



# Model 5482 Dante® Bridge

## Key Features

- Dante audio-over-Ethernet technology with AES67 and DDM support
- Two versions available: one with up to 32 channels and one with up to 64 channels in each direction
- 44.1, 48, 88.2, and 96 kHz sample rate support
- Integrated Sample-Rate-Conversion (SRC) capability
- Multiple Gigabit Ethernet interfaces allow Switched or Redundant Dante operation
- AC mains and DC powering
- Multiple status LEDs and graphics display
- Lightweight enclosure, single rack-space (1U) mounting

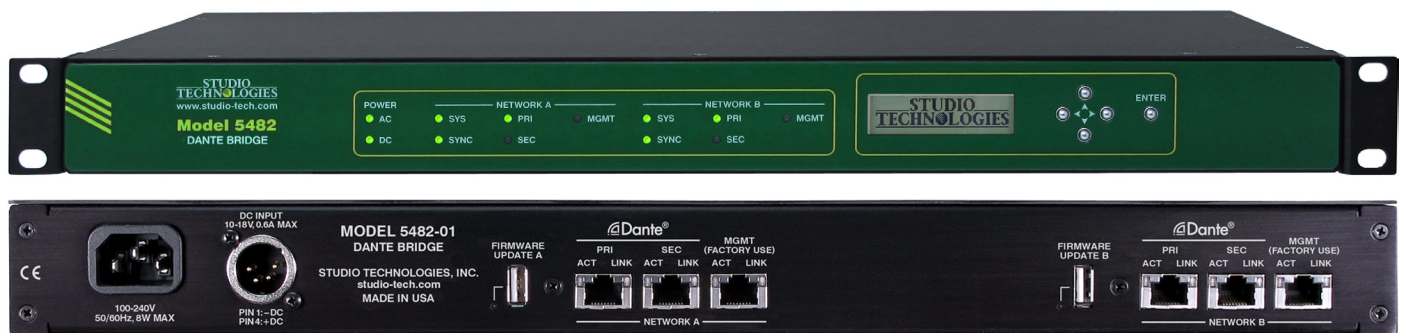
## Introduction

The Model 5482 Dante Bridge provides a high-performance means of interconnecting (“bridging”) Dante® audio-over-Ethernet channels associated with two independent local-area-networks (LANs) or Dante domains. The unit is compatible with the Dante Domain Manager™ (DDM) software application and is compliant with the AES67 technical standard. The Model 5482 is available in two versions: the Model 5482-01 allows up to 32 audio channels to pass in each direction, while the Model 5482-02 allows up to 64 audio channels. Internal sample rate conversion (SRC) capability provides sample rate, bit-depth, and timing conversion to ensure that audio signal integrity is maintained.

Dante audio-over-Ethernet has found wide acceptance as a network “backbone” due to its ease of use, excellent audio performance, strong interoperability, and wide adoption by a large number of equipment manufacturers. However, interconnecting Dante audio channels on independent local-area-networks or domains can present a challenge. But using the Model 5482 makes this a simple task, only requiring interconnecting standard Ethernet signals and performing a minimal amount of configuration. A few minutes of time is all that’s required to make the unit part of a sophisticated, networked audio system.

The Model 5482 can be powered by 100-240 V, 50/60 Hz or a source of 12 volts DC. Both can be simultaneously connected to provide redundant power operation. The unit’s lightweight enclosure mounts in one space (1U) of a standard 19-inch equipment rack. Industry-standard connectors are used for the Ethernet, AC mains, and DC power interconnections. The unit is built to professional standards and is intended for continuous, 24-hour operation.

Each of the Model 5482’s two Dante interfaces incorporates three Gigabit Ethernet (GigE) connections. Two GigE ports are designated for use by the associated Dante network while the third is reserved for factory configuration use. A setting performed within the Dante Controller application selects whether each Dante interface will operate in a Switched or Redundant mode. For installation flexibility the two Dante interfaces can be configured independently.



Model 5482 Front View (top) and Model 5482-01 Rear View (bottom, typical for Model 5482-02)

Front-panel LED indicators, an LCD display, and five pushbutton switches are provided to view and revise selected operating parameters. The Dante Controller software application, available free of charge from Audinate, is used to configure all Dante network and audio parameters.

## **Dante Audio-over-Ethernet**

Audio data is sent to and received from each Model 5482 interface using the Dante audio-over-Ethernet media networking technology. Two separate network interfaces allow completely independent Dante configurations. Audio signals with a sample rate of 44.1, 48, 88.2, and 96 kHz and a bit depth of up to 24 are supported.

When configured for a sample rate of 44.1 or 48 kHz, the Model 5482-01 allows up to 32 channels in each direction to be bridged (“passed”) between the unit’s two network interfaces. When configured for 88.2 or 96 kHz sample rates, 16 channels of bridging is supported. The Model 5482-02 allows up to 64 channels of bridging at a sample rate of 44.1 and 48 kHz and 32 channels of bridging at 88.2 or 96 kHz.

