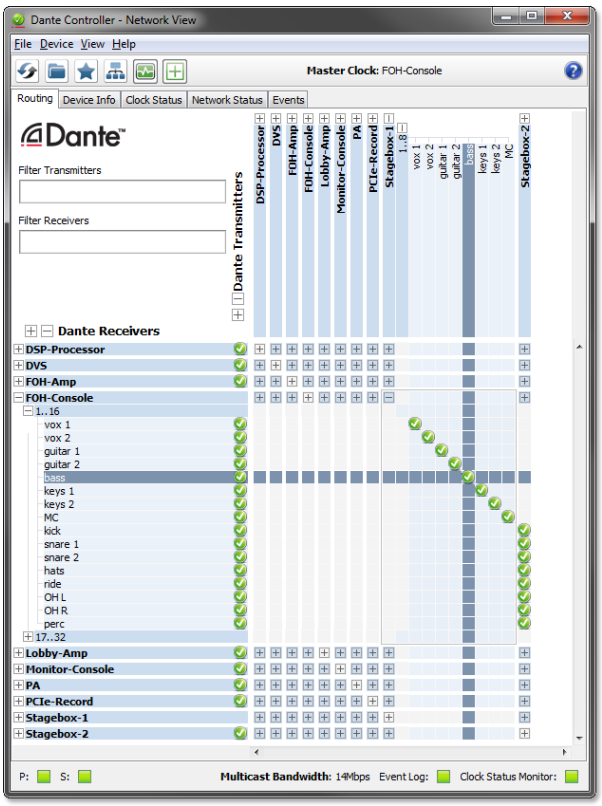
Dante Controller User Guide

User Guide

For Dante Controller version 3.5.x

For Windows and OS X



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Contacts

Audinate Pty Ltd

Level 1, 458 Wattle Street
Ultimo NSW 2007
AUSTRALIA
Tel. +61 2 8090 1000

Postal address

Audinate Pty Ltd
PO Box 855
Broadway NSW 2007
AUSTRALIA

Audinate Inc

1732 NW Quimby Street
Suite 215
Portland, OR 97209
USA
Tel: +1 503 224 2998
info@audinate.com
www.audinate.com

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About Audinate

Audinate revolutionizes AV systems to enable its customers to thrive in a networked world. Audinate's patented Dante media networking technology has been adopted by the leading manufacturers in the professional audio/visual industry.

Dante is used extensively for live performance events, commercial installation, broadcast, recording and production, and communications systems.

Audinate offices are located in US, UK and Australia. Visit www.audinate.com for the latest news and information on the company.

Dante is Digital Media Networking Perfected.

About Dante

Audinate's Dante technology provides high performance digital media networking that meets the quality and performance requirements of professional live sound, AV installations and broadcast and recording systems.

Designed to fully exploit the capabilities of today and tomorrow's networking equipment, Dante provides media transport mechanisms that eliminate many traditional audio network design restrictions. Dante makes it easy to set up robust, flexible digital audio networks with virtually unrestricted performance. A Dante network can be designed with mixed Gigabit and 100Mbps network speeds, simultaneously support audio with different sample rates and bit depths, and even allow the design of network zones with different latencies.

Dante is built on Internet Protocols – not just Ethernet. Because it uses standard IP over Ethernet, Dante is capable of running on inexpensive off-the-shelf computer networking hardware, and with the use of standard QoS can share installed networks with other data and computing traffic.

Dante provides sample-accurate synchronization and can deliver the very low latency required by professional audio. Dante's network-centric, audio-independent approach to synchronization allows perfectly synchronized playout across different audio channels, devices and networks, even over multiple switch hops.

Dante makes networking a true plug-and-play process, allowing automatic device discovery and system configuration. Dante-enabled devices will automatically setup their network configuration and advertise themselves and their channels on the network, reducing complicated, error-prone set-up procedures. Instead of 'magic numbers', networked devices and their input and output signals can be named to make sense to the user.

Dante is not restricted to allowing configuration and transmission of audio channels. Dante also provides mechanisms to send or receive control and monitoring information across the Dante IP network, including equipment-specific messages and control specified and developed by a particular manufacturer.

With its strong foundations and links to current and evolving network standards, Dante is able to deliver a level of future proofing otherwise unavailable in other types of digital audio transportation. Continued evolution of its networking technology is an integral part of the Dante roadmap.

Dante technology is available in ready-to-implement hardware and software products, reference designs and development APIs.

For more information, please visit the Audinate website at www.audinate.com.

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Introduction

About Dante Controller



Dante Controller is a software application provided by Audinate which allows users to configure and route audio around Dante networks. It is available for Windows and OS X (see Minimum System Requirements for more details).

Once you install Dante Controller on your PC or Mac and connect it to a Dante network, you can use Dante Controller to:

- View all Dante-enabled audio devices and their channels on the network
- View Dante-enabled device clock and network settings
- Route audio on these devices, and view the state of existing audio routes
- Change the labels of audio channels from numbers to names that suit you
- Customize the receive latency (latency before play out)
- Save audio routing presets
- Apply previously saved presets
- Edit presets offline, and apply as configurations for new network deployments
- View and set per device configuration options including:
  - Changing the device name
  - Changing sample rate and clock settings
  - Viewing detailed network information
  - Access the device web page to upgrade firmware and license information (where supported)
  - Identify a device for example by flashing LEDs (where supported)
- View network status information, including:
  - Multicast bandwidth across the network
  - Transmit and receive bandwidth for each device
- View device performance information, including latency statistics and packet errors
- View clock status information for each device, including frequency offset history and clock event logs

What's New in version 3.5

v3.5.6

- Dante Controller now displays Ultimo devices in orange text when they are in upgrade mode.
- Device names can now start with a numeric character.
- OS X 10.10 is now supported.

v3.5.1

- Dante Controller now checks (at startup) the version of the Dante Control and Monitoring service (conmon) that is installed on the computer. If the conmon version is not correct for the installed

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version of Dante Controller, the user is prompted to update the conmon version, by reinstalling Dante Controller.

v3.5.0

- Presets have been enhanced. You are now able to filter the parameters that are saved into presets, edit preset files offline (this effectively allows you to use Dante Controller as an offline configuration tool), and apply the saved parameter sets as 'device roles' to any compatible devices, on any network (where supported). See Presets for more information.
- For supported devices, the new Device View > Latency tab allows you to view a histogram of audio packet latency for each transmitter that the device is subscribed to.
- For supported devices, Clock Status Monitoring allows you to view a histogram of clock stability for the device.
- Dante Controller can now be connected to primary and secondary networks (where applicable), enabling full control over redundant devices should the primary network fail.
- Channel Groups allow you to group device channels into sets of 16.
- A new tab, Network Status, displays network related information for all devices on the network.
  - The 'Clear Counters' button on the Device View > Status tab can be used to clear packet error history for the device.
- The Device Status tab is now called Device Info.
- The Clock Status tab has been enhanced.
- The Events tab has been enhanced. Events can now be filtered by severity, and the event log icon in the status bar displays notifications for new events.
- The new Status Bar displays the status of connectivity to the primary and secondary networks, multicast bandwidth (previously shown in the toolbar), and notification icons for the event log and the clock status monitor.
- New look and feel.

Previous releases

v3.4.0

- Metering icons are displayed for supported devices.
- The Multicast Bandwidth for the network is displayed on the menu bar.
- The event log icons have been updated.
- Subscription in progress icons are now displayed when new subscriptions are made.
- Clock Health Monitoring - displays a notification if a device clock is showing signs of instability.
- Clear Config replaces Factory Reset for supported devices.
- Mute Status has been added to the Device view > Status tab.
- The Apple Bonjour service is no longer used for device discovery by Dante Controller for Windows - the Audinate 'Dante Discovery' service is now used instead. Dante Discovery is installed automatically with Dante Controller v3.4.0 for Windows.

Note: If you have Dante Firmware Update Manager or Dante Virtual Soundcard, do not uninstall Bonjour from your system - it is still required by those applications.

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v3.2.9

- For supported devices (Dante-MY16-AUD cards v3.3.9 and up), the Device View now includes an HA Remote tab.
- Dante Controller for Mac now supports OS X 10.8.

v3.2.8

- Switch Configuration - supported devices allow specialist switching configurations
- Device View > Status tab - for supported devices, the 'Device Information' pane in the Device View > Status tab now displays manufacturer, product type and product version information for the device. Dante-specific information for the device (Dante model, Dante software and Dante firmware versions) is now displayed in the 'Dante Information' pane.
- Device Status View - the 'Type' and 'Version' columns have been renamed as 'Product Type' and 'Product Version'
- Various performance and stability enhancements

Minimum System Requirements

The tables below list the minimum system specifications for your computer to be able to use Dante Controller.

Disclaimer: It is possible that your computer may meet the requirements below, but suffer from some other individual performance limitation related to its particular hardware. Please seek the advice of your computer support administrator.

General

Component	Recommended Minimum Requirement
Processor	1GHz or better
Memory	512Mbyte of RAM
Network	Standard wired Ethernet network interface (100Mbps or Gigabit). Wireless LAN (Wi-Fi) Ethernet interfaces are not supported

Windows

Component	Recommended Minimum Requirement
Operating System	Windows 7 (SP1 and above), 8 and 8.1 **NOTE:** Both UTF-8 and Unicode are supported EXCEPT for host or device names; the DNS standard does not support Unicode for these

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Mac OSX

Component	Recommended Minimum Requirement
Operating System	Mac OS X 10.7.5, 10.8.5, 10.9.5 and 10.10 **NOTE:** Intel architecture only; PPC architecture is not supported

Note: If you intend to also install Dante Virtual Soundcard on the same machine as Dante Controller, you will require a machine which meets the minimum system requirements for Dante Virtual Soundcard.

Operating System Updates

Ensure your PC or Mac has the latest Windows or Apple updates installed.

Firewall Configuration

Firewall configuration for Windows Firewall and Mac OS X built-in firewall is automatically handled during installation.

Dante Controller communicates over UDP over the following ports:

- Dante Control and Monitoring: 8700-8705, 8800

If you are using a third-party firewall product, use the port information provided above to configure it accordingly.

Monitor Requirements

- A display resolution of at least 1024 x 768, with a screen size of at least 19” is recommended for Dante Controller.

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Installing Dante Controller

Downloading Dante Controller

Dante Controller is available for download from Audinate's website.

To download a copy of Dante Controller:

1. Go to the Audinate website: www.audinate.com.
2. Navigate to **Products** > **Dante Controller**.
3. Under 'Download', choose your operating system.
4. Click the red download button.

This will take you to the appropriate Dante Controller release page for your operating system.

Click the link under 'File downloads' to download the Dante Controller installer.

Installing Dante Controller on Windows

Once you have downloaded the self-installing Dante Controller file, navigate to the directory where you have downloaded it (e.g. Desktop).

To install:

1. Ensure you are logged on to your PC as an administrator.
2. Navigate to and double-click the Dante Controller installer file.
3. Read the license agreement. If you agree to the terms, select the 'I agree' checkbox and click **Install**. If you do not agree to the terms, click **Close**.
4. Confirm / acknowledge any Windows security prompts that are displayed.

   Dante Controller will then be installed. Dante Controller will be added to the start menu, under 'Audinate'.

Installing Dante Controller on Mac OSX

To install Dante Controller on Mac OSX:

1. Double-click the Dante Controller .dmg file. A drive icon will appear on your Desktop Finder window. Double click on this to open.
2. Double click the Dante Controller .pkg. This will run the installer.
3. Read the license text, and if you accept the terms of the agreement, click **Agree**.

   If you do not accept these terms, click **Disagree** to terminate the installation.

Uninstalling Dante Controller

You should not need to uninstall Dante Controller before installing a new version.

However, if you do wish to uninstall Dante Controller:

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Windows

Navigate to **Control Panel** > **Programs and Features**, select Dante Controller and click **Uninstall**.

Note: Two other Dante features, 'Dante Control and Monitoring' and 'Dante Discovery', may still be present in the programs list after uninstalling Dante Controller. Do not uninstall these features if they are present - they are required by other Dante software applications (for example, Dante Virtual Soundcard, Firmware Update Manager, and third-party Dante control applications). They will be removed automatically if they are no longer required.

Mac OS X

Use the Uninstall tool available in the .dmg file.

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Dante Basics

Discovery and auto-configuration

When a Dante-enabled device is connected to an IP/Ethernet network, it will automatically:

1. Configure its IP address
2. Advertise itself to allow automatic discovery

Within seconds of a Dante-enabled device connecting to a network, Dante Controller will automatically discover and display the device, allowing you to configure channels and route audio.

Automatic network configuration

A Dante-enabled device connected to a network will automatically setup its own network configuration, including its IP address.

If the network has a DHCP server, which may be the case for installed networks, it will receive its IP configuration using the standard DHCP protocol.

On a network without a DHCP server, which may be the case for temporary or smaller networks, the Dante-enabled device will automatically assign itself an address using link local protocols, in the same way PCs and printers often do.

Automatic discovery

A Dante-enabled device will advertise information about itself to other Dante devices and Dante Controller, including:

- Device name
- Audio channel labels
- Number of audio channels
- Sample rates and bit depths

This information can be seen when viewing a device on Dante Controller, and allows Dante devices to determine compatibility with other devices, such as compatible sample rates to allow audio to be routed.

Device Channels

A Dante device has a number of channels associated with it. These are either transmit (Tx) or receive (Rx) channels. Receive channels and devices are listed down the left side of the grid. Transmit channels and devices are listed along the top of the grid.

Transmit channels are advertised on the network. A receiver uses this advertisement to establish a subscription to the channel. A transmit channel can be sent to multiple receivers using unicast or multicast.

Receive channels are connected to transmit channels via a subscription. Each receive channel will receive audio over the network from at most one transmit channel.

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Subscribing to Audio Channels

In the Routing View, a blue square at the intersection of an Rx and a Tx channel indicates that is it possible to create an audio route between those channels. A grey square indicates that it is not possible to create a route between those channels. This may be because of a mismatch in sample rate between the transmitter and receiver, or because a device cannot route to itself.

When you click a blue square at the cross-point between a transmit channel and a receive channel, a subscription will be created, and a green tick will appear in the matrix cross point. You may initially see a grey hourglass icon (usually very briefly) to indicate that the subscription is in progress.

If there is a problem with the subscription, either a warning or an error icon may appear. If many devices have been subscribed at the same time, a yellow pending icon may appear temporarily. Hover the mouse over subscription icons to see a related tooltip (see Subscription Tooltips).

Note: Subscriptions can also be created in the Device View. This is covered in the Device View section (Device View is NOT the same as Device Status View).

Subscribing to Multiple Audio Channels at once

To subscribe multiple channels at the same time, hold down the Ctrl key and click the [-] symbol at the top left corner of the intersection between the two devices. All possible channels will be subscribed at the same time (see the figure in Expanding the Routing View).

Unsubscribing Audio Channels

To unsubscribe an audio channel, click on the cross-point containing a subscription. The subscription icon will be removed and revert to a plain blue square.

Subscription Status

The symbol displayed at the intersection of the Tx channel and the Rx channel in the Routing View provides information on the status of the subscription or connection, as follows:

In progress	The subscription is in progress
Subscribed	Connection is established and fully functional
Warning	The subscription is unresolved, typically because the transmitting device is not visible on the network (for example, because it has been removed, or switched off)
Error	An error has occurred - for example, there is insufficient bandwidth to establish the subscription
Pending	Device is part-way through setting up subscription. Most commonly seen when subscribing many channels at a time

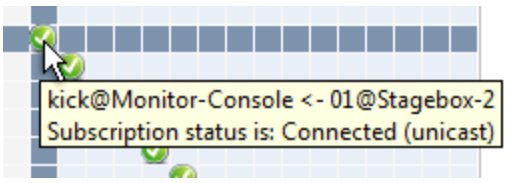
Note: The status of a subscription can change after it has been initially established, due to changes in the network or changes in other devices.

Subscription Tooltips

Hovering the mouse over a subscription icon in the Routing tab displays a tooltip containing information about the subscription.

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If there is no problem with the subscription, the tooltip will display the Rx channel and device name, plus the Tx channel and device name (for example, 'kick@Monitor-Console <- 01@Stagebox-2').



Other messages are displayed if the subscription is in any other state.

Some common messages are:

- 'Incorrect channel format: source and destination channels do not match'

  The receiver and transmitter are set to different sample rates.

- 'Mismatched clock domains: The transmitter and receiver are not part of the same clock domain'

  One of the devices is configured with sample rate pull-up/down that does not match the other device.

- 'Tx Scheduler failure'

  This is typically because you are trying to use sub-millisecond latency over a 100 Mbps network link (1 msec is the minimum supported latency over 100 Mbps links).

- 'No Receive flows: receiver cannot support any more flows'

  This will be seen if the receiver is subscribed to too many devices (devices typically do not support the same number of flows as they do channels). See Routing Audio > Flows for more information.

- 'No more flows (TX): transmitter cannot support any more flows'

  This will be seen if too many devices are subscribed to the transmitter. See Fanout for more information.

Differentiating between input and output channels

Channels are classified according to whether they put audio data onto, or take audio data off the network:

- A channel that puts audio data onto the network is known as a transmitting, Tx or output channel.
- A channel that takes data off the network is known as a receiving, Rx or input channel.

Device Names and Channel Labels

In Dante, devices and audio channels are identified by names and labels, not “magic numbers”. Device names and channel labels can be customized.

- Dante routing is performed using the device names and channel labels. A receive channel can be subscribed to the name of a transmit channel at a device.

  Example: “`Analog L@my-transmitter`” describes a channel labelled “`Analog L`” on a device named “`my-transmitter`”. Device names must be unique on a Dante network. Channel labels must be unique on the device.

- If a device or channel is renamed, Dante routing considers it to be a different device or channel. If a new device or channel is then given the old name, Dante routing will route from the new device in place of the previous device.

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Example: The power supply on "stage-box" fails and "stage-box" needs to be replaced. The old "stage-box" is removed, and a new box is plugged in and named "stage-box". Dante receivers previously subscribed to the old "stage-box" will now automatically restore their subscriptions to the new "stage-box".

- Device names must be unique on the network. If you attempt to rename a device using Dante Controller to a name that is already in use on the network, Dante Controller will notify you and reject the name change.

  Example: There is an existing device on the network called "MY16-slot1". If user attempts to rename another device to "MY16-slot1" Dante Controller will notify you that the name is already in use. The device will not be renamed.

- If a new device is added to the network with a name that already exists, a name conflict is detected, and one of the devices will rename itself by appending (2) to its name. This device will not be able to transmit audio until it is renamed.

Note: A device that has been renamed with (2) appended (e.g. "MY16-slot1(2)") will not be able to transmit audio until it is renamed. The device name must be changed by the user to be a valid non-conflicting name before the device can become fully functional.

Rules for Names and Labels

- All Dante names and labels are up to 31 characters in length. Name and label comparisons are case-insensitive; "Guitar" and "guitar" are treated as the same label. Unicode and non-roman characters are not supported.
- Device names should follow Domain Name System (DNS) hostname rules. Legal characters are A-Z, a-z, 0-9, and '-' (dash or hyphen).
- Tx channel labels may use any character except '=' (equals), '.' (full stop or period), or '@' (at). Tx channel labels must be unique on a device. Tx channel labels do not need to be unique on the network as they are always qualified by device (channel@device).
- Rx channel labels follow the same rules as Tx channel labels.

