infocomm
JUNE 6-8 2018 • LAS VEGAS

DANTE CERTIFICATION PROGRAM

LEVEL 2

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

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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 or online

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INTERMEDIATE

DANTE CONCEPTS

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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

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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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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

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CLOCKING

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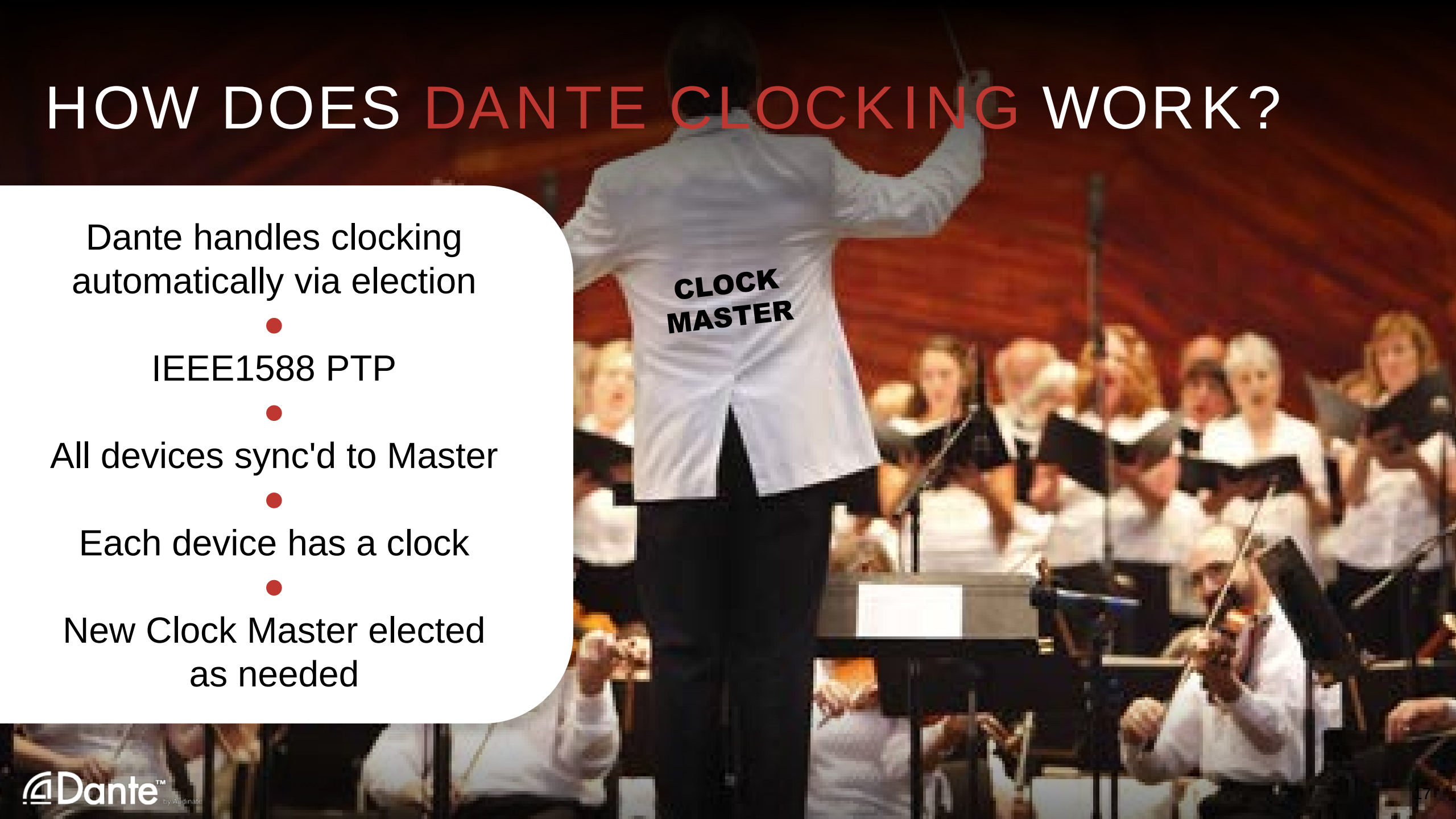
HOW DOES DANTE CLOCKING WORK?

Dante handles clocking automatically via election

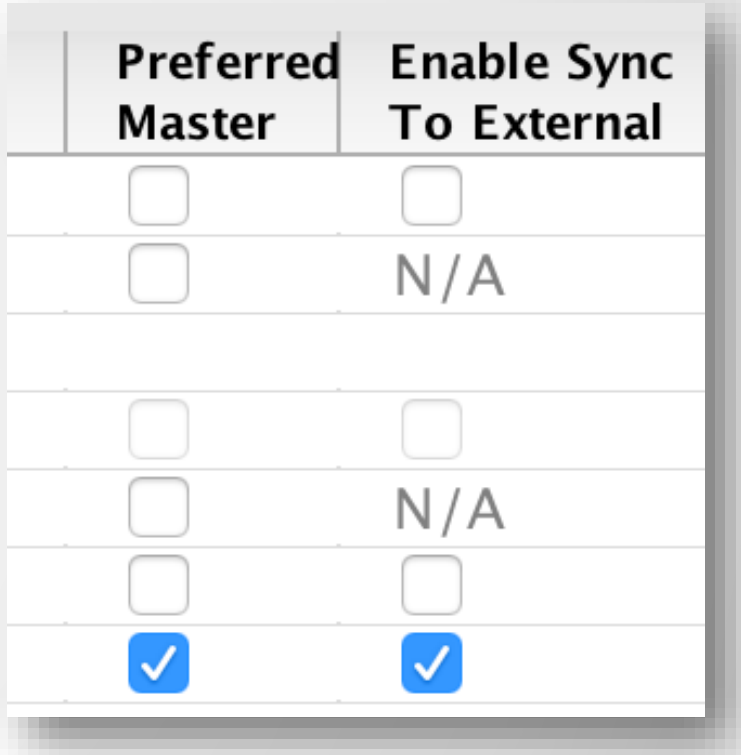
- IEEE1588 PTP
- All devices sync'd to Master
- Each device has a clock
- New Clock Master elected as needed



CLOCK 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



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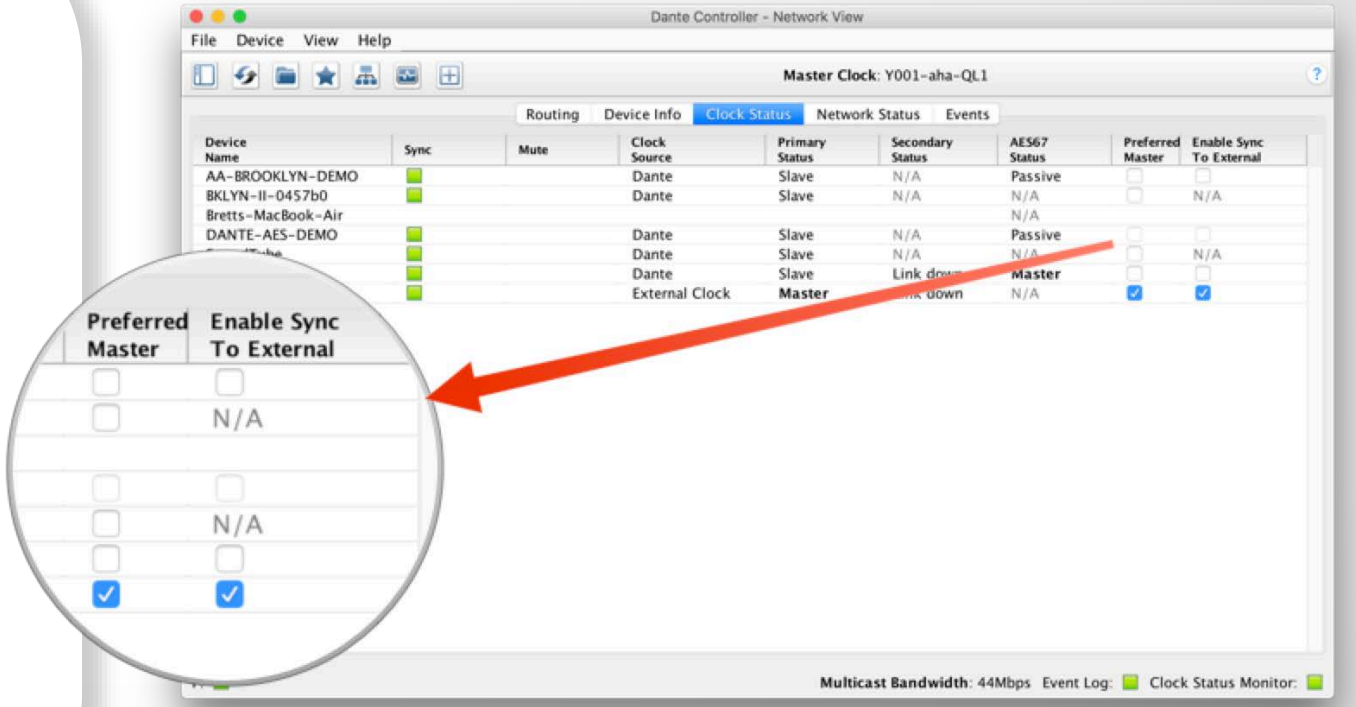
ADJUSTING CLOCKS

