

DANTE

CERTIFICATION PROGRAM

LEVEL 2

THE DANTE CERTIFICATION PROGRAM

New 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



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)



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



THE DANTE CERTIFICATION PROGRAM

Required steps:

- Level 1: Pass Level 1 online exam
- Level 2: Pass Level 2 online exam
PLUS hands-on exam
 - Hands-on exams available at events held by Audinate and partners



THE DANTE CERTIFICATION PROGRAM

Required steps:

- Level 1: Pass Level 1 **online** exam
- Level 2: Pass Level 2 **online** exam



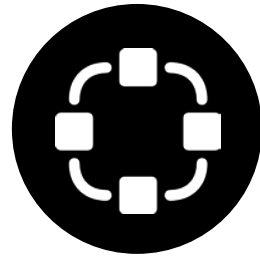
INTERMEDIATE DANTE CONCEPTS

DANTE CERTIFICATION PROGRAM
LEVEL 2

ABOUT AUDINATE



Headquartered in
Sydney, Australia



Network
engineers first



Develop Dante as
100%
interoperable
solution
for all audio
manufacturers

WHAT WE MAKE

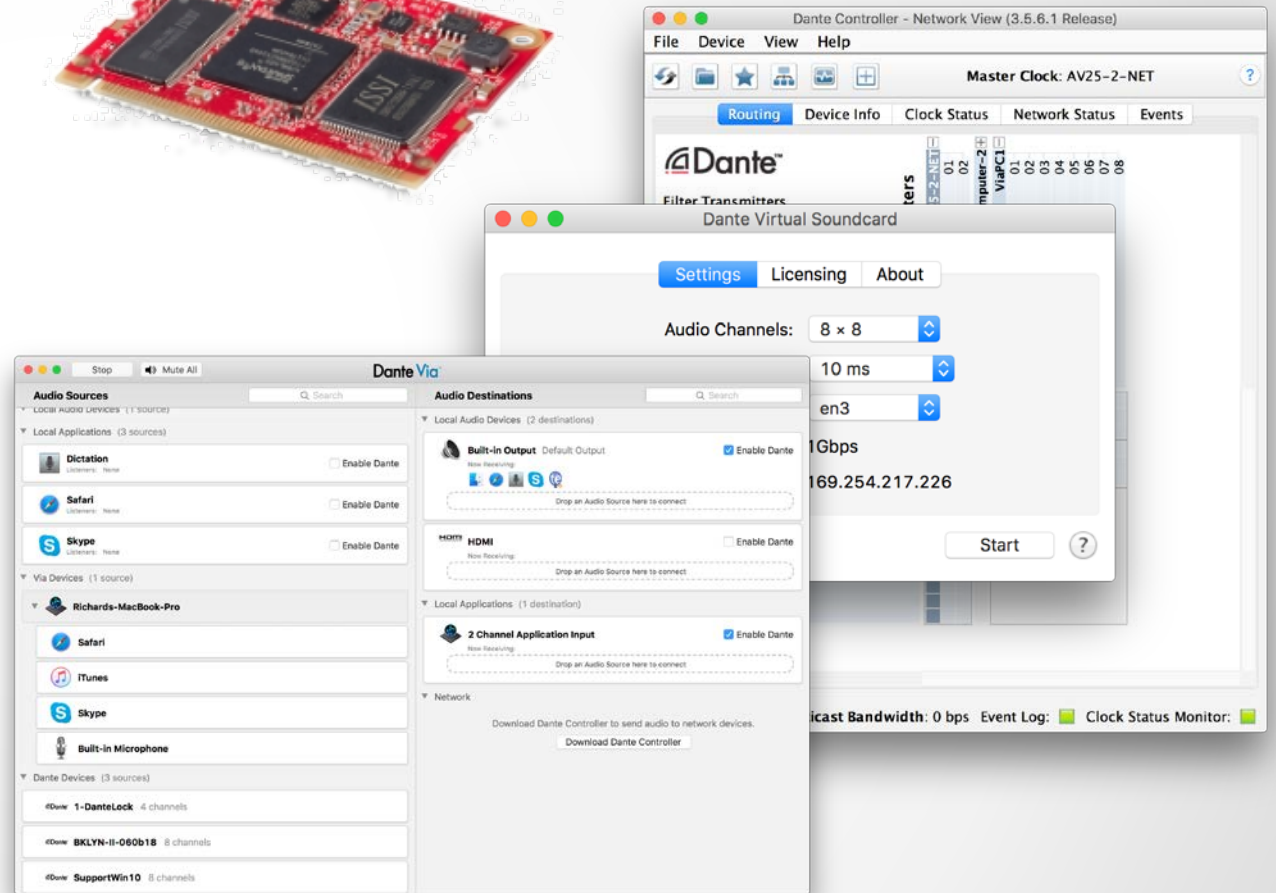
Dante technology
(all of it)

Hardware modules

Development tools

Software products:

- Dante Controller
- Dante Virtual Soundcard
- Dante Via



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

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

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

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

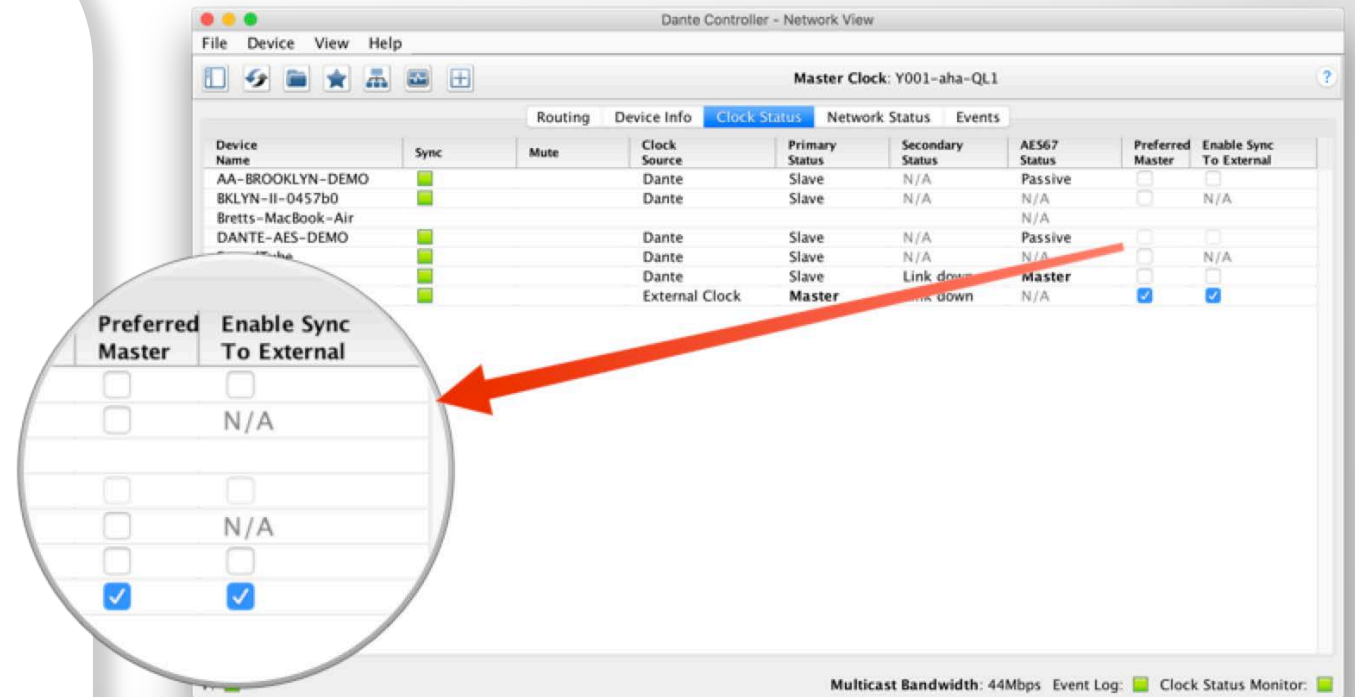


	Preferred Master	Enable Sync To External
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	N/A
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	N/A
	<input type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

ADJUSTING CLOCKS

Clock Status tab in Dante Controller

•
Checkboxes for Preferred Master and Enable Sync to External



CLOCK ELECTION

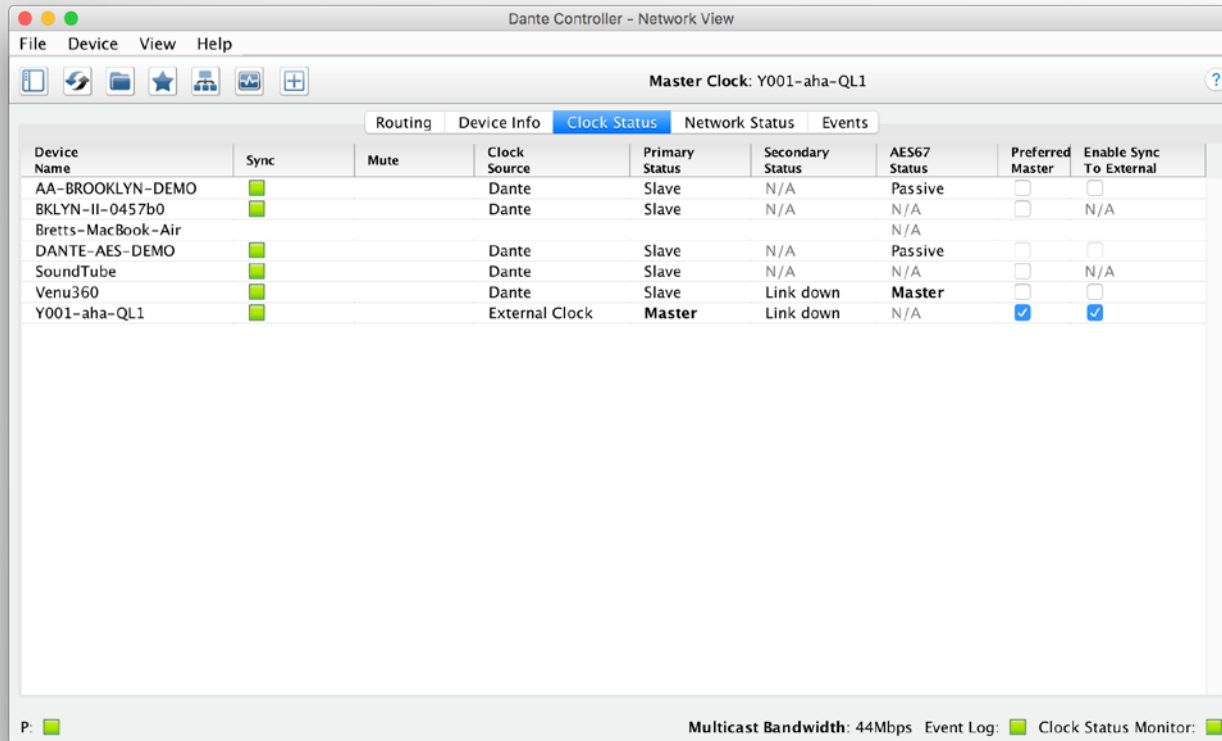
WIN

Preferred Master ✓ ✓

Enable Sync to
External ✓

Nothing checked

PREFERRED MASTER



The screenshot shows the Dante Controller Network View window. The title bar reads "Dante Controller - Network View". The menu bar includes "File", "Device", "View", and "Help". The main window displays a table of device clock status. The table has columns for Device Name, Sync, Mute, Clock Source, Primary Status, Secondary Status, AES67 Status, Preferred Master, and Enable Sync To External. The device "Y001-aha-QL1" is highlighted as the Preferred Master.

