand side, and by the presence of the GLK and PSU OK LEDs on either side of the DIN connector at the centre front of the board. Note that a V3X board with genlock must be installed as V3X #1 in first position (slot 2) in an XT3 server. A V3X board with genlock can never be installed in any other slot, and thus cannot be used instead of V3X #2 or #3. Doing so will result in conflicting electrical signals inside the system.

BLOCK DIAGRAM



JUMPERS ON THE COHX BASE OF A V3X BOARD

ST1, ST2:	These 2 jumpers must be installed on the last V3X board of the server (i.e. on V3X #1, 2 or 3 if there are respectively 1, 2 or 3 V3X board installed in the server)
ST3 (SPARE):	«parking» for jumpers for ST1 and ST2 when these are not used
ST4 (only on V3X with genlock):	It must be set to HiZ (or not installed). Note that the Genlock Loop connector on the back panel of the XT3 server must always be terminated with a 75 Ohm load if it is not used.
ST5:	It defines the position of the board inside the server. It must be set to « 1 » for a V3X with genlock, and to « 2 » or « 3 » for a V3X board without genlock, depending on its position in the server.

LEDS ON THE COHX BASE OF A V3X BOARD WITH GENLOCK

GLK

Off	when the genlock module is not initialized
Blinks green	when the genlock module is properly initialized, but not valid genlock signal is detected
On, steady green	when the module is initialized and a valid genlock signal is detected
Red (intermittent)	when there is a genlock problem
Red (steady)	when a resync is needed

PSU OK

On (green)	when all voltages are present and in the allowed range, otherwise the led is off

LEDS ON THE V3X COD A AND COD B MODULES (FROM LEFT TO RIGHT)

CPU

Blinks green	to indicate CPU activity
On, steady green	when there is a problem with the processor of the COD module

PLAY

On (green)	when the COD module is set by the software in play mode
Off	when the COD module is set in record mode

PVID

on (green)	when a valid video signal has been detected on the J8 connector (SD/HD SDI input), whether the COD module is in play or record mode

TF (transfer)	
Blinks green	while data transfers occur between the COD module and the H3X board
M1, M2, M3, M4	not yet used

GENERAL CONNECTIVITY ON THE V3X COD A AND COD B MODULES

This section describes the connector assignments and layout for the video standards SD 525i, SD 625i, HD 1080i and HD 720p.

The specific connectivity for HD 3D/1080p Dual Link and 3D/1080p single link 3Gbps is described in dedicated sections.

Connector Assignments in SD and HD Modes

Connector	SD mode	HD mode	Connector label
J1	J5 is factory-wired to the backplane instead of J1. You can connect J1 instead of J5 if monitoring (CVBS or SDI) is required in SD or HD mode.		CHAR SD
	SDI/CVBS (*) monitoring output (SD)	SDI/CVBS(*) monitoring output (SD, down-converted)	
J2	SDI monitoring output (SD)	SDI monitoring output (SD, down-converted)	Not wired to the backplane. Used for onboard multiviewer input
J3	Loop-through for the SDI input signal (SD)	Loop-through for the SDI input signal (SD, down-converted)	OUT B
J4	SDI monitoring output (SD)	SDI monitoring output (HD/SD)	CHAR OUT SD/HD
J5	N/A	N/A	IN B
J6	SDI program output (SD)	HD SDI program output (HD)	OUT
J7	SDI program output (SD, identical to J6)	HD SDI program output (HD, identical to J6)	OUT
J8	SDI input (SD)	HD SDI input (HD)	IN
J9	Alternate SDI input (SD, for hardware loop)	Alternate HD SDI input (HD, for hardware loop)	Used for loop in

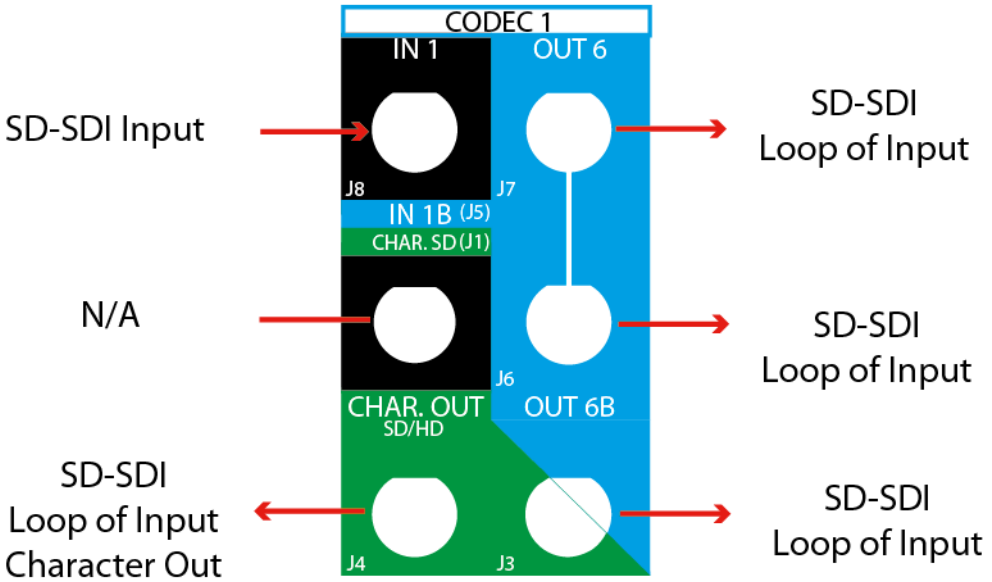
* The switch between SDI and CVBS on J1 is done by a software setting in the EVS Configuration menu.

Note

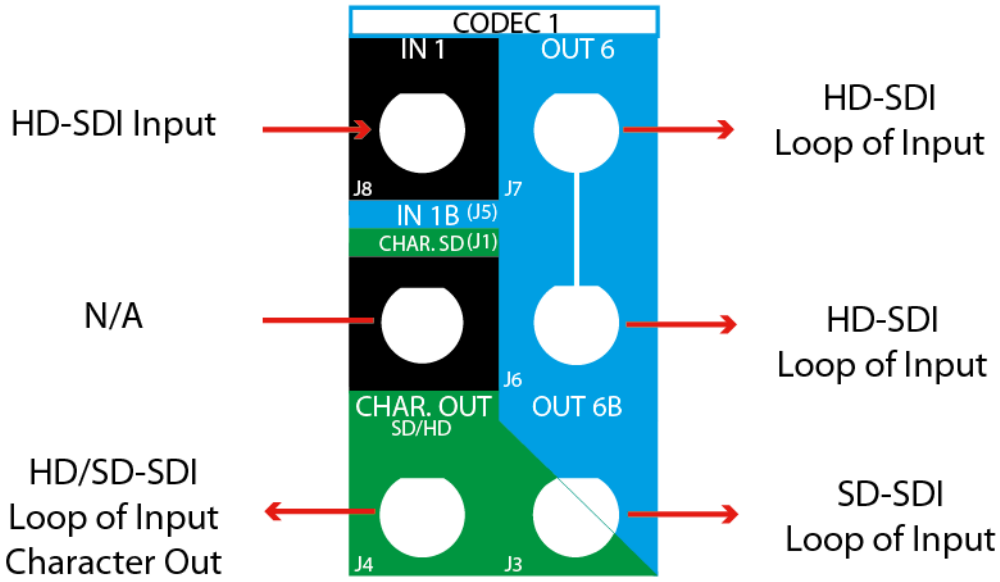
The loops of the input signal are not genlocked.