Clock Status tab in Dante Controller

- Checkboxes for Preferred Master and Enable Sync to External



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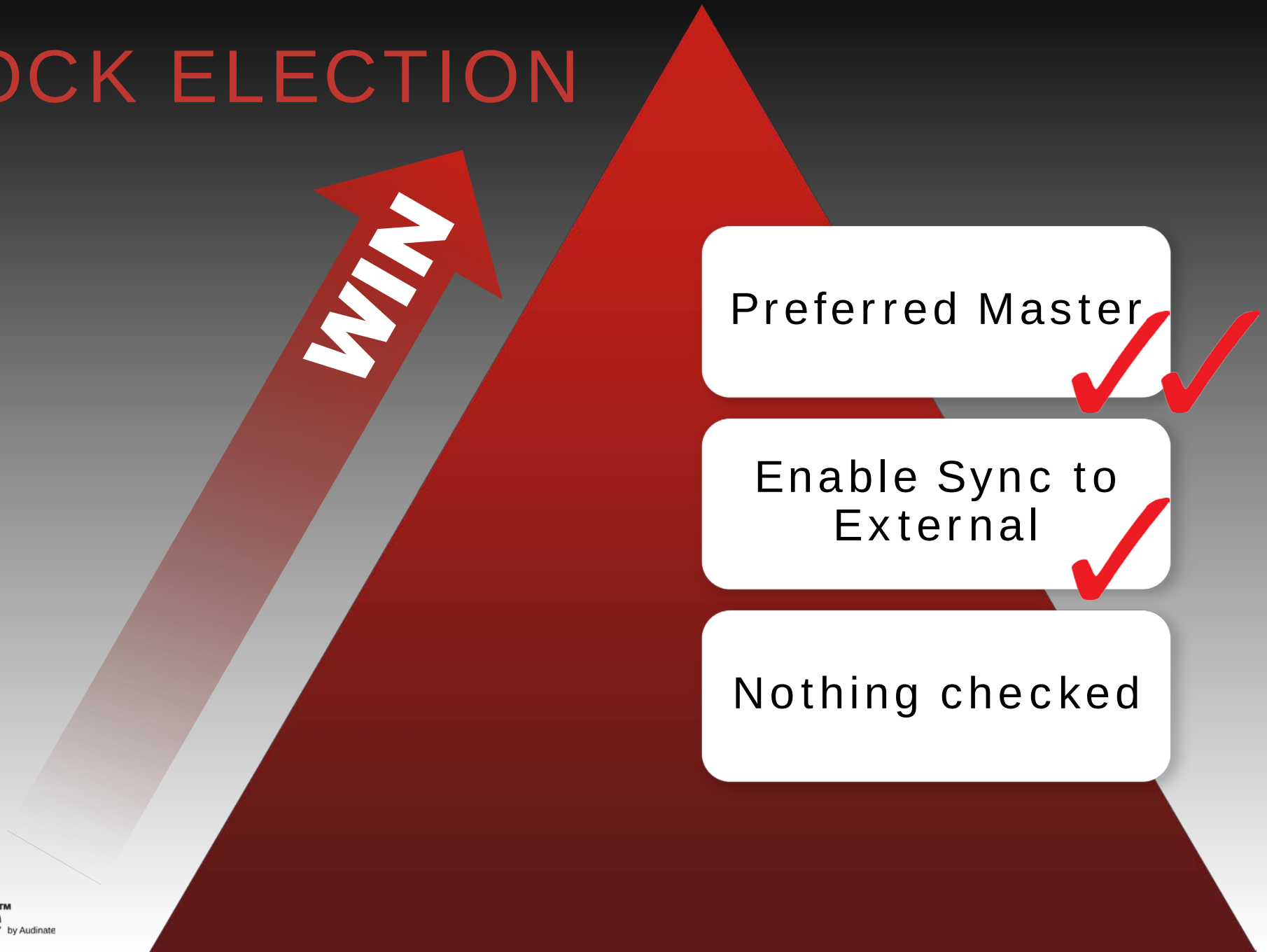
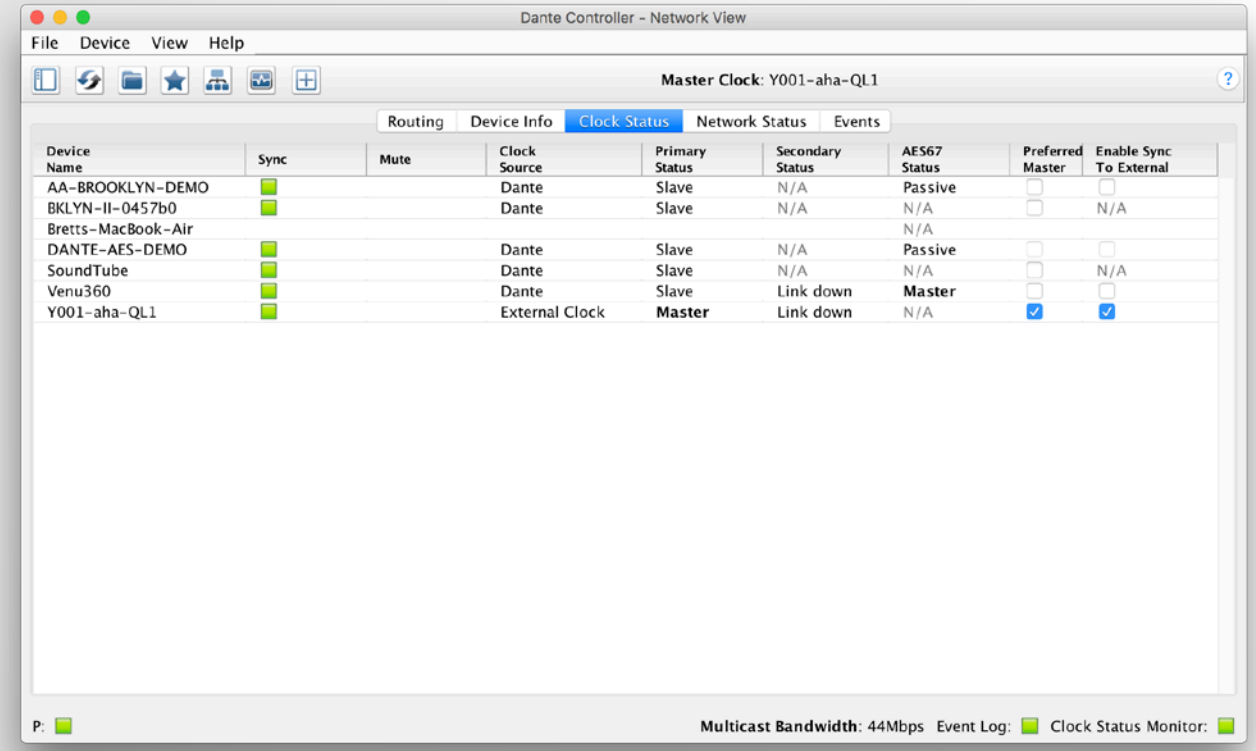
CLOCK ELECTION



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

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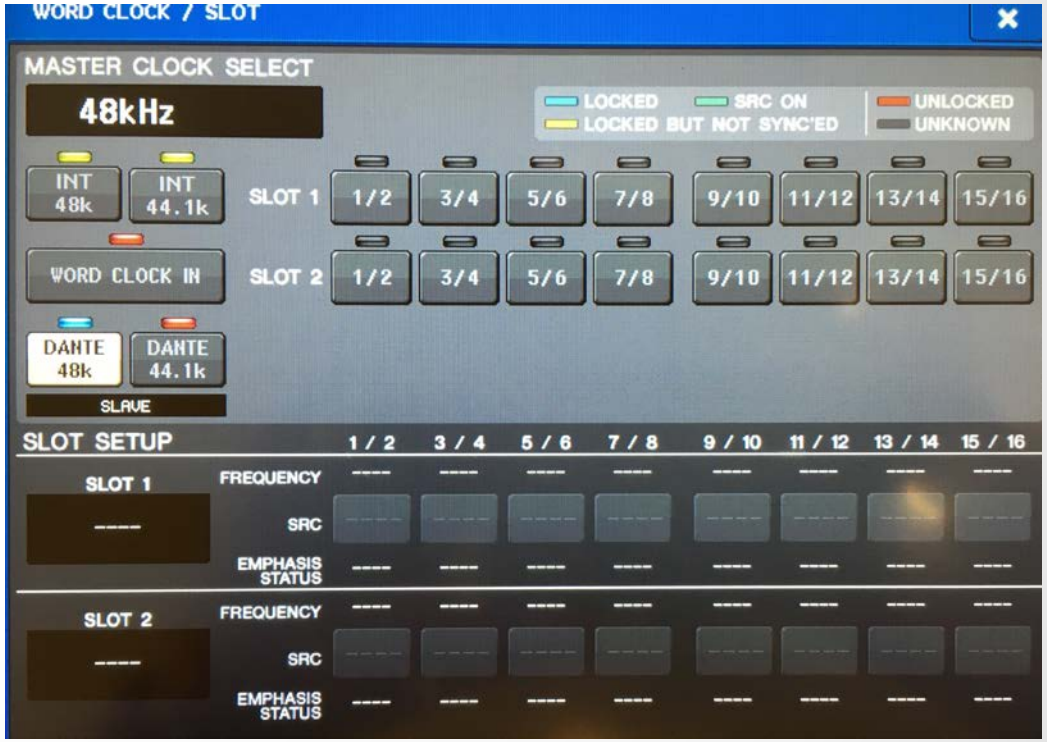
USING EXTERNAL CLOCKS

- “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



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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

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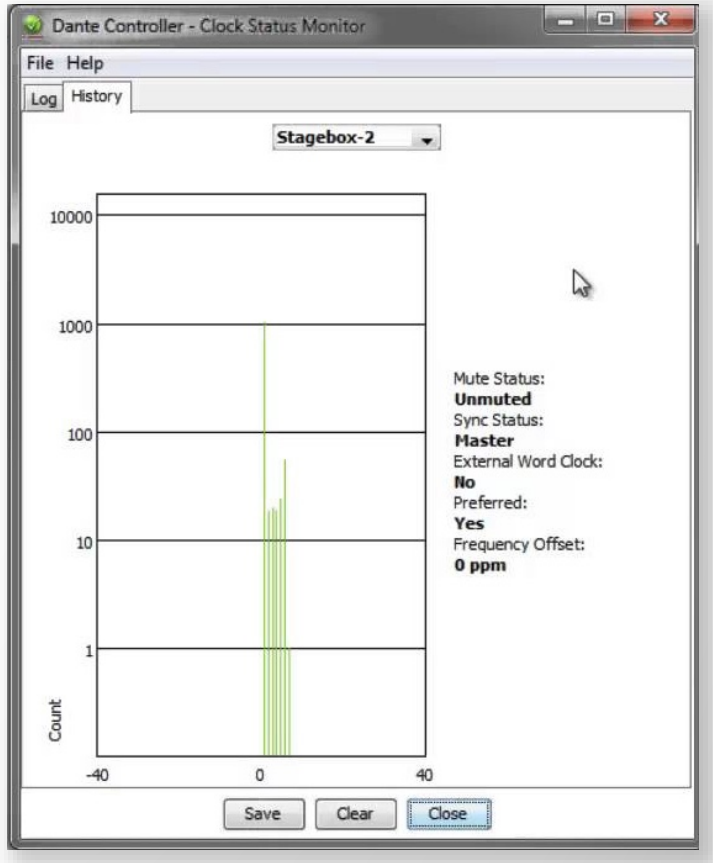
CLOCK STATUS MONITORING