Device Name	Sync	Mute	Clock Source	Primary Status	Secondary Status	AES67 Status	Preferred Master	Enable Sync To External
AA-BROOKLYN-DEMO	<input checked="" type="checkbox"/>		Dante	Slave	N/A	Passive	<input type="checkbox"/>	<input type="checkbox"/>
BKLYN-II-0457b0	<input checked="" type="checkbox"/>		Dante	Slave	N/A	N/A	<input type="checkbox"/>	N/A
Bretts-MacBook-Air						N/A		
DANTE-AES-DEMO	<input checked="" type="checkbox"/>		Dante	Slave	N/A	Passive	<input type="checkbox"/>	<input type="checkbox"/>
SoundTube	<input checked="" type="checkbox"/>		Dante	Slave	N/A	N/A	<input type="checkbox"/>	N/A
Venu360	<input checked="" type="checkbox"/>		Dante	Slave	Link down	Master	<input type="checkbox"/>	<input type="checkbox"/>
Y001-aha-QL1	<input checked="" type="checkbox"/>		External Clock	Master	Link down	N/A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

At the bottom of the window, there are status indicators: "P: ", "Multicast Bandwidth: 44Mbps", "Event Log: ", and "Clock Status Monitor: ".

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

USING EXTERNAL CLOCKS

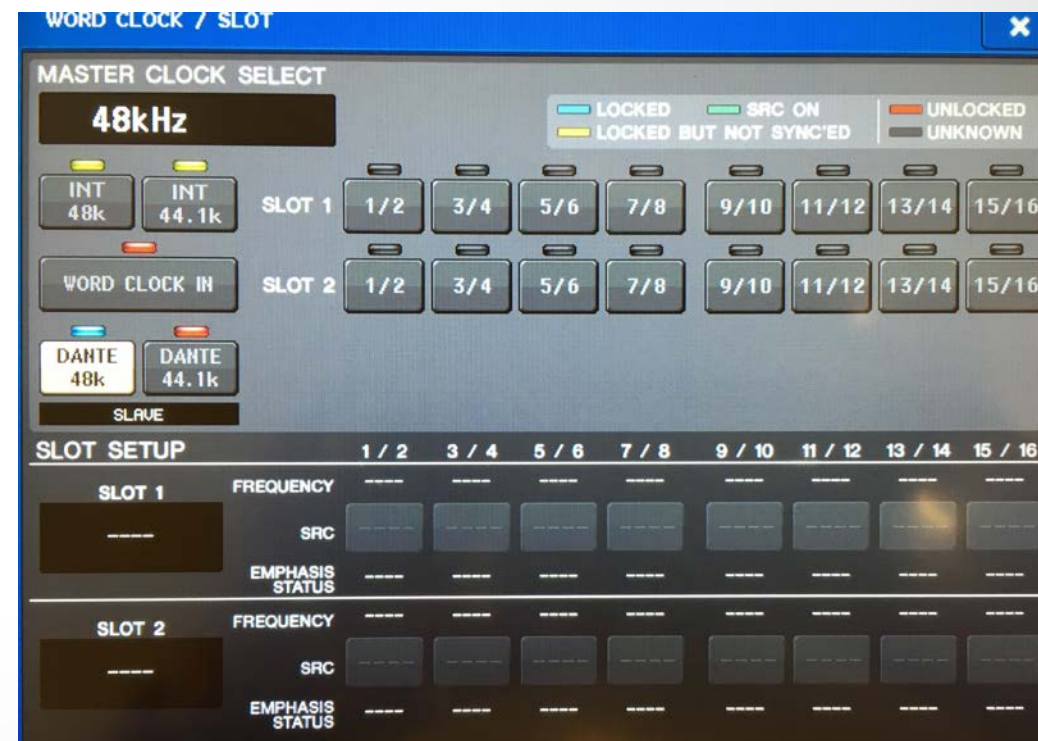
“Enable Sync to External” allows use of console (or other) clock

- Configure in console, too

- Check “Preferred Master”

- Mismatch may result in pops and clicks

- Using Active Clock Monitoring to ensure quality of external clock



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

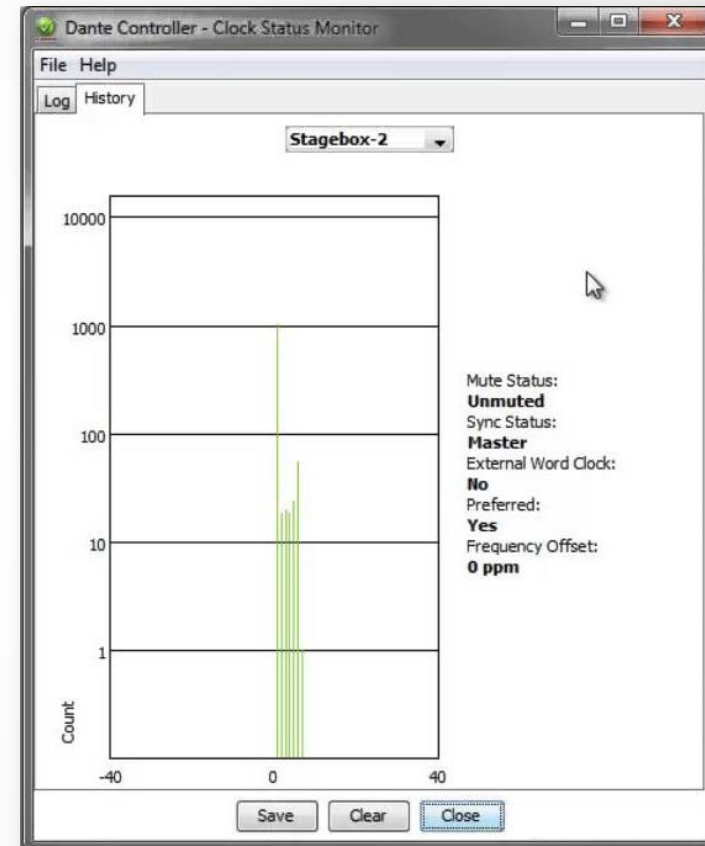
CLOCK STATUS MONITORING

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



LATENCY

DANTE CERTIFICATION PROGRAM
LEVEL 2

ABOUT LATENCY – A REFRESHER

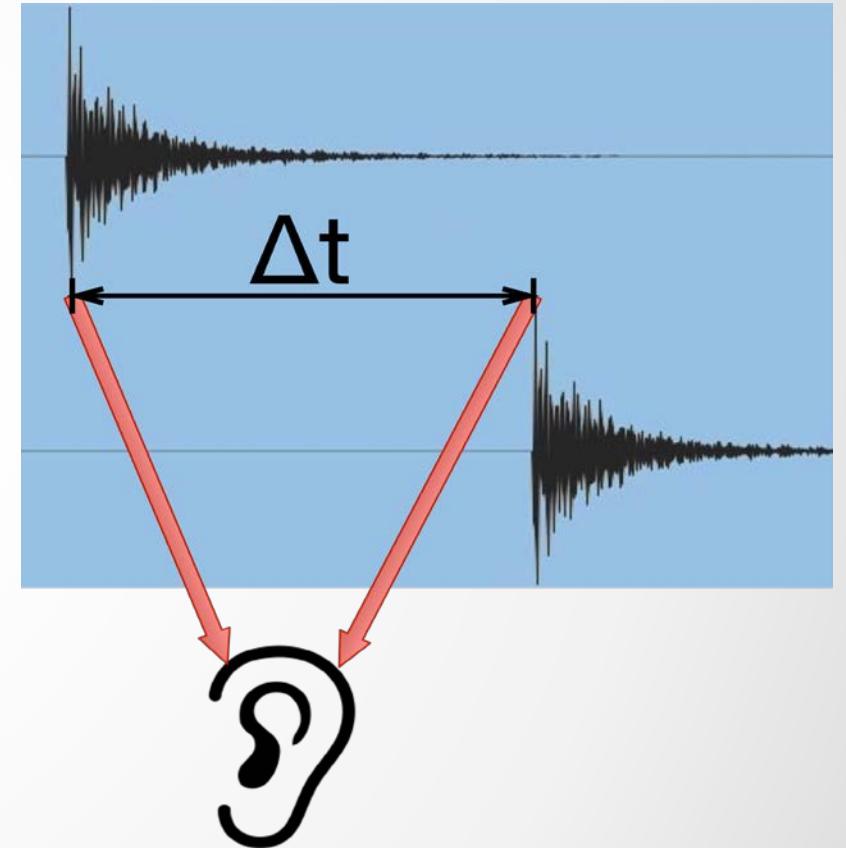
Audio signal delay in a system

- Transport and processing

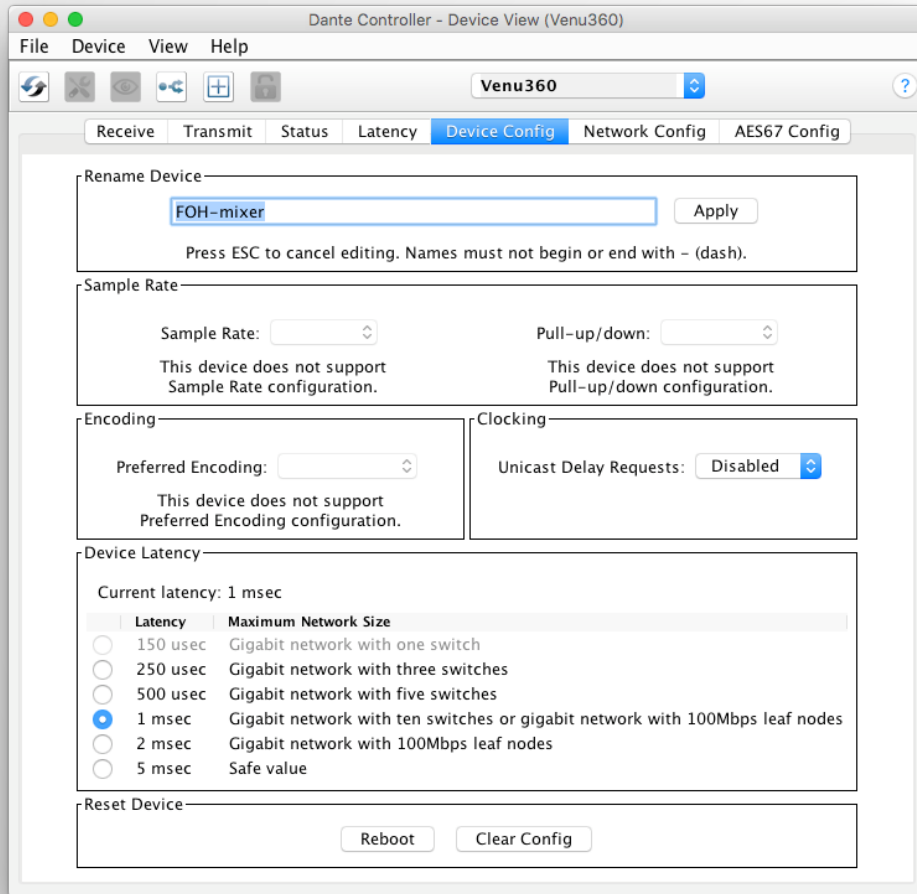
- Mainly a problem when we hear delayed and un-delayed signal simultaneously