Layout of Connector Positions and Assignments

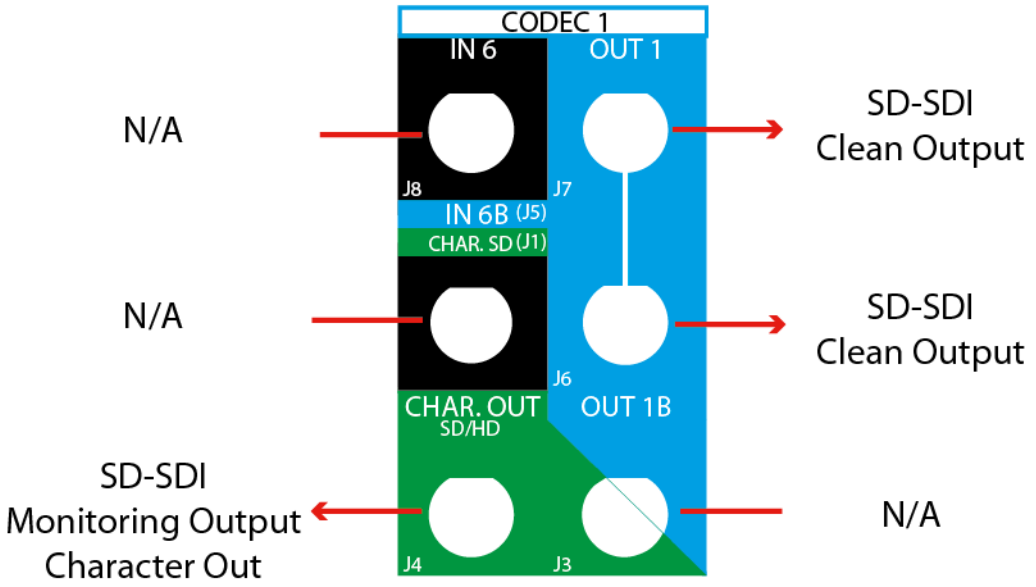
SD Mode - Input (REC)



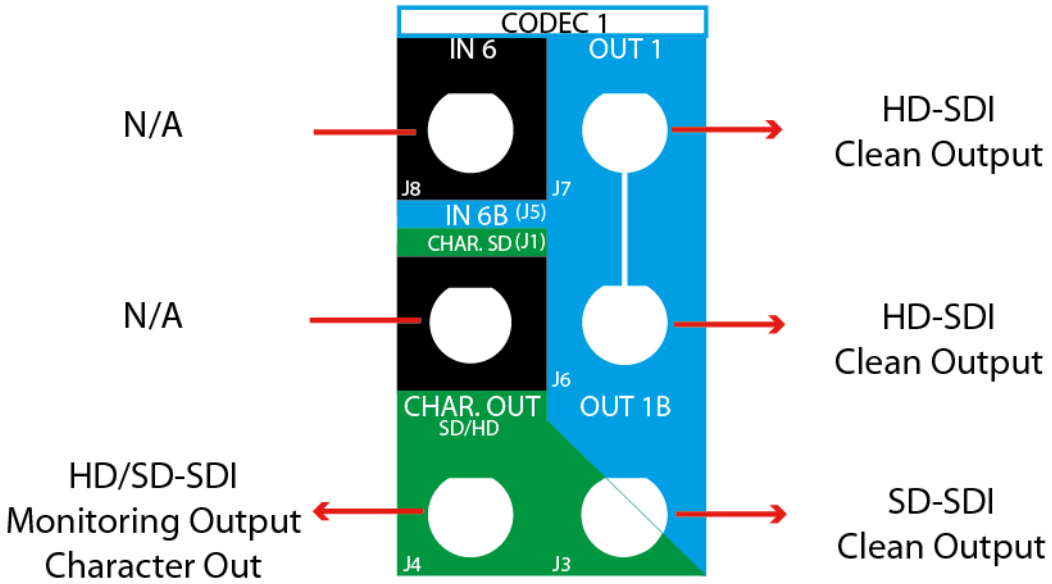
HD Mode - Input (REC)



SD Mode - Output (PLAY)



HD Mode - Output (PLAY)



Note

Only front backplanes labelled BKP7 are compatible with V3X boards (7 slots for 6U frames). The BKP7 backplanes (compatible with V3X boards) have 3 rows of soldering per slot, while the backplanes compatible with IO-E, COHD or COHU boards have 2 rows of soldering per slot. Note that the top slot of BKP7 backplanes must always be connected to the H3X board.

