Model 5418 Mic/Line Interface

Key Features

- Dante® audio-over-Ethernet technology

- Eight mic/line inputs to Dante outputs

- Eight Dante inputs to line-level analog outputs

- Flexible monitoring with metering and headphone output

- Three Gigabit Ethernet interfaces

- Standard connectors

- Excellent audio quality

- AC mains and 12 volt DC powering

- Lightweight enclosure, single rack-space (1U) mounting

Introduction

The Model 5418 Mic/Line Interface provides a simple yet high-performance means of interfacing analog signals with applications that utilize Dante® audio-over-Ethernet media networking technology. Eight analog microphone- or line-level sources can be connected to the unit and then output in the digital domain by way of a Dante interface. Eight digital audio signals, which arrive by way of Dante, are converted to analog and then output as balanced line-level signals. Configuration choices also allow other audio signals to be selected as the sources for the analog output channels. A monitor section allows the input and output signals to be selectively observed using meters and a headphone output.

The Model 5418 is a fully professional product that offers the audio quality, features, and reliability required by 24-hour on-air and commercial applications. Located on the unit's front panel, the eight mic/line audio inputs use standard 3-pin female XLR connectors for easy interfacing with balanced and unbalanced sources. The input circuitry features adjustable gain, P48 phantom power, and high-pass filter functions. Configuration of the inputs can be made locally by using pushbutton switches and an OLED display. Alternately, the STcontroller software application allows remote control of the input parameters. The analog mic/line input audio signals are converted to 24-bit PCM digital and then transported via the Dante interface.

Using the Dante Controller software application, eight digital audio signals can be routed (subscribed) to the Model 5418 via the Dante interface. These input signals are then converted to analog and provided to users as balanced line-level analog outputs. One 25-pin female D-subminiature connector, located on the unit's back panel, provides access to the eight analog outputs.

The monitor section provides the user with the ability to select any input or output signal, or signal pair, for monitoring using the 2-channel (stereo) headphone output. A configuration choice allows selected analog outputs to provide a monitoring function for connection to inputs on amplified loudspeakers. The OLED display offers level metering functions which allow the input or output audio signals to be visually monitored.

The Model 5418 provides three Gigabit Ethernet ("GigE") network interfaces, two to support redundant Dante operation and the third for accessing the management menu system. To meet the latest interoperability standard the Model 5418's Dante implementation supports AES67-2018. The unit also supports the Dante Domain Manager™ (DDM) software application. An integrated web server allows fast and flexible monitoring and configuration of the unit's networking, audio, and Dante performance. Front-panel indicators, an OLED display, and pushbutton switches provide users with direct access to key operating parameters.

The Model 5418 can be powered by 100-240 V, 50/60 Hz mains or a source of 12 volts DC. Both can be simultaneously connected to provide redundant operation. The lightweight enclosure mounts in one space (1U) of a standard 19-inch

rack. Industry-standard connectors are used for the audio input, audio output, Ethernet, DC power, and AC mains interconnections.

Dante audio-over-Ethernet has found wide acceptance as an audio "backbone" due to its ease of use, interoperability, excellent audio quality, and wide adoption by a large number of equipment manufacturers. The Model 5418 can serve as an "edge" device for Dante network implementations, providing high-performance input, output, and monitor resources in a compact, cost-effective package. The unit can also serve as a general-purpose "tool" to help extend Dante capabilities to facilities and applications that were initially implemented to support signals in the analog domain.

Dante Audio-over-Ethernet

Digital audio data associated with the Model 5418 is interfaced with a local area network (LAN) using Dante audio-over-Ethernet media networking technology. Status LEDs provide a real-time indication of Dante and LAN performance. A major benefit of using Dante is its ability to use any standard Ethernet network implementation, including switches, to directly transport professional audio signals. The Model 5418 supports digital audio signals with a sampling rate of 44.1, 48, and 96 kHz and a bit depth of up to 24. These sampling rates were selected for optimal support of broadcast, production, industrial, and commercial applications.

The signals associated with the eight mic/line input channels are converted to digital and then routed to transmitter (output) channels on the Dante interface. Eight transmitter (output) channels from one or more associated Dante-enabled devices can be assigned to the Model 5418's receiver (input) channels using the Dante Controller software application. These input signals are converted into analog and then, depending on the unit's configuration, sent to the analog output circuitry.

Network Ports

Using the Dante Controller software application, the Model 5418's two Dante Ethernet ports can be selected to operate in either the switched or redundant modes. In the switched mode a single Ethernet connection is used for interconnection with other Dante-compliant devices. The second Model 5418 Dante Ethernet port can be used to interface with another piece of network equipment. In the redundant mode independent Ethernet connections would be made to the unit's two Ethernet ports implementing Dante's redundant network capability.