- Air travel 34cm = 1msec

- Problem for legacy networking systems (VoIP)



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

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
<input type="radio"/>	150 usec	Gigabit network with one switch
<input type="radio"/>	250 usec	Gigabit network with three switches
<input type="radio"/>	500 usec	Gigabit network with five switches
<input checked="" type="radio"/>	1 msec	Gigabit network with ten switches or gigabit network with 100Mbps leaf nodes
<input type="radio"/>	2 msec	Gigabit network with 100Mbps leaf nodes
<input type="radio"/>	5 msec	Safe value

LATENCY - LOWER BOUNDS

- If only 1 switches, 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**

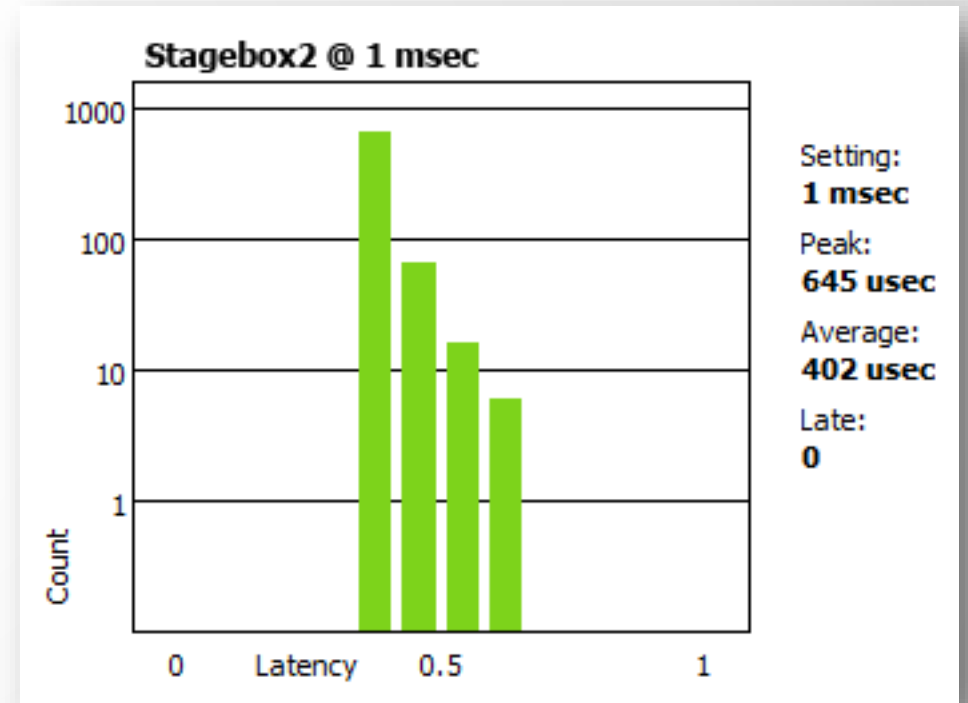
Device Latency

Current latency: 1 msec

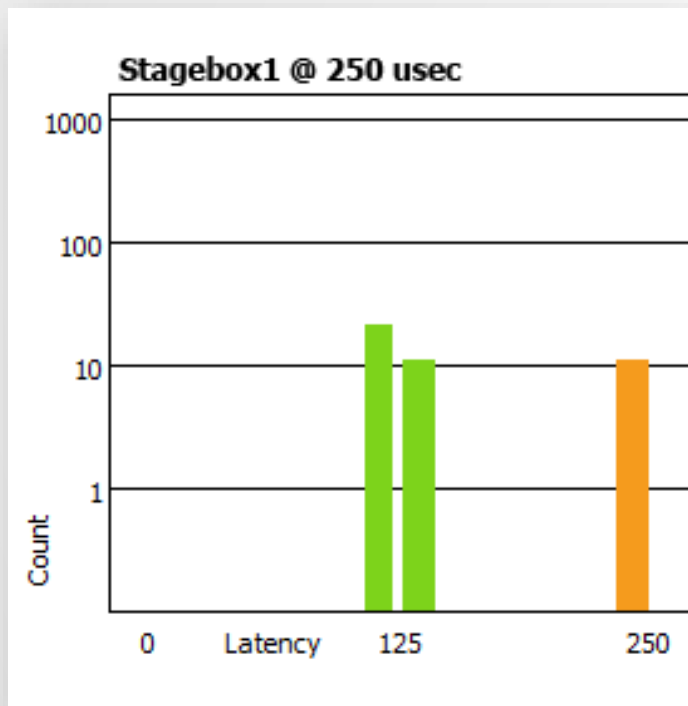
	Latency	Maximum Network Size
<input type="radio"/>	150 usec	Gigabit network with one switch
<input type="radio"/>	250 usec	Gigabit network with three switches
<input type="radio"/>	500 usec	Gigabit network with five switches
<input checked="" type="radio"/>	1 msec	Gigabit network with ten switches or gigabit network
<input type="radio"/>	2 msec	Gigabit network with 100Mbps leaf nodes
<input type="radio"/>	5 msec	Safe value

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



MONITORING LATENCY – BAD EXAMPLE



Example:

- 250 μ s 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

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



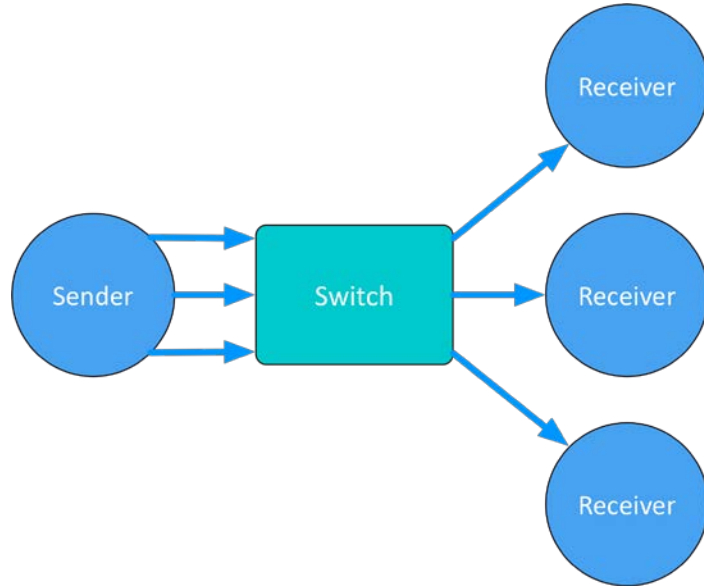
“Public announcement” – messages sent to everybody on the network



Data is processed by all receivers

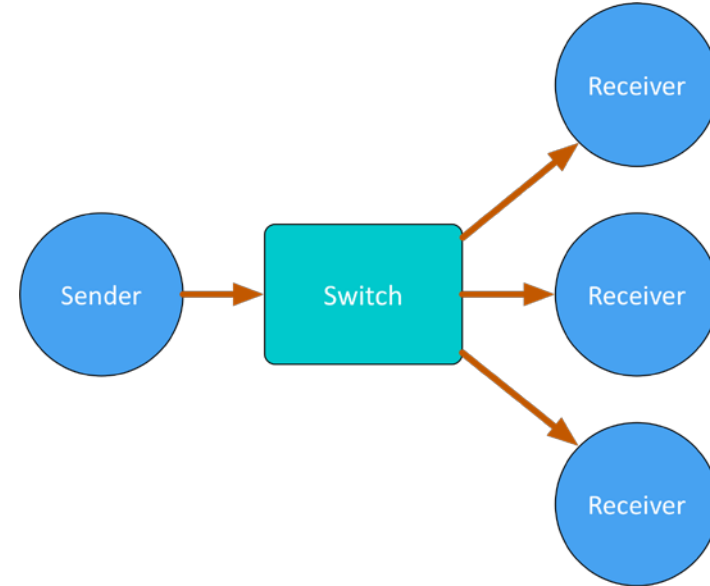
UNICAST AND MULTICAST

Unicast



1 data stream per receiver

Multicast



1 data stream for all receivers

DIFFERENCES: BROADCAST AND MULTICAST

If *unmanaged*, both send data out of all network ports



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



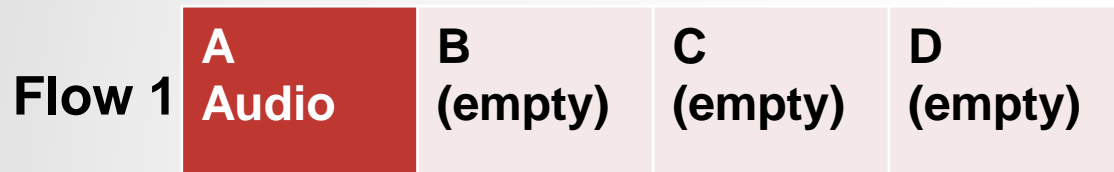
Organization of multicast receiving groups is done with managed switch



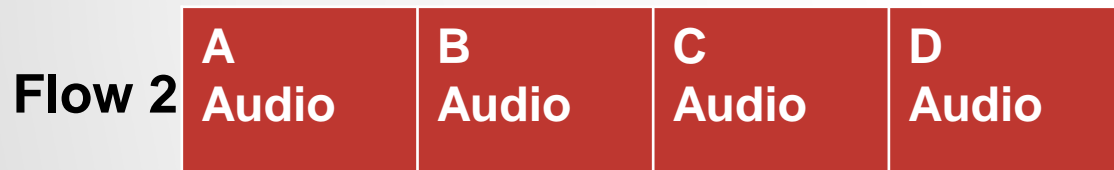
Separate LANs or VLANs used to manage both types

