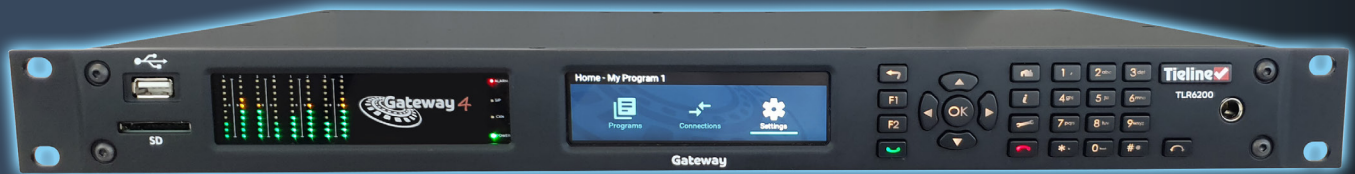# Gateway 4

## The New Generation 4 Channel IP Audio Codec

The Gateway 4 provides two stereo connections, or one stereo and two mono connections, or up to 4 mono connections.

## AoIP Interfaces

AES67 | ST 2110-30 | WheatNet-IP

RAVENNA | NMOS | Ember+

**www.tieline.com**

**Tieline®**
The Codec Company

# Gateway 4 (TLR6200-4)

## Introducing the New Generation 4 Channel Codec

The Gateway 4 is a powerful DSP-based 1RU IP codec designed for live remote broadcasting applications, as well as STL or SSL links. The Gateway 4 enables transport of multiple channels of mono or stereo audio across the Public Internet or any QoS-enabled IP network, including T1 and T3 connections and private WANs with MPLS. The Gateway 4 supports AES67, ST 2110-30, RAVENNA, NMOS, Ember+, AES3 and analog I/O as standard. The Gateway 4 streams AES67, ST 2110-30 and RAVENNA compliant digital audio between equipment from vendors supporting these standards. Plus, an optional WheatNet-IP card can be purchased. The codec supports interoperability with proprietary Dante® and Livewire+™ protocols in AES67 compatibility mode.
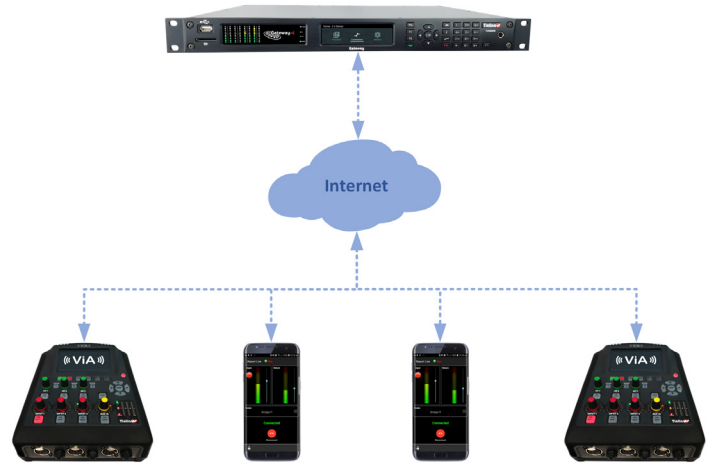
## Applications

The new generation Gateway 4 delivers best-in-class DSP-based reliability and performance for mission critical broadcast streaming applications. It is ideal for:

➤ Remote broadcast applications.

➤ Studio-to-Transmitter Links (STLs)

➤ Studio-to-Studio Links (SSLs)

The Gateway 4 is designed for solutions requiring up to 4 audio streaming channels with advanced redundancy features and remote configuration and control. It supports 4 full-duplex audio channels in 1RU and is backward compatible with all Tieline IP codecs. The Gateway 4 provides two stereo connections, or one stereo and two mono connections, or up to 4 mono connections.



