

Model 5682

ST 2110 to Dante Bridge

User Guide

Issue Preliminary 1, November 2024

This User Guide is applicable for serial numbers
M5682-01-00151 and later with Main Firmware 1.01 and later
M5682-02-00151 and later with Main Firmware 1.01 and later

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Revision History

Issue Preliminary 1, November 2024:

- Initial Preliminary release.

Introduction

The Model 5682 ST 2110 to Dante Bridge provides a high-performance means of interconnecting (“bridging”) SMPTE® ST 2110 audio channels with Dante® audio-over-Ethernet channels. Both the ST 2110 and the Dante interfaces are typically associated with independent local area networks (LANs). The Model 5682 supports this scenario, as well as a single network that carries both ST 2110 and Dante audio signals. The unit is compatible with the SMPTE ST 2110-30 standard for PCM audio signals and the ST 2110-10 standard for signal timing. On the Dante side, the Model 5682 is compatible with the Dante Domain Manager™ (DDM) software application and is compliant with the AES67 interoperability standard. The Model 5682 is available in two versions: the Model 5682-01 allows up to 32 audio channels to pass in each direction, while the Model 5682-02 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.

The suite of ST 2110 standards is finding wide-ranging use in broadcast applications. While also handling video and control signals, the Model 5682 is focused on ST 2110-compliant audio channels and their associated timing parameters. Dante audio-over-Ethernet has found acceptance in broadcast, audio/visual, and general audio applications due to its ease of use, excellent performance, strong interoperability, and wide adoption by many equipment manufacturers. However, interconnecting or bridging ST 2110 audio channels with Dante audio channels can present a challenge. Using the Model 5682 makes this a simple task, only requiring interconnecting standard Ethernet signals and performing a moderate amount of configuration.

The Model 5682’s ST 2110 and Dante interfaces each incorporate three Gigabit Ethernet (GigE) connections. Two GigE ports on each interface are designated for use by the associated ST 2110 or Dante network while the third is reserved for configuration use. The ST 2110 will support redundant streams, following the SMPTE 2022-7 standard. On the unit’s Dante interface, a setting performed within the Dante Controller application selects whether the Dante interface will operate in a Switched or Redundant mode. Each Model 5682 audio channel is associated on a one-to-one basis with a channel on each interface. For example, input 1 on the ST 2110 interface is associated with transmitter (output) 1 on the Dante interface. The Model 5682 does not perform any routing or crosspoint functions.

Front-panel LED indicators, an LCD display, and five pushbutton switches are provided to view and revise selected operating parameters. NMOS, ANEMAN, and JSON configuration support for the unit’s ST 2110 interface is provided. The Dante Controller software application, available free of charge from Audinate, is used to configure the unit’s Dante network and audio parameters.

The Model 5682 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.

Applications

The Model 5682’s primary application is to interconnect audio channels associated with two independent networks, one that supports ST 2110 and the other Dante. The source and destination of these audio channels would typically be other equipment such as



Figure 1. Model 5682 ST 2110 to Dante Bridge front view

mixing consoles, broadcast or production crosspoint switchers, matrix intercom systems, or digital audio processing units. The Model 5682 can also perform effectively on the same local area network (LAN), interconnecting independent ST 2110 and Dante audio channels. Each implementation, ST 2110 or Dante, can have its own Leader Clock (sync reference), bit depth, and sample rate. Sample-rate conversion (SRC) logic within the Model 5682 ensures that the audio signals can pass between the two implementations with minimal degradation in performance. The Model 5682's ST 2110 and Dante network interfaces 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 5682 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. As the number of facilities that utilize both ST 2110 and Dante-compliant equipment increases so does the need to interconnect them. Maintaining isolation between these two network implementations can be important for reasons of both signal integrity and security.