DANTE UNICAST FLOWS

1 Flow to 1 Receiver containing 1 channel of audio



1 Flow to 1 Receiver containing 4 channels of 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

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



DANTE AND UNICAST FLOWS

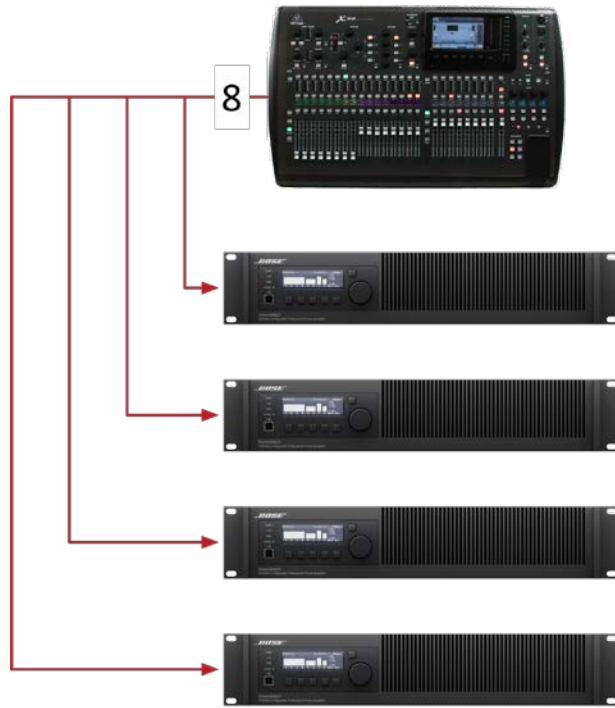


8 channels each -> 2 flows each -> 4 flows



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

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

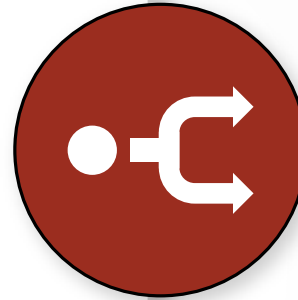
CONFIGURING MULTICAST FLOWS

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	<input checked="" type="checkbox"/>
Snare	<input checked="" type="checkbox"/>
Kick	<input checked="" type="checkbox"/>
Vox1	<input checked="" type="checkbox"/>
Vox2	<input checked="" type="checkbox"/>
Guitar1	<input type="checkbox"/>
Keys	<input type="checkbox"/>
Guitar2	<input type="checkbox"/>

Create Cancel

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!

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

NAMING DEVICES

DANTE CERTIFICATION PROGRAM
LEVEL 2

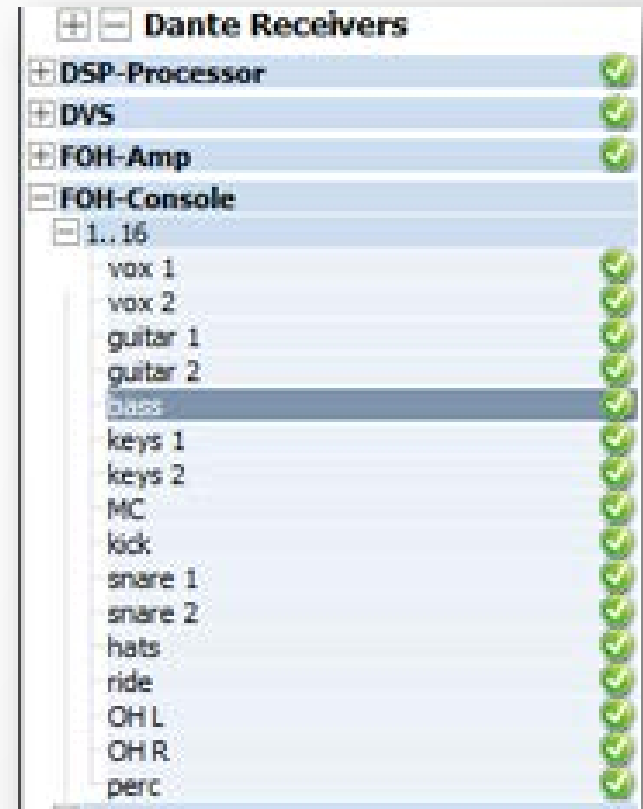
NAMING DANTE DEVICES

All Dante devices have editable names

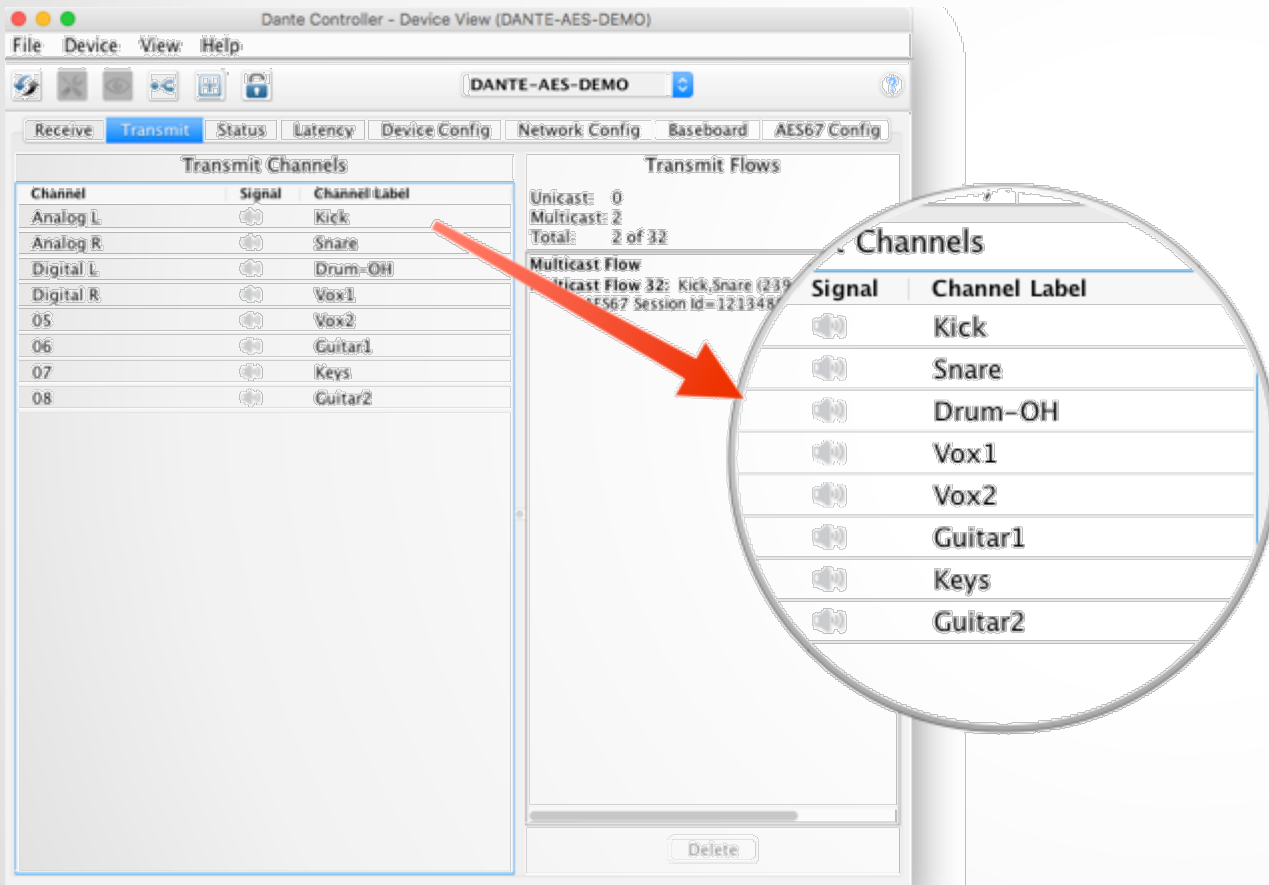
- Name devices to make a system easy to understand

- Channel labels help in busy environments

- Name first, then route



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



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

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



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)



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

WORKING WITH DEVICE LOCK

Locked devices have a lock icon in the name bar



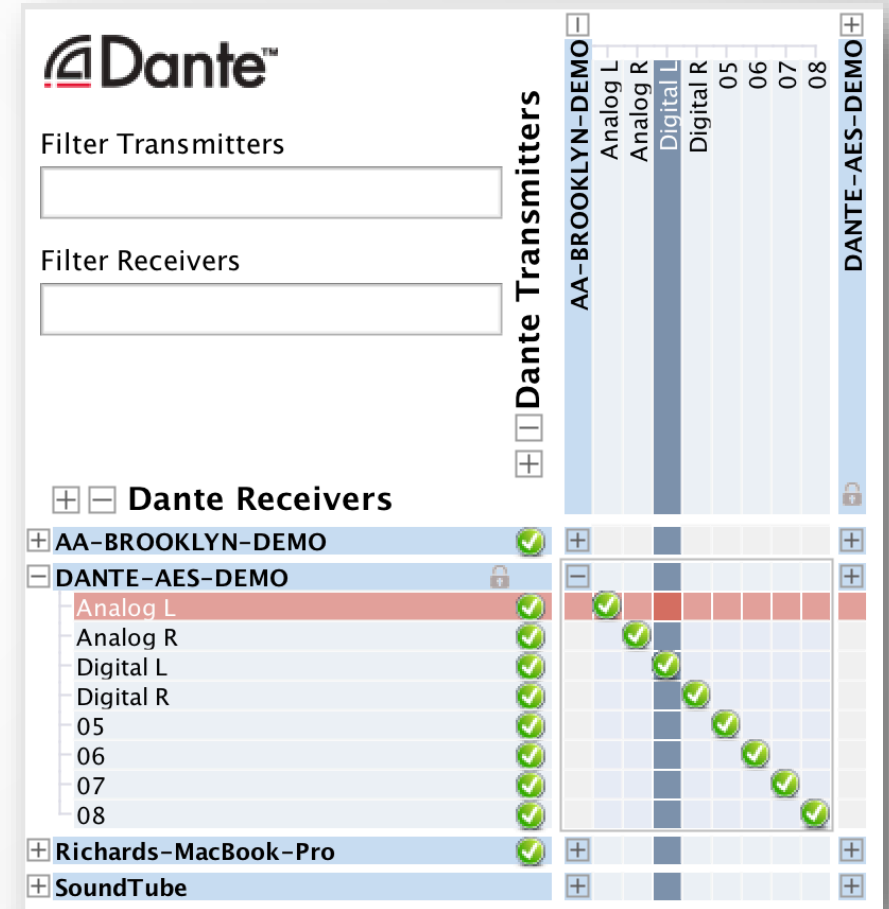
When a locked channel is selected, highlight is red



