Best Practices
for Managing Dante Devices

Version 2.0

Dante®

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Overview

THANK YOU FOR CHOOSING DANTE FOR USE IN YOUR AV NETWORK.

Dante makes it easy to connect and route your audio and video signals through an IP network.

While it is easy to get started, as you progress through the many options and features available to you, it becomes natural to wonder if you are implementing the technology the best way to meet your needs.

This guide gives an overview of Dante and the technical specifics so that you understand how Dante devices communicate across a network. With this knowledge you can configure your network, choose appropriate tools and software, and make the most of Dante technology for your specific needs.

We at Audinate intend for this Best Practices Guide to be a living document that will be updated as new technology is created, adopted, and deployed in AV networks. We welcome feedback and discussions about content that can help you. Please feel free to share your thoughts with your Dante reseller or any member of Audinate.

Let's get started!
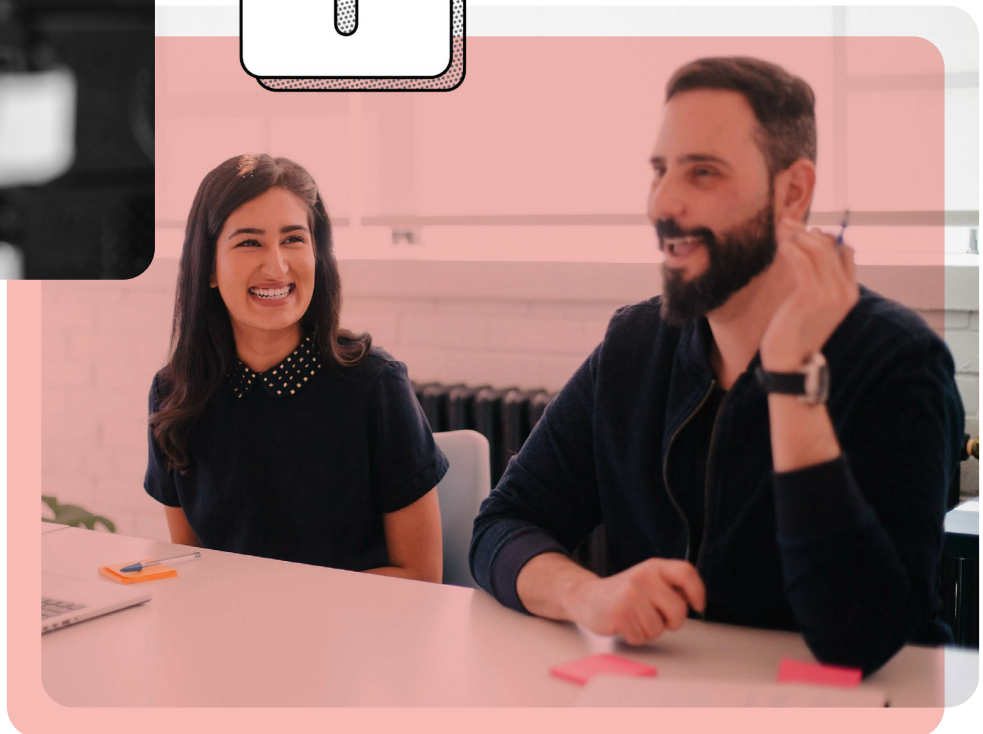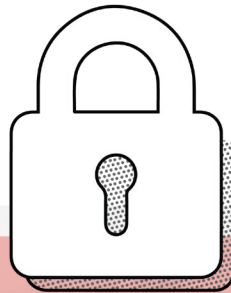
What is Dante?

You are likely already using Dante devices as part of your AV network. To establish a baseline of context, let's start with a refresher of what Dante is, and how it is used to create reliable AV over IP networks.

AV systems have traditionally required point-to-point physical connections between devices, resulting in cumbersome amounts of specialized, single-purpose cables that define where audio and video signals can go. Changes are labor-intensive and expensive, and noise and signal degradation are constant companions as distances grow. The result is systems that are difficult to deploy and even more difficult to adapt as demands shift.

Dante replaces all of those connections with a standard IP network, effortlessly sending video or hundreds of channels of audio over slender Ethernet cables with perfect digital fidelity. All connections are now managed with software, making routes fast, readable, and reliable. Because all devices share the same network, signals can be sent between any devices no matter where they are located on a site, with no change to the wiring at all. Dante systems are easily expanded, exactly as one might add a printer to a network. Just connect additional devices to any available network jack and start using it.

Dante is the evolution of AV systems, converging all previous connection types into one. Dante delivers vastly superior performance while making these systems easier to use, easier to expand, and less expensive to deploy.

You don't have to worry about re-establishing routes when a system is moved or power cycled — it "just works," saving time, worry and setup costs.

HOW DOES DANTE WORK?

Dante is developed by Audinate and is available to manufacturers of audio and video products in several formats that suit different product types. Manufacturers integrate Dante audio and video in the form of hardware modules, chips, reference designs and software. The technology is then incorporated into products ranging from single channel microphones to massive 3000+ channel broadcast consoles. No matter how Dante is implemented, complete interoperability between devices is guaranteed for easy, dependable deployment in the real world.

The Dante hardware or software in a device takes digital audio and video and 'packetizes' it. Audio and video is segmented and wrapped it in IP (Internet Protocol) packets suitable for transmission across a standard IP network. The packets contain timing information and source and destination network addresses, allowing them to be efficiently routed through the network to the correct destination.

When a device receives Dante audio packets, it reconstructs them back into a continuous digital audio stream, which is then played out, recorded, or digitally processed, depending on that device's role in the audio system. Performance is second to none: all Dante audio is 100% lossless 24- or 32-bit, and sample rates from 44.1 kHz to 192 kHz are supported.

Dante AV does the same job with video transport, taking compressed video signals and converting them into IP packets that share the same timing and control mechanisms as Dante audio. This provides visually lossless video transmitted across a standard IP network.

The Dante Controller software enables you to configure signal routes and other settings. All routes and settings are stored in the individual Dante devices, allowing them to run without any connected computers. You don't have to worry about re-establishing routes when a system is moved or power cycled - it "just works," saving time, worry and setup costs.

Dante Network Management Types

As we move audio and visual from analog to digital, we are effectively moving traditional AV technologies into the world of IT. If you are entering AV from the IT perspective, you will likely find many of the terms and concepts familiar.

For example, when building an IP network, you choose to include hardware devices such as network switches that can be either managed or unmanaged. When discussing Dante AV networks, we use the same terms of managed and unmanaged. We are not making any implication about your choice of switch types yet are merely applying the same concepts to the AV network.

THE UNMANAGED DANTE NETWORK

When you first start using Dante devices, you're likely wanting to get things up and running quickly. Dante makes that easy - plug them all into your network, launch Dante Controller and quickly establish subscriptions between devices. These subscriptions are stored in the device and remain even if they are unplugged and moved to new networks. With Dante Controller, anyone with access to the network can remap device subscriptions and monitor content flowing to and from the device.