CONNECTIVITY ON THE V3X COD A AND COD B MODULES FOR 3D AND 1080P DUAL LINK

Connector Assignments

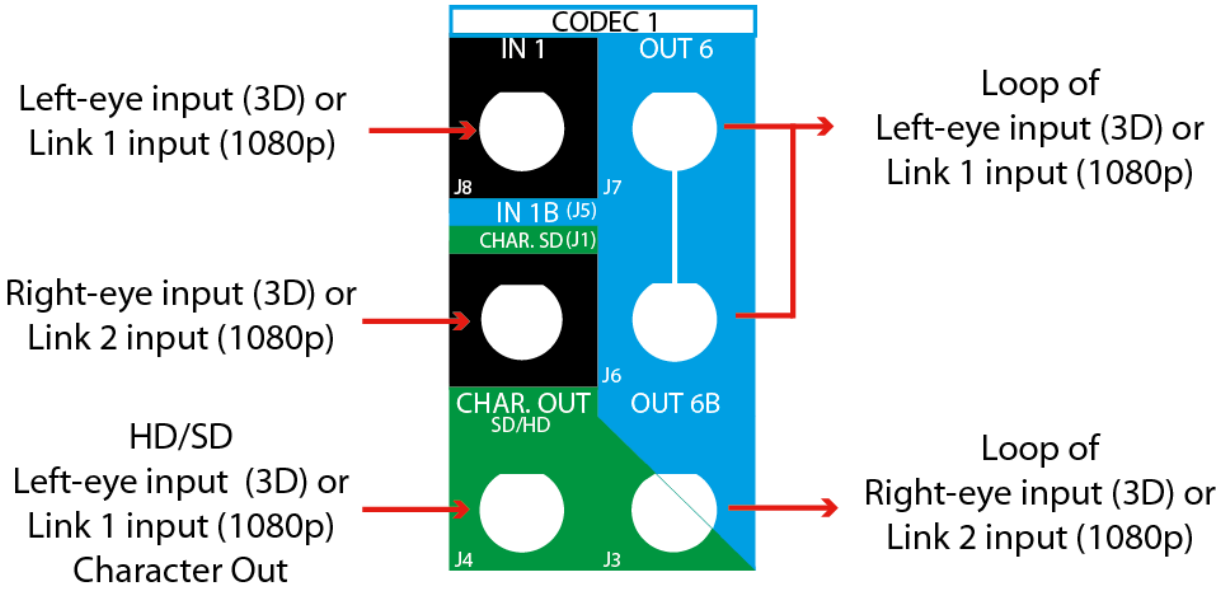
Connector	3D/1080p mode	Connector label
J1	N/A	CHAR SD
J2	SDI monitoring output (SD, down-converted)	Not wired to the backplane. Used for onboard multiviewer input
J3	HD SDI program output for right eye (3D) or link 2 (1080p) (HD)	OUT B
J4	SDI monitoring output for left eye (3D) or link 1 (1080p) (HD/SD)	CHAR OUT SD/HD
J5	HD SDI input for right eye (3D) or link 2 (1080p) (HD)	IN B
J6	HD SDI program output for left eye (3D) or link 1 (1080p) (HD)	OUT
J7	HD SDI program output for left eye (3D) or link 1 (1080p) (HD, identical to J6)	OUT
J8	HD SDI input for left eye (3D) or link 1 (1080p) (HD)	IN
J9	Alternate HD SDI input (HD, for hardware loop)	Not wired to the backplane. Used for loop in.

Note

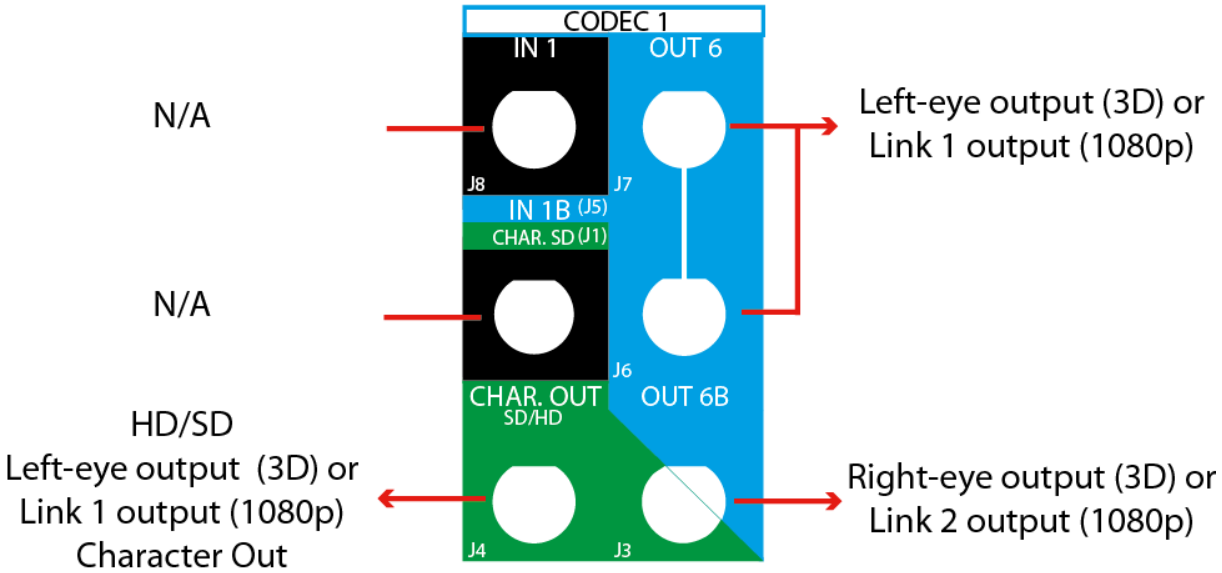
The loops of the input signal are not genlocked.

Layout of Connector Positions and Assignments

3D/1080p - Input (REC)



3D/1080p - Output (PLAY)



CONNECTIVITY ON THE V3X BOARDS COD A AND COD B MODULES FOR 3D AND 1080P IN SINGLE-LINK 3G-SDI

Connector Assignments

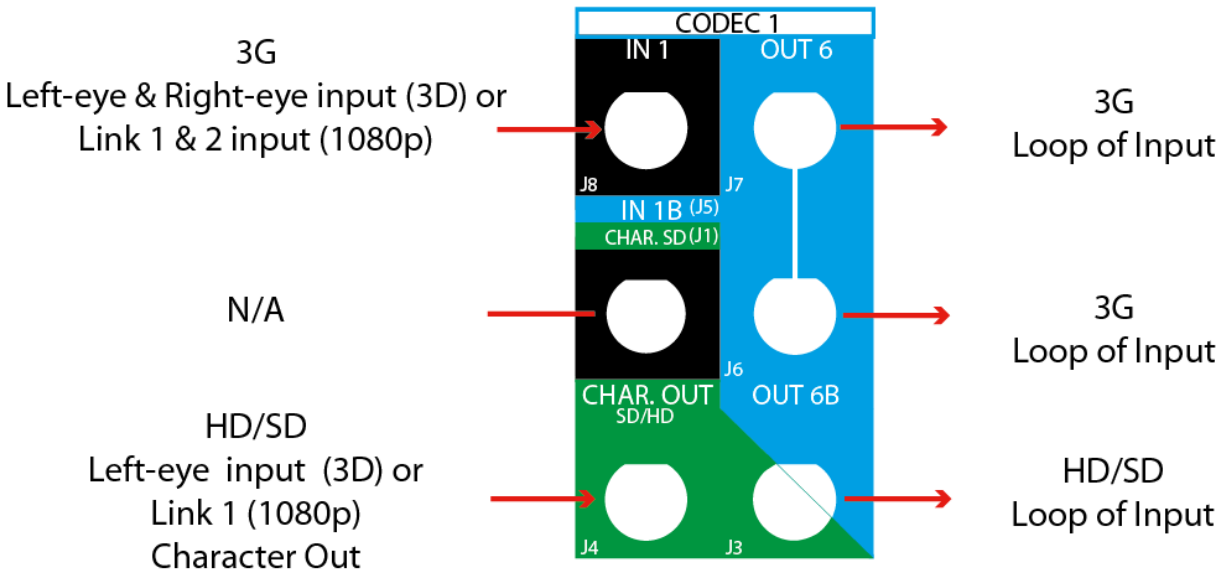
Connec-tor	3D/1080p Mode	Connector label
J1	N/A	CHAR SD
J2	SDI program output 2D (SD, down-converted)	Not wired to the backplane. Used for onboard multiviewer input
J3	SDI program output 2D (HD/SD)	OUT B
J4	SDI monitoring output for left eye (3D) or link 1 (1080p) (HD/SD)	CHAR OUT SD/HD
J5	Not installed	IN B
J6	3G-SDI program output for left & right eyes (3D) or link 1 & 2 (1080p) (3G)	OUT
J7	3G-SDI program output for left & right eyes (3D) or link 1 & 2 (1080p) (3G, identical to J6)	OUT
J8	3G-SDI input left & right eyes (3D) or link 1 & 2 (1080p) (3G)	IN
J9	Alternate 3G-SDI input (3G, for hardware loop)	Not wired to the backplane. Used for loop in.

