# Telos Alliance® xNode™ IP-Audio Interfaces

## The most advanced AoIP interfaces on the planet.

## OVERVIEW

The xNode lightweight, half-rack, high-performance IP-Audio interface from Telos Alliance is loaded with advanced features and capabilities. One-button configuration takes a new xNode from out-of-the-box to on-the-air in under one minute. They're fanless, which means they're noiseless too. Versatile mounting options let you deploy two xNodes in just 1RU of rack space, or on ceilings, walls, and under counters with an available wall-mount kit. xNodes have studio-grade audio performance specs. Redundant power options (using AC mains and Power-over-Ethernet) and dual-redundant network interfaces are included, both with automatic switching. And xNodes are fully AES67-compliant, so they work with all AES67 audio gear—now, and in the future. In fact, they are the first and only AoIP I/O devices that are Livewire+™ AES67, RAVENNA, and AES67 compliant. Every xNode not only supports RAVENNA audio stream interoperability, but also enables advertising/discovery of those streams natively, above and beyond AES67.

xNodes are available in Analog, AES/EBU, Microphone-level, Mixed-Signal, and GPIO versions to handle virtually any signal encountered in today's broadcast studio.

# FEATURES

- Fanless design with cast-aluminum heat-sinks is completely silent in-studio. Front-panel heat sinks are cooled by ambient air, not "rack air," eliminating overheating worries.
- World's only fully AES67-compliant AoIP interface; xNodes are "universal translators" that support a huge installed base of Livewire+™ AES67 hardware as well as audio streams from other AES67-compliant devices.
- First and only AoIP I/O device that is Livewire+™ AES67, RAVENNA, and AES67 compliant. Every xNode not only supports RAVENNA audio stream interoperability, but also enables advertising/discovery of those streams natively, above and beyond AES67.
- High-resolution front-panel multi-function OLED display meters inputs and outputs or GPIO status, gives software and other status information.
- Power-efficient: xNodes use just 14 Watts each.
- Exclusive redundant power plan uses AC and Power over Ethernet (IEEE 802.3af) supplied by compliant Ethernet switches. Multi-color front-panel LED glows green when AC mains power is used, red when PoE is used, and orange when both AC and PoE are connected.
- Exclusive redundant network connection: Dual NICs allow you to connect xNode to separate network branches for full audio pathway redundancy. Automatic failover activates backup connection should the primary be interrupted.
- Built-in Syslog server with configurable event filter and SNMP (Simple Network Management Protocol) support help you stay fully informed, should an xNode's power or connection status change.
- Synchronize your AES master clock to a designated xNode AES/EBU input to keep all of your AES streams synchronized to the house clock.
- xNodes use premium components, including rugged cast aluminum faceplates and heat sinks, high-resolution OLED displays, bulletproof power supplies designed for high-availability telecom applications, studio-quality SRCs with recording-studio specs.
- I/O connections via industry-standard RJ-45 audio connectors or high-density DB-25 connections, both available prefabricated and ready to attach in seconds.
- Versatile mounting options: Use freestanding, rack singly or side-by-side in 1 RU, or wall-mount using an optional surface-mount kit.
- Analog xNode inputs can be configured to supply four stereo audio channels, eight true mono channels, or 5.1 surround + stereo downmix. Outputs support the same variety of selections, easily selectable in software via the built-in web interface.
- On the Analog, AES/EBU, Mixed Signal, and Microphone xNodes, a fully configurable mixing matrix allows for mixing of both physical and network inputs, stream conversion, and a multitude of other unique solutions.

# IN DEPTH

## The AoIP Interface that's twice as powerful. (But only half the size.)

One day, all audio equipment will be networked. Until then, there are xNodes, the world's first self-configuring, fully AES67-compliant AoIP interfaces.

xNodes give you an easy way to add non-networked audio devices to your studio network. They pack a lot of I/O into a very small space. And xNodes are so simple to set up, they nearly configure themselves.