Routing Audio

Routing Terminology

- **Device**: A device means a Dante-enabled device, and more specifically that component of the audio equipment that implements the Dante interface. A Dante device typically has Tx and Rx channels and other routing-related properties.
- **Transmit (Tx) channel**: A transmit channel transmits audio from the audio hardware onto the network.
- **Receive (Rx) channel**: A receive channel receives audio from the network and sends it to the audio hardware.
- **Flow**: Dante audio routing creates flows. Each flow carries several channels of audio from a transmitter to one or more receivers. Unicast routing creates flows to single receivers. Multicast routing creates flows that can be received by multiple receivers. Multicast flows are assigned IDs enabling them to be identified in Dante Controller.

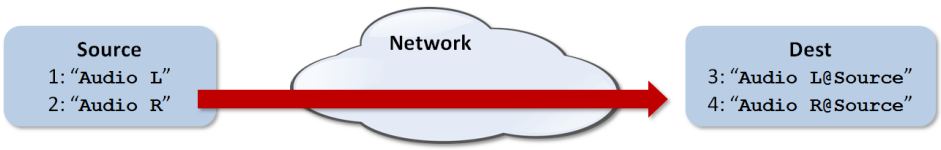
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- **Unicast routing**: Unicast flows are point-to-point from a single transmitter to a single receiver. Unicast flows typically have room for 4 channels of audio.
- **Multicast routing**: Multicast flows are one-to-many from a single transmitter to any number of receivers. Use Dante Controller to choose which channels are to be multicast. Unlike unicast routing, multicast flows consume network bandwidth even if there are no receivers, but do not require additional bandwidth to add more receivers.
- **Subscription**: A subscription configures a receive channel to receive audio from a transmit channel on another Dante device.
- **Subscription status**: For a receive channel, subscription status indicates whether it is subscribed, whether it is receiving unicast or multicast audio, whether the subscription is OK, or whether an error has occurred.

Subscription

Dante routing is performed by associating a receiving (Rx) channel with a transmitting (Tx) channel. This is called subscription.

> **Example**: Route Tx channels 1 and 2 (labeled “Audio L” and “Audio R”) on the device labeled “Source” to Rx channels 3 and 4 on the device labeled “Dest”.



Rx channels 3 and 4 on “Dest” are subscribed as follows:

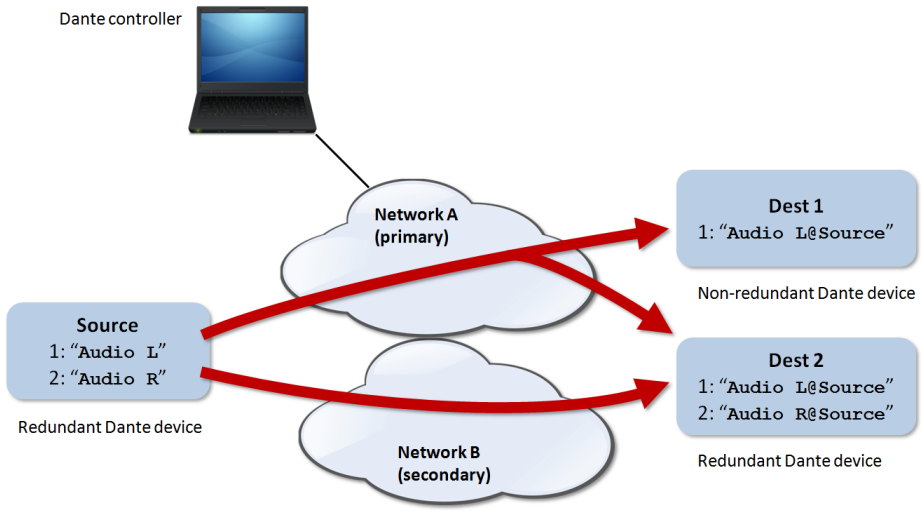
- 3. `Audio L@Source`
- 4. `Audio R@Source`

Dante will perform the necessary audio routing to deliver the audio from the Tx channels to the Rx channels.

Redundancy

Many Dante devices support redundant audio routing. These devices have two network interfaces, labeled primary and secondary. Primary interfaces should be connected to one physical network. If redundancy is being used, secondary interfaces should be connected to a second separate network. Secondary interfaces cannot communicate with primary interfaces.

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If the secondary network is connected to a device that supports redundancy, it is enabled automatically. The same audio data is transmitted on both the primary and secondary networks simultaneously. In the event of a failure on one network, audio will continue to flow via the other network.

Note: Dante redundancy requires that both the primary and secondary interfaces on any redundant device are connected using the same link speed. For example, if the primary interface is connected to a 1 Gbps switch port, the secondary interface must also be connected to a 1 Gbps switch port. Similarly, if the primary interface is connected to a 100 Mbps switch port, the secondary interface must also be connected to a 100 Mbps switch port.

Note: Dante devices that do not support redundancy must be connected to the primary network only.

Audio Formats

Most Dante devices support a range of audio formats (sample rates). Devices can usually be switched between audio formats, but will not support more than one at a time.

It is only possible to set up a subscription between channels which have a common audio format. Channels on devices with incompatible formats will be shown in grey, and will not be routable.

Flows

Dante audio routing creates 'flows'. Each flow carries one or more channels of audio from a transmitting device to one or more receiving devices. There are two types of flow, unicast and multicast.

Unicast routing creates flows to a single receiving device; a unicast flow typically assigns space for 4 channels of audio. Unicast flows are set up when a receiver subscribes to an available audio channel, and are automatically removed when the receiver unsubscribes from all channels in that flow.

Multicast routing creates flows that can be received by multiple receivers. Multicast flows are assigned IDs, enabling them to be identified in Dante Controller, and to facilitate their removal. In contrast to unicast flows, multicast flows must be set up on the *transmitting* Dante device before receivers can subscribe to these flows.

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Advanced Routing: Using Multicast

Dante routing is unicast by default. This means that a separate flow is set up between each transmitter and receiver. If several receivers are all subscribed to the same channels of a transmitter, it may sometimes be more efficient to use *multicast*.

Multicast sends the same set of channels to multiple receivers. In practice, this usually means that the audio flow is flooded throughout the network. If many receivers want the same channels, using multicast can reduce overall network use, especially on the transmitter, because only one copy of each audio channel needs to be sent, rather than many.

Dante receivers will automatically prefer multicast to unicast if it is available. This means that if a new multicast flow is created containing the channels that a receiver is currently receiving as unicast, the receiver will switch over to receiving audio from the multicast flow and the unicast flow will be removed.

Clock Synchronization

All Dante-enabled devices use the IEEE 1588 Precision Time Protocol (PTP) across the network to synchronize their local clocks to a master clock, providing sample-accurate time alignment throughout the network.

One Dante device will be elected as the PTP Master Clock for the network; all other Dante devices act as a PTP Slave Clocks to the elected master clock. Although many Dante devices may be capable of becoming PTP Master Clock, only one device will win the election. Devices with clock inputs (e.g. Word Clock or AES3) will be preferred in the election process. A gigabit connected device is preferred over a device connected via 100Mbps. A tie-breaker rule of the lowest MAC address is used if several equivalent candidate master clocks are available. The election process may be overridden by manually setting 'Preferred Master' on a device.

Dante Clock Types

Each Dante hardware device can derive its clock from either its high-quality onboard clock circuit, or an externally connected word clock. In the case of Dante Virtual Soundcard, the computer's clock will be used.

Clock Settings

Enable Sync To External

A Dante device set to 'Enable Sync To External' will use the external word clock from its host equipment to tune its onboard VCXO. A Dante device with this attribute set will become the PTP Master Clock, unless there is another Dante device present with 'Preferred Master' set.

Preferred Master

Sometimes it may be necessary to force a particular device to provide the PTP Master Clock. A Dante device with 'Preferred Master' set will always be chosen as the PTP Master Clock. If more than one device has 'Preferred Master' set, the device with the lowest MAC address will be chosen.

Note: If device A is deriving its clock from an external word clock source ('Enable Sync To External'), but device B is set as Preferred Master, device A will lose sync with the Dante network

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and will eventually be muted - *unless* device B is also deriving its clock from the same external source as device A.

Clock Status

Clocking and Synchronization in Redundant Networks

In a redundant network, the clock synchronization protocol operates over both primary and secondary networks. Each network will have a designated PTP master clock; usually this will be the same device on both networks. If this is not the case (e.g. if a non-redundant device is designated Preferred Master) then one device will bridge the clock synchronization information from the primary to the secondary network, ensuring that all devices derive their clock from the same source. Redundant PTP Slave clocks will synchronize their local clocks based on information from one of the networks they are connected to. In event of a failure on one network, a redundant device will continue to receive clock synchronization information over the other network.

Latency

In Dante, variation in latency in the network is compensated for at the receiver. Each receiver has a device latency setting. This setting defines the latency between the timestamps on the incoming audio samples and when those samples are played out.

The typical default latency for a Dante device is 1 msec. This is sufficient for a very large network, consisting of a Gigabit network core (with up to 10 hops between edge switches) and 100 megabit links to Dante devices. Smaller, Gigabit-only networks can use lower values of latency (down to 150 µsec for very fast devices, such as PCIe cards). Recommended latency settings are displayed in Dante Controller, and may also be found in the documentation accompanying the product.

Latency is set on the receiver. However, when a subscription is made, there is an automatic negotiation process between the receiver and the transmitter, to ensure that the latency for the subscription is high enough to prevent packet loss.

For example, Ultimo devices support a minimum of 2ms latency. If a faster device (such as a PCIe card) is set to 1ms latency, and is then subscribed to an Ultimo transmitter, the latency used for the subscription will be 2ms, which is the minimum supported latency for the subscription. Subscriptions to other devices (such as a Brooklyn II device) will be set at 1ms (or whatever latency the receiver is set to). This effectively makes the device latency setting a 'default' latency, which is used unless the transmitter doesn't support it.

Note: The minimum latency available for a device connected to a 100 Mbps network port is 1 msec.

Using a latency lower than 1 msec over a 100 Mbps link will result in a subscription error, with the tooltip 'Tx Scheduler Failure'.

Latency Monitoring

Dante Controller provides latency monitoring for supported devices. For more information, see Latency Tab.

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Latency and Dante Virtual Soundcard

Dante Virtual Soundcard allows a standard Apple Mac or Windows PC to function as a Dante device. Because Dante Virtual Soundcard runs on a general purpose computer without special hardware to support Dante timing requirements, additional latency needs to be added to connections received from a Dante Virtual Soundcard transmitter.

Dante Virtual Soundcard is configured with custom latency values for reliable operation. Dante devices with Rx channels that are subscribed to Tx channels from a Dante Virtual Soundcard transmitter will automatically configure themselves to use these higher latency values for those channels only. The latency on all other subscriptions on the receiver is unaffected.

Dante Control and Monitoring

In addition to automatic configuration and discovery, audio transport and routing, Dante-enabled devices can also be controlled and monitored in various ways. This includes being able to view and change specific parameters, such as clock configuration settings. Dante devices are also capable of sending status events that can be viewed using Dante Controller. Status events include changes in clock status, or network interface changes.

Note: The computer service that manages control and monitoring is called 'ConMon' or 'Dante Control and Monitoring'.

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Starting Dante Controller

Where to find the Dante Controller application

Windows

By default Dante Controller will be installed in

`C:\Program Files\Audinate\Dante Controller\`

It can be started in several ways:

- Using the Start menu: **Start** > **Programs** > **Audinate** > **Dante Controller** > **Dante Controller**
- Run by going to **Start** > **Run** and entering
  `C:\Program Files\Audinate\Dante Controller\DanteController.exe`
  in the dialog box
- Navigate to the directory where it is installed, and double-click the Dante Controller icon: 

Mac OSX

The Dante Controller application will be installed in the Applications folder.

To start:

- Navigate to **Applications** folder, and double-click the Dante Controller icon: 

Or:

- Drag the icon to the Dock and click on it

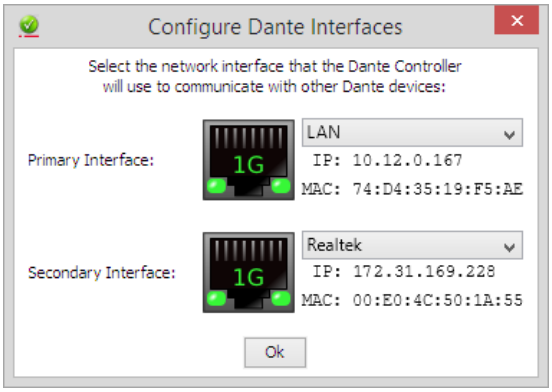
Configuring Dante Controller

Network Interface Selection

Dante Controller can communicate with other Dante devices on the primary network, or the secondary network, or both. Dante Controller needs to know which of the network interfaces of the host computer is connected to each Dante network.

The first time Dante Controller is run, you may be presented with the **Configure Dante Interfaces** dialog box (shown below), providing a list of interfaces from which to select the primary and secondary Dante interfaces. Once interfaces have been selected, they are remembered for future use, and this dialog box will not be shown when Dante Controller is run subsequently.

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To display this dialog at any other time, click the  button in the main toolbar.

Network Interface Configuration Guidelines

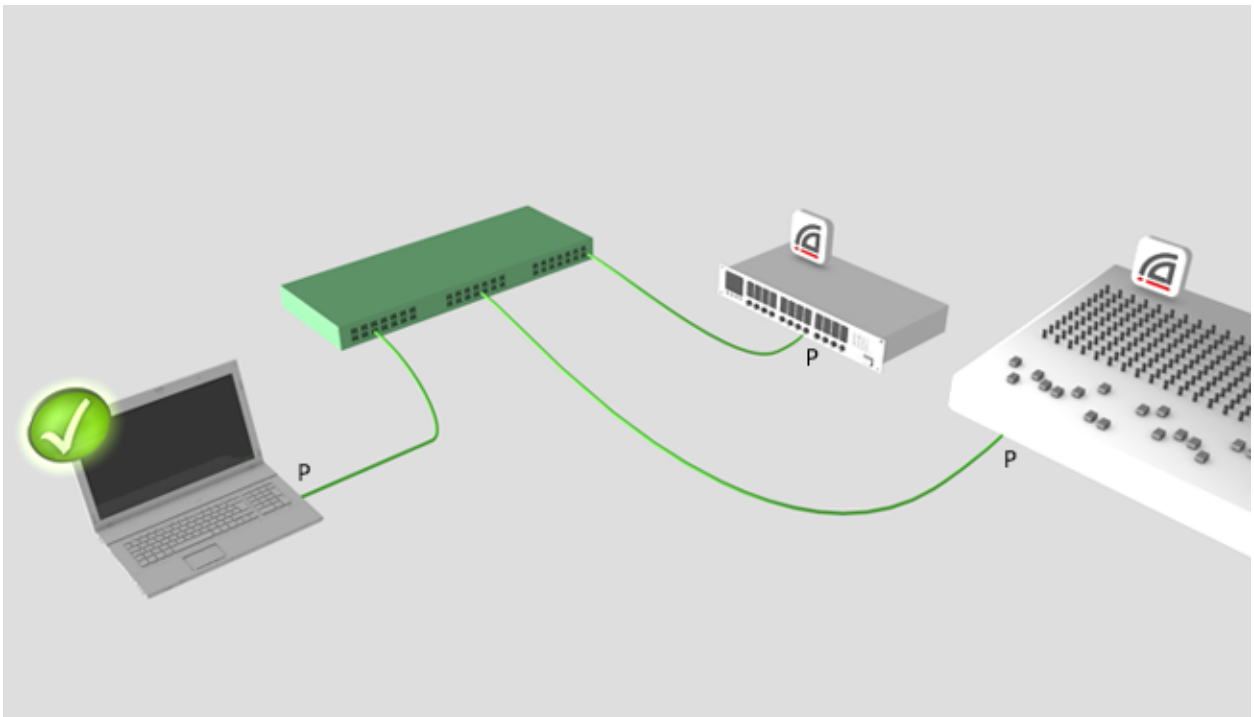
Primary only (non-redundant) Dante network

If you only have a primary network, you can only connect one interface to the Dante network.

Example

In the example below, the laptop (running Dante Controller) and the two Dante devices are connected to the switch via their primary interfaces. This is a typical non-redundant Dante network.

If the laptop has two network interfaces, either can be used.



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Primary and secondary Dante networks (redundant configuration), only one network interface on the host computer

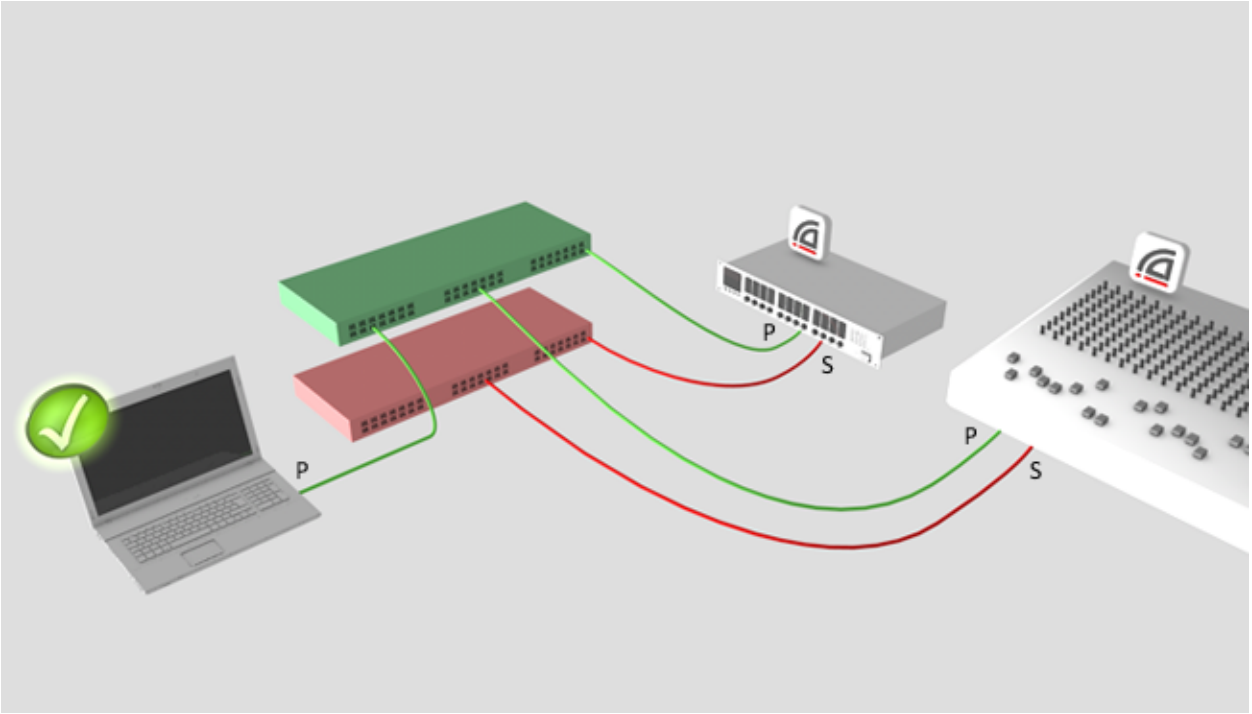
If you have primary and secondary (redundant) networks, but only one network interface on your computer, you should set your computer's network interface as the *primary* interface. This ensures that you can control any non-redundant devices, and see full connection information for any redundant devices that are connected to non-redundant devices.

If a problem does occur, and you lose connectivity on the primary network, you can connect instead to the secondary network, to maintain control over your devices. This entails changing the physical connection (i.e. physically connecting your computer to a switch on the secondary network), and changing the interface selection in the Configure Dante Interfaces dialog.

Example

In the example below, the laptop (running Dante Controller) is connected to the switch via one interface only, which is set as the primary Dante interface.

The two Dante devices are connected to the primary switch via their primary interfaces, and to the secondary switch via their secondary interfaces. The two switches are not connected to each other. This is a typical redundant network configuration for computers with only one network interface.