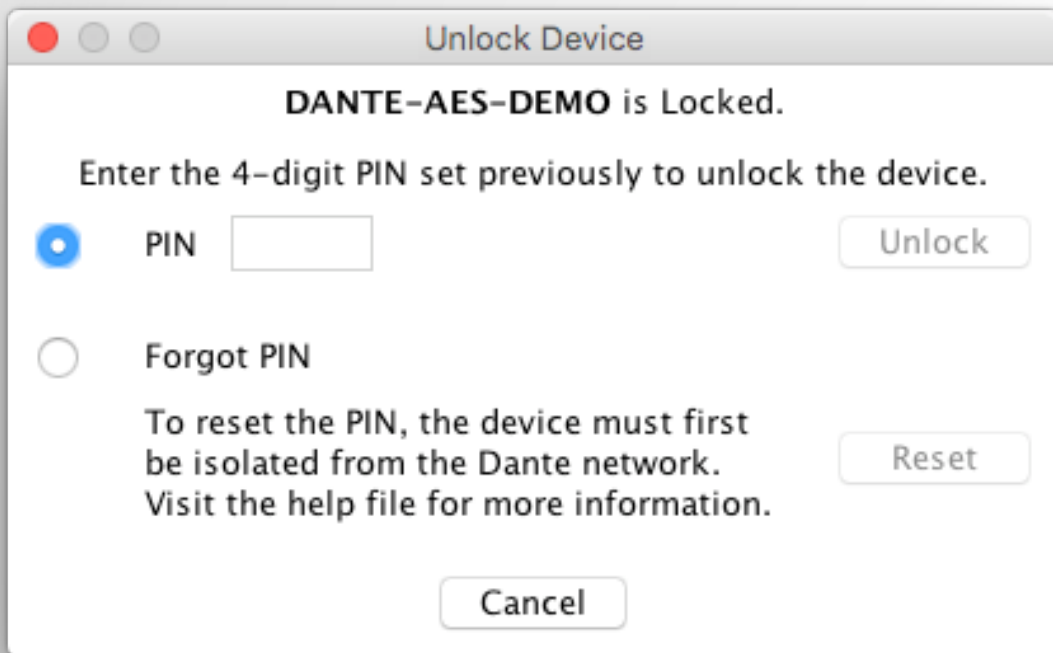
Attempts to change routes result in no action



Limit flows used by transmitters



UNLOCKING A DEVICE



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

PRESETS

DANTE CERTIFICATION PROGRAM
LEVEL 2

DANTE PRESETS

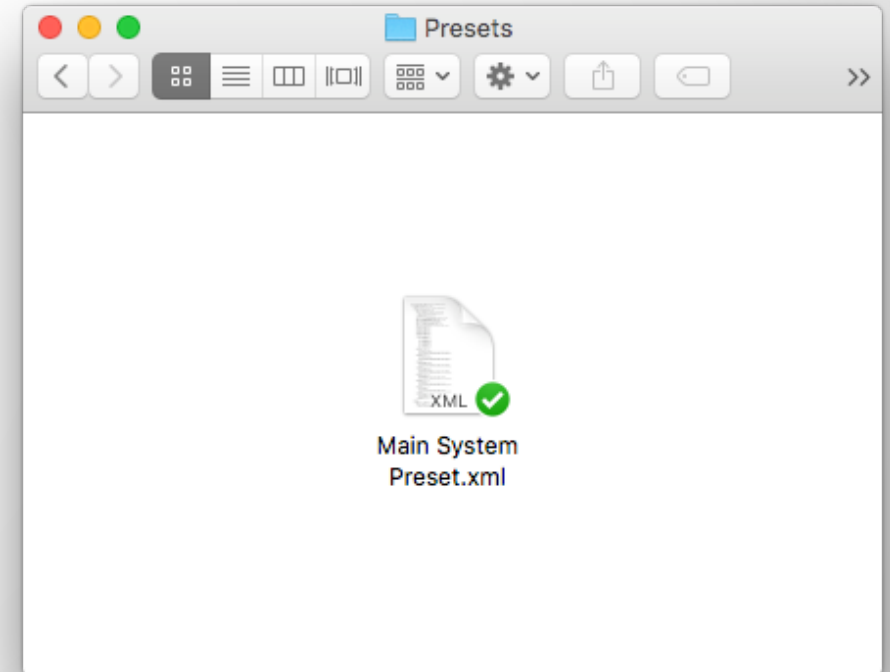
Dante network configuration can be saved in a file



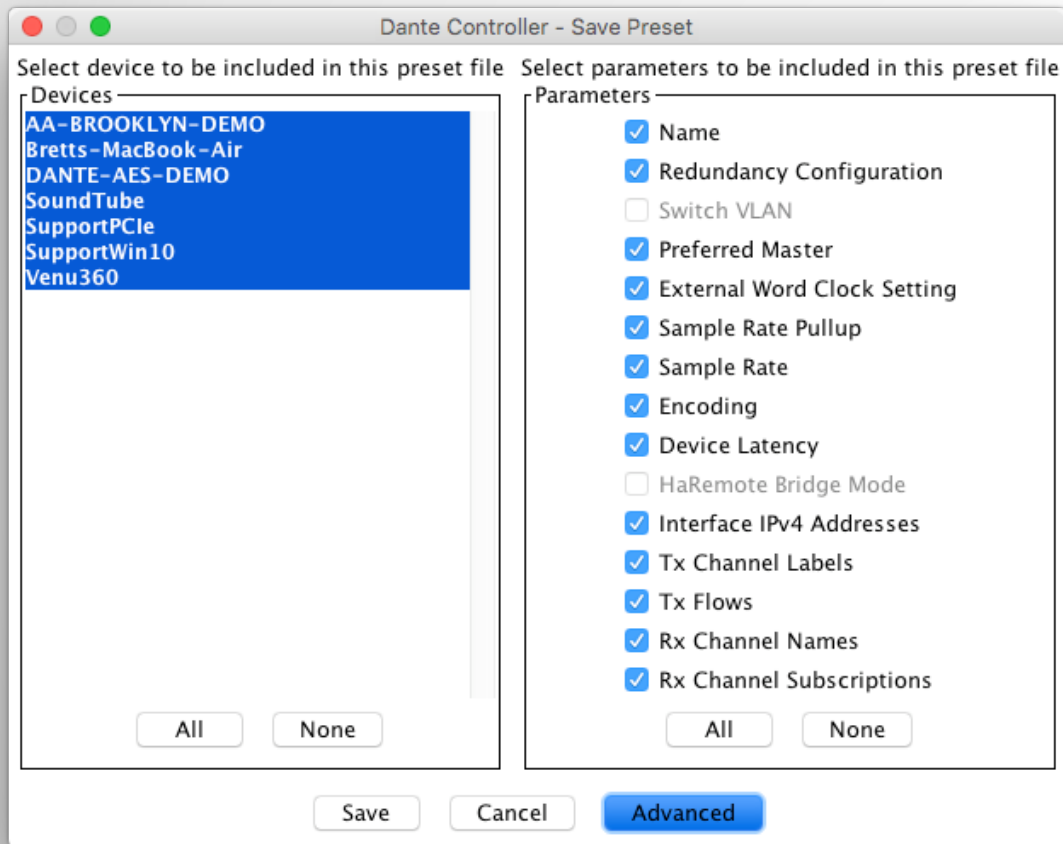
Preset may include device names and roles



Quickly reconfigure a Dante system to a known state



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

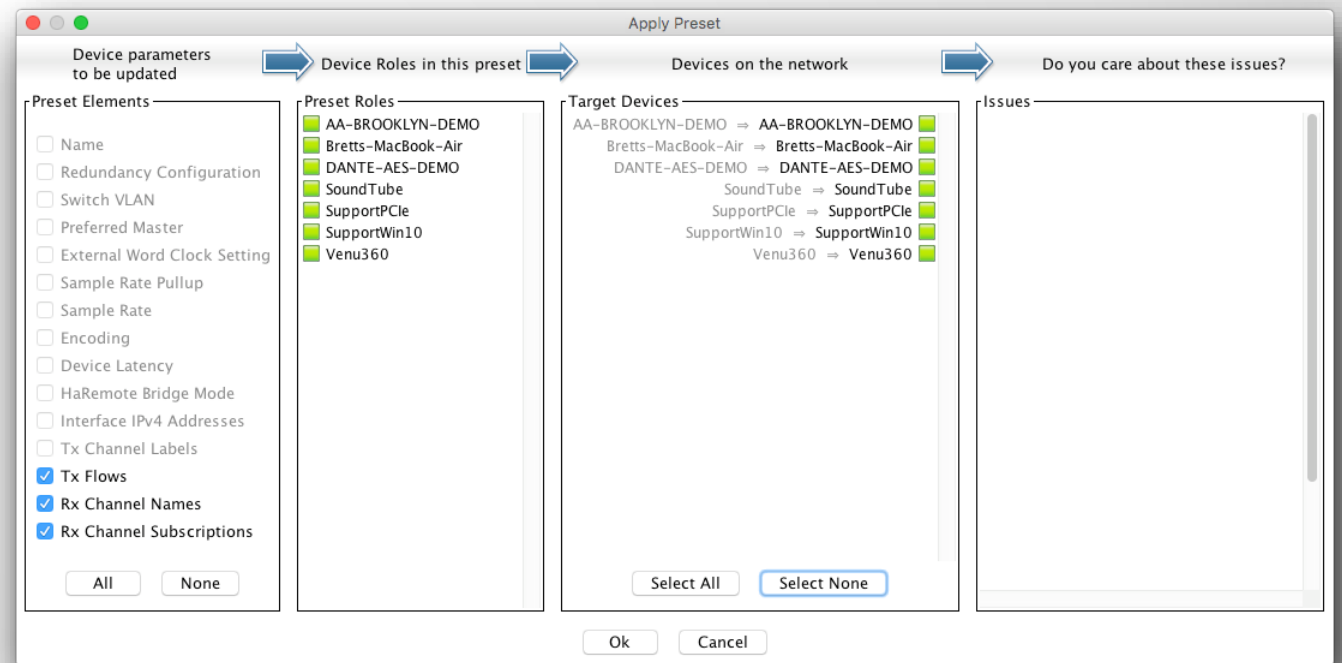
DEPLOYING A PRESET

Choose “Load preset” 