ST 2110 Networking

The Model 5682's ST 2110 interface supports conformance levels A, B, C, AX, BX, and CX in single and redundant streams. The latter follows the SMPTE ST 2022-7 standard and allows connection of one or two networks as desired. The Model 5682 provides a separate Ethernet interface that serves as a control port, allowing configuration of the ST 2110 interface

by way of web pages. NMOS support that follows the IS-04 and IS-05 standards is provided. The Merging Technologies ANEMAN Audio Network Manager application can also be utilized as can JSON. The ST 2110 audio sample rate is selected for 48 kHz with a bit depth of up to 24.

Dante Networking

The Model 5682's Dante interface can be configured for either Switched or Redundant network operation. In the Switched mode, only a single Gigabit Ethernet (GigE) connection is required. The unit's second Gigabit Ethernet port can function either as an active "loop-thru" resource or left unused. When the Model 5682 is placed in the Redundant mode, two Gigabit 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 Dante networked audio signals. Sample rates of 44.1, 48, 88.2, and 96 kHz are supported, although selecting the latter two will reduce the number of interface channels.

Dante AES67 and Domain Manager Support

The Model 5682's Dante interface can be configured to support AES67 digital audio signals. This feature, provided by Dante, would be a subset of the full AES67 range of operations. When this AES67 support is enabled, the Dante interface's sample rate will be fixed at 48 kHz and only multicast operation will be active. The Model 5682's Dante interface is also compliant with the Dante Domain Manager (DDM) software application.



Figure 2. Model 5682-01 ST 2110 to Dante Bridge back view



Figure 3. Model 5682-02 ST 2110 to Dante Bridge back view

Pro Audio Quality

The Model 5682'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 ST 2110 and Dante 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 ST 2110 and Dante audio channels, even if they have widely divergent sample rates and independent reference clock sources.

Status LEDs and LCD Display

On the Model 5682'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. Two sets of five LEDs each are associated with the ST 2110 and Dante network interfaces. The graphics display allows the monitoring of a number of operating conditions, including interface names, network configurations, and product firmware versions. The five pushbutton switches can be used to select which information is displayed as well as allowing key network parameters to be revised. These include the ST 2110 and Dante interface IP configuration methods, IP addresses, and subnet mask values.

LEDs on the Model 5682's back panel indicate the status of the ST 2110 network interfaces, the Dante network interfaces, the ST 2110 control interface, and the management interface. There are two LED indicators for each of the six Gigabit Ethernet connections that reflect the link and network activity status. Two additional LEDs reflect the status of the USB host interfaces which are used to update the Model 5682's firmware.

Installation and Operating Power

The Model 5682 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 10–16 volts DC source that is connected via a

broadcast-standard 4-pin XLR connector. If both AC and DC power sources are connected, the Model 5682 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. All six of the Model 5682's Gigabit Ethernet ports support twisted-pair signals, each with Auto MDI/MDI-X capability so reversing cables are never required.

Firmware Updating

The Model 5682 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. A Merging Technologies ZMAN module is used to implement the Model 5682's ST 2110 functionality. The module's firmware can be updated using a web browser connected to the Ethernet interface dedicated to ST 2110 control use. To implement its Dante interface the Model 5682 uses an Audinate Brooklyn module. To help ensure that the unit's Dante capabilities remain up to date, the firmware in this module can be updated via one of the unit's Dante Ethernet connections.

Installation

In this section, the Model 5682 ST 2110 to Dante Bridge will be mounted in one space (1U) of an equipment rack. Two or three Gigabit Ethernet data connections will be made to the unit's ST 2110 interface using standard RJ45 patch cables. One or two Gigabit Ethernet data connections will be made to the unit's Dante interface using standard RJ45 patch cables. AC mains power can be connected to the Model 5682 by means of a detachable mains 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 5682 or it can serve as a backup power source should AC mains power be connected.