Note: When connected to the secondary network, you will not have control over devices that are *only* connected to the primary network (i.e. non-redundant devices, or Dante Virtual Soundcard). You will see the device names in the Network view, and in subscription dialogs (for example, the Device View > Receive and Transmit tabs) but you will not be able to view or edit device configuration for those devices. Also, if the master clock is only connected to the primary network, its name will not resolve in the 'Master Clocks' section of the main window tool bar, it will be shown as a MAC address string.

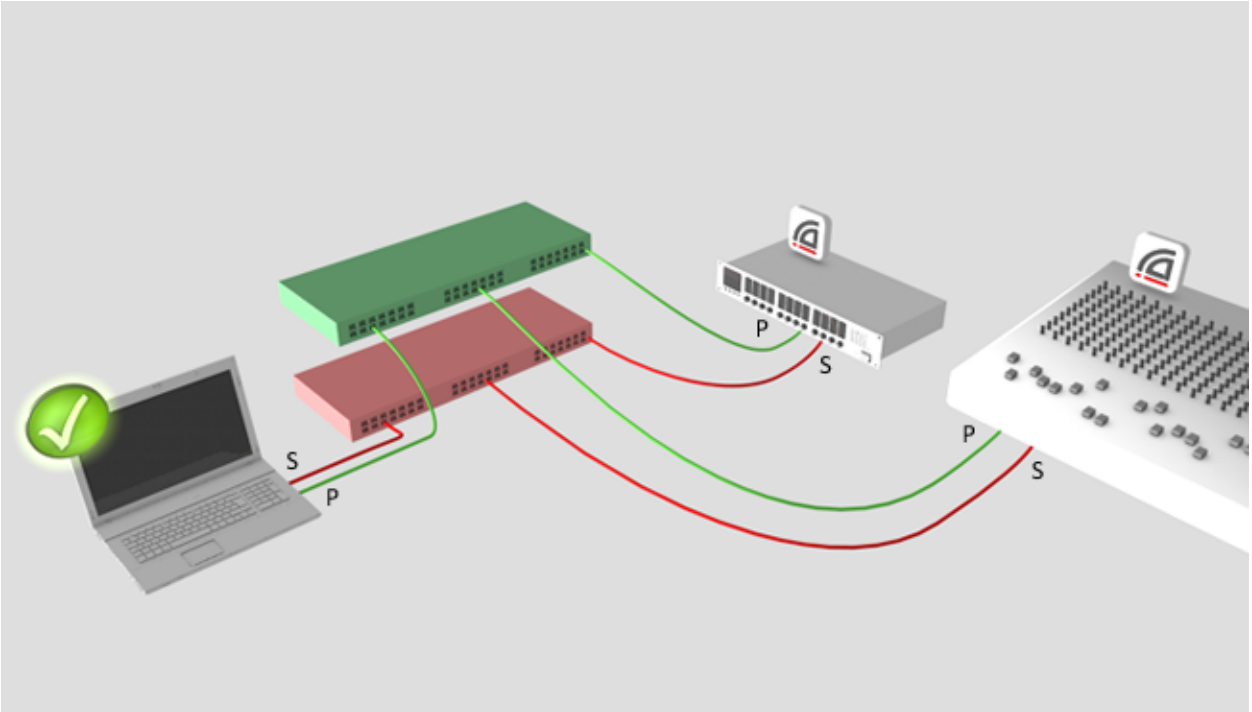
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Primary and secondary networks (redundant configuration), two network interfaces on the host computer

if you have primary and secondary networks, and two network interfaces available on the host computer, you should connect one interface to each network. This means that you will always have full control of all *redundant* devices, even if the primary network fails.

Example

In the example below, the laptop (running Dante Controller) and the two Dante devices are connected to the primary switch via their primary interfaces, and to the secondary switch via their secondary interfaces. The two switches are not connected to each other. This is a typical redundant network configuration for computers with two (or more) network interfaces.



Note: You must be connected to a standard wired Ethernet network in order to use Dante Controller. Wireless and other non-standard wired Ethernet interfaces will not appear in the Configure Dante Interfaces dialog.

Note: All Dante applications on the same computer have a shared understanding of which interface is the primary Dante interface. For example, if you have installed Dante Virtual Soundcard on the same PC as Dante Controller, and a new primary interface is selected from within Dante Virtual Soundcard, Dante Controller will automatically switch to the newly selected interface, and begin operating on that interface.

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Using Dante Controller

Dante Controller presents two main types of view: **Network View** and **Device View**.

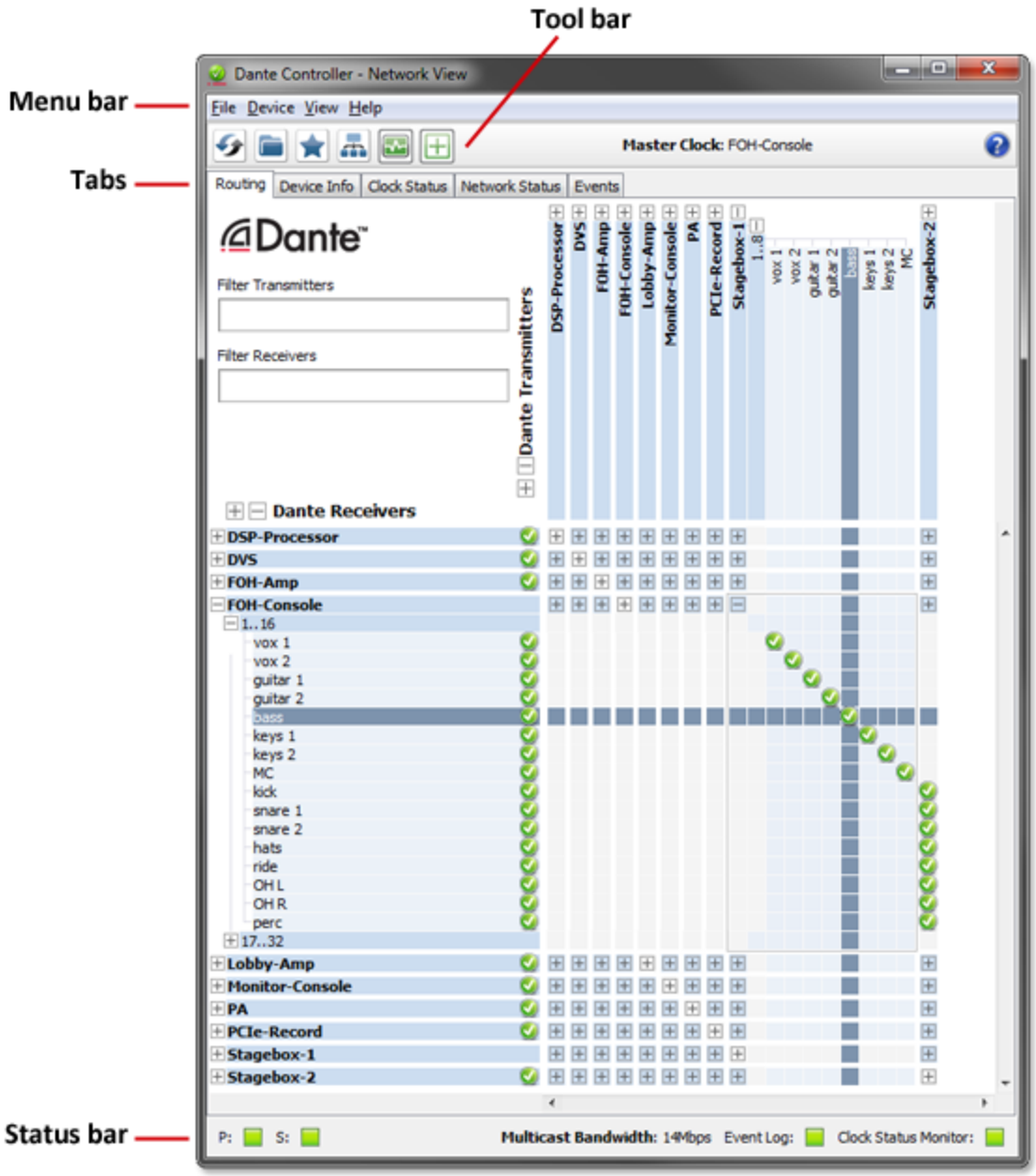
Important: After making changes to Dante network routing (e.g. subscriptions, device names, channel labels etc.) please wait at least 5 seconds before disconnecting or powering down any affected devices. This ensures that the new information has been properly saved to the devices. Device configuration (e.g. sample rates, latency, clock settings) are saved instantly.

Note: Mac OS X users: Please note that the key combinations shown below are for Windows users. When using Dante Controller on a Mac, please use the “Command (CMD)” or “Apple” key instead of the “Control” key when following the instructions below, and substitute standard Mac key combinations where applicable - see the Dante Controller menu for details.

Network View

When Dante Controller is started, it opens at the Network View, with the Routing tab selected.

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Menu bar

The menu bar in the Network View includes four menus: **File**, **Device**, **View** and **Help**.

File

- Load Preset (Ctrl+L): loads a configuration from a file
- Save Preset (Ctrl+S): saves configuration for currently displayed devices to a file
- Exit (Alt+F4): Exits Dante Controller

See Presets for more information.

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Device

- Refresh (F5): Refreshes the displayed network / device data
- Device View (Ctrl+D): Opens a new Device View window

View

Allows the activation of channel groups.

Help

- About: Shows the Dante Controller version, and current event log file location
- License: Displays the license text
- Contents (Shift+F1): Opens a help window and displays help contents

Tool bar

Below the menu bar there is a tool bar, containing six buttons:

	**Reload Device Information**	Updates the current view with the latest device information from the network. This is useful when a recent change to the network has not yet propagated automatically through to Dante Controller (for example, a new device has been added to the network).
	**Load Preset**	Loads a previously saved audio routing configuration. See Presets for more information.
	**Save Preset**	Saves the current audio routing configuration. See Presets for more information.
	**Choose a Dante Interface**	Opens the Configure Dante Interfaces dialog. See Configuring Dante Controller for more information.
	**Clock Status Monitoring**	Activates the Clock Status Monitoring function. See Clock Status Monitoring for more information.
	**Channel Groups**	Activates channel groups. See Channel Groups for more information.

To the right of the toolbar, Dante Controller displays the current master clock (or clocks, in the case of redundant networks).

Tabs

Click the tabs below the tool bar to view:

- Routing
- Device Info
- Clock Status
- Network Status
- Events

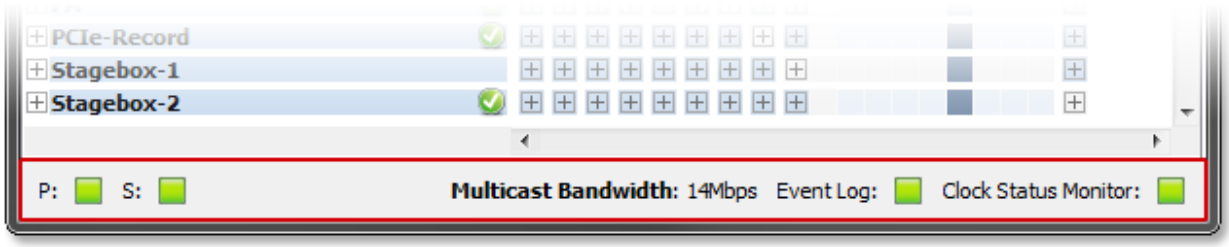
The use of each of these tabs is described in the next section.

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Status Bar

The Status Bar displays notifications for network status, general device events, and clock status events, plus the current Dante audio multicast bandwidth on the network.

Status Bar



The Status Bar displays the following information:

- **P**: The current status of the Primary network. Green indicates that Dante Controller is currently connected to the primary Dante network. Red indicates a problem with the connection.
- **S**: The current status of the Secondary Dante network. Only displayed where a secondary network is connected.
- **Multicast Bandwidth**: The current Dante audio multicast bandwidth on the connected networks. Note that there may be network traffic from other sources that is not included in the multicast bandwidth reading.
- **Event Log**: Indicates the current status of the event log. Click the icon to open the Events View.
- **Clock Status Monitor**: Indicates the current status of the Clock Status Monitor. Click the icon to open the Clock Status Monitor.

Network View Tabs

Routing View

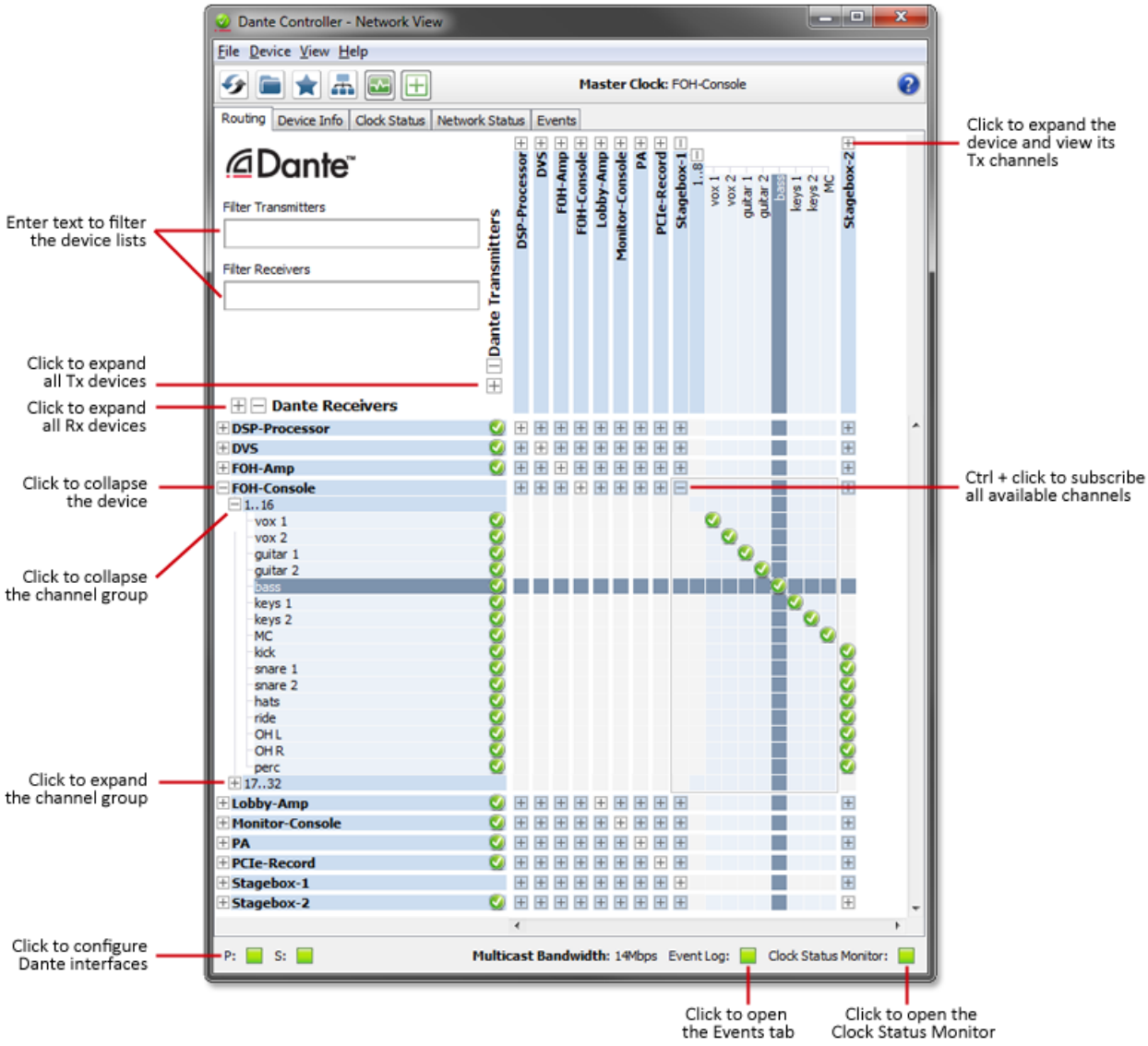
When Dante Controller is started, it always displays the Routing Tab within the Network View. In this view the network is shown in the form of a grid. Devices with Tx channels are displayed along the top row of the grid, and those with Rx channels are displayed along the left-hand column of the grid. Initially a collapsed view is presented; individual channels cannot be seen.

Note: If a device name is shown in red, it means Dante Controller has automatically detected an error condition. Double-click the device name to see more information. Refer to Automatic Notification of Device Errors for further explanation.

Note: If a device has Tx and Rx channels, it is shown both along the top row of the grid and also along the left-hand edge.

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Expanding the Routing View



The Rx channels associated with any device can be displayed by clicking on the [+] to the left of the device name in the left-hand column of the grid. The Tx channels associated with any device can be displayed by clicking on the [+] above the device name on the top row of the grid. When this action is performed the grid view expands to show each channel of the device, and the [+] becomes a [-]. Clicking on [-] collapses the view. You can also group channels into sets of 16.

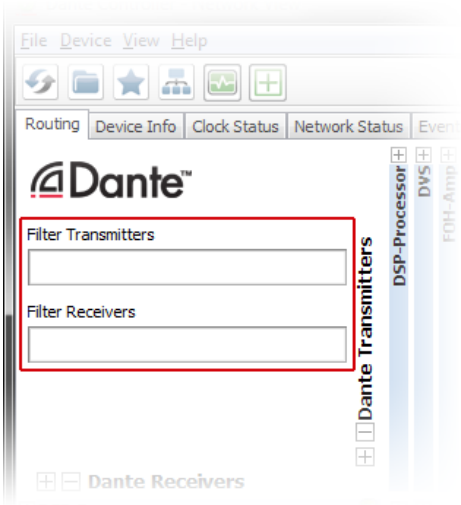
The Rx channels associated with all devices can be simultaneously expanded by clicking on the [+] of "[+] [-] Dante Receivers" at the top of the left-hand column. Similarly, the Tx channels associated with all devices can be simultaneously expanded by clicking on the [+] of "[+] [-] Dante Transmitters" at the left of the top row. Clicking on [-] will collapse the view.

Device List Filtering

The device lists in the Routing view can be filtered using the 'Filter Transmitters' and 'Filter Receivers' boxes, below the Dante logo in the top left-hand corner. Any text string typed into the box will filter the view

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to only display devices that contain that text string, in either a device name, or channel name.



The filtering is case-insensitive. For example, in the Dante Controller Network view shown here, entering the string “foh” in either of the Filter fields would display only the FOH-Amp and FOH-Console devices, and their channels.

Channel Groups

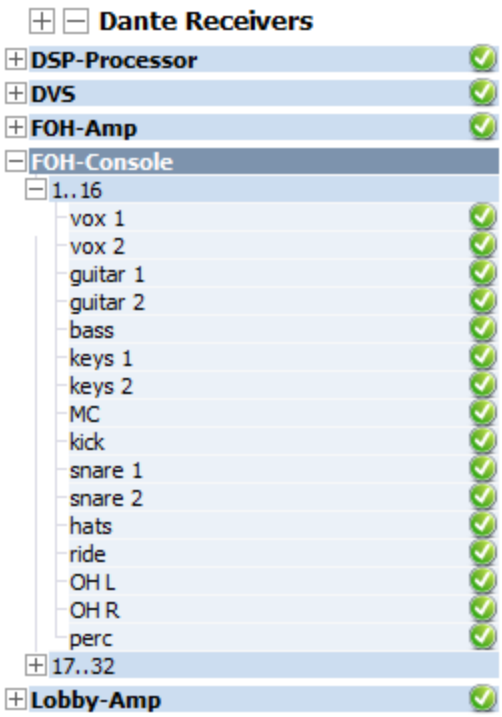
When Channel Groups is active, device channels in the Network View Routing tab are grouped into sets of 16.