**Gateway 4 codec connects 4 full-duplex remote connections to ViA and Report-IT**

For larger networks the Gateway 4 is ideal for transmitter sites, remote trucks or rack-mounted remote kits. For affiliates and smaller stations, it can be used to transport studio-to-studio links, or a stereo studio-to-transmitter link signal plus another stereo connection, or other mono connections for remotes.
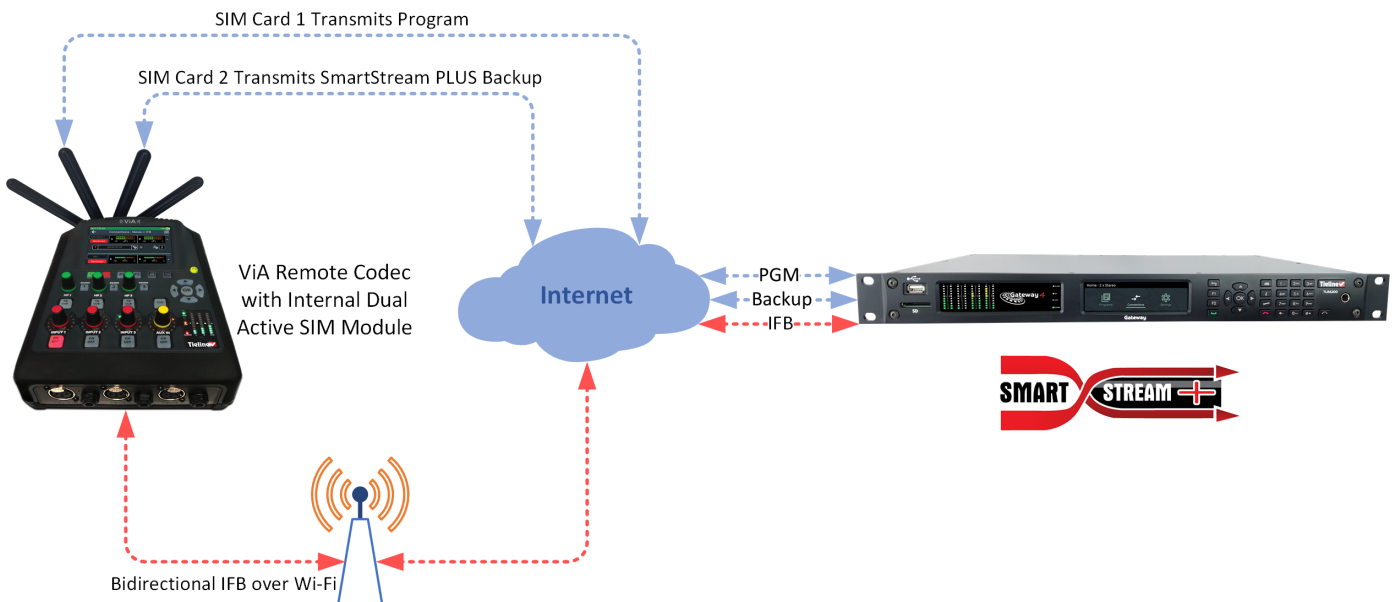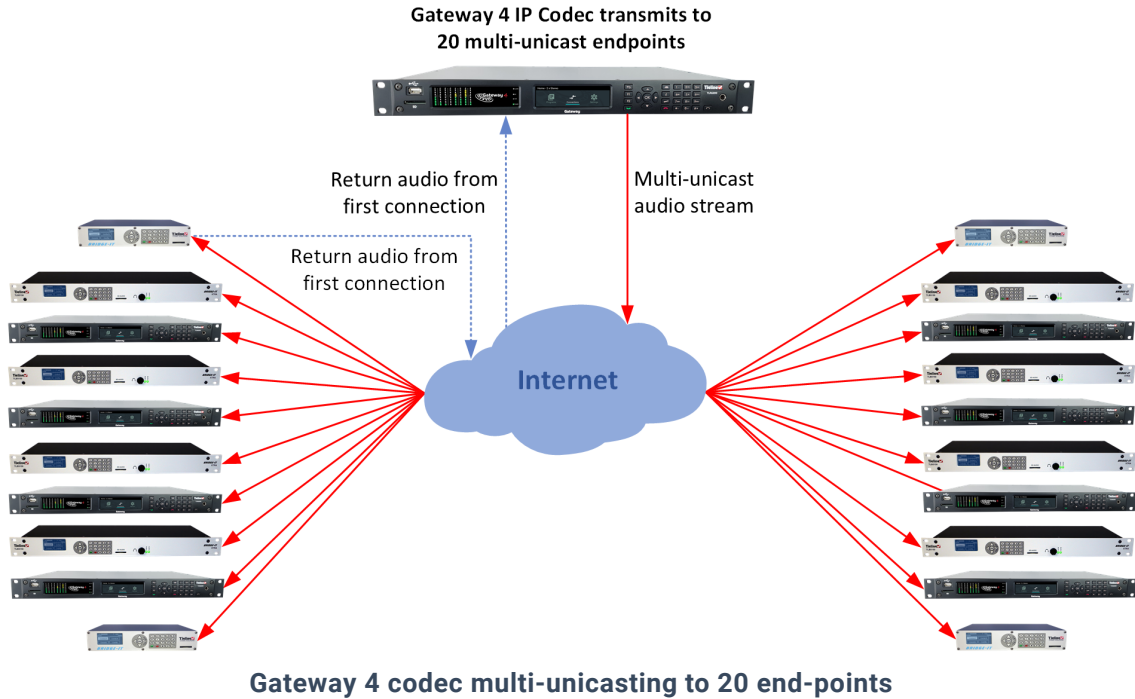