Note

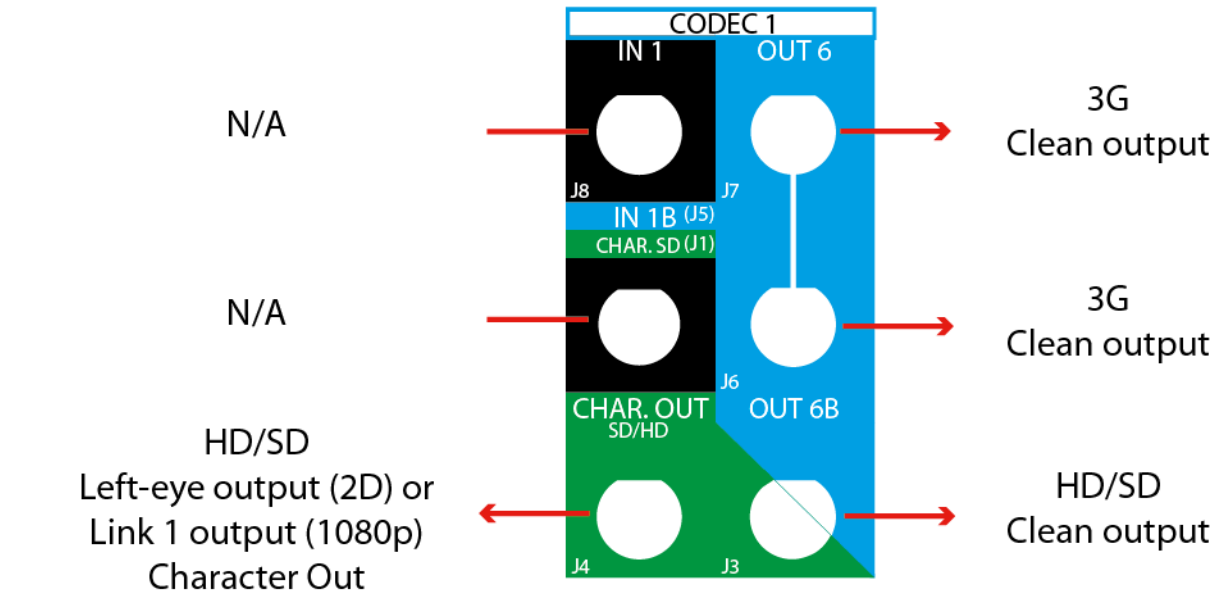
The loops of the input signal are not genlocked.

Layout of Connector Positions and Assignments

3D/1080p - Input (REC)



3D/1080p - Output (PLAY)



3.2.2 CHANNEL ASSIGNMENT

2-ch XT3 Server

Lower Codec (SLOT 2)

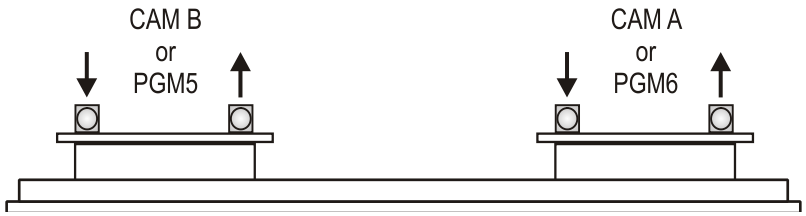
4-ch XT3 Server

Upper Codec (SLOT 3)

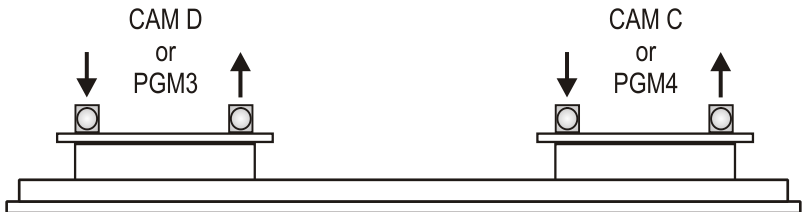
Lower Codec (SLOT 2)

6-ch XT3 Server

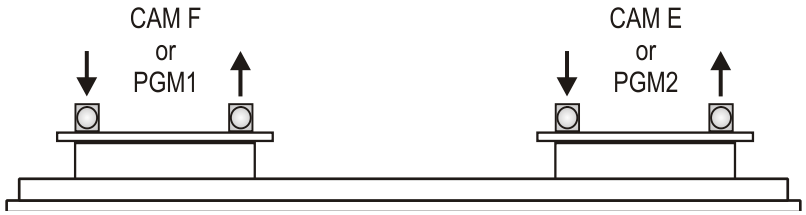
Upper Codec (SLOT 4)



Middle Codec (SLOT 3)

