DANTE
CERTIFICATION PROGRAM

LEVEL 2

THE DANTE CERTIFICATION PROGRAM

Training program from Audinate

- Official certification lets your customers know that you have the knowledge and skills to implement Dante networks

- Ensures a consistent set of methods and knowledge

THE DANTE CERTIFICATION PROGRAM

With Dante Certification, you receive:

- Use of the Level 1 and Level 2 "Dante Certified" logos
- A certificate of completion for each level passed.
- Optional listing in directory of Dante Certified professionals

http://www.audinate.com/resources

THE DANTE CERTIFICATION PROGRAM

Level 1: Introduction to Dante

- 100% online delivery
- Background
- Basic signal routing
- Setting up Dante in simple systems (approximately 6 devices, 1 switch)

http://www.audinate.com/resources

4

THE DANTE CERTIFICATION PROGRAM

Level 2: Intermediate Dante Concepts

- Delivered in-person
- Larger systems (approx. 12 devices)
- Clocking options
- Understanding unicast & multicast
- Latency
- Redundancy
- Dante Virtual Soundcard and Dante Via

http://www.audinate.com/resources

THE DANTE CERTIFICATION PROGRAM

Required steps:

- Level 1: Pass Level 1 **online** exam
- Level 2: Pass Level 2 **online** exam PLUS "hands on" exam at event

http://www.audinate.com/resources

INTERMEDIATE
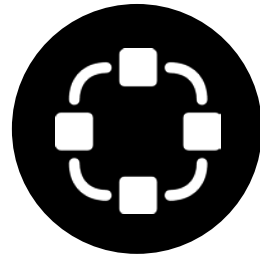# DANTE CONCEPTS

DANTE CERTIFICATION PROGRAM

LEVEL 2

ABOUT AUDINATE

Headquartered in Sydney, Australia

Network engineers first

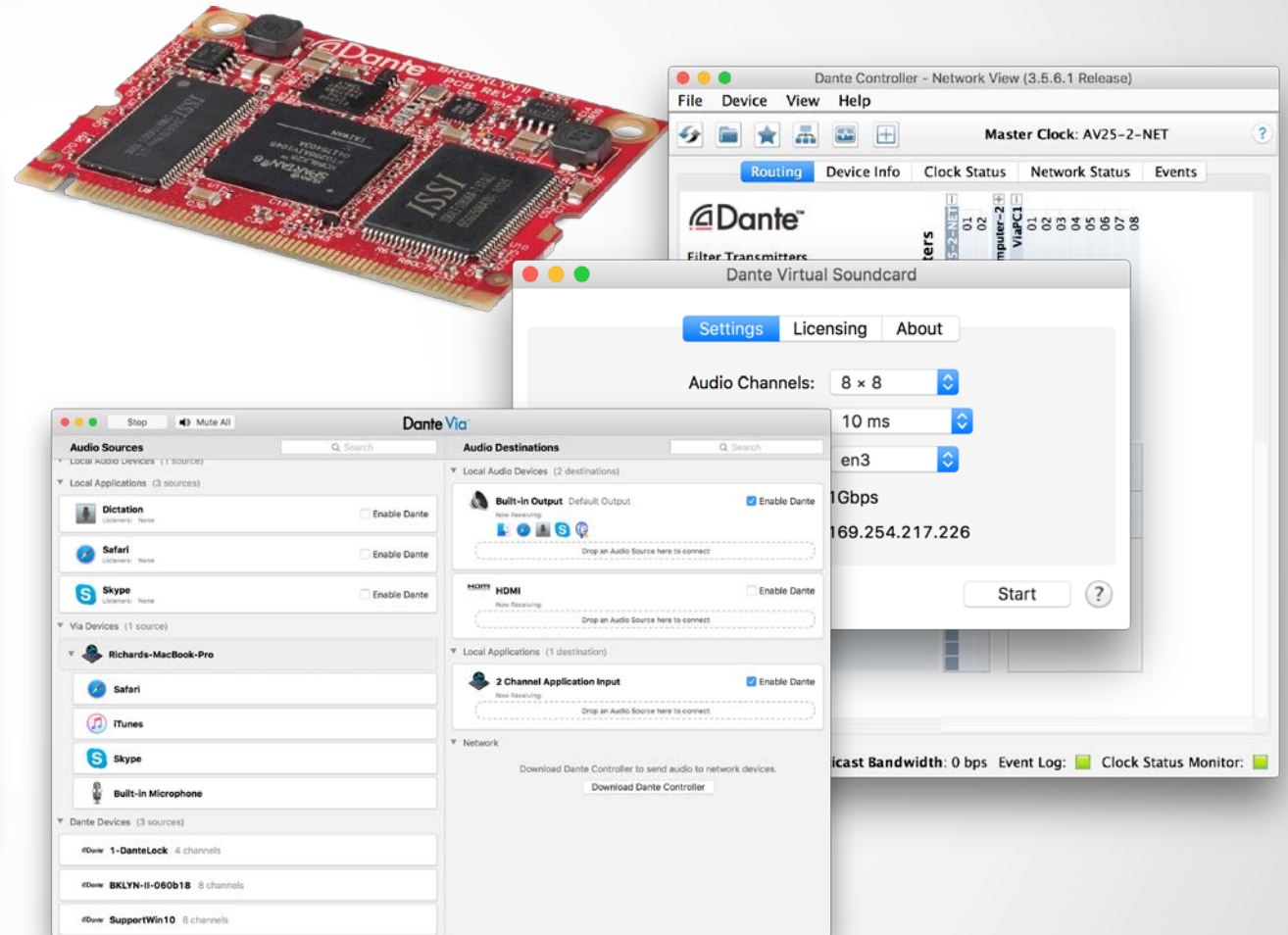Develop Dante as **100% interoperable solution** for all audio manufacturers

http://www.audinate.com/resources

WHAT WE MAKE

Dante technology
(all of it)

Hardware modules
Development tools
Software products:

- Dante Controller
- Dante Virtual Soundcard
- Dante Via

http://www.audinate.com/resources

LEVEL 2 TOPICS

Switch Features

•

Clocking options in Dante

•

Understanding latency in networks

•

Dante Flows and Multicast

Creating backup devices with Dante names

•

Dante redundancy

•

Dante Virtual Soundcard

•

Dante Via

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SWITCH
FEATURES

DANTE CERTIFICATION PROGRAM

LEVEL 2

MANAGED VS. UNMANAGED

Managed

More expensive

●

Many possible settings
(and risks)

●

May be required in some
conditions

Unmanaged

Less expensive

●

100% plug and play

●

May not be appropriate in
some situations

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12

THEN YOU DON'T NEED A MANAGED SWITCH

If you use only **one** switch to connect your Dante devices…

If you are **only** using the network for Dante audio…

SWITCH FEATURES **RECOMMENDATIONS**

Start with the default features

●

Do not change settings until there is a problem that the feature may help

●

Resist temptation to over-configure!

●

In most stand-alone Dante networks, features are not required

●

Incorrect switch configurations are a common cause of problems

http://www.audinate.com/resources

CLOCKING

DANTE CERTIFICATION PROGRAM

LEVEL 2

HOW DOES DANTE CLOCKING WORK?

Dante handles clocking
automatically via election

●

IEEE1588 PTP

●

All devices sync'd to Master

●

Each device has a clock

●

New Clock Master elected
as needed

CLOCK
MASTER

CLOCK MASTERS

Clock Master determined by election in accordance with IEEE1588

●

Rig Election with "Preferred Master" and "Enable Sync to External" settings
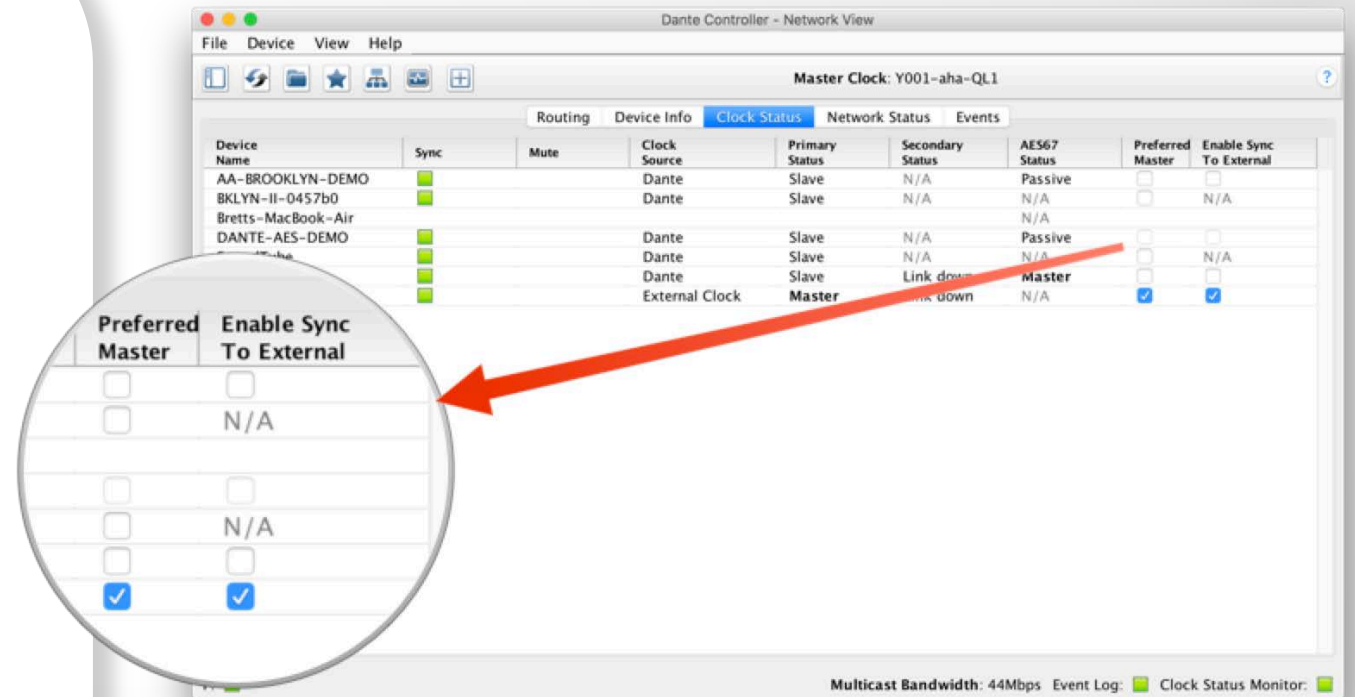
●

Understanding the election process

Preferred Master	Enable Sync To External
☐	☐
☐	N/A
☐	☐
☐	N/A
☐	☐
☑	☑

ADJUSTING CLOCKS

Clock Status tab in
Dante Controller

●

Checkboxes for Preferred
Master and Enable Sync to
External

http://www.audinate.com/resources
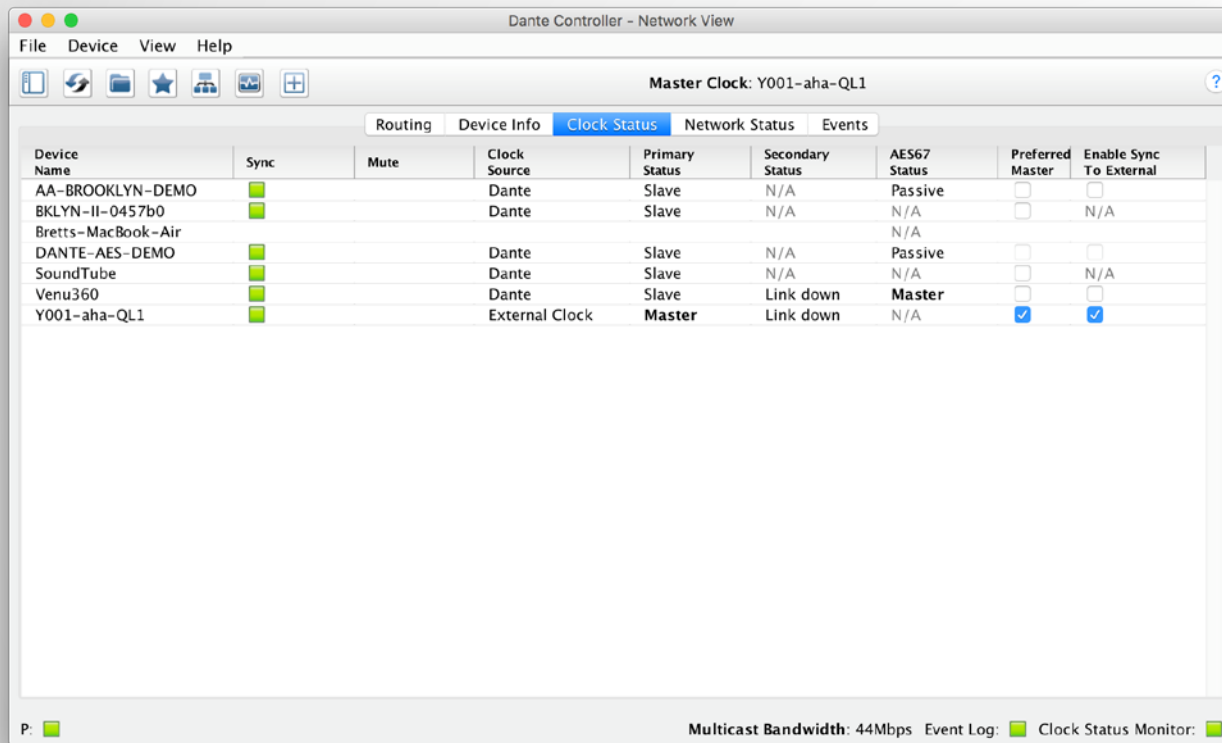
PREFERRED MASTER