**Gateway 4 codec connects in stereo using SmartStream PLUS over cellular, with IFB over Wi-Fi**

The Gateway 4 also supports multiple unicasting to up to 20 endpoints and multicasting.

**Gateway 4 IP Codec transmits to 20 multi-unicast endpoints**

Return audio from first connection

Multi-unicast audio stream

Return audio from first connection

**Internet**

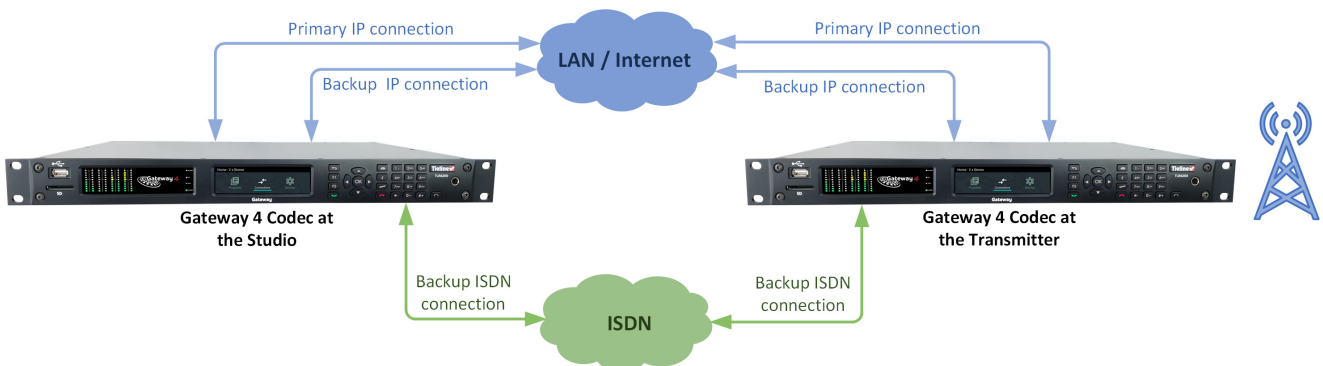**Gateway 4 codec multi-unicasting to 20 end-points**

## Multiple Layers of Redundancy

The Gateway 4 seamlessly integrates with all Tieline IP codecs and delivers hitless packet switching using SmartStream PLUS redundant streaming. A primary and 3 redundant streams can be configured for each connection, delivering multiple layers of IP network redundancy

The codec also supports bandwidth aggregation using Fuse-IP technologies over internet connections. It features dual internal power supplies, dual LAN ports and dual AoIP ports. Automated network failure detection provides automatic switching to a backup IP LAN connection or fail over to an ISDN connection using an optional Euro ISDN module. Automatic silence detection can fail over to alternative audio sources, including file playback.

