Model 5482
Dante Bridge

User Guide

Issue 2, November 2023

This User Guide is applicable for serial numbers
M5482-01-00151 and later with Main Firmware 2.01 and later
M5482-02-00151 and later with Main Firmware 2.01 and later

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Revision History

Issue 2, November 2023:

- Miscellaneous edits for clarification.
- Removed Appendix B as only applies to factory personnel.

Issue 1, December 2022:

- Initial release.

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 complaint 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.

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

Figure 1. Model 5482 Dante Bridge front view

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).

Figure 2. Model 5482-01 Dante Bridge back view

Figure 3. Model 5482-02 Dante Bridge back view

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.

Installation

In this section, the Model 5482 Dante Bridge will be mounted in one space (1U) of an equipment rack. One or two Gigabit Ethernet data connections will be made to each of the Model 5482's two Dante interfaces using standard RJ45 patch cables. AC mains power can be connected to the Model 5482 by means of a detachable cord set that is compatible with the unit's 3-pin IEC 320 C14 inlet connector. Some applications may warrant connection to a source of nominal 12 volts DC which can be made by way of a 4-pin XLR connector. The DC source can be used to power the Model 5482 or it can serve as a backup power source should AC mains be connected.

What's Included

The shipping carton contains one each of either a Model 5482-01 or Model 5482-02 and instructions on how to obtain an electronic copy of this guide. Also included in the shipping carton is a North-American-standard AC mains cord. For destinations outside of North America the local reseller or distributor should provide an appropriate AC mains cord.

Mounting the Model 5482

The Model 5482 Dante Bridge requires one space (1U) in a standard 19-inch (48.3 cm) equipment rack. Secure the unit into the equipment rack using two mounting screws per side. As the Model 5482 does not contain a fan or other noise-producing source it can be located within a room or other structure where audio monitoring is going to take place. Select a location that is convenient for making connections to the Ethernet interfaces. Twisted-pair (UTC) Ethernet has a 100-meter (325-foot) interconnection cable limitation. But that can be overcome by using fiber-optic interconnections between the Model 5482 and the Ethernet switches in the associated local area networks (LANs)

Ethernet Connections

Each of the Model 5482's two Dante interfaces provides two Gigabit Ethernet (GigE) ports for flexibility and compatibility with many Dante implementations. These ports are provided for interconnection with one or two local area networks (LANs) associated with Dante audio-over-Ethernet networking schemes. Two sets are provided, both of which are labeled PRI for primary and SEC for secondary. Using the Dante Controller application, these ports can be independently configured for *Switched* or *Redundant* Dante operation. A third Ethernet port associated with each Dante interface is dedicated for management use and should not typically be utilized. (Factory personnel use these ports to access the Model 5482's management resources.)

Connections to the Ethernet ports are made by way of standard RJ45 jacks that are located on the back of the Model 5482's enclosure. The Ethernet ports support auto MDI/MDI-X ensuring that crossover cables are never required.

Dante Port Connections

For Model 5482 operation, at least one 1000BASE-T Gigabit Ethernet (GigE) connection is required for each of the two Dante interfaces. Separate network cables should be connected to each of the RJ45 jacks that are labeled PRI. A second 1000BASE-T GigE connection can be made to the secondary (SEC) RJ45 jack if Redundant Dante for a specific Dante interface is desired. (For this functionality to be active the Model 5482's network configuration for that specific Dante interface must be set for *Redundant* within the Dante Controller software application.) It's

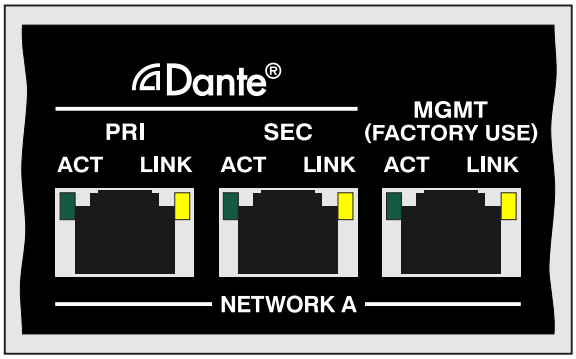


Figure 4. Detail of Model 5482 back panel showing the Ethernet port's RJ45 jacks for Network A

important to note that there is no problem with one of the Model 5482's Dante interfaces being used in the redundant Dante mode while the other is not. Correct bridge functionality will still occur if one Dante interface is configured for *Switched* while the other is configured for *Redundant*.

Note that while technically 100BASE-TX (100 Mb/s) Ethernet can also be used for these Dante connections, it is not optimal. Additionally, it's important to note that 10BASE-T (10 Mb/s) Ethernet connections are not sufficient.

When a Model 5482 interface is configured in Dante Controller for the *Switched* network mode the associated secondary (SEC) Dante Ethernet port can also be used as a "loop through" port such as would be provided by an Ethernet switch. *Switched* mode is the default setting but using the secondary Dante port in this manner for applications other than troubleshooting is not recommended. It will function reliably but "daisy chaining" Ethernet signals can limit flexibility and present a failure point; it's optimal if each Dante interface connects directly to a separate port on an Ethernet switch.

Management Port Connections

Each of the two Model 5482's Dante interfaces includes a management Ethernet port that can be accessed by way of an RJ45 jack. But please don't connect to them! They are provided for factory use only and are labeled MGMT. Plastic filler plugs may be present in these two RJ45 jacks to indicate that they are not normally utilized. If filler plugs are present, do not remove them as hopefully they will indicate to other technical personnel that an Ethernet connection is not necessary.