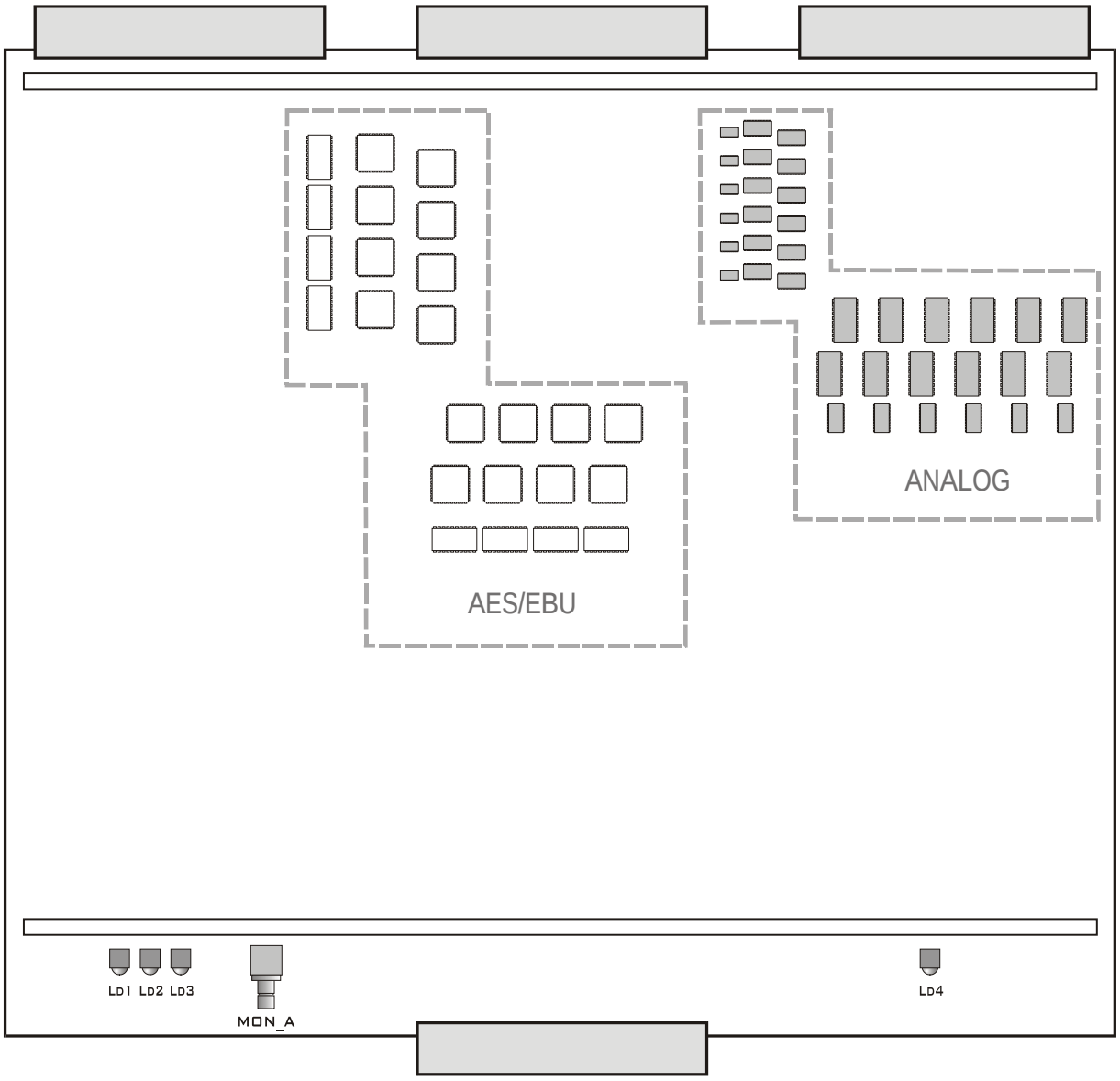


Lower Codec (SLOT 2)



3.3 AUDIO CODEC BOARD

The AUDIO CODEC board is the audio interface between the V3X boards and the H3X board. VIDEO CODEC and AUDIO CODEC boards are tied to the H3X board with one Bus connector on the front side. Different audio configurations are available with the AUDIO CODEC board. See section 2.6 ‘Audio Configurations’, on page 40 for details.



LED INFORMATION AND CONNECTOR

LD 1-3: Internal EVS information only

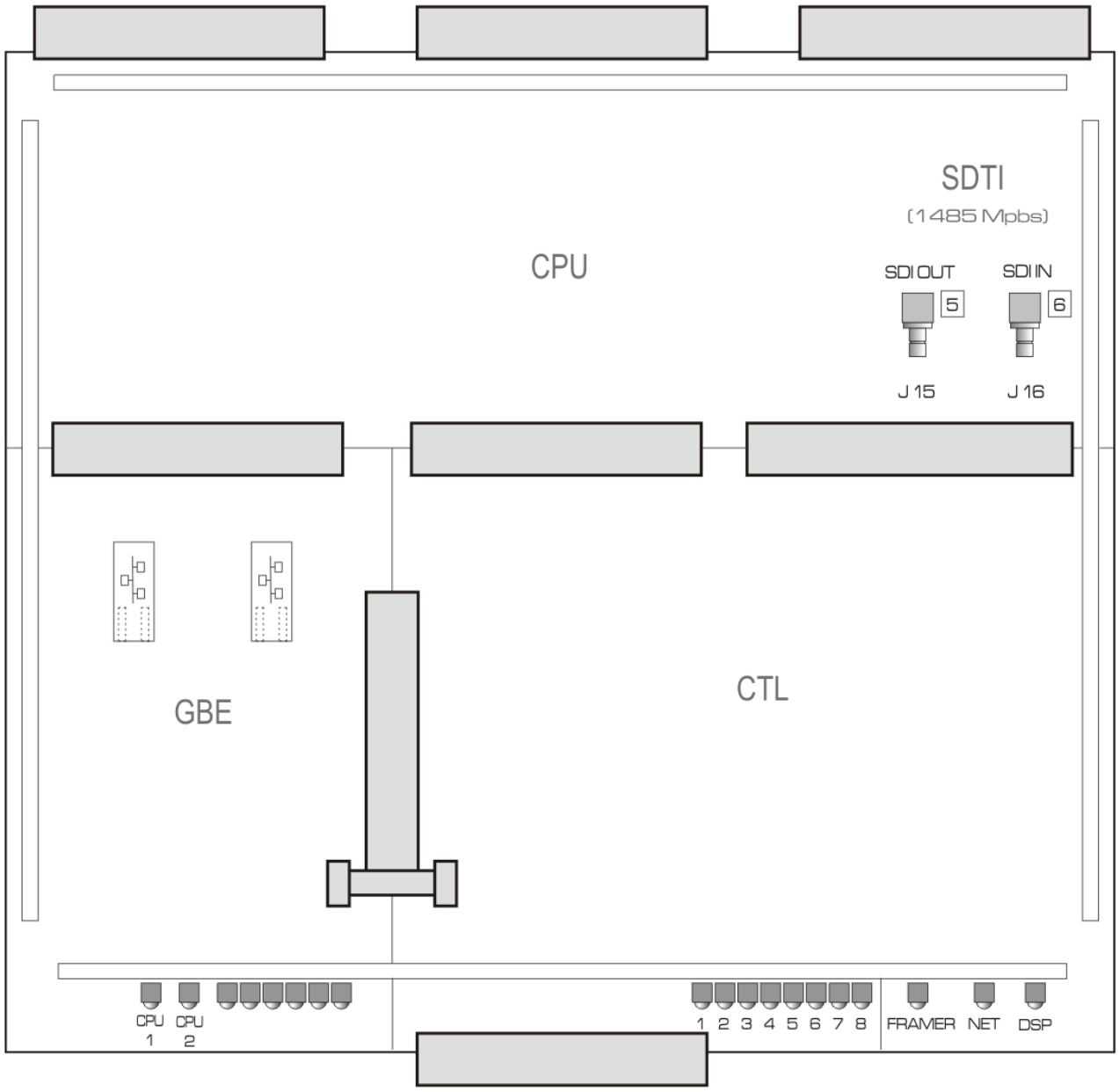
LD4: transfer activity to/from the H3X board