A special function allows, if desired, the timing reference from one interface to be used as the reference timing for the Leader Clock on the other. This will result in the Dante synchronization on one LAN to be utilized as the synchronization source on the other.

Sample rate converter (SRC) functionality is implemented within field-programmable gate array (FPGA) programmable logic. This resource ensures that audio that enters on one network interface exits the corresponding network interface with correctly aligned digital audio information. Each interface in a Model 5482-01 has 32 Dante receiver (input) and 32 Dante transmitter (output) channels. Each interface in a Model 5482-02 has 64 Dante receiver (input) and 64 Dante transmitter (output) channels. They are associated on a one-to-one basis with the channels in both interfaces. For example, input 1 on Network A is associated with output 1 on Network B. Routing (subscribing) the Dante receiver (input) and transmitter (output) channels to related devices is performed using the Dante Controller software applications.

## **Applications**

The Model 5482’s primary application is to interconnect audio channels associated with two independent Dante networks. The source and destination of these audio channels would

typically be other Dante-compliant equipment such as mixing consoles, matrix intercom systems, or digital audio processing units. The Model 5482 can also perform on the same local area network (LAN), interconnecting two independent Dante domains. Each Dante network can have its own Leader Clock (sync reference), bit depth, and sample rate. Sample-rate conversion (SRC) logic within the Model 5482 ensures that the audio signals can pass between the networks with minimal degradation in performance. The Model 5482’s two Dante network interfaces, and four associated RJ45 jacks, are electrically isolated and share no non-audio data, minimizing the risk of security issues. Only uncompressed PCM digital audio signals pass, by way of the SRC logic, between the two network interfaces.

The Model 5482 can be effective when used in both fixed and mobile applications. Ideal uses would include stadiums, live-event venues, media production studios, mobile production trucks or trailers, and education facilities where “guests” frequently need to interconnect their Dante equipment with “house” resources. To achieve network isolation one of the Model 5482’s network interfaces can be connected to secure resources while the other network interface remains “open” for guest use.

As the number of mobile broadcast facilities that utilize Dante-compliant equipment increases so does the need to interconnect them with the resources offered by various venues. Maintaining isolation between these two network implementations can be important for reasons of both signal integrity and security. In just minutes the Model 5482 can allow audio signals in both directions to be securely traversing the two networks.

The Model 5482 can also find use within a single Dante network. The unit’s ability to link Dante audio channels that have different clocking, bit depth, and sample rate characteristics can be valuable. For example, one piece of equipment may only support a sample rate of 96 kHz, while the other devices connected to the network only support 48 kHz. In this situation, the Model 5482-01 would allow the interconnection of 16 channels in each direction, while still maintaining the required 96 kHz and 48 kHz sample rates. (The Model 5482-02 would allow 32 channels.) In this application, it’s interesting to note that the Model 5482’s Dante Ethernet ports would be connected to the same local-area-network (LAN).

## **DDM and AES67**

The Model 5482 is compliant with the Dante Domain Manager (DDM) software application. Each of the Model 5482's Dante interfaces can function interdependently. However, there is no requirement that each of the two network interfaces be part of a DDM domain. One of the Model 5482's network interfaces can utilize the security resources of DDM while the other remains "open." Each interface can be configured to support, or not support, AES67 digital audio signals. This allows a Model 5482 to serve in a unique Dante-to-AES67 bridge function. However, note that when AES67 support is enabled for an interface the sample rate will be fixed at 48 kHz and only multicast operation will be active.

## **Pro Audio Quality**

The Model 5482's audio circuitry was designed to meet the stringent demands of professional audio applications. To ensure that superior performance is maintained, audio data passing between the two network interfaces always remains within the digital domain. To achieve audio data synchronization between the two network interfaces bi-directional sample-rate-converter (SRC) logic functions are implemented in high-speed programmable (FPGA) logic. This allows compatibility between the two network interfaces, even if they have widely divergent sample rates and independent reference clock sources.

## **Dante Network and Ethernet Data**

The Model 5482's two Dante interfaces can be independently configured for either Switched or Redundant Dante operation. In the Switched mode only a single Gigabit Ethernet (GigE) connection is required. The second Ethernet port can function either as an active "loop-thru" resource or left unused. In the Redundant mode two GigE Ethernet connections are made to two independent LANs, allowing support for Redundant Dante operation. This ensures that the loss of one network resource will not result in the interruption of networked audio signals. For application flexibility one interface can be configured for Switched Dante operation while the other is configured for Redundant Dante operation.

As previously mentioned, a third GigE port is associated with each Model 5482 interface. These, named Management, are provided for factory use only. All six of the Model 5482's Gigabit Ethernet ports support twisted-pair signals, each with Auto MDI/MDI-X capability so reversing cables are never required.