The management Ethernet ports are utilized at the time of Model 5482 manufacture to access internal web servers and associated configuration web pages. There are no user-designated configuration parameters available using these ports. Should a factory support session be initiated, a 1000BASE-T Gigabit Ethernet (GigE) connection is preferred but a 100BASE-TX (100 Mb/s) or even a 10BASE-T (10 Mb/s) connection is sufficient. By default, the management ports obtain their IP addresses and related network parameters by way of the DHCP protocol. If DHCP is not available then the link-local protocol will be utilized.

Connecting Power

The Model 5482 requires a source of AC mains or nominal 12 volts DC for operation. Either source can be connected with the same result. Both can also be simultaneously connected if a redundant (backup) power scheme is desired.

Connecting AC Mains Power

The Model 5482 can operate directly from AC mains power of 100 to 240 volts, 50/60 Hz, 8 watts maximum. As a "universal mains input" device there are no switches to set or jumpers to install. A 3-pin IEC 320 C14 inlet connector on the back panel mates with a detachable mains cord set.

All units are supplied from the factory with an AC mains cord that has a North-American (NEMA 5-15L) standard plug on one end and an IEC 320 C13 connector on the other end. Units intended for use in other destinations require that an appropriate mains cord be obtained. The wire colors in the mains cord should conform to the internationally recognized color code and be terminated accordingly:

Connection	Wire Color
Neutral (N)	Light Blue
Line (L)	Brown
Earth/Ground (E)	Green/Yellow

Because the Model 5482 does not contain a power on/off switch it will begin operation as soon as AC mains power is connected.

Safety Warning: The Model 5482 does not contain an AC mains disconnect switch. As such, the AC mains cord plug serves as the disconnection device. Safety considerations require that the plug and associated inlet be easily accessible to allow rapid disconnection of AC mains power should it prove necessary.

Connecting DC Power

The Model 5482 can also operate from a source of 10 to 18 volts DC. The current required from a 12 volts DC source is 0.6 ampere maximum. A 4-pin male XLR connector, located on the unit's back panel, is used to connect the source of DC. Prepare a mating connector (female) so that pin 1 is DC– and pin 4 is DC+. Pins 2 and 3 are not used and should remain unconnected. This connector type and pinout have become a broadcast DC power standard and should be familiar to many technical personnel. Because the Model 5482 contains no power on/off switch it will begin operation as soon as a DC power source is connected.

As previously mentioned, both an AC mains source and a DC source can be connected at the same time. If this is the implementation, then the AC mains source will always power the Model 5482 with the DC source serving as a "hot standby." Only if the AC source fails will the unit draw power from the DC source. This will occur automatically with no interruption of Model 5482 operation. In this "standby" mode (when an AC mains source is connected), the Model 5482 will draw less than 120 microamperes (uA) from a connected 12 volts DC source.

Dante Configuration

For audio to correctly pass to and from the Model 5482 requires, at a minimum, that several Dante-related parameters be configured for each Dante interface. These configuration settings are stored in non-volatile memory within each of the Model 5482's two Dante interfaces. Configuration will typically be done with the Dante Controller software application, available for download free of charge from Audinate (audinate.com). Versions of Dante Controller are available to support several operating systems.

The Model 5482's two Dante interfaces are compatible with the Dante Domain Manager (DDM) software application. Refer to the DDM documentation, also available from Audinate, for details on which Model 5482 and related parameters may have to be configured.

Audio Routing

When selected for a sample rate of 44.1 or 48 kHz, each of the Model 5482-01's two Dante interfaces has 32 Dante transmitter (output) and 32 Dante receiver (input) channels which are associated with the unit's 32 interface channels. When selected for a sample rate of 44.1 or 48 kHz, the Model 5482-02 has 64 Dante transmitter (output) and 64 Dante receiver (input) channels for each of the two Dante interfaces. These are associated with the unit's 64 interface channels.

Dante data received on one Dante receiver (input) channel will be output on the corresponding Dante transmitter (output) channel of the other Dante interface. The input-channel-to-output-channel relationship in the Model 5482 will be mapped 01-to-01, 02-to-02, 03-to-03, etc. This will be true all the way up to channel 32 for the Model 5482-01 and channel 64 for the Model 5482-02 (16 and 32 channels, respectively, when the sample rate is selected for 88.2 or 96 kHz). The data (1s and 0s) from the receiver to the transmitter will be the same but the timing and related parameters will be adjusted by the internal sample-rate-conversion (SRC) circuitry. So, as an example, Dante receiver (input) channel 01 on Network A will be associated with Dante transmitter (output) channel 01 on Network B. As another example, Dante receiver (input) channel 15 on Network B will be associated with Dante transmitter (output) channel 15 on Network A.

The Model 5482's Dante transmitter (output) channels on each interface should be assigned to the desired Dante receiver (input) channels on associated equipment. The Model 5482's Dante receiver (input) channels on each interface should be assigned to the desired Dante transmitter (output) channels. This will route the Model 5482's interface channels to the two Dante local area network (LAN) connections. Note that within Dante Controller a "subscription" is the term used for routing a transmitter flow (a group of up to four output channels) to a receiver flow (a group of up to four input channels).

At a sample rate of 44.1 or 48 kHz, the Model 5482-01 is a 32-channel resource. It can provide a 32 channel "bridge" between two Dante LANs. But not all 32 channels have to be utilized. The Model 5482-02 provides a 64-channel resource (at 44.1 or 48 kHz) so creating a bridge with anywhere from 1 to 64 channels is perfectly acceptable.

Both of the Model 5482's Dante interfaces use a Brooklyn module to implement their Dante functionality. The number of flows associated with these modules is 64; 32 transmitter (output) and 32 receiver (input). With this capability typically no flow limitation will occur. Flows, each of which usually can support up to four audio channels, can operate either as unicast, multicast, or a combination of the two.

Note that when the AES67 mode has been enabled for a Model 5482 Dante interface, the associated Dante transmitter (output) channels associated with that interface will only function in multicast; unicast is not supported.