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



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LATENCY

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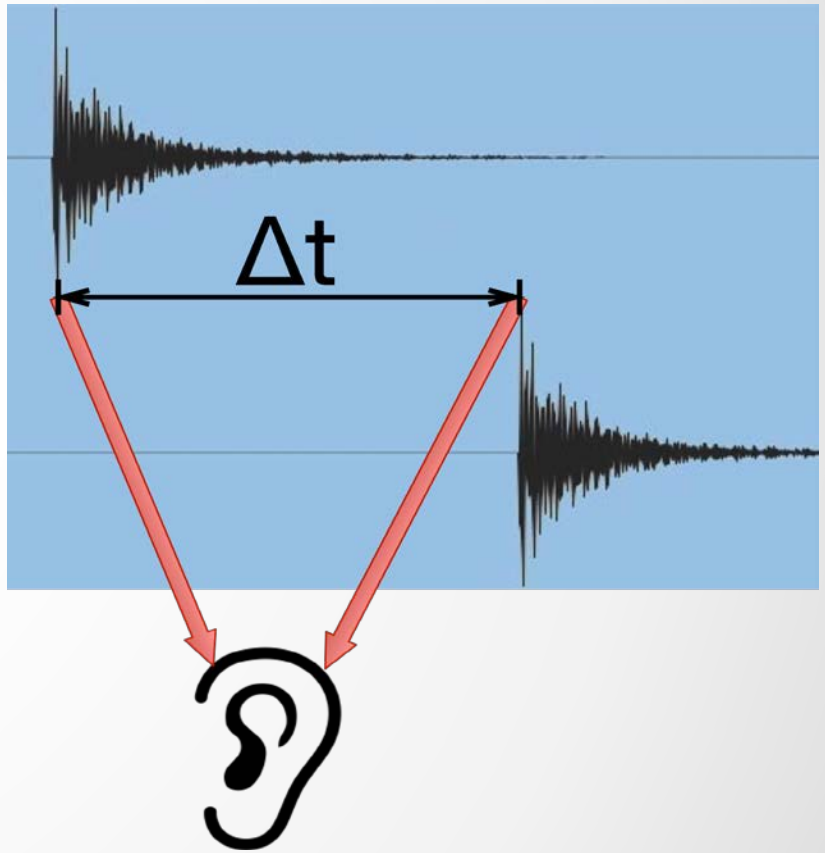
ABOUT LATENCY – A REFRESHER

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)



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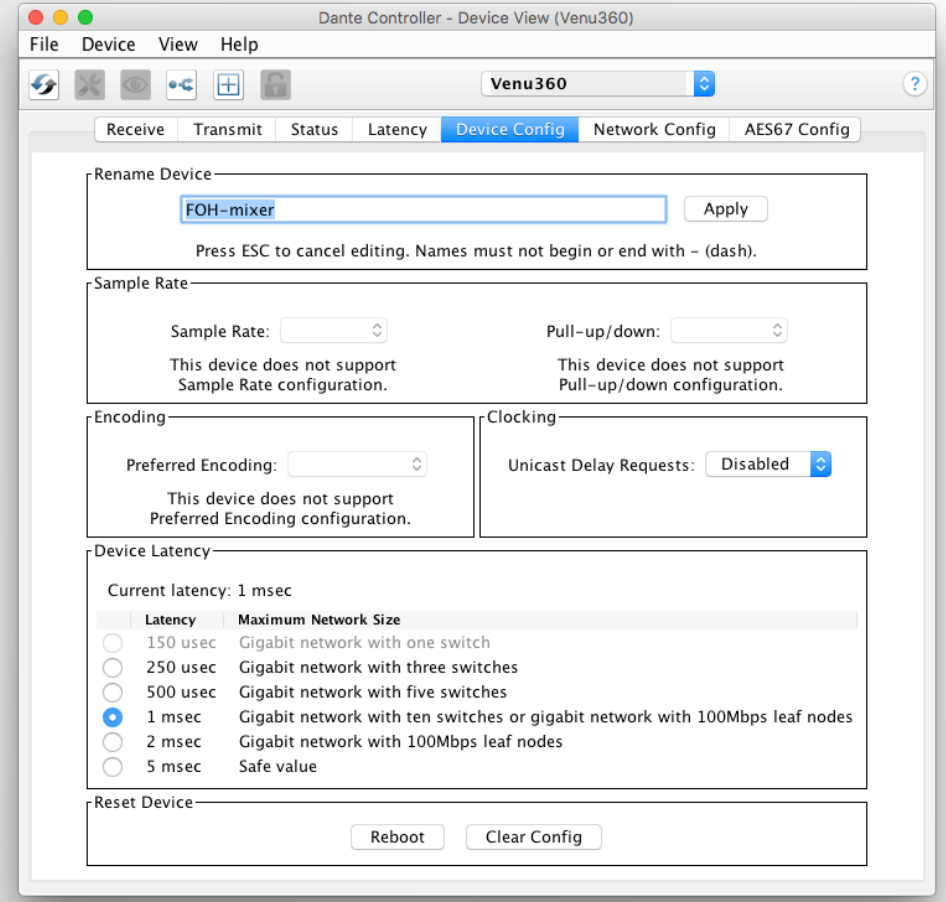
SETTING AND MONITORING LATENCY



- Double click any device in routing view to open the Device View
- Set latency in Device Config tab
- Monitor latency in Latency tab

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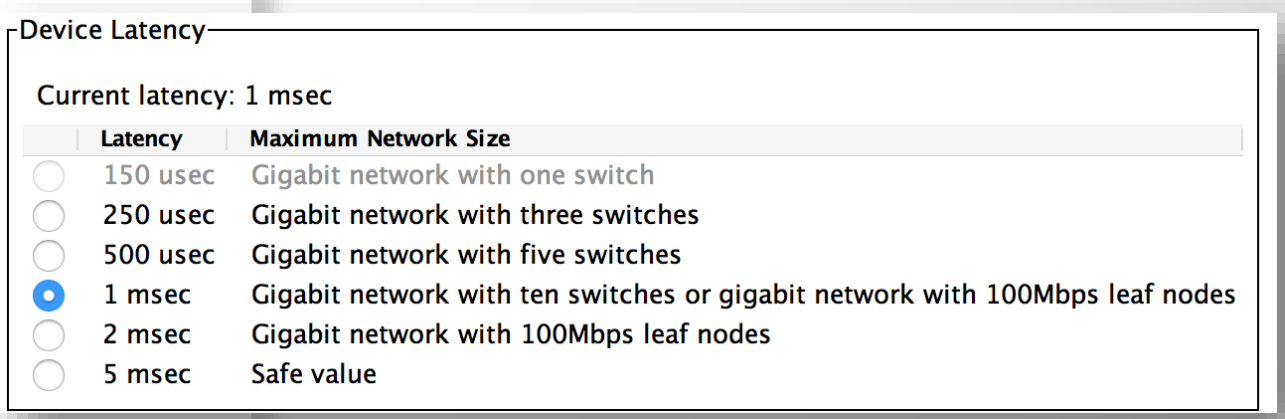
LATENCY IN DANTE

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



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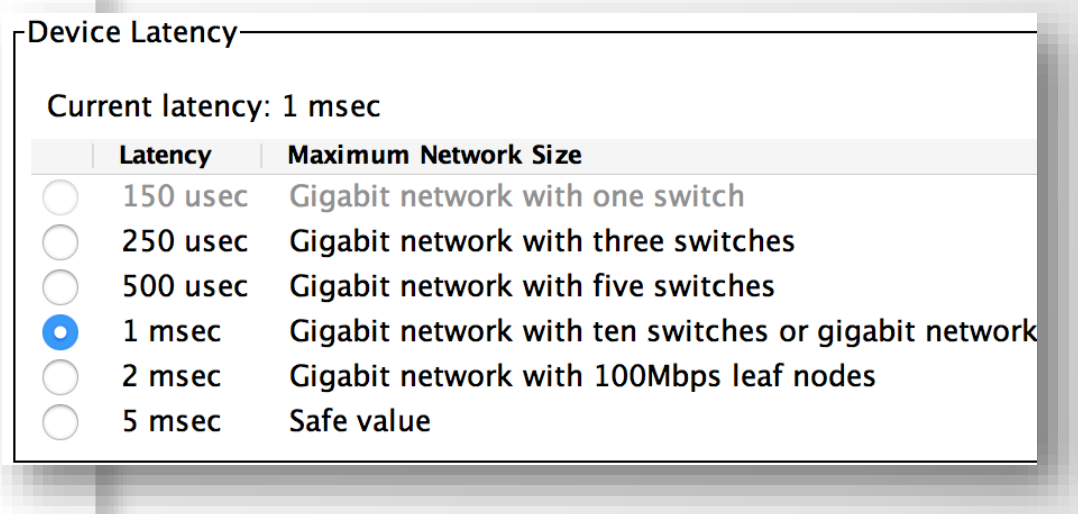
LATENCY - LOWER BOUNDS

- 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**



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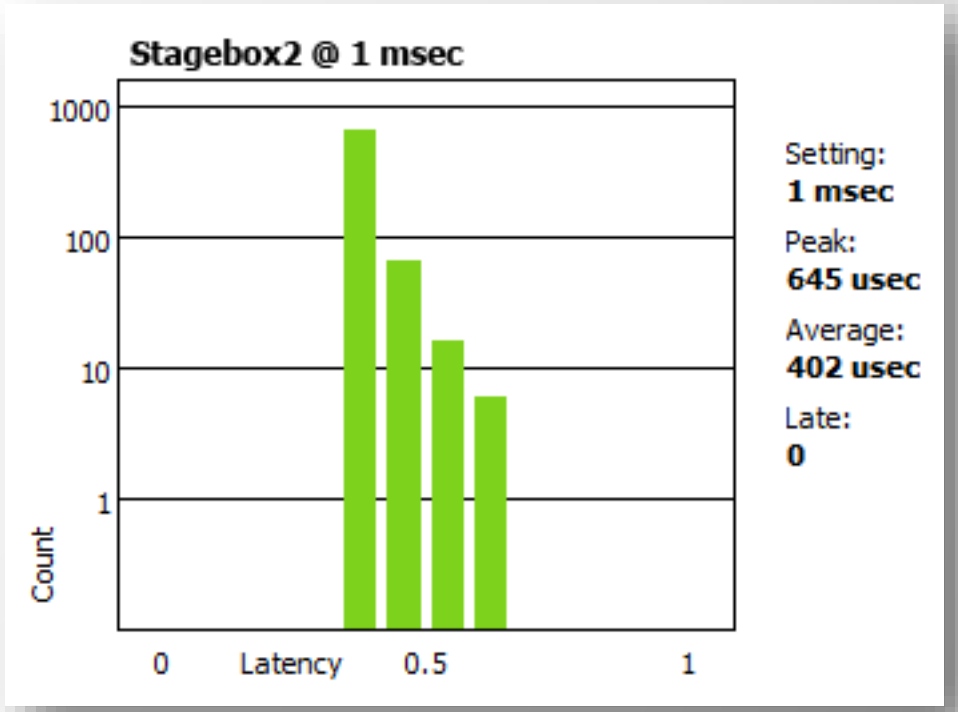
MONITORING LATENCY – GOOD EXAMPLE

- 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



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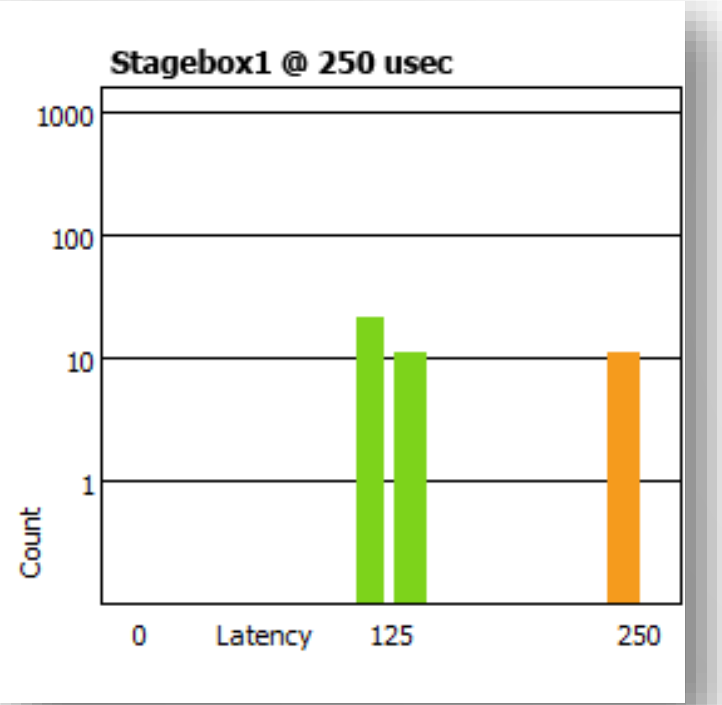
MONITORING LATENCY – BAD EXAMPLE