## **Status LEDs and LCD Display**

On the Model 5482's front panel are 12 LED indicator lights, a back-lit graphics display, and five pushbutton switches. Two of the LEDs indicate the status of the AC and DC input power sources. A set of five LEDs is associated with each of the two network interfaces. These reflect the status of the interface's Dante and management network connections. The graphics display allows the monitoring of a number of operating conditions, including Dante names and network configurations, product firmware versions, and interface audio sample rates. The five pushbutton switches can be used to select which information is displayed as well as allowing key network parameters to be revised for each interface. These include the Dante primary IP configuration method, IP addresses, and subnet mask values.

LEDs on the Model 5482's back panel indicate the status of the two network interfaces, specifically two for each of the six Gigabit Ethernet connections. Two additional LEDs reflect the status of the USB host interfaces which are used to update the Model 5482's firmware.

## **Installation and Operating Power**

The Model 5482 is housed in a rugged yet lightweight aluminum enclosure that is designed for use in fixed or mobile facilities. It mounts in one space (1U) of a standard 19-inch rack enclosure. The unit allows an AC mains source of 100-240 V, 50/60 Hz to be directly connected. It can also be powered using a 10–18 volt DC source that is connected via a broadcast-standard 4-pin XLR connector. If both AC and DC power sources are connected the Model 5482 will be powered by the AC mains supply. Should the AC mains source fail the DC source will provide operating power with no interruption in the performance of the unit.

## **Firmware Updating**

The Model 5482 was designed so that its performance and capabilities can be enhanced in the future. Two USB receptacles, accessible on the unit's back panel, allow the main and FPGA (programmable logic) firmware (embedded software) to be easily updated using a USB flash drive. To implement its two Dante interfaces the Model 5482 uses two of the Audinate Brooklyn modules. The firmware in these modules can be updated via the unit's Ethernet connections, helping to ensure that the Dante capabilities remain up to date.

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## Model 5482 Specifications

### Applications:

Interconnects up to 64 channels in each direction between two independent Dante audio-over-Ethernet networks. Also supports AES67-2018 applications. Integrated sample-rate-conversion (SRC) functions ensure that timing of independent networks is maintained.

### Versions Available:

Model 5482-01: supports up to 32 channels (44.1 or 48 kHz sample rates) and 16 channels (88.2 or 96 kHz sample rates)  
Model 5482-02: supports up to 64 channels (44.1 or 48 kHz sample rates) and 32 channels (88.2 or 96 kHz sample rates)

### Network Audio Technology (each Network Interface):

Type: Dante audio-over-Ethernet

AES67-2018 Support: yes

Dante Domain Manager (DDM) Support: yes

Ethernet Interface Configuration: switched or redundant

Sample Rates: 44.1, 48, 88.2, or 96 kHz

Pull-Up/Down Support: yes

Bit Depth: up to 24 bits

Number of Transmitter (Output) Channels—M5482-01: 32 (44.1 or 48 kHz sample rates), 16 (88.2 or 96 kHz sample rates)

Number of Transmitter (Output) Channels—M5482-02: 64 (44.1 or 48 kHz sample rates), 32 (88.2 or 96 kHz sample rates)

Number of Receiver (Input) Channels—M5482-01: 32 (44.1 or 48 kHz sample rates), 16 (88.2 or 96 kHz sample rates)

Number of Receiver (Input) Channels—M5482-02: 64 (44.1 or 48 kHz sample rates), 32 (88.2 or 96 kHz sample rates)

Dante Audio Flows: 32 transmitter, 32 receiver

### Network Interfaces: 2

Physical Ethernet Connections per Interface: 3; Dante Primary, Dante Secondary, and Management

Ethernet Connection Type: 1000BASE-T Gigabit Ethernet (GigE) per IEEE 802.3ab (10 and 100 Mb/s not supported)

Ethernet Connection NIC Status LEDs: one link and one activity for each Ethernet connection

### Audio Performance:

Type: fully digital paths between network interfaces (by way of sample-rate-converter (SRC) functions)

Dynamic Range: 147 dB at 48 kHz sample rate, 148 at 96 kHz sample rate, A-weighted

Distortion (THD+N): -140 dB at 48 kHz sample rate, -143 dB at 96 kHz sample rate, measured at -1 dBFS, 1 kHz

Internal Digital Audio Processing: 32 bits

Input-to-Output Audio Processing Latency: <500 uSec

### Front-Panel LEDs: 12, dual-color

Functions: provides indication of condition of incoming AC and DC power, Dante status on each interface, and Ethernet status on each interface

### Back-Panel LEDs: 14

Functions: provides status indication of both firmware update functions and six Ethernet interfaces

### Power Sources:

AC Mains: 100 to 240 V, 50/60 Hz, 8 W maximum

DC: 10 to 18 V, 0.6 A max

### Connectors:

Ethernet: 6, RJ45 jacks

USB: 2, type A receptacle (used only for updating firmware)

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:

19.0 inches wide (48.3 cm)

1.72 inches high (4.4 cm)

8.0 inches deep (20.3 cm)

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

**Weight:** 3.2 pounds (1.4 kg)

Specifications subject to change without notice.

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