SONY

IP Live Production

Over recent decades, information technology (IT) capabilities have expanded to revolutionize and deliver efficiency in every industry. However, the video content creation industry has been relatively slow to embrace and adopt IT transformation. This is because the massive amount of data in video content tends to prevent smooth transfer via Ethernet connections. But now the latest technological developments have answered this challenge, enabling the adoption of IP-based video and audio streams for use even in live production environments which demand real-time operation without delay.

Benefits Of IP Live Production

Sony provides not only a value-added solution (4K/8K) but also total operational efficiency with its IP Live Solution.

Sony's high-end live production-equipped IP interfaces enable remote integration (REMI) of live production systems, allowing you to share resources between a number of studios, overcoming previous logistical barriers. This offers the extraordinary potential to build a data center of live production equipment, a capability that is highly valued by many broadcasters today. Accessibility to all connected devices over a network is also of great benefit to system setup and maintenance.

To create the IP Live Solution, Sony utilizes IP switches provided by major IT manufacturers. These switches can route AV signals with very low latency, and all signals can be synchronized without any shock in vision during switching operations. The IP switches are commercial off-the-shelf (COTS) products, typically used in office IT facility equipment, and they provide a common platform for file-based video production operation.

Within the next ten years, broadcasters may be tasked to originate 4K, high frame rate (HFR), and eventually even 8K signals. Adopting SDI routers may cause difficulties: while SDI routers are made by a limited number of video professional manufacturers, format migration simply means each broadcaster will have to choose their brand-new expensive router from only a few candidates.

Any investment in video routing infrastructure should be carefully made, giving consideration to frequent changes in market demand for different formats, such as 4K, 8K, or HFR with higher bandwidth than ever. An IP network represents a significant decision – a signal format-agnostic choice that promises rapid technology development and ongoing cost reduction thanks to IT economies of scale.

Ready Today, Open For Tomorrow

IP Live Alliance

Sony's IP Live Solution is ready now for business. Driven by Sony, the fast-growing IP Live Alliance already brings together 70* leading equipment vendors and technical partners in the live production business, offering IP-ready products and solutions via the Networked Media Interface.
*As of September 2017.

Sony provides the central technology of the Networked Media Interface by ASIC and FPGA core to the IP Live Alliance partners, allowing smooth development of products with this IP interface.

Sony's Approach For Interoperability Of IP Live Production
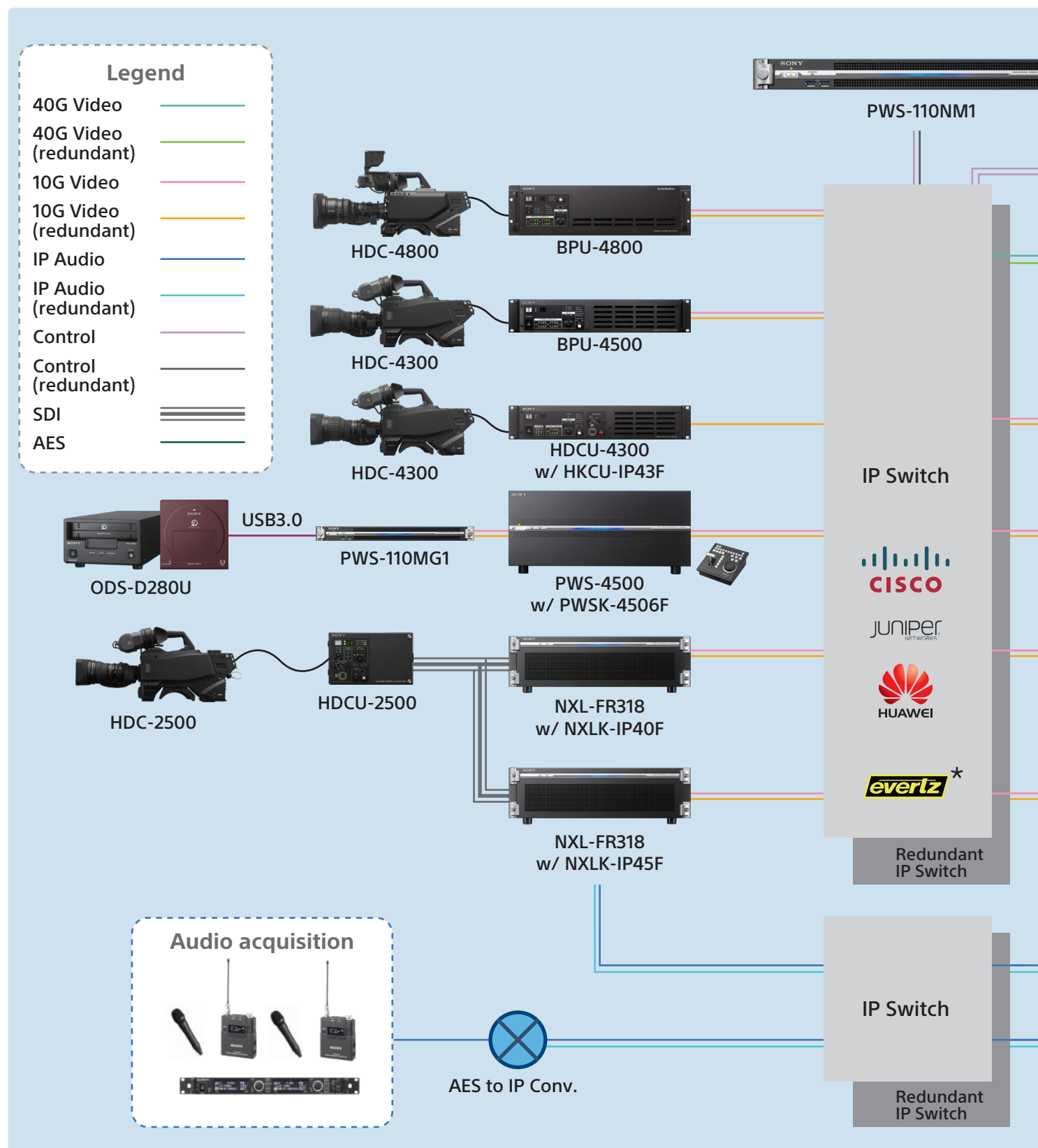