Dante will always elect a Clock Master without intervention

Changes to Clock Master are automatic and do not affect audio

Any hardware device can be made a "Preferred Master" clock

Preferred Master should be a device that is always present in system

http://www.audinate.com/resources

USING EXTERNAL CLOCKS

"Enable Sync to External" allows use of console (or other) clock

- Configure in console, too
- Check "Preferred Master"
- Mismatch may result in pops and clicks
- Using Active Clock Monitoring to ensure quality of external clock

http://www.audinate.com/resources
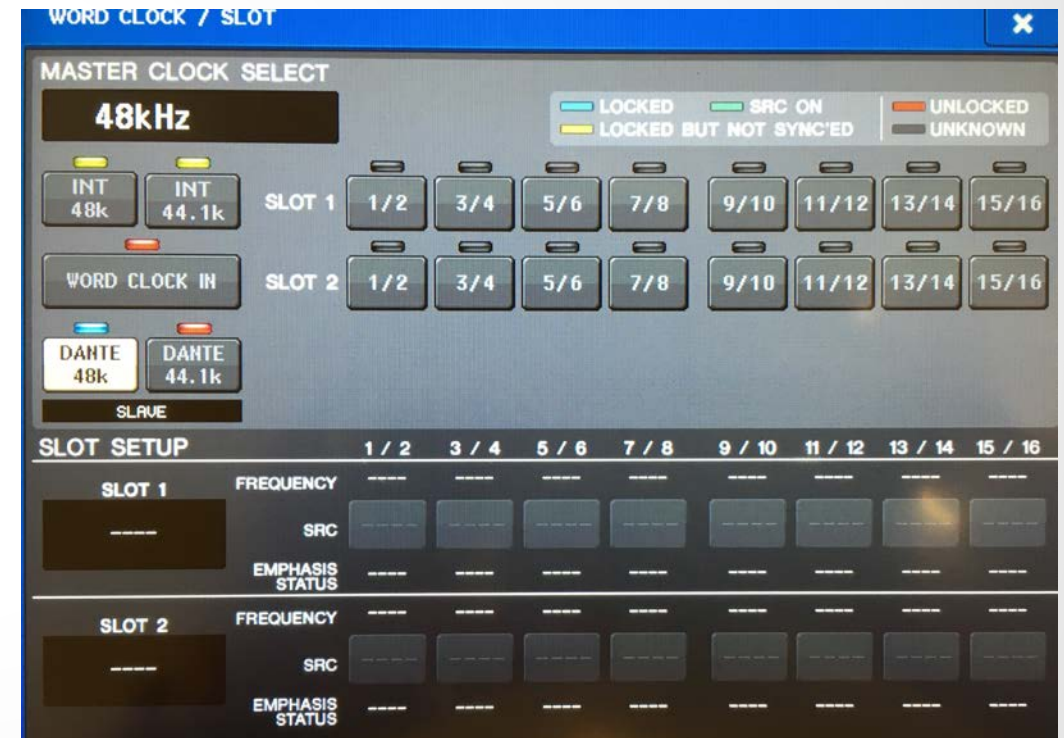
EXTERNAL CLOCK BEST PRACTICES

If using an external clock, configure in both device and Dante Controller (Enable Sync to External)

●

Always check Preferred Master on the device using Enable Sync to External

●

Symptom: clicks and pops

CLOCK STATUS MONITORING

Passive: always on

- Clock Master changes only

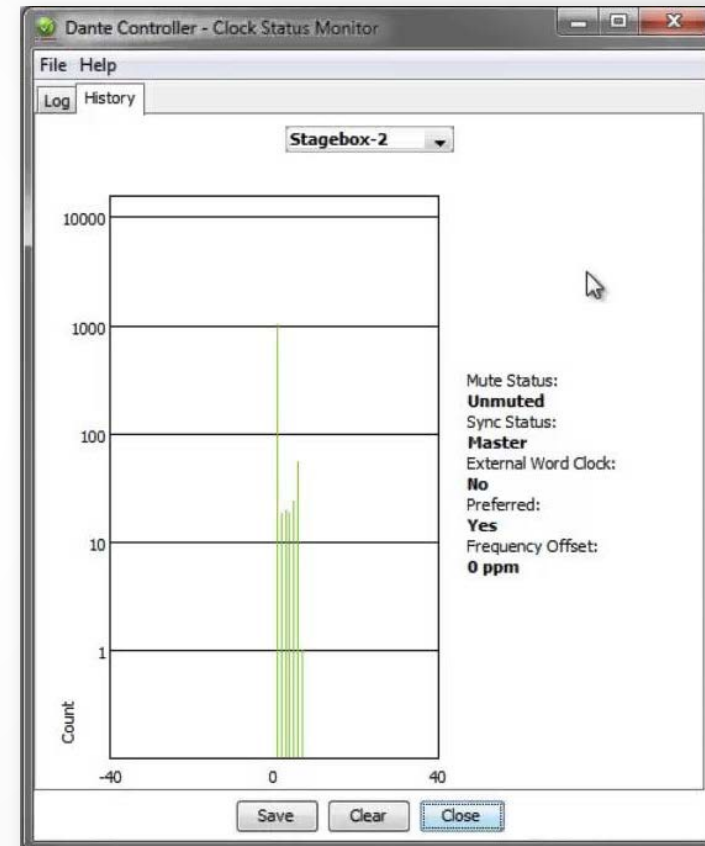**Active: select in toolbar to turn on**

- *Useful for troubleshooting external clocks*
- Looks for instability
- Accumulates data over time
- Displays spread of clock frequency

http://www.audinate.com/resources

LATENCY

DANTE CERTIFICATION PROGRAM

LEVEL 2

ABOUT LATENCY – A REFRESHER

Audio signal delay in a system

•

Transport and processing

•

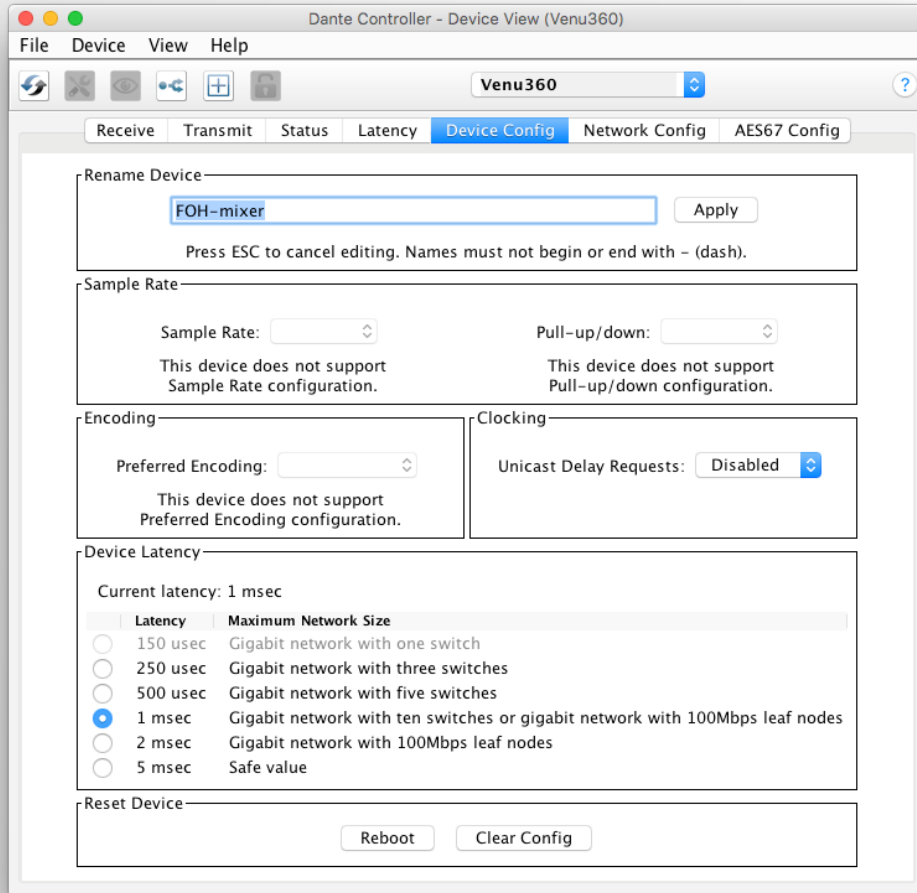Mainly a problem when we hear delayed and un-delayed signal simultaneously

•

Air travel 34cm = 1msec

•

Problem for legacy networking systems (VoIP)

Δt

Dante™ by Audinate
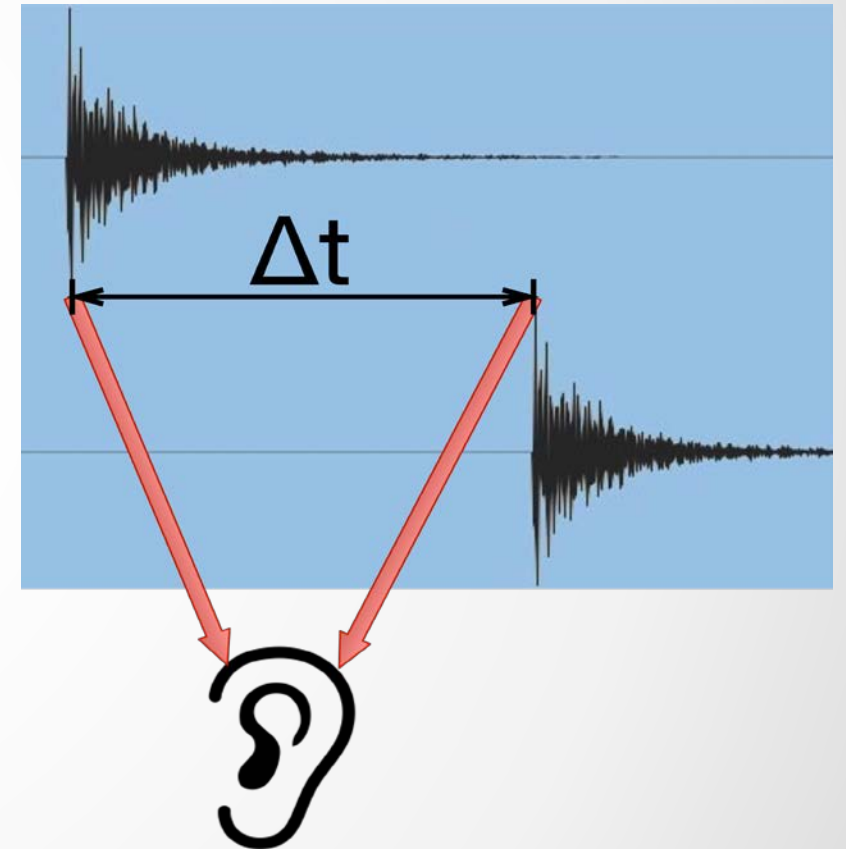
SETTING AND MONITORING LATENCY

Double click any device in routing view to open the Device View

●

Set latency in Device Config tab

●

Monitor latency in Latency tab

http://www.audinate.com/resources

LATENCY IN DANTE

- 100% deterministic – always well-defined
- Default Dante latency 1ms – suitable for large networks
- Adjustable to suit needs
  - Minimum 150µs
  - Maximum 5ms
- Set per Device

Device Latency

Current latency: 1 msec

Latency	Maximum Network Size
150 usec	Gigabit network with one switch
250 usec	Gigabit network with three switches
500 usec	Gigabit network with five switches
● 1 msec	Gigabit network with ten switches or gigabit network with 100Mbps leaf nodes
2 msec	Gigabit network with 100Mbps leaf nodes
5 msec	Safe value

http://www.audinate.com/resources

LATENCY - LOWER BOUNDS

- If only 1 switch, Dante latency can be set to 150µs
- 3 switches, 250µs
- 10 switches, 1ms (Dante default)
- Recommended values are based upon worst-case scenarios
- **Monitor actual network performance**