•
Select preset file

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

•
Apply



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

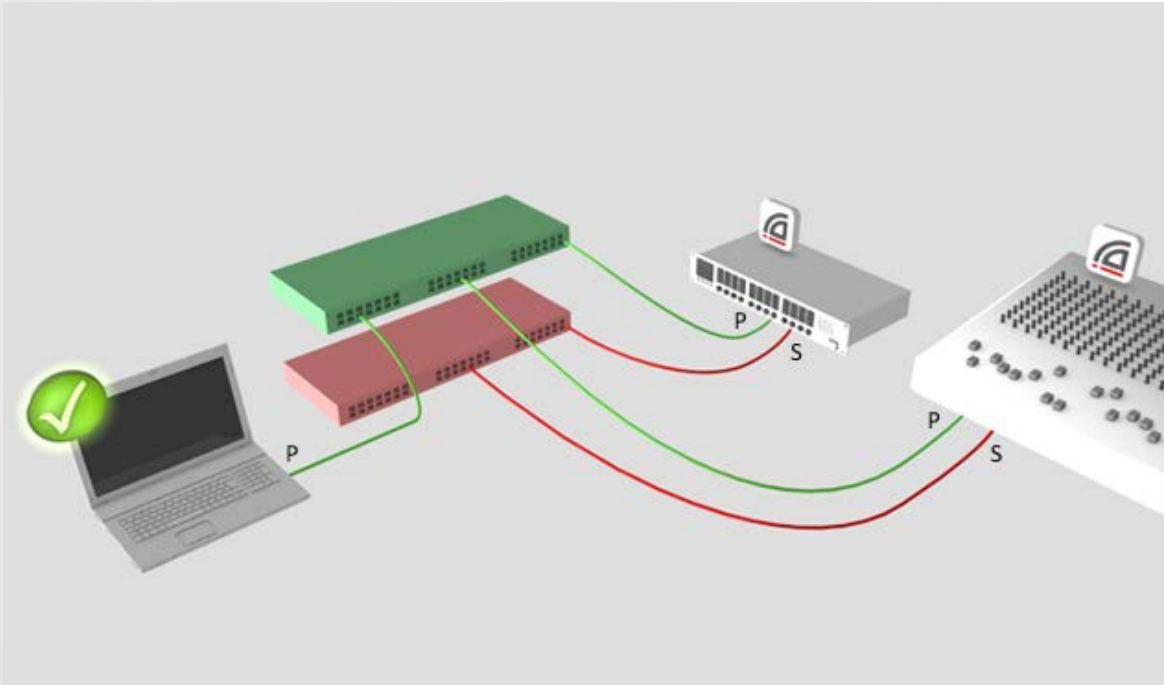
- No clicks or pops

- Completely automatic setup

- For mission critical systems

**DEPARTMENT OF
REDUNDANCY
DEPARTMENT**

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

REDUNDANCY AND DANTE CONTROLLER

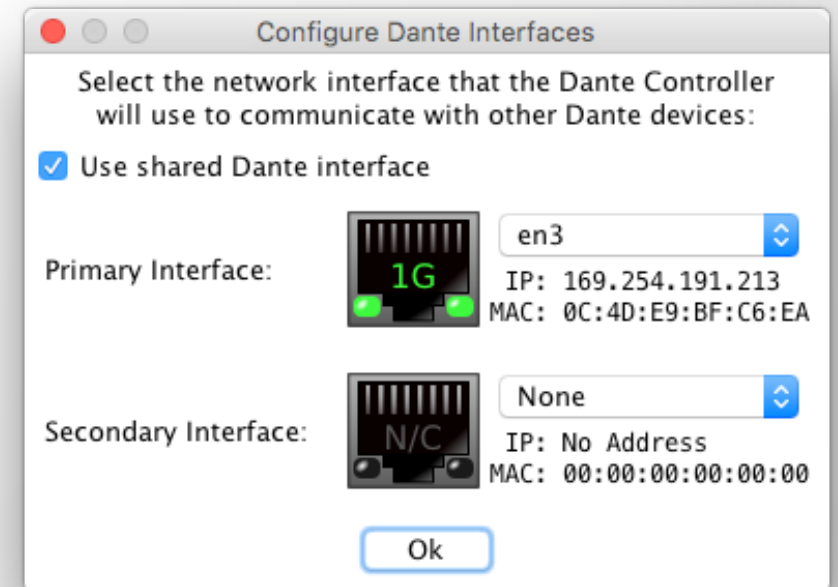
Dante Controller can be connected to both Primary and Secondary interface



Control is passed from one network to the other



If Primary fails, Dante Controller can be connected to Secondary



DANTE VIRTUAL SOUNDCARD

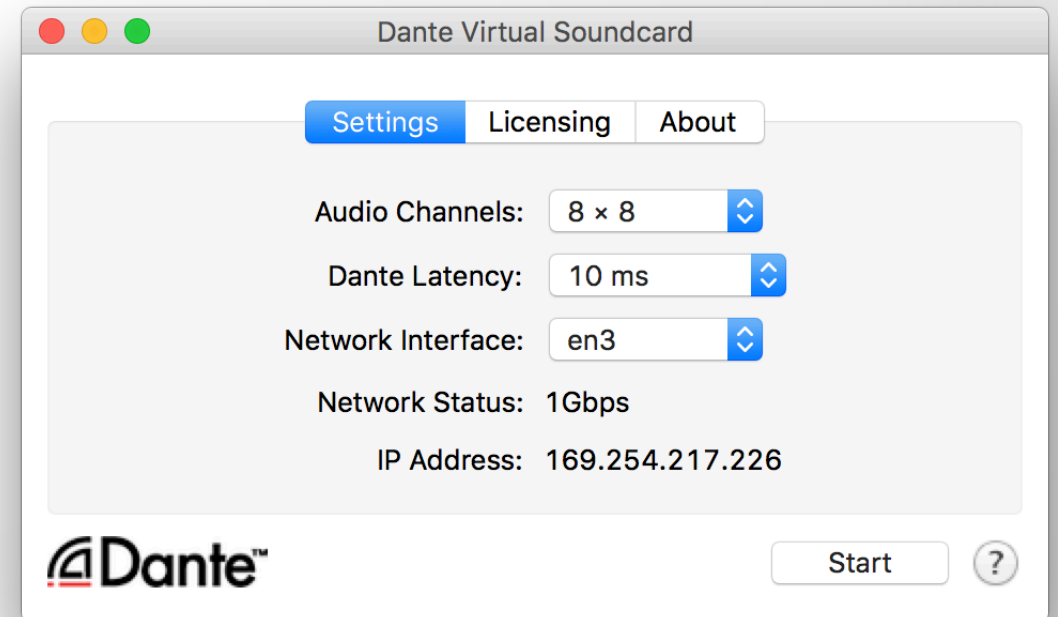
DANTE CERTIFICATION PROGRAM
LEVEL 2

WHAT IS DANTE VIRTUAL SOUND CARD? (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