Unit and Channel Names

The Model 5482's first interface, called Network A, has a default Dante device name of **ST-M5482-A-** along with a unique suffix. The suffix identifies the specific Model 5482 Dante interface that is being configured. The suffix's actual alpha and/or numeric characters relate to the MAC address of the associated Brooklyn module. The Model 5482's second Dante interface, called Network B, has a default Dante device name of **ST-M5482-B-** along with the same type of unique suffix.

Each of the Model 5482-01's two Dante interfaces can have 32 Dante transmitter (output) channels with default names of **Ch01** through **Ch32**. In addition, each of the Model 5482-01's two Dante interfaces can have 32 Dante receiver (input) channels with default names of **Ch01** through **Ch32**. When the Model 5482-01's sample rate has been selected for 44.1 or 48 kHz, then 32 transmitter (output) and 32 receiver (input) channels will appear in Dante Controller. When the sample rate has been selected for 88.2 or 96 kHz, then 16 transmitter (output) and 16 receiver (input) channels will appear.

As expected, each of the Model 5482-02's two Dante interfaces can have 64 Dante transmitter (output) channels with default names of **Ch01** through **Ch64**. Each of the Model 5482-02's two Dante interfaces can have 64 Dante receiver (input) channels with default names of **Ch01** through **Ch64**. When the Model 5482-02's sample rate has been selected for 44.1 or 48 kHz, then 64 transmitter (output) and 64 receiver (input) channels will appear in Dante Controller. When the sample rate has been selected for 88.2 or 96 kHz, then 32 transmitter (output) and 32 receiver (input) channels will appear.

Using Dante Controller, the default device and channel names can be revised as appropriate for a specific application. Refer to Appendix C for a summary of the default channel numbers, names, and descriptions.

Device Configuration

Both of the Model 5482's Dante interfaces can be independently configured. The available parameters include sample rate, encoding, and clocking. To clarify: the selections made for each interface can be different. Each interface supports audio sample rates of 44.1, 48, 88.2, and 96 kHz with pull-up/down options available. The digital audio data is in the form of pulse-code modulation (PCM) samples. Encoding choices available within Dante Controller include PCM 16, PCM 24, and PCM 32, but in most cases the selection of PCM 24 would be appropriate. Clocking and device latency parameters can be adjusted if required but the default values in Dante Controller are typically correct.

Network Configuration – Dante

A Model 5482 has two Dante interfaces, each allowing connection of one or two Ethernet signals. Physical connections utilize standard RJ45 jacks which are located on the unit's back panel. (Note that a third RJ45 jack is associated with each interface but is provided only for factory access to the management interface.) The Dante ports are labeled PRI and SEC indicating that they are the primary and secondary connections. How these two ports function can be selected in the Dante Redundancy section of Dante Controller's Network Configuration tab. The choices are *Switched* or *Redundant*. Each Dante interface is independently configured and does not have to have the same setting.

If *Switched* is selected for a Dante interface then it can establish one connection with an Ethernet network. It doesn't matter which RJ45 jack, PRI or SEC, is utilized, although for clarity this would typically be the primary jack. The secondary RJ45 jack can be used to interconnect with another piece of networked equipment.

If a Model 5482's Dante interface is configured for *Switched* ensure that only one of the two Dante RJ45

jacks on the back panel, PRI or SEC, is connected to the LAN associated with the Dante network. If both of the interface's RJ45 jacks are routed to ports on the same LAN this will typically "crash" the network! (Although some of the latest/most-advanced Ethernet switches will automatically detect and prevent such a "network bridging" issue from occurring.)

If *Redundant* is selected for a Dante interface then redundant networking capability will be enabled. In this case, separate network connections should be made to a Dante interface's primary and secondary RJ45 jacks.

Network Configuration – IP Addresses

When a Model 5482 Dante interface has been configured for the *Switched* network mode a single Dante IP address will be associated with the network connection that is made to that network's primary or secondary RJ45 jack. If the network configuration has been selected for *Redundant* then separate IP addresses and related network parameters will be assigned to the primary and secondary Dante Ethernet ports.

In many cases, each of the Model 5482's Dante interfaces will have its IP address (or addresses) and related network parameters determined automatically using DHCP. If DHCP capability is not available, then the link-local network protocol will be utilized. Other applications may want the IP address (or addresses) and related network parameters to be manually set to a fixed (static) configuration. This capability is available in the Dante Controller application. While this is a more-involved process than simply letting DHCP or link-local "do their thing," if fixed addressing is necessary then this capability is available.

Note that if a Model 5482's Dante interface configuration has been set for *Redundant* then the primary and secondary Dante IP addresses and related parameters can be independently configured. This allows both network connections associated with a Dante interface to be configured automatically, both network connections to be configured manually, or one connection configured automatically and the other configured manually.

AES67 Configuration – AES67 Mode

The Dante Controller application allows either or both of the Model 5482's Dante interfaces to be configured to allow AES67 operation. This requires the AES67 mode to be set for *Enabled*. As previously noted, if the AES67 mode is Enabled then the Dante transmitter (output) channels will use multicast. The sample rate will be fixed at 48 kHz. There is no problem having one of the Model 5482's Dante networks configured for AES67 operation and the other Dante network configured to not allow AES67 operation.

Model 5482 Clocking Sources

Technically, the Model 5482 can serve as two independent Leader clocks for the two associated Dante networks. However, in most cases the unit will be configured such that Network A and Network B will receive their timing references ("sync") from another Dante device on their respective local-area-network (LAN). These devices could be audio consoles, input/output interfaces, or dedicated devices such as the Studio Technologies' Model 5401A Dante Leader Clock. As such, the Dante Controller check box for the Preferred Leader configuration that is associated with each of the Model 5482's two Dante interfaces would typically not be enabled.