Cellular Network

LAN

**Internet**

LAN

Studio codec decodes data from multiple redundant audio streams

Single data stream reconstructed from all 4 IP streams on a first packet arrived basis

Wi-Fi

Remote codec transmits 4 identical IP streams using SmartStream PLUS redundant streaming
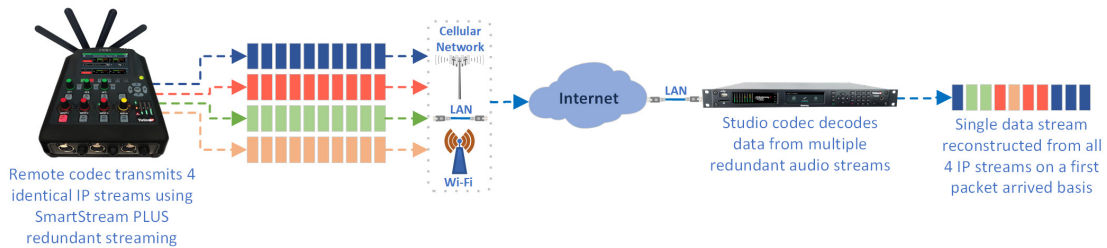
**Gateway 4 codec receives multiple SmartStream PLUS redundant streams sent from ViA remote codec**

Primary IP connection

Primary IP connection

**LAN / Internet**

Backup IP connection

Backup IP connection

**Gateway 4 Codec at the Studio**

**Gateway 4 Codec at the Transmitter**

Backup ISDN connection

Backup ISDN connection

**ISDN**

## WheatNet-IP

Order an optional WheatNet-IP card when you purchase the codec and it will appear as a Blade in Wheatstone's Navigator software. The WheatNet-IP card delivers interoperability with Wheatstone's WheatNet-IP Environment and seamlessly supports stream discovery, advertisement and control. Codec sources and destinations can then be managed using Navigator.

## Interoperability and Remote Control

Its feature-rich and compact design is interoperable with all Tieline IP codecs and compatible over SIP with all EBU N/ACIP Tech 3326 and 3368 compliant codecs and devices. The codec is also fully AES67, ST 2110-30 and RAVENNA compliant for AoIP streaming. An optional WheatNet-IP card is available and the codec supports Dante® and Livewire+™ in AES67 compatibility mode.

The Gateway 4 is also NMOS IS-04 and IS-05 compliant for AoIP discovery, registration and connection management, simplifying setup and configuration of networked AoIP devices and systems. The Ember+ control protocol is also supported.

Maintain connectivity and interoperability with legacy ISDN networks as required with the optional Euro ISDN module and integrate with IP audio streams simultaneously. Gateway is configurable through an embedded HTML5 Toolbox Web-GUI interface and is also fully controllable using Tieline's Cloud Codec Controller.
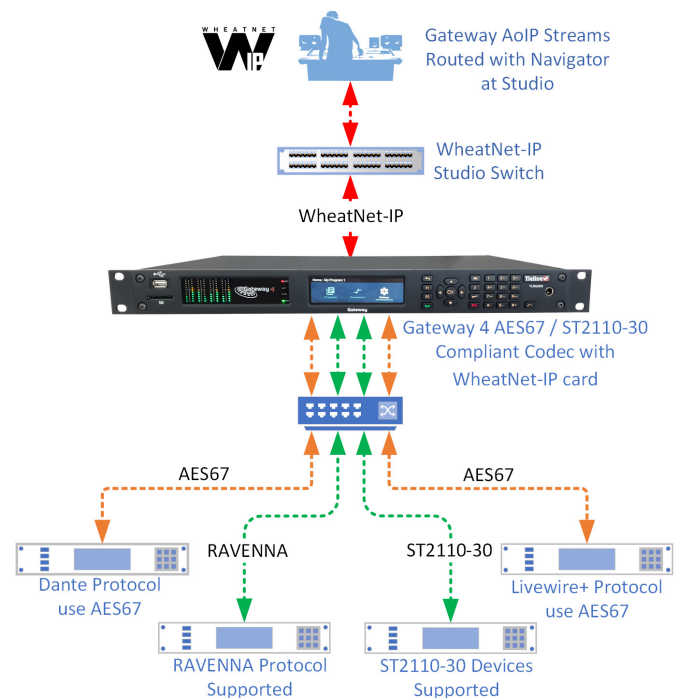


