



# XI-DANTE

## DANTE EXPANSION INTERFACE

### Connection Guide

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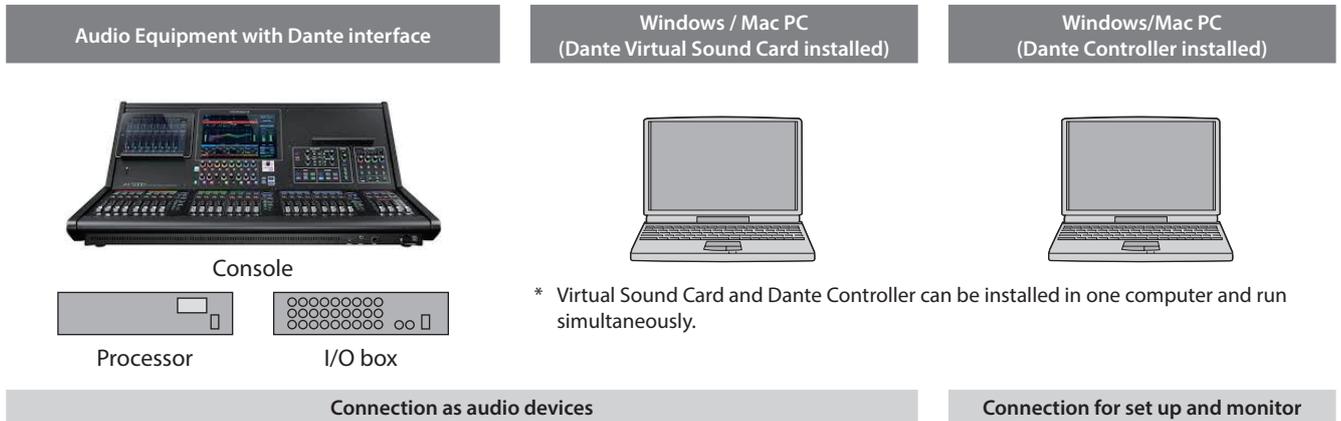
# What is Dante?

## Outline

Dante is one of typical network audio transportation protocols. With Dante Virtual Soundcard, you can connect a computer (Windows or Mac) to a Dante Device as well as from a Dante device to a Dante device.

You can set up and monitor all Dante devices' parameters and status using a special software, Dante Controller.

### Dante Network Device



Dante is a proprietary protocol developed by Audinate to deliver multi-channel audio data over Ethernet. You can send Dante traffic from one LAN to another as well as from inside a VLAN to outside a VLAN. Dante networks can be branched and extended with any Layer2 switch or router and can be built to run in redundancy.

### XI-DANTE module

You can connect any Roland pro audio product with an XI series interface to a Dante network with an XI-DANTE module. The XI-DANTE module supports a redundant network as well as a daisy chain network.

The XI-DANTE module has an additional LAN port for connection to a computer, allowing you to easily configure your Dante network. Please note that the number of audio channels XI-DANTE module can send depends on the host device.



XI-DANTE Module

### Fundamental

You can connect your Dante devices to an Ethernet switch, using Cat5e or Cat 6 Ethernet cable, and also connect your computer. In the case of long distance transportation, Dante can work using fiber.

Over Fast Ethernet, Dante connection can transport 48 channels of bidirectional 24bits / 48kHz audio. Over Gigabit Ethernet, a single Dante connection can transport 512 channels of bidirectional 24bits / 48kHz audio.

Dante is based on "star" topology, not "daisy chain". By using "star" topology Dante can have redundant connections to each device on the network with the secondary network port.

The latency of the Dante network is managed by Dante Controller software. You can set the latency using Dante Controller. If the packet arrives at its destination device before the set latency period, the device will delay slightly to ensure that all Dante devices remain in sync. Dante networks support a maximum of 10 hops latency.

**Hop:**

The term "hop" is the total number of network devices, i.e. network switch, between source and destination.

