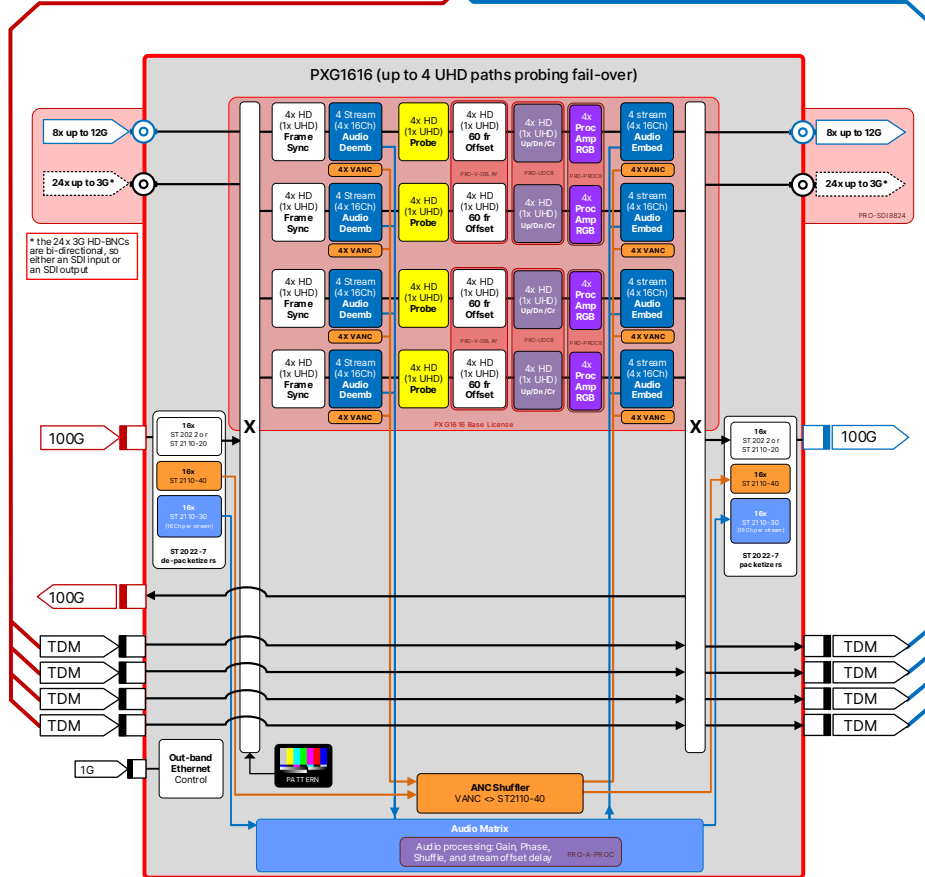# Neuron

PROTECT

Bi-directional IP Firewall and Dual Card Probing Failover Firewall

Block schematics

PFG1616 (up to 8 UHD paths firewall)