This type of use we call an "unmanaged Dante network." While you can actively make choices about where to route audio and video signals using Dante Controller, devices in an unmanaged network continue to operate independently without the need for a centralized manager. Audio and video media data is still transferred directly between devices and control data is established. by Dante Controller.
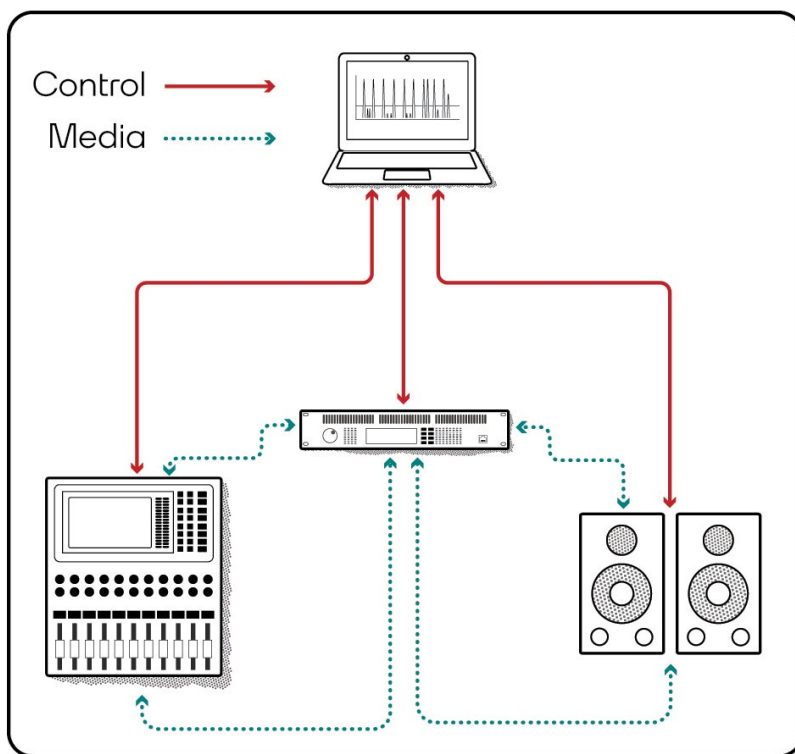
When you first start using Dante devices, you're likely wanting to get things up and running quickly. Dante makes that easy - plug them all into your network, launch Dante Controller and quickly establish subscriptions between devices.

THE MANAGED DANTE NETWORK

In Managed Dante Network, control of all devices in the network is established by a management server, either the on-premise Dante Domain Manager, or the SaaS service Dante Director. This control enables IT and AV professionals to actively manage the audio and video network. All media signal flows remain between devices, only control and monitoring data is managed centrally by the server software.

Active management of the Dante network includes:

- Security controls over Dante devices in the AV network. This includes the creation of login credentials for all changes to device subscriptions, routing, and status monitoring.

- The creation of logical groupings of Dante devices, separate from the physical network infrastructure. In environments with widespread usage of Dante devices, mapping and control can require sorting through long lists of devices and channels. With logical groups in use, routing and control is greatly simplified. This includes the ability to route audio and video signals across IP subnets – an ability not always easily solved in an unmanaged network.

- Real-time insight into Dante device functionality. If a device fails, the managed system reports the failure immediately so that IT and AV professionals can quickly address the issue. This includes the use of real-time device dashboards and access to detailed audit logs for diagnosis.

- Extension of device routing to end users through custom API development. Provide routing and device switching through the creation of custom software applications, for example the use of Crestron and AMX control systems, Bitfocus Companion enabled control surfaces, and other custom software applications.

- When using Dante Domain Manager, you also gain the ability to share content across multiple subnets, build high-availability failover servers, simplify AES67 and SMPTE ST2110 network connections, and more.

- When using Dante Director, high availably is built-in due to its nature as SaaS service running on AWS. Director also enables cross-subnet routing for maximum signal flexibility.
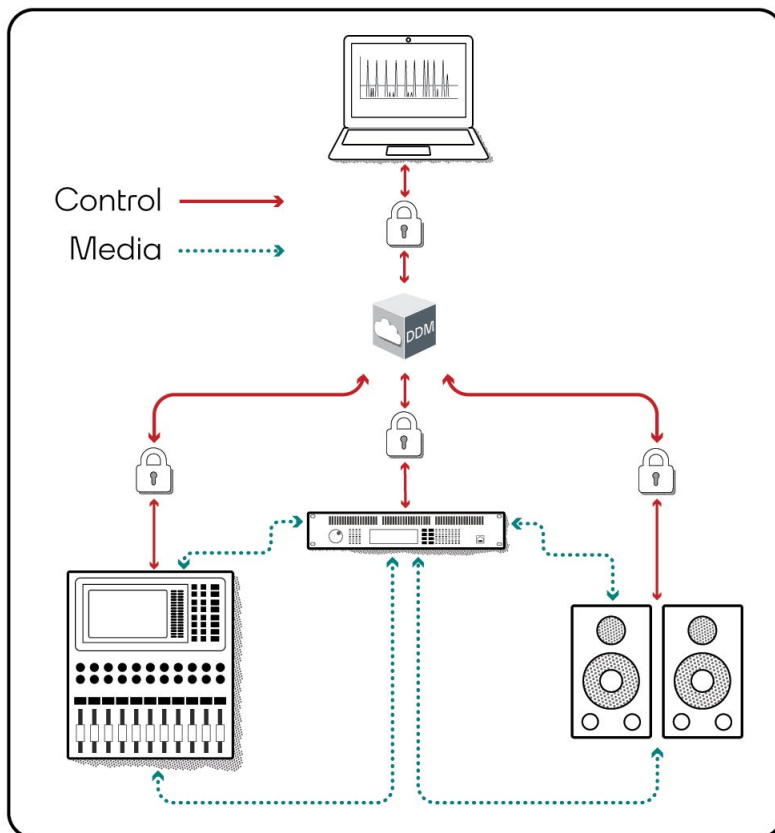
Choosing the Right Dante Management for You

Dante is available in thousands of products from hundreds of manufacturers, covering a diverse range of installations and applications across industries. Dante devices are all able to connect with each other in an unmanaged mode with Dante Controller, or in a managed mode with Dante Domain Manager or Dante Director.
How do you choose which type of management is best for your application?

Whether you choose to continue using Dante in an unmanaged mode, or move to a managed system, will likely depend upon how frequently your system will be torn down and rebuilt, how many devices you need to control, how your IT & AV professionals monitor and manage your system, and more.

LIVE PERFORMANCE SETTINGS

Touring musical acts and performances that carry their own AV gear from one location to another are frequently building and tearing down their AV system. All gear is typically controlled by a few, select AV professionals, and are not required to enable novice interaction. The Dante network is typically a private, dedicated network that doesn't allow or require external access.

For these types of situations, an unmanaged Dante network is typically the best choice, and provides these benefits:
- Dante device configuration is plug and play through the use of Dante Controller.
- Once configured, Dante devices have no reliance on a central controller or manager to keep operating.
- Security can be assumed through network inaccessibility.
- Device subscriptions are retained by each device between teardown and setup, so when the setup remains the same, minimal reconfiguration is required.
- Redundant IP networks with instant failover can be used with supporting Dante devices.

INSTALLED OR IN-PLACE USAGE

The vast majority of Dante devices are used in systems that don't typically move from one location to another and have a greater consistency of device usage.

These installed Dante networks are commonly found in:

- Houses of Worship
- Arenas and Stadiums
- Recording Studios
- Conference Centers
- Universities & Higher Education facilities
- Broadcast Studios
- Corporate Spaces and Studios
- Amusement Parks
- Sportscasts
- Event Spaces with installed hardware
- Experiential centers
- Zoos
- Theaters
- And more...

Since Dante can be used with existing networks, many of these applications benefit from infrastructure that is already in place for further savings.