### Required Network and Switch

Dante requires a switched Ethernet network of 100 Mbps or higher, with at least a Gigabit Ethernet condition. Dante uses standard Quality of Service (QoS) switch features, to prioritize clock sync and audio traffic over other network traffic. Therefore QoS is required in order to ensure proper operation.

**Quality of Service:**

QoS is a feature of managed switches, which ensures that certain real-time types of network packets (i.e. sync and audio data) get preferential treatment and are ahead of other traffic.

You can connect a general network, i.e. office network, to Dante network. However, if audio and video streaming or Skype etc. are operated on the network, some troubles may occur on both sides. Therefore Audinate doesn't recommend it. Dante can't operate over a Wi-Fi network. Dante can operate over a router and connect to WAN on a network infrastructure which is optimized for real time audio transportation on the whole network including WAN.

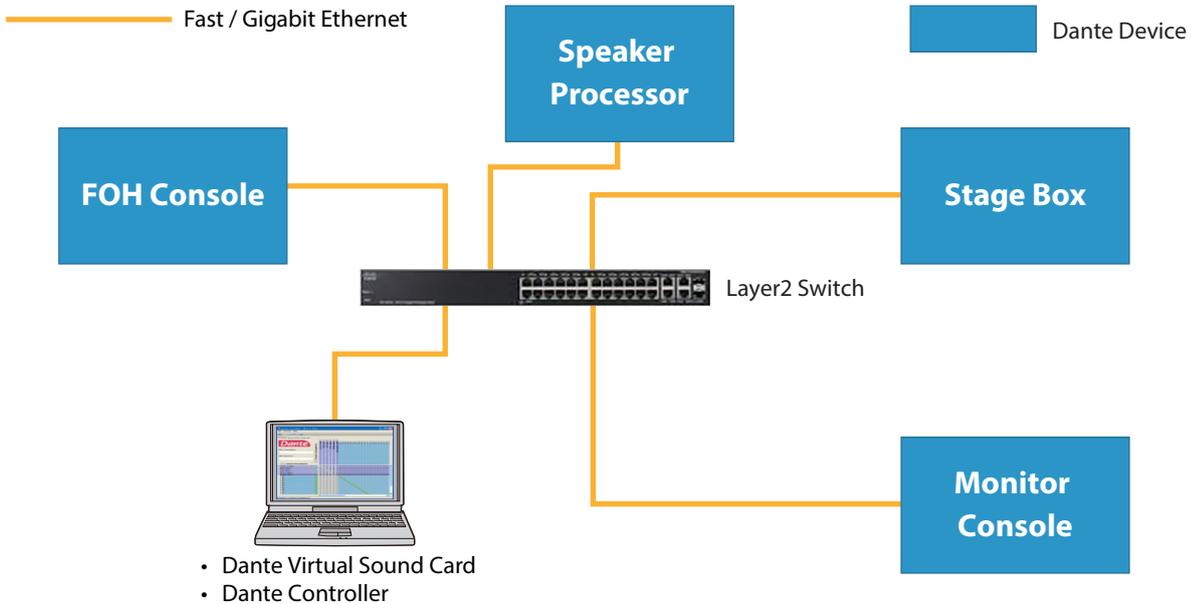
# Connections

## Star Network

Dante can run over any Ethernet topology. However, Audinate recommends “star” topology to build the network easily and safely. Also “star” topology has less latency value than “daisy chain” topology (described below).

All nodes (Dante devices and switches) connect to a central point and this central point may be a switch. As “star” topology is hierarchical, each node has access to the other nodes through switches.