The Model 5418's third Ethernet port will always be used to access the management web pages. This port can be connected to an independent network that some facilities implement for equipment monitoring and management purposes. The unit's maintenance port can also be connected to the network that is being used for Dante. It would have a unique IP address and would not interact with the Dante audio data.

Applications

The Model 5418 is a general-purpose mic/line input, analog output, and monitoring device intended for a variety of audio and audio-for-picture applications that utilize Dante. It's suitable for use in demanding on-air broadcast and live-event applications that require both excellent audio performance and reliable operation. The rack-mounted unit is appropriate for installation in fixed locations, serving the needs of systems associated with stadium, worship, education, commercial, and government facilities. Its lightweight enclosure also makes it suitable for mobile and field uses.

The Model 5418 features an optimized set of controls and indicators that makes it simple and intuitive to use. With the unit's headphone and level monitoring resources it's easy for operators to obtain optimal performance. And by providing standard connectors for all inputs and outputs, along with AC mains and DC powering, setup can be completed in just a few minutes.

Mic/Line Inputs

The Model 5418 provides eight analog inputs that are compatible with microphone and line-level signals. The mic/line input circuitry allows the level of the connected sources to be boosted as required, converted to digital, and then output to an Ethernet network by way of Dante. Each mic/line input can be individually configured to meet the requirements posed by a

wide range of sources. The configuration choices can be made either locally or by way of the STcontroller software application. The preamplifier of each channel can be selected for 0 dB of gain to support line-level sources or 10 to 60 dB of gain, in 1-dB steps, for microphones. A source of P48 phantom power can be enabled to power condenser microphones. In addition, a high-pass filter (HPF) function can be enabled as required to reduce the presence of unwanted low-frequency content typically associated with hum, rumble, or wind noise.

Compatible signal sources include dynamic, ribbon, and phantom-powered condenser (capacitor) microphones. The preamplifier gain settings of 0 dB and the range of 10 to 20 dB were specifically included to support connection of balanced and unbalanced line-level signals that are commonly provided by professional and semi-professional audio equipment. Typical nominal levels for these sources would be +4 dBu and −10 dBV, respectively. Devices providing these analog signal sources could include audio consoles, wireless microphone receivers, and broadcast playback equipment.

For front-panel space efficiency the eight mic/line input channels share a common configuration section which includes seven pushbutton switches and an OLED display. The buttons allow rapid local selection of the preamplifier gain as well as controlling the on/off status of the P48 phantom power and high-pass filter (HPF) functions. The OLED display allows the preamplifier gain of each mic/line input channel to be observed. Audio channel level metering is also provided as part of the OLED display's resources. The "virtual" meters are calibrated in dBFS which can assist users in optimizing the preamplifier gain settings which in turn will provide the best possible conversion from the analog to the digital domain. LED indicators associated with each mic/line input channel provide the on/off status of the P48 phantom power and high-pass filter (HPF) functions.

The mic/line inputs are electronically balanced (differential), capacitor-coupled, and ESD (static) protected for reliable operation in a variety of demanding applications. Extensive filtering minimizes the chance that radio frequency (RF) energy will cause interference. The inputs are protected from damage should a moderate DC voltage be accidentally connected. The sum of these characteristics makes the mic/line inputs suitable for use in studio and mobile facilities as well as field-deployed environments.

The eight 3-pin female XLR connectors associated with the Model 5418's mic/line inputs were specifically located on the front panel. This can eliminate the need for an external I/O or "patch" panel, allowing signal sources and their associated interconnecting cables to be rapidly connected and disconnected as required. Rather than being "buried" in the back of a rack enclosure the Model 5418 provides convenient access to the mic/line input connectors and their associated configuration buttons, indicators, and OLED display.

The audio performance of the Model 5418's mic/line inputs is very good. Low-noise, wide dynamic-range preamplifier circuits ensure that input audio quality is preserved. The P48 phantom power source is extremely low noise, allowing optimal microphone operation and imparting little signal degradation. The outputs of the preamplifiers are routed to high-performance analog-to-digital conversion (ADC) sections that support various sampling rates and a bit depth of 24. A precision voltage-reference circuit helps the ADC circuitry perform highly accurate signal conversion. The audio signals, now in the digital domain, are connected to the Dante interface section where they are packetized and prepared for transport over Ethernet.