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

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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

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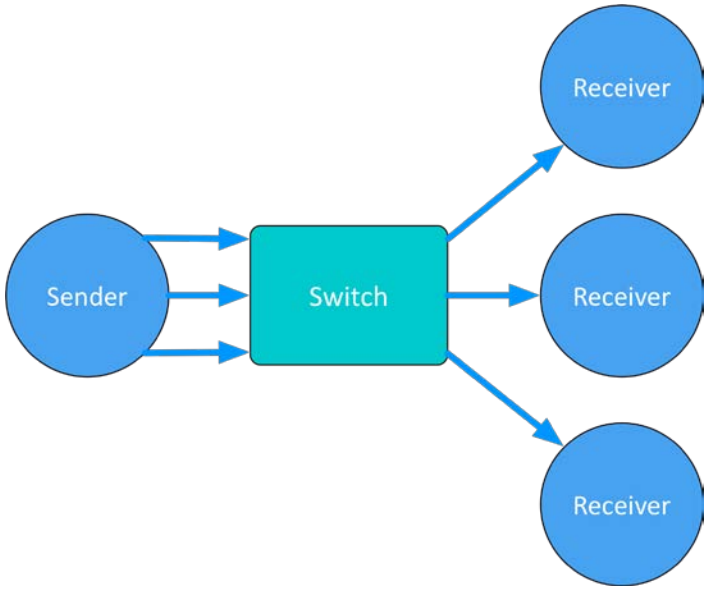
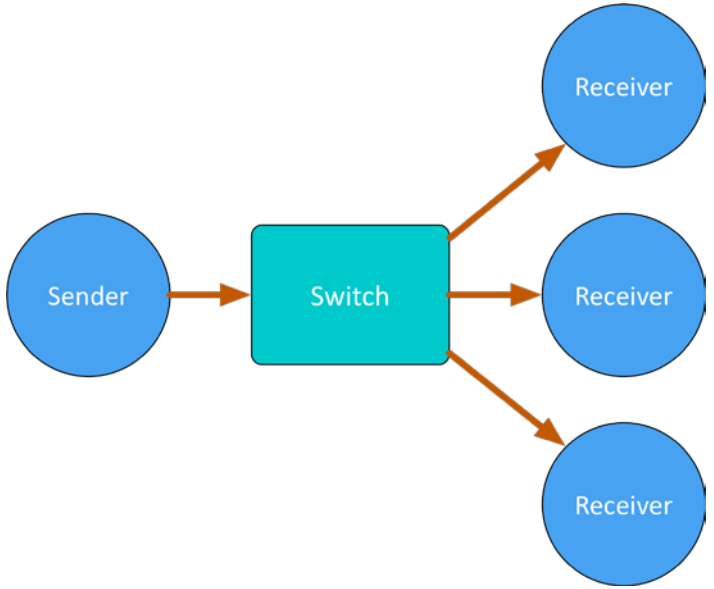
UNICAST AND MULTICAST

Unicast



1 data stream per receiver

Multicast



1 data stream for all receivers

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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

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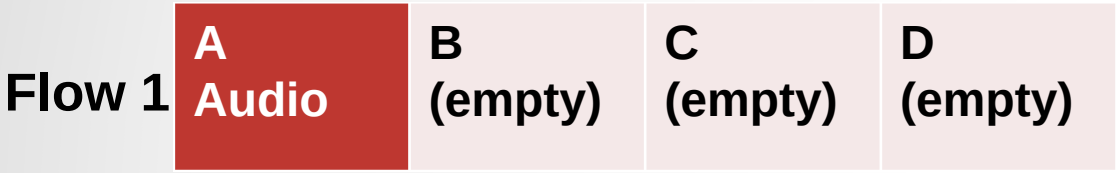
DANTE UNICAST FLOWS

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

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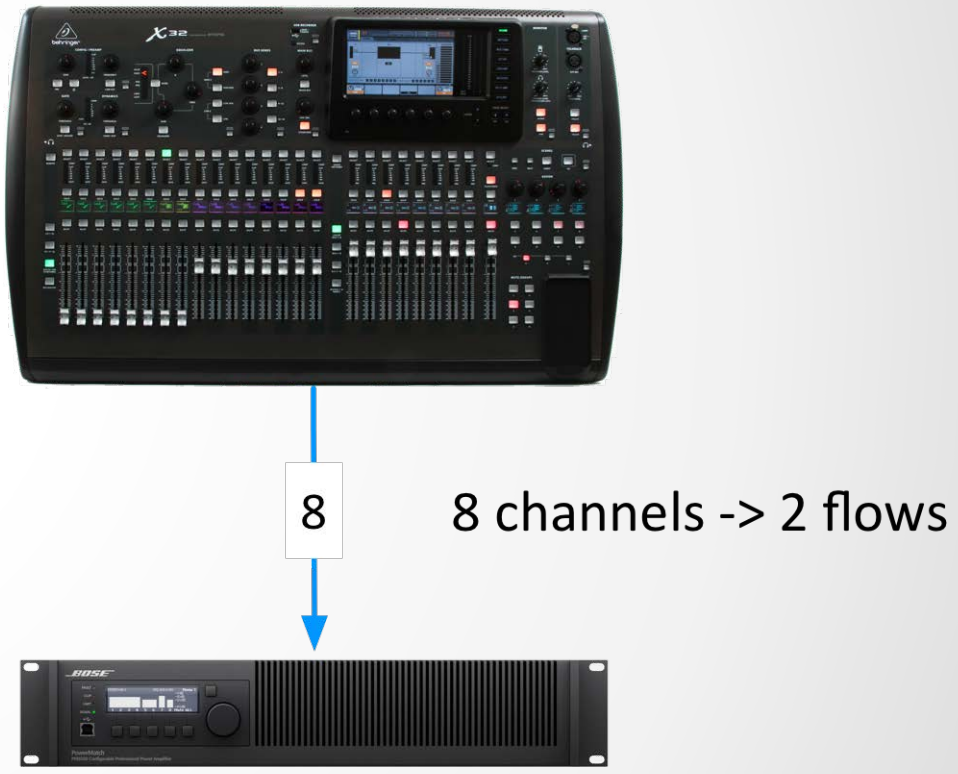
DANTE UNICAST FLOWS

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



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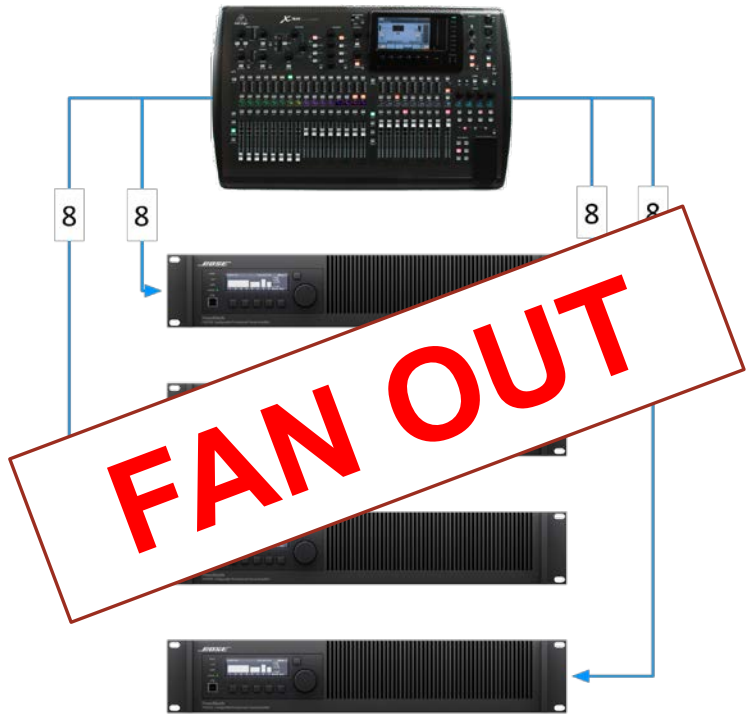
DANTE AND UNICAST FLOWS

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



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

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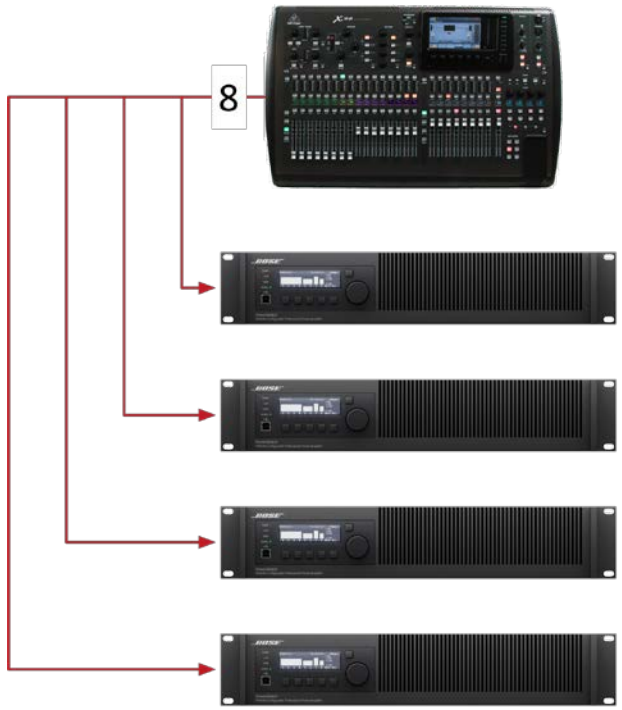
DANTE AND MULTICAST FLOWS