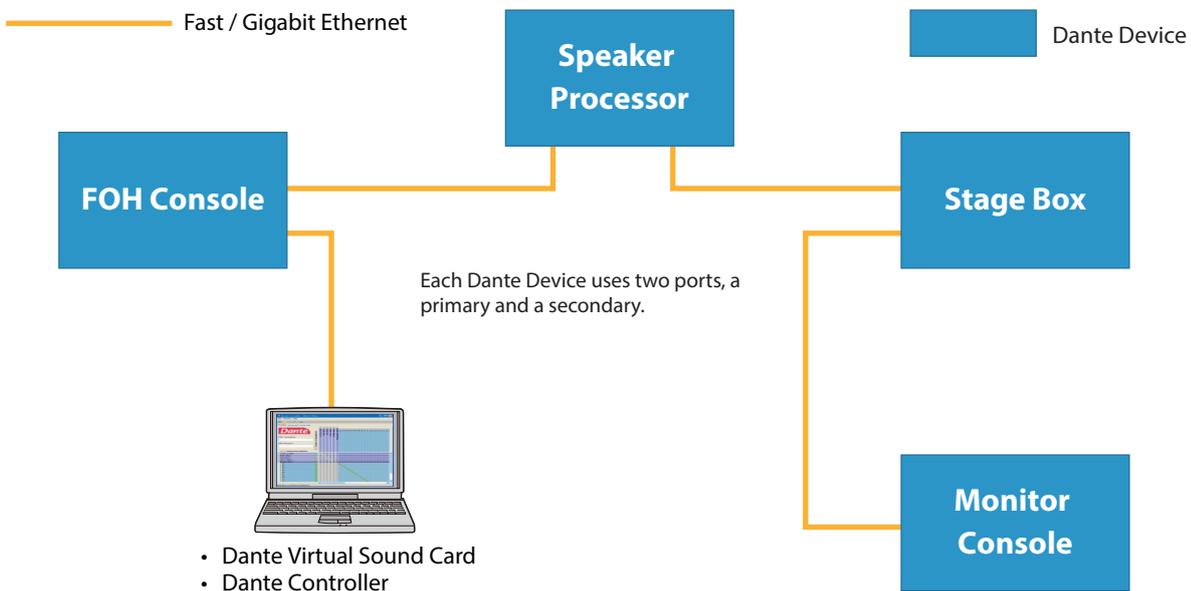
If any device fails, access to devices below it is cut off, but the rest of the network keeps operating.



## Daisy chain Network

Dante interface hardware can run as a virtual network switch with two ports, a primary port and a secondary port. Although Dante can't be daisy chained technically, with this function Dante devices can be connected directly to each other, and it looks like a “daisy chain” network.

