Broadcast Studio Uncompressed 4K Video Network Switch - Official Technical Overview & Hardware Datasheet

PRODUCT OVERVIEW & HARDWARE DATASHEET

EXECUTIVE SUMMARY

Designed for mission-critical broadcast production environments, the Broadcast Studio Uncompressed 4K Video Network Switch delivers deterministic, sub-microsecond latency switching for 12G-SDI, SMPTE ST 2110, and NDI-capable video streams. Unlike conventional Ethernet switches, this platform guarantees zero frame loss, constant bitrate forwarding, and full hitless redundancy essential for live production, post-production, and master control room operations. The switch operates as a fully non-blocking Layer 2/Layer 3 device with integrated PTP (Precision Time Protocol) grandmaster capabilities, ensuring genlock-accurate switching across 4Kp60 4:4:4 uncompressed flows.



HARDWARE ARCHITECTURE & SILICON

The forwarding plane is built upon a purpose-designed Video-Aware ASIC that processes SMPTE ST 2022-7 seamless protection switching in hardware. Each of the 48 front-panel SFP28 cages supports 25Gbps line rate, configurable as 12G-SDI, 25G Ethernet, or dual 10G breakout modes. The backplane provides 2.4 Tbps of non-blocking switching capacity, with a cut-through latency of 480 nanoseconds for 4K video frames. A dedicated FPGA cluster manages video timing reconstruction, PTP profile handling (SMPTE ST 2059-2), and ANC (Ancillary Data) preservation across switch fabrics.

KEY FEATURES & ROUTING LOGIC

- Uncompressed 4K Video Switching: Hardware-based forwarding for 12G-SDI

over IP (SMPTE ST 2110-20/21), supporting 4Kp60 RGB 4:4:4 with full ancillary data preservation.

- Hitless Protection Switching: Implements ST 2022-7 seamless redundancy with under 1 microsecond failover, utilizing duplicate flows across separate fiber paths.

- PTP Grandmaster & Boundary Clock: Integrated GNSS receiver input with holdover stability of ±5ppb, enabling studio-wide genlock without external timing gear.

- Zero Packet Loss Flow Control: Priority flow control (PFC) with per-priority pause thresholds engineered for constant bitrate video streams, eliminating RTP jitter.

- NMOS IS-04/IS-05 Discovery: Native support for AMWA NMOS Node API, allowing automatic registration with broadcast controllers (e.g., Sony LSM, Grass Valley GV Orbit).

COMPLIANCE & STANDARDS

The platform is certified for SMPTE ST 2110-10/-20/-21/-30/-40, SMPTE ST 2059-2 (PTP), AES67 (audio over IP), and AMWA NMOS. It carries AIMS (Alliance for IP Media Solutions) Verified mark for interoperability with major broadcast vendors, including Sony, Grass Valley, Evertz, and Lawo. Environmental compliance includes FCC Part 15 Class A, CE, RoHS, and REACH.

TECHNICAL SPECIFICATIONS

- Port Configuration: 48x SFP28 (25Gbps each) + 8x QSFP28 (100Gbps each) for uplinks or spine interconnect
- Switching Capacity: 2.4 Tbps non-blocking
- Forwarding Rate: 1.8 Bpps (billion packets per second)
- Latency (cut-through): 480 ns (minimum) / 1.2 µs (store-and-forward for 4K video)
- Jitter (PTP locked): < 50 ns RMS (per SMPTE ST 2059-2)
- MAC Address Table: 128K entries
- VLANs: 4094 (IEEE 802.1Q), + VLAN translation for broadcast workflows
- Flow Control: IEEE 802.3x, Priority Flow Control (PFC), ST 2022-7 hitless merge
- Timing: GPS-disciplined 10MHz/1PPS input, 6x SFP PTP ports (master/slave/slave)
- Power Supply: Dual hot-swappable 800W AC/DC (1+1 redundancy)
- Cooling: Front-to-rear airflow, 5+1 redundant fans
- Dimensions (HxWxD): 1RU, 17.3" x 19" x 21.5"
- Operating Temperature: 0°C to 50°C (derated at altitude)
- MTBF: 275,000 hours (Telcordia SR-332, GB

Parameter	**Specification**

Form Factor	1RU Standard Rackmount (19")
Switching Capacity	2.4 Tbps non-blocking
Power Supply	Dual 800W Hot-Swappable Redundant AC/DC (1+1)
Latency (4K video)	480 ns cut-through / 1.2 µs store-and-forward
Port Types	48x SFP28 (25G) + 8x QSFP28 (100G)
PTP Support	SMPTE ST 2059-2 Boundary Clock / Grandmaster
MTBF	275,000 hours (Telcordia SR-332)
Cooling	Front-to-rear, 5+1 redundant fans

ORDERING SKU INFORMATION

- BRN-4824-8Q: Main chassis, 48x SFP28, 8x QSFP28, dual PSU, no optics
- BRN-PSU-800-AC: Replacement 800W AC power supply
- BRN-PSU-800-DC: Replacement 800W DC power supply (-48V)
- BRN-FAN-6: 6-fan rotor kit
- BRN-PTP-GPS: External GPS/GNSS receiver antenna (with LNA)
- BRN-SFP28-SDI: SFP28 module, 12G-SDI video transport (coax, 75-ohm)
- BRN-SFP28-SR: SFP28 module, 25Gbase-SR (850nm, 100m OM4)

- BRN-QSFP-LR4: QSFP28 module, 100Gbase-LR4 (10km SMF)

- BRN-SW-BROAD-L3: Software license for advanced IP routing & multicast video routing (PIM-SM, IGMPv3)