Typical applications will have independent Dante clocking for the Model 5482's two Dante interfaces. This allows the LANs associated with Network A and Network B to be completely separate. A subtle but powerful Model 5482 feature allows one Dante interface to be "timed" from the other Dante interface. To accomplish this is simple, just requiring Dante Controller's *Enable Sync To External* check box to be enabled for the interface that is to "follow" the other. For example, by checking this box using the Dante Controller application that is associated with Network A, the Dante clock source for Dante Network A will be Dante Network B. Checking the same box when using the Dante Controller application associated with Network B will allow it to be timed by Network A.

Be certain that the **Enable Sync To External** check box is not checked for both interfaces. If this configuration is present, it will cause an error condition

irrationally asking each Dante interface to receive its timing from the other.

If **Enable Sync To External** is selected for one interface it may be appropriate to also, on the same interface, select the Preferred Leader check box. This would allow an entire network of Dante devices to be "timed" to the other network.

Operation

Now that the Model 5482 is installed and configured it's ready for use. Normally no operator intervention should be required. However, there are a number of nuances in the unit's operation. This may make it useful for technical personnel to spend some time reviewing this section.

Upon application of AC mains or DC power, the Model 5482 will go through several power-up sequences. The LEDs associated with the Model 5482's six Ethernet jacks will flash briefly several times in response to their associated integrated circuit's power-up action. Soon after, the LEDs associated with the USB receptacles on the unit's back panel will briefly light green to indicate that the two circuit cards are functioning under software control. After a few more seconds, the 12 LEDs on the unit's front panel will first light green, then light red in a confirmation sequence. While the LEDs are going through their power-up sequence the front-panel display will first show the Studio Technologies' logo, followed by the unit's model number (Model 5482). After a few seconds, the screen saver mode will become active. The screen saver consists of displaying the logo and then the sample rates of the two Dante interfaces. Each of these will show for three seconds and then automatically transition to the next. After the Model 5482 has completed its power-up sequences, full operation will begin.

Front-Panel LED Indicators

The Model 5482's front panel contains 12 bi-color LEDs which reflect the real-time status of unit's major functions. The two power LEDs indicate the presence of incoming AC mains and 12 volts DC power. They are labeled AC and DC. When a source of AC mains power is connected the AC LED will light green. The DC LED will light green whenever a connected DC source exceeds approximately 10 volts. The DC LED will light red when the DC input is between approximately 9 and 10 volts, indicating a low-voltage condition. If the DC input is less than approximately 9 volts the DC LED will not light and the Model 5482 will no longer operate from the DC source.

Two LEDs are associated with each of the Model 5482's two Dante interfaces. The system LED, labeled SYS, and the synchronization LED, labeled SYNC, will both light red as the associated Dante interface starts to function and awaits connection to the associated LAN or LANs. The system LED will light red to indicate that the interface is not ready to pass data to other devices. It will blink red if there is an issue communicating with the internal Dante Brooklyn module. (This should never occur unless there is a Model 5482 hardware problem.) It will light green when it is operating normally and is ready to pass data.

The synchronization LED will light red to indicate that the Model 5482's Dante interface has not established timing synchronization. It will light solid green when it has synchronized with a Dante network and an external clock source (timing reference) is being received. The synchronization LED will slowly flash green if this specific Model 5482 interface is part of a Dante network and is serving as the Leader Clock. (In this case, it's likely that other Dante devices are following this Model 5482 which is acting as their timing reference.) It's possible that up to 30 or 40 seconds may be required for a synchronization LED to reach its final state.

Two LEDs are associated with the each of the Model 5482's two Dante interface's primary and secondary Ethernet connections. Both sets are labeled PRI and SEC. How they respond will depend on the unit's network configuration as made in the Dante Controller application.

When a Dante interface has been configured for *Switched* operation, its primary LED will light red when no Ethernet connection is present. It will light green when a Gigabit Ethernet (GigE) connection is present. It will light orange when a 100 Mb/s Ethernet connection is present. The secondary LED will not light when an Ethernet connection is not present. It will light green when a GigE or a 100 Mb/s Ethernet connection is present.

When a Model 5482's Dante interface has been configured for *Redundant* operation their associated primary and secondary LEDs will light red when Ethernet connections are not present on their respective RJ45 jacks. Each will light green when a Gigabit Ethernet (GigE) connection has been made and orange when a 100 Mb/s Ethernet connection has been made.

An LED is associated with each of the Model 5482's two management Ethernet connections. These LEDs, both labeled MGMT, will not light if an Ethernet connection has not been made. They will light green if a GigE or a 100 Mb/s Ethernet connection has been made to their associated RJ45 jack.

RJ45 LED Indicators

On the Model 5482's back panel there are six RJ45 jacks that are provided for interfacing with the unit's two Dante interfaces and associated management ports. (The management ports are for factory use only.) All six ports support Gigabit Ethernet (GigE). Two of the RJ45 jacks are labeled Dante PRI, two are labeled Dante SEC, and two are labeled MGMT (FACTORY USE). Associated with each jack are two LEDs. One LED is labeled LINK and lights orange when a GigE connection has been established with that specific jack The LINK LED will not light if a 100 Mb/s Ethernet connection has been made. It will also not light if an Ethernet connection has not been made. The second LED, labeled ACT, will flash green to indicate data activity, responding to Ethernet traffic traveling to and from that specific jack.

Front-Panel Display Page Descriptions

The following sections provide information about the Model 5482's front-panel menu pages. Refer to Appendix A for the menu structure diagram.

Row One

Row one has a total of eight menu pages which relate to the Model 5482's Network A resources.

Dante Name: The Dante device name for the interface associated with Network A is shown on this menu page. This name is unique to each device in a Dante deployment and is used as part of the channel routing (Dante subscription) process. The Dante name can be changed using a feature provided in the Dante Controller application.