**Gateway 4 codec supports connecting with a variety of AoIP protocols**

## Key Features

- Up to 4 bidirectional mono or 2 bidirectional stereo IP streams
- Bidirectional stereo plus dual mono IP streams
- 8 hardware GPIOs, plus 3 virtual inputs, 56 logical outputs, and 64 WheatNet Logic Inputs/Outputs
- Ideal for contribution/remotes, STL, and SSL applications
- Stream IP audio over WANs using dual Ethernet ports
- Fully AES67, ST 2110-30 and RAVENNA compliant for AoIP streaming
- WheatNet-IP interface option available
- Interoperable with Dante® and Livewire+™ in AES67 compatibility mode.
- Support for Ember+
- Supports multicasting and multi-unicasting to 20 endpoints
- Dual DSP based platform with dual internal power supplies, dual Ethernet ports, dual [1] AoIP ports, and

- dual USB ports for firmware upgrades, memory, or Wi-Fi modems
- Supports uncompressed audio or a huge range of encoding options
- USB 2.0 port support firmware upgrades, Wi-Fi modems and USB memory sticks. USB 3.0 will support store and forward [2]
- SD card slot for firmware upgrades and memory options
- Fully SIP EBU N/ACIP 3326, 3368 and 3347 compliant to operate with 3rd party codecs
- Module slot for optional ISDN module, future technologies, and hardware upgrades
- Fully remote control using the Toolbox HTML5 Web-GUI, or the Cloud Codec Controller, plus SNMP support
- Connect simply using the TieLink Traversal Server [2]
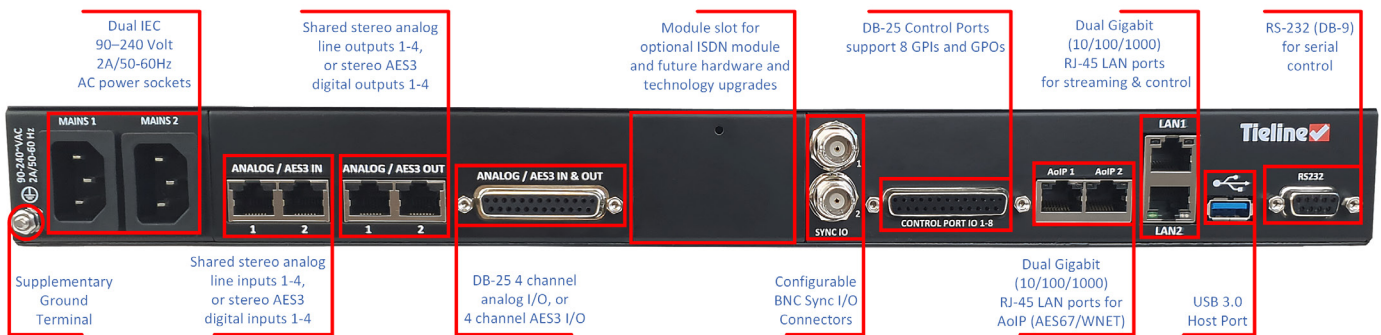- 10 Band EQ, Compressor and IGC Limiting on all analog inputs

# Front Panel Interfaces

The Gateway front panel has 8 PPMs to view input and output streams. It also features a high-quality color LCD screen for at-a-glance monitoring and configuration. Silicon menu, navigation and keypad buttons deliver simple configuration, control and audio monitoring. An SD card slot and USB port allow simple access for firmware upgrades, attaching Wi-Fi USB modems[2], and additional memory.



USB 2.0 Host Port

Alarm, SIP, Connection and Power LEDs

Navigation Buttons

Return Button

Info Button

Home Screen

Keypad

6.35 mm (¼") Headphone Out

SD Card Slot

8 PPM Meters

24-bit Color LCD Screen

Function Buttons

Connect Button

Configuration Settings

Disconnect Button

Headphone Level Adjust

# Rear Panel Interfaces

The Gateway rear panel facilitates maximum flexibility with support for analog, AES3 and AES67 / ST 2110-30 / ST-2022-7[2] I/O. Tieline also offers optional WheatNet-IP compatibility via dual AoIP ports. The codec supports 8 GPIOs as well as software logic I/Os. The module slot allows an optional Euro ISDN module to be installed in the codec for network connection flexibility and redundancy. This module slot can also be used for future hardware innovation upgrades to maximize the effective life of the codec.