What's Included

The shipping carton contains one each of either a Model 5682-01 or Model 5682-02 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 5682

The Model 5682 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 5682 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 5682 and the Ethernet switches in the associated local area networks (LANs)

ST 2110 Interface Ethernet Connections

The Model 5682's ST 2110 interface provides three Gigabit Ethernet (GigE) ports for flexibility and compatibility with several ST 2110 implementations. Two of the ports are provided for interconnection with one or two local area networks (LANs) associated with a ST 2110 networking scheme. These Ethernet ports are accessible using RJ45 jacks and are labeled PRI for primary and SEC for secondary. Using the ST 2110 control (user) interface, these ports can be configured for single or redundant stream operation. The third Ethernet port, labeled CTRL (control), is associated with the ST 2110's control and configuration interface. This web-page-based interface is utilized for configuring ST 2110 operation. Connections to the Ethernet ports are made by way of standard RJ45 jacks that are located on the back of the Model 5682. The three Ethernet ports support auto MDI/MDI-X ensuring that crossover cables are never required.

For ST 2110 operation, specifically transporting audio and timing signals, at least one 1000BASE-T Gigabit Ethernet (GigE) connection is required. It should be connected to the RJ45 jack labeled PRI (primary). If redundant stream operation is going to be utilized

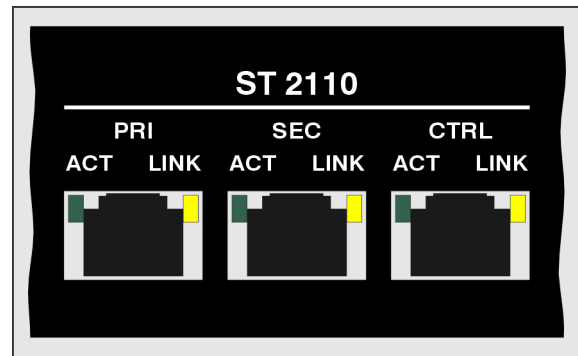


Figure 4. Detail of Model 5682 back panel showing the Ethernet port's RJ45 jacks for ST 2110 interface

a second 1000BASE-T GigE connection should be made to the RJ45 jack labeled SEC (secondary). These two Ethernet connections could be provided by independent local-area-networks (LANs) or by way of separate VLANs created on one physical network. A connection is not required to be made to the SEC (secondary) jack if redundant stream operation is not required.

To configured the Model 5682's ST 2110 interface requires access to the control port. To achieve this an Ethernet signal must be connected to the RJ45 jack labeled CTRL (control)L. This Ethernet signal can connect to the same local-area-network (LAN) as is being used for the ST 2110 audio and timing signals. Or it can be connected to a separate local-area-network (LAN) that is designated for configuration use. It could also be connected directly to a personal computer that is intended for configuration use. Note that while technically 10BASE-T (10 Mb/s) or 100BASE-TX (100 Mb/s) Ethernet signals can be used with the ST 2110's control port, neither would be optimal. Once the ST 2110 interface has been configured, an Ethernet signal does not have to be made to the RJ45 jack labeled CTRL. Settings are stored in non-volatile memory within the Model 5682's ST 2110 interface hardware.

It's important to note that there is no problem with the Model 5682's ST 2110 interface being configured for redundant stream operation while the Dante interface is not configured for redundant operation. Correct ST 2110 to Dante bridge functionality will still occur no matter what configuration is selected for the ST 2110 and the Dante interfaces.

Dante Interface Ethernet Connections

The Model 5682's Dante interface provides two Gigabit Ethernet (GigE) ports for flexibility and compatibility with several Dante implementations. These ports are provided for interconnection with one or two local area networks (LANs) associated with a Dante audio-over-Ethernet networking scheme. The Ethernet ports are labeled PRI for primary and SEC for secondary. Using the Dante Controller application, these ports can be configured for Switched or Redundant Dante operation. A third Ethernet port associated with the Dante interface is dedicated for management use and will not typically be utilized. (Factory personnel will use this port to access the Model 5682's Dante management resource.)

Connections to the PRI and SEC Dante Ethernet ports are made by way of standard RJ45 jacks that are located on the back of the Model 5682's enclosure. The Ethernet ports support auto MDI/MDI-X ensuring that crossover cables are never required. Note that while technically 100BASE-TX (100 Mb/s) Ethernet signals can be used with the Dante interface's Ethernet connections, it is not optimal. Additionally, it's important to note that 10BASE-T (10 Mb/s) Ethernet connections are not sufficient.