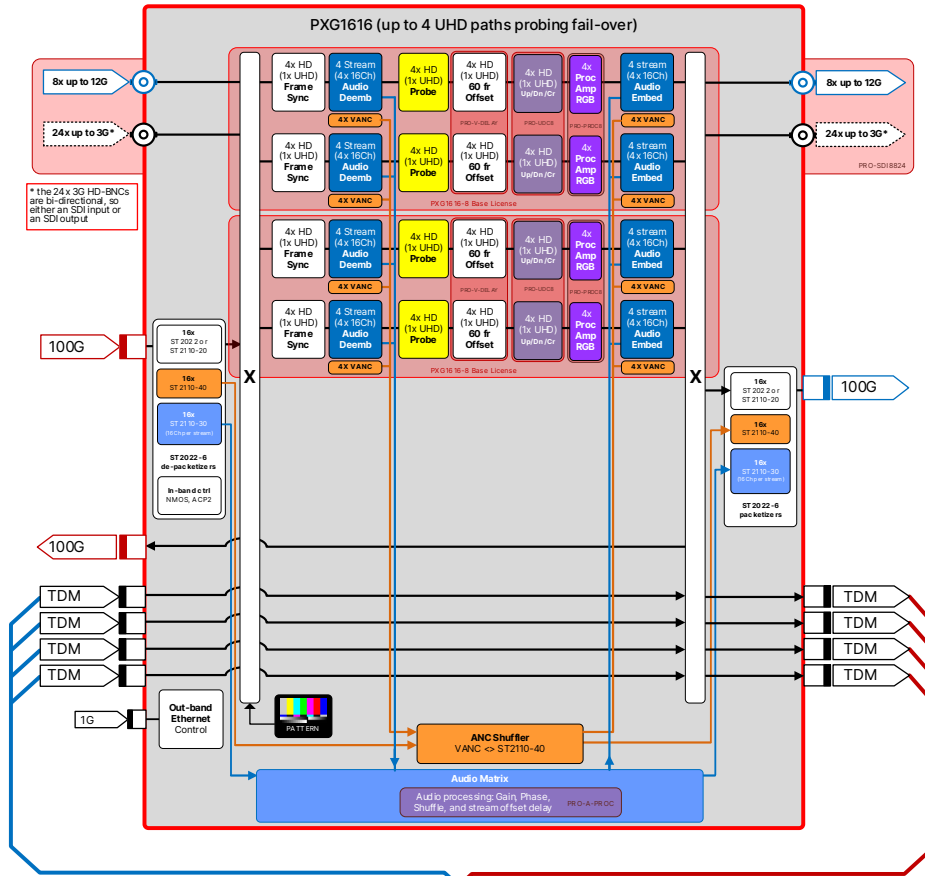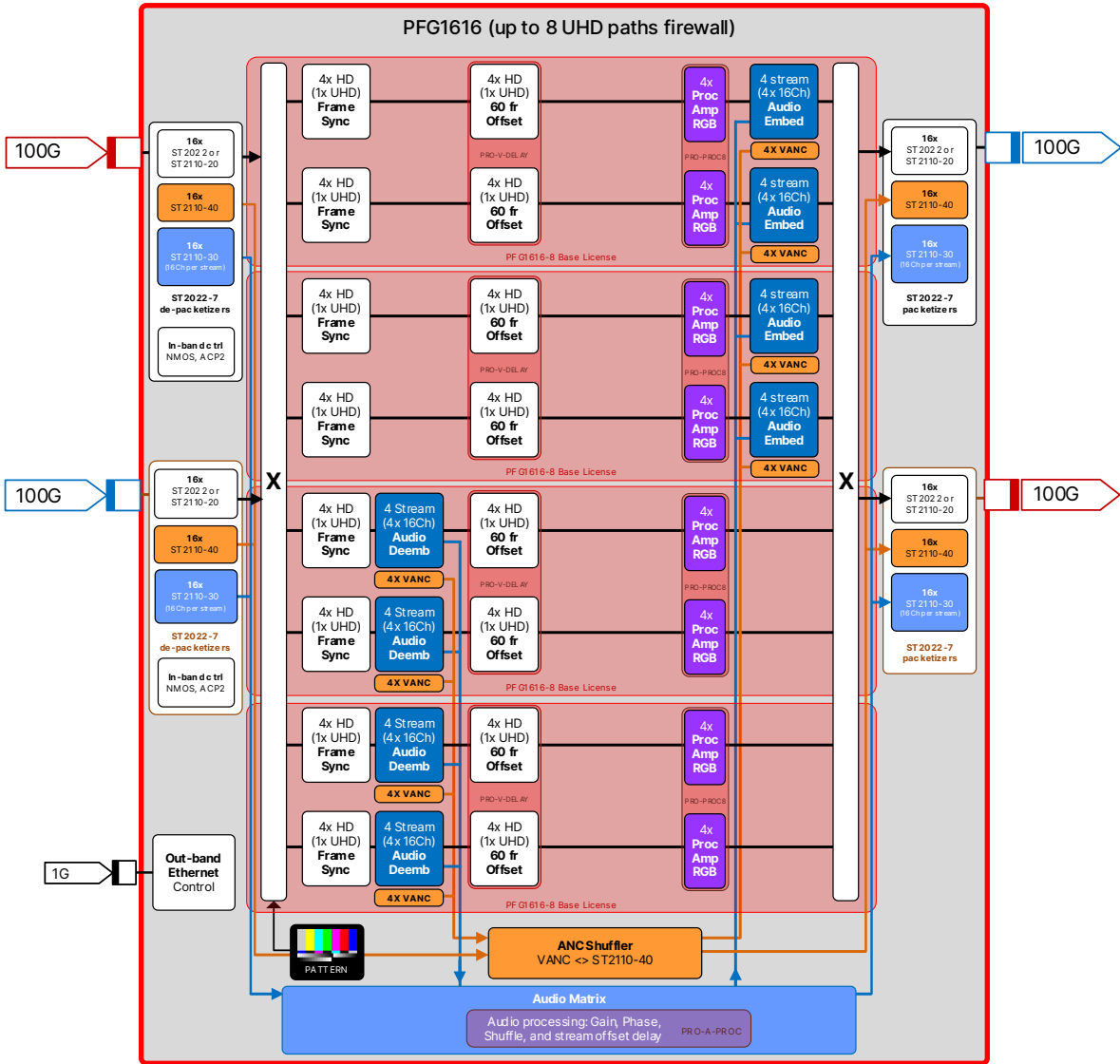
I/O Panel
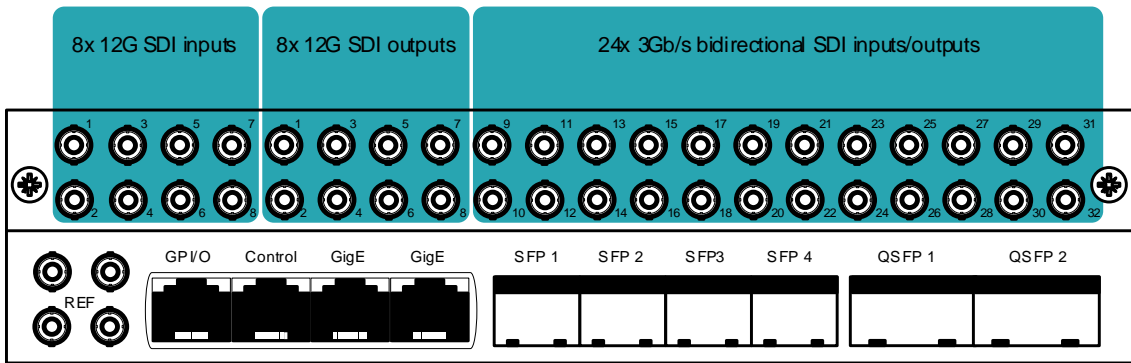
I/O of indentities