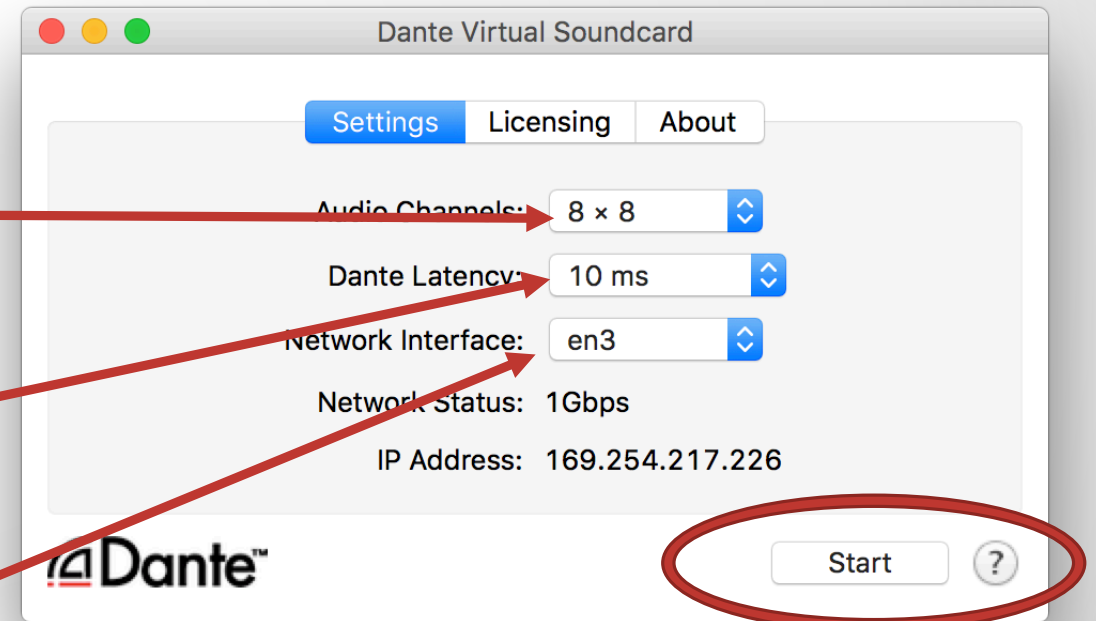
SETTING UP DANTE VIRTUAL SOUND CARD

Start or Stop the service
Must be stopped to adjust

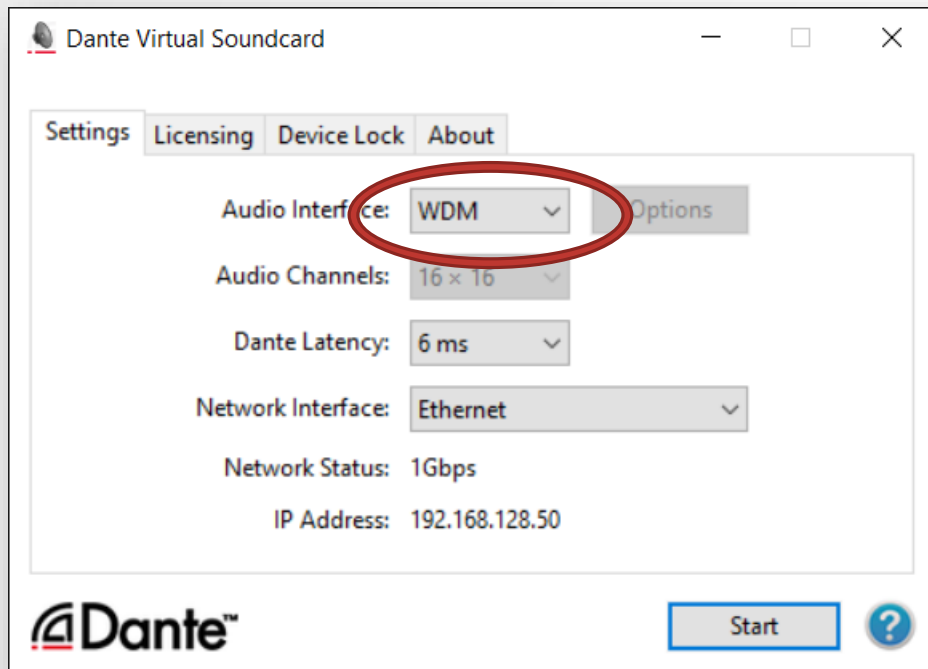
- Audio channels 2x2 – 64x64

- Latency – 4ms – 10ms

- Choose network interface



DANTE VIRTUAL SOUND CARD IN WINDOWS



Choice of WDM or ASIO drivers

- ASIO common in professional audio applications

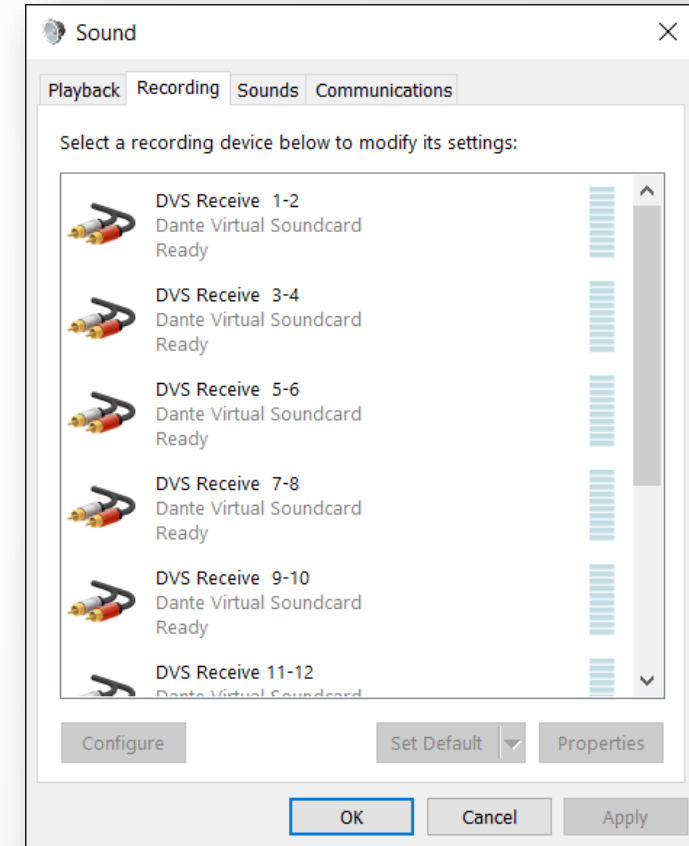
- WDM common in consumer audio products

DANTE VIRTUAL SOUND CARD 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



DANTE VIRTUAL SOUND CARD IN OSX

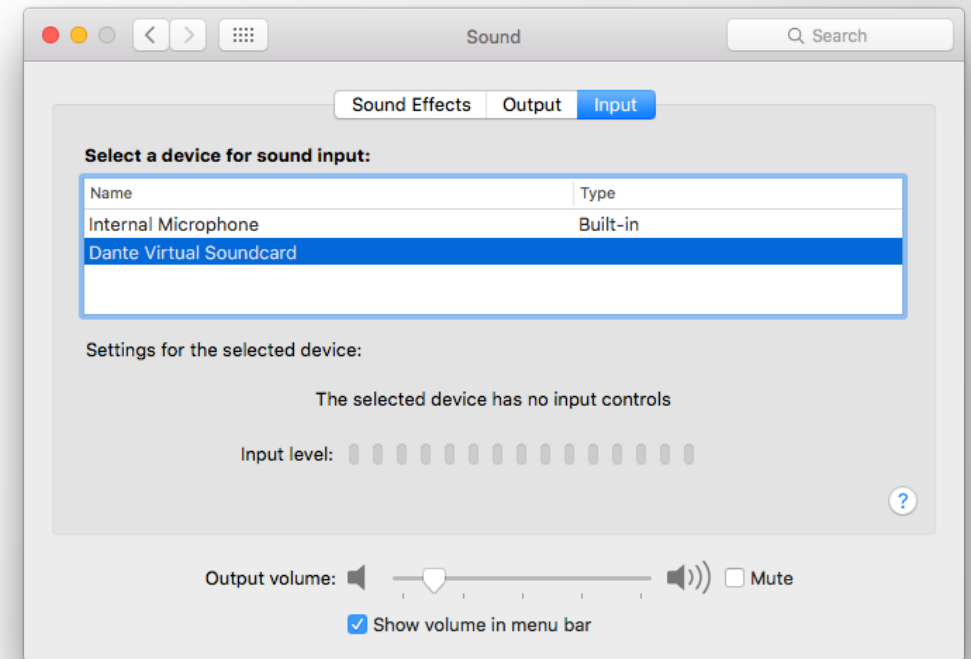
On OS X, Dante Virtual Soundcard appears as a regular Core Audio device