All xNodes feature a high-resolution OLED front panel display and two "soft" buttons to provide status information and assist with initial setup, and a multi-color LED that gives at-a-glance information about the xNode's power configuration. To ensure ultra-reliable network operations and extremely low delay, xNodes run Linux on an embedded processor, and a built-in web server in each node gives you remote configuration and control—in an intuitive, easy-to-understand manner—using any standard web browser.

xNodes are loaded with features designed to ensure the uptime of your network. Dual Ethernet ports can provide redundant connections to separate network segments. Redundant power capability with automatic switchover enables xNodes to run on house mains or PoE (Power over Ethernet), letting the network switch itself supply power, and enabling easy single-cable setup in places where AC power isn't practical. Built-in Syslog servers with a configurable event filter and SNMP (Simple Network Management Protocol) support let you stay fully informed, should an xNode's power or connection status change.

The xNode Matrix Mixer feature is one of the most flexible and capable virtual mixers available. It lets users mix physical inputs (like mics and playback devices) with digital network sources (like stream inputs) to a single output. With the xNode Matrix Mixer feature, broadcasters can bypass the studio console during automated dayparts and send on-air mixes straight to the transmitter thus simplifying audio workflows. This one-of-a-kind solution offers the power and flexibility of a big studio mixer switching system in a compact ½ RU device!

xNodes are convenient, too. For example, a Microphone xNode placed in a studio can take audio from microphones and also provide outputs to associated studio monitors and headphones. An xNode in the rack room can collect audio from network feeds, codecs and other shared sources for system-wide use while providing handy outputs for audio processors and other terminal-room gear.

xNodes provide audio quality superior to any other AoIP interface. Not only are they capable of operating at a network sampling rate of 48kHz, they also employ high-resolution 32-bit floating-point SRC chips. xNodes produce a "sweeter," more natural audio quality—clients routinely tell us of noticeable sonic improvements after installation.

xNodes are versatile and cost-efficient. Since they're half the size of other AoIP interfaces, they cost less. And you can mix-and-match I/O as needed: Choose between analog, AES/EBU, or Mic-level inputs, without paying for ports you won't use. High-density GPIO xNodes let you easily provide logic and control for your audio source devices.

xNodes are easy to deploy, too. When you connect an xNode to your network, it automatically prompts you to give it an ID via the front-panel controls. Then, it derives a unique static IP address, and even gives names to its sources and outputs (which you can edit later, from the comfort of your computer). All you have to do is connect devices to the inputs, and it advertises that its audio sources are available for use, allowing any users access to them.

xNodes are also fanless, so you can tuck one anywhere you need I/O without worrying about cooling fans or heat—they consume only 14 Watts of power! Two xNodes fit side-by-side in a single rack space using the included rack-mount kit. Or, mount them to walls, ceilings, or under countertops, with an optional surface-mount kit.

Five different xNodes provide analog and AES ins and outs, microphone inputs and GPIO logic ports, wherever you need them. No need for "home runs" to a central rack—one CAT-5 cable connection is all an xNode needs to interface multiple channels of bi-directional audio to your network.

## Microphone xNode


The Microphone xNode has four professional-grade microphone preamps with selectable Phantom power and software-adjustable gain. There are also four balanced analog line outputs to conveniently deliver headphone and studio monitor feeds back to your talent. Inputs and outputs are presented both on easy-to-install RJ-45s and high-density DB-25s, both of which connect to easily available 3rd-party breakout cables, to suit your connection preference.

## Analog xNode



The Analog xNode has 8 mono or 4 stereo balanced line-level inputs and 8 mono or 4 stereo balanced line-level outputs, on RJ-45 and DB-25 connectors. It can also accommodate 5.1 Surround inputs and outputs, each with an associated discrete Stereo mix. Each input is switchable to accommodate either consumer-level -10dBv or professional level +4dBu sources. The short-circuit protected outputs can deliver up to +24dBu before clipping. Telos Alliance uses only studio-grade A/D/A converters and low-noise components, so that each Analog node provides superior audio performance for high-end studio use.

## AES/EBU xNode



Our AES/EBU xNode has 4 AES/EBU inputs and 4 AES/EBU outputs. Left and right input signals may be split and routed independently as mono signals. Stunning performance specs include 48 kHz sampling rate, 126dB of dynamic range, and <0.0003% THD. Sample rate conversion is available on all inputs; the unit can also be synchronized to a house clock to provide sync to your entire Axia network.

## Mixed-Signal xNode



The Mixed-Signal xNode is your utility player; perfect for places that require a mix of different audio I/O types. It provides 1 selectable Mic/Line analog input, 2 dedicated analog line inputs, 3 analog line outputs, 1 digital AES3 input and 1 AES3 output, and 2 GPIO ports – truly a "jack of all trades."