Device Latency

Current latency: 1 msec

Latency	Maximum Network Size
150 usec	Gigabit network with one switch
250 usec	Gigabit network with three switches
500 usec	Gigabit network with five switches
● 1 msec	Gigabit network with ten switches or gigabit network
2 msec	Gigabit network with 100Mbps leaf nodes
5 msec	Safe value

http://www.audinate.com/resources

MONITORING LATENCY – GOOD EXAMPLE

- Visualize actual latency in Latency Tab of Device View
- Example:
  - 3 switches
  - 1ms latency setting
- All packets safely inside window
- Try lower values and see what happens

Stagebox2 @ 1 msec

Setting: **1 msec**

Peak: **645 usec**

Average: **402 usec**

Late: **0**

http://www.audinate.com/resources
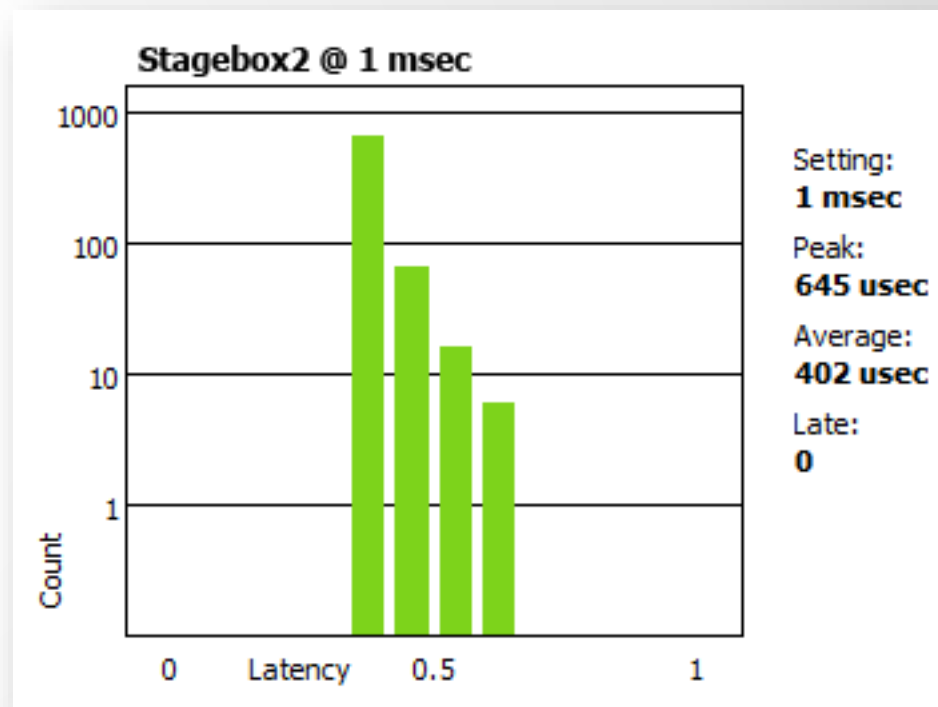
MONITORING LATENCY – BAD EXAMPLE

Stagebox1 @ 250 usec
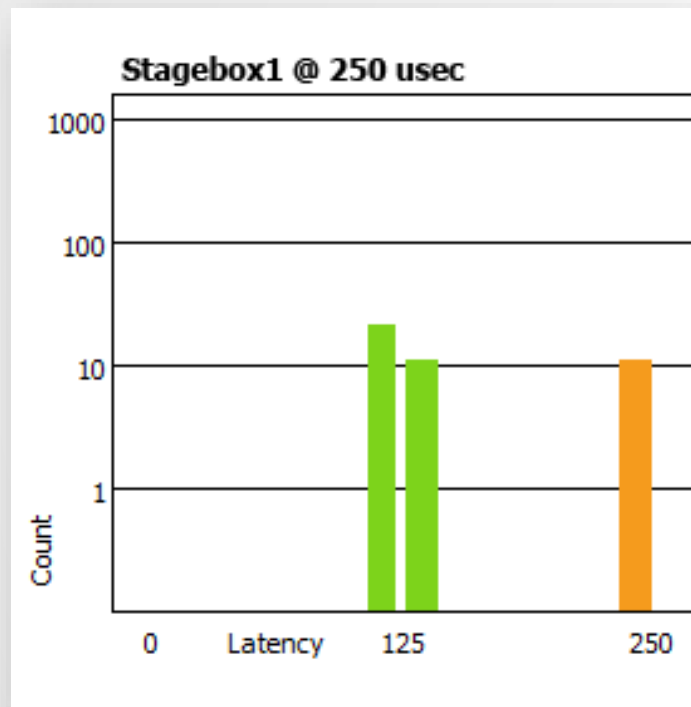
Example:
- 250µs latency setting
- Some packets are dangerously close to the edge of the window

Solutions:
- Increase latency
- Improve network performance (QoS, etc.)
- Replace faulty equipment
- Disable unneeded switch management

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FLOWS
AND MULTICAST

DANTE CERTIFICATION PROGRAM

LEVEL 2

UNICAST AND MULTICAST

Unicast

One to one traffic

●

"Private conversation" – data sent uniquely from transmitter to each receiver

●

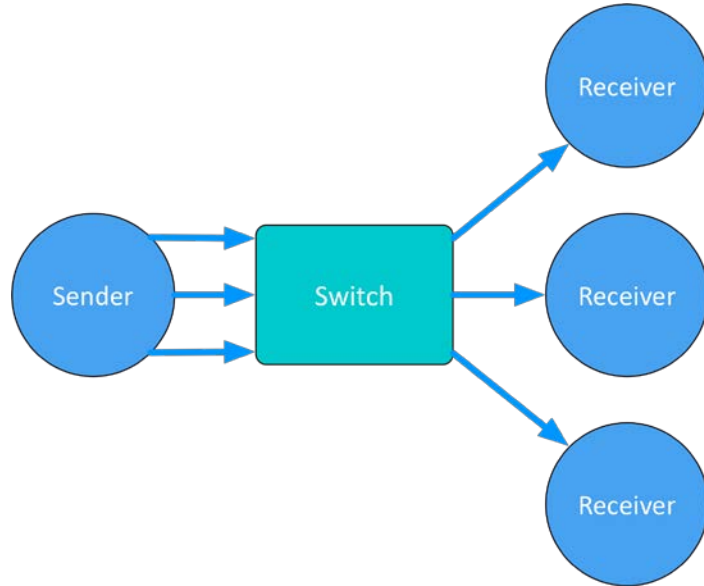Multiple receivers require multiple copies of data from transmitter

Multicast (unmanaged)

One to many traffic

●

"Public announcement" – messages sent to everybody on the network

●

Data is processed by all receivers

http://www.audinate.com/resources

UNICAST AND MULTICAST

Unicast

1 data stream per receiver

Multicast
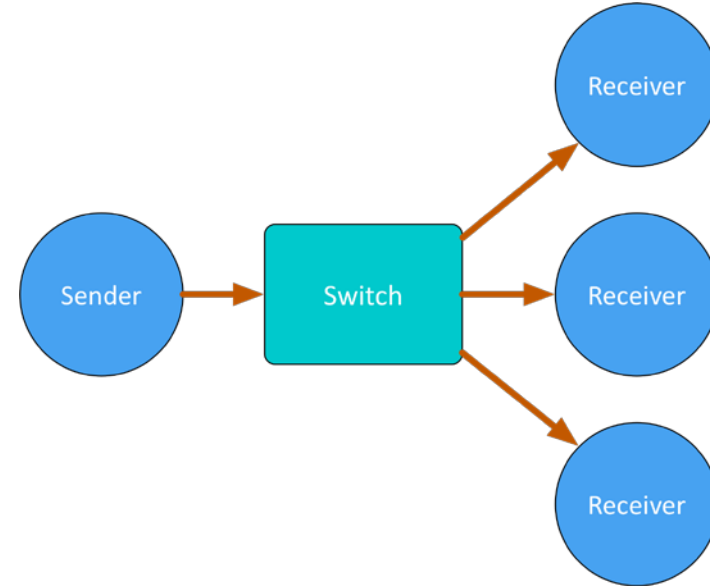
1 data stream for all receivers

http://www.audinate.com/resources

DIFFERENCES:
BROADCAST AND MULTICAST

If *unmanaged*, both send data out of all members of a LAN

●

Multicast traffic can be organized to send data only to requesters (receivers) – IGMP snooping

●

Organization of multicast receiving groups is done with managed switch

●

Separate LANs or VLANs used to manage both types

http://www.audinate.com/resources

DANTE UNICAST FLOWS

1 Flow to 1 Receiver containing 1 channel of audio

Flow 1

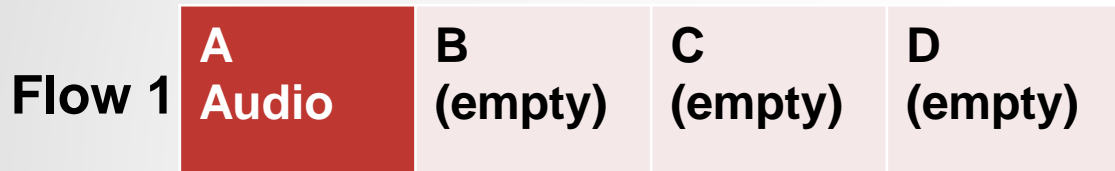| A Audio	B (empty)	C (empty)	D (empty)

1 Flow to 1 Receiver containing 4 channels of audio

Flow 2

A Audio	B Audio	C Audio	D Audio
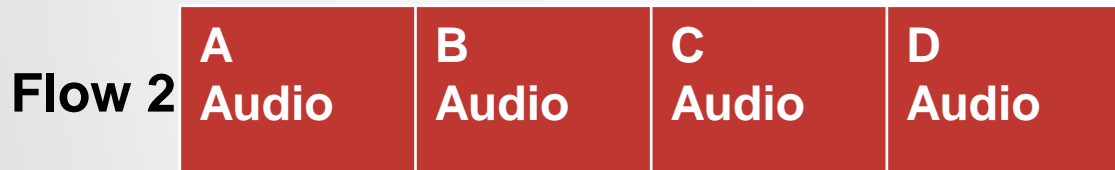
Dante packages audio into 4-channel "Flows" when using unicast, for efficiency

- Flows are unique to each receiver

- Flows may contain empty audio channels

- 1 channel sent to 1 receiver uses the same bandwidth as 4 channels

http://www.audinate.com/resources

Dante™ by Audinate

DANTE UNICAST FLOWS

More receivers means more Flows

●

More channels (4 at a time, 1 receiver) means more Flows

●

Small Dante devices (1 to 4 channels) support 2 Flows

●

Large Dante devices (16 channels and up) support 32 Flows

8

8 channels -> 2 flows

http://www.audinate.com/resources
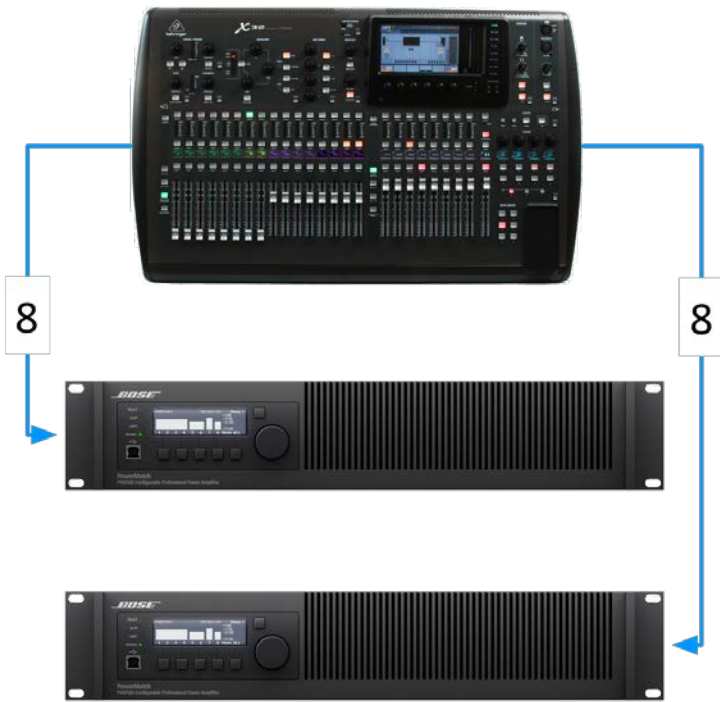
DANTE AND UNICAST FLOWS