Works with both pro and consumer applications



Can be made default sound device



CLOCKING DANTE VIRTUAL SOUND CARD



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

CONNECT TO A DAW

Launch Dante Virtual Soundcard

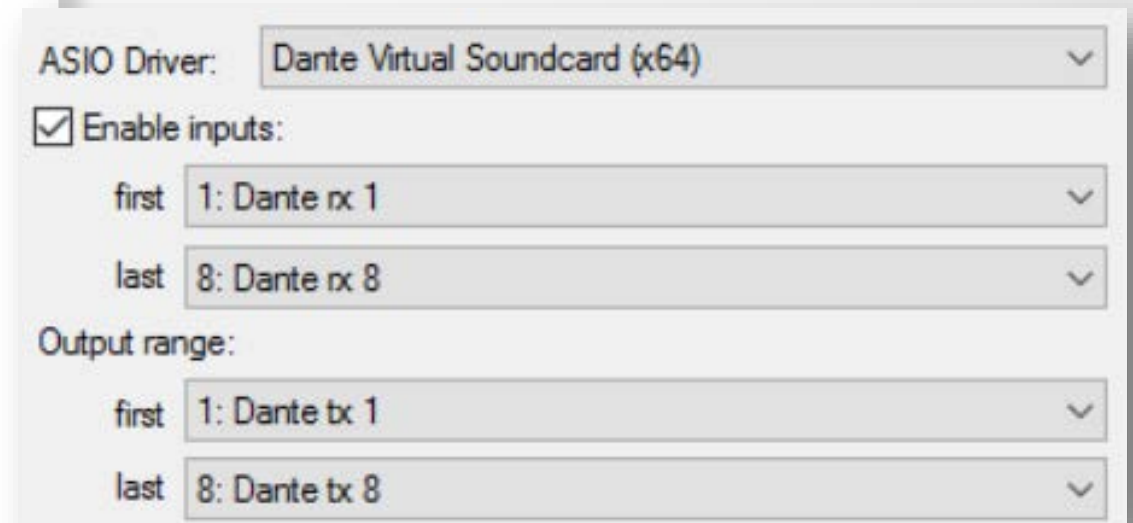
•
Set number of channels and Start DVS

•
DVS will appear as audio device on computer

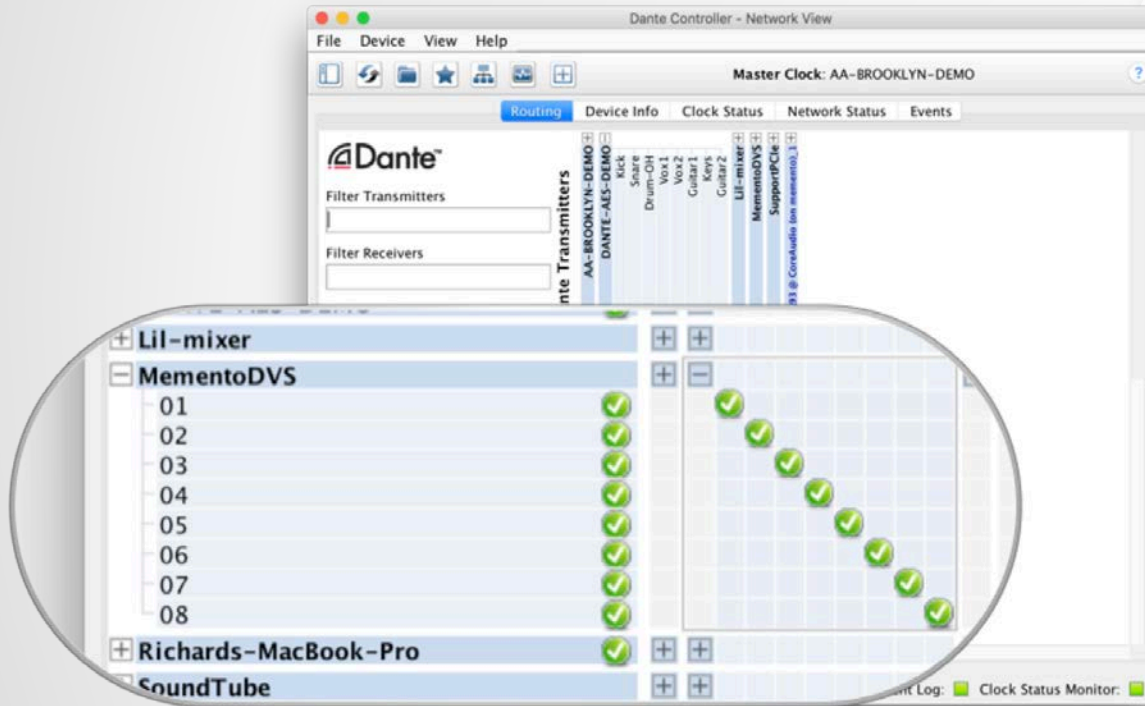
Mac – Core Audio

Windows – ASIO or WDM

•
Select as I/O device in DAW preferences



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

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

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

DANTE VIA: EXTENDING USB I/O

Connect USB I/O



Launch Dante Via
USB I/O discovered



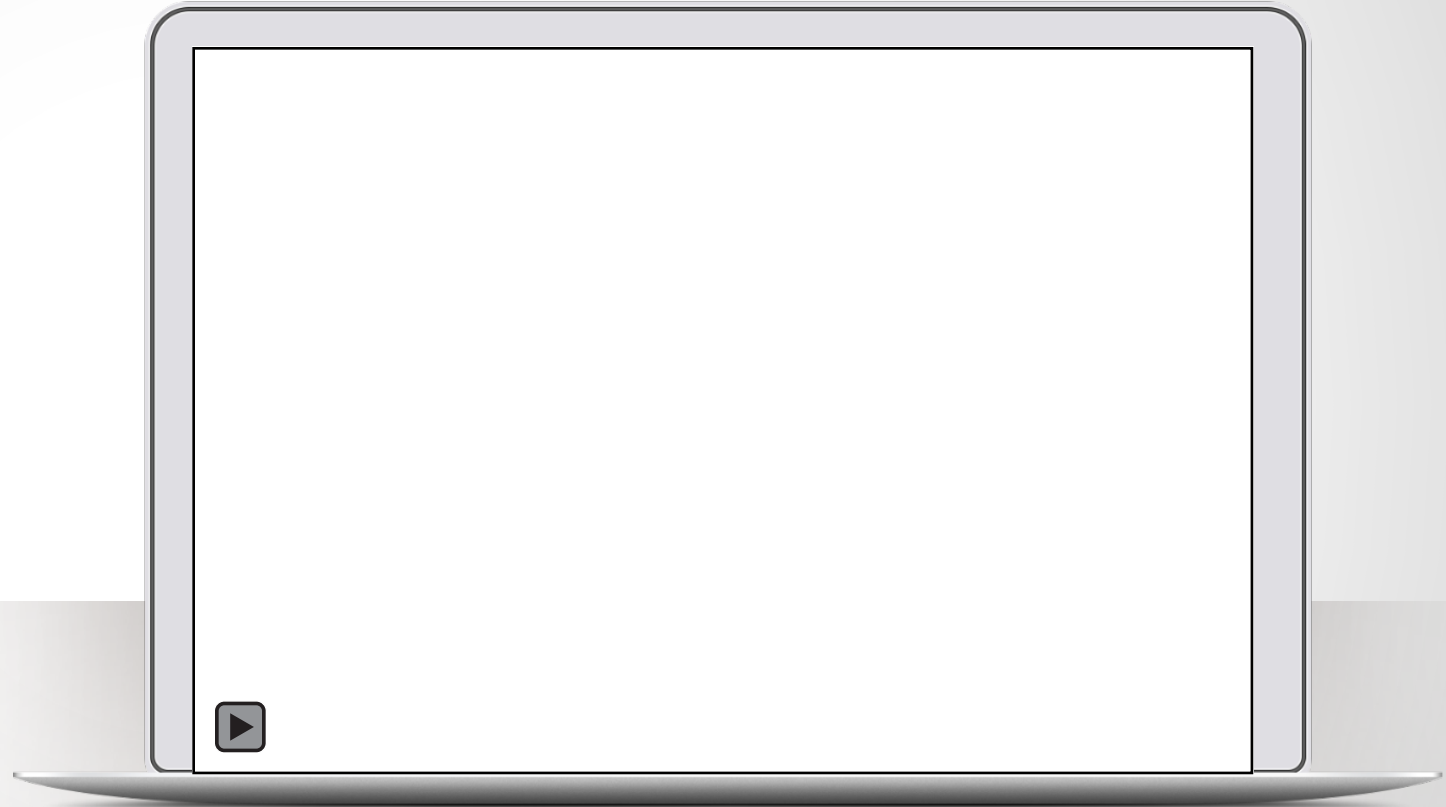
Check “Enable Dante” for USB I/O



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



Drag USB I/O to destination in
Dante Via



DANTE VIA: AUDIO APPLICATION ON DANTE

Start audio application, such
as iTunes



iTunes is auto-discovered



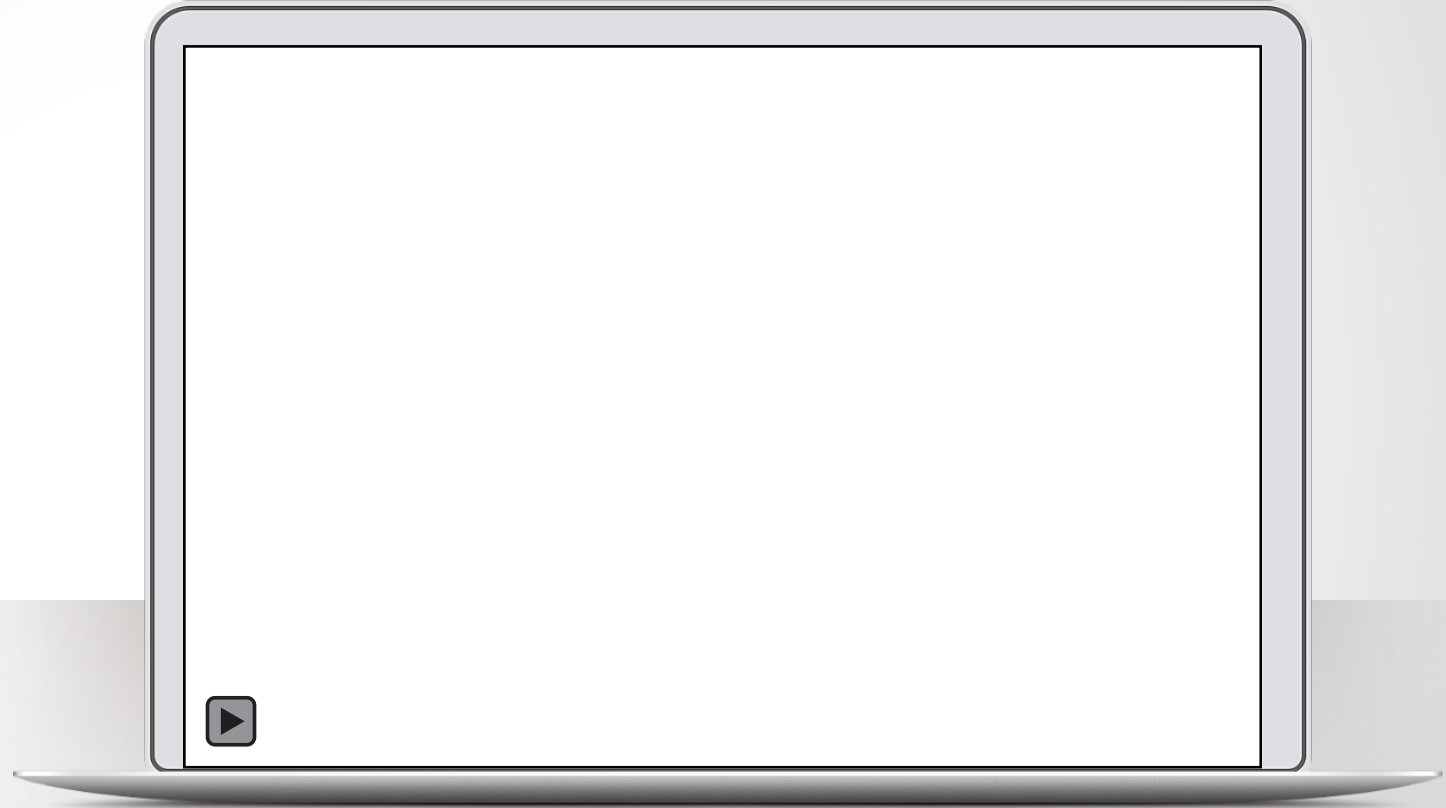
Select “Enable Dante” for
iTunes



iTunes appears as labeled
channels in Dante Controller



Application audio only - no
system sounds



DANTE VIA: MONITORING CHANNELS

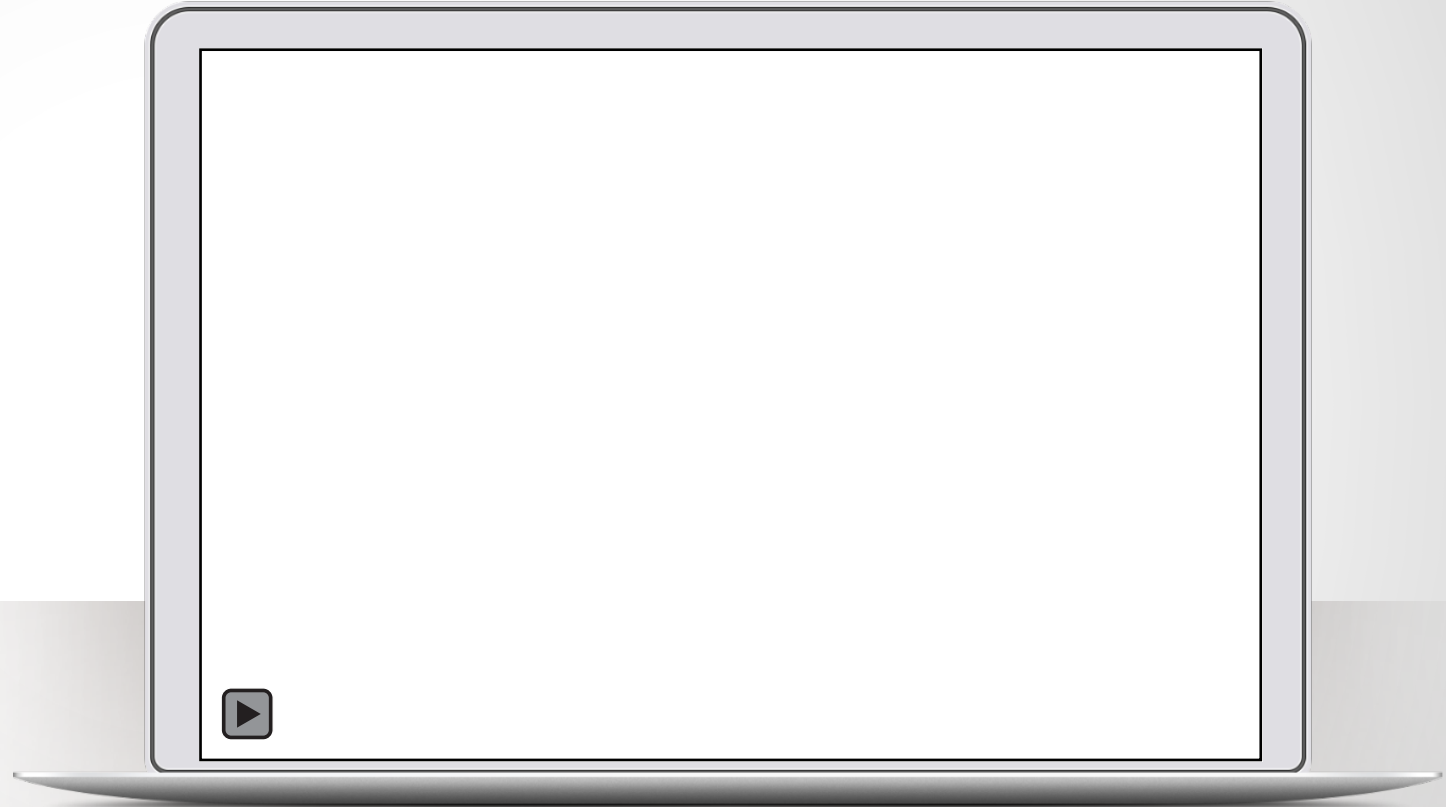
“Enable Dante” for your
headphone jack (built-in
output)



Headphone jack appears in
Dante Controller



Route any Dante channels
directly to headphones
without disturbing audio



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

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

THANK

YOU