Analog Outputs

The Model 5418 provides eight general-purpose line-level analog output channels. Each of the analog output channels can be individually configured to use as its input source a Dante input (receiver) channel, a mic/line input channel, one of the monitor output channels, or a 1 kHz sine-wave tone. In most applications an input (receiver) channel associated with the unit's Dante interface will serve as the audio source. The Dante Controller software application would be used to select the source which originates from an output (transmitter) channel on an associated piece of Dante equipment.

Another configuration choice allows signals associated with any of the mic/line inputs to serve as the source for an analog output channel. The selected signal would be post (after) the mic/line input circuitry and provide a broadcast-style "hot mic" line-level analog output version of its associated mic/line input signal. To allow connection to inputs on amplified speakers any analog output channel can be configured to use either of the two monitor outputs as its source. For troubleshooting purposes a 1 kHz sine-wave tone at −20 dBFS can be assigned as the source for any analog output channel. This would result in an analog output level of +4 dBu.

The Model 5418's analog outputs have a maximum level of +24 dBu. This allows both compatibility and sufficient headroom in SMPTE®-compliant applications where digital audio signals with a nominal level of −20 dBFS need to translate into analog signals that have a nominal level of +4 dBu. For flexibility a configuration menu choice allows the level of each analog output channel to be individually adjusted ("trimmed") over a range of ±20 dB in 1-dB steps.

The analog outputs are electronically balanced, capacitor-coupled, and ESD (static) protected. High-quality components, including the important digital-to-analog converters, are used to provide low-distortion, low-noise, and sonically-excellent performance. Robust circuitry provides protection from damage should a moderate DC voltage be accidentally connected, something especially useful in broadcast applications. The analog outputs are compatible with virtually all balanced and unbalanced loads with an impedance of 2 k ohms or greater.

Input and Output Monitoring

A flexible yet easy-to-use monitor section offers users the ability to listen to and visually observe the level of the audio signals that are associated with the eight mic/line input channels and the eight analog output channels. A mode configuration choice allows monitoring of either a single audio channel or a pair of audio channels. This can be valuable when monitoring monaural or stereo (dual-channel) signals. Using a ¼-inch 3-conductor jack, located on the front panel, a 2-channel output supports the connection of a pair of stereo headphones. A rotary control allows the level of the headphone output to be adjusted.

For application flexibility a 2-channel line-level analog monitor output can also be created. The analog outputs selected for this function would be connected to inputs on amplified loudspeakers or a power amplifier associated with monitor loudspeakers. In this way the audio signals that are selected for the headphone output will also be used by the designated analog output channels. A configuration choice allows the selected audio sources to be either pre (before) or post (after) the rotary level control.

The front-panel OLED display provides "bar graph" signal level metering. Depending on how the monitor section is being used, one, two, or eight channels of level can be simultaneously displayed. The meters are calibrated in dBFS, directly reflecting the signal level in the Dante output (transmitter) and input (receiver) digital domain.

Simple Installation

The Model 5418 uses standard connectors to allow fast and convenient interconnections. 3-conductor female XLR connectors, a 25-pin female D-subminiature connector, and a 3-conductor ¼-inch jack are used to interface with the mic/line input, analog output, and headphone output audio signals. The unit connects to local area networks (LANs) using three RJ45 connectors. Multiple LEDs on the unit's back panel display the status of the network connections. A detachable power cord can be used to connect a source of mains power. Alternately, a DC power source can be connected using a 4-pin XLR connector. The lightweight aluminum enclosure mounts in one space (1U) of a standard 19-inch rack enclosure.

Operating Power

The Model 5418 allows an AC mains source of 100-240 V, 50/60 Hz to be connected by way of a standard detachable mains power cord. It can also be DC powered using a 10-18 volt source that is connected via a broadcast-standard 4-pin XLR connector. If both AC and DC power sources are connected the unit will be powered by the AC mains supply. Only if the AC mains source fails will a load be placed on the DC source. This allows a source of DC, such as a battery pack, to serve in a backup capacity. With this arrangement normal operation can continue even if AC mains power is lost.

Future Capabilities and Firmware Updating

The Model 5418 was designed so that its capabilities can be enhanced in the future. A USB connector, located on the unit's back panel, allows the application and FPGA firmware (embedded software) to be updated using a USB flash drive. The Model 5418 uses Audinate's Brooklyn II circuitry to implement Dante. The firmware in this module can be updated via the unit's Ethernet connections, helping to ensure that the Dante capabilities remain up to date. All software files and configuration parameters are stored in non-volatile memory.