*Joint Task Force on Networked Media

IP Live takes an industry-wide interoperability approach, and this has been and will continue to be driven by Sony. The company works closely with standardization committees, alliance partners, and customers. Sony ensures the standardization of IP technologies by participating in many different alliances and interop activities. Sony is planning to support the open standard format SMPTE ST2110* in the product lineup as the media transport protocol, and AMWA NMOS which ensures device discovery and registration, helping to enhance the interoperability of IP live production.
*As of September 2017, ST2110 is a draft, pending/under development as the SMPTE standard.
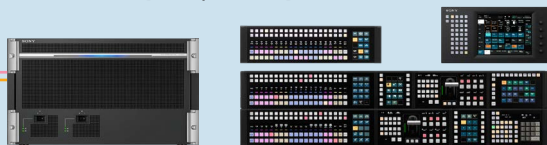
Sony's IP Live Solution

IP Live Production System Overview

Legend

40G Video	——
40G Video (redundant)	——
10G Video	——
10G Video (redundant)	——
IP Audio	——
IP Audio (redundant)	——
Control	——
Control (redundant)	——
SDI	≡
AES	——

PWS-110NM1

HDC-4800 — BPU-4800

HDC-4300 — BPU-4500

HDC-4300 — HDCU-4300 w/ HKCU-IP43F

ODS-D280U — USB3.0 — PWS-110MG1 — PWS-4500 w/ PWSK-4506F

HDC-2500 — HDCU-2500 — NXL-FR318 w/ NXLK-IP40F

NXL-FR318 w/ NXLK-IP45F

IP Switch

CISCO

JUNIPER NETWORKS

HUAWEI

evertz *

Redundant IP Switch

Audio acquisition

AES to IP Conv.

IP Switch

Redundant IP Switch

*For the IP switch manufactured by Evertz, please contact Evertz Microsystems Ltd.

IP Live Alliance Products

Controllers

KSC Panel

MAGNUM Orchestration and Control for Facilities

Magellan Panel

VSM Broadcast Control & Monitoring System

IP Video Device

4K VoIP PCIe Card

4K Video Server

4K NMI RXTX Gateway & VoIP Bridge Converter

IP Gateway on USF frame

Up/Down Converter

Waveform Monitor

VIPA™ PCIe Accelerator

4K/IP Converter

Playout Server (tentative)