	SDI Inputs[1]	IP Inputs[1]	SDI Outputs[1]	IP outputs[1]
PFG1616	0	16[2]	0	16[2]
PXG1616	16	16[2]	16	16[2]

[1]) amount of FHD (1080p50/59.94) channels
[2]) Redundant streams

Video Processing paths

PXG1616 (Probing fail-over firewall)
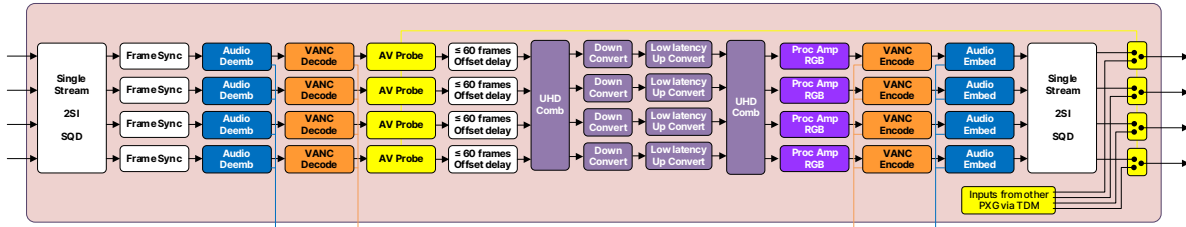
The PXG1616 can have up to 4 of these UHD processing paths. Depending on the active licenses, these processing paths include framesyncs, audio and VANC de-embedders, Audio/video/VANC probes, video offset delay (optional), up/down/cross converters (optional), UHD remapping, color correcting proc amps (optional), VANC and audio embedders and audio gain/phase/delay functionality (optional). The fail-over switches, controlled by the probes, are at the end of the processing paths. Two PXG1616 cards are interconnected via 4 SFP+ connections. These connections do not use Ethernet as a transport layer but our own TDM bus. You can use a Direct Attached Copper wire (DAC) or a fiber connection if the frames are more than 1m (3ft) apart. This application gives you full redundant probing and 100% IP isolation.