Managing your Dante network with a server solution such as Dante Director or Dante Domain Manager can provide management, monitoring and oversight benefits for installed systems. If a system is offline, or not performing up to expectations, a cloud management solution enables you to remotely inspect device status, reboot affected devices and repair select issues without ever stepping foot onsite.
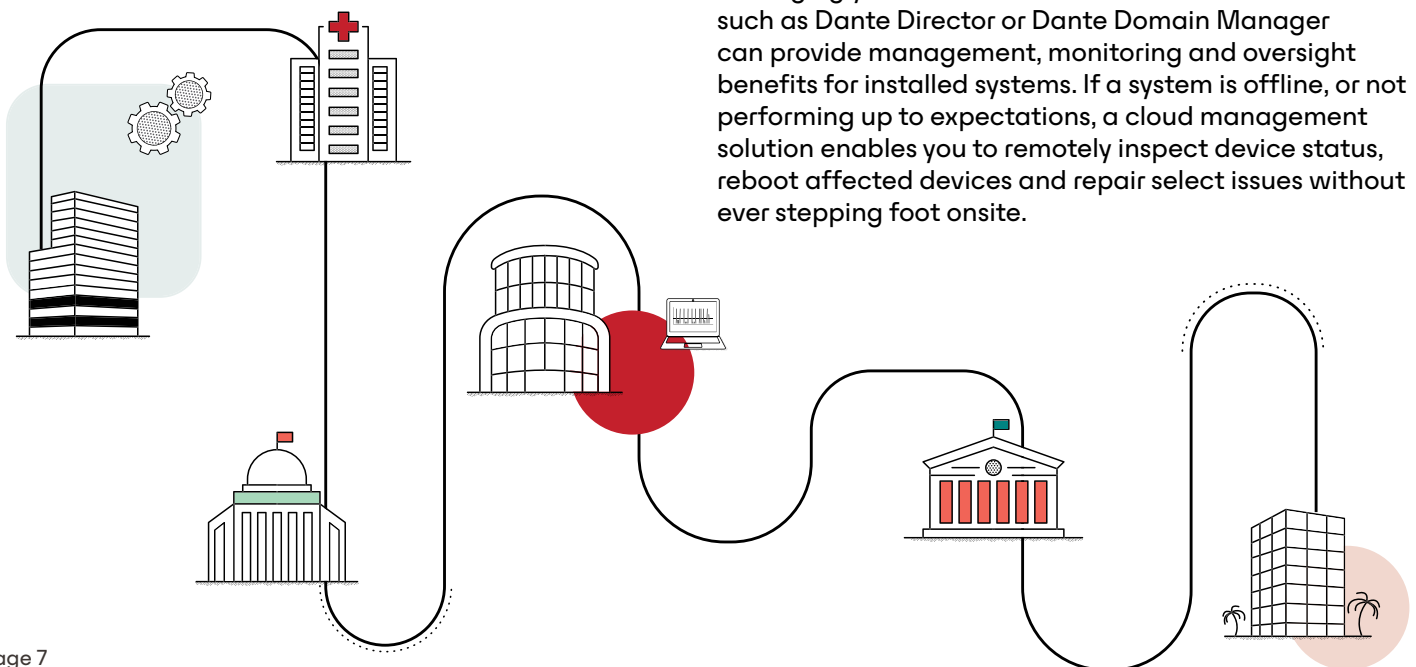
MANAGING LARGE NUMBERS OF DEVICES

As your Dante networks grow, establishing subscriptions between Dante Devices can become visually challenging and unmanageable. See this example of Dante Controller that contains a reasonable number of devices.

Breaking down devices into physical subnets is a logical step during network creation. That being said, in unmanaged mode, device connectivity is generally confined to each subnet and connecting devices between subnets becomes increasingly a challenge.

Introducing Dante Director or Dante Domain Manager into the equation enables the creation of logical domains that can span across IP subnets. This allows flexible routing along with network scalability.

Firstly, domains and sites can be used to break large number of devices down into smaller, logical groups. In the example on this page, after logging in to DDM or Director, only the appropriate domain or site is displayed in Dante Controller. This ensures that signals are routed to the appropriate, expected devices, and enables much more discrete management and control of those devices by authenticated users.
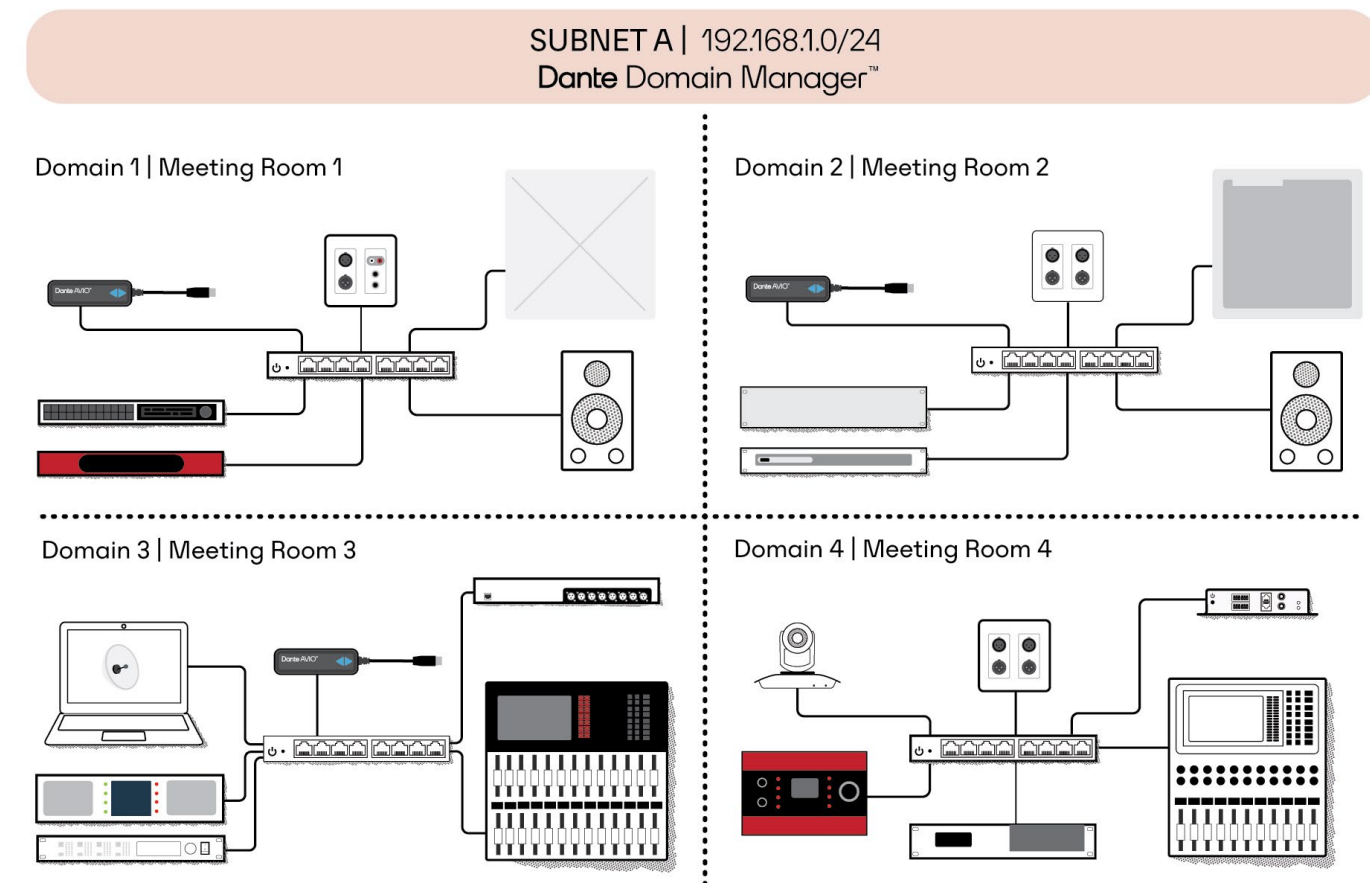
Subnets, domains & sites

Designating logical domains in Dante Domain Manager or sites in Dante Director does not need to follow your physical subnet infrastructure. This gives you the power to organize your devices however you deem necessary, without respect to whatever physical infrastructure is in place. Sites and domains can be in geographically distant locations, or merely used to logically separate different device applications. They can even span multiple locaitons, grouping devices in the best possible logical configuration.

