



Model 5421 Dante® Intercom Audio Engine

Key Features

- 16-channel audio engine creates multiple virtual party-line (PL) intercom circuits
- Dante audio-over-Ethernet technology
- Auto Mix for enhanced audio performance
- Supports Studio Technologies' intercom beltpacks
- DDM support and AES67 compliant
- PoE powered, Gigabit Ethernet interface
- Configured using STcontroller application
- Table-top, portable, or optional rack-mount installation

Overview

The Model 5421 Dante® Intercom Audio Engine is a high-performance, cost-effective, flexible solution for creating party-line (PL) intercom circuits. It's directly compatible with the Studio Technologies' range of 1-, 2-, and 4-channel Dante-enabled beltpacks and other interface-related products. The unit is suitable for use in fixed and mobile broadcast facilities, post-production studios, commercial and educational theater environments, and entertainment applications.

Only a Gigabit Ethernet network connection with Power-over-Ethernet (PoE) support is required for the Model 5421 to provide a powerful resource in a variety of Dante applications. Front- and back-panel LEDs provide operating status indications. The Studio Technologies' STcontroller software application allows personnel to view and configure key operating parameters. The unit's lightweight "1/2-rack"

enclosure can be used stand-alone or mounted in one space (1U) of a standard 19-inch rack enclosure with an optional rack-mount installation kit. To meet the latest interoperability standard the Model 5421's Dante implementation meets the requirements of AES67 as well as supporting the Dante Domain Manager (DDM) application. Using DDM, compliance with ST 2110-30 may be possible.

The Model 5421 provides one 16-channel audio engine which can be configured to provide from one to four "virtual" intercom circuits. The term "audio engine" was selected to describe a set of audio input, processing, routing, and output resources that can be configured to support specific intercom requirements. Unlike general-purpose Dante digital matrix devices, the Model 5421 is optimized to allow direct support for theater, small broadcast, and general intercom applications.



Model 5421 Dante Intercom Audio Engine Front and Rear Views

Configuration and Functionality

Using the STcontroller software application a configuration choice selects how the Model 5421's 16-channel audio engine is segmented. This allows efficient use of the Dante channels to support the needs of specific applications. As all Dante intercom beltpacks are essentially 4-wire devices (having independent receiver (input) and transmitter (output) channels) "virtual" (simulated) party-line functionality must be created within the Model 5421's digital processing resources. This requires that the maximum number of participants (users) on any one "party-line" be defined and an appropriate configuration be made.

The 16 channels offered by the Model 5421 are configured into what are called groups. Simple configuration choices are accessed using the STcontroller software application and allow the number of groups and their sizes to be selected. Group configuration can range from one group having 16 channels (a complete audio engine being used for a single group) to four groups each having four channels. The size of a group will dictate how many devices and associated users can be part of any one party-line. Five choices allow a range of group configurations to be selected with the default setting being two 8-channel groups.

Using the Dante Controller application, each group can be assigned a unique name. These names would typically reflect how each specific group is going to be utilized. Names such as Production, Lighting, Stage Manager, or Follow Spot would be typically used in theater-oriented intercom applications.

Technically, each group supports party-line operation by creating a series of unique "mix-minus" outputs, one for each channel in the group. These specialized outputs allow each intercom user assigned to that specific group (a "party-line") to hear all members of that group except for themselves. (Thus comes the term "mix-minus" or a mix of all source but themselves.) By each user receiving a mix-minus signal precise control of each user's sidetone audio level and overall audio quality can be maintained.

Applications

The Model 5421 is compatible with many Dante-compliant devices including the extensive range of intercom beltpacks

from Studio Technologies. These include the single-channel/dual-listen Model 372A and Model 373A, the 2-channel Model 370A and Model 371A, and the 4-channel Model 374A. The Model 5421 will also function directly with other Dante-supporting devices such as the Model 348 Intercom Station and Model 391 Dante Alerting Unit. In addition, the Model 5421 can function with matrix intercom systems, audio consoles, and wireless intercom base stations.

Dante Audio-over-Ethernet

Audio data associated with the Model 5421 is sent and received using the Dante audio-over-Ethernet media networking technology. Audio signals with a sample rate of 48 kHz and a bit depth of up to 16, 24, and 32 are supported. Up to 16 Dante receiver (input) and 16 transmitter (output) channels are available to implement virtual party-line (PL) intercom circuits.

AES67 and DDM

Using the Dante Controller software application, the Model 5421's Dante interface can be configured to support, or not support, AES67 digital audio signals. The unit is also compliant with the Dante Domain Manager (DDM) software application. DDM offers an enhanced set of network control and monitoring features making it ideal for security-conscious applications. This may also allow the Model 5421's audio channels to support ST 2110-30.