Dante Primary IP Configuration: This menu page allows the display and revision of the method that the Model 5482's Dante interface for Network A uses to obtain its Dante primary IP address and related parameters. The choices are *Automatic* and *Manual*. This setting has no impact on how the Model 5482 obtains IP addresses for the Dante secondary interface and management interface webpages.

An arrow icon will be shown in the upper-right corner of this menu page. This indicates that the setting can be changed. If the active configuration method is not the desired one, press the Enter pushbutton switch located on the front panel. Use the left and right arrow buttons to select the desired method. Then again press the Enter button. The entry will then be stored. To cause Network A to use the new setting requires that the circuit card associated with Network A be rebooted (restarted). This can be performed by using another front-panel menu page or by power cycling the unit. (Power cycling means to restart the unit by first removing and then re-applying mains or DC power.)

Selecting *Automatic* will cause Network A's primary Dante interface to use DHCP or, if DHCP is not available, the IPv4 link-local protocol to establish the Dante primary IP address. (An IP address that has the format of 169.254.x.x was assigned using the IPv4 link-local protocol.) Even if the IP address was established using link-local the DHCP protocol will remain active. In this case, Network A's Dante primary interface will continue to check for the presence of a DHCP server. If one becomes available then an IP address will be requested and, when obtained, will automatically replace the primary IP address that was previously established by way of link-local.

The *Manual* setting allows Network A's Dante primary IP address and related parameters to be manually entered. This can be useful when a fixed or static addressing scheme has been established. In this way, a designated IP address can be entered, along with the other necessary network parameters.

To cause Network A to use a revised Dante primary IP address configuration method requires that the

unit's Network A Dante interface be rebooted (restarted). This can be performed using either the reboot Dante front-panel menu page or by power cycling (restarting) the Model 5482.

Dante Primary IP Address: This menu page shows the IP address associated with Network A's Dante primary interface. (This address has nothing to do with the IP addresses utilized by Network A's Dante secondary and management interface ports.) When the IP address configuration has been selected for *Automatic* this field cannot be changed and a lock icon will show in the upper-right corner of the display. It can be revised only when the *Manual* mode has been selected for the Network A's Dante primary IP configuration method.

If no Ethernet connection has been made to Network A's primary Ethernet port the text **No Ethernet Link** will be shown. If the network configuration for Network A is selected in the Dante Controller application for *Switched* then the Dante primary IP address will be associated with a network connection that has been made to either the Network A Dante primary or Dante secondary RJ45 jack on the unit's back panel. If the network configuration for Network A is selected for *Redundant* then Network A's Dante primary IP address will be associated with the Network A RJ45 jack labeled Dante PRI on the Model 5482's back panel.

Whenever the Network A's IP address configuration method is selected for *Manual* mode then the Dante primary IP address for Network A can be modified as desired. This will be indicated by an arrow icon that will show in the upper-right corner of the display. To start the process of changing Network A's Dante primary IP address press the Enter pushbutton switch on the front panel. (An icon with a wrench and screwdriver will be shown to indicate that an edit is in process.) Use the left and right arrow pushbutton switches to select which specific digit of the IP address number is to be modified. Press the up and down arrow pushbuttons to select the desired number. The standard dot-decimal notation is used to display and revise this IP address. Once the desired changes have been made press the Enter button to save the changes.

To cause Network A to use the new Dante primary IP address setting requires that the unit's Network A Dante interface be rebooted (restarted). This can be performed using the reboot Dante front-panel menu page. A power cycle will also cause a new Network A Dante primary IP address to be utilized.

Dante Primary Subnet: This menu page shows the stored subnet mask value associated with Network A's Dante primary interface. This value has nothing to do with the subnet mask values utilized by Network A's Dante secondary or management ports. When the primary IP address configuration has been selected for *Automatic* this field cannot be changed and a lock icon will show in the upper-right corner of the display. This value will be utilized only when the Manual mode has been selected for Network A's Dante primary IP address configuration.

Whenever Network A's IP address configuration is selected for the *Manual* mode the subnet mask value can be modified as desired. (This ability will be indicated by an arrow icon that will show in the upper-right corner of the display.) To start the process of changing the subnet mask value press the Enter pushbutton switch on the front panel. An icon with a wrench and screwdriver will be shown to indicate that an edit is in process. Use the up and down arrow pushbutton switches to select the desired subnet mask value. Once the desired value has been selected press the Enter button to store it.

To instruct Network A to use the new Dante primary subnet mask value requires that Network A's Dante interface be rebooted (restarted). This can be performed using the Network A reboot Dante front-panel menu page. Alternately, rebooting the Model 5482 by means of power cycle can also be utilized to cause a new Network A Dante primary subnet mask value to be used.

Main Firmware Version: This menu page shows the version number of the firmware (embedded software) being used by the general logic circuitry associated with Network A. This firmware is used by a microcontroller (MCU) integrated circuit and can be updated using a USB flash drive. Details regarding the firmware update process are provided in the Technical Notes section.

FPGA Firmware Version: This menu page shows the version number of the firmware (embedded software) used in the programmable logic (field-programmable-gate-array or FPGA) integrated circuit that is used in the circuitry associated with Network A. This firmware can be updated using a USB flash drive. Details regarding updating this firmware are provided in the Technical Notes section.

Dante Product Version: This menu page shows the product version number associated with Network A's Dante interface. (The actual Dante interface is primarily implemented using a Brooklyn module supplied by Audinate.) The Dante product version number is assigned by Studio Technologies as an identifier when a Dante firmware file is released. (This firmware combines specific Model 5482 Network A configuration information with the Audinate-developed Dante operating firmware for the Brooklyn module.) The Dante firmware can be updated by way of an Ethernet connection using the Dante Updater software application that's provided as part of the Dante Controller software application.