For Model 5682 operation, at least one 1000BASE-T Gigabit Ethernet (GigE) connection is required for the Dante interface. A network cable should be connected to the Dante interface's RJ45 jack that is labeled PRI. A second 1000BASE-T GigE connection can be made to the Dante interface's secondary (SEC) RJ45 jack if Redundant Dante operation is desired. (For this functionality to be active the Model 5682's network configuration for the Dante interface must be set for Redundant within the Dante Controller software application.)

It's important to note that there is no problem with the Model 5682's Dante interface be configured for redundant operation while the ST 2110 interface is not configured for redundant streams. Correct bridge functionality will still occur no matter which way the Dante and ST 2110 interfaces are configured.

When the Model 5682 Dante interface is configured in Dante Controller for the Switched network mode the associated secondary (SEC) Dante Ethernet port

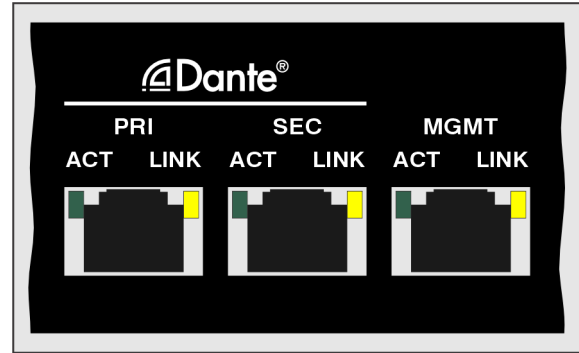


Figure 5. Detail of Model 5682 back panel showing the Ethernet port's RJ45 jacks for Network A

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 a Dante Ethernet port connects directly to a separate port on an Ethernet switch.

Dante Management Port Connection

The Model 5682's Dante interface includes a management Ethernet port that can be accessed by way of an RJ45 jack. But please don't connect to it! It's labeled MGMT and is provided only for factory use. A plastic filler plug may be present in this RJ45 jack to indicate that it is not normally utilized. If a filler plug is present, do not remove the plug as hopefully it will indicate to other technical personnel that an Ethernet connection is not necessary.

The Dante interface's management Ethernet port is utilized by the factory at the time of Model 5682 manufacture, providing access to an internal web server and associated set of configuration web pages. There are no user-designated configuration parameters available using this port.

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 port obtains its IP address 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 5682 requires a source of AC mains nominal 12 volts DC power 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 5682 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 standard (NEMA 5-15L) 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 5682 does not contain a power on/off switch it will begin operation as soon as AC mains power is connected.

Safety Warning: The Model 5682 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 5682 can also operate from a source of 10 to 16 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 and 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 5682 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 5682 while the DC source will serve as a “hot standby.” Only if the AC mains source fails will the unit draw power from the DC source. This will occur automatically with no interruption in Model 5682 operation. In the “standby” mode (when an AC mains source is connected), the Model 5682 will draw less than 120 microamperes (uA) from a connected 12 volts DC source.

ST 2110 Configuration

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Dante Configuration

For audio to correctly pass to and from the Model 5682 requires, at a minimum, that several Dante-related parameters be configured. These configuration settings are stored in non-volatile memory within the Model 5682’s Dante interface. Configuration will typically be done with the Dante Controller software application, available for download free of charge from Audinate (getdante.com). Versions of Dante Controller are available to support several operating systems.

The Model 5682’s Dante interface is compatible with the Dante Domain Manager (DDM) software application. Refer to the DDM documentation, also available from Audinate, for details on which Model 5682 and related parameters may have to be configured.