8 channels each -> 2 flows each -> 4 flows

8 channels each -> 2 flows each -> 8 flows

http://www.audinate.com/resources

DANTE AND MULTICAST FLOWS
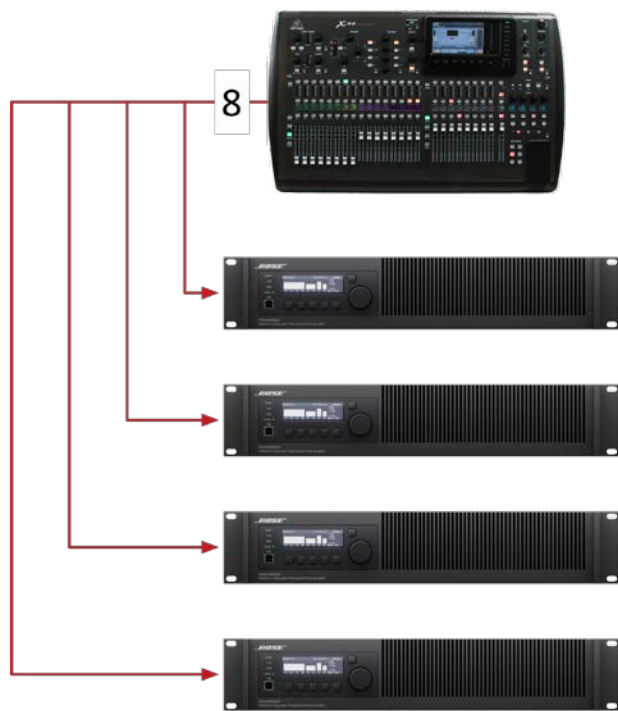
8 channels -> 1 multicast flow

Multicast solves "fan out" condition

●

Up to 8 audio channels in 1 multicast flow

●

Configured in Dante Controller

http://www.audinate.com/resources

CONFIGURING MULTICAST FLOWS

Open Device View

•

Click "Create Multicast Flow" button in toolbar

•

Choose up to 8 channels for a single multicast flow

•

You may create more multicast flows if needed

Create Multicast Flow

MainAmp supports up to **8** channels per flow.

Select one or more transmit channels to be placed in multicast flows.

Channel Name	Add to New Flow
Overhead	☑
Snare	☑
Kick	☑
Vox1	☑
Vox2	☑
Guitar1	☐
Keys	☐
Guitar2	☐

Create   Cancel

http://www.audinate.com/resources
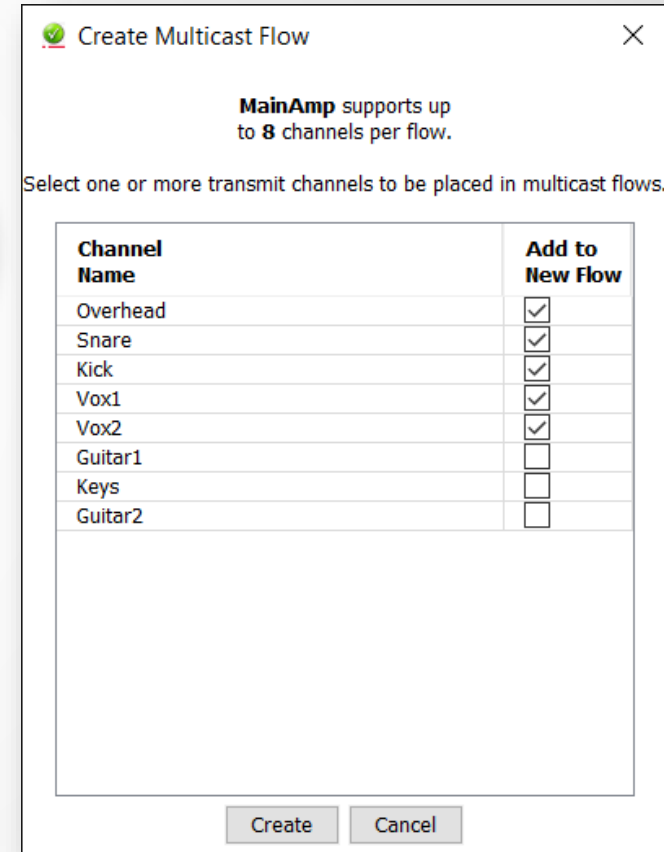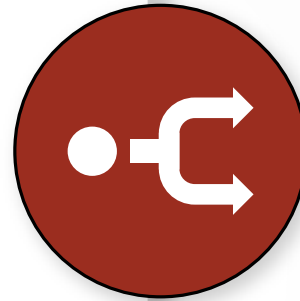
DO I NEED TO CONTROL MULTICAST?

On gigabit networks, multicast traffic is unlikely to be a problem

●

Example: 64 channels of multicast produces approximately 100mbits/sec of traffic

●

If using 100mbps devices or Wi-Fi access on the same network, use multicast filter (IGMP Snooping)

●

Use multicast selectively!

http://www.audinate.com/resources

SUMMARY

Dante uses unicast by default

●

Dante audio is packaged into multi-channel flows

●

Number of flows is limited (between 2 and 32)

●

Each receiver requires at least 1 flow

●

Unmanaged multicast sends data to all devices

●

Multicast is useful for conserving flows in one-to-many situations

●

Explicit management of multicast often not necessary

http://www.audinate.com/resources

NAMING
DEVICES

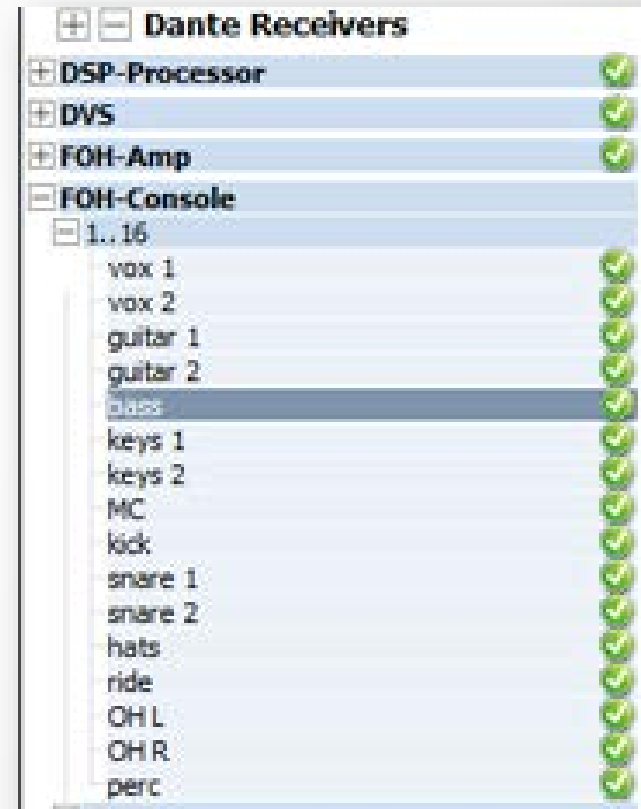DANTE CERTIFICATION PROGRAM

LEVEL 2

NAMING DANTE DEVICES

All Dante devices have editable names
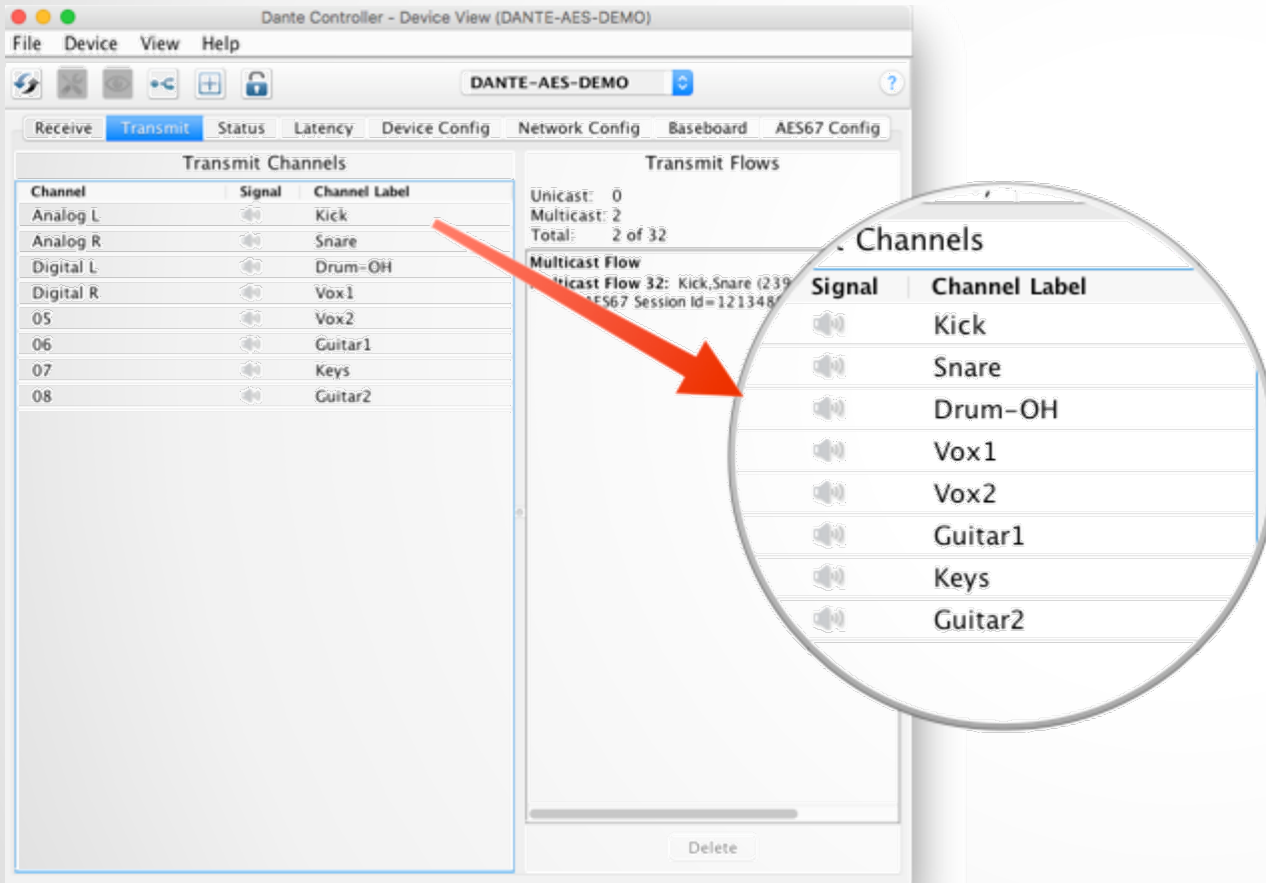
●

Name devices to make a system easy to understand

●

Channel labels help in busy environments

●

Name first, then route

http://www.audinate.com/resources

CHANNEL LABELS

Use Device View

•

Labels can be applied to any channels

•

Makes it easy for volunteers or newbies to use system

•

Software version of masking tape 😉

http://www.audinate.com/resources

CREATING BACKUP DEVICES USING NAMES

Dante uses names to create subscriptions

•

Use this to create backup devices for critical gear

•

Name primary and backup devices and channels identically

If the primary device fails, connect backup device to network
Subscriptions are automatically re-established using names

http://www.audinate.com/resources

DEVICE
LOCK

DANTE CERTIFICATION PROGRAM

LEVEL 2

WHAT IS DEVICE LOCK?