3.4 RAID CONTROLLER BOARDS

3.4.1 H3X BOARD

The H3X board is divided in 4 parts (2 in front, 2 in the back).

- Front: CTL controller module
- Front left: GBE module (GigE)
- Back: CPU module
- Back right: SDTI module



LEDs

LEDs on the XNet2CTL controller module from left to right:

LED Name	Status(es)	Description
LED 1	green/red	This lights red when an error occurs while booting the H3X board.
LEDs 2 to 8	-	These 7 LEDs are for EVS internal use.
FRAMER	off/ on (green)	This is on (green) when the signal on the XNet2 IN connector is a valid EVS SDTI signal.
NET	off/ on (green)	This is on (green) when the XNet2 SDTI network is established (SDTI loop closed, correct speed, etc).
DSP	off/ blinking green	This blinks green to show DSP activity.

LEDs on the GBE Gigabit module (left), from left to right:

LED Name	Status(es)	Description
CPU1/CPU2	off/ blinking green	These LEDs blink alternately every 250 milliseconds to indicate that the processor is running.
Other LEDs	-	The six other LEDs are for EVS internal use.

CONNECTORS

On the XNet2 module (SDTI) :

J15	OUT connector for XNet2 (SDTI network 1485Mbps without relay).
J16	IN connector for XNet2 (SDTI network 1485Mbps without relay).

GIGABIT CONNECTORS

The two Gigabit connectors of the card are connected to the two Gigabit ports of the backplane.

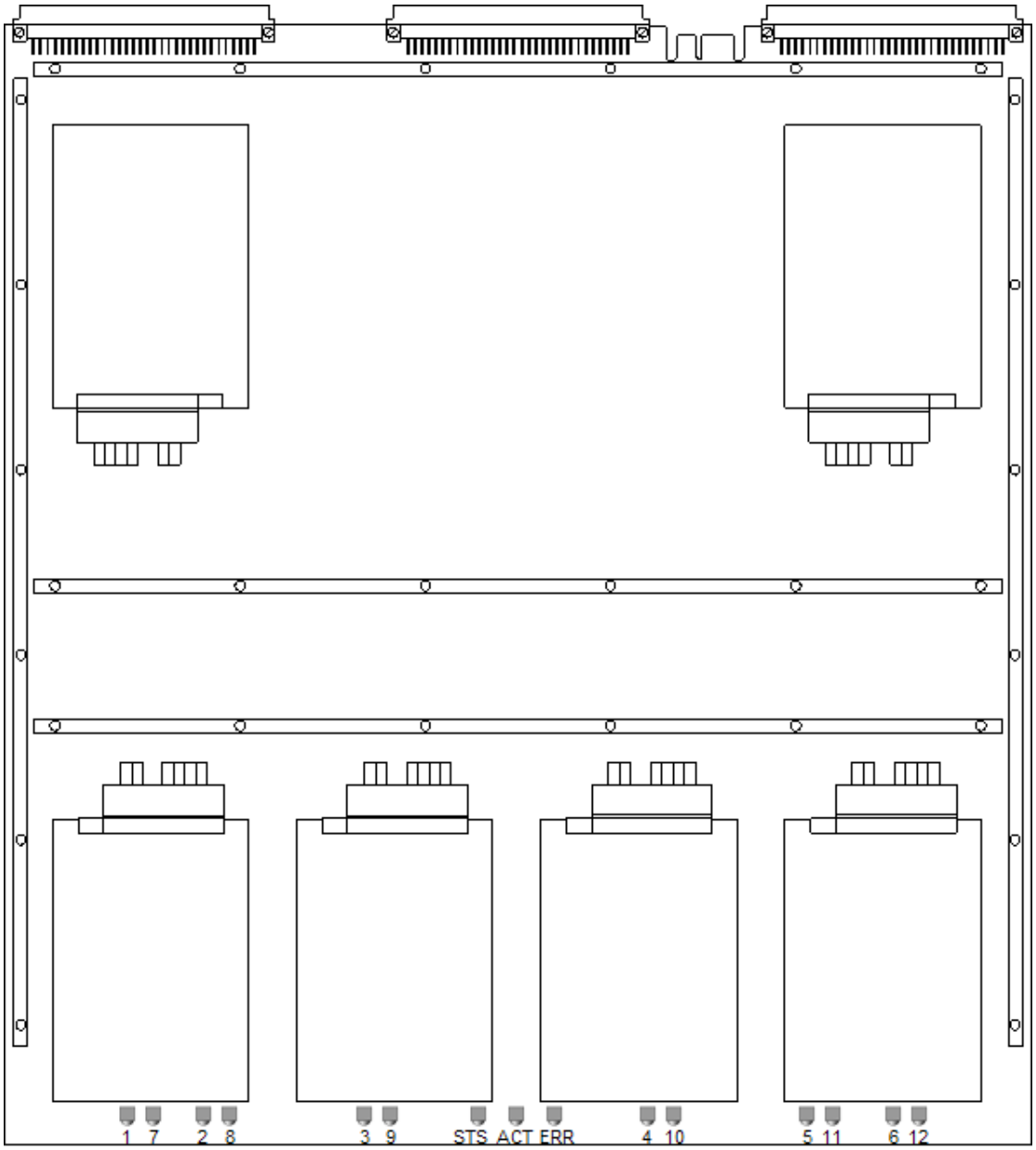
The Gigabit connectors must be on a network that supports Jumbo Frames of (at least) 9014 bytes Ethernet frames. One of the tested switch belongs to the Cisco 3750 G family, for example the WS-C3750G-24T-S.