IP Audio Device

IP Audio Mixer

IP Audio Mixer

XVS-8000/7000/6000
w/ XKS-Q8111, XKS-Q8166

XVS-8000/7000/6000
w/ XKS-T8110, XKS-T8165

NXL-IP4F

BVM-X300

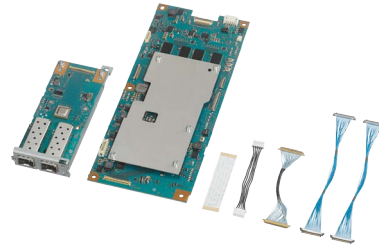SDI-Out

NXL-FR318
w/ NXLK-IP45F

IP Live Interfaces Of Sony's High-End Live Production Devices

IP Live Interfaces Of System Camera

HKCU-IP43F (HDCU-4300 option)

[NMI LAN]
- Number of streams: 4K x 1 or HD x1
- Connector: SFP+
- Number of port: 2
- Signal formats: 10GBASE-** (dependent on SFP+ transceiver module)
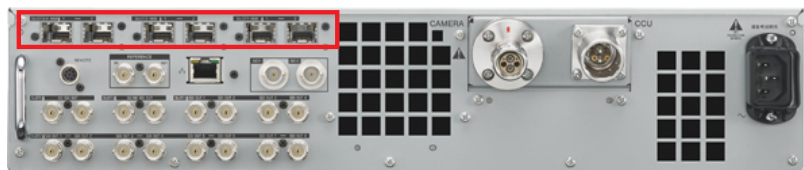- Recommended Transceiver: OTM-10GSR1

HKCU-IP43F

HDCU-4300

BPU-4500

[NMI LAN]
- Number of streams: 4K x2, HD x1
- Connector: SFP+
- Number of port: 6
- Signal formats: 10GBASE-** (dependent on SFP+ transceiver module)
- Recommended Transceiver: OTM-10GSR1

BPU-4500

BPU-4800

[NMI LAN]
- Number of streams: 4K x2, HD x1
- Connector: SFP+
- Number of port: 6
- Signal formats: 10GBASE-** (dependent on SFP+ transceiver module)
- Recommended Transceiver: OTM-10GSR1

BPU-4800

PWSK-4506F (PWS-4500 option)

[NMI LAN]
- Number of streams: 4K x4 or HD x8 (6 in / 2 out)
- Connector: SFP+
- Number of port: 8
- Signal formats: 10GBASE-** (dependent on SFP+ transceiver module)
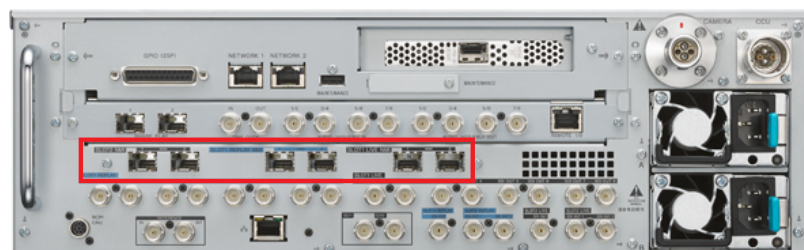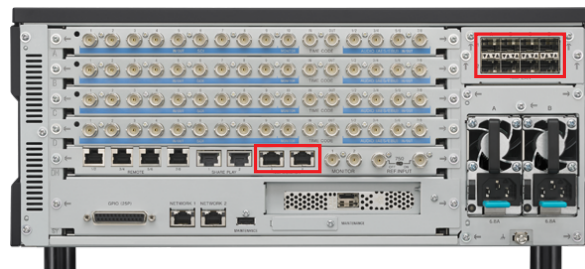- Recommended Transceiver: OTM-10GSR1

PWSK-4506F

[NMI Monitor]
- Number of streams: HD LLVC x4
- Connector: RJ-45 (1G)
- Number of port: 2

PWS-4500

IP Live Interfaces Of Production Switcher

XKS-Q8111 (Input)
XKS-Q8166 (Output)
(XVS-8000/7000/6000 option)

[NMI LAN]
- Number of streams: 4K x4 or HD x16
- Connector: QSFP+
- Number of port: 2
- Signal formats: 40GBASE-** (dependent on SFP+ transceiver module)

Recommended Transceiver:
- AVAGO AFBR-79EIDZ/AFBR-79EQDZ

XKS-Q8111   **XKS-Q8166**

XKS-Q8111

XKS-Q8166

XKS-T8110 (Input)
XKS-T8165 (Output)
(XVS-8000/7000/6000 option)

[NMI LAN]
- Number of streams: 4K x4 or HD x16
- Connector: RJ-45
- Number of port: 8
- Signal formats: 10GBASE-T

XKS-T8110

XKS-T8165

Live Production Over IP

Sony has an end-to-end product portfolio in IP Live production equipment which covers the full workflow of live production from acquisition to monitoring. Sony's 4K system cameras, production switchers, and video servers can be connected to IP via optional interface boards or processor units. Interface options for supporting ST2110* will be released in future, so today's investment in 4K products can be used in the open standard format too. In addition, a variety of partner products are available on the market from the IP Live Alliance, providing system configuration flexibility.