Unit and Channel Names

The Model 5682’s Dante interface has a default device name of ST-M5682- along with a unique suffix. The suffix identifies the specific Model 5682 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 5682-01's Dante interface will have 32 Dante transmitter (output) channels with default names of Ch01 through Ch32. It will have 32 Dante receiver (input) channels with default names of Ch01 through Ch32. When the Model 5682-01's sample rate has been selected for 44.1 or 48 kHz, the 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, the Model 5682-02's Dante interface will have 64 Dante transmitter (output) channels with default names of Ch01 through Ch64. The Model 5682-02's Dante interface will have 64 Dante receiver (input) channels with default names of Ch01 through Ch64. When the Model 5682-02's sample rate has been selected for 44.1 or 48 kHz, the 64 transmitter (output) channels 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 X for a summary of the default channel numbers, names, and descriptions.

Sample Rate, Encoding, and Device Latency

The sample rate, encoding, and device latency of the Model 5682's Dante interface can be configured. The 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. Device latency parameters can be adjusted if required but the default values in Dante Controller will typically be correct.

Clocking

Technically, the Model 5682's Dante interface can serve as Leader clock for the associated Dante network. However, in most cases the unit will be

configured such that it will receive its Dante timing reference ("sync") from another Dante device on its associated local-area-network (LAN). This device could be an audio console, an input/output interface, or a dedicated device 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 the Model 5682's Dante interface would typically not be enabled.

Network Configuration – Dante

A Model 5682's Dante interface allows 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 the Dante 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.

If Switched is selected for the Dante interface then it can establish one connection with an Ethernet network. Technically it doesn't matter which RJ45 jack, PRI (primary) or SEC (secondary), is utilized, although for clarity it's recommended that the PRI be used. If necessary, the SEC RJ45 jack can be used to interconnect with another piece of networked equipment.

If the Dante interface is configured for Switched ensure that only one of the two Dante RJ45, 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 the Dante interface, then redundant networking capability will be enabled. In this case, separate network connections should be made to the Dante interface's PRI (primary) and SEC (secondary) RJ45 jacks.

Network Configuration – IP Addresses

When the Model 5682's 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 one of the network's RJ45 jack. If the network configuration has been selected for Redundant then separate IP addresses and related network parameters will be assigned to the PRI (primary) and SEC (secondary) Dante Ethernet ports.

In many cases, the Model 5682's Dante interface 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 the Model 5682'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 the 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 the Model 5682's Dante interface 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.

Audio Routing

When a Model 5682-01's Dante interface is selected for a sample rate of 44.1 or 48 kHz it will have 32 Dante transmitter (output) and 32 Dante receiver (input) channels. These are associated with the unit's 32 interface channels. When selected to have a sample rate of 88.2 or 96 kHz there will be 16 transmitter (output) and 16 receiver (input) channels. When a

Model 5682-02 is selected for a Dante sample rate of 44.1 or 48 kHz it will have 64 Dante transmitter (output) and 64 Dante receiver (input) channels. These are associated with the unit's 64 interface channels. When selected to have a sample rate of 88.2 or 96 kHz there, a Model 5682-02 will provide 32 transmitter (output) and 32 receiver (input) channels. Neither the Model 5682-01 or the Model 5682-02 will support a sample rate of greater than 96 kHz. (As such, sample rates of 176.4, 192, and 384 kHz are not supported.)

Audio data received on a Dante receiver (input) channel will be output on the corresponding output channel of the ST 2110 interface. The input-channel-to-output-channel relationship in both Model 5682 versions 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 5682-01 and up to channel 64 for the Model 5682-02. (16 and 32 channels, respectively, when the Dante sample rate is selected for 88.2 or 96 kHz). The digital audio data (1s and 0s) from the receiver channels to the transmitter channels will essentially be the same but the timing and related parameters will be adjusted by internal sample-rate-conversion (SRC) circuitry. So, as an example, Dante receiver (input) channel 01 associated with the Dante network will be associated with output channel 01 on the ST 2110 interface. As another example, Dante receiver (input) channel 15 will be associated with ST 2110 output channel 15.

The Model 5682's Dante transmitter (output) channels should be assigned to the desired Dante receiver (input) channels on associated equipment. The Model 5682's Dante receiver (input) channels should be assigned to the desired Dante transmitter (output) channels coming from the source equipment. 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).

