Spectera

Network Guide for IT Administrators, System Integrators and Event Technicians

PDF export of the original HTML instructions

Contents

1. Network guide

This network guide is intended for IT administrators, system integrators and event technicians and serves as an planning and configuration guide for integrating components of the Spectera offering into diverse network environments from small home networks up to enterprise networks.

The guide contains recommendations on network setup for transmission of control data and audio content (via Dante®).

General requirements

Operating systems

The Spectera Base Station as network device is able to be controlled by network-capable PC or Mac devices.

The following system requirements apply for operation with Spectera WebUI and Sennheiser LinkDesk:

System requirements

Recommended for Host PC Client

- Intel i5 Dual Core processor/M1 Mac/or similar
- 16 GB RAM
- At least 4 GB hard disk space (5 GB for Mac devices)
- Gigabit LAN interface
- Windows® 10, 11, Server 2019, Server 2022 (x64) or higher
- Mac OS Big Sonoma or later
- IPv4 network

Supported web browsers for Spectera WebUI

- Google Chrome: 125 or later