This makes it easier to view and make channel subscriptions for devices with large numbers of channels, such as PCIe cards.

To activate it, click the Channel Groups button in the Network view toolbar: 

The groups are named 1..16, 17..32 etc.

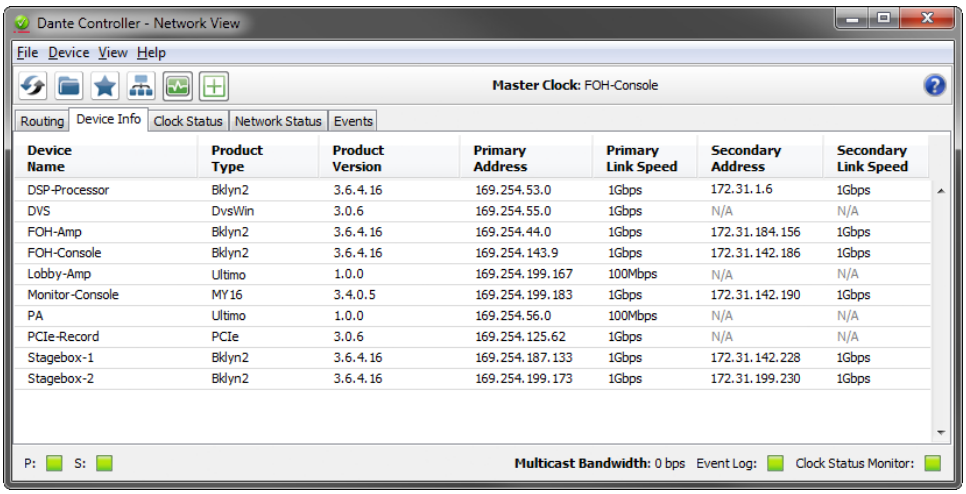
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To expand a channel group, click the plus [+] icon. To collapse a channel group, click the minus [-] icon.

Note: Grouping channels does not affect routing or device behaviour.

Device Info



The Device Info tab provides a network-wide overview of device configuration and operating information.

The tabular view presents the following information, in columns from the left:

- **Device Name**: The device name currently associated with the device
- **Product Type**: The type of Dante module in the device

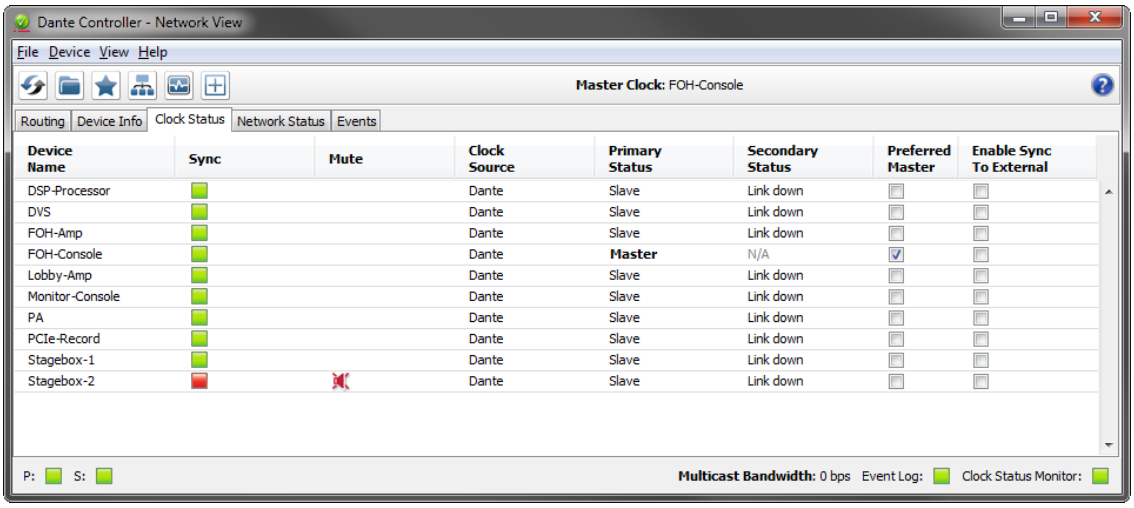
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- **Product Version**: The product version, as defined by the manufacturer
- **Primary Address**: The IP address assigned to the primary interface.
  IP addresses are currently assigned via DHCP, or automatically self-assigned. Self-assigned addresses on the primary interface will be in the 169.254.*.* range.
- **Primary Link Speed**: The Ethernet link speed of the primary interface
- **Secondary Address**: The IP address assigned to the secondary interface.
  Self-assigned addresses on the secondary interface will be in the 172.31.*.* range. 'N/A' indicates that the device does not support a secondary interface. 'Link down' indicates that the device supports a secondary Dante interface, but it is not currently connected.
- **Secondary Link Speed**: The Ethernet link speed of the secondary interface. Other values are possible (as per Secondary Address)

Note: A Dante interface may have a preferred link speed. Where it does, and an interface is not operating at that preferred link speed, the values in the Link Speed columns will be shown in red.

Note: If no device information is displayed for a device, it can indicate a ConMon (Dante control and monitoring service) failure on the device. The device may need to be reset or restored.

Clock Status



The Clock Status tab provides a network-wide overview of the clocking state within the network.

This view provides a convenient way of quickly scanning the network for clock information. The tabular view presents the following information, in columns from the left:

Device Name

The device name currently associated with the device.

Sync

Indicates the clock sync status for the device.

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- A green light indicates that the device is currently synced to (or is driving) the network clock
- A red light indicates that the device is not currently synced

Mute

Indicates the mute status for the device.

- A red mute icon indicates that the device is currently muted (usually due to loss of clock sync)
- No icon in the mute column means that the device is not muted (audio should be flowing normally)

Clock Source

Indicates the clock source for the device.

- **Dante**: The device is deriving its clock from the Dante network, or is acting as master clock (but not deriving its clock from an external source)
- **External**: The device is deriving its clock from an external word clock source

Primary Status | Secondary Status

Indicates the state of the PTP clock for the primary and secondary network interfaces.

- **Master**: Device is the current PTP Master Clock on the primary Dante network
- **Slave**: Device is a PTP Slave on the primary Dante network
- **Passive**: Device is not using clock synchronization information from this interface
- **Link Down**: The interface is not connected to the network
- **N/A**: Indicates that the device does not support clock status reporting. In the Secondary Status column, can also indicate that the device is non-redundant.
- **Listening**: Usually transient. When persistent, it indicates that the device can not operate as a clock master (slave only), and is waiting for a clock master to appear on the network.

Devices that are configured with sample rate pull-up/down are shown with the relevant pull-up/down value against their Clock Status. For example, a device acting as master clock with +0.1% pull-up will be shown as **Master (+0.1%)**. See About Clock Domains for more information.

Other transient clock states exist, which are not listed above.

Preferred Master

Raises the priority of the device in the master clock election.

If only one device on a particular clock domain has this checkbox ticked, it ensures that the selected device becomes master clock (for that clock domain). When multiple devices have their Preferred Master checkbox ticked, the master will be elected automatically from within that group.

If 'Slave Only' is shown instead of a checkbox, it indicates that the device is not capable of acting as a master clock.

Enable Sync To External

Forces the Dante module to derive its clock from an external source - either from a host device word clock, or from an auxiliary device.

This will also ensure that this Dante device becomes master clock for the relevant clock domain (unless another device has 'Preferred Master' selected). It is not normal practice to configure more than one device per clock domain with an external clock source. In this case, the user is assumed to have synchronized external word clock sources (e.g. house clock).

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Where the checkbox is present but greyed-out (and inactive), it means that the Dante device *can* be slaved to an external word clock, but it cannot be set directly from Dante Controller - it must be done via the host device user interface, or via some other method (e.g. third-party control software). If the checkbox is greyed out and populated, it means that the Dante device is currently slaved to the external clock.

If N/A is displayed, it means that the device does not support slaving to an external word clock.

Note: If no clock status information is displayed for a particular device, it can indicate a ConMon (Dante control and monitoring service) failure on the device. The device may need to be reset or restored.

About Clock Domains

Dante Devices that are *not* configured with sample rate pull-up/down operate on the default clock domain, using the default clock. Devices that *are* configured with sample rate pull-up/down operate on separate 'clock domains', which have their own dedicated PTP clocks, adjusted to account for the pulled up/down sample rates.

Clock domains are not physically separated, they all exist on the network simultaneously. Devices with pull-up/down synchronise to the appropriate clock for their pull-up/down setting, and ignore other clocks. Those devices are shown with the relevant pull-up/down value against their Clock Status in the Clock Status tab.

Dante devices can only transmit audio to, and receive audio from other devices on the same clock domain. For example, a device with zero sample rate pull-up/down operates on the default clock domain, and cannot transmit audio to, or receive audio from any devices on the +4.1667% clock domain, or the -1% clock domain, etc.

Up to 5 separate clock domains can be supported at any one time. All clock domains have their own master clock.

About Master Clocks

The Dante network master clock (often also referred to as the 'Grand Master'), is displayed at all times in the center of the toolbar of the Network View. This is the device that is providing the time sync source for all devices on the network.

If multiple clock domains are in use, the master clock for each domain is shown, in a comma-separated list.

The master clock is chosen automatically through an election process, though there are user configurable parameters that allow prioritization of some devices in the master clock election. Configuring a device to have an external word clock source will force that device to become master clock, unless another device has 'Preferred Master' set.

Checking the 'Preferred Master' flag will always result in that device (or the device with the lowest MAC address, if more than one device has been checked) becoming master clock for that domain.

Note: If the master clock device is not directly visible to Dante Controller (for example, if the master clock device is for some reason only connected to the secondary network, and Dante Controller is only connected to the primary network), the 'Master Clock' display in the toolbar may show a MAC address string, instead of the device name.

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Clock Status Monitoring

Dante devices are monitored by Dante Controller to establish the status of their clock synchronization with the Dante network master clock.

There are two levels of monitoring: 'passive' and 'active'.

In passive mode, Dante Controller will report if a clock loses sync (or regains sync) with the master clock.

In active mode, Dante Controller will *also* report if a clock is showing signs of instability. If a device clock is significantly unstable, it can lose sync with the master clock, which will result in the device being automatically muted.

Why would a device clock be unstable?

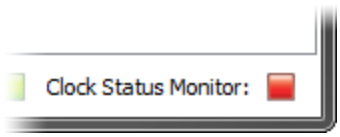
There are a range of network conditions that can interfere with a device's clock stability. These include:

- A switch on the network is configured to use Energy Efficient Ethernet ('Green Ethernet') functionality
- A 100 Mb switch or link is present where a Gigabit connection is required
- One or more switches are incorrectly configured
- A 'problematic' external word clock is being used as the master clock

Refer to the Dante FAQs for more information.

Passive monitoring

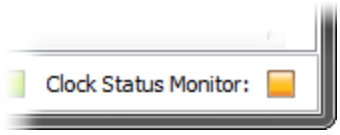
Passive monitoring is on all the time. If a Dante device loses sync with the master clock, or regains sync with the master clock, it reports the event to Dante Controller. Dante Controller records these events in a log file, and also will display an alert: the Clock Status Monitor icon (at the bottom right corner of the main window) will light up red.



Clicking the icon opens the Clock Status Monitor, which includes the clock status event log, and a clock status histogram.

Active Monitoring

When active monitoring is switched on, Dante Controller begins actively monitoring the behaviour of supported devices to identify signs of clock instability. If a clock exhibits significant instability, the Clock Status Monitor icon will light up amber, and a warning event will be recorded in the clock status event log.

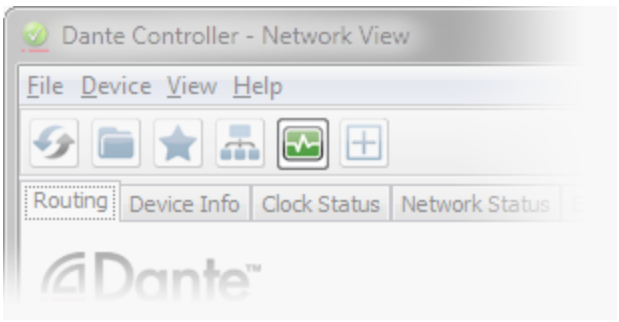


Click the icon to open the Clock Status Monitor.

Active monitoring is off by default. To activate it, click the Clock Status Monitoring button on the main toolbar: 

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When Active Clock Status Monitoring is active, the button is shown in green.



To switch it off, click the button again.

Note: Active monitoring does not affect passive monitoring.

Which devices are supported?

Dante PCIe cards, Dante-MY16-AUD cards, Ultimo (low channel count) devices and devices that include a 'Brooklyn II' Dante module support active monitoring.

If your device is a Brooklyn II device, it will be displayed as the **Model** type in the Dante Information section of the **Device View** > **Status** tab.

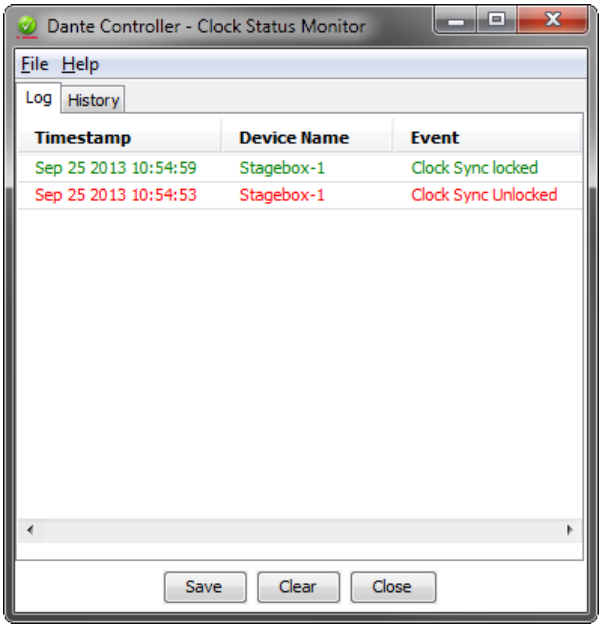
Clock Status Monitor

The Clock Status Monitor includes two tabs, Log and History.

Log

The Clock Status log shows time-stamped clock status events for each device that has been identified as unstable, or has lost or regained sync with the master clock.

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The event types are:

- **Clock Sync Warning**: Indicates that a clock has been identified as unstable, and is at risk of losing sync with the master clock
- **Clock Sync Unlocked**: Indicates that a device has lost sync with the master clock. This will result in the device being automatically muted until it regains sync.
- **Clock Sync Locked**: Indicates that a device has regained sync with the master clock.

To delete all Clock Status log entries, click **Clear** . This will reset the Clock Status Monitor icon to green.

Note: This will also clear all other event log entries (the Clock Status log is a filtered view of the main event log).

Dante Controller will then resume monitoring (unless the Clock Status Monitoring button is switched off).

To save the event log as an xml file, click **Save**.

History

The History tab can be used to establish the stability of device clocks. It shows a histogram of clock frequency offset for the selected device, and the current frequency offset value, updated in real time.

The following information is also displayed:

- Mute status
- Sync status
- External word clock
- Preferred Master status

About Clock Offset

Hardware clocks are based on a vibrating (piezoelectric) quartz crystal. All crystals are slightly different, and vibrate at slightly different frequencies. When a device ('slave') clock wants to sync to a master

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network clock, its frequency must be 'pulled' up or down to match the frequency of the master clock. The amount that the clock's frequency is pulled is referred to as 'offset'.

Hardware clocks can only support a certain amount of offset, referred to as 'pull range'. If the pull range is exceeded, the slave clock will lose sync with the master clock, and the device will be automatically muted.

Software clocks typically use an algorithm to derive a clock from an internal counter. Software clocks can support any amount of offset.

Rapidly-changing offset can also cause a slave clock to lose sync with the master clock.

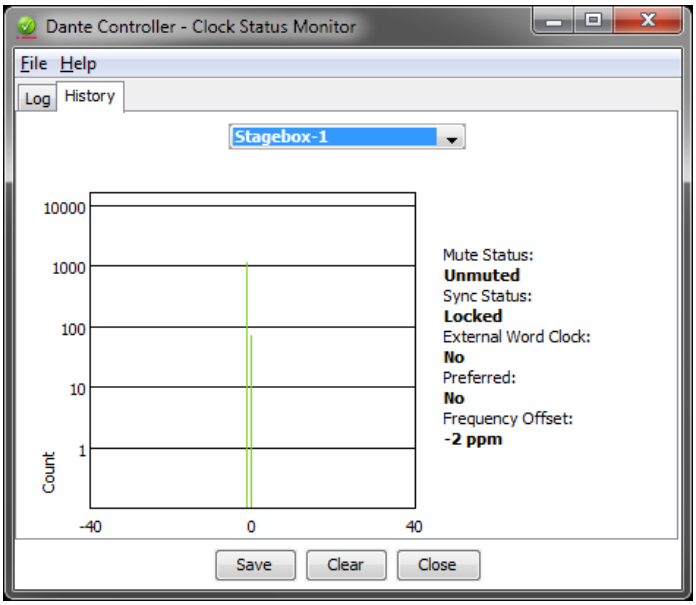
Various factors can destabilise slave clocks by affecting their offset, such as:

- Overloaded network links
- Poorly-implemented EEE (Energy Efficient Ethernet)
- A master clock that is derived from an inaccurate external word clock (one that does not run at its nominal frequency)

About the Histogram

The horizontal axis of the histogram shows the distribution of clock frequency offset measurements against the nominal frequency of the clock, in parts per million (ppm). The zero point of the horizontal axis corresponds to the clock's nominal frequency (i.e. the frequency that the clock is intended to run at - for example, 98kHz).

The vertical axis shows the number of measurements recorded at each data point, on a logarithmic scale.



The histogram is continually updated, with measurements taken roughly once per second.

- To select devices, click the drop-down menu at the top .
- To clear the histogram, click **Clear**.
- To save a png format screenshot of the current data, click **Save**.

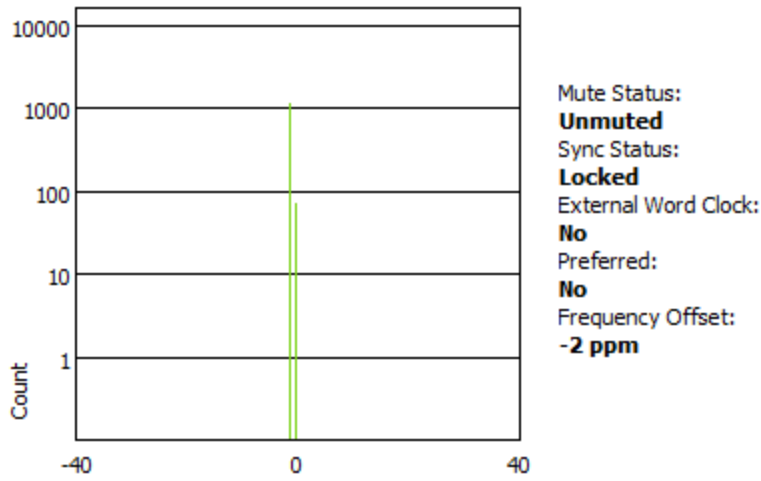
Interpreting the Histogram

The histogram can be seen as an indication of how much work a slave clock is doing to stay in sync with the master clock.