PFG1616 (Bi-directional IP Firewall)
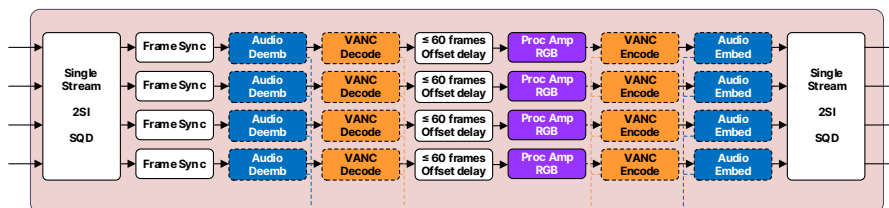
The PFG1616 can have up to 8 of these UHD processing paths. These processing paths include framesyncs, audio and VANC de-embedders (incoming signal paths), video offset delay (optional), color correcting proc amps (optional) VANC and audio embedders (outgoing signal paths), audio gain/phase/delay functionality (optional) and UHD remapping.

Audio Processing

The audio matrix below the video processing paths allows audio shuffling of:
- The individual audio channels coming from the audio de-embedders
- The individual audio channels from the ST2110-30 inputs (each containing up to 16 audio channels)

With the audio processing license activated, these audio channels can also be individually gained and phased and the streams can be delayed.

Features

The PROTECT identities guarantee and safeguard signals coming in and going out of facilities and interconnections between venues. The PROTECT Firewall (PFG1616) can be used as a bi-directional IP Firewall for complete isolation between facilities. The PROTECT Failover (PXG1616) is a dual card solution. 2 PXG1616 together will act as multi-channel integrity checking failover switches and firewalls in one, ideally suited for handover/playout center applications.

Using all modern ST2022 and ST2110 encapsulation standards, the PROTECT Failover is also capable of bridging up to 16x 3Gb/s or 4x 12Gb/s SDI signals (requires optional SDI board) to redundant 100G Ethernet I/O. Besides bridging, it can also do low latency up/down/cross conversion (optional).

Depending on the identity the PROTECT will offer:
- Supports asynchronous inputs
- Video Standards supported: UHD (single wire 2Si, 4 wire SQD/2Si), FHD Level-A, HD, SD, ST2022 and ST2110 on 50Hz and 59.94Hz.
- UHD remapping (gearboxing) of single wire to four-wire SQD/2SI and vice versa
- Tracking audio delay
- Frame-syncs to local clock on external ref (B&B or ST2059) on each processing path
- Audio de-embedding and embedding
- Individual audio channel gain and phase, and audio stream delay (optional)
- True IP isolation using both 100Gb/s single MAC QSFP's. What comes in on QSFP 1, goes out on QSFP 2 and vice versa.
- PXG1616 Probe functions: SDI carrier detect, TRS validation, ANC checksum validation, video content freeze detection with ROI, video content black detection with ROI, VANC WST and OP47 presence detection, Timecode availability, audio channel detection (16 channels), Audio silence detection (16 channels), Audio Clip/5 sample full-scale indication (16 channels)
- The PXG1616 can clean switch between local signals and signals coming from another PXG1616 via the TDM bus links on the 4 SFP+ connections.
- In the PXG1616 an extensive probing matrix allows adjustment of individual classes of importance of the channels next to the main and backup channels.
- The PXG1616 can bridge up to 16 channels SDI channels to/from IP (ST2022-6 or 2110-20/30) (requires optional SDI expansion board)
- The PXG1616 can perform up/down/cross conversion from and to a maximum of 16x 1080p or 4x 2160p (optional)
- Clean audio switch-over through V fade
- Redundancy in IP signals: Each SDI or IP input can be used as a back-up signal for an SDI or IP output. A single SDI or IP input can be replicated to 2 IP outputs for creating identical stream (port replication)
- PTP Network timing with slave functionality on the Ethernet ports, compliant with SMPTE ST2059-2
- External black burst inputs
- 2x Analog bi-level reference out
- Multicast and Unicast selectable per streams
- Selectable VLAN and priority per stream
- Compatible protocols: ACPv2, DNS, IGMPv2, IGMPv3, LLDP, DHCP, SDP, NMOS IS04, NMOS IS05, 802.1as, ST2059-1/2, ST2022-6/7, ST2110-20/30/31/40