Multiple domains, or an entire Dante Network can exist within a single subnet. Alternately, you can create domains/sites that span across multiple subnets, having some devices existing on a subnet, but belonging primarily to a domain/site where most of the devices are on a separate subnet.

The following examples provide an explanation of how managing devices with management software can be used to organize and monitor devices. In this case, we focus on the use of the on-premise server solution, Dante Domain Manager (DDM). Similar organizational strategies can be deployed using the cloud-based Dante Director. In the diagram below, (s01), four conference rooms are all in the same subnet that also includes DDM. This subnet is logically broken down into four different domains, making it easier for device organization and management.

SUBNET A | 192.168.1.0/24
Dante Domain Manager™

Domain 1 | Meeting Room 1

Domain 2 | Meeting Room 2

Domain 3 | Meeting Room 3

Domain 4 | Meeting Room 4

s01, conference rooms

Multiple subnets can be enrolled into a single domain and each domain in DDM can support up to 20 subnets (see diagram below, d01). The DDM server can even reside in a separate subnet elsewhere, perhaps in a remote data center.
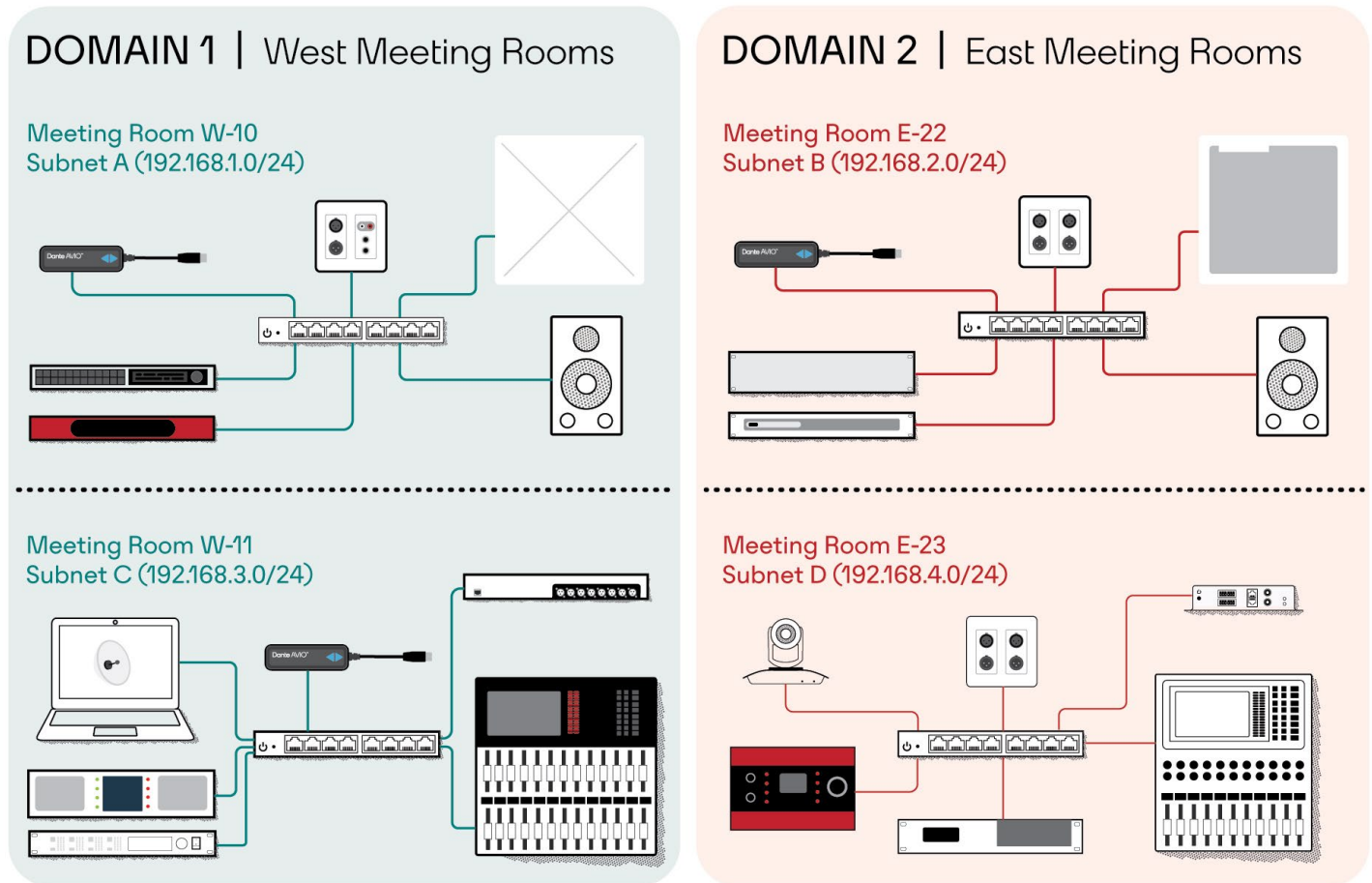
d01, subnet A

With installed networks, the IT and AV teams typically manage the overall system but may not be the primary user in day-to-day interactions with Dante devices. For example, in educational, corporate, conference centers and houses of worship, inexperienced users may need to reconfigure device subscriptions to meet their needs.

One method of solving this issue is to grant access to trusted individuals. Using Dante Director or DDM, you can set authentication credentials that limit the access to your Dante devices, and also limit any network modification with Dante Controller. This keeps your Dante settings secure even if someone gains physical access to your switches and devices.

To give broader access, you can use the Dante Managed API to build new, simplified control surfaces that anyone, even untrained and unauthenticated users can access. Pre-built integrations for Crestron and AMX touchpads are available on the Dante website, as well as API support for Bitfocus Companion enabled control surfaces.

With the Dante Managed API, you can enable inexperienced users to quickly change the Dante subscriptions to support the need. For example, you can use the API to which audio input between podium and lavalier microphones, combined and separate meeting spaces, or perhaps switch audio and video streams from a conference room computer to a user laptop for presentations.

A managed network gives access to only those who need it, and prevents potentially nefarious actions like leaking corporate secrets, corporate espionage, damaging student curiosity, student pranks, etc. This prevents unauthorized access to audio and video streams and gives you peace of mind that your users have what they need without the ability to mess up your settings.

Dante Network Administration & Planning

Dante AV-over-IP is based on common IT standards, enabling Dante to run alongside data traffic on networks comprised of readily available conventional switches and cabling.

BASIC DANTE NETWORK CONSIDERATIONS

The following design considerations apply to both managed and unmanaged Dante networks. Differentiation between managed and unmanaged network applications are called out where appropriate.

Single vs. Multi-Subnet Dante networks

As seen in the previous deployment examples, Dante can be used with many different network configurations.

The main consideration for your Dante network is whether you'll need to deploy devices across multiple subnets, or if all Dante devices will be contained within a single subnet.

If all your devices reside within a single subnet, you have the option of using either an unmanaged or managed network in your deployment. If you have unmanaged devices in multiple subnets they will only talk to devices within their subnet.

With an unmanaged network on a single subnet, all devices are visible in Dante Controller when run on a computer attached to that subnet. You are limited to only the devices on that subnet and won't be able to discover or route audio to any Dante devices outside the subnet.