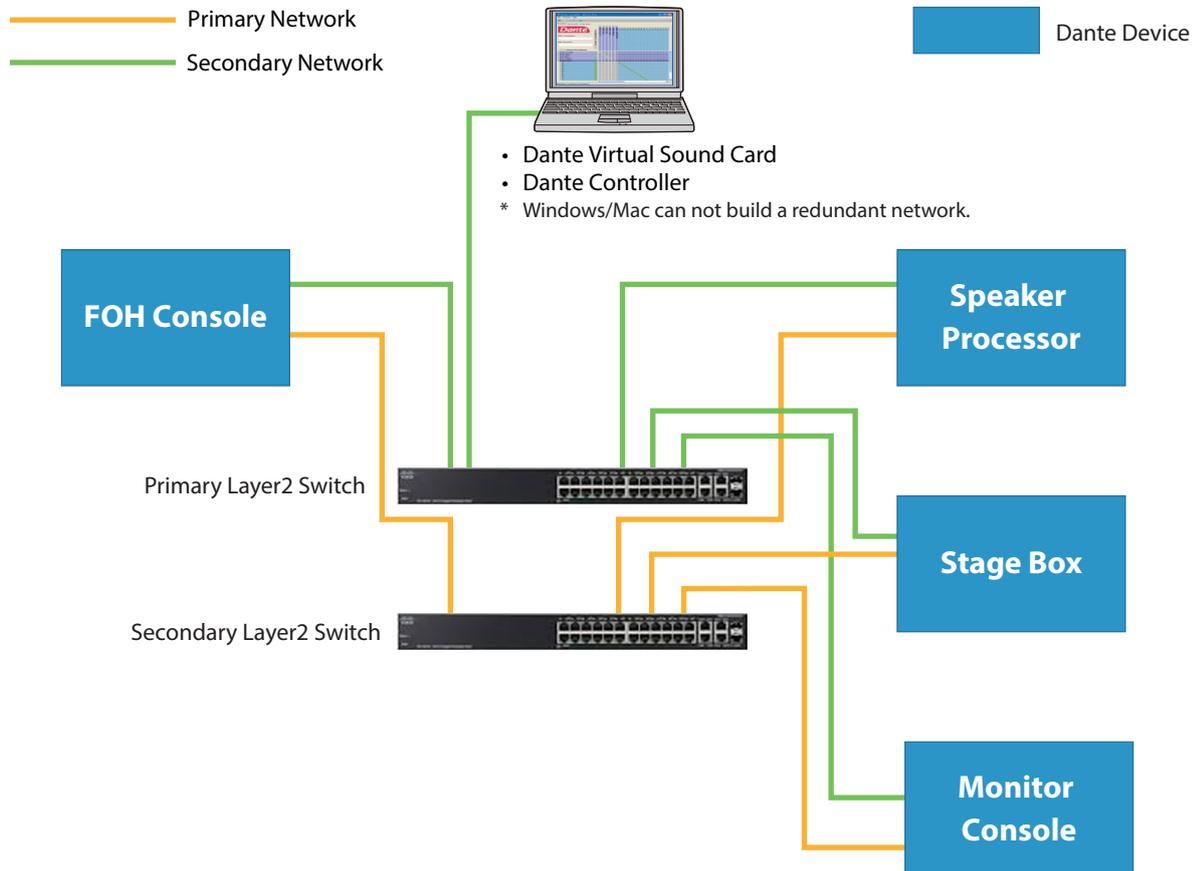
This connection requires no network switches. However, Dante devices have latencies when used as switches. If devices are increased, the latency must be increased. If any device fails, the communication is cut off at that point and no data will be accessed beyond the device.



## Redundant Network

Redundancy can be built into Dante networks simply with “star” topology. A redundant network consists of two networks, a primary network and a secondary network. Normally the network operates on the primary network with primary ports of Dante devices. If the primary connections fail, the secondary port automatically takes over communications and the network changes to the secondary network.

In order to build a redundant network, the network requires not only two groups of Ethernet cables but also two independent switches.



# Network Set Up

First, please install Dante Controller software on your computer. If your computer has multiple network ports, you will need to select the correct one to use with Dante. When connecting a computer to the Dante network, keep DHCP enabled to obtain an IP address automatically. It is recommended to disable Wi-Fi and any other network connections that are not needed.

When you start Dante Controller, all Dante devices are discovered automatically, and are shown in the Routing view.

## Dante Controller:

Dante Controller is a software application provided by Audinate. With Dante Controller, you can make signal routings and settings for Dante devices. It also provides real-time network monitoring functionality, including latency monitoring, clock status monitoring and configurable event logging on the network. More information is posted on the following website.

<https://www.audinate.com/>

## Network Switch

Audinate recommends managed (Layer 2) Gigabit switches with QoS features. Please set QoS on all ports connected to Dante network to higher value using a managing software of the switch.

Also please make sure that EEE is disabled on all ports used for Dante network. If you use unmanaged switches, make sure to not use network switches that support the EEE function, since EEE operation cannot be disabled in these switches.