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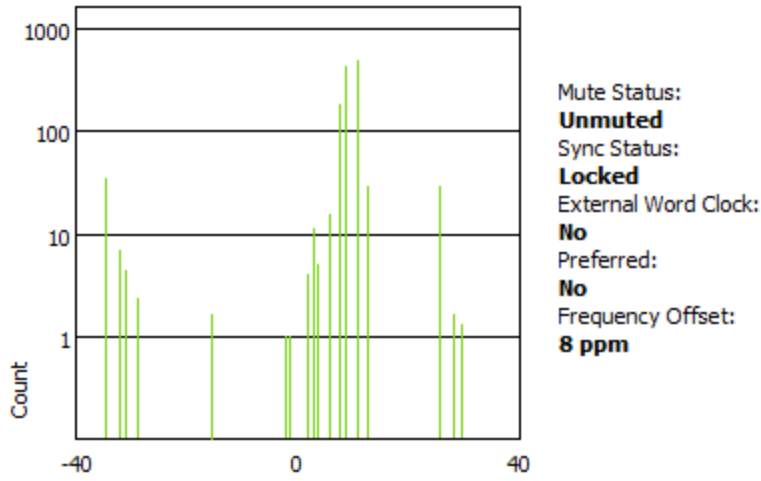
Generally, a stable and accurate clock will show consistently stable offset (with variation in the order of a few ppm). It means that it is not having to change its offset very much to stay in sync.

Show me



A histogram that shows a distributed range of offsets indicates an unstable clock - it is having to change its offset significantly, and often, to stay in sync with the master clock. This can be due to overloaded network links, or poorly-implemented EEE. A device in this state is highly likely to lose sync with the master clock.

Show me

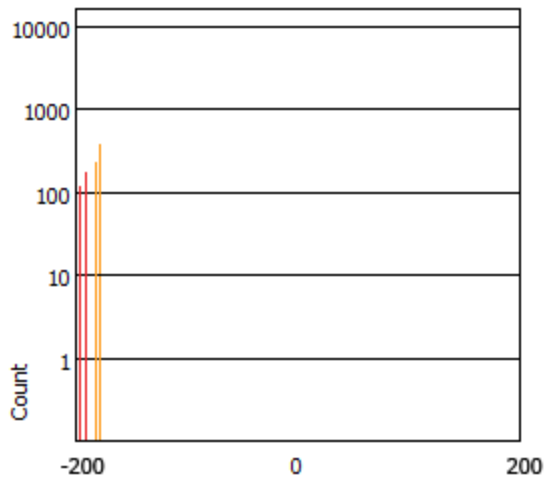


A histogram that shows measurements in amber and/or red indicates a clock that might be *currently* stable, but has little room for manoeuvre; its offset could easily move outside its pull range, at which point it will lose sync completely. This can result when the master clock is derived from an inaccurate external word clock.

Note: Dante Controller can be left running for a few days (or even weeks) to collect clock status data, providing a long-term picture of the stability of your network clocking configuration.

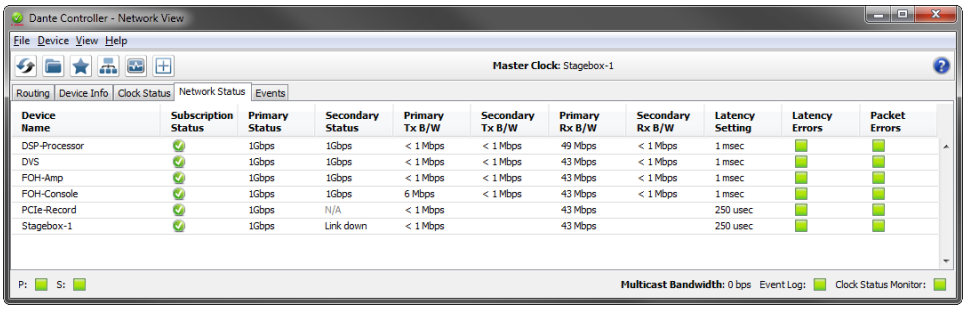
Show me

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Mute Status:
Unmuted
Sync Status:
Locked
External Word Clock:
No
Preferred:
No
Frequency Offset:
-195 ppm

Network Status



The Network Status tab provides a range of network-related information across all devices in the network.

This view includes subscription status, bandwidth and latency information, and can be used to quickly identify any potential network traffic issues.

The tabular view presents the following information, in columns from the left:

Device Name

The device name currently associated with the device.

Subscription Status

The icon in the Subscription Status column displays a summary of subscription states for the device. If any of the device's channels are not successfully subscribed, the relevant icon will be displayed here.

See Subscribing to Audio Channels for information about the various icons that can be displayed in the Subscription Status column.

Primary Status

The Primary Status column indicates the link speed of the primary Dante network interface for the device.

Secondary Status

The Secondary Status column indicates the link speed and status of the secondary Dante network interface for the device (if applicable). 'N/A' indicates that the device does not have a secondary interface. 'Link Down' indicates that the device has a secondary interface, but it is not currently connected.

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Bandwidth Columns

Use the bandwidth columns to see an approximation of transmit and receive traffic over individual device interfaces.

- **Primary Tx B/W**

  The Primary Tx B/W column displays an approximation of the current transmit bandwidth on the primary Dante network interface for the device.

- **Secondary Tx B/W**

  The Secondary Tx B/W column displays an approximation of the current transmit bandwidth on the secondary Dante network interface for the device.

- **Primary Rx B/W**

  The Primary Rx B/W column displays an approximation of the current receive bandwidth on the primary Dante network interface for the device.

- **Secondary Rx B/W**

  The Secondary Rx B/W column displays an approximation of the current receive bandwidth on the secondary Dante network interface for the device.

Latency Setting

Shows the current latency setting for the device.

Latency Errors

The Latency Errors column displays icons representing the recent latency performance of the device.

 A green light indicates that the device is subscribed, and there are no latency problems - i.e. all audio packets are arriving well within the device's latency setting.

 An amber light indicates that audio packets for one or more channels are arriving at or near the limit of the device's latency setting. You may need to increase the device's latency, or reconfigure the network to prevent audio glitches due to packet loss from late-arriving audio packets.

 A red light indicates that one or more audio packets have arrived outside the device's latency setting. This will result in audio glitches. The device's latency setting should be increased, or the network reconfigured (for example, by reducing the number of network nodes in between the transmitter and the receiver).

 A grey light indicates that the device is not currently subscribed.

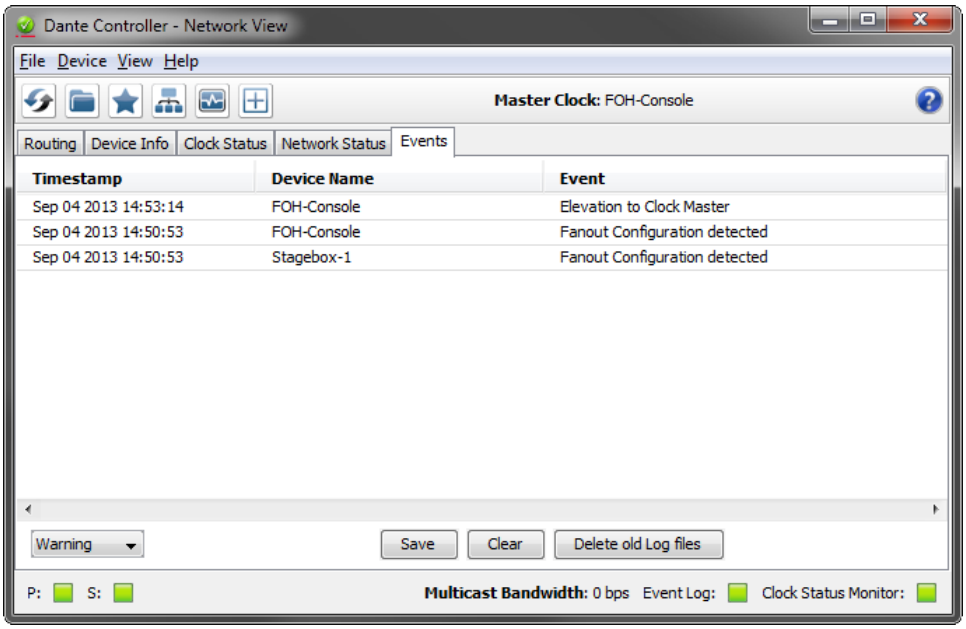
Packet Errors

A red light in the Packet Errors column indicates that one or more audio packets have been corrupted in between the switch and the receiver. This is usually due to a faulty Ethernet cable.

Use the **Clear Counters** button in the Device View > Status tab to clear the packet errors history for a device.

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Events



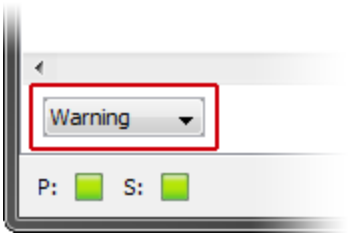
The Events tab provides information on significant changes and failures in the network.

Dante Controller continually monitors Dante devices and the network as a whole. It is able to watch for problematic configurations, unexpected problems and communication failures between itself and Dante network devices. Events are displayed and stored in an event log.

Events fall into one of three categories: Information, Warning and Error.

Filtering the Event List

Use the drop-down menu at the bottom left of the view to filter the events list.



- When set to **Information**, all events are shown.
- When set to **Warning**, only warning and error events are shown.
- When set to **Error**, only error events are shown.

Clearing the Event List

To clear the event list, click the **Clear** button. When new events are detected that match the current filter setting, they are displayed in the event list.

If you have switched to another Network View tab, new events in the event list will also be indicated by a red Event Log LED icon in the Status Bar. Clicking the LED icon will take you straight to the Events tab and will clear the Event Log LED.

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Note: The Event Log LED icon will always remain green while the Events tab is open.

Saving the Event Log

To save the event list, click the **Save** button. The list is saved as a text file with file extension .log. All events in the list are saved (the filter does not apply to saved events logs).

Automatic event logging

Events are also continuously written to a log file. Each time Dante Controller is started, it creates a new log file (with a time-stamped filename, to avoid overwriting previous logs).

You can find the path to these log files under **Help** > **About**. To delete log files more than seven days old, click the **Delete old Log files** button.

Event Classification

The following events are classified as Errors:

- Invalid link local address
- Subnet mismatch on dante interface
- Subnet match with non dante interface
- Multiple addresses with matching subnets
- Subnet conflict of dante interface on primary
- Subnet conflict of dante interface on secondary
- Unknown address error
- Fail Safe Mode
- Unknown device issue
- Elevation to Clock Master
- Fanout Configuration detected
- Mismatched clock pullup subdomain
- Wrong subdomain for pullup
- Unknown subdomain
- Audio mute / Audio unmute
- Clock sync lock / unlocked

The following events are classified as Warnings:

- Resolution Failed
- Elevation to Grand Master
- Multiple external clock sources
- Cannot Elevate to Clock Master
- Clock Sync Warning

The following events are classified as Information:

- Request Timeout Error
- Response Timeout Error
- Demotion from Clock Master

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- Demotion from Grand Master
- Reboot required

Automatic Notification of Device Errors

Dante Controller is able to identify several types of problems that a Dante device may experience. A device that is found to have problems will have its device name displayed in red. Additional information about the problem can be found by double-clicking on the device.

A device displayed in **red** will either have entered **failsafe mode**, or will have an identified issue with its IP configuration. These states are described in more detail below.

A device displayed in **orange** ('Ultimo' low channel count devices only) will have entered **upgrade mode** (see below).

Incorrect IP address configuration

Dante networks use IP Addressing to communicate. Incorrect address configuration can make it hard or impossible for a Dante device to communicate. Dante Controller attempts to identify and report several types of incorrect IP address configuration, including:

- Having multiple DHCP servers on the same network
- Incorrectly configured static IP addresses
- Connecting the secondary interface of a Dante device to the primary network
- Different interfaces on the same device using the same IP address subnet
- Configuring a DHCP server on the primary network to use the IP address range reserved for secondary link local devices (172.31.*.*)

If you need further information, please refer to the Troubleshooting section.

Failsafe mode

A device will enter failsafe mode when the firmware image stored on the board has become corrupted. Although rare, this can occur when:

- The firmware update process is interrupted by power loss or network failure
- The firmware image itself that was used in an upgrade is corrupt

If your device enters failsafe mode, please use the Failsafe Recovery function in the Firmware Update Manager application (if available) or contact your device manufacturer.

Upgrade mode

When some 'Ultimo' devices (technically, those that include an internal Ethernet switch) are upgrading, or have finished upgrading but have not yet been rebooted, they are in 'upgrade mode', and are displayed in orange text in Dante Controller. While in this mode, an 'Issues' tab is visible in the Device View for the device, indicating their current state.

When these devices have had new firmware applied, they must be 'manually' rebooted by the user, via Dante Controller (unlike other devices which reboot automatically as part of the upgrade process). This is because any daisy-chained Dante devices downstream of the upgraded device will not receive audio or firmware update data via that device while it is rebooting. The manual reboot option allows you to control when the device reboots, and thus prevent:

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- Interruption of audio to any downstream daisy-chained devices until it is convenient, and
- Interruption of firmware update data to any downstream daisy-chained devices that are also in the process of updating - which in some devices can lead to the update failing, and the device entering failsafe

When the device has rebooted, audio flow to any downstream daisy-chained devices will resume automatically.

Other Event Notifications

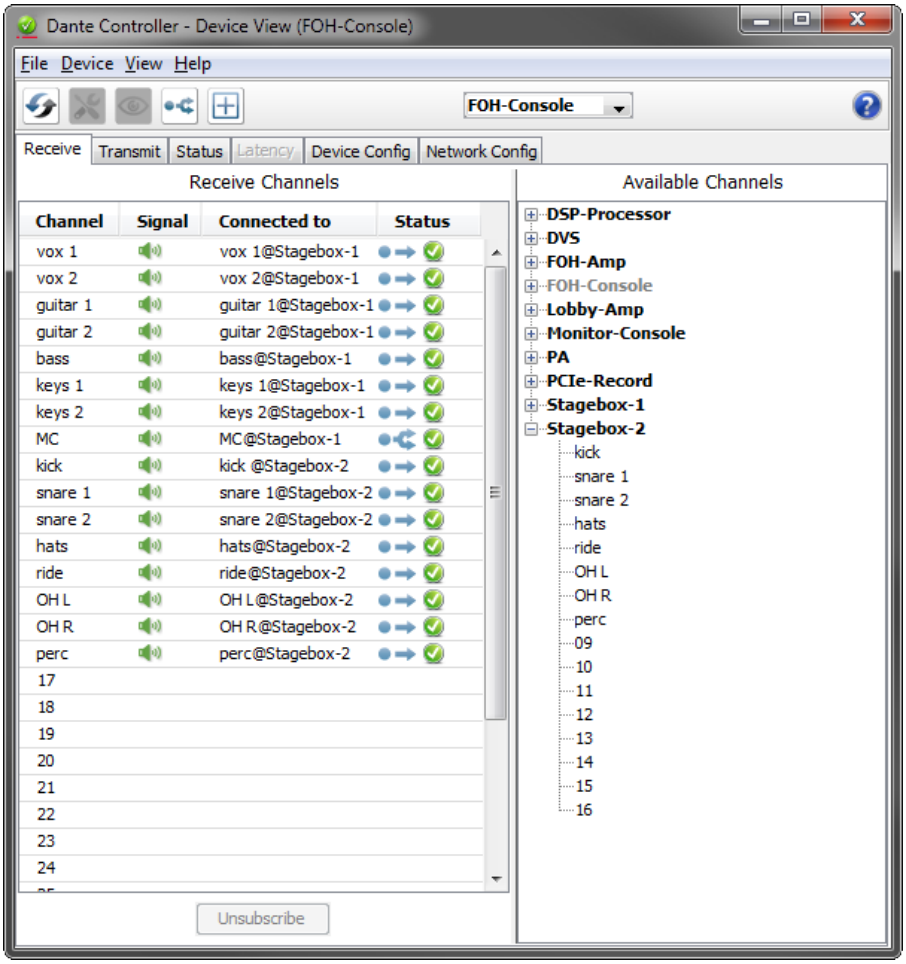
Dante Controller will also notify you of network status, general device events and clock status events, via the LED icons in the Status Bar.

Device View

The Device View is used to view and modify detailed information and settings for a specific device. Device view can be activated by double-clicking a device name in any of the Network View tabs (except Events), or by selecting **Device View** from the **Device** menu (Ctrl + D, or Command + D) in the Network View window. The Device View opens in a new window. Multiple device views can be open simultaneously.

Note: Mac OS X users: Please note that the key combinations shown below are for Windows users. When using Dante Controller on a Mac, please use the 'Command' or 'Apple' key instead of the Ctrl key when following the instructions below, and substitute standard Mac key combinations where applicable – see the Dante Controller menus for details.

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The label of the device being viewed is displayed in the middle of the toolbar. In the screenshot above, FOH-Console is the device being displayed in the drop-down list box.

The device viewed can be changed by selecting another device from the drop-down list.

Multiple Device View windows may be opened from the Network View, so that several devices can be examined simultaneously.

The Device View displays some or all of the following tabs, allowing you to see different information relating to a specific Dante device:

- Receive: Display and configure device's receive (Rx) channels
- Transmit: Display and configure device's transmit (Tx) channels including multicast
- Status: Device software, clock and network status information
- Latency: View latency histograms (supported devices only)
- Device Config: Rename device, change sample rate and set other attributes (as relevant to device type)
- Network Config: View and edit network configuration
- Issues: Displays information for devices in failsafe mode, or upgrade mode (upgrade mode is used by 'Ultimo' low channel count devices only). Not usually visible.
- Baseboard: Only available when the Dante device is mounted on a Dante PDK audio baseboard (**NOTE**: the device must be in SPI Master mode)

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Device View Menu bar

The menu bar in the Device View contains the following menus:

File

- Close Window

Device

- Refresh: Refreshes the displayed network / device data
- Create Multicast Flow

View

- Show/Hide Channel Groups

Help

- About: Shows Dante Controller version and current log file
- License: Displays the license text
- Contents: Opens a help window and displays help contents

Device View Toolbar

The Device View toolbar contains the following buttons:

	**Refresh**	Re-load routing and configuration information for the current device.
	**Web Config**	Some Dante devices can be configured via a web interface. This button opens a web browser window which can be used to perform functions such as firmware upgrades. This feature is not supported on all Dante devices.
	**Identify**	Identify the current device by, for example, causing its LEDs to flash. Note that this feature is not supported on all Dante devices.
	**Multicast**	Configure multicast transmit flows on the current device.
	**Channel Groups**	Activates / deactivates Channel Groups.

The toolbar also provides a drop down list of all available devices on the network, which allows you to switch the Device View to a different device.

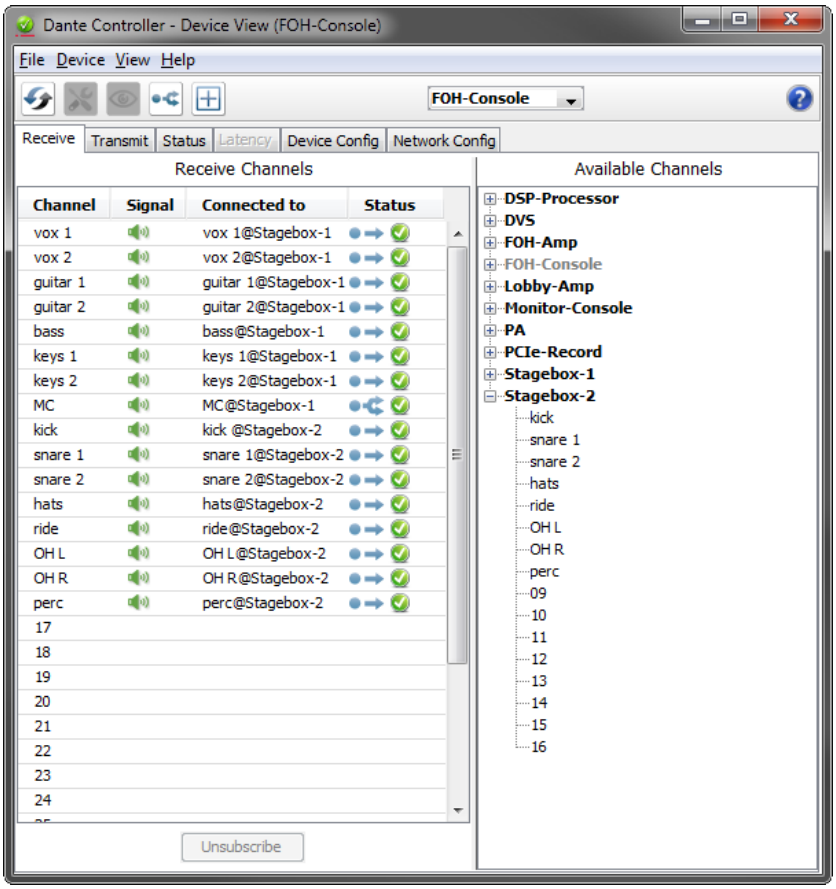
Device View Tabs

The Device View is split into tabs, some of which are only applicable to certain devices. Each tab is described in detail below.