Dual IEC 90–240 Volt 2A/50-60Hz AC power sockets

Shared stereo analog line outputs 1-4, or stereo AES3 digital outputs 1-4

Module slot for optional ISDN module and future hardware and technology upgrades

DB-25 Control Ports support 8 GPIs and GPOs

Dual Gigabit (10/100/1000) RJ-45 LAN ports for streaming & control

RS-232 (DB-9) for serial control

Supplementary Ground Terminal

Shared stereo analog line inputs 1-4, or stereo AES3 digital inputs 1-4

DB-25 4 channel analog I/O, or 4 channel AES3 I/O

Configurable BNC Sync I/O Connectors

Dual Gigabit (10/100/1000) RJ-45 LAN ports for AoIP (AES67/WNET)

USB 3.0 Host Port

[1]AoIP Port 2 Future Release    [2]Future Release

# Specifications

## Input and Outputs

| | |
|---|---|
| RJ45 Analog Inputs 1-4/AES3 Inputs 1-4 | Shared analog stereo line inputs 1-4, or stereo AES3 digital inputs 1-4 |
| RJ45 Analog Outputs 1-4/AES3 Outputs 1-4 | Shared analog stereo line outputs 1-4, or stereo AES3 digital outputs 1-4 |
| Female DB-25 Analog/AES I/O | Optional analog or digital inputs/outputs x 4 (Tascam pinout) |
| Gigabit LAN Ports | 2 x Gbit Ethernet ports for IP streaming over WANs (4 bidirectional mono, bidirectional stereo plus mono,  or 2 bidirectional stereo streams) |
| Gigabit AoIP Streaming Ports | 2 x Gbit Ethernet ports for AES67/ ST 2110-30/ ST 2022-7[2] or Optional WheatNet-IP streaming over AoIP1 (4 bidirectional mono or 2 bidirectional stereo); port 2 not operational in early releases |
| USB 2.0 Host Port | Front panel host port (supports firmware upgrades, Wi-Fi USB modems[2] and memory sticks) |
| USB 3.0 Host Port | Rear panel host port supports record and playback[2] |
| Front Panel Headphone Output | 1 x 6.35mm (1/4") headphone Jack |
| Front Panel SD Card Slot | Full size push-push SD card slot for firmware upgrades [2] |
| Internal SSD Storage Capability | Internal connector supports SSD memory after purchase |
| BNC Sync Input/Output | 2 configurable input/output BNC sync connectors (Wordclock, AES3 Input, AES11id, PTP Sample Clock, and Fixed) |
| Female DB-25 Control Port In/Out | Dual DB-25 Control panel support 8 CMOS control inputs and 8 opto-isolated solid-state relay outputs |
| Analog Input Impedance | > 10k ohm |
| Analog Output Impedance | < 30 ohm balanced |
| Clipping Level | Nominal output level +4dBu with maximum output + 24 dBu |
| A/D & D/A Converters | 24 bit |
| AES3 (AES/EBU) | 24 bit inputs with support for sample rates from 32kHz to 192 kHz[2]; 24 bit outputs |
| Frequency Response | 20Hz to 22kHz |
| Total Harmonic Distortion | <0.002% at +22dBu unweighted |
| Signal to Noise Ratio | >100dB at +24dBu, unweighted, 20Hz − 20kHz |
| Crosstalk | < -95dB between adjacent channels |

## Data and Control

| | |
|---|---|
| Configuration and connectivity | HTML5 Toolbox Web-GUI, Cloud Codec Controller (CCC), TieLink Traversal Server[2] |
| Web Audio Monitoring | Selectable web audio monitoring[2] of IP audio streams |
| Serial (DB-9) | RS232 up to 115kbps with or without CTS/RTS flow control can be used as a proprietary data channel |
| Software Logic I/Os (SLIO) | 8 hardware GPIOs, plus 3 virtual inputs, 56 logical outputs, and 64 WheatNet Logic Inputs/Outputs |
| ISDN | Optional via module slot; 2 B channels supported |