Applications

- Playout center handover application
  - Redundant (using 2 boards) 16 channel probing and backup switching
  - Clean switching between two Neuron Boards if upstream network or play-out server fails or when video/audio/VANC errors are detected
- Full IP isolation (Firewall/DMZ) between facilities

PXG1616 application example

The diagram below shows how 2 PXG1616 cards will guarantee valid streams on your network, no matter what the scenario. Unlike standard -7 devices, which when in error will not produce any output streams, the 2 PXG1616 cards work independently of each other. Even when one card fails, the other is still actively outputting streams.
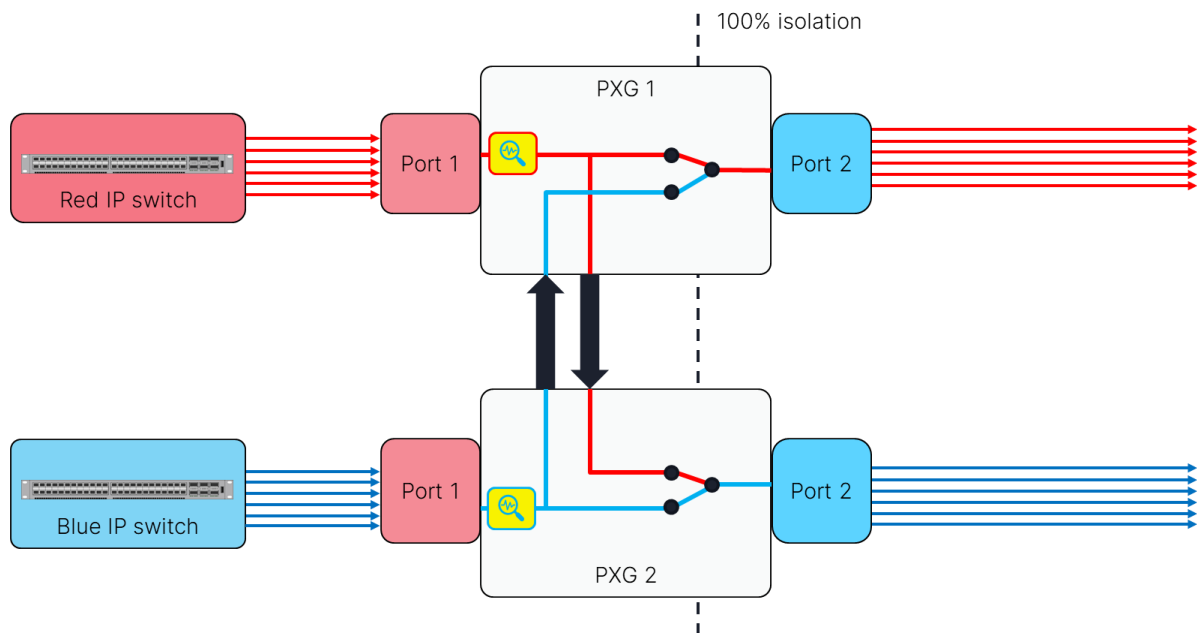
Ordering information

Hardware options:
- **NEU-BASE-BOARD:** Neuron base processing board. Requires at least one of the base licenses listed below (no mix per board)
- **NEU-SDI40-BOARD:** Neuron SDI IO expansion board with 8x 12G in, 8x 12G out and 24 3G bidirectional IO on HD BNC. Requires NEU-BASE-BOARD