Reboot Dante Card: This menu page allows the circuitry associated with Network A to be rebooted (restarted). This can be useful to force Network A to utilize configuration changes made to the primary Dante interface. Rebooting (restarting) using a power cycle will also cause the unit's Network A Dante interface to reboot. An arrow icon shows in the upper-right corner of this menu. To start the process of rebooting Network A, press the Enter pushbutton on the unit's front panel. This will lead to a confirmation page being shown. Use the left and right arrow pushbutton switches to select (highlight) the desired action. The choices are to cancel or to confirm. Press the Enter pushbutton switch to act upon the highlighted action. Network A's circuitry will then immediately commence the selected action. After performing the reboot (restart) function, 20 to 60 seconds may be required for Model 5482's operation to fully restore. During this time period, the Ethernet connections may briefly disconnect and then reconnect.

Row Two

The eight menu pages in row two perform the same functions as row one except that they apply to Network B.

Row Three

Row three contains five menu pages. Three are applicable to the user and two are provided for factory use only.

Sample Rates: This menu page shows the sample rates that have been selected for the two Dante networks, A and B. The sample rate can be 44.1, 48, 88.2, or 96 kHz. It can be selected using the Dante Controller software application.

Product Name & Serial Number: This menu page shows the name of the product (Model 5482) and the hardware serial number. The name and serial number are assigned at the factory and cannot be changed.

Reboot Dante: This menu page allows the both Dante interfaces, A and B, to be rebooted (restarted). This can be useful to force the Model 5482's two Dante interfaces to utilize revised Dante primary IP address and related parameters. It can also be useful when troubleshooting Dante network issues. An arrow icon will show in the upper-right corner of the reboot Dante menu. To start the process of rebooting (restarting) the Dante interfaces press the Enter pushbutton on the unit's front panel. This will lead to a confirmation page being shown. Use the left and right arrow pushbutton switches to select (highlight) the desired action. The choices are to cancel or to confirm. Press the Enter pushbutton switch to select the highlighted action. Note that if the Dante interfaces are rebooted it may take 20 to 60 seconds for the Model 5482's operation to fully restore.

Network A – Management IP Address and MAC: This menu page is provided for factory use, allowing access to another page that will show the IP address and MAC (media access controller) number associated with Network A's management port. The MAC address is assigned by the factory to the management interface associated with network A.

Network B – Management IP Address and MAC: This menu page is provided for factory use, allowing access to another page that will show the IP address and MAC (media access control) number associated with Network B's management port. The MAC address is assigned by the factory to the management interface associated with network B.

Screen Saver

A “screen saver” mode will automatically activate two minutes after the last press of any of the five front-panel pushbutton switches. When active, the screen saver mode will cause a continuous sequence of two menu pages to show. The display sequence is continuous with each menu page being present for two seconds before the other menu page will be shown.

When the screen saver mode is active, pressing any of the five pushbutton switches on the front panel will cause it to stop and immediately show item one of row one, the Dante name for Network A. To cause the screen saver mode to immediately start simultaneously press the left and right arrow pushbutton switches on the front panel.

The two menu pages in the Model 5482’s screen saver mode are:

1. The Studio Technologies’ company logo graphic.
2. The sample rates for Dante Network A and Dante Network B.

Details regarding the information provided in the sample rate screen saver menu page was documented in a previous section of this guide.

Technical Notes

Dante IP Addresses

Before reviewing this topic, it’s important to highlight the fact that the Dante Controller application and its associated personal computer will only communicate with Dante devices that are on the same subnet of the same local area network (LAN). As the Model 5482 has two independent Dante interfaces, named Network A and Network B, typically this personal computer will only communicate with one Model 5482 Dante interface at any given time. To communicate with the other Model 5482 Dante interfaces will normally require that the personal computer’s network connection be reconnected to the LAN that is supporting the other Dante interface.

A Model 5482 Dante interface that has been configured in Dante Controller for Switched operation will have its associated primary (PRI) Ethernet interface attempt to automatically obtain its IP address and associated settings using DHCP (Dynamic Host Configuration Protocol). If a DHCP server is not detected then an IP address will automatically be assigned using the link-local protocol. This protocol is known in the Microsoft® world as Automatic Private IP Addressing (APIPA). It is also sometimes referred to as auto-IP (PIPPA). Link-local will randomly assign a unique IP address in the IPv4 format of 169.254.x.x. In this way, multiple Dante-enabled devices on the same LAN will connect together and automatically function, whether or not a DHCP server is active on this LAN. Even two Dante-enabled devices that are directly interconnected using an RJ45 patch cord should, by way of link-local, correctly acquire IP addresses and be able to communicate with each other. As previously discussed, automatically acquiring Ethernet interface parameters is not required. Using Dante Controller, each of the Model 5482’s two Dante interfaces can independently have their Ethernet IP address and related network parameters set for manual (fixed or static) operation.

A Model 5482 Dante interface that has been configured in Dante Controller for Redundant operation will have its associated primary (PRI) and secondary (SEC) Ethernet interfaces attempt to automatically obtain IP addresses and associated network settings using DHCP. If DHCP is not available then link-local IP addresses will be assigned. Link-local will assign an IP address in the format of 169.254.x.x for Dante primary (PRI) and 172.31.x.x for Dante secondary (SEC). If automatic assignment of Ethernet interface parameters is not desired then each Ethernet interface can be individually configured using Dante Controller to have a manual (fixed or static) IP address and related network parameters.

The specific IP address (or addresses) assigned to each of the Model 5482’s Dante interfaces can be identified using several methods. The Dante Controller application will directly display the network parameters of the primary (PRI) and, if utilized, secondary (SEC) Ethernet interfaces. Another means is to utilize the Model 5482’s front-panel menu pages to directly display the IP addresses assigned to the Dante primary (PRI) and, if utilized, Dante secondary (SEC) Ethernet ports for each Dante interface.