## Encoding and IP Streaming

| | |
|---|---|
| Encoding Formats | Tieline Music, Tieline MusicPLUS,  Opus, G.711, G.722, MPEG Layer 2, MPEG Layer-3 LC-AAC, HE-AAC, HE-AACv.2, AAC-LD, AAC-ELD, 16/24 bit aptX® Enhanced algorithm, MPEG audio technologies licensed by Fraunhofer IIS (http://www.iis.fraunhofer.de/audio) |
| Uncompressed IP | Linear PCM16/24 bit 32kHz, 44.1kHz, 48kHz, 96kHz sampling |
| IP Sample Frequencies | 8kHz, 16kHz, 32kHz, 44.1kHz, 48kHz, 96kHz |
| Phase-locked Surround Sound Channels | Stream 4 digital channels in phase-locked mode to deliver live surround sound content |
| Asymetric encoding | Supports asymetric multi-format encoding |
| Protocols | RTP, DHCP, SNMP, DNS, HTTP, IGMP, IPv4/IPv6, RTCP, STUN, SSL Security Certificate |
| SmartStream PLUS | Primary plus 3 redundant streams supported (algorithm dependant) Note: only 1 redundant stream available using TieLink[2] |
| Multi-unicasting | Support for 1 or 2 Multi-unicast streams (20 connections in total) |
| Multicasting | Support for 1 or 2 Multicast streams to unlimited endpoints over compatible IP networks |
| Fuse-IP | Bond IP interfaces to aggregate data |

## AoIP Standards & Specifications

| | |
|---|---|
| EBU N/ACIP 3326 | Audio Contribution Over IP Compliant |
| I3P EBU Tech 3347 | Intercom Over IP Compliant |
| EBU N/ACIP 3368 | SIP Profiles Compliant |
| AES67 Compliant | 44.1.kHz, 48kHz, 96kHz Sample rates; 16 & 24 Bit, 1-8 Channels, SDP; supports 1 AES67 stream in 8 Channel mode (up to 4 active channels) |
| ST 2110-30  Compliant | Class A, Ax, B, Bx Sender and Receiver Compliant |
| ST 2022-7 Seamless Protection Switching[2] | Compliant with requirements for sending multiple redundant streams of RTP packets to enable seamless protection switching. |
| RAVENNA Compliant | RAVENNA Stream Discovery and Advertisement |
| NMOS Compliant | NMOS IS-04 & IS-05 Discovery, Registration and Connection Management |
| Supported Audio Frames | 125us, 250us, 333µs, 1ms, 4ms |
| Clock Modes Supported | Primary Leader [2] (Master), Follower (Slave), Follower Only (Slave Only) |

## Advanced Networking

| | |
|---|---|
| VLAN Tagging | IEEE 802.1Q,802.1p |
| Quality of Service (QoS) | Support for DiffServ (DSCP) |
| Synchronization | IEEE 1588-2008(PTPv2) |
| Multicasting | IGMP v2 and v3 |
| SAP | SAP v2 (Session Announcement Protocol) as defined in RFC 2974 |

## General

| | |
|---|---|
| Display | 24-bit Color LCD Screen (480 x 128 pixels) |
| Keypad | 26 button silicon keypad |
| Navigation | 5 navigation and selection buttons |
| Size | 1U x 19" Rackmount |
| Dimensions | 19" x 1 3/4" x 11 13/16" [482mm (W) x 44.45mm (H) x 300mm (D)] excluding rear connectors |
| Weight | 4 Kg /8 lb 13.100 oz |
| AC Power | Dual AC 90-240V IEC power inlets; 2A 50-60 Hz |
| Operating Temperature | 0°C to 45°C (32°F to 113°F) |
| Humidity Operating Range | 10% ≥ RH ≤ 90% (0 to 45°C/32°F to 113°F), non-condensing |

[2] Future release

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