With a managed network, the server (Dante Director or DDM) manages all your devices whether they are on a single or multiple subnets. With the server and Dante Controller, you can discover devices and route audio no matter where those devices are located on the physical network.

PLANNING NETWORK HARDWARE USE

When planning your physical network to support Dante audio, there are some things that that you should consider.

How many Dante devices & switches are needed?

As you select Dante devices, it's logical that you should plan for the connection of at least one switch port per device. The more devices that you have, the more switch ports you'll need to support them. Remember to consider how much capacity you might require for adding additional Dante devices in the future.

Converged networks vs. Standalone Dante networks

Previous approaches to deploying audio networks required that audio be run on a separate, air- gapped network. There were many reasons to do so at the time. Now with the introduction of better methods of segregating traffic, including QoS to prioritize PTP audio and video, it is very common to stream Dante audio over converged networks that are also used for office communications and more.

So, what do you need to consider if you want to use a converged network? The type of data typically supported by your network, is of course the key metric. Typical office communications like email, web browsing and the like have a miniscule impact on modern 1Gb ethernet. Even Zoom and Microsoft Teams calls only require 4Mbps at maximum per call.

Where you should take care is examining other AV devices on your network, most certainly endpoints that transmit or receive video. While Teams and Zoom calls are very compressed and efficient with bandwidth, other video use may require a much higher quality stream and thus use significantly more bandwidth.

Depending upon how many simultaneous video streams are required, you may need to upgrade your switches and uplinks to those that support faster throughput.

When deploying new switches for your AV network, it's important to consider how far your network will physically reach and the bandwidth required.

Managed networks can easily include geographically distributed devices with latencies up to 40ms, so choosing the correct uplinks will be necessary.

Typically, CAT5e copper cabling will support 1Gbps at a maximum distance of 100m/328 feet, and 10Gbps at about half that distance. CAT6 will support 10Gbps over a 100m cable run. If you need to have a longer interconnect, or support for more bandwidth, you will need to go with a Fiber uplink. All individual Dante devices operate at a maximum of 1Gbps over copper cable.

Fiber uplinks can be deployed in multiple different modes – single and multimode – that support different distances and bandwidths. Multimode is helpful for high bandwidth interlinks within a data center or building and can reach 300m to 1500m runs. For longer runs, fiber used in single mode can support up to 40 kilometers in a single run. Ensure that your switches and uplinks support your necessary bandwidth and distance requirements.

Addressing Dante Devices

Dante devices use DHCP for addressing when available or will auto-assign (link local) an IP address in the 169.254.0.0/16 range on the primary network and 172.31.0.0/16 on the secondary network if DHCP is not available. Link local is typically for the most basic use cases in unmanaged networks.

NOTE: DHCP reservations can be used to manage larger systems where you want to always be able access devices at specific addresses. This is a viable alternative to statically addressing devices in Dante Controller. Dante devices continue to look for a DHCP server even after auto-assigning an IP address. DHCP is the preferred way to address devices, yet it does require the creation and management of a DHCP server.

When configuring a DHCP server, specify the DNS server IP address and DNS domain name for the devices connecting to DDM or Director as the first entry in the domain-search field. Dante devices will only use the first entry in the domain search path.

Most Dante Devices also support static IP addressing which can be helpful if you need to know the exact IP address of your devices.
Unfortunately, as your device list expands, this can lead to managing long lists of devices which require high management overhead and the potential of injecting human error into the process. That being said, in environments where DHCP and DNS servers aren't maintained, static IP addressing can require less work setting up the network at the outset.

NOTE: Devices statically addressed in Dante Controller (or other programs) that do not include a domain search field cannot automatically discover an on-premise DDM server using DNS-SD.
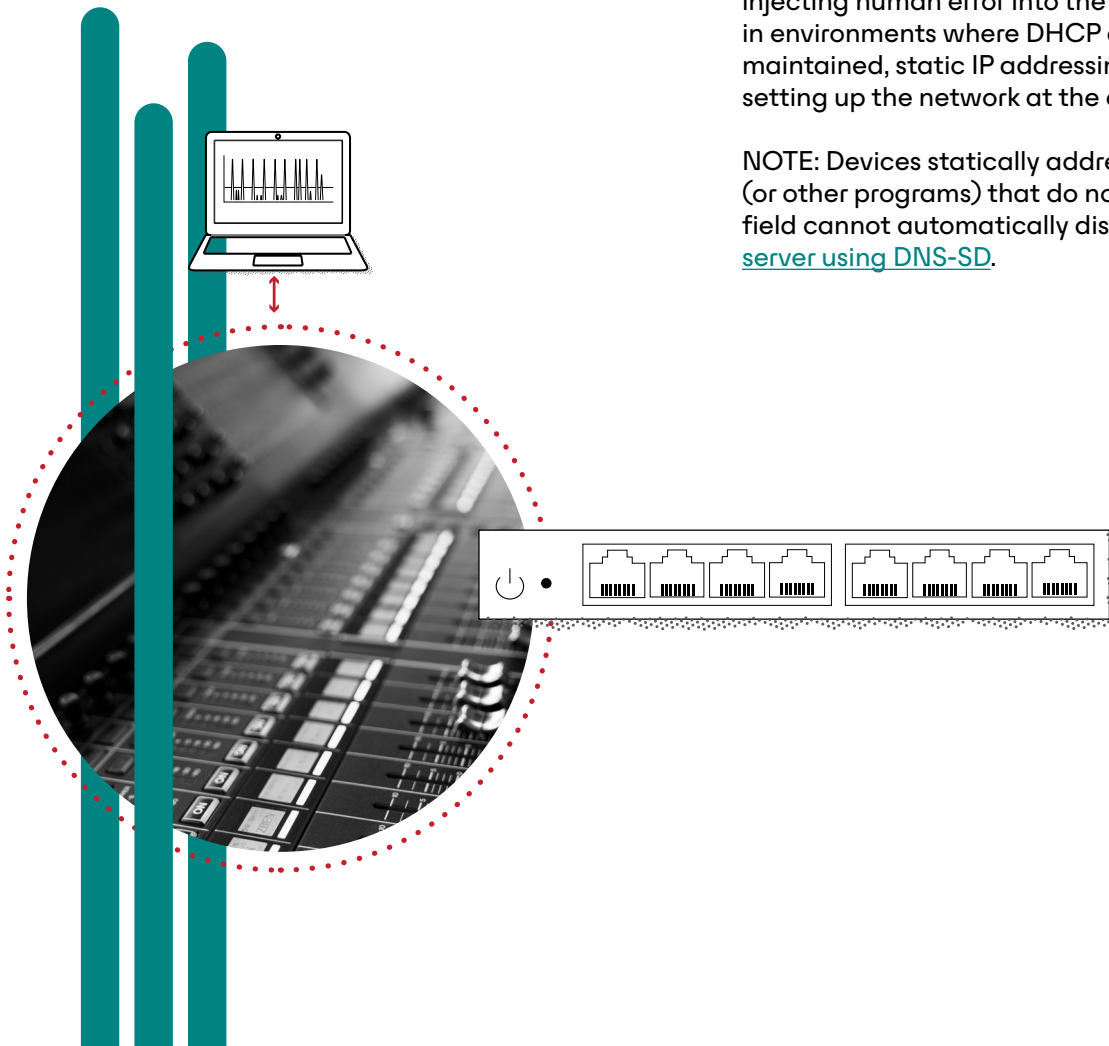
Audio Transport and Expected Bandwidth

The majority of audio used in professional settings is PCM (uncompressed), sampled at 48 kHz and a bit depth (word length) of 24 bits. Dante audio is unicast by default but can be set to use multicast for cases of one-to-many distribution.