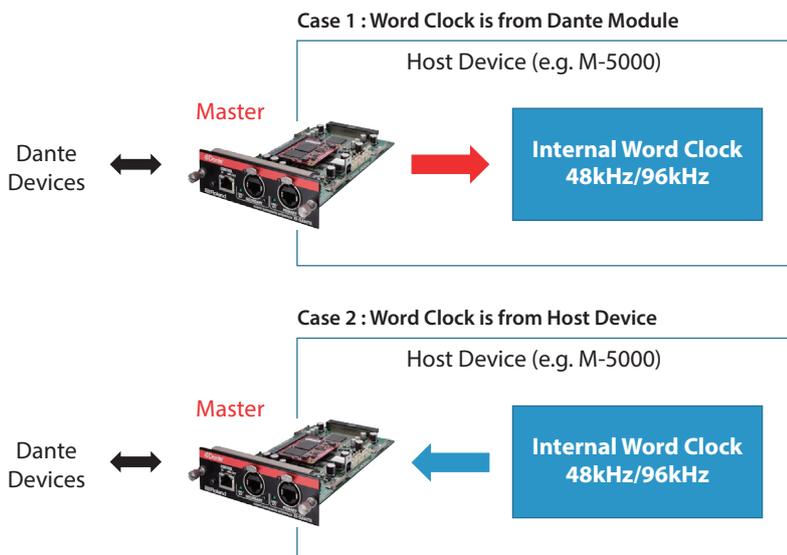
## EEE:

EEE (Energy Efficient Ethernet) is a technology that reduces switch power consumption during periods of low network traffic.

## Word Clock Master

One Dante device will be elected as the Word Clock Master for the network automatically. The election may be overridden manually with Dante Controller. Each Dante hardware device can derive its word clock from its onboard word clock generator. Or a Dante device set to 'Enable Sync To External' will use the external word clock from its host equipment (e.g. M-5000) to sync its onboard word clock generator of Dante hardware.

Dante devices use the IEEE1588 Precision Time Protocol (PTP) across the network to synchronize their local clocks to a master clock.



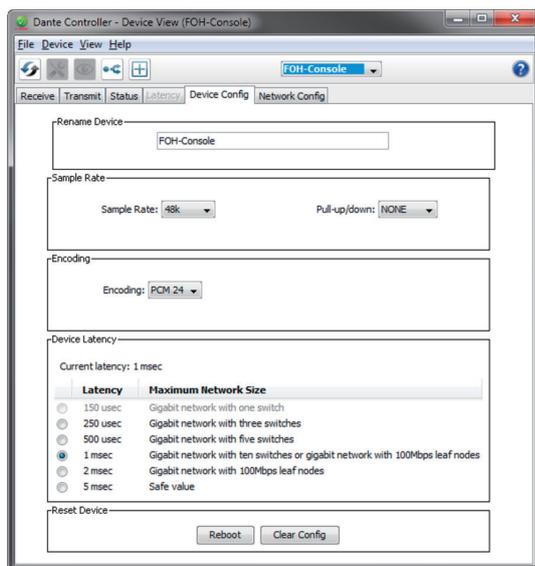
## Latency Set

Latency in the Dante network is compensated for at the receiver. Each receiver has to have a device latency setting with Dante Controller. The latency between the time stamps on the incoming audio data and the timing of sending out is defined by value of the latency setting. Typically a Dante device will have 1msec default latency. However, Dante can accept lower latency up to 150  $\mu$ sec. The Dante Controller shows recommended latency settings.

When a subscription is made, an automatic negotiation process between the receiver and the transmitter is done, to ensure that the latency for the subscription is high enough to prevent packet loss. Dante Controller provides latency monitoring for Dante devices.

### Subscription:

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



## Audio Routing

Dante audio routing is performed using the device names and channel labels. A receive channel can be linked to the name of a transmit channel (Subscription). 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. After making changes to the routing, you should wait for at least 5 seconds before disconnecting or powering down any affected devices. This ensures that the new routing configuration has been properly saved to the devices.