8 channels -> 1 multicast flow

Multicast solves “fan out” condition

- Up to 8 audio channels in 1 multicast flow
- Configured in Dante Controller

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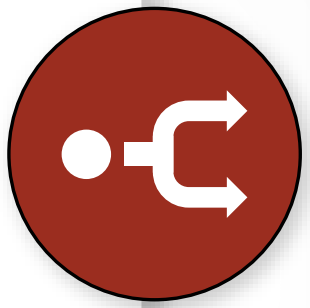
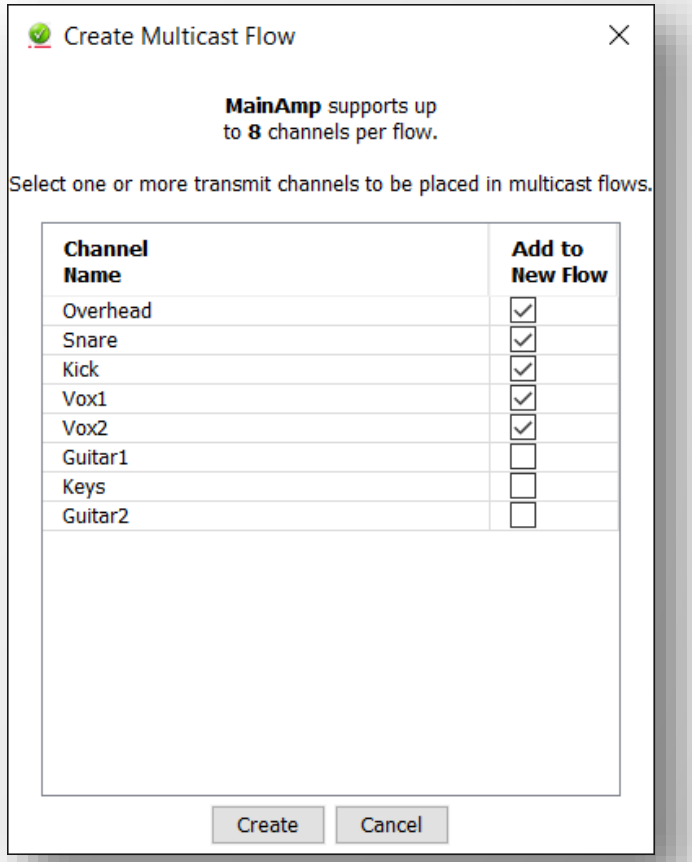
CONFIGURING MULTICAST FLOWS

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





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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!

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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

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NAMING DEVICES

DANTE CERTIFICATION PROGRAM

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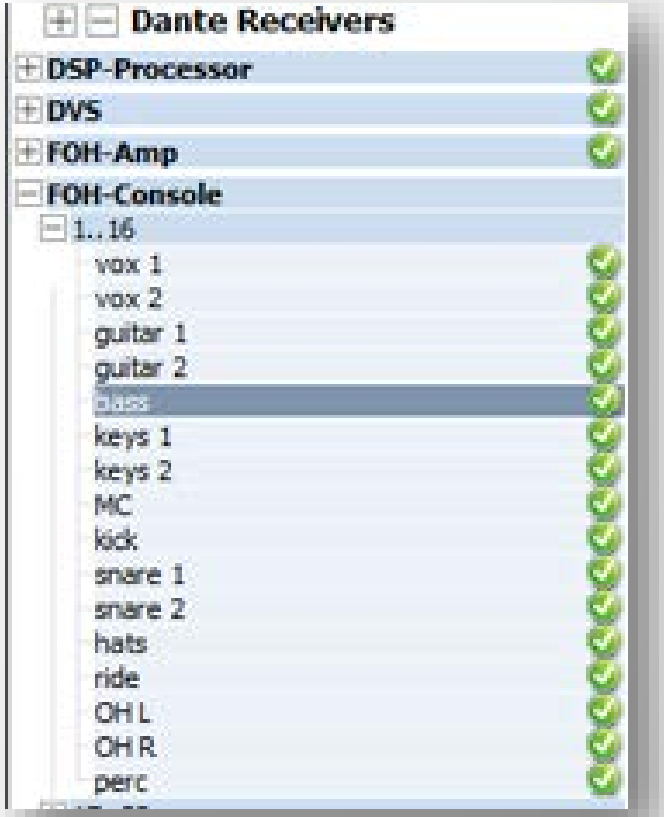
NAMING DANTE DEVICES

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



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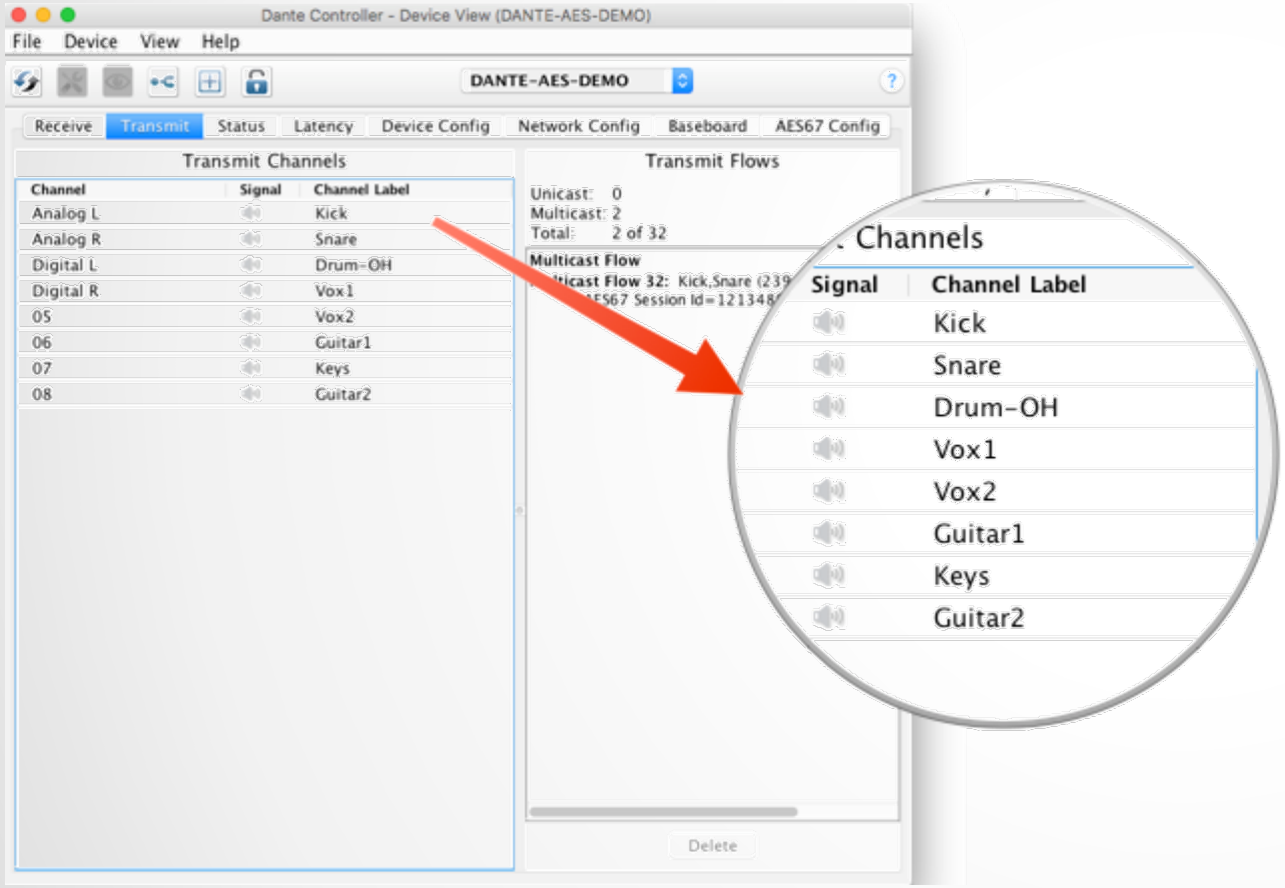
CHANNEL LABELS



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 😉

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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

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DEVICE LOCK

DANTE CERTIFICATION PROGRAM

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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

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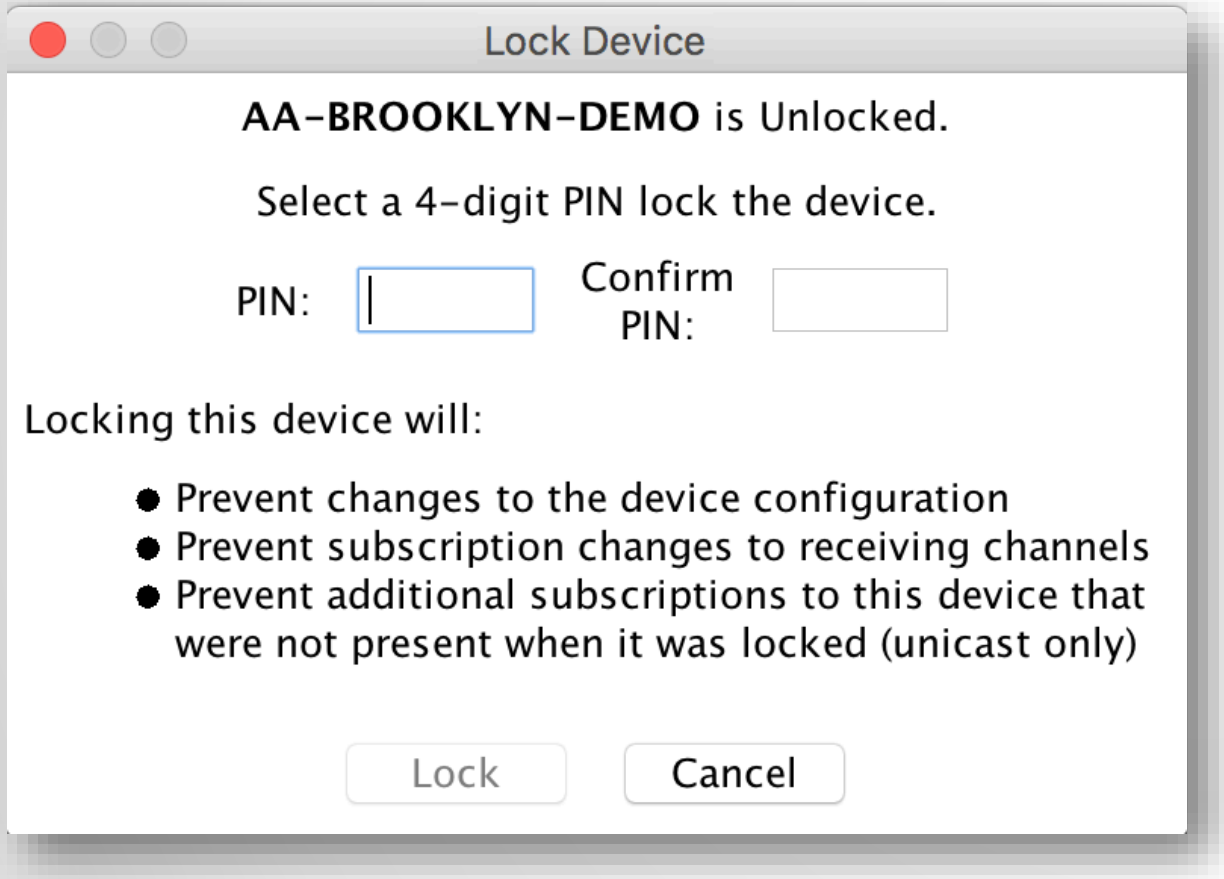
ENABLING DEVICE LOCK