As previously discussed, at a sample rate of 44.1 or 48 kHz, the Model 5682-01 is a 32-channel resource. It can provide a 32 channel "bridge" between a Dante LAN and an ST 2110 LAN. But not all 32 channels have to be utilized. The Model 5682-02 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.

The Model 5682's Dante interface uses a Brooklyn module to implement its Dante functionality. The number of flows associated with this module is 64; 32 transmitter (output) and 32 receiver (input). With this capability typically no flow limitation will occur. Flows, each of which 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 the Model 5682 Dante interface, the associated Dante transmitter (output) channels will only function in multicast; unicast is not supported.

Operation

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Technical Notes

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Specifications

Applications:

Interconnects audio paths in each direction between independent ST 2110 and Dante audio-over-Ethernet networks. Integrated sample-rate-conversion (SRC) functions ensure that timing of independent networks is supported.

Versions Available:

Model 5682-01: supports up to 32 channels (44.1 or 48 kHz sample rates) and 16 channels (88.2 or 96 kHz sample rates)

Model 5682-02: 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 – ST 2110:

Type: SMPTE ST 2110-10:2017 and ST 2110-30:2017

Supports Conformance Levels:

A: 48 kHz streams with 1-8 audio channels at packet times of 1 ms

B: 48 kHz streams with 1-8 audio channels at packet times of 125 us

C: 48 kHz streams with 1-64 audio channels at packet times of 1 ms

AX: 96 kHz streams with 1-4 audio channels at packet times of 1 ms

BX: 96 kHz streams with 1-8 audio channels at packet times of 125 us

CX: 96 kHz streams with 1-32 audio channels at packet times of 125 us

AMWA NMOS Support: IS-04 Discover & Registration and IS-05 Device Connection Management

Redundant Streams: compliant with Level B, SMPTE ST 2022-7:2013 Seamless Protection Switching (8-channel stream at 48 kHz sample rate, packet time 125 us)

Synchronization: per SMPTE ST 2110-10, Precision Time Protocol (PTP) IEEE® 1588-2008 Version 2; supported profile IEEE 1588:2008

Discovery, Control, and Connection Management: includes web user interface, JSON API, NMOS, and Merging Technologies' ANEMAN Audio Network Manager

Audio Performance and Transport: digital

Audio Type: pulse-code modulation (PCM)

Sampling Rate: 48 kHz

Bit Depth: 24

Number of Sender (Output) Channels – Model 5682-01: 32

Number of Receiver (Input) Channels – Model 5682-01: 32

Number of Sender (Output) Channels – Model 5682-02: 64

Number of Receiver (Input) Channels – Model 5682-02: 64

Network Audio Technology – Dante:

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 – M5682-01: 32 (44.1 or 48 kHz sample rates) or 16 (88.2 or 96 kHz sample rates)

Number of Receiver (Input) Channels – M5682-01: 32 (44.1 or 48 kHz sample rates) or 16 (88.2 or 96 kHz sample rates)

Number of Transmitter (Output) Channels – M5682-02: 64 (44.1 or 48 kHz sample rates) or 32 (88.2 or 96 kHz sample rates)

Number of Receiver (Input) Channels – M6482-02: 64 (44.1 or 48 kHz sample rates) or 32 (88.2 or 96 kHz sample rates)

Dante Audio Flows: 32 receiver and 32 transmitter

Network Interfaces: 3; ST 2110, Dante, and System Management

Physical Ethernet Connections – ST 2110: 3; Primary, Secondary, and Control

Physical Ethernet Connections – Dante: 2; Primary and Secondary

Physical Ethernet Connection – System Management: 1

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 ST 2110 and Dante 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, ST 2110 status, Dante status, and system management interface status

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 16 V, 0.6 A max

Connectors:

Ethernet: 6, RJ45 jacks

USB: 2, Type A receptacles (used only for firmware updating)

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: 3.3 pounds (1.5 kg)

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

Appendix A—Front-Panel Menu Structure