For more information, refer to the Multicam Configuration manual for setting up the IP addresses.

3.4.2 RCTL BOARD ON SAS DISK ARRAY (WITH H3X)

Disk Arrays on systems with H3X Boards have a controller on the disk array board. Different configurations can be used

- One internal array with a series of 6 disks
- One internal arrays with two stacked series of 6 disks,
- No internal storage



LEDS ON INTERNAL ARRAY

LEDs 1 to 6 are used in case of one internal array of 6 disks.

LEDs 7 to 12 are used for the upper series of disks in case of one internal array of 2x6 disks.

LEDs correspond to the disks as schematized as followed:

upper	7			12
lower	1			6
upper	8	9	10	11
lower	2	3	4	5

Disk LEDs

off	the corresponding disk is not started (not spinning)
on, fast blinking (green)	the corresponding disk is starting (spinning)
on, steady (green)	the corresponding disk is started and used in the RAID array
on, slowly blinking (green)	the corresponding disk is started but not used in the RAID array

STS

on (green)	when RCTL RAID controller is properly booted.

ERR

lights red	when errors occur during the data transfer between the RAID controller and the disks

3.4.3 EXTERNAL RAID ARRAY SAS-HDX FOR XT3 SERVERS

The SAS-HDX is a 2RU external disk storage containing up to 24 hot-swappable SAS disks, with a minimum of 5 disks. External storage can be used with or without internal storage.

It is connected to the XT3 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.

Necessary equipment:

- XT3 with SAS-HDX connector on the rear panel.
- Multicam version 10.05 or higher
- SAS-HDX external disk storage

LEDS ON EXTERNAL ARRAY

For each disk, a blue LED and a red LED are present.

Disk LEDs

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.
Off	Off	The corresponding disk is not present.

Note on Disk LEDs Activity

When starting from a clean disk array (after a “Clear Video Disks” from the EVS maintenance menu), the XT3 server is recording first on RAID #0 until this one is full, then on RAID #1 and finally on RAID #2. It is therefore normal to see activity only on some disks depending on how much material (clips and record trains) is stored on the server.

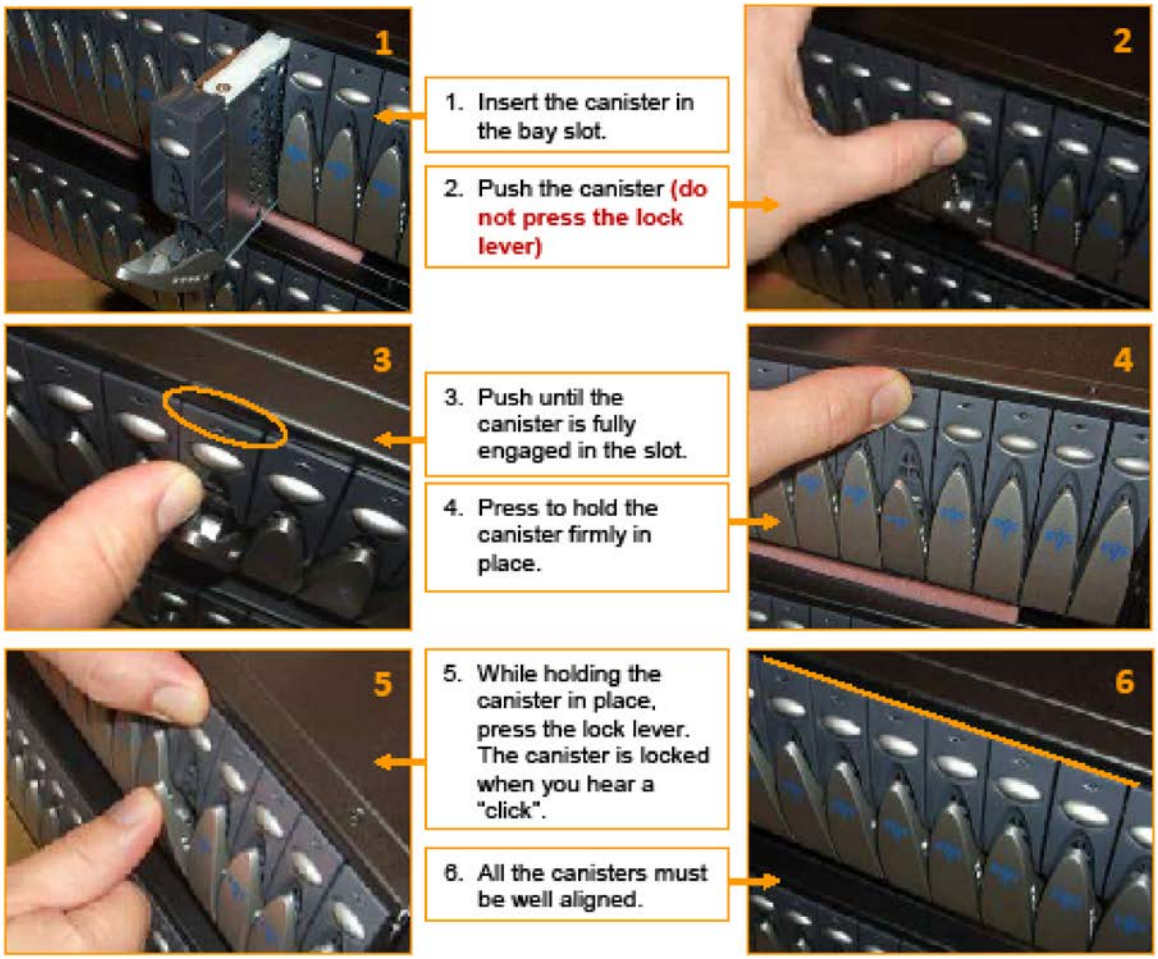
SOUND ALERT ON EXTERNAL ARRAY

When a fan or a power supply unit has failed on an external array, a sound alert is given and can be stopped by pressing the **Mute** button on the array.