Optimizing Dante Network Performance

For best Dante audio-over-Ethernet performance, connecting the Model 5482's two Dante interfaces to Ethernet switches and associated LANs that support QoS (Quality-of-Service) capability is recommended. This capability can be implemented on virtually all contemporary managed Ethernet switches. There are even specialized switches that are optimized for entertainment-associated applications. Refer to the Audinate website (audinate.com) for details on how to optimize networks for Dante applications.

Management IP Addresses

A management Ethernet interface is associated with each of the Model 5482's Dante interfaces. Using RJ45 jacks, these two interfaces are provided only for factory use. By default, their network parameters are set to be obtained automatically. In this way, they will attempt to automatically obtain an IP address and associated settings using DHCP. If a DHCP server is not detected an IP address will automatically be assigned using the link-local protocol in the IPv4 range of 169.254.x.x.

Firmware Update Procedure

The Model 5482 has two independent Dante interfaces, labeled Network A and Network B. Each uses an identical circuit board that is loaded with firmware (embedded software) to control its operation. Three firmware files are utilized by each circuit board. One firmware file, called the main firmware, is used by the board's processor integrated circuit. The second firmware file, called the FPGA firmware, is used by the board's field programmable gate array (FPGA) inte-grated circuit. The third file, called the Dante firmware, is utilized by each circuit board's Dante interface. The set of three firmware files used in each circuit board should be identical (the same version number) and can be field updated.

The main and FPGA firmware for the two Dante interfaces is updated using a USB flash drive. The first interface, labeled Network A, is updated by way of a USB type A receptacle that is labeled Firmware Update A. The same USB flash drive is used to update the second interface, labeled Network B, by way of the USB type A receptacle labeled Firmware Update B. The Dante firmware must be independently updated, typically using the Dante Updater program that is part of the Dante Controller application. The Dante Updater program functions by way of the Ethernet port associated with each Dante interface, rather than using a USB flash drive. The Dante Updater application, or the alternate update method, must be run separately for the two Dante interfaces, Network A and Network B.

It's possible that updated versions of the firmware (embedded software) files that are utilized by the Model 5482's two Dante interface circuit boards will be released to add features or correct issues. Refer to the Studio Technologies' website for the latest firmware files. Details on the actual update process will be covered in the following paragraphs.

Each of the Model 5482's Dante interface circuit boards have the ability to load revised files into their non-volatile memory by way of a standard USB flash drive. Each interface circuit board implements a USB host function and provides access to update its firmware by way of a USB type A receptacle. As such, two type A receptacles are located on the unit's back panel. Each Model 5482 Dante interface circuit board updates its firmware using identical files which are named **M5482.bin** for the main firmware and **SFB.bit** for the FPGA firmware.

The update process begins by preparing a USB flash drive. The flash drive doesn't have to be empty (blank) but must be in the personal-computer-standard FAT32 format. Either or both of the firmware files can be automatically loaded at the same time. On the flash drive's root folder, save the desired new firmware file(s), ensuring that the required name or names are specified. For the main firmware the file name must be **M5482.bin**. For the FPGA firmware the file name must be **SFB.bit**.

Studio Technologies will supply each firmware file inside a .zip archive file. While the firmware file inside of the zip file will adhere to the naming convention required by the Model 5482, the name of the zip file itself will include the file's version number. For example, a file named **M5482v2r00MCU.zip** would indicate that version 2.00 of the main firmware (**M5482.bin**) is contained within this zip file.

Once the USB flash drive has been prepared it can be used to update the Model 5482's two Dante interfaces. To update Network A, insert the flash drive into the USB receptacle that is labeled Firmware Update A. To begin the loading process the Model 5482 must be powered off and again powered on. At this point, the file(s) will automatically load. Once the first interface has been updated, power off the unit and move the USB flash drive to the USB receptacle labeled Firmware Update B. Apply power to the unit and the file(s) will automatically load into the circuitry associated with Network B. The USB flash drive can then be removed. The precise steps required will be highlighted in the next paragraphs.

To install either or both of the firmware files in both Dante interface circuit boards follow these steps:

1. Remove power from the Model 5482. This will entail either removing the AC mains power connector or removing the external source of 12 volts DC. (Both must be disconnected if dual powering has been implemented.)
2. Locate the USB receptacles on the Model 5482's back panel. They are labeled Firmware Update A and Firmware Update B. Directly adjacent to each USB receptacle is a small hole that provides visual access to a green LED indicator.
3. Insert the prepared USB flash drive into the USB receptacle that is labeled Firmware Update A.
4. Apply power to the Model 5482. Power can be provided by connecting AC mains or a source of 12 volts DC.
5. After a few seconds, the Dante interface circuit board for Interface A will run a "boot loader" program that will automatically load and save the new firmware file(s) that are present on the USB flash drive. The time required for the update process can range from approximately 15 seconds to approximately 45 seconds, depending on which of the two files are going to be updated. While the files are being loaded, the green LED, located adjacent to the USB receptacle for interface A, will flash slowly. Once the entire loading process has completed the Dante interface circuit board for interface A will restart using the newly saved main and/or FPGA firmware.
6. At this time, the circuit board associated with Network A is functioning with the newly loaded firmware and the USB flash drive can be removed. But to be conservative, remove the power source first and then remove the USB flash drive.
7. Insert the prepared USB flash drive into the USB receptacle that is labeled Firmware Update B.
8. Apply power to the Model 5482. Power can be provided by connecting AC mains or a source of 12 volts DC.
9. After a few seconds, the Dante interface circuit board for Interface B will run a "boot loader" program that will automatically load and save the new firmware file(s) that are present on the USB flash drive. As before, the time needed for the update process can range from approximately 15 seconds to approximately 45 seconds, depending on which of the two files are going to be updated. While the files are being loaded the green LED, located adjacent to the USB receptacle for interface B, will flash slowly. Once the entire loading process has completed the Dante interface card for interface B will restart using the newly saved main and/or FPGA firmware.
10. At this point, it's a good idea to confirm that the desired main and FPGA firmware versions have been loaded into the interface circuits cards associated with Network A and Network B. This will help to ensure that the Model 5482 is operating as expected. To observe the Model 5482's main firmware version numbers, simply view the unit's front-panel display as the unit powers up. The version number of the main firmware for the Model 5482's two interface boards will show as part of the unit's start-up sequence. To observe the version numbers of the Model 5482's FPGA firmware requires accessing the Model 5482's front-panel display pages. (These display pages will also show the version number of the main firmware.) Dante Controller is used to observe the firmware version used in each of the Model 5482's Dante interface.