*As of September 2017, ST2110 is a draft, pending/under development as the SMPTE standard.

Sony's IP Live Features

• Redundancy & hitless failover

Sony's IP-supported equipment comes with two Ethernet ports for redundancy. Even when a network switch in the system experiences sudden shut down, the backup system can seamlessly stream data. During the network's switchover process, there is no impairment in video and audio transmission. This duplexed system runs all the time (Active-Active), and the system duplicates not only the AV stream but also the system manager's control signals. The user can keep live production in operation without any additional care.

• Low latency, high picture quality

In order to meet the essential demand of real-time operability in live production, signal transmission between devices is performed in very low latency conditions. Even when compression mode is used to secure Ethernet bandwidth, high picture quality is assured. Sony adopts the Low Latency Video Codec (LLVC, SMPTE RDD 34:2015), which achieves low latency and visually lossless high picture quality for both 4K and HD.

• Reference signal synchronization (SMPTE ST2059)

Switching multiple AV sources requires precise signal synchronization. That's why conventional SDI transmission includes a sync signal. In the IP Live Production System, Sony's IP Live System is compliant with SMPTE ST2059.

• Network security

Compared to a conventional SDI infrastructure, IP delivers powerful efficiency and agility. However, IP raises the possibility of network attacks. This makes network security a major priority. Sony's IP Live Production System protects the entire control path using Transport Layer Security (TLS). In addition, Sony deploys standard, proven IT technology against security attacks. The system prevents these risks via user authentication and device authentication.

• System status monitoring

Sony's IP Live products support SNMP to send alerts to the system management device. As long as devices are connected to the monitoring network, you can check an alert even from remote locations, starting the investigation by referring to the log data recorded in each device. In addition, Sony offers a remote maintenance service* using the system's connection to the internet. With its remote maintenance service, Sony can help your engineering team to manage the system by using monitoring device alerts; the team can investigate issues and propose workarounds to meet agreed service levels*.

*Remote maintenance is an optional service based on a maintenance support contract between the customer and Sony; this contact includes a specified SLA (service level agreement).
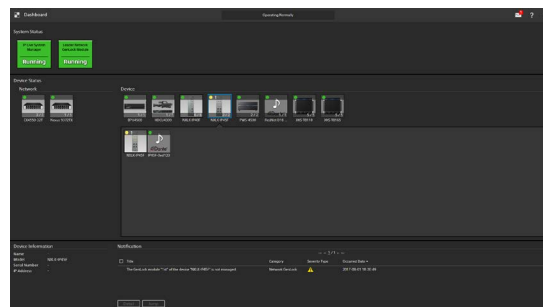
PWS-110NM1 – IP Live System Manager

The PWS-110NM1 IP Live System Manager Station comes with IP Live System Manager software that allows you to setup, control, and reconfigure an IP live production system.


System Configuration

The IP Live System Manager provides a variety of configuration functionalities such as router setting, monitoring setting, redundancy setting, device registration, workgroup registration, and user registration. These configuration settings can be flexibly modified, and the user can build several production systems under one networked system of AV devices.

Video And Audio Routing Capability

IP Live System Manager software provides video and audio routing functionality that is similar to video routers. You can choose how to assign control buttons and configure the layout, according to your needs and preferences.
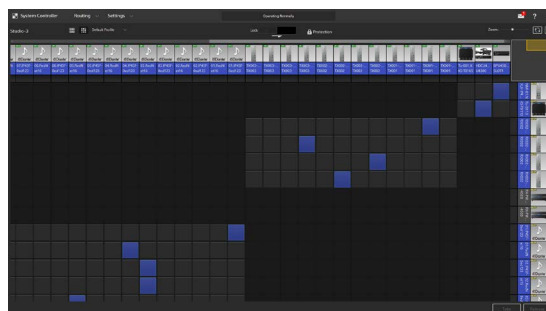
Network Monitoring