The screenshot shows the Dante Controller Network View interface. The main window displays a routing matrix with columns for Dante Transmitters and Dante Receivers. The Dante Receivers list includes DSP Processor, DVS, FOH-Amp, FOH-Console, Lobby-Amp, PA, PCIe-Record, Stagebox-1, and Stagebox-2. The Dante Transmitters list includes DSP Processor, DVS, FOH-Amp, FOH-Console, Lobby-Amp, PA, PCIe-Record, Stagebox-1, and Stagebox-2. The routing matrix shows connections between these devices and channels. Annotations with red arrows point to various UI elements:

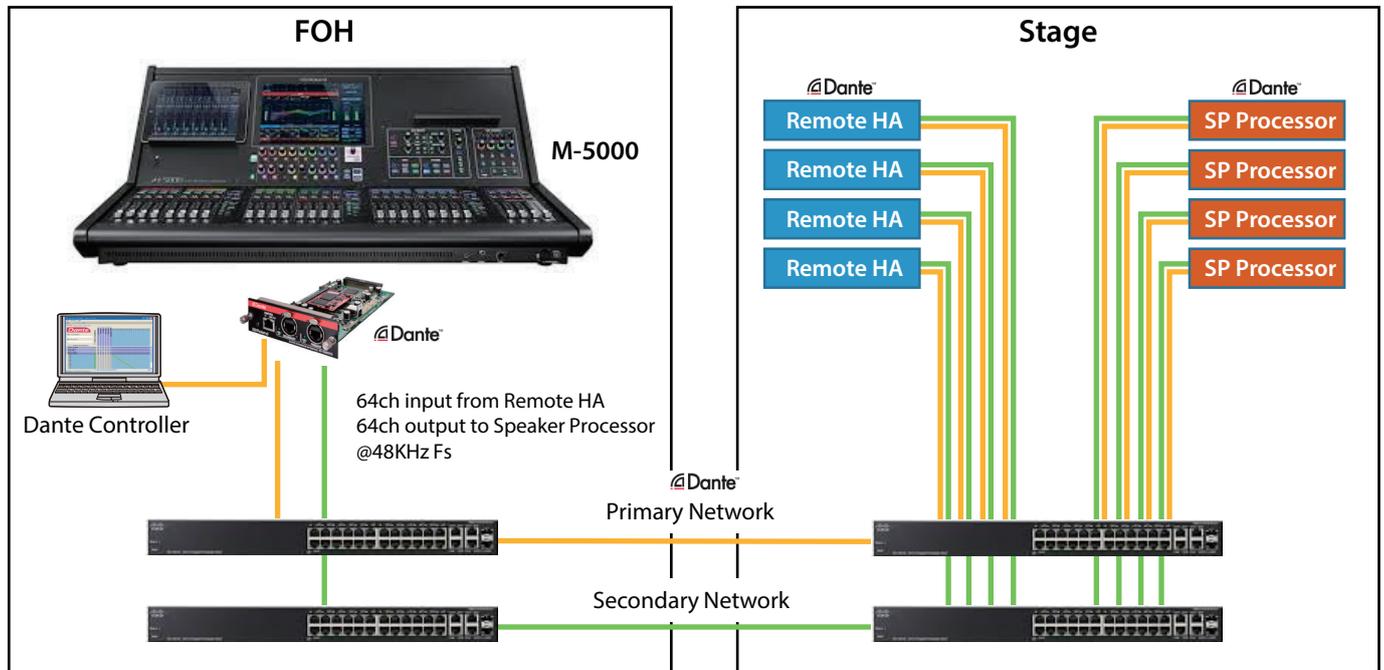
- Enter text to filter the device lists (points to Filter Transmitters and Filter Receivers)
- Click to expand all Tx devices (points to the expand icon for Dante Transmitters)
- Click to expand all Rx devices (points to the expand icon for Dante Receivers)
- Click to collapse the device (points to the collapse icon for FOH-Console)
- Click to collapse the channel group (points to the collapse icon for the channel group under FOH-Console)
- Click to expand the channel group (points to the expand icon for the channel group under FOH-Console)
- Click to configure Dante Interfaces (points to the Pi and Si icons at the bottom)
- Click to open the Events tab (points to the Events tab at the top)
- Click to open the Clock Status Monitor (points to the Clock Status Monitor icon at the bottom)
- Click to expand the device and view its Tx channels (points to the expand icon for Stagebox-2)
- [Ctrl] + click to subscribe all available channels (points to a green checkmark in the routing matrix)