Pro Audio Quality and Auto Mix

The Model 5421's audio circuitry was designed to meet the demands of professional audio applications, far exceeding that of "typical" intercom products. Audio processing is performed in the digital domain using a high-speed field-programmable-gate-array (FPGA) integrated circuit. The Model 5421's Auto Mix function utilizes a sophisticated FPGA-based algorithm to provide enhanced audio intelligibility. This feature is unique to party-line (PL) intercom applications and offers the opportunity for users to obtain the absolutely finest audio performance.

Status LEDs and Configuration

Two LEDs, located on the Model 5421's front panel, provide an indication of the Dante interface's status. LEDs associated with the back-panel R45 jack display the real-time

status of the connected Ethernet signal. No pushbutton or configuration switches are provided. The Studio Technologies' STcontroller software application is used to configure the unit's operating parameters.

Ethernet Data and Power Source

The Model 5421 interconnects with a local-area-network (LAN) using a standard Gigabit (1000 Mb/s) twisted-pair Ethernet signal. The physical connection is made by way of a RJ45 receptacle. The Model 5421's operating power is provided by a Power-over-Ethernet (PoE)-compliant Ethernet signal. For network management purposes the unit's Ethernet interface will report to the power sourcing equipment (PSE) that it's a class 2 (low power) powered device (PD).

Simple Installation

The Model 5421 is housed in a rugged, lightweight aluminum enclosure that is designed to be "field tough." It can be used as a standalone portable unit, supporting what's known in the broadcast world as "throw-down" applications.

Or it also can be directly placed upon on a rack-shelf or other flat surface. Optional rack-mount installation kits are available to allow one or two units to be mounted in one space (1U) of a standard 19-inch rack enclosure. As previously mentioned, the Model 5421 uses a standard RJ45 connector to allow fast and convenient interconnection. Operation will commence as soon as a Gigabit Ethernet signal with Power-over-Ethernet (PoE) capability is connected.

Future Capabilities and Firmware Updating

The Model 5421 was designed so that its performance and capabilities can be enhanced in the future. A USB type A connector, accessible on the unit's back panel, allows the main firmware (embedded software) to be updated using a standard USB flash drive. To implement its Dante interface the Model 5421 uses Audinate's Broadway™ integrated circuit. The firmware in this integrated circuit can be updated via the unit's Ethernet interface, helping to ensure that the Dante performance remains up to date.

Model 5421 Specifications

Applications: designed to create from one to four virtual party-line (PL) circuits in Dante audio-over-Ethernet environments

Engine Group Options:

The following group sizes can be selected:

- 16 (one group)
- 12, 4 (two groups)
- 8, 8 (two groups)
- 8, 4, 4 (three groups)
- 4, 4, 4, 4 (four groups)

Audio Performance:

Internal Digital Audio Processing: 24-bit, fixed
Input-to-Output Audio Processing Latency: <100 uSec
Auto Mix: sophisticated FPGA-based algorithm provides enhanced party-line (PL) audio intelligibility (selectable on or off)

Network Audio Technology:

Type: Dante audio-over-Ethernet (also known as Dante audio-over-IP)
AES67-2018 Support: yes
Dante Domain Manager (DDM) Support: yes
Clock Source: Dante network or internal (can serve as leader clock)
Bit Depth: 16, 24, or 32
Sample Rate: 48 kHz
Number of Dante Receiver (Input) Channels: 16
Number of Dante Transmitter (Output) Channels: 16
Number of Dante Flows: 16 receiver, 16 transmitter

Network Interface:

Type: 1000BASE-T (Gigabit, GigE, or GbE) per IEEE 802.3ab, twisted-pair Ethernet, Power-over-Ethernet (PoE) supported
Data Rate: 1000 Mb/s (10 Mb/s not supported; 100 Mb/s supported but not optimal)
Auto MDI/MDI-X Support: yes
NIC Status LEDs: one link and one activity

Power Source:

Power-over-Ethernet (PoE): class 2 (low power, ≤6.49 watts) per IEEE® 802.3af

Configuration: requires Studio Technologies' STcontroller software application, version 2.06.00 and later

Connectors:

Ethernet: 1, RJ45
USB: type A receptacle (used only for updating application and FPGA firmware)

Software Updating: USB flash drive used for updating application and FPGA firmware; Dante Controller or Dante Firmware Update Manager applications can be used for updating Dante interface firmware

Front Panel LEDs: 2, dual-color

Functions: provides indication of status of Dante connectivity

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: 0 to 95%, non-condensing
Altitude: not characterized

Dimensions – Overall:

8.7 inches wide (22.1 cm)
1.72 inches high (4.4 cm)
8.3 inches deep (21.1 cm)

Mounting Options: single-unit (RMBK-11) and dual-unit (RMBK-12) rack-mount installation kits, purchased separately. Each uses one space (1U) in a standard 19-inch rack.

Weight: 1.3 pounds (0.59 kg); rack-mount installation kits add 0.2 pounds (0.09 kg)

Specifications subject to change without notice.

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