You can monitor device status with a network topology view; this helps you to intuitively understand where any error is occurring. A variety of status indicators are available such as network switch status indication and device status indication.
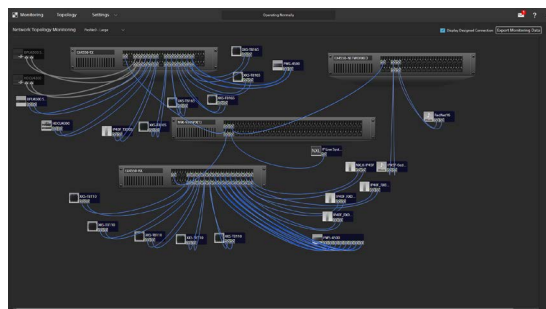
System Maintenance Functionality

The PWS-110NM1 collects status logs from AV and network devices, providing basic system maintenance functionality. By using Sony's remote maintenance service, the PWS-110NM1 can communicate with a remote maintenance server allowing remote users and Sony's support team to detect and investigate system issues.

Software Licenses Extend Functionality

You can extend the variety of IP Live System Manager functionality by installing software license keys, configuring the IP Live System Manager by choosing functionalities that precisely fit your system requirements.

Licenses	Description
PWSL-NM10	**IP Live System Manager License** • Basic license • Up to 128 I/O • Up to 20 simultaneous user access
PWSL-NM11	**128 I/O Port License** • Additional 128 I/O
PWSL-NM12	**Redundant System License** • Necessary for redundant LSM configuration
PWSL-NM13	**10 User License** • Additional 10 simultaneous user access
PWSL-NM14	**UHD License** • Enables 4K/8K
PWSL-NM15	**Audio Control License** • Provides Audio over IP control
PWSL-NM16	**Gateway License for Ember+** • Enables controllers w/Ember+ protocol such as VSM to control LSM

* All licenses are varid for 5 years. One-year extention licenses are available which can be installed any time the original licenses are effective.

General specifications		
Power requirement		100 V to 240 V AC
		50/60 Hz
Power consumption		235 W
Standby power consumption		3 W or lower
Operating temperature		5 °C to 35 °C (41 °F to 95 °F)
Storage temperature		-20 °C to +60 °C (-4 °F to +140 °F)
Operating humidity		20% to 90% (relative humidity)
Storage humidity		5% to 80%
Mass		10.4 kg (22 lb 15 oz)
Dimensions (W x H x D)		440 × 43.6 × 507 mm (17 3/8 × 1 3/4 × 20 in)
CPU	Processor	Intel Core i7-3770 (3.4 GHz)
	Memory	8 GBytes
		SO-DIMM (DDR3) (×2)
	Drive (m-SATA)	120 GBytes
	Expansion bus	PCIe Gen2 8Lane (30 W) (×2)
Inputs/outputs		
LAN		RJ-45 (×2)
		1000BASE-T
		100BASE-TX
USB (front panel/rear panel)		Super Speed USB (USB 3.0) Type A (6, 2 on front and 4 on rear)
		Front: Power delivery support (900 mA/port)
		Rear: Power delivery support on bottom right port (900 mA), not supported on other three ports
HDMI		Type A (×1)
		HDMI Ver. 1.4a, 1920 × 1200 maximum resolution, 60 Hz
DisplayPort		DisplayPort (×1)
		DisplayPort Ver. 1.1a, 2560 × 1600 maximum resolution, 60 Hz
Supplied accessories		
		Operation manual (1), Installation manual (1), Operation guide (1)

NXL-FR318

The NXL-FR318 is a 3RU-sized rack-mountable frame which provides the power supply for optional boards.

18 Flexible Slots For SDI-IP Conversion Option Boards

With 18 open slots, the NXL-FR318 signal processing unit enables flexible loading and combination of optional NXLK-IP40F or NXLK-IP45F boards. This means you can configure the system to fit your precise requirements.

Redundant Power Supply

The NXL-FR318 comes with two power supply modules for redundancy.