Prevents tampering with Dante routes and settings

•

Requires Dante Controller 3.10 and firmware update for hardware

•

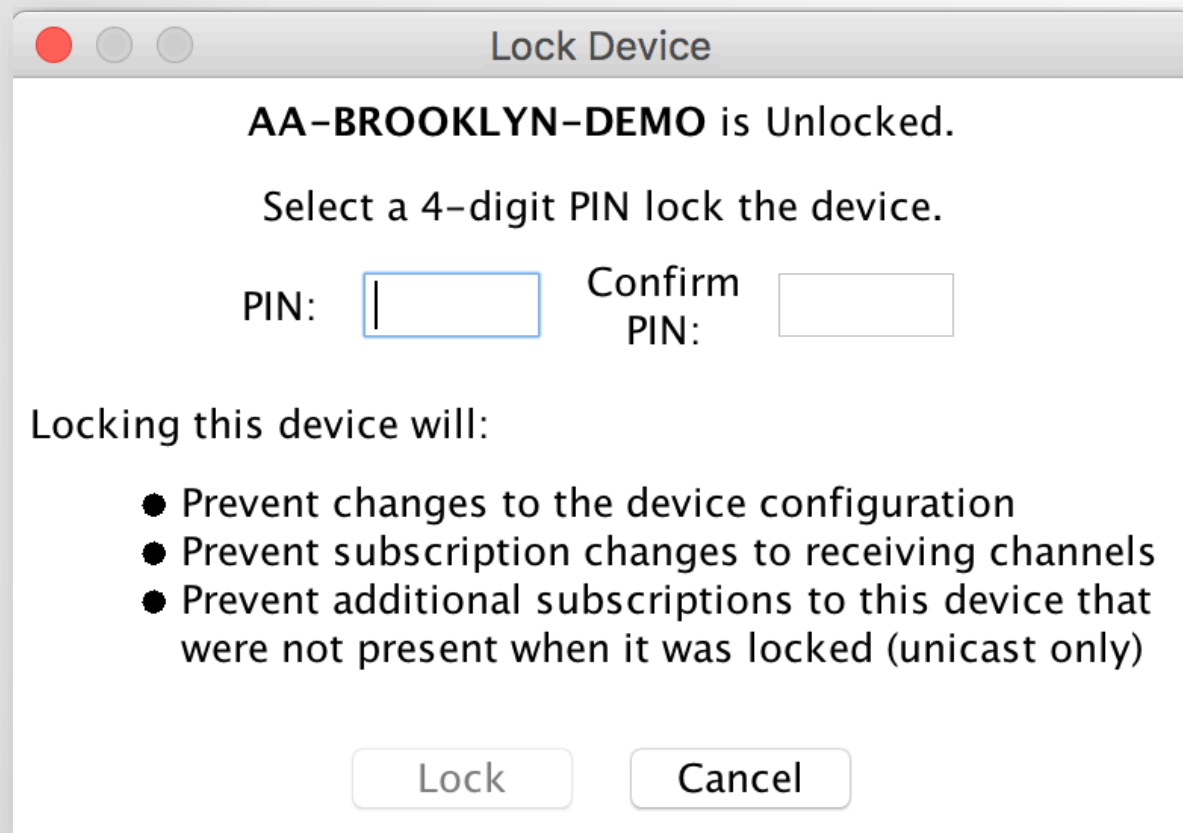Supported in Dante Virtual Soundcard and Dante Via

•

Only affects devices as seen through Dante Controller

Changes from inside products are not locked

http://www.audinate.com/resources

ENABLING DEVICE LOCK

Lock Device

AA-BROOKLYN-DEMO is Unlocked.

Select a 4-digit PIN lock the device.

PIN: [ ]   Confirm PIN: [ ]

Locking this device will:

- Prevent changes to the device configuration
- Prevent subscription changes to receiving channels
- Prevent additional subscriptions to this device that were not present when it was locked (unicast only)

Lock   Cancel

Check to see which devices support locking

•

Click Lock button in Device View or check Device lock checkbox in Device Info

•

Select PIN in dialog box

•

Done

http://www.audinate.com/resources
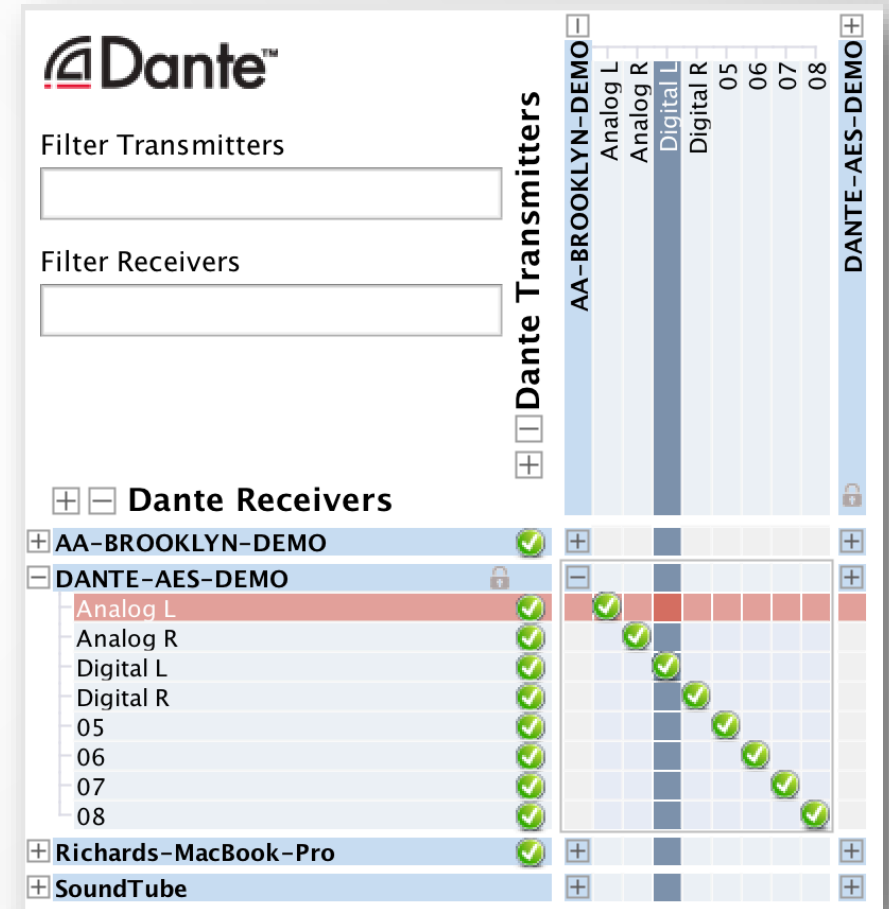
Dante™ by Audinate

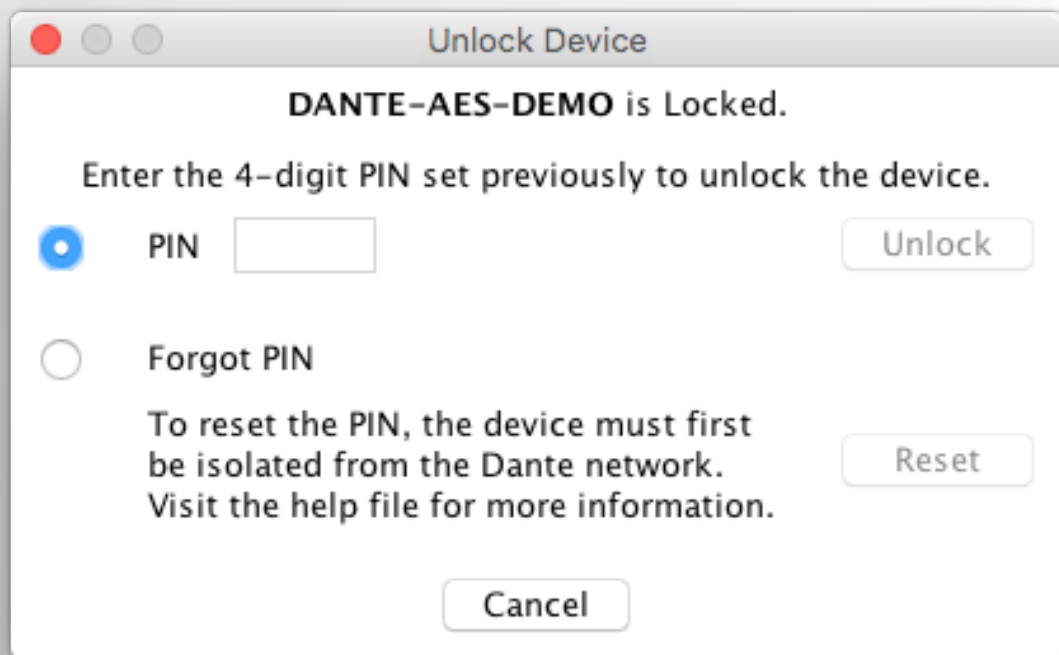# WORKING WITH DEVICE LOCK

Locked devices have a lock icon in the name bar

●

When a locked channel is selected, highlight is red

●

Attempts to change routes result in no action

●

Limit flows used by transmitters

http://www.audinate.com/resources

UNLOCKING A DEVICE

Unlock Device

DANTE-AES-DEMO is Locked.

Enter the 4-digit PIN set previously to unlock the device.

○ PIN [ ] Unlock

○ Forgot PIN

To reset the PIN, the device must first be isolated from the Dante network. Visit the help file for more information.

Reset

Cancel

Open Device View

•

Click "Lock" button

•

Select PIN in dialog box

•

Unlock device

•

Old PIN is forgotten

•

Yes, there is a recovery scheme!

DEVICE LOCK IN MIXED ENVIRONMENTS

Best when both Transmitter and Receiver support feature
Lock both for maximum security

●

A Locked Receiver prevents changes to its subscriptions

●

A Locked Transmitter can prevent transmitting to other devices only

●

Lockable and unlockable devices can be mixed

http://www.audinate.com/resources

PRESETS

DANTE CERTIFICATION PROGRAM

LEVEL 2

DANTE PRESETS
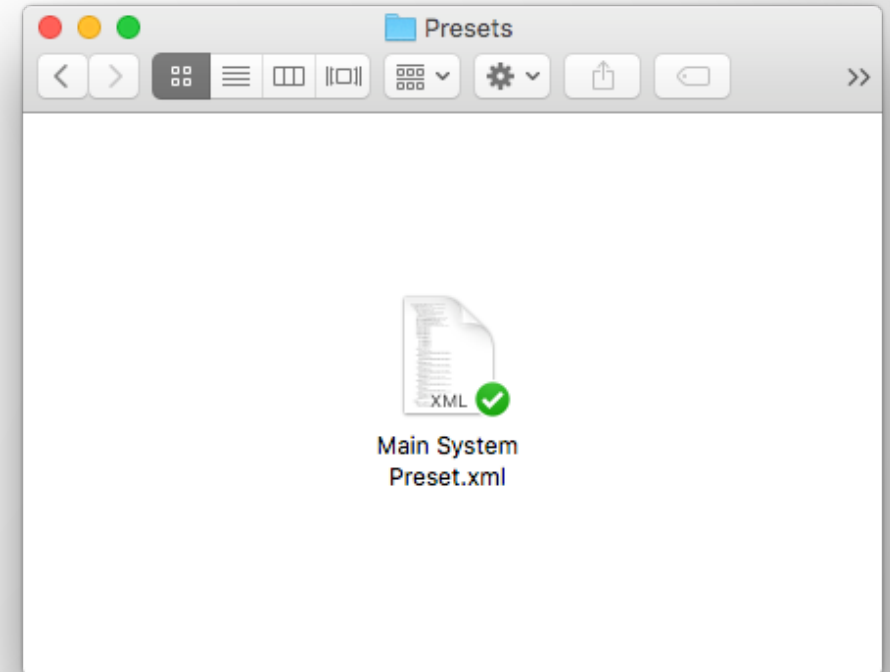
Dante network configuration can be saved in a file

●

Preset may include device names and roles
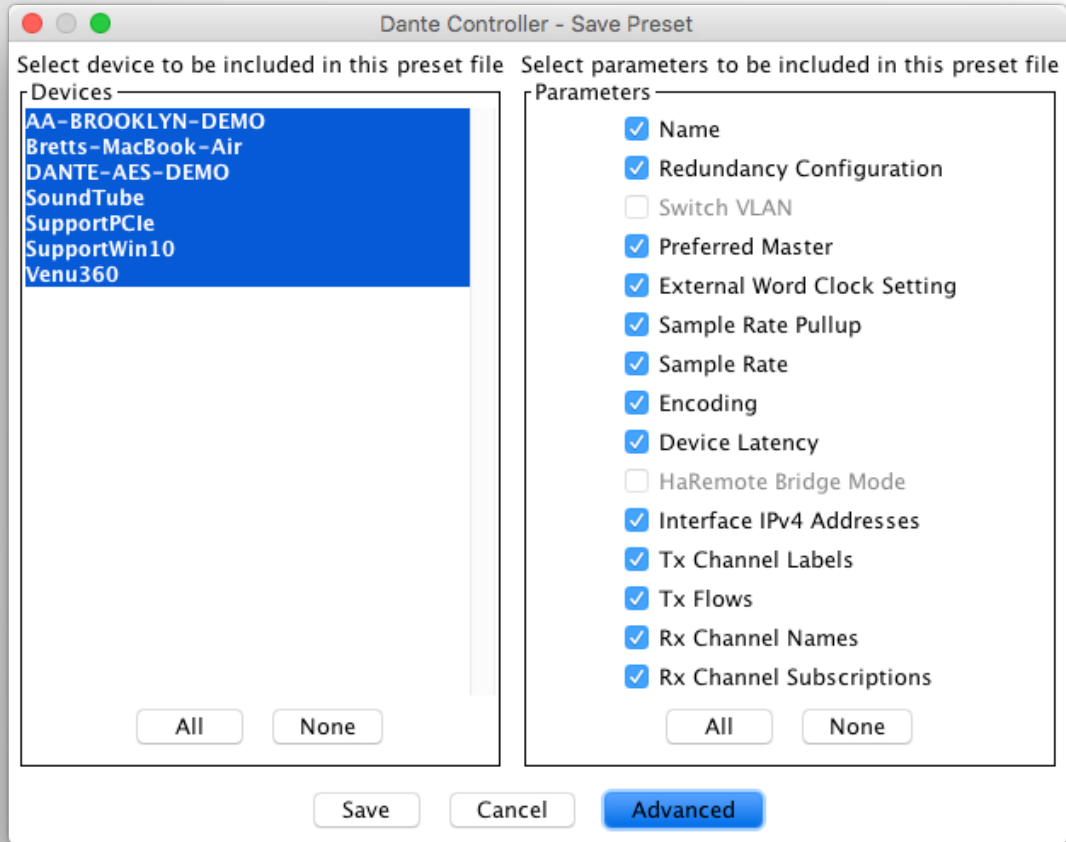
●