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Receive Tab

The Receive tab displays a list of all subscribed and dormant receive channels on the current device, plus subscription information for the subscribed channels. It also allows the creation of subscriptions from the Available Channels list.



The tab is split into two panes: Receive Channels, and Available Channels.

Receive Channels

The Receive Channels pane contains four fields:

- **Channel**: Lists the receive channel labels for the current device. These can be edited here to rename the channel.
- **Signal**: Supported devices will also show the following channel metering icons, indicating the presence of audio on subscribed channels:

	Channel is either muted, or receiving audio at less than -61dbFS
	Channel is receiving audio between -61dbFS and 0dfFS
	Channel is clipping

Which devices support channel metering?

Currently, Brooklyn II and PCIe devices support channel metering in Dante Controller. You can check your

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device type in the Device Info tab.

- **Connected To**: Lists the Tx channel that the receive channel is currently subscribed to.
- **Status**: Shows the status of both primary and secondary subscriptions, using the following icons:

	Subscription is OK and audio should be flowing
	Subscription is unresolved - usually because the transmitting device has been removed from the network, or is switched off
	No subscription, or a subscription error
	Subscription is via unicast connection
	Subscription is via multicast connection

Subscriptions can show several symbols in the Status column. Common status icon combinations and their meanings are as follows:

	Unicast device successfully subscribed to a transmitter
	Redundant device successfully subscribed on both primary and secondary via unicast
	Redundant device successfully subscribed on both primary and secondary via multicast
	Redundant device successfully subscribed on primary only via unicast. This is typically seen when the secondary interface is not connected

Available Channels

The Available Channels pane lists the devices and advertised channels available on the network. Devices that are greyed out indicate that this receiver cannot subscribe to those channels or devices. This is typically because of a mismatch in parameters (e.g. sample rate incompatibility etc.), or because a device cannot route audio to itself.

For devices with many channels, you can click the Channel Groups button to group available channels into sets of 16.

Creating Subscriptions

Subscriptions are created by selecting a channel from the Available Channels list in the right-hand pane of the Receive Tab, then dragging and dropping it onto the appropriate receive channel in the left-hand pane of the Receive Tab.

Multiple channels can be selected and then dragged and dropped onto the Receive Channels pane, to make several subscriptions simultaneously. You can also drag and drop channel groups to make bulk subscriptions.

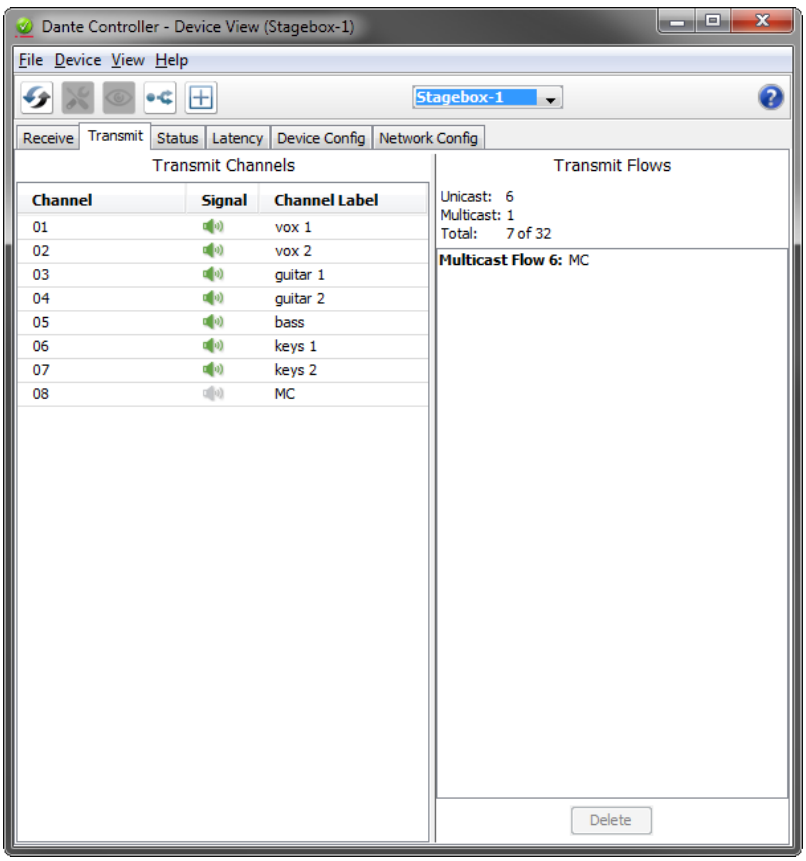
Changing Receive Channel Labels

To change a receive channel label, click the label and type in the new value.

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Transmit Tab

The Transmit tab is used to inspect and modify the transmit configuration of a device.



The Transmit Tab is arranged in two areas:

- **Transmit Channels**: The area on the left pane of the tab shows the Tx channels for the device, and any user-defined channel label. It allows you to create labels for transmit channels. Input to the table is filtered to prevent illegal characters from being used in channel labels.

  Supported devices will also show the following channel metering icons in the **Signal** column, indicating the presence of audio on subscribed channels:

	Channel is either muted, or receiving audio at less than -61dbFS
	Channel is receiving audio between -61dbFS and 0dfFS
	Channel is clipping

- **Transmit Flows**: The area on the right pane of the tab indicates how many unicast flows are currently in use, as well as the multicast transmit flows that have been configured on the device. Multicast flows are listed in ID order, including the channels contained within the flow.

Note: Unicast flow details are not displayed in the transmit flow window. The total number of transmit flows currently in use is shown at the top of the pane. The total number of flows is the sum of

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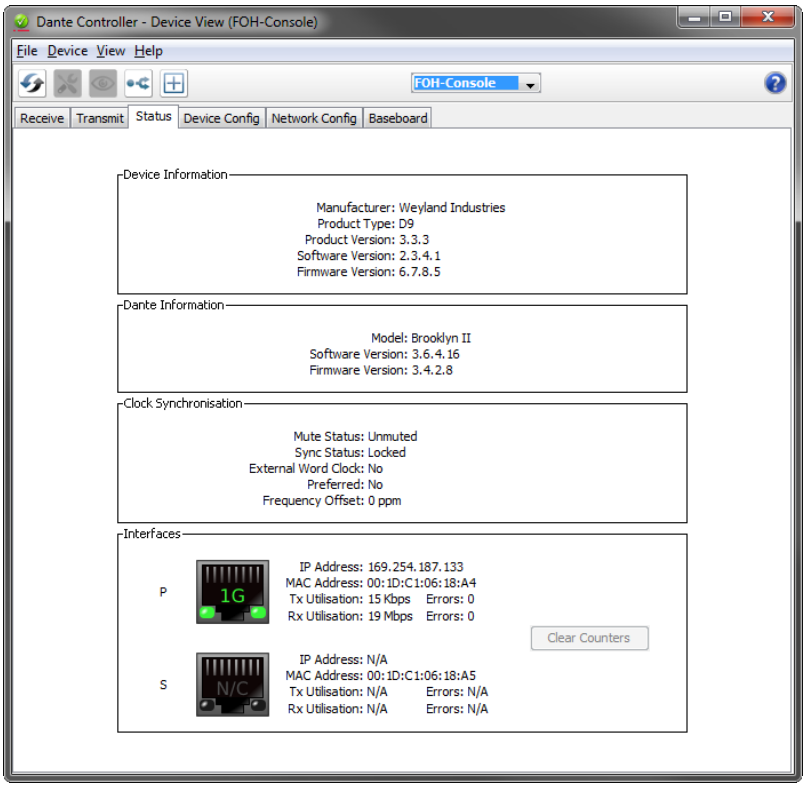
the unicast and multicast flows in use. The maximum number of flows that the device supports is also shown (32 in the screenshot above).

Changing Tx channel labels

To change a Tx channel label double click on the label and type in a new one. Tx channel labels must be unique on a single device.

Status Tab

The Status tab is used to obtain current information about a Dante device.



The tab is divided into sections. The information presented on this tab can be very useful when investigating networking or clocking issues in the system. The Refresh button can be used to update this information if required.

Note: Not all Dante devices support the display of all of this information.

Device Information

This provides the following general information about the device:

- **Manufacturer**: The name of the device manufacturer.
- **Product Type**: The type of device.
- **Product Version**: The product version.

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- **Software Version**: The version of the manufacturer software running on the device.
- **Firmware Version**: The version of the manufacturer firmware running on the device.

Dante Information

This provides Dante-specific information about the device:

- **Model**: The Dante device type.
- **Software Version**: The version of the Dante software running on the device.
- **Firmware Version**: The version of the Dante firmware running on the device.

Clock Synchronization

This provides the following information about device clocking:

- **Mute Status**: 'Muted' indicates that the device is has been automatically muted (due to a clock synchronisation problem, or because the external word clock is invalid). 'Unmuted' indicates that the device is not muted, and audio is flowing normally.
- **Sync Status**: 'Locked' indicates that the device is locked to the network PTP clock. 'Not Locked' indicates that the interface has not achieved lock with the network PTP clock.
- **External Word Clock**: 'No' indicates that the device has been configured to use the internal clock source. 'Yes' indicates that the device has been configured to accept an external word clock source. NOTE: If the Dante device is configured to accept an external word clock source, it is important to make sure that the host equipment has been configured to provide its word clock to the Dante device. Check your product manual for more information.
- **Preferred**: 'No' indicates that the card has not been set to preferred master mode. 'Yes' indicates that the card is set to preferred master mode.
- **Frequency Offset**: Indicates the offset from the network clock master measured in parts-per-billion.

Primary Interface

Provides the following information about the primary network interface:

- **IP address**: The IP address currently assigned to the interface
- **MAC address**: The Media Access Control address of the interface, associated with the Ethernet layer
- **Tx Utilization**: Shows the current total transmit bandwidth in use
- **Errors**: (on the same line as Tx utilization) shows the number of transmit Cyclic Redundancy Check (CRC) or packet errors detected since the device was last started
- **Rx Utilization**: Shows the current total receive bandwidth is use
- **Errors**: (on the same line as Rx utilization) shows the number of receive Cyclic Redundancy Check (CRC) or packet errors detected since the device was last started



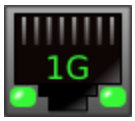
Note: The Rx Utilization includes not only network traffic destined for the Dante device, but any other multicast or broadcast traffic received at this network interface.



Note: As a rule of thumb neither the Rx nor the Tx utilization should exceed about 85% of the link speed in order to guarantee good clock synchronization performance (links are full duplex).

The graphic also indicates the speed and connected state of the interface as follows:

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Indicates that the link is operating at 1Gbps



Indicates that the link is operating at 100Mbps



Indicates that the link is not connected, or that there is an error. The IP address will read N/A, and Tx and Rx utilization will be 0 kbps.

Clear Counters: Click this button to reset the packet errors history for the device.

Secondary Interface

This provides the same information for the secondary interface that is provided for the primary interface, as described above.

Note: The secondary network interface will only be displayed if the device supports redundancy.

Latency Tab

For supported devices, the Latency tab displays histograms of audio packet latency for each transmitter that the device is subscribed to.

Which devices support latency monitoring?

Newer Brooklyn II, PCIe and Ultimo devices support latency monitoring in Dante Controller. You can check your device type in the Device Info tab.

About Latency and Packet Loss

Latency is used to account for the delay between an audio packet leaving the transmitter, traversing the network (potentially through multiple switches) and reaching the receiver.

If a receiver's latency setting is too low, audio packets will not have time to get from the transmitter to the receiver before they are supposed to be played out. When this happens, the receiver will drop packets (i.e. it will throw packets away, because they are 'late to the party').

Packet loss results in audio glitches, so it is very important to ensure that all receivers have their latency set high enough to prevent packet loss.

Setting device latency too high, however, can interfere with low-latency applications (for example, real-time monitoring when recording vocals), so it is sometimes important to find a balance between low latency and guaranteed audio integrity.

The Latency tab can be used to identify:

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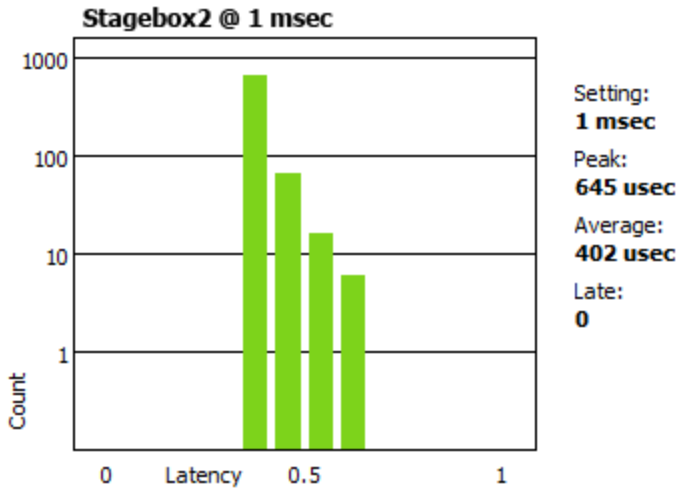
- Devices that are dropping packets because their latency is set too low
- Devices that are at risk of dropping packets because their latency is set too low
- Devices that could potentially have their latency reduced (if required; generally, the default Dante latency of 1ms is more than adequate for low-latency applications)

About the Histogram

The transmitter's name is displayed at the top of the histogram, along with the latency value against which the histogram is reporting.

The horizontal axis shows the distribution of audio packet latency measurements from the transmitter. The vertical axis shows the number of measurements recorded at each data point, on a logarithmic scale.

Measurements are taken at roughly 1 second intervals, from when Dante Controller is started.



To clear the histogram, click **Clear**. Latency measuring will then restart.

To save the histogram as a png image, click **Save**.

Note: If any subscriptions are via multicast flows, there may be two histograms displayed for one transmitter: one histogram for the unicast flows, and one for multicast. This is because multicast flows always use a latency of 1ms. If the receiver is set to a latency other than 1ms, two histograms will be displayed.

The following information is also displayed:

- The latency **Setting** for the histogram. In most cases, this will be the same as the latency setting on the receiver. However, for some subscriptions, Dante will automatically apply a different latency. For example:
  - Multicast flows are automatically set to a minimum of 1ms
  - If a transmitter does not support the latency set on the receiver (i.e. it can't guarantee delivery within the required latency), Dante will increase the latency to the lowest setting supported by the transmitter. Ultimo devices, for example, support a minimum latency of 2ms, so subscriptions to Ultimo devices will use a minimum of 2ms latency.

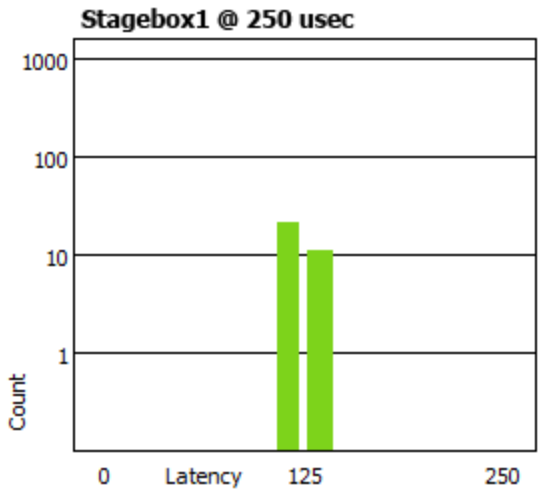
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- The **Peak** latency since measuring started
- The **Average** latency since measuring started
- The number of measurements taken that included one or more **Late** packets (note that each measurement typically includes many packets)

Interpreting the Histogram

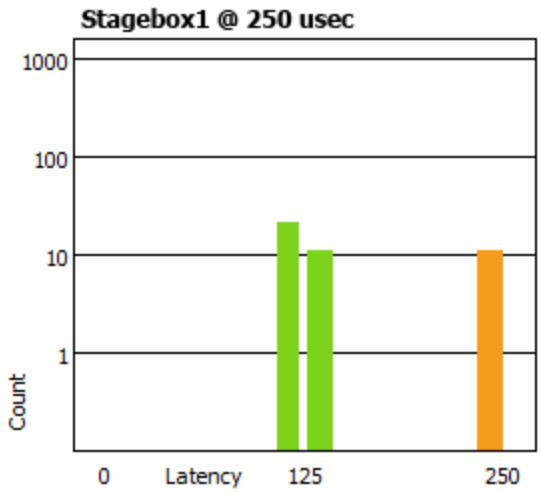
If all bars are green and falling well within the limit of the histogram (i.e. towards the left or middle of the histogram), it indicates that the latency setting for the receiver is set high enough to prevent packet loss.

Show me



If any bars are amber, it means that some packets are arriving near the limit of the latency setting. Network traffic fluctuations could potentially lead to extra delay which could cause packets to arrive late. A histogram of this type indicates that the receiver latency should be increased if possible.

Show me

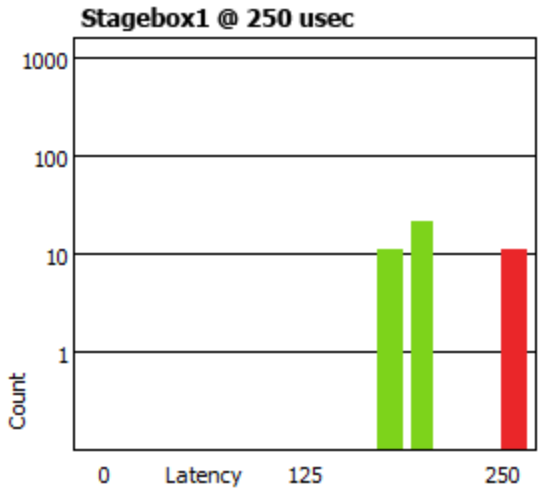


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If any bars are red, it indicates lost packets, and audio loss. The receiver latency should be increased, or the network reconfigured.

Note: Dante Controller can be left running for a few days to collect latency data, providing a long-term picture of the latency performance of your network configuration. This is especially useful after any network infrastructure upgrades, or after the addition of more end point load in a given network, to determine if QoS tuning or increased capacity may be required at the network switch level.