Specifications

Network Audio Technology:
Type: Dante audio-over-Ethernet
AES67-2018 Support: yes, selectable on/off
Dante Domain Manager (DDM) Support: yes
Ethernet Interface Configuration: switched or redundant
Bit Depth: up to 24
Sampling Rates: 44.1, 48, and 96 kHz, selectable
Number of Transmitter (Output) Channels: 8
Number of Receiver (Input) Channels: 8
Dante Audio Flows: 32 transmitter, 32 receiver

Network Interfaces:
Qty: 3; Dante primary, Dante secondary, and management
Type: 1000BASE-T (Gigabit Ethernet ("GigE")) per IEEE 802.3ab (100 Mb/s also supported but not recommended for optimal performance)
NIC Status LEDs: one link and one activity for each Ethernet interface

Mic/Line Inputs: 8
Compatibility: dynamic, ribbon, or phantom-powered mics; mic/line-level sources
Type: analog, electronically balanced, capacitor coupled
Impedance – Mic Setting: 3.0 k ohms, nominal
Impedance – Line Setting: 6.4 k ohms, nominal
Gain: 0 dB (line), 10-60 dB in 1-dB steps
Maximum Level: +24 dBu, 0 dB gain selected (results in Dante output level of 0 dBFS)
EIN: –126 dBu, 22 kHz bandwidth, 49 dB gain, 150 ohm source resistance
Dynamic Range: >117 dB, 0 dB gain, A-weighted
Distortion (THD+N): <0.001% (–101 dB) at –1 dBFS, 40 dB gain, 22 kHz bandwidth
Frequency Response: +0.0/–0.1 dB, 20 Hz to 22 kHz, HPF off
High-Pass Filter (HPF): –6 dB at 75 Hz, 18 dB per octave, on/off selectable per channel
Phantom Power: P48 per IEC 61938:2013 standard, +46 volts DC nominal, on/off selectable per channel
Metering: part of OLED display function
Status LEDs per Input Channel: 3; P48, HPF, and input channel selected

Remote Configuration Capability: preamplifier gain, P48 phantom power on/off status, and high-pass filter (HPF) on/off status (uses STcontroller software application)

Analog Outputs: 8
Type: line-level, electronically balanced, capacitor coupled, intended to drive balanced or unbalanced loads of 2 k ohms or greater
Source Impedance: 200 ohms
Nominal Level: +4 dBu, reference –20 dBFS, adjustable ±20 dB in 1-dB steps
Maximum Level: +24 dBu
Dynamic Range: >119 dB, A-weighted
Distortion (THD+N): 0.001% (–100 dB), reference 1 kHz, measured at +23 dBu output (–1 dBFS input)
Frequency Response: ±0.1 dB, 6 Hz to 20 kHz

Audio Monitor:
Source: mic/line inputs or analog outputs, selectable as monaural or stereo
Metering: part of OLED display function

Headphone Output:
Type: stereo (dual-channel)
Compatibility: intended for connection to stereo headphones with nominal impedance of 100 ohms or greater
Maximum Output Voltage: 4.9 volts RMS, 1 kHz, 150 ohm load
Frequency Response: +0/–1.4 dB, 20 Hz to 20 kHz
Distortion (THD+N): 0.005%
Dynamic Range: >100 dB

Front-Panel Display: OLED

Software Updating: USB flash drive supports updating of application and FPGA firmware (embedded software); Dante interface updated via Ethernet interface

Power Sources:
AC Mains: 100 to 240 V, 50/60 Hz, 20 W maximum
DC: 10 to 18 V, 1.5 A maximum

Connectors:
Mic/Line Inputs: 3-pin female XLR
Analog Outputs: 25-pin female D-subminiature (DB-25F), AES59-2012 compliant
Ethernet: RJ45
Headphone Output: 3-conductor ¼-inch jack
USB: type A receptacle (used only for application firmware updates)
DC Input: 4-pin male XLR (pin 1 negative, pin 4 positive)
AC Mains Input: 3-blade, IEC 320 C14-compatible (mates with IEC 320 C13)

Environmental:
Operating Temperature: 0 to 50 degrees C (32 to 122 degrees F)
Storage Temperature: –40 to 70 degrees C (–40 to 158 degrees F)
Humidity: 5 to 95%, non-condensing
Altitude: not characterized

Dimensions – Overall:
19.0 inches wide (48.3 cm)
1.72 inches high (4.4 cm)
7.8 inches deep (19.8 cm); 8.3 inches (21.1 cm) overall

Mounting: one space (1U) in a standard 19-inch rack

Weight: 3.5 pounds (1.6 kg)

Specifications subject to change without notice.