General specifications		
Power supply		AC 100 V to 240 V +/-10% 50/60 Hz, dual
Power consumption		300 W
Dimensions (W x H x D)		440 × 132 × 420 mm (17 3/8 × 5 1/4 × 16 5/8 in)
Mass		Approx. 12 kg (26 lb 7.3 oz)
Temperature ranges		Operation guaranteed temperature: 5 °C to 40 °C (41 °F to 104 °F)
		Performance guaranteed temperature: 10 °C to 35 °C (50 °F to 95 °F)
		Storage temperature: -20 °C to +60 °C (-4 °F to +140 °F)
I/O specifications		
REFERENCE IN	Connector	BNC (×2), loop through 75 Ω
	Number of lines	1 (loop through)
	Signal formats	HD tri-level sync signal, black burst signal (NTSC, PAL), SYNC signal (NTSC, PAL)
STATUS OUT	Connector	D-sub 15-pin (female)
	Signal formats	Open collector
NETWORK	Connector	RJ-45
	Number of lines	1
	Signal formats	Ethernet 100BASE-T compliant
AUX-IN	Connector	BNC (×1)
Supplied accessories		
		Operation manual (1)
Optional accessories		
		RMM-10 rack mount bracket
		Power cord

NXLK-IP40F

The NXLK-IP40F SDI-IP converter board provides four 3G-SDI ports and two SFP+ ports for redundancy in network connection. The NXLK-IP40F can convert signals in very low latency which enables live production.
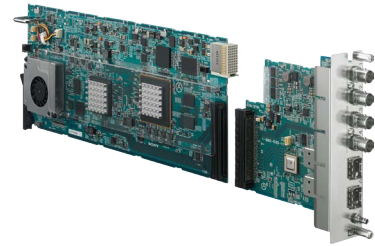
Support SDI-IP Conversion Of 4K/HD Signals

Supporting both 4K and HD video signals, the NXLK-IP40F is equipped with four 3G-SDI I/O ports and can convert signals from SDI to IP and from IP to SDI.

## Long-Distance Signal Transmission By SFP+ Interface

The NXL-IP40F can transmit up to 300 meters using multi-mode fiber cable with the optional OTM-10GSR1 SFP+ transceiver.

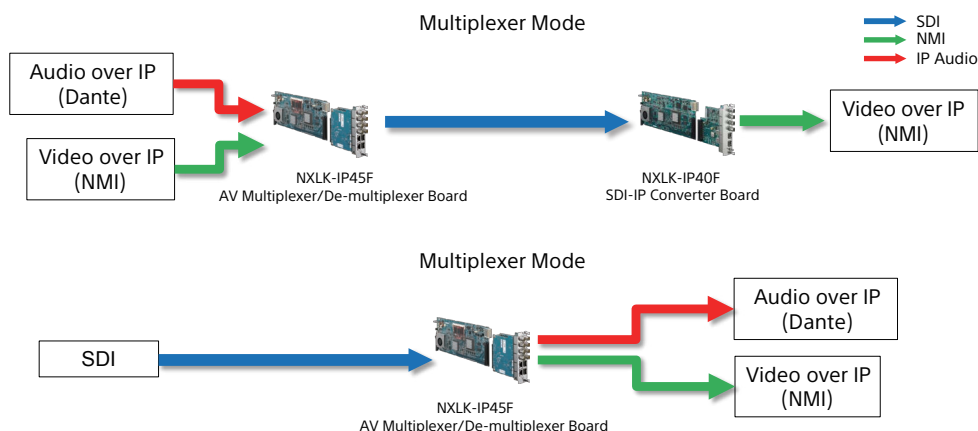| General specifications		
Power supply		DC 12 V (supplied from NXL-FR318)
Power consumption		2.0 A 24 W (2 slot occupancy)
Dimensions (W × H × D)		Main board: 114.5 × 28 × 275.8 mm (4 5/8 × 1 1/8 × 10 7/8 in)
		Connector board: 131 × 35.2 × 117.25 mm (5 1/4 × 1 7/16 × 4 5/8 in)
Mass		Main board: 240 g (8.5 oz)
		Connector board: 160 g (5.6 oz)
Temperature ranges		Operation guaranteed temperature: 5 °C to 40 °C (41 °F to 104 °F)
		Performance guaranteed temperature: 10 °C to 35 °C (50 °F to 95 °F)
		Storage temperature: -20 °C to +60 °C (-4 °F to +140 °F)
I/O specifications		
SDI	Connector	BNC 75 Ω
	Number of lines	4
	Signal formats	SMPTE ST 424, SMPTE ST 292-1
REF OUT	Connector	DIN 1.0/2.3 75 Ω
	Number of lines	1
	Signal formats	HD tri-level sync signal, black burst signal (NTSC, PAL), SYNC signal (NTSC, PAL)
NMI LAN	Connector	SFP+
	Number of lines	2
	Signal formats	10GBASE-** (dependent on SFP+ transceiver module)
		For details on supported SFP+ transceiver modules, contact your local Sony service representative.
Supplied accessories		
		Operation manual (1)
Supported formats		
SDI input/output		1920 x 1080 59.94i, LLVC compression or uncompressed
		1920 x 1080 50i, LLVC compression or uncompressed
		3840 x 2160 59.94p Level-A, 2SI or SQD, LLVC compression
		3840 x 2160 50p Level-A, 2SI or SQD, LLVC compression