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

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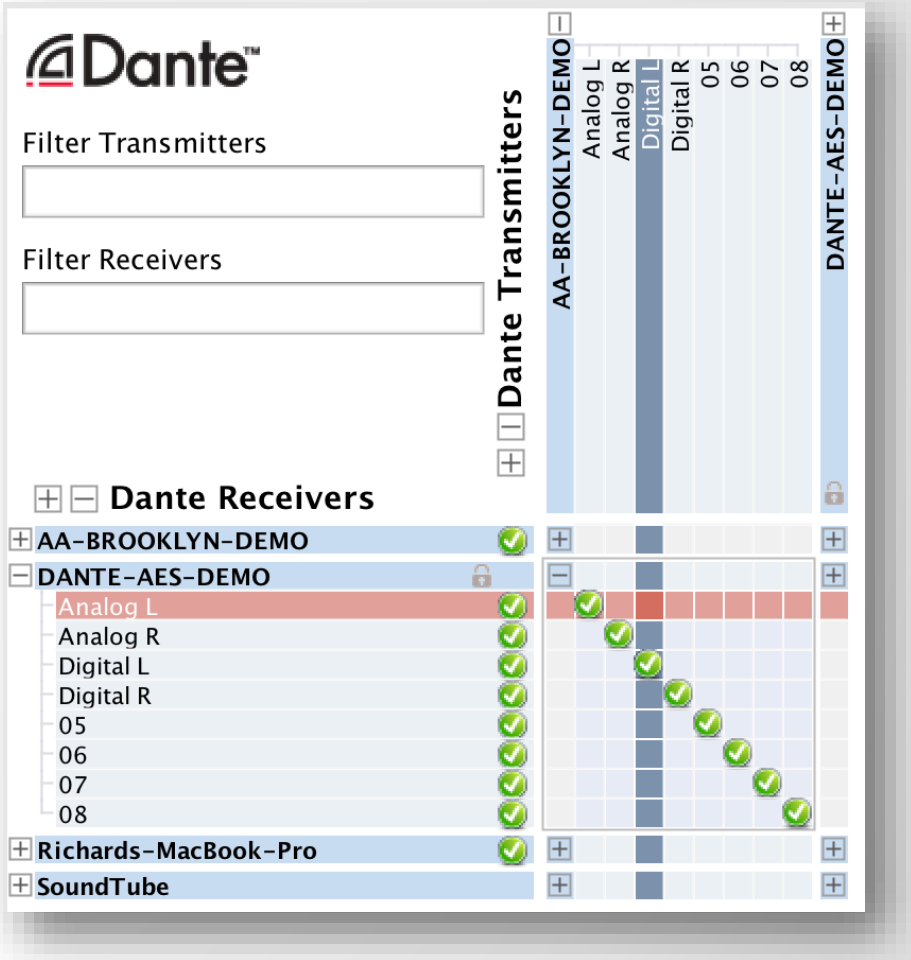
WORKING WITH DEVICE LOCK

- 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



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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!

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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

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PRESETS

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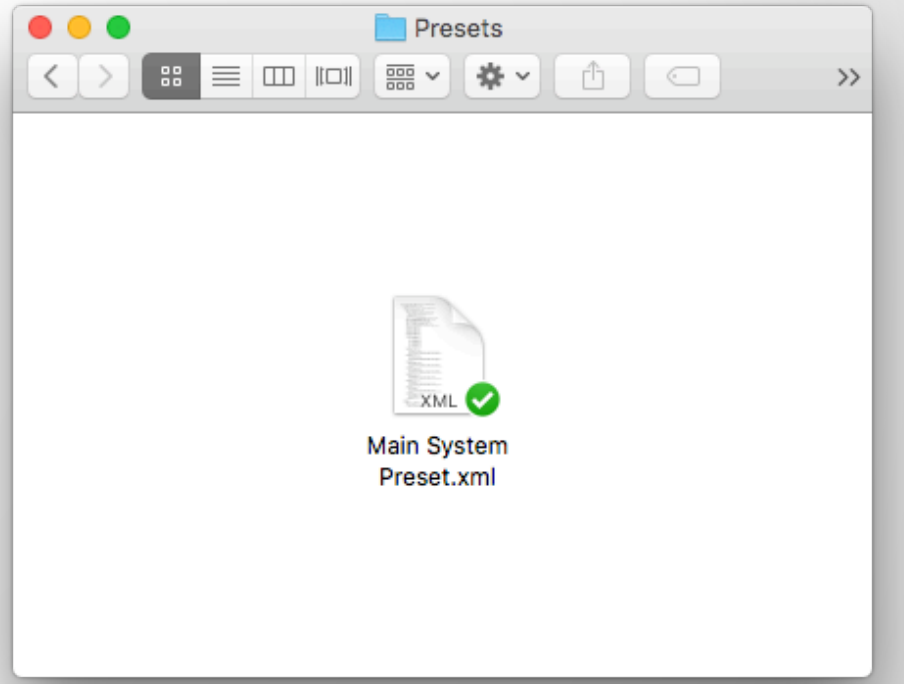
DANTE PRESETS

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



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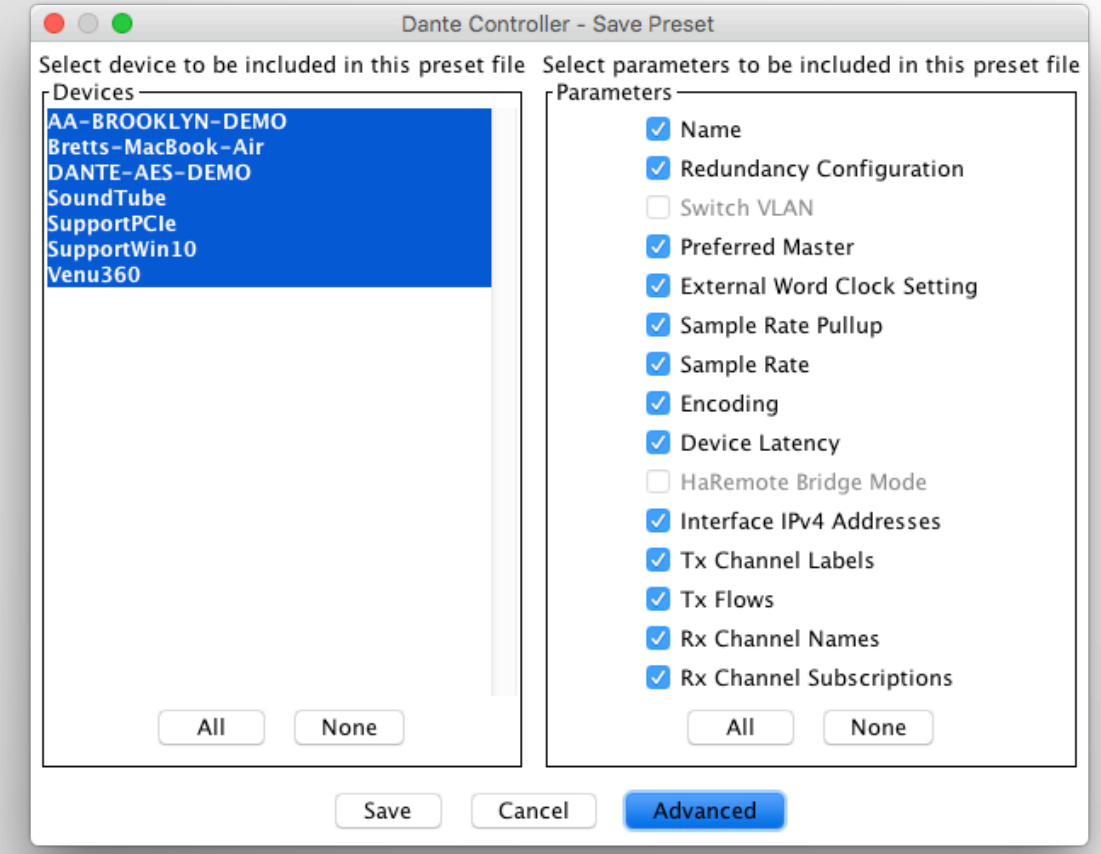
CAPTURING A PRESET



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

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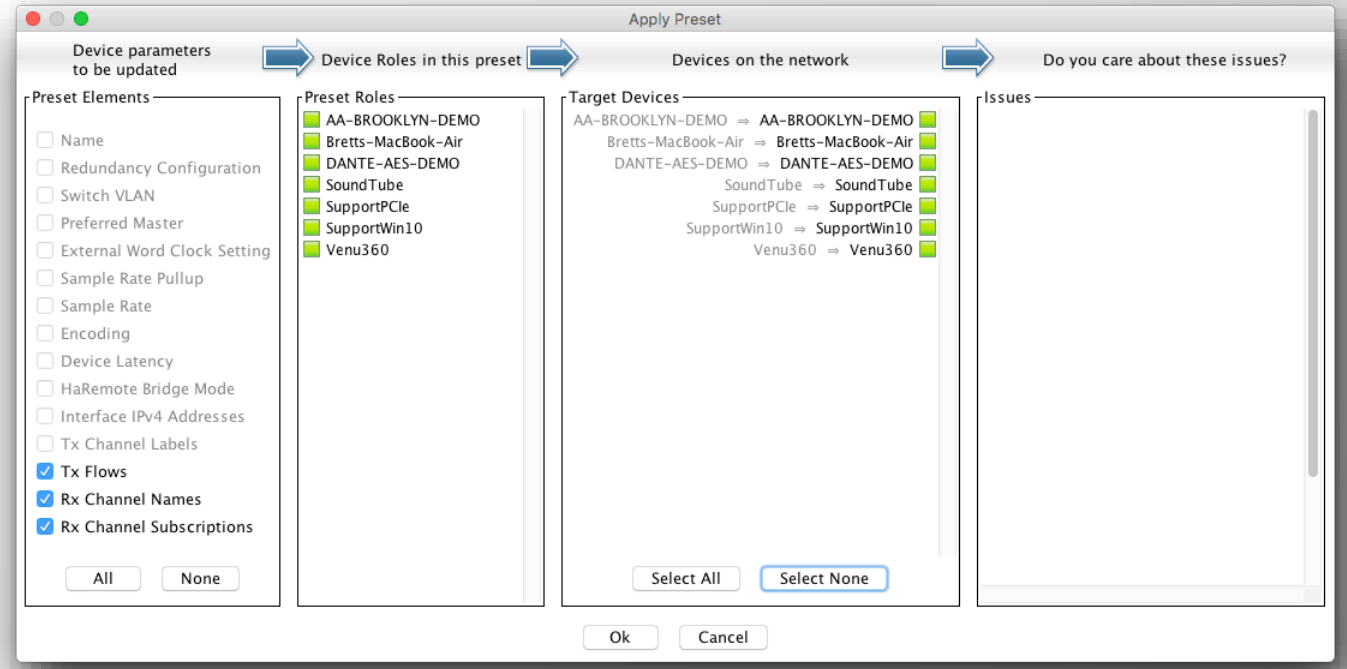
DEPLOYING A PRESET

Choose “Load preset”

- Select preset file
- Check elements to apply (names, sample rates, etc.)
- Apply



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REDUNDANCY

DANTE CERTIFICATION PROGRAM

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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