## GPIO xNode



GPIO xNode provides 6 general-purpose logic ports for machine control of studio peripherals – audio devices, loudspeaker muting relays, signal lamps, etc. – each with 5 opto-isolated inputs and 5 outputs. A logic port can be associated with any audio input or output and routes control data transparently along with the audio.

# SPECIFICATIONS

## Microphone Preamplifiers

- Source Impedance: 150 Ohms
- Input Impedance: 4k Ohms minimum, balanced
- Nominal Level Range: Adjustable, -75 dBu to -20 dBu
- Input Headroom: >20 dB above nominal input
- Phantom power: +48VDC, switchable

## Analog Line Inputs

- Input Impedance: >40k Ohms, balanced
- Nominal Input Range: Selectable, +4 dBu or -10dBv
- Input Headroom: 20 dB above nominal input

## Analog Line Outputs

- Output Source Impedance: <50 Ohms balanced
- Output Load Impedance: 600 Ohms, minimum
- Nominal Output Level: +4 dBu
- Maximum Output Level: +24 dBu

## Digital Audio Inputs and Outputs

- Reference Level: +4 dBu (-20 dB FSD)
- Impedance: 110 Ohm, balanced
- Signal Format: AES3 (AES/EBU)
- AES3 Input Compliance: 24-bit with sample rate conversion
- AES3 Output Compliance: 24-bit
- Digital Reference: Internal (network timebase) or external reference 48 kHz, +/- 2 ppm
- Internal Sampling Rate: 48 kHz
- Input Sample Rate: 32 kHz to 192kHz
- Output Sample Rate: 44.1 kHz or 48kHz
- A/D Conversions: 24-bit, Delta-Sigma, 256x oversampling
- D/A Conversions: 24-bit, Delta-Sigma, 256x oversampling

## Frequency Response

- Any Input to Any Output: +/- 0.5 dB, 20 Hz to 20 kHz

## Latency

- Analog Input to Analog Output, 2.75ms including network, converters, and mixing process
- Digital Input to Digital Output, 1.75ms including network mixing engine (ASRC off)

## Dynamic Range

- Analog Inputs to Analog Outputs 108dB referenced to 0dBFs, 111dB A-weighted
- Analog Inputs to Digital Outputs 110dB referenced to 0dBFs, 113dB A-weighted
- Digital Inputs to Analog Outputs 112dB referenced to 0dBFs, 115dB A-weighted
- Digital Inputs to Digital Outputs 126dB

## Equivalent Input Noise

- Microphone Preamp: -128 dBu, 150 Ohm source, reference -50 dBu input level

## Total Harmonic Distortion + Noise

- Mic Pre Input to Analog Output: < 0.005%, 1 kHz, -36dBu input, +18dBu output
- Analog Input to Analog Output: < 0.005%, 1 kHz, +18dBu input, +18dBu output
- Analog Input to Digital Output: < 0.004%, 1 kHz, +18dBu input, -6dBFs output
- Digital Input to Analog Output: < 0.004%, 1 kHz, -6dBFs input, +18dBu output
- Digital Input to Digital Output: < 0.0003%, 1 kHz, -20dBFs

## Crosstalk Isolation, Stereo Separation and CMRR

- Analog Line Channel to Channel Isolation: 90dB minimum, 20Hz to 20kHz
- Analog Line Stereo Separation: 85dB minimum, 20Hz to 20kHz
- Analog Line Input CMRR: 80dB minimum, 20Hz to 20kHz
- Microphone Input CMRR: >60 dB, 20 Hz to 20 kHz

## Power Supply AC Input

- Auto-Ranging Supply, 95VAC to 240VAC, 50Hz to 60Hz, IEC Receptacle, Internal Fuse
- Power Consumption: 14 Watts

## Operating Temperatures

- 0 degree C to +40 degree C, <90% humidity, no condensation

## Dimensions

- 8.5" (22 cm) wide; two may be mounted side-by-side in a standard 1RU rack space; 1.72" (4.4 cm) height, 11.75" (30 cm) depth

## Regulatory

**North America:** FCC and CE tested and compliant, power supply is UL approved.

**Europe:** Complies with the European Union Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended by Commission Decisions 2005/618/EC, 2005/717/ EC, 2005/747/EC (RoHS Directive), and WEEE.

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