Quickly reconfigure a Dante system to a known state

http://www.audinate.com/resources

CAPTURING A PRESET

Click the 'Save Preset' button in the main toolbar

- Select devices that you wish to include in the preset
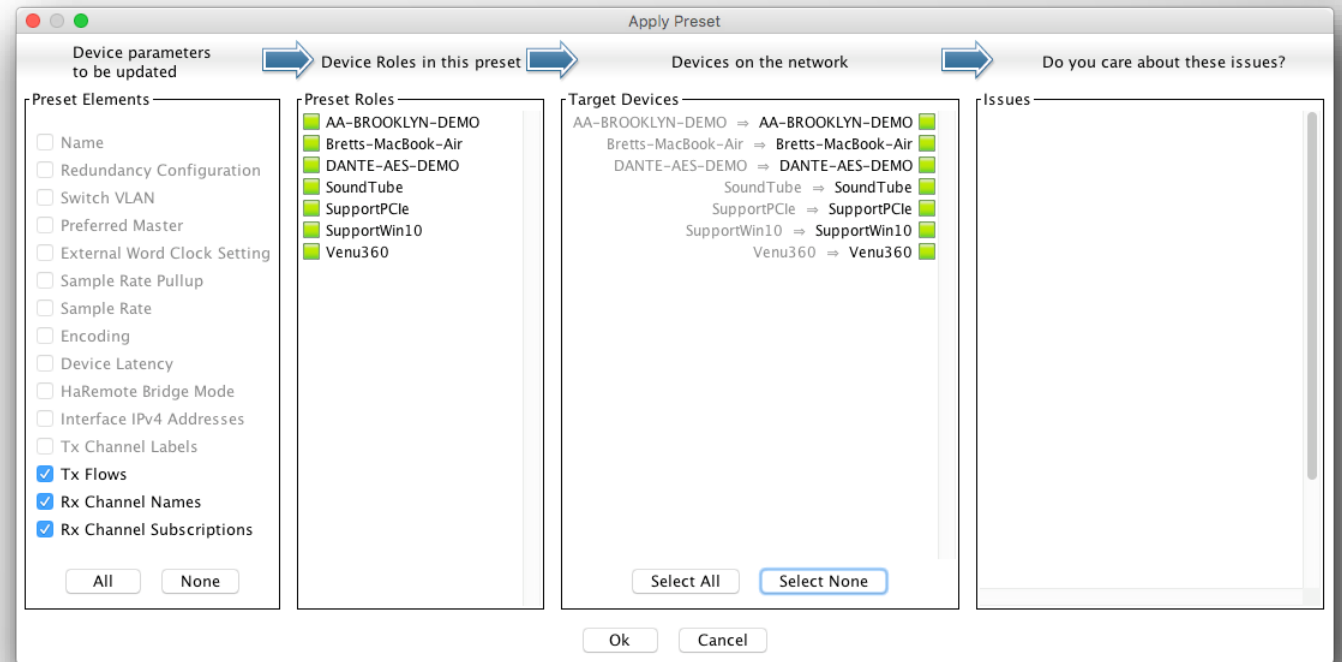
- Select parameters to save

- Save the file in any folder

http://www.audinate.com/resources

DEPLOYING A PRESET

Choose "Load preset"

Select preset file

Check elements
to apply (names,
sample rates, etc.)

Apply

http://www.audinate.com/resources

REDUNDANCY

DANTE CERTIFICATION PROGRAM

LEVEL 2

WHAT IS DANTE REDUNDANCY?

Create two physically independent networks using Primary and Secondary Dante ports
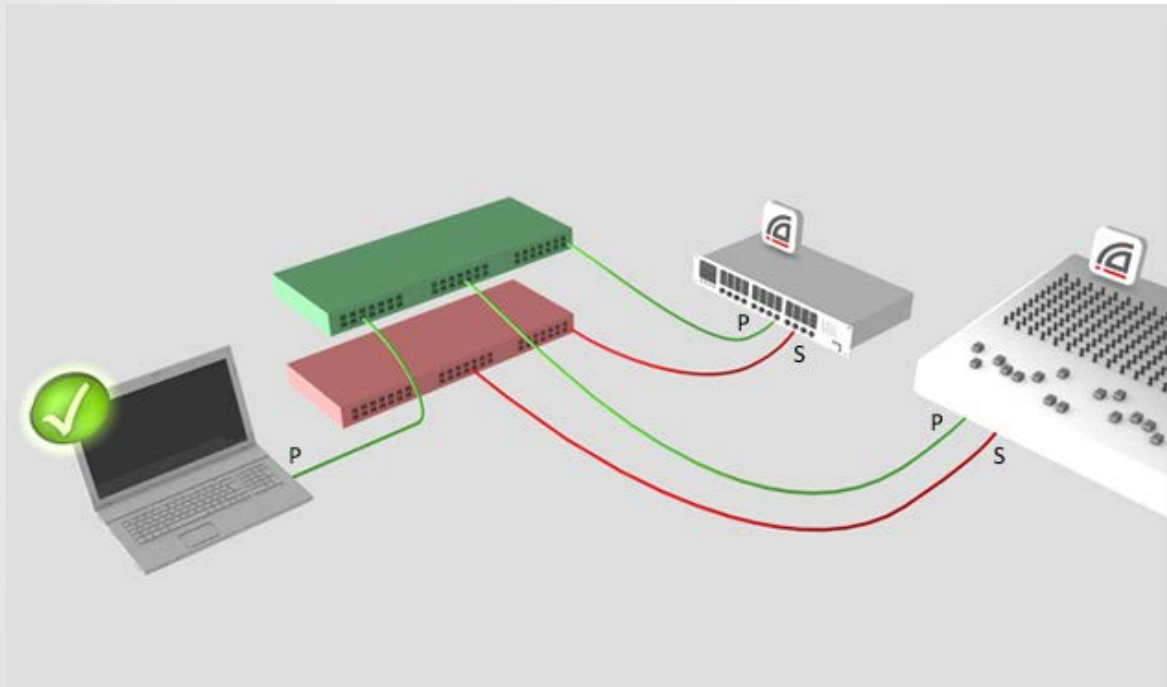
•

Audio flows on both networks at once, no failover

•

No clicks or pops

•

Completely automatic setup

•

For mission critical systems

DEPARTMENT OF REDUNDANCY DEPARTMENT

http://www.audinate.com/resources

SETTING UP REDUNDANCY

Setup Primary network first

●

Separate set of cables & switches connected to Secondary ports

●

No other interaction required

●

OK if not all devices supported

http://www.audinate.com/resources
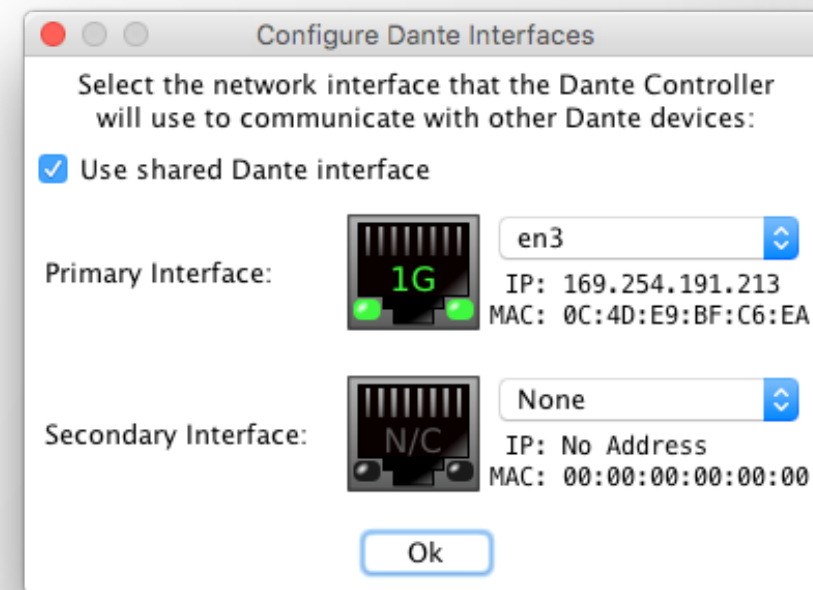
REDUNDANCY **AND** DANTE CONTROLLER

Dante Controller can be connected to both Primary and Secondary interface

●

Control is passed from one network to the other

●

If Primary fails, Dante Controller can be connected to Secondary

http://www.audinate.com/resources
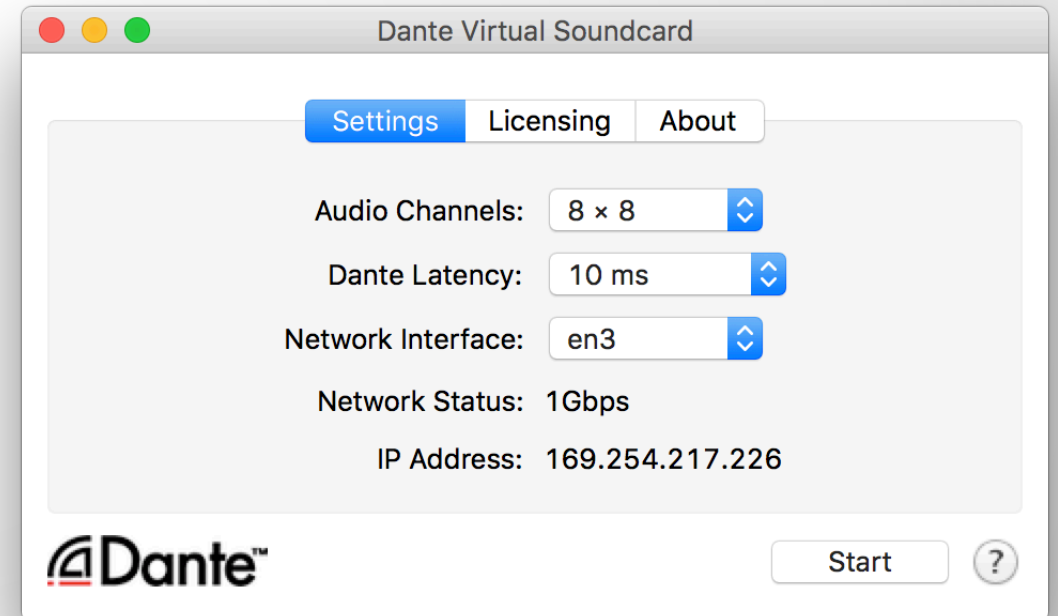
DANTE VIRTUAL SOUNDCARD

DANTE CERTIFICATION PROGRAM

LEVEL 2

WHAT IS DANTE VIRTUAL SOUNDCARD? (DVS)