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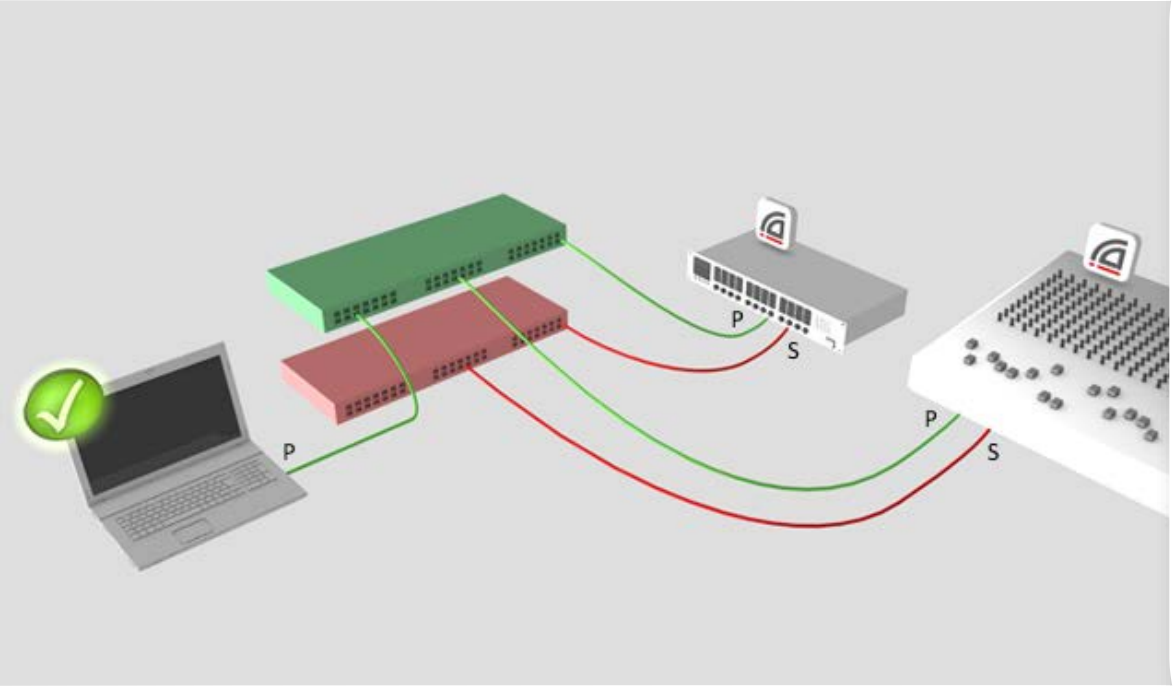
SETTING UP REDUNDANCY



Setup Primary network first

Separate set of cables & switches connected to Secondary ports

No other interaction required

OK if not all devices supported

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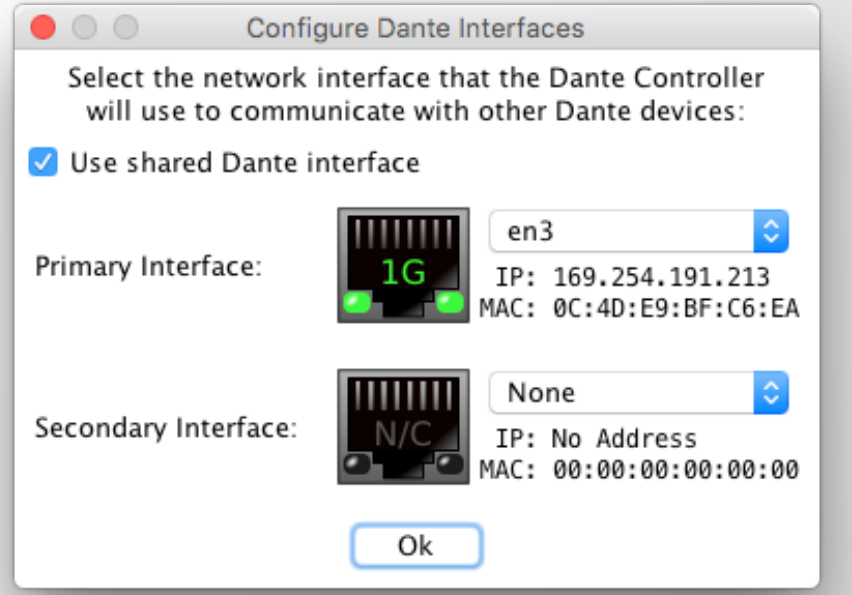
REDUNDANCY AND DANTE CONTROLLER

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



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DANTE VIRTUAL SOUNDCARD

DANTE CERTIFICATION PROGRAM

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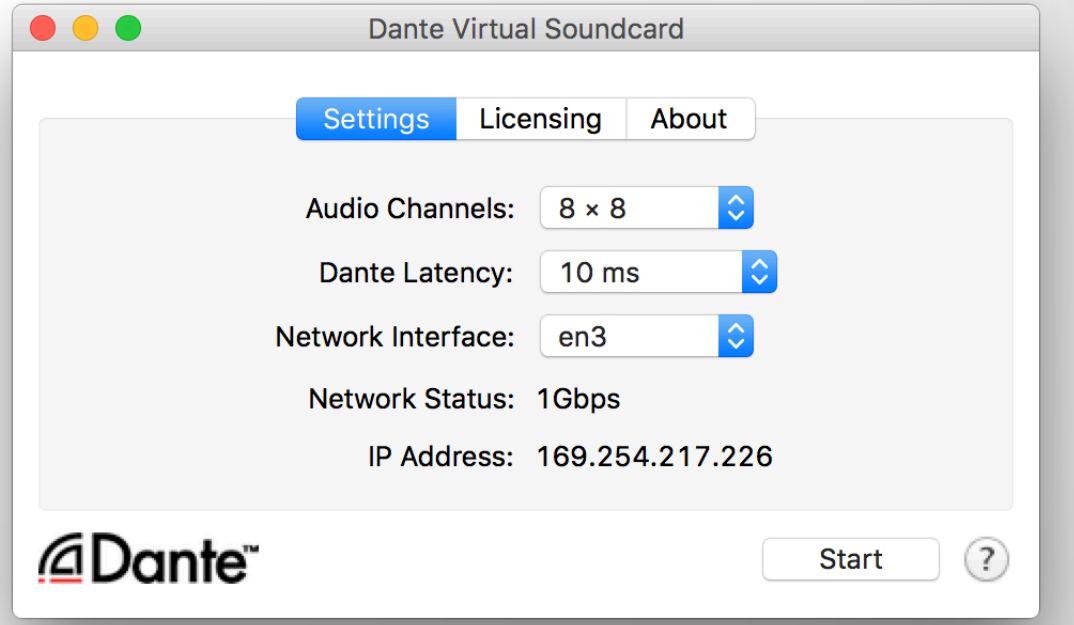
WHAT IS DANTE VIRTUAL SOUNDCARD? (DVS)

Soft Soundcard for Mac or PC

- Connects to Dante network
- Record and playout up to 64 channels of networked audio directly to/from applications



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SETTING UP DANTE VIRTUAL SOUNDCARD

Start or Stop the service

Must be stopped to adjust

•

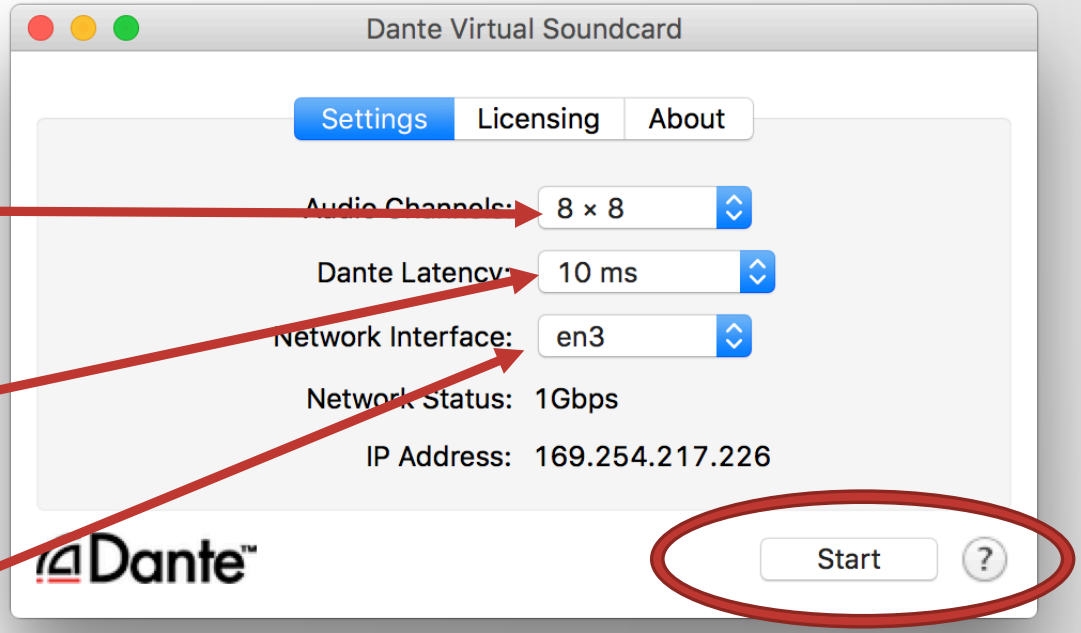
Audio channels 2x2 – 64x64

•

Latency – 4ms – 10ms

•

Choose network interface



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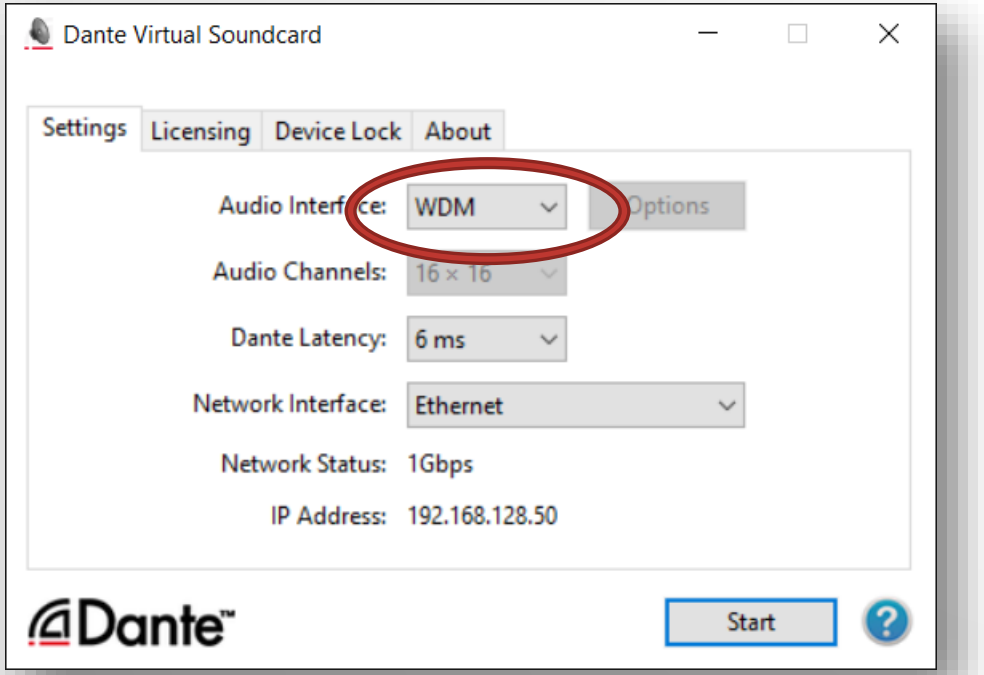
DANTE VIRTUAL SOUNDCARD IN WINDOWS