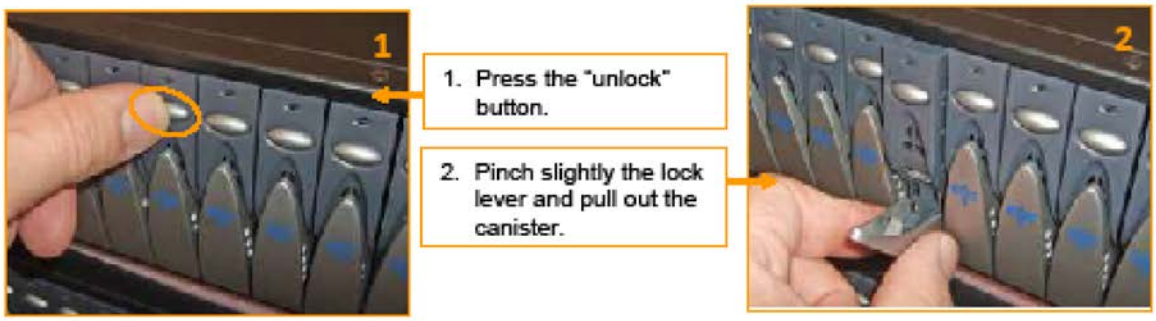
DISK INSERTION AND REMOVAL

To insert or remove a disk from an external array, carefully follow these steps:

1. **How to insert**



2. **How to remove**



3.5 MTPC BOARD

3.5.1 INTRODUCTION

The function of the PC board is mainly the control of the Video hardware and to interface the peripheral equipment (i.e. remote controller) with the Video hardware.

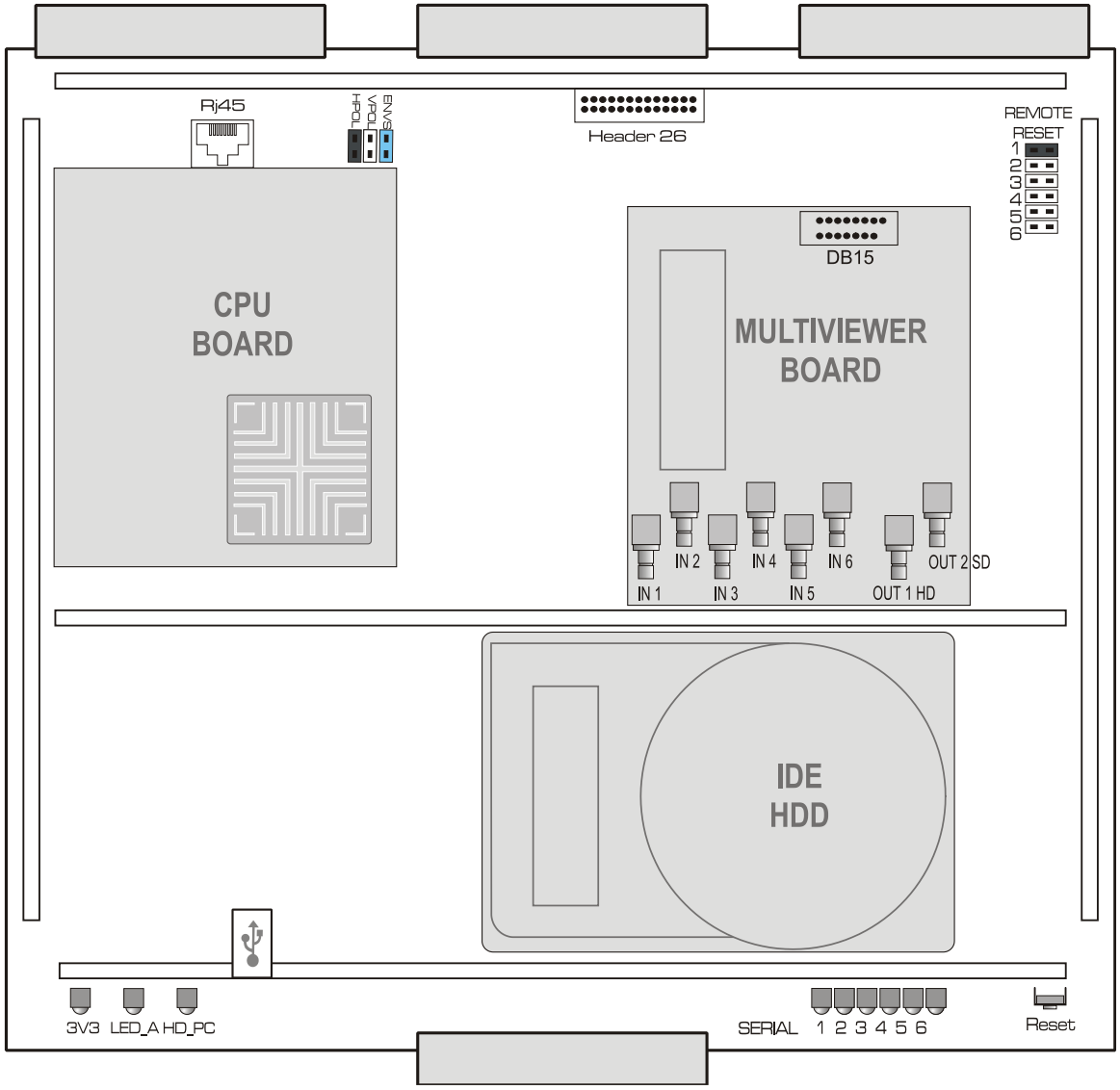
The following MTPC board is used:

- **Revision A2/A4** with COMMEL HS870 motherboard and a new time code management module (with bootable USB)

In standard configuration the PC hardware is composed by:

- One mounting PC board, with serial ports, LTC reader and generator, is controlled by the motherboard.
- IDE System Hard disk: the IDE disk drive is used for storing the EVS software and the DOS operating system. Neither audio nor video data is saved on this disk. The capacity of this drive may vary depending on market availability, but the system partition is always set to 1GB. The remaining capacity of this drive is not used.
- 64/128MB SDRAM modified. The SDRAM used has been modified to suit the system requirements. Please contact EVS support for RAMs upgrade. Do not use standard PC RAM modules.

3.5.2 A2/A4 BOARD



MULTIVIEWER

The multiviewer board is an option on XT3 servers.

Connectors

IN	The J2 connectors from the CODEC modules of the COHX board are connected to the IN connectors of the multiviewer board.
OUT1 HD	The OUT HD connector of the multiviewer board is connected to the MULTIVIEWER HD SDI connector on the rear panel of the server.

Connectors	
OUT2 SD	The OUT SD connector of the multiviewer board is connected to the MULTIVIEWER SD SDI connector on the rear panel of the server.
DB15	The DB15 connector of the multiviewer board is connected to the MULTI DB15 connector on the rear panel of the server.

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 XT3 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.

Important

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 XT3 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.

Notes:

Instant Tapeless Technology

EVS Broadcast Equipment
Liège Science Park
16, rue Bois St Jean
B-4102 Ougrée
Belgium

Corporate Headquarters
+32 4 361 7000

North & Latin America Headquarters
+1 973 575 7811

Asia & Pacific Headquarters
+852 2914 2501

Other regional offices available on
www.evs.tv/contact

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