NXLK-IP45F

The NXLK-IP45F is an IP interface board for audio, allowing multiplex and demultiplex of audio signal onto video signals, in addition to the SDI-to-IP and IP-to-SDI conversion capability of the NXLK-IP40F.
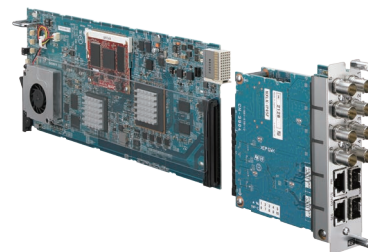
Multiplexing & Demultiplexing Audio And Video Over IP

The NXLK-IP45F can multiplex the audio and video over IP signals, and output to the SDI interface. And conversely, it can demultiplex the audio and video on SDI, and output them as separated signals on IP.

Multiplexer Mode

— SDI
— NMI
— IP Audio

Audio over IP
(Dante)

Video over IP
(NMI)

NXLK-IP45F
AV Multiplexer/De-multiplexer Board

NXLK-IP40F
SDI-IP Converter Board

Video over IP
(NMI)

Multiplexer Mode

SDI

NXLK-IP45F
AV Multiplexer/De-multiplexer Board

Audio over IP
(Dante)

Video over IP
(NMI)

Supports Dante

For the audio format over IP, the NXLK-IP45F supports Dante format that is widely adopted as standard.

General specifications	
Power supply	DC 12 V (supplied from NXL-FR318)
Power consumption	2.5 A 30 W (3 slot occupancy)
Dimensions (W × H× D)	Main board: 114.5 × 28 × 275.8 mm (4 5/8 × 1 1/8 × 10 7/8 in)
	Connector board: 131 × 35.2 × 117.25 mm (5 1/4 × 1 7/16 × 4 5/8 in)
Mass	Main board: Approx. 244 g (8.6 oz)
Connector board	Approx. 250 g (8.8 oz)
Temperature ranges	Operation guaranteed temperature: 5 °C to 40 °C (41 °F to 104 °F)
	Performance guaranteed temperature: 10 °C to 35 °C (50 °F to 95 °F)
	Storage temperature: -20 °C to +60 °C (-4 °F to +140 °F)

I/O specifications		
SDI	Connector	BNC 75 Ω
	Number of lines	Input/output: 4
		Output: 4
Signal formats		SMPTE ST 424
NMI LAN	Connector	SFP+
	Number of lines	2
	Signal formats	10GBASE-** (dependent on SFP+ transceiver module)
		For details on supported SFP+ transceiver modules (e.g., OTM-10GSR1), contact your local Sony service representative.
DANTE LAN	Connector	RJ-45
	Number of lines	2
	Signal formats	1000BASE-T

Supplied accessories	
	Operation manual (1)

Supported formats	
SDI input/output	3840 x 2160 59.94p Level-A, 2SI or SQD, LLVC compression
	3840 x 2160 50p Level-A, 2SI or SQD, LLVC compression

NXL-IP4F

The NXL-IP4F SDI-IP converter unit is ideal for interconnecting SDI equipment with IP-based infrastructure. The compact design gives great flexibility to an IP-based live production system.

Boxed-Type SDI-IP Converter

The NXL-IP4F converter unit gives you the perfect combination of SDI-based video monitors for live monitoring in an IP-based live production environment.

4K/HD Switchable

This converter unit allows for SDI-IP conversion of both 4K and HD signals.

SFP+ Ports For Optical Fiber Cables

With this unit, you can use optical fiber cables up to a distance of 300 meters by using the OTM-10GSR1 Optical Transceiver Module.