# System Examples

## Live PA with redundant Dante networks (M-5000-FOH $\leftrightarrow$ Remote HA / Speaker Processor)

This redundant Dante network based on "star" topology ensures that when the primary network fails between FOH and Stage, the secondary port automatically take over communications without any interruption of sound.

In order to build a redundant network properly, please use primary network switches and secondary network switches for a primary network and a secondary network respectively.

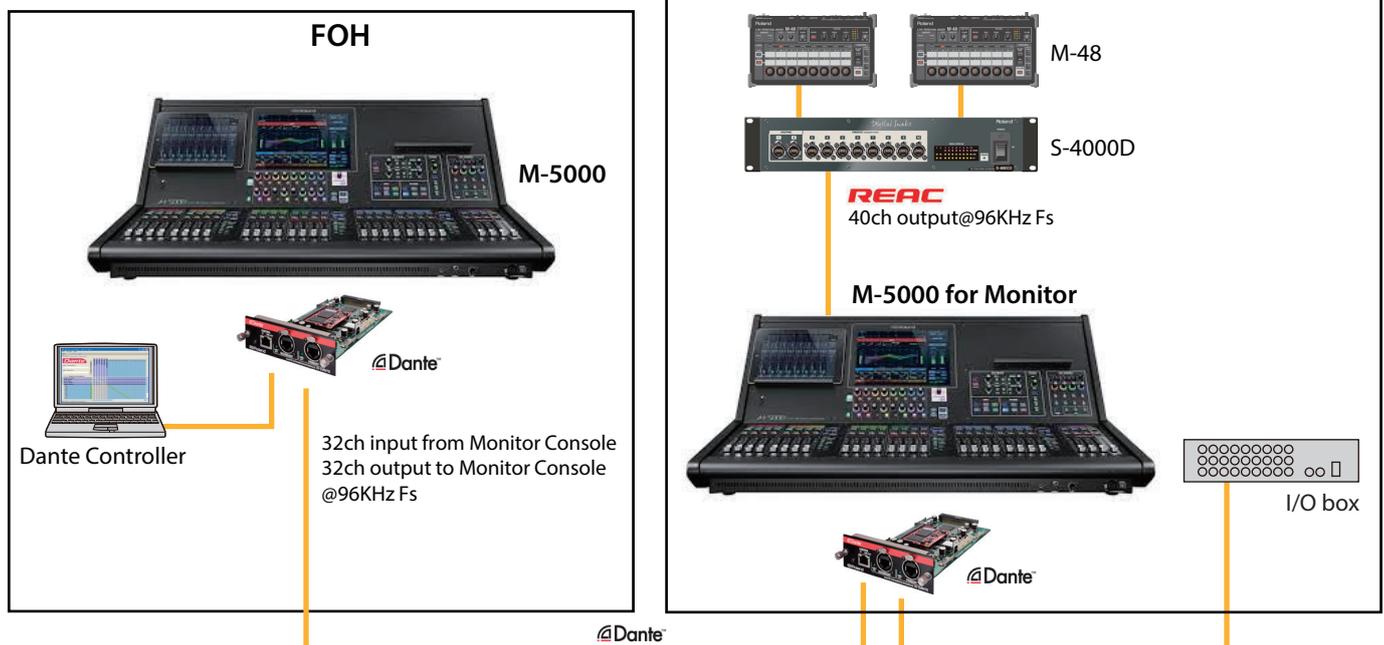


## Live PA with daisy chain Dante networks (M-5000-FOH $\leftrightarrow$ M-5000-Monitor)

This simple system allows two M-5000s to be easily set up for FOH and Monitor consoles with daisy chain Dante network without network switches.