- Dante packages audio into flows to save on network overhead.
- Unicast Audio flows contain up to 4 channels. The samples-per-channel can vary between 4 and 64, depending on the latency setting of the device. Bandwidth usage is about 6 Mbps per typical unicast audio flow.
- Bandwidth for multicast flows is dependent on the number of audio channels used. Bandwidth is about 1.5 Mbps per channel.
- Dante audio cannot be sent over Wi-Fi.

You must configure your DNS server with an SRV record describing where to locate the Dante Server (DDM or Director), and blank TXT record.

Address	Port	Usage	Type
Device IP	UDP 14336-14591	Unicast Audio/Video	Unicast
239.255.0.0/16	UDP 4321	Multicast Audio/Video	Multicast

Video Transport and Expected Bandwidth

Dante video is optimized to run on Gigabit Ethernet. Video bandwidth is impacted by resolution, frame rate, chroma sampling, color bit depth, compression codec used, and varies with content shown. Dante video flows must be multicast if video is being sent to more than one destination.

Dante AV is supported by multiple technology deployments that have different bandwidth caps. When you are adding video to your network, it's important to note that IGMPv2 or v3 is required for use on your network, otherwise you risk flooding your ports with video.

Device Discovery

In a single-subnet, unmanaged Dante network, multicast DNS (mDNS) based discovery is recommended. The mDNS discovery feature, the Dante Discovery Service, is enabled by default and does not need to be configured.

Address	Port	Usage	Type
224.0.0.251	5353	mDNS	Multicast

If your network spans multiple subnets, you can use DNS Service Discovery (DNS-SD) to discover the DDM server via unicast traffic.

You must configure your DNS server with an SRV record describing where to locate the Dante Server (DDM or Director), and blank TXT record.

The domain name in the SRV and TXT records must match the search domain(s) provided to DHCP clients (devices).
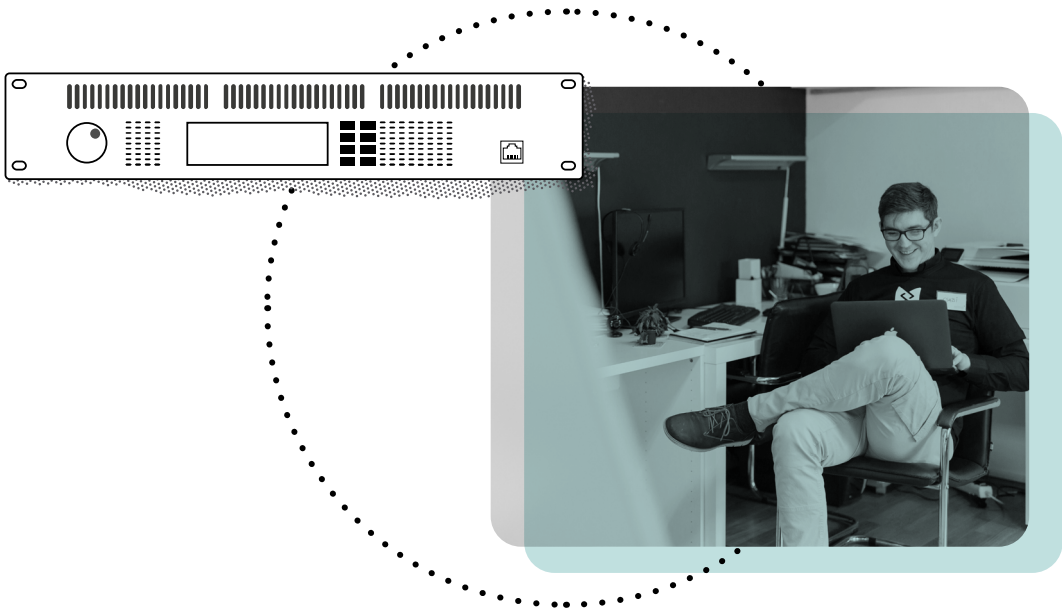
Synchronization and Clocking

Digital audio requires synchronization for accurate playback of audio samples. Dante uses Precision Time Protocol (PTP version 1, IEEE 1588-2002) by default for time synchronization. This generates a few small packets, a few times per second.

Dante uses a distributed Leader Clock election protocol that automatically selects the best clock for the network, based upon information advertised by each Dante device. This information includes the quality of its clock, clock source, link speed and other parameters, and results in the best clock being elected as the Leader Clock. This is also known as the Best Master Clock Algorithm (BMCA).

The clock which is elected Leader sends multicast sync and follow up messages to all followers, on a per-subnet basis.

Follower devices reply back to the leader with a "delay request." This allows the device to calculate network delay so that precise time alignment can be maintained.
- To reduce multicast traffic, follower devices can be configured to send replies via unicast.
- Dante does not require PTP aware switches.
  In most cases, Dante does not benefit from enabling Boundary or Transparent clocks on switches.

Address	Port	Usage	Type
224.0.1.129-132	UDP 319, 320	PTP	Multicast
239.254.3.3	UDP 9998	PTP Logging (if enabled)	Multicast

Clocking is a frequent topic of discussion.

For more information about clocking in Dante, see the online FAQ.
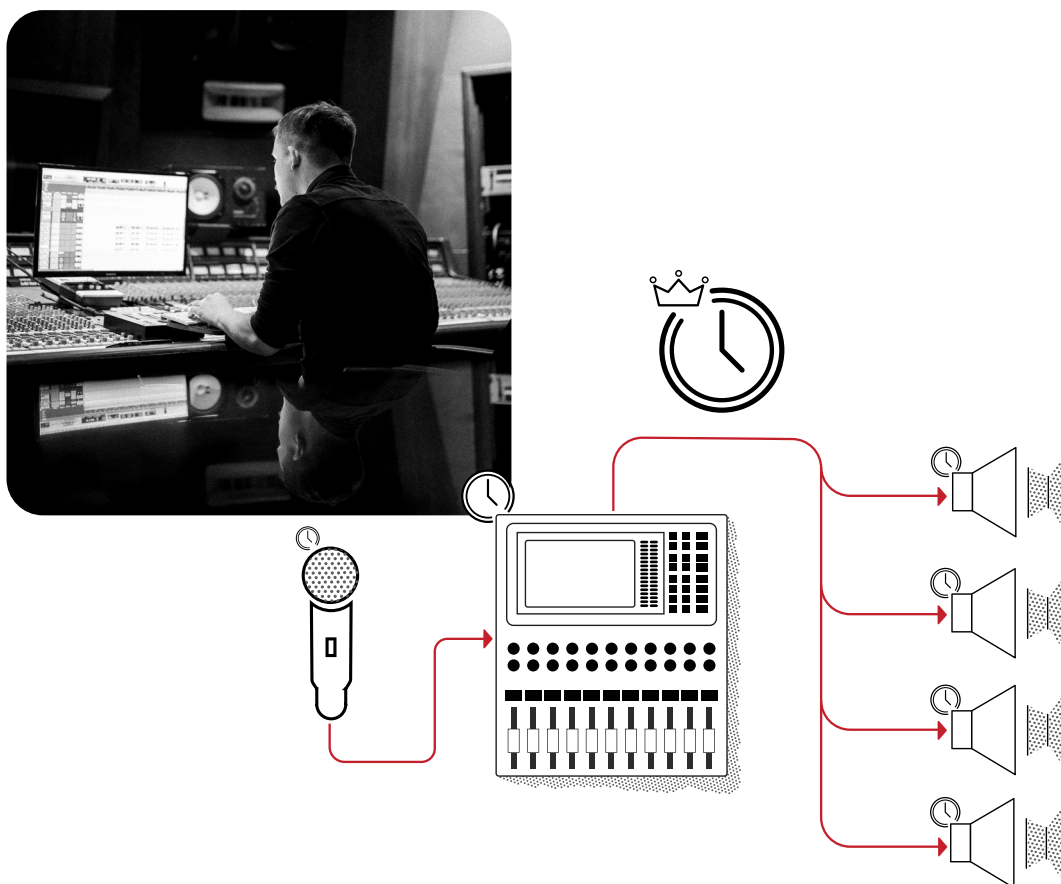
Dante Devices, PTP Clocking Support and AES67/SMPTE Interoperability

Dante devices can also support Precision Time Protocol version 2 (PTPv2), which is used by AES67 and SMPTE ST2110 audio flows. The following tables give a generic guide that summarizes the PTP capabilities of Audinate products and a table that states the allowed parameter ranges and defaults for PTPv2 compatibility.