General specifications		
Power supply		19.5 V DC
Current consumption		1.2 A
Dimensions (W× H × D; excluding protrusions)		180 × 42 × 120 mm (7 1/8 × 1 11/16 × 4 3/4 in)
Mass		Approx. 650 g (1 lb 6.9 oz)
Temperature range		Operation guaranteed temperature: 5 °C to 40 °C (41 °F to 104 °F)
		Performance guaranteed temperature: 10 °C to 35 °C (50 °F to 95 °F)
		Storage temperature: -20 °C to +60 °C (-4 °F to +140 °F)
I/O specifications		
SDI	Connector	BNC, 75 Ω
	Lines	4
	Signal format	SMPTE ST 424, SMPTE ST292-1
		Only 2 ch (48 kHz 24 bit) embedded audio supported
NMI LAN	Connector	SFP+
	Lines	2
	Signal format	10GBASE-** (depending on SFP+ transceiver module)
		For details on supported SFP+ transceiver modules, contact your local Sony representative.
DC IN		19.5 V
RS-232C (cannot be used)	Connector	9-pin D-Sub
	Lines	1
Supplied accessories		
		Operation Manual (1), AC adapter (1), Clamp (1)
Optional accessories		
		Power cord
Supported formats		
SDI output		1920 x 1080 59.94i, uncompressed
		1920 x 1080 50i, uncompressed
		3840 x 2160 59.94p Level-A, 2SI, LLVC compression
		3840 x 2160 50p Level-A, 2SI, LLVC compression

OTM-10GSR1

The OTM-10GSR1 SFP+ Ethernet transceiver supports multi-mode optical fiber for up to 300 meters.

General specifications	
Power requirements	3.3 V DC
Power consumption	1 W
Dimensions (W × H× D)	13.9 × 13 × 56.4 mm (9/16 × 17/32 × 2 1/4 in)
Mass	21 g (0.74 oz)
Temperature ranges	Operating temperature: 5 °C to 40 °C (41 °F to 104 °F)
	Storage temperature: -20 °C to +60 °C (-4 °F to +140 °F)
I/O specifications	
Optical I/O	Connector: LC Duplex optical connector
	Signal formats: IEEE802.3ae 10GBASE-SR
	Signal transmission speed: 10.3125 Gbps
	Media Type: Multi Mode
Host interface	Connector: Card edge connector
	Signal formats: SFF Committee SFF-8431 Specifications

Certified IP Switches

Sony's IP Live supports IP switches made by the major manufacturers listed below.

Manufacturer	Model	Description
CISCO	Nexus92160YC-X	48 x 1/10-Gb host-ports and 6 x 40 G QSFP+ uplink-ports, 3.2 Tbps throughput, 1 U
CISCO	Nexus9372TX	48 x 1/10GBase-T host-ports and 6 x 40 G QSFP+ uplink-ports, 1.44 Tbps throughput, 1 U
CISCO	Nexus9332PQ	32 x 40 G QSFP+, 2.56 Tbps throughput, 1 U
CISCO	N93-LAN1K9	LAN Enterprise License for Nexus 9000 Platform *Required for each Nexus switch
Juniper	EX4550-32F	32 x 1/10-Gb host-ports, 960 Gbps throughput, 1 U, Expansion module is required for uplink
Juniper	EX4550-32T	32 x 1/10GBase-T host-ports, 960 Gbps throughput, 1 U, Expansion module is required for uplink
Juniper	QFX5100-24Q	24 x 40 G QSFP+, 2.56 Tbps throughput, 1 U
Juniper	EX4550-EM-2QSFP	2 x 40 G QSFP+Uplink expansion module for EX4550
Juniper	EX4550-EM-8XT	8 x 1/10GBASE-T expansion module for EX4550
Juniper	EX4550-EM-8XSFP	8 x 1/10-Gb host-ports expansion module for EX4550
Juniper	QFX-EM-4Q	4 x 40 G QSFP+ expansion module for QFX5100
Huawei	CE6851-48S6Q-HI	48 x 1/10-Gb host-ports and 6 x 40 G QFSP+ uplink-ports, 1.44 Tbps throughput, 1U
Huawei	CE6850-48T6Q-HI	48 x 1/10GBASE-T host-ports and 6 x 40 G QSFP+ uplink-ports, 1.44 Tbps throughput, 1 U
Huawei	CE7850-32Q-EI	32 x 40 G QSFP+, 2.56 Tbps throughput, 1 U

Note:The above descriptions are only verified by Sony, not all specifications of the manufacturers.
    The information is as of September 2017 and subject to change without notice.

Nexus 92160

EX4550-32F

CE7850-32Q-EI

*For the IP switch manufactured by Evertz, please contact Evertz Microsystems Ltd.

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