I/O box is connected to M-5000 Monitor console in order to reduce latency between microphone inputs and monitor outputs.

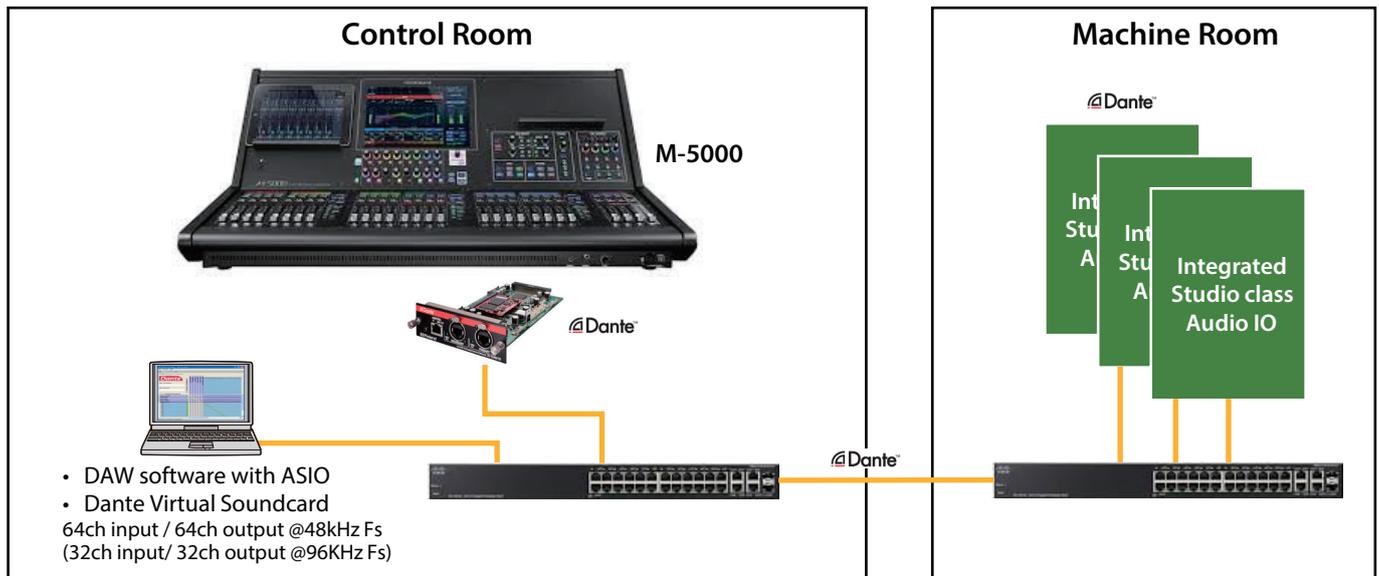
Please note that you must set all Dante modules to "switch mode" on Dante Controller to build a daisy chain Dante network.



## System Examples

### Multi-track Recording (M-5000 ⇔ Windows / Mac PC)

In this configuration, Windows or Mac computer with Dante Virtual Soundcard can be merged into M-5000 and Integrated studio class audio IOs (e.g. Focusrite RedNet) as a multi-track recorder. This makes it possible to provide a 64ch multi-track recording system very easily. Dante Virtual Sound Card (purchase required) is a software developed by Audinate. It changes your computer to a Dante-powered workstation, seamlessly integrating your computer with Dante audio devices on your network.



### Broadcast (M-5000-OB van ⇔ Remote HA)

This redundant Dante network makes it possible to mix for broadcasting and recording on OB van with large scale audio signals via a long distance transportation from the recording site (e.g. a concert hall). Long distance communication between each switches of OB van and the recording site is performed by fiber link with network switches which have optical ports or media converters.

With a XI-MADI module, any MADI based multi-track recorders or DAWs in the OB van can be connected.