Software options:

PXG1616-8-GO	Base license for Protect Failover with probing functionality for 8x FHD or 2x UHD. Includes embedding, de-embedding, frame sync, AV probes and IP I/O. SDI I/O requires NEU-SDI40-BOARD and CON-SDI8824-GO. You need 2 boards in Protect Probing config when failover redundancy is required. Max. 2 of these base licenses per processing board (no mix with other base licenses)
PROTECT PROBING FAIL-OVER Optional licenses	
PRO-SDI8824-GO	Activation license for NEU-SDI40-BOARD.
PRO-UDC8-GO	Up/down/cross conversion license for 8x FHD or 2x UHD. Max. 1 per base license.
PRO-PROC8-GO	Proc-amp and RGB color correction license for 8x FHD or 2x UHD. Max. 1 per base license.
PRO-V-DELAY-GO	Additional video offset delay of up to 60 frames for 8x FHD or 2x UHD. Max. 1 per base license.
PRO-A-PROC-GO	Audio Processing license for Gain/phase/delay. Max. 1 per processing board
PFG1616-8-GO	Base license for Protect Firewall for 8x FHD or 2x UHD. Includes embedding, de-embedding, frame syncs and IP I/O. Max. 4 of these base licenses per processing board (no mix with other base licenses)
PROTECT FIREWALL Optional licenses	
PRO-PROC8-GO	Proc-amp and RGB color correction license for 8x FHD or 2x UHD. Max. 1 per base license in case of Protect Firewall
PRO-V-DELAY-GO	Additional video offset delay of up to 60 frames for 8x FHD or 2x UHD. Max. 1 per base license in case of Protect Firewall
PRO-A-PROC-GO	Audio Processing option for Gain/phase/delay. Maximum 1 per board.

Specifications

Reference I/O

Connector Type	Micro BNC (HD BNC)
Number of inputs	1
Number of outputs	2, Loop input or analog reference out
Termination	75 Ohms when not looped
Bi-Level	PAL/NTSC Black Burst ITU624

Gigabit Ethernet

Connector Type	RJ45
Number	3 (2 Future use)
Standards	10/100/1000 Base-T
Protocols streaming	NA
Protocol control	ACPv2
Cable	Shielded twisted pair

QSFP Cages

Number of cages	2
Standards	QSFP28, 100GbE
Protocols	ST2022-6, ST2110, AES67, ST2059

SFP Cages

Number of cages	4
Standards	proprietary
Protocols	proprietary

Serial video inputs (optional)

Standard	UHD-SDI ST2082, HD-SDI ST292, ST296 ST274 3G-SDI ST424 (Level A) ST425-1
Number of Inputs	8
Connector type	Micro BNC (HD BNC)
Signal Level	800mV
DC Offset	0V±0.5V
Overshoot	Within 10% of signal level
Return Loss	>15dB up to 1.5GHz, >10dB up to 3GHz

Audio shuffler

Protocol	SWP08

Serial video outputs (optional)

Standard	UHD-SDI ST2082, HD-SDI ST292/ST296/ST274 3G-SDI ST424 (Level A)/ST425-1
Number of Inputs	8
Connector type	Micro BNC (HD BNC)
Signal Level	800mV
DC Offset	0V±0.5V
Overshoot	Within 10% of signal level
Return Loss	>15dB up to 1.5GHz, >10dB up to 3GHz

Serial video bi-directional connections (optional)

Standard	HD-SDI ST292/ST296/ST274 3G-SDI ST424 (Level A)/ST425-1
Number of Inputs	24
Connector type	Micro BNC (HD BNC)
Signal Level	800mV
DC Offset	0V±0.5V
Overshoot	Within 10% of signal level
Return Loss	>15dB up to 1.5GHz, >10dB up to 3GHz

Miscellaneous

Weight	Approx. 2050gr
Operating temp.	0°C to +40°C
Dimensions	400 x 193 x 42mm (LxWxD)

Electrical

Voltage	+12V nominal (tolerance:-1V/+0.5V)
Power	100-120Watts