Support for features like AES67 or SMPTE 2110 must be enabled at the firmware level by the manufacturer of your Dante enabled device. Please consult manufacturer documentation for firmware details and update procedures.

PTP CLOCKING SUPPORT OF DANTE DEVICES AND SOFTWARE

Clocking is an interesting topic for Dante AV devices and is critical for devices to function well together. Whether devices can function as Leader or Boundary clocks, and what version of PTP (1 or 2) they will use, varies by device and configuration. This is something that should be considered when you are in the design phase of your Dante network. For detailed information by device, see this Clocking FAQ topic.

PTPV2 CLOCKING OPTIONS FOR AES67 / SMPTE INTEROPERABILITY WITH DANTE

The following table below provides the allowed ranges and default values (in bold) for several PTPv2 parameters. A range (for example 0 .. 127) shows configurable value. Others are non- configurable.

Note: TTL >1 is supported only on FPGA based platforms built using Dante IP Core.

	Unmanaged Networks	Managed Networks			
	AES67	AES67 (Default)	AES67 (Custom)	Custom (v1 + v2)	SMPTE
Domain	0			0 .. **128** .. 255	0 .. **127**
Priority 1 & 2	Device Specific		0 .. **248** .. 255	0 .. **128** .. 255	0 .. **128** .. 255
Announce Interval	0				-3 .. **-2** .. 1
Announce Timeout Interval	3				
Sync Interval	-2				-7 .. **-3** .. -1
Delay-Req Interval	0				
Timestamp Mechanism	One or Two Step				
Delay Mechanism	End to End (E2E)				
TTL*	16				1 .. **16** .. 63

Interval Value (n)	Interval Time (2n)	Frequency
4	16 s	0,0625 Hz
3	8 s	0,125 Hz
2	4 s	0,25 Hz
1	2 s	0,5 Hz
0	1 s	1 Hz
-1	0,5 s	2 Hz
-2	0,25 s	4 Hz
-3	0,125 s	8 Hz
-4	0,0625 s	16 Hz
-5	0,03125 s	32 Hz
-6	0,015625 s	64 Hz
-7	0,0078125 s	128 Hz

Note: Unicast delay requests only work for PTP v1 ports when using Dante Controller.

Handling Latency

Dante devices include a latency setting that creates a safe window for samples to be delayed (relative to the transmit) to accommodate for the natural latency of your network. When planning and deploying a Dante network, you need to ensure that device latency will be within tolerances for your network. Dante devices can connect over some distance as long as the latency does not surpass 10ms. Devices that are enrolled as part of a managed network can gain a greater latency (up to 40ms latency) and better synchronization over longer distances using GPS clocking.

Control and Monitoring Traffic

Dante monitoring and control traffic uses the following ports:

EXTERNAL

Address	Port	Usage	Type
224.0.0.230-233	UDP 8700-8708	Multicast Control and Monitoring	Multicast

INTERNAL

Protocol	Port	Usage	Type
UDP	4440, 4444, 4455	Audio Control	Unicast
UDP	8751	Dante Controller metering port	Unicast
UDP	8800	Control & Monitoring	Unicast

A full list of ports used by Dante is available here.

Dante Integration with Other Audio Technologies

It is common for you to need to integrate Dante with other methods of audio transmission including Analog, AES3, MADI, AES67, ST2110.

Out of the box, many Dante devices are capable of running in AES67 mode to provide native support. See the charts in this guide for more details about clocking support considerations to best match your network requirements.

For many use cases, you can implement a physical piece of hardware that does the translation from one technology to another. AVIOs are an easy way to interlink Dante audio to analog line level inputs and outputs, AES3-connected amplifiers as well as Bluetooth and USB interfaces. There are also many devices that translate audio from Dante to other specifications. These devices can be found from many manufacturers in the online Dante-enabled Product Catalog.

Securely Opening Networks for SaaS Solutions and Dante Director

Many new tools available for professional AV are moving to an online, software-as-a-service (SaaS) model. This provides you a better experience with more frequently updated software, without the capital expense and ongoing maintenance of an on-premise server.

Opening your network to the internet is a necessary step to enable the use of advanced, online management tools like Dante Director. When done properly, it can be more secure than running a local, unmanaged Dante network.

If you have already opened your network to the internet, either by using a network that is converged with the rest of your internet traffic, or directly opening the Dante network itself to the internet, you will also want to take these additional setups to make your network secure from tampering and signal eavesdropping.

To secure a Dante network that is open to the internet:
1. Manage your Dante network by enrolling your devices into a Dante network manager such as Dante Director
2. Open select ports in your firewall and/or switches
3. Restrict traffic to/from known sources
4. Create user accounts and give access to trusted users and admins

For a full description about how to open your network,

download the white paper – Securing Dante Networks for use with SaaS tools and Dante Director.

Dante Network Redundancy and High Availability

Dante supports redundancy for applications which require high uptime, most notably in live performances and broadcast systems.

Developing a high availability Dante network relies upon the creation of primary and secondary networks for optimal resiliency. When doing so there are several recommendations for developing your redundant Dante networks.

Redundancy Recommendations:

When possible, deploy redundant Dante networks using separate switches and cabling.

If you want to have redundancy for cabling only, you can create two separate VLANs on a single switch, but if your switch goes down, this a single point of failure. Power redundancy for switches is recommended, and higher quality switches will contain redundant power supplies.

For switches with two power supplies, plug one into a UPS and the other into power line voltage. This way you are diversifying your power source and increasing layers of redundancy.

Dante Domain Manager also supports a different form of High Availability where a secondary Dante Domain Manager instance can be used a failover in cases where the original DDM server goes down for whatever reason – power or hardware failure, for example. This is available for use in the Platinum level of Dante Domain Manager.

Dante Director is a SaaS service that runs on Amazon Web Services, so reliability is very high. Use this page to

LOCATING YOUR DANTE DEVICE PRODUCT MODEL

Every Dante device, from any manufacturer, uses a specific type of Dante technology to connect and route AV signals, creating a Dante network. The abilities are enabled by either a hardware chip inside your device, or by software integrated by the manufacturer.