Show me

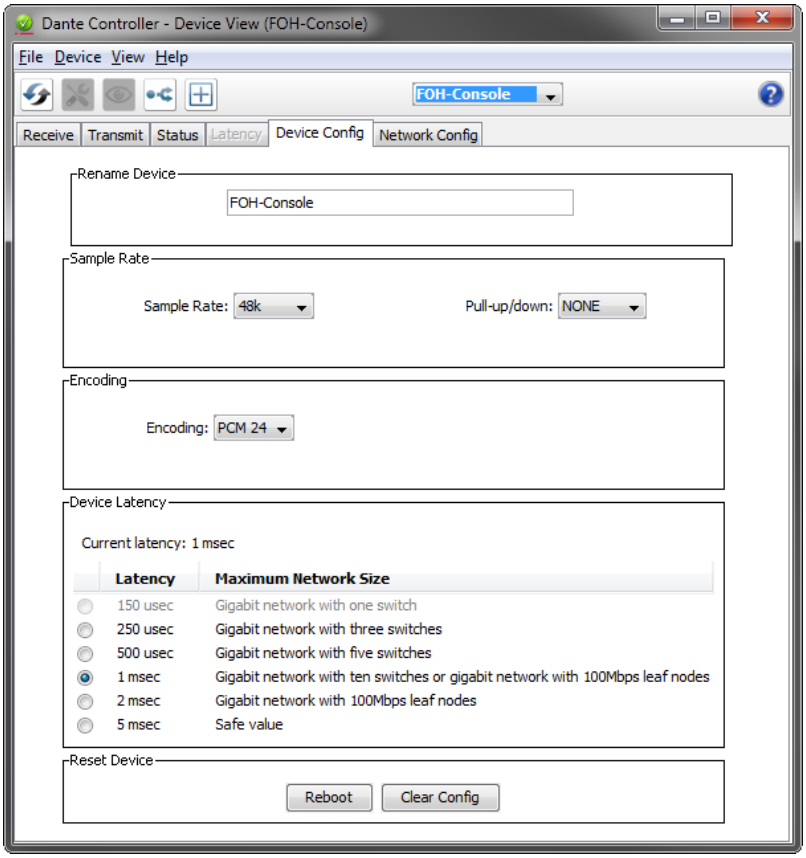


Device Config Tab

This tab on the device view window allows you to configure device specific parameters. The specific options available will depend on the capabilities of the device. In the case where a device does not support configuration via Dante Controller, the tab will be disabled.

Note: Dante Virtual Soundcard does not have a Config Tab available on Dante Controller. The Dante Virtual Soundcard User Interface on the PC or Mac must be used to configure these devices.

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Configurable Parameters

Rename Device

Allows you to enter a new Dante 'friendly name' for the device. The text field displays the current name.

To change the device name, enter a new name in the text field and press **Enter**.

See Device Names and Channel Labels for information about name conflicts and device name rules.

Sample Rate

- Shows the current sample rate of the device, and allows you to change the operating sample rate of the Dante device. This may require the device to be rebooted to take effect. All sample rates supported by the device are shown in the drop down menu.
- Shows the current pull-up/down setting for the device, and allows you to change the pull-up/down setting. The pull-up/down setting can be used to adjust the sample rate of the device to synchronise audio with video that has undergone frame rate conversion. For example, to synchronise Dante audio with video that has been converted from 24 fps to 25 fps, set the sample rate pull-up/down for any relevant Dante audio devices to +4.1667%.

Note: Changing the sample rate pull-up/down for a device places that device in a dedicated clock domain. Dante devices can only transmit audio to, or receive audio from other devices on the same clock domain. See Clock Status View for more information.

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Device Latency

Shows the current device latency setting, and allows you to change the operating receive latency for the selected device. Select a value and click OK to apply the latency to all flows that the device is receiving.

Note: The 150 µsec setting is unavailable for devices that include an internal network switch.

Warning: changing the latency value will cause disruption in the audio while the flows are re-established at the new latency setting.

Reset Device

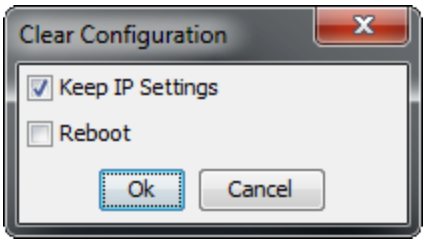
Allows you to remotely reboot the Dante interface, and also to reapply factory settings (Factory Reset). Rebooting the Dante device may also require a reset of the host audio equipment containing the device.

Factory Reset wipes the following device configuration settings:

- User-defined device name
- User-defined channel labels
- Clock configuration (clock master / external clock master setting)
- Static IP addresses
- Redundancy configuration
- Sample rate setting (including pull-up/down)
- Latency setting
- Any existing audio routes

Supported devices allow you to 'Clear Config' instead of Factory Reset. Clear Config wipes the same configuration settings listed above, but allows you to optionally keep the IP settings (i.e. retain the Dante Redundancy settings, and any static IP addresses currently configured in the Network Config tab).

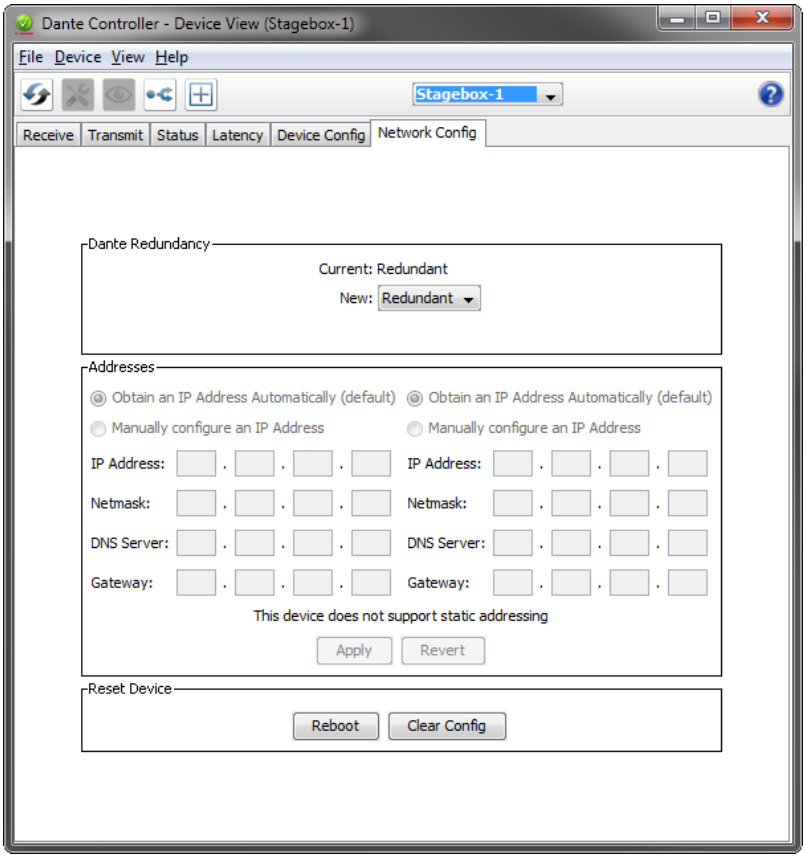
A reboot is required after clearing the configuration for the changes to take effect. Some devices will allow you to automatically reboot after clearing the configuration. If this option is not available, a manual reboot is required.



Network Config Tab

Use the Network Config Tab to toggle supported devices between Redundant and Switched modes, and to specify static IP addresses for a device's Ethernet ports.

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Dante Redundancy / Switch Configuration

Depending on the manufacturer's configuration of a device, it may be possible to toggle the device between Redundant and Switched modes, or to select a Switch Configuration.

Redundant

When a device is set to Redundant, the device will duplicate Dante audio traffic to both Ethernet ports, allowing the implementation of a redundant network via the secondary port. Not all devices support redundancy.

Switched

When a device is set to Switched, the secondary Ethernet port will behave as a standard switch port, allowing daisy-chaining through the device.

Switch Configuration

Certain devices support specialist switching and/or redundancy configurations for the Ethernet ports. For these devices, the top pane of the Network Config tab will be titled 'Switch Configuration'. Please refer to the manufacturer's technical documentation for information on the supported switching configurations for the device.

Addresses

Dante devices obtain IP addresses automatically by default, and in the vast majority of circumstances there is no need to change the Addresses settings. However, static IP addresses can be assigned if

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necessary.

To assign a static IP address:

1. Select 'manually configure an IP Address' for the appropriate Ethernet port.
2. Enter the IP Address and Netmask.
3. Click **Apply**.

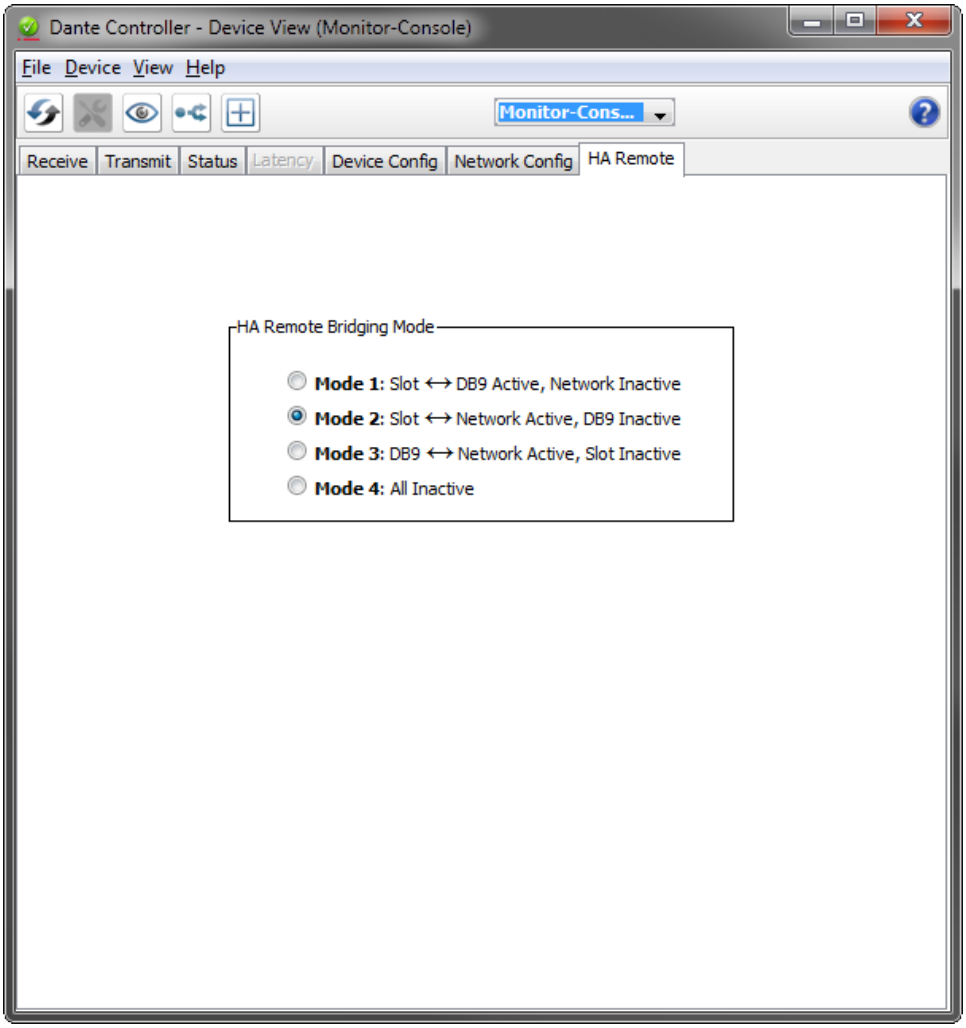
The DNS Server and Gateway settings are optional - the device will use network defaults if they are not specified.

Click **Revert** to revert back to the previous settings.

Note: Assigning static IP addresses requires a device reboot.

HA Remote

For supported devices (Dante-MY16-AUD cards v3.3.9 and up), the Device View also includes an HA Remote tab. The HA Remote tab allows the selection of the HA Remote bridging mode for the device.

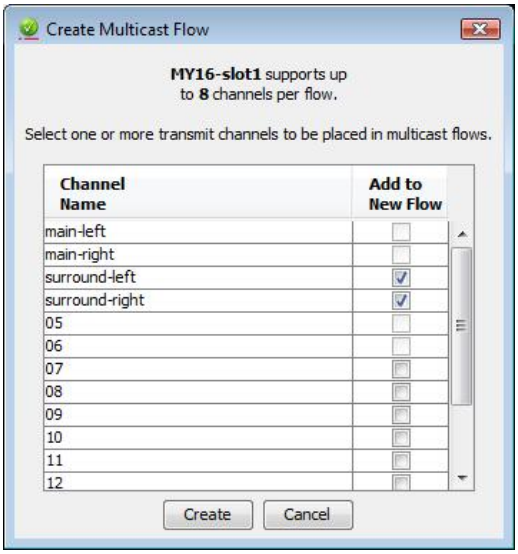


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HA Remote is a proprietary serial control protocol used by Yamaha products. For more information about HA Remote bridging modes, please download the latest version of the Dante-MY16-AUD user guide from the Yamaha website.

Multicast Transmit Flow Configuration

Click the Multicast Configuration button in the Device View to open the **Create Multicast Flow** dialog.



The window shows a list of the Tx channels for the device, and allows you to add them to the new multicast flow that is being created, by checking the tick box next to each channel name. Once you have selected all the channels required, create the multicast flow by clicking the **Create** button at the bottom of the dialog box. To abandon creating a new multicast flow, click **Cancel**.

A single multicast flow can contain up to the maximum supported channels per flow for this device. This is displayed at the top of this window, and is 8 channels for this device. If you select more than the maximum allowed channels per flow, multiple flows will be created.

Once a flow has been created, it will appear in the list of flows in the transmit pane, along with the channels contained within that flow. Channels cannot be added to or removed from existing flows. Each time the dialog is used to select additional channels, a new multicast flow will be created.

By default, Dante receivers will connect to a multicast flow if one exists that contains the required channel (s), rather than creating a new unicast flow.

If a channel that does not form part of an existing multicast flow is added to a new multicast flow, any existing unicast subscriptions to that channel will automatically switch over to use the new multicast flow.

Care should be taken when deleting a multicast flow, as the existing subscriptions will convert back to unicast. This has the potential to result in exceeding the link capacity or maximum number of flows at the transmit device, as multiple unicast flows will be established between the transmitter and its receivers. It may be advisable to remove some or all of the audio routes prior to deleting the multicast flow.

A good rule of thumb is to use multicast when there are more than two receivers for a specific audio channel. You should also assume that the flow will flood throughout the entire network, and therefore consume bandwidth on all network links.

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Note: Certain Ethernet switches support IGMP (Internet Group Management Protocol), a protocol that provides the ability to 'prune' multicast traffic, so that it travels only to those end destinations that require that traffic. If this is the case, and IGMP is correctly configured on all the Ethernet switches, then multicast audio will not flood throughout the network, but will instead be sent only over the links required to deliver it to subscribed devices.

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Presets

Dante Controller supports the saving and loading of Dante network routing and device configurations, known as 'presets'. A preset file contains configuration and routing parameters for some or all of the devices in the network.

Preset files are saved as xml, and can be edited offline. They are also 'device-agnostic' - they can be shared between networks with different physical devices.

You can use presets to:

- Backup and restore network configurations
- Quickly switch between saved network configurations
- Copy a Dante network configuration from a 'lab' or test network to a live or production network
- Create network configurations for special, or periodic events, and then switch back to the standard configuration when desired
- Quickly apply one or more configuration settings to a number of devices simultaneously - for example, setting all devices on your network to the same sample rate (global configuration)
- Use Dante Controller as an off-line editing tool – off-line edit the saved preset configuration for reuse in new network configuration deployments

About Device Roles

Presets introduce the concept of 'device roles'. When a preset is saved, the configuration and routing for each selected device is saved into the preset as a device role, with the same name as the device from which it was created.

The role is not 'tied' to its originating device. When a preset is loaded into Dante Controller, each role can be applied to its originating device, *or* to another device (even if it does not support exactly the same functionality). It is a transferable set of device configuration and routing parameters.

For example:



Dave the sound engineer has gigs on Friday and Saturday night at a local venue. On Friday evening before the gig, he sets up his Dante network at the venue, and when he's happy with it, he saves the preset.

After the gig, Dave's annoying boss turns up and steals the mixing console for another job. Dave, however, has a friend with a similar console (conveniently from the same manufacturer, and with a higher channel count) which he can borrow for Saturday's gig.

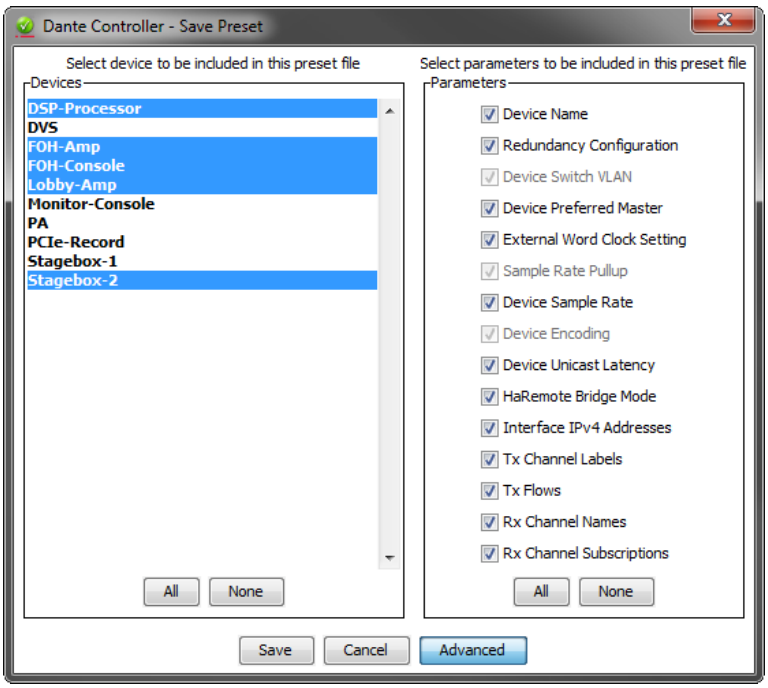
The next night, Dave simply connects the new mixing console to the network, in place of the old one, and reloads his preset. The new console is now configured exactly like the old one - including all of the relevant channel labels, and audio subscriptions - and the network functions exactly as before, without any need for further configuration. The gig goes really well, and the band takes Dave out for dinner.

If a role is applied to a device that is different from the role's originating device - for example, a role for console model A is applied to console model B - Dante Controller will identify any issues that might arise

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(such as unsupported sample rates) and will display those issues so they can be addressed - or ignored, if they are not important.

Saving Presets



To save a Preset that includes all device parameters:

1. Click the 'Save Preset' button in the main toolbar: 
2. Select the devices that you wish to include in the preset.
   Click **All** to select all devices, or **None** to clear all selections.
3. Click **Save**.

To save a Preset that includes a selection of device parameters:

1. Click the 'Save Preset' button in the main toolbar.
2. Click **Advanced**.
3. Select the devices that you wish to include in the preset.
4. Select the parameters that you want to save for the selected devices.
5. Click **Save**.

Presets are saved as an xml files, which can be manually edited if required, using a text editor.

Parameter Rules

Rx Subscriptions

If 'Rx Subscriptions' are included in the preset, and applied to the target system (i.e. 'Rx Subscriptions' is checked in the Advanced > Parameters column when the preset is saved, and also checked in the Preset

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Elements column when the preset is applied):

All subscriptions for all matched devices on the target system will be updated to match the source system. This means that:

- All subscriptions saved into the preset will overwrite the respective subscriptions for matched devices on the target system. If the subscriptions are identical, they are maintained.
- Any existing subscriptions on the target system that do not exist in the preset will be removed, regardless of whether any subscriptions are defined in the preset.

Tx Flows (multicast flows)

The behaviour for TX Flows and Tx Channel Labels is different to that of Rx Subscriptions.