Soft Soundcard for Mac or PC

●

Connects to Dante network

●

Record and playout up to 64 channels of networked audio directly to/from applications
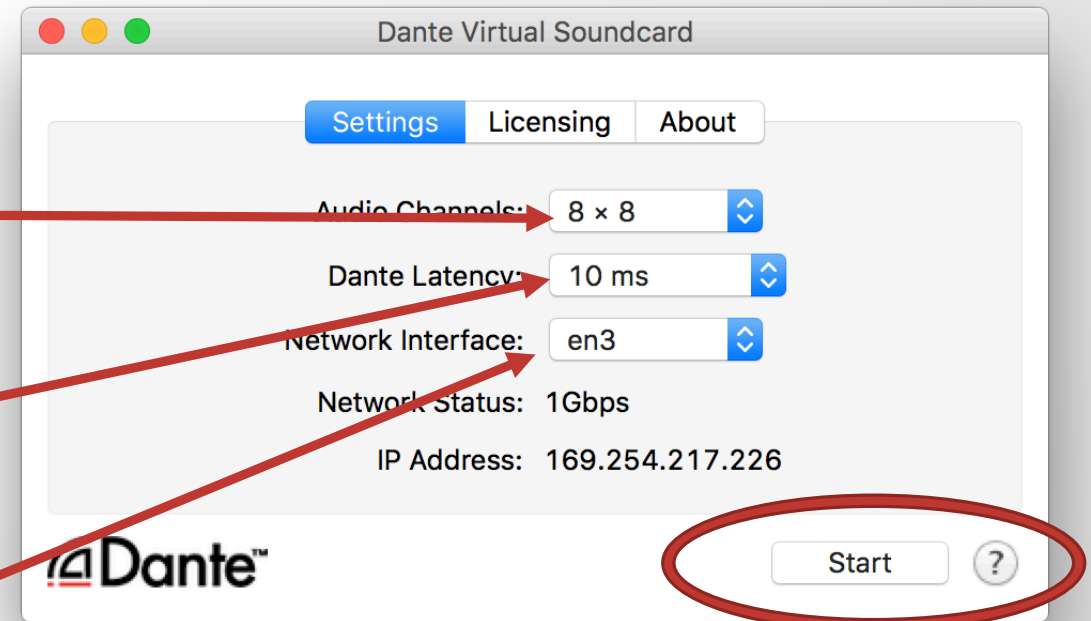
http://www.audinate.com/resources

SETTING UP DANTE VIRTUAL SOUNDCARD

Start or Stop the service

Must be stopped to adjust

-

Audio channels 2x2 – 64x64

-

Latency – 4ms – 10ms

-

Choose network interface

Dante Virtual Soundcard

Settings · Licensing · About

Audio Channels: 8 × 8
Dante Latency: 10 ms
Network Interface: en3
Network Status: 1Gbps
IP Address: 169.254.217.226

Start ?

http://www.audinate.com/resources

DANTE VIRTUAL SOUNDCARD
IN WINDOWS
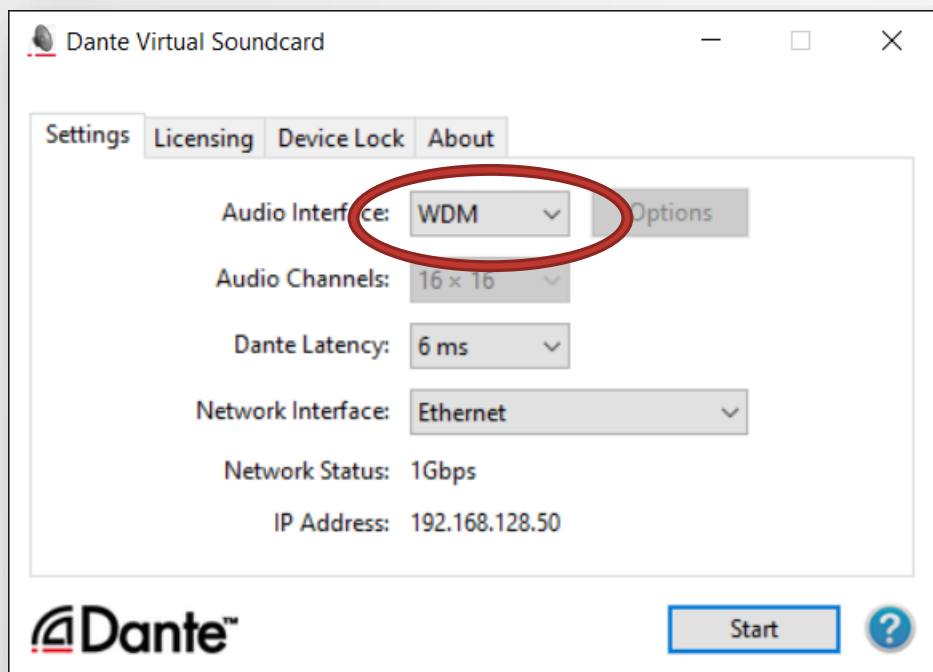
Choice of WDM or ASIO drivers

ASIO common in professional audio applications

WDM common in consumer audio products
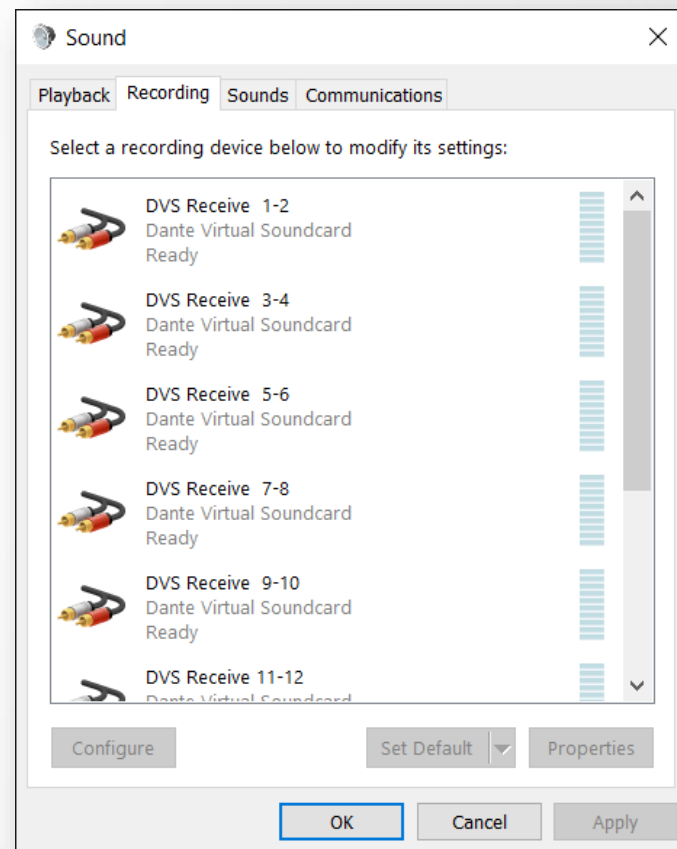
http://www.audinate.com/resources

DANTE VIRTUAL SOUNDCARD
IN WINDOWS

WDM drivers 16x16 channels only

●

WDM channels presented by Windows as stereo pairs

●

Each stem appears as a stereo "device" in Windows Sound settings

http://www.audinate.com/resources
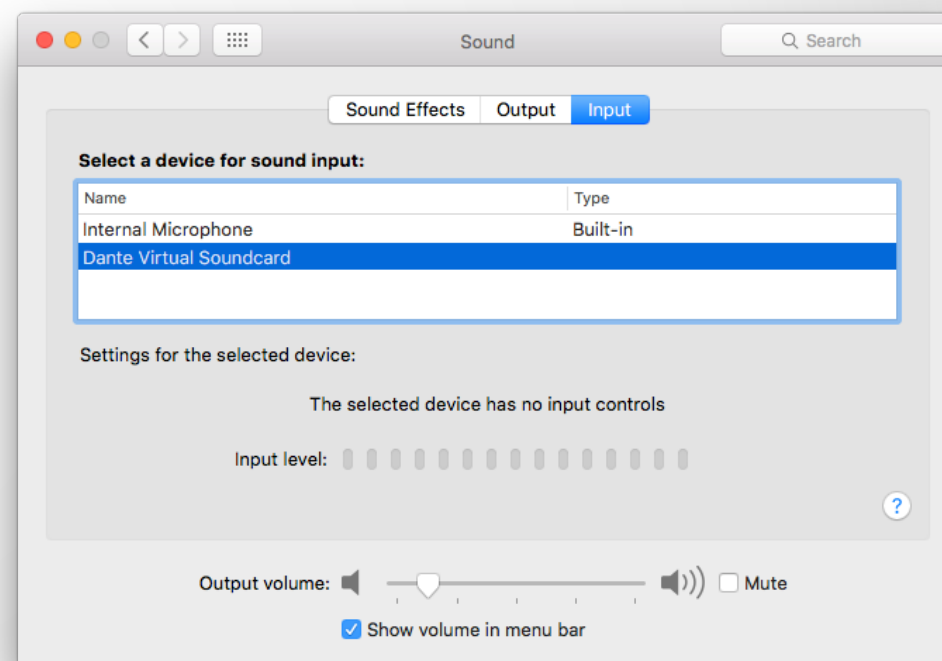
DANTE VIRTUAL SOUNDCARD
IN OSX

On OS X, Dante Virtual Soundcard appears as a regular Core Audio device

●

Works with both pro and consumer applications

●

Can be made default sound device

http://www.audinate.com/resources

CLOCKING DANTE VIRTUAL SOUNDCARD

Dante Virtual Soundcard does not contain a hardware clock

Computer must be connected to a network with Dante-enabled hardware or another computer running Dante Via

http://www.audinate.com/resources

CONNECT TO A DAW

Launch Dante Virtual Soundcard

Set number of channels and Start DVS

DVS will appear as audio device on computer
Mac – Core Audio
Windows – ASIO or WDM

Select as I/O device in DAW preferences

Output Device: Dante Virtual Soundcard

Input Device: Dante Virtual Soundcard

ASIO Driver: Dante Virtual Soundcard (x64)
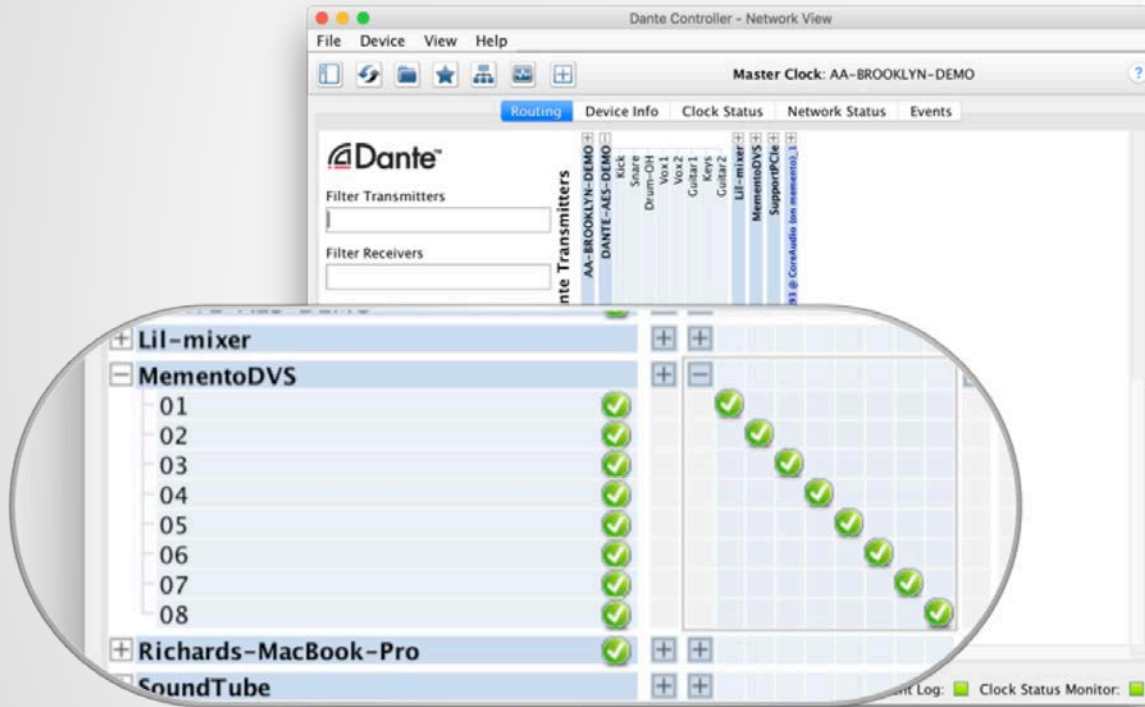
☑ Enable inputs:

first 1: Dante rx 1

last 8: Dante rx 8

Output range:

first 1: Dante tx 1

last 8: Dante tx 8

http://www.audinate.com/resources

SUBSCRIBE CHANNELS

Open Dante Controller

●

Computer with DVS appears as Dante device

●

Subscribe channels to Dante devices on network

●

Record/Playout

●

Adjust sample rate in Dante Controller like other devices

http://www.audinate.com/resources

DANTE
VIA

DANTE CERTIFICATION PROGRAM

LEVEL 2

WHAT IS DANTE VIA?

Software for Mac or PC

●

Connect any connected audio device to Dante network

●

Connect any audio application to Dante network

●

Drag and drop to create novel audio routes on computer

http://www.audinate.com/resources

ABOUT DANTE VIA

Shares some technology with Dante Virtual Soundcard

●

Dante Via and Dante Virtual Soundcard cannot run on the **same** computer at the **same** time

They will prevent each other from running simultaneously.