To locate your Dante device model, in Dante Controller double click your device name to open the Device View window. You can also open Device View from the Device menu (Ctrl + D, or Command+ D) in the Network View window. On the Status tab, look for the Dante Information section where your Dante Model is listed. This is the technology, firmware and hardware in your device that enables Dante connectivity.
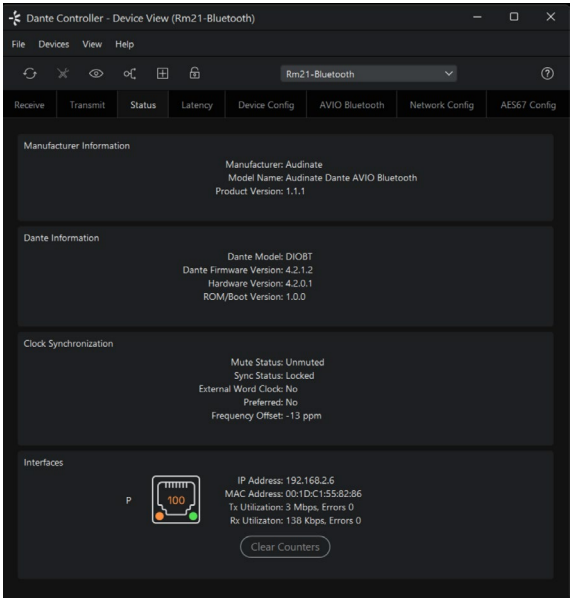
Unmanaged Dante Network Considerations and Tips

As any unmanaged Dante network grows, you may have some issues sorting large numbers of devices, establishing connections across subnets, providing security and so forth. Some of these issues will require you to move to a managed Dante network, while others can be solved with some careful planning or the introduction of custom hardware.

NAMING CONVENTIONS & FILTERING

Establishing and enforcing the use of a device naming convention can get you a long way. By carefully planning out how your devices will be deployed into your environment, you can name them accordingly and more quickly find them by filtering in Dante Controller.

For example, if you have a building that has multiple conference rooms running in an unmanaged network, you might establish a naming convention to separate your conference room devices from an auditorium.

Rooms	Devices	Example names	
CR = Conf. Room	Mic = Handheld Microphone	CR01_Amp AUD_Amp01	
AUD = Auditorium	Lav = Lavalier Microphone Amp = Amplifier DSP = DSP Mix = Mixer	CR01_DSP CR01_Mic01 CR01_Mic02 CR02_Amp CR02_DSP CR02_Mic01 CR02_Mic02	AUD_Amp02 AUD_DSP AUD_Lav01 AUD_Lav02 AUD_Mic01 AUD_Mic02 AUD_Mix

Now, using filters in Dante Controller, you can filter devices using "CR01" "CR02" or "AUD" to display and manage devices within each room.

HARDWARE BRIDGING BETWEEN SUBNETS OR NETWORKS

Routing Dante audio across subnets is typically the point at which you should consider managing your Dante network with Dante Domain Manager or Dante Director. If you are not ready to make the move to a managed network, or if you need to link totally separate networks that are managed by different teams, there are hardware options that can help you transfer Dante signals across the gap.

HARDWARE BRIDGES

Dante on unmanaged networks requires all Dante Devices to be in the same LAN. If you want to connect, but not combine two standalone Dante networks on different switches a bridging device is key.

Any device that supports multiple Dante interfaces that can be independently configured and audio internally routed (not routed via Dante) works as a Dante bridging device. Dedicated bridge devices like Studio Technologies Model 5482 Dante Bridge or Model 48D have two Dante modules built in.

Other bridging devices can take the form of I/O frames that support adding multiple Dante cards like the NTP Penta 720 or Yamaha RSio64-D. Devices or cards can support from 4-128 channels of Dante audio to fit your unique audio production needs.

Hardware bridges to choose from can be found in online catalog of Dante-enabled devices.

For more information about uses for bridging devices, see: 5 Uses for Dante Bridging Devices.
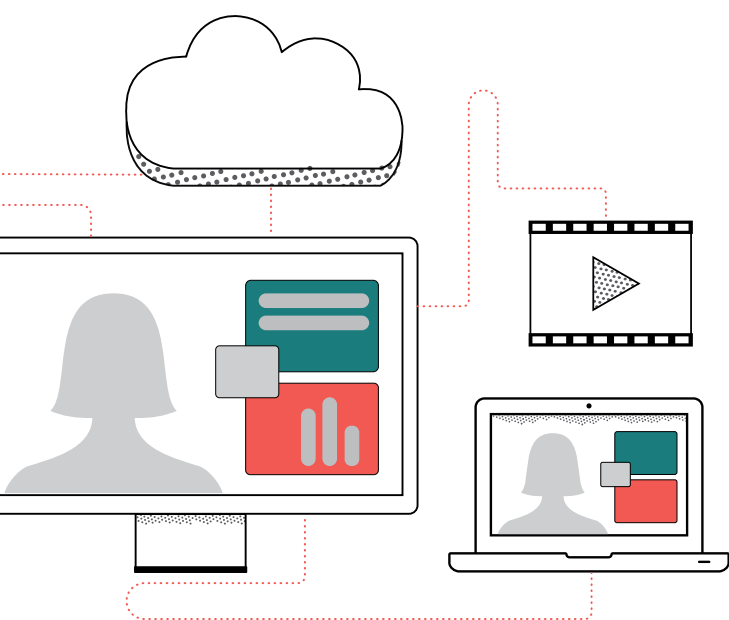
QOS

Dante as a real time media streaming service benefits from low latency and jitter on the network. QoS should be used for prioritization of Dante clock, audio and video on mixed-use networks. It is a requirement for Dante audio-only networks if using 100 Mbps, when using mixed 1 Gbps/100 Mbps network infrastructure and devices, or when a network becomes increasingly saturated (70% or more).

- Dante can make use of DiffServ QoS where needed.
- Dante will tag packets, and its tags can be integrated into an existing IT network QoS scheme.
- When used, QoS must be configured with strict priority queueing.

Note: The QoS DSCP values can be re-marked, provided that the PTP packets still receive high priority.

Priority	Usage	DSCP Label	Hex	Decimal	Binary
High	Time critical PTP events	CS7	0x38	56	111000
Med	Audio, PTP v2	EF	0x2E	46	101110
Low	(reserved)	CS1	0x08	8	001000
None	Other traffic	Best effort	0x00	0	000000

MULTICAST MANAGEMENT

When Dante resides in mixed networks, those where IP video is on the same network segment, or a significant amount of multicast audio is in use, IGMP should be used to assist with multicast management. IGMP is not a requirement for Dante audio only networks with few or no multicast audio flows.

- Dante implements IGMP v2 or v3.
- One IGMP Querier should be elected per VLAN.
- The IGMP query interval should be 30 for a Dante network.
- IGMP proxies are not supported by Audinate.
- PIM routing is not supported.

ENERGY EFFICIENT ETHERNET

Energy Efficient Ethernet (EEE) or 'Green ethernet' (IEEE 802.3az) should be disabled on all ports used for Dante traffic. EEE can result in poor synchronization performance and occasional audio dropouts.

Training and Certification

The Dante Certification program is an easy way for you to learn about Dante and demonstrate your expertise to prospective employers or clients. This extensive, free training and certification is available online where you can move at your own pace. Training is broken into multiple courses that start simply and move into more complex material as you proceed.

Once you have completed Dante Levels one through three, we recommend diving into the Dante Domain Manager Administrator training which is provided as a separate course. This course goes into the setup of hypervisors, enrolling and managing devices, and other tasks critical to setup and configuration of your DDM-managed network. In addition to Dante Domain Manager training, there is a Dante AV elective course that provides a deep dive into Dante video solutions such as cameras, encoders and decoders.

Online resources also include a variety of video tutorials, on-demand recorded webinars, white papers, application diagrams, and in-depth documentation.

Audinate also provides a variety of opportunities to attend in-person training that includes hands-on experience with software and hardware resources. This includes in-person Dante Mastery Class, currently offered in Audinate's Portland, Oregon and Cambridge, UK offices.

See more information online see:
• Upcoming events, registration information and more
• On-demand online training