If 'Tx Flows' are included in the preset, and applied to the target system (i.e. 'Tx Flows' is checked in the Advanced > Parameters column when the preset is saved, and also checked in the Preset Elements column when the preset is applied):

- All Tx flows saved into the preset will overwrite the respective Tx flows for matched devices on the target system.
- Any Tx flows on the target system that do not exist in the preset will be removed, if at least one Tx flow is defined in the preset. Otherwise (i.e. if no Tx flows are defined in the preset), all Tx flows on the target system are maintained (note this is different to how Rx subscriptions are handled).
- Multicast flows and/or transmit channel names can be manually deleted from the target device prior to or following the preset application.

Tx Channel Labels

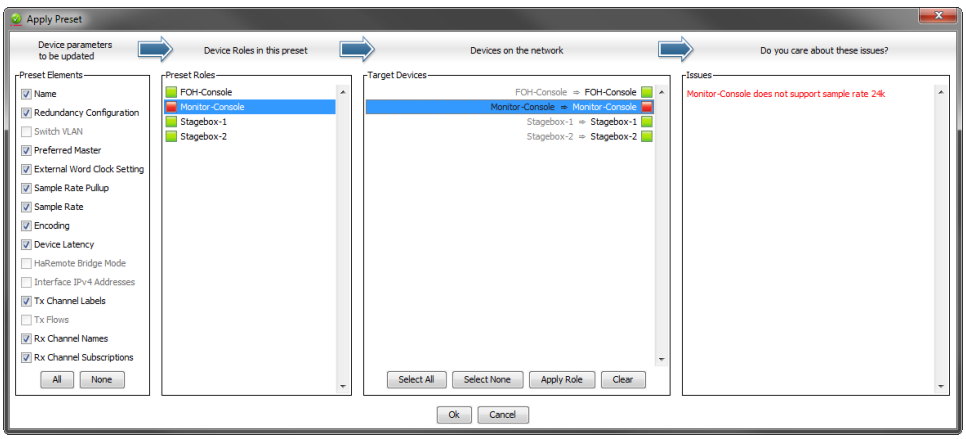
The behaviour for Tx channel labels is identical to the Tx flows behaviour described above.

Applying Presets

To load and apply a saved preset, select **File** > **Load Preset** from the main menu (Ctrl + L).

Legacy preset files are supported.

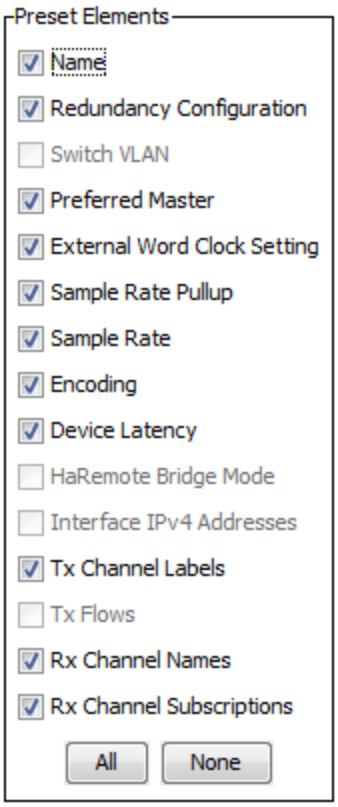
The 'Apply Preset' dialogue is arranged in 4 columns, representing the logical steps in applying a preset (from left to right).



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Preset Elements

Use the Preset Elements column to select the parameters that you wish to apply from the preset to the target network.

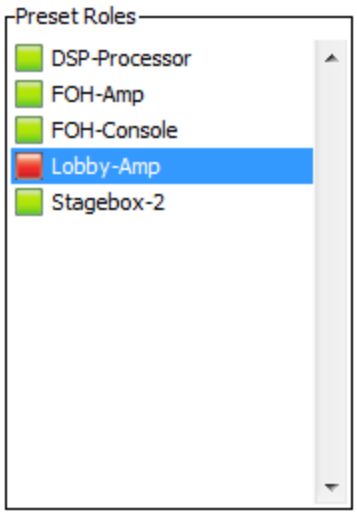


If the target network is not identical to the original network (from which the preset was saved), some elements might not be applied successfully. For example, if some devices on the target network do not support the same range of sample rates as the devices on the original network, you could choose not to apply the 'Device Sample Rate' element, and change the sample rates manually instead, once the preset has been applied.

Preset Roles

The Preset Roles column lists the roles that were saved in the preset.

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You can apply a role to the same physical device from which it was created (if it exists in the target network), or to a different device in the same network, or to another device in a new network.

When a role is applied to the same physical device, or a device of the exact same model, the configuration and routing should be replicated perfectly (although some subscriptions may be 'broken', if the relevant transmitters are not also present on the target network).

Note: This makes presets an ideal way to backup and restore configurations for relatively static networks.

If a role is applied to a different device model or a different type of device, the configuration and routing may not be replicated exactly - the success of the role assignment will vary depending on the functionality and channel support of the target device.

Applying a role to a *fundamentally* different type of device may not be very successful. For example, applying a role for a fully-subscribed 32-channel mixing console configured at 96kHz to a 2-channel amplifier that only supports 48kHz will be problematic - only two channels can be subscribed (assuming the transmitters are also present), and the sample rate will be rejected.

You can apply a role to multiple devices. You cannot apply multiple roles to one device.

To see which devices a role has been assigned to, click the role. The assigned device/s will be highlighted in the 'Target Devices' column.

Automatic Assignments

Dante Controller will automatically assign roles to devices, based on the following rules:

- If there is a perfect device match (i.e. the physical device in the original network from which the role was created is also found in the target network), the role is assigned automatically
- If there is a device name match, the role is assigned automatically
- If a perfect match or a device name match cannot be made, the role will be assigned automatically to a device of the same manufacturer and model, assuming there is an unassigned device of that type

Removing Assignments

To remove an assignment, select the target device and click **Clear** or press the Delete key on your keyboard.

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Manual Assignments

To manually apply a role to a device:

- Drag the role onto the device, or:
- Select the role in the 'Preset Roles' column and the target device/s in the 'Target Devices' column, and click **Apply**.

The LED icons against each role indicate the assignment status of the role.

A grey icon indicates that the role has not been assigned to any target devices.

A green icon indicates that the role has been successfully assigned to one or more target devices.

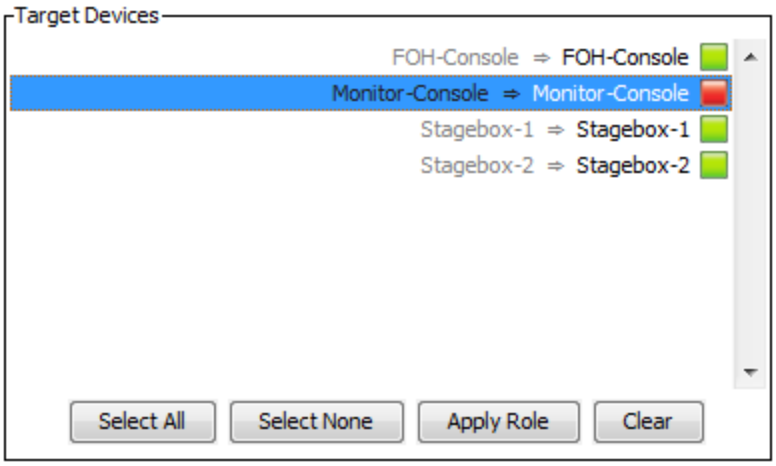
An amber icon indicates that the role has been assigned to one or more target devices, but there is a warning condition associated with one or more of the assignments.

A red icon indicates that the role has been assigned to one or more target devices, but there is an error condition associated with one or more of the assignments.

A black icon indicates that the role has been assigned to a target device, but the assignment will have a potentially terminal effect on the operation of the network. A preset cannot be applied if any terminal issues are identified.

Target Devices

The Target Devices column lists the device names of devices on the currently connected Dante network, and the roles that have been assigned to them (if applicable).



The LED icons against each device indicate the assignment status of the device.

A grey icon indicates that the device has not been assigned a role.

A green icon indicates that the device has been successfully assigned a role.

An amber icon indicates that the device has been assigned a role, but there is a warning condition associated with the assignment.

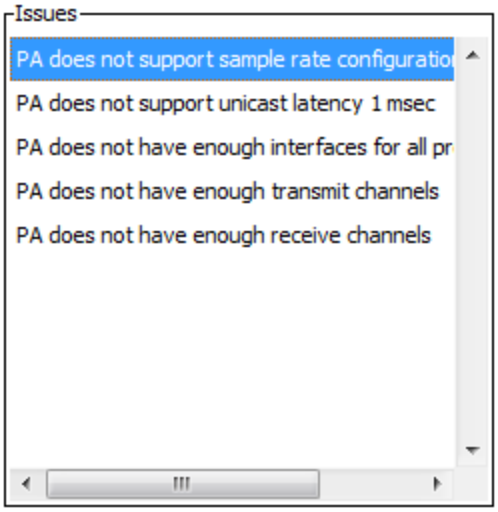
A red icon indicates that the device has been assigned a role, but there is an error condition associated with of the assignment.

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A black icon indicates that the device has been assigned a role, but the assignment will have a potentially terminal effect on the operation of the network. A preset cannot be applied if any terminal issues are identified.

Issues

The Issues column lists all issues identified by Dante Controller. Clicking a role or a target device will highlight the issues associated with that role or role assignment.



The following are 'terminal' issues that could render the network unusable (identified by a black LED icon):

- You cannot apply the same device name to multiple devices.
- You cannot apply the same static IP address to multiple devices.

Other issues may or may not be a problem, depending on your requirements for the network.

Applying the Preset

To apply the preset, click **OK**. Click **Cancel** to abandon the operation.

Global Configuration

You can use the Presets feature for global configuration, i.e. applying one or more configuration settings to a number of devices simultaneously.

For example, if you want to apply the same sample rate to all devices on your network:

1. Set one of your devices to the required sample rate.
2. Click the Save Preset button 
3. Click **None**, then select only the relevant device.
4. Click **Advanced**.
5. Click **None**, then select the 'Device Sample Rate' checkbox.
6. Click **Save**.
7. Load the preset (File > Load Preset).

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8. In the 'Preset Roles' column, select the relevant role.
9. In the 'Target Devices' column, click **Select All**.
10. Click **Apply** then click **OK**.

This will set all devices to the same sample rate, but will leave all other device configuration settings untouched.

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Troubleshooting

Fanout

About Transmit Flows

Transmit flows are 'streams' of audio packets which supply data between devices. Dante devices can support a finite number of transmit flows, depending on their specific hardware configuration and firmware version.

Dante supports two types of flows - unicast and multicast.

Unicast flows are used to supply audio to specific devices, and support 4 channels of audio simultaneously. So if you subscribe 4 channels on a receiver to 4 channels on a single transmitter, that audio data will be supplied using one flow. If you were to then subscribe a fifth channel, a second flow would have to be created.

If you were to subscribe 4 different receivers to the same channel on a single transmitter, Dante Controller would have to create 4 unicast flows, because the audio data is going to 4 different places. In this case, it would be better to create a multicast flow.

A **multicast** flow 'broadcasts' the audio across the network, so multiple receivers can subscribe to the audio, but the transmitter is only using one of its available flows. Multicast flows can be configured with up to 8 channels. However, multicast audio traffic can propagate throughout an entire network, using up bandwidth on every link in the network, even on links where the audio is not required. 100Mbps links in particular are easily saturated when large numbers of multicast flows exist. Therefore, multicast flows should only be used when there is a good reason to do so.

If you subscribe a number of devices to one channel via unicast, Dante Controller will alert you with the following message: “Fanout Configuration detected.”

If you then exceed the supported number of transmit flows, any further subscriptions will fail, and the tooltip for the failed subscription will read 'No more flows (TX): transmitter cannot support any more flows, reduce fan out by unsubscribing receivers or switching to multicast.'

Messages on Startup

Error Message	Meaning & Actions
'Dante Controller was unable to connect to the Dante Control and Monitoring manager. Dante Controller cannot function without this connection. This problem is most likely caused by the Dante Control and Monitoring ('conmon') service or daemon stopping unexpectedly. Click OK to restart Dante Controller. You may also need to manually restart the Dante Control and Monitoring service, or the computer, if the problem reoccurs.'	**Affects**: Windows only. **Meaning**: The 'Dante Control and Monitoring' service is not responding. This can occur after a computer has been in sleep mode. **Action**: Restart Dante Controller. In the event that does not work, reboot your PC, or restart the Dante Control and Monitoring service via Control Panel > Administrative Tools > Services.

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Error Message	Meaning & Actions
'The installed version [x] of the Dante Control and Monitoring service ('ConMon') is out of date. This version of Dante Controller requires ConMon version [x] or later. Please reinstall Dante Controller to resolve this issue. Dante Controller will now exit.'	**Affects**: Windows and OS X. **Meaning**: Usually this is because the required service (ConMon) that is installed with Dante Controller has been overwritten with an older version by another Dante software product installation. **Action**: Reinstall Dante Controller. This will update the ConMon service to the latest version.
'The installed version [x] of the Dante Discovery service is out of date. This version of Dante Controller requires Dante Discovery version [x] or later. Please reinstall Dante Controller to resolve this issue. Dante Controller will now exit.'	**Affects**: Windows only. **Meaning**: Usually this is because the required service (Dante Discovery) that is installed with Dante Controller has been overwritten with an older version by another Dante software product installation. **Action**: Reinstall Dante Controller. This will update the Dante Discovery service to the latest version.

Computer Configuration Checklist

Before installing Dante Controller, you must be logged in to your computer as a user with administrator privileges.

To be correctly configured for use with a Dante network, the computer should have:

- Dante Controller installed
- The correct network interface/s selected
- The correct IP addresses in use

Third-party firewall configuration

- Standard Windows and Mac firewalls are typically configured on installation.
- Third party firewalls will need to be manually configured.

If your computer has a third-party firewall installed, please read the Dante Controller and Dante Virtual Soundcard User Guides for detailed information about firewall requirements and configuration.

Troubleshooting Dante IP Address Configuration

All devices in a Dante network, including Dante Virtual Soundcard, must be using IP addresses from the same network. When using Dante Virtual Soundcard or Dante Controller, your PC or Mac must be connected to the Primary and/or Secondary Dante network, and must have a correct IP address.

Note: If a device name is shown in red, it means Dante Controller has automatically detected an error condition, such as an IP address configuration issue, or the device has entered failsafe. Double-click the red device name to see more information.

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Correct IP configuration

Dante hardware devices are set to obtain their IP address automatically from the network. They will either:

- Automatically assign themselves an address in the range 169.254.*.* (172.31.*.* for the secondary network if present), or
- Obtain an IP address from a DHCP server if it is present on the network

Your PC or Mac TCP/IP network configuration set should be set to "Obtain an IP address automatically". This way it will automatically acquire a Link Local automatic IP address in the same network as other Dante devices. If a DHCP server is present, the computer and Dante devices will all acquire their IP addresses via DHCP.

Possible IP network configuration mistakes

Possible network configuration errors are listed below. Dante Controller will try to automatically detect these. If detected the offending device will be displayed in red.

Incorrect PC/Mac IP configuration

- Accidentally having multiple network interfaces with addresses in the same subnet
- If your secondary network is using Link Local (no DHCP server), all devices on that network will be in the 172.31.*.* range. The secondary network interface for the computer must be manually configured (using static IP addressing) to the same range.

Incorrect general IP configuration

- Accidentally having multiple DHCP servers on the same network

  Unusual - for example, someone may have a PC connected to the network with a DHCP server running that they're not aware of.

- Incorrectly configured static IP addresses

  You shouldn't typically need to configure static IP addresses at all. If for some reason you do, it must be in the same subnet as the rest of the network.

Incorrect redundant network configuration

Setting up a redundant network is described in 'Routing Audio'. There are a few ways to incorrectly configure a redundant network. More than one of these can be present at the same time.

- Connecting the secondary interface of a Dante device to the primary network

  Most commonly by either misunderstanding how redundancy works, and using only one switch with all cables connected to it; or correctly using two switches or networks, but accidentally connecting one secondary cable to a primary network switch

- Joining the primary and secondary Dante networks

  By connecting primary and secondary switches, or perhaps just using one switch.

- Multiple interfaces on the same device using the same IP address subnet

  Possibly by having the same DHCP server on both primary and secondary networks, or both DHCP servers configured to serve the same IP addresses. Also, mixing DHCP and Link Local on the same network can cause issues. It is often necessary to have all devices and the computer on either DHCP or Link Local.

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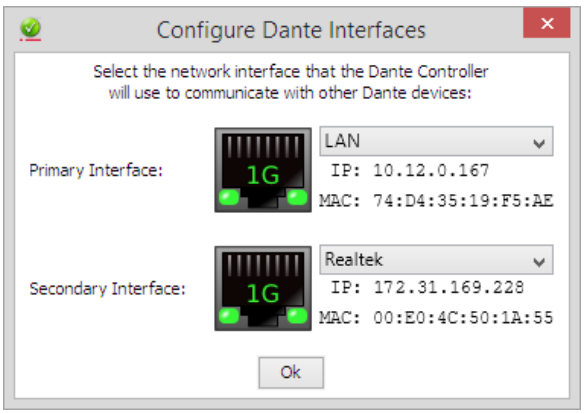
What are the symptoms of using the wrong network interface on my computer?

If you have more than one wired network interface, and Dante Controller is not using the interface the rest of the Dante devices are connected to:

- Dante Controller cannot see any Dante devices
- Dante Virtual Soundcard is not sending or receiving any audio when it is expected to

How do I check which network interfaces Dante Controller is using?

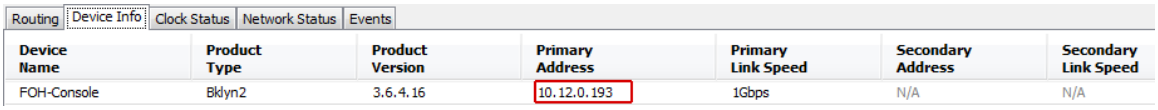
- The selected network interfaces can be viewed or changed via the 'interface selection' button  in the Network View toolbar of Dante Controller.



- If the Dante network is standalone and does not have a DHCP server installed, the addresses should be in the range 169.254.*.*
- If the Dante network is using a DHCP server, the IP addresses should conform to the addressing scheme it is using (as shown in the image above)

How do I check IP addresses for all devices on my network?

- Use the Device Info tab to view the IP addresses of all the devices on your network.



- The Primary Address of all devices should follow the same IP address scheme (e.g. 169.254.*.* or 10.12.0.*). Same for secondary addresses...
- Note that some older Dante devices or devices running older firmware may not show this information.

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Troubleshooting Switch Configuration and Cabling

Cables are the most vulnerable part of a network system. If you suspect cabling issues, check for:

- Faulty or manually terminated cables
- Unplugged /badly connected Ethernet cables
- Incorrectly configured switches
- Dante devices removed or turned off

Symptoms of switch or cabling issues

- You cannot see (some) devices in the Dante Controller network view
- Dante Controller shows orange “unsuccessful subscription” icons, which usually means a device that was present earlier is now missing
- Faulty cables can lead to intermittent faults, which may be heard as dropped samples or “cracks” in the audio
- Dante devices may appear and disappear in Dante Controller

Switch and Cabling Checklist

- Are all the connected link/status lights on the switch lit, or flashing as expected?
  - Is the switch powered on?
  - Is the cable correctly plugged in at the switch and the PC or equipment?
- Is the switch correctly configured?
  - Perhaps QoS or VLANs have been incorrectly set up
- Are you using a switch from another application with an unchecked or tested configuration?
  - Consult the switch manual and check the switch configuration

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