●

Dante Via can be a Clock Master– no hardware devices on network required

Allows creation of "Dante Via only" networks, 100% software-based

http://www.audinate.com/resources

DANTE VIA: EXTENDING USB I/O

Connect USB I/O

•
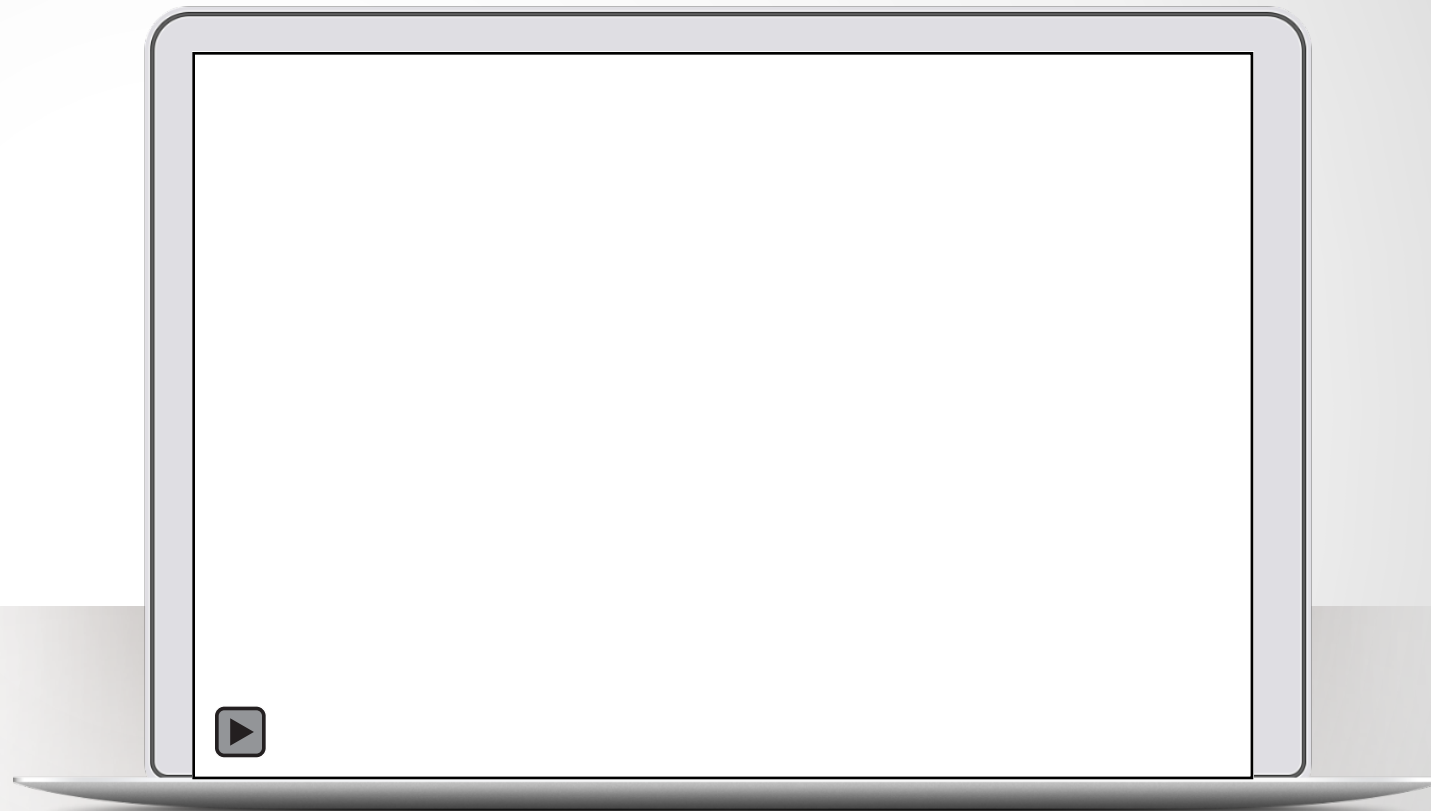
Launch Dante Via
USB I/O discovered

•

Check "Enable Dante" for USB I/O

•

On second computer running
Dante Via, USB I/O appears
Also in Dante Controller

•

Drag USB I/O to destination in
Dante Via

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DANTE VIA: AUDIO APPLICATION ON DANTE

Start audio application, such as iTunes

●

iTunes is auto-discovered

●
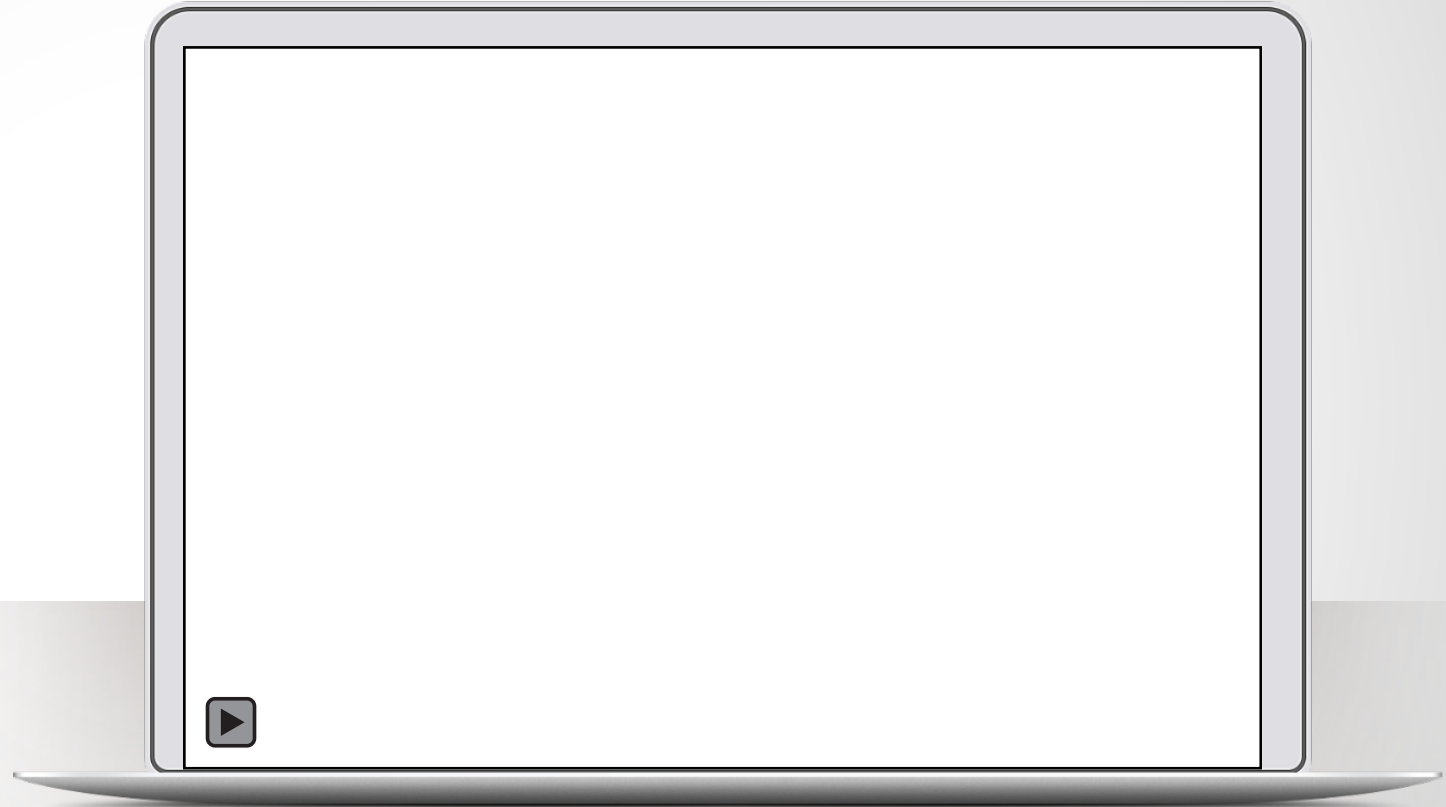
Select "Enable Dante" for iTunes

●

iTunes appears as labeled channels in Dante Controller

●

Application audio only - no system sounds

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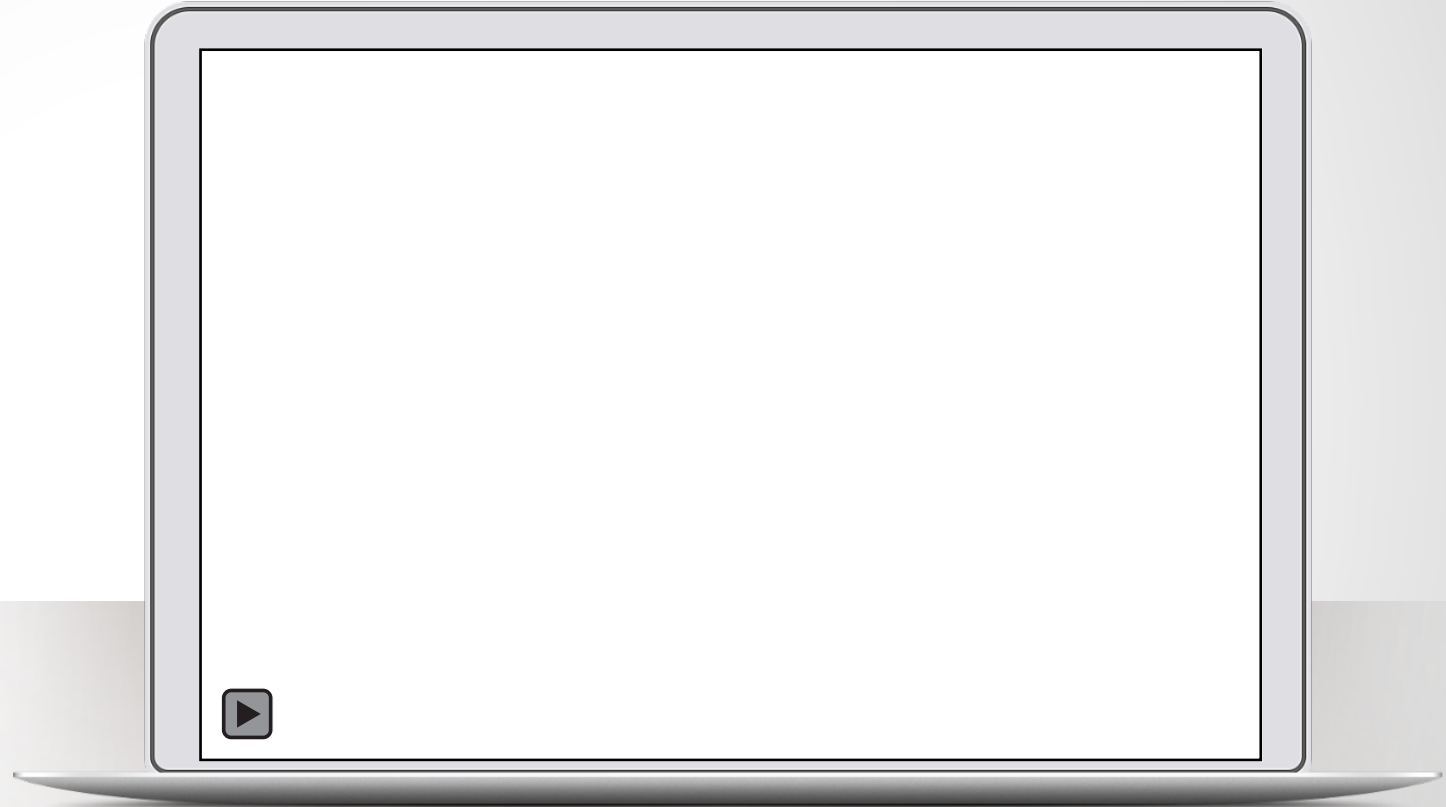
DANTE VIA: MONITORING CHANNELS

"Enable Dante" for your headphone jack (built-in output)

•

Headphone jack appears in Dante Controller

•

Route any Dante channels directly to headphones without disturbing audio

▶

http://www.audinate.com/resources

NOW WHAT?

TAKE THE HANDS-ON TEST

- Check with your instructor
- Test stations at most certification events
- Demonstrate your Dante knowledge on actual equipment
- Requires less than 30 minutes

http://www.audinate.com/resources

TAKE THE ONLINE TEST

http://www.audinate.com/certify

- Create Audinate account if you don't have one
- Login at URL
- Take Level 2 test
- When combined with Hands-on test results, certificate is automatically generated

http://www.audinate.com/resources

THANK
YOU

Dante™ by Audinate