Choice of WDM or ASIO drivers

- ASIO common in professional audio applications
- WDM common in consumer audio products

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DANTE VIRTUAL SOUNDCARD IN WINDOWS

WDM drivers 16x16 channels only

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WDM channels presented by Windows as stereo pairs

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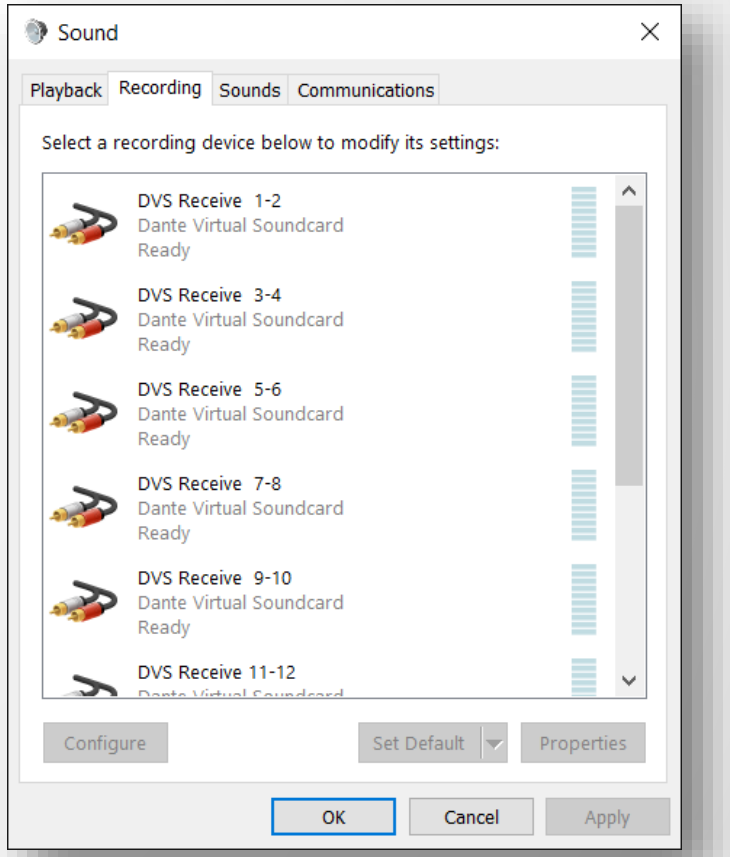
Each stem appears as a stereo “device” in Windows Sound settings



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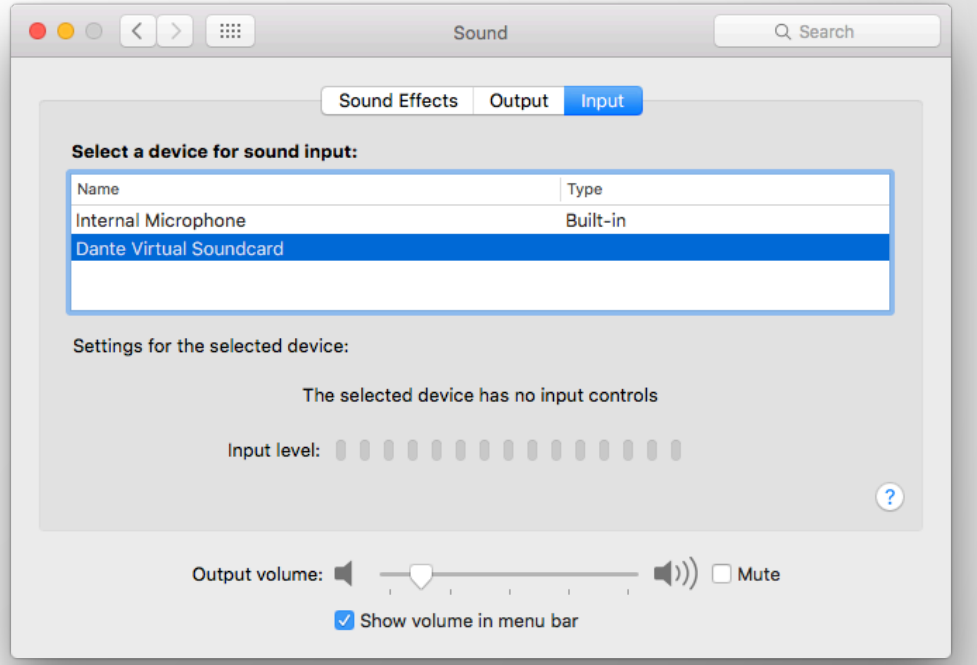
DANTE VIRTUAL SOUNDCARD IN OSX

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



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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

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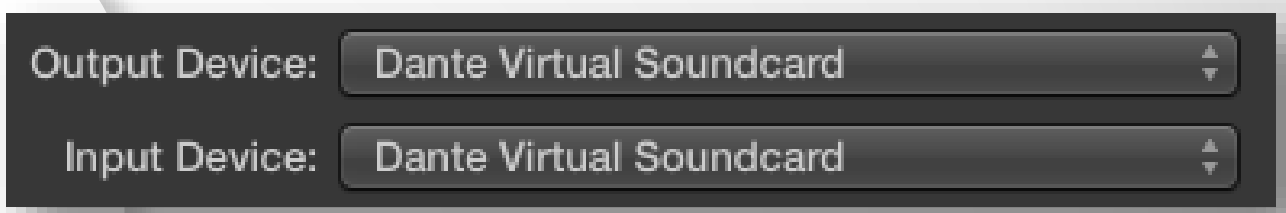
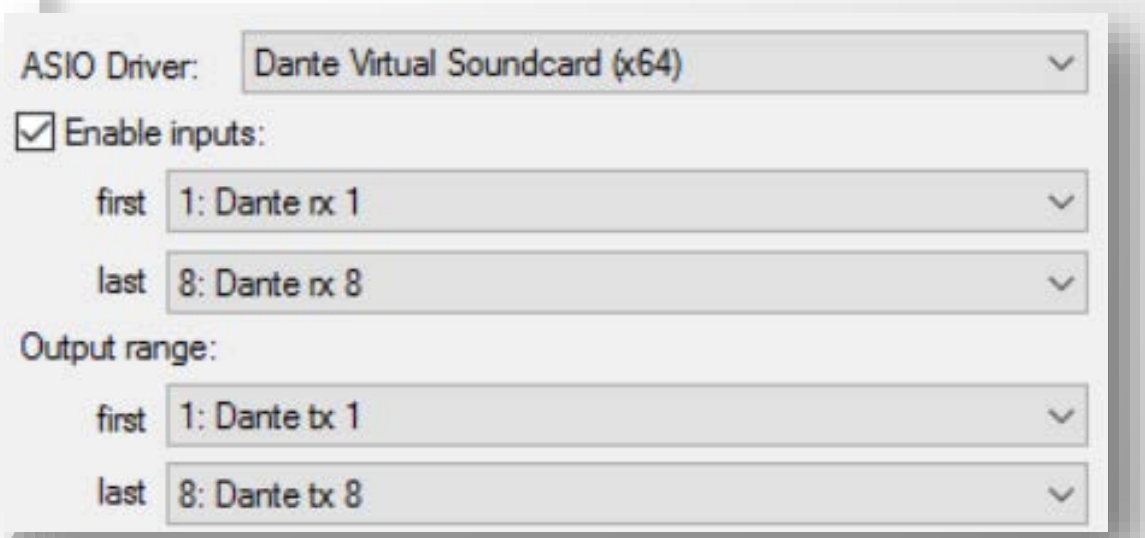
CONNECT TO A DAW

- 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





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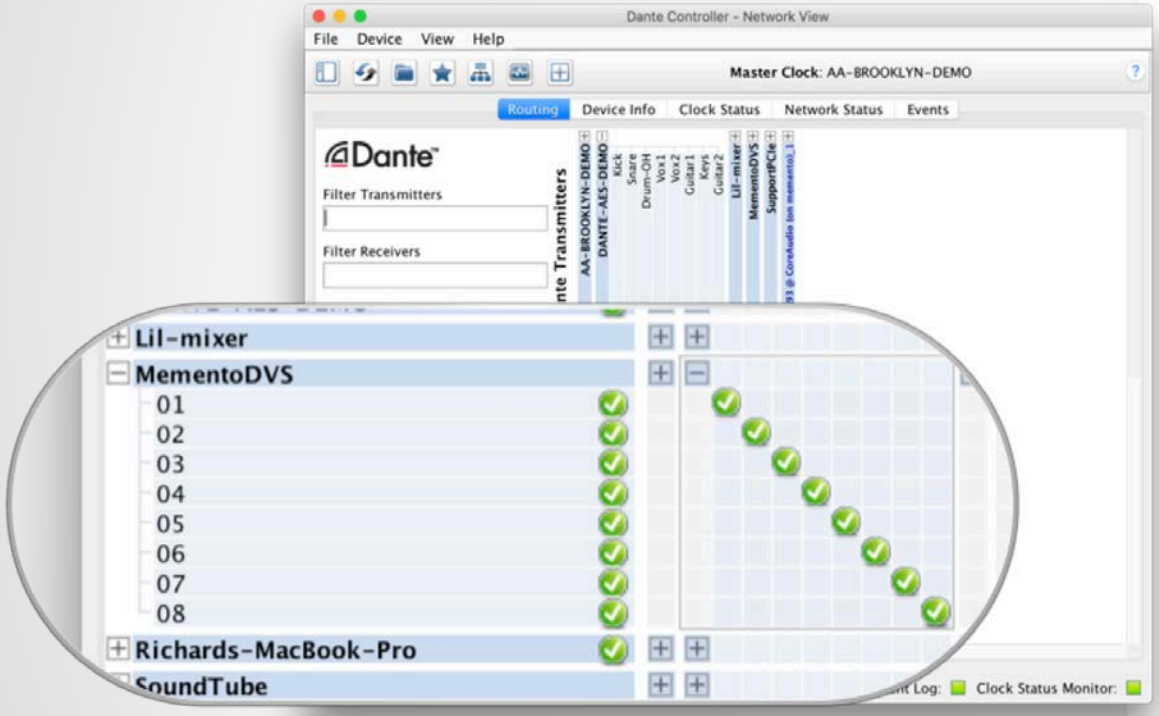
SUBSCRIBE CHANNELS



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

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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

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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

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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

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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

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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

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THANK YOU

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