Note that upon power being applied to the Model 5482 if a connected USB flash drive doesn't have a correct file in its root folder no harm will occur. Upon power up the green LED, located adjacent to each

USB receptacle, will flash on and off rapidly for a few seconds to indicate that a valid file has not been found. After this warning, operation using the unit's existing firmware will begin.

Dante Firmware Update

As previously discussed, the Model 5482 implements Dante connectivity using Brooklyn modules from Audinate. Each interface has a separate interface circuit board which each contains a Brooklyn module. The firmware (embedded software) residing in each Brooklyn module can be updated by way of an Ethernet connection. The Model 5482's front-panel display can be used to view the version number of the firmware that resides in the two Brooklyn modules. The Dante Controller software application can also be used to determine the versions of the Dante firmware. The Dante Updater software application, supplied with Dante Controller, includes an automated method of updating the Brooklyn module's firmware. The Dante Controller application is available, free of charge, on the Audinate website (audinate.com).

The latest Model 5482 Dante firmware file, with an extension of .dnt, is available on the Studio Technologies' website as well as being part of Audinate's product library database. The latter allows the Dante Updater software application that is included with Dante Controller to automatically update the Model 5482's Dante interface. It's important to remember that each of the Model 5482's two Dante interfaces has to be independently updated. This is a simple process but one that has to be performed twice!

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

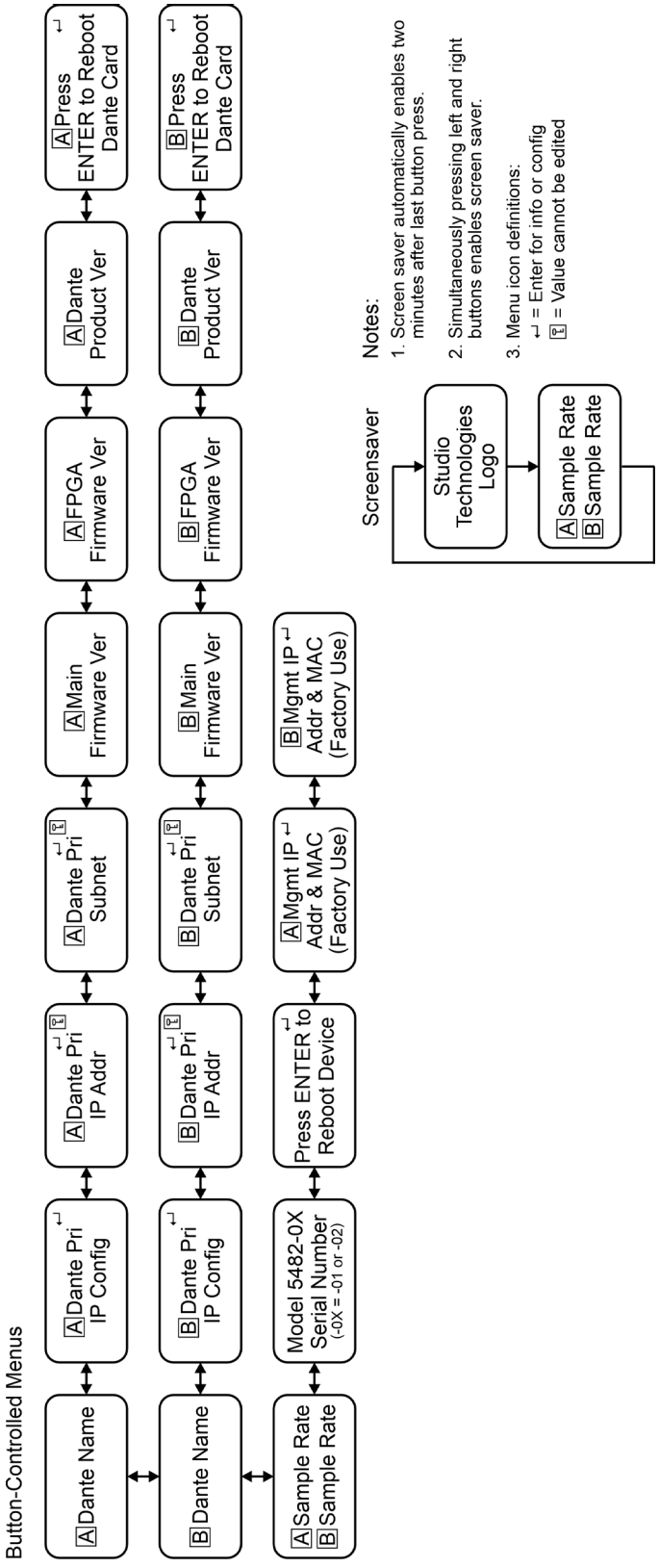
Altitude: not characterized

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 and information contained in this User Guide subject to change without notice.

Appendix A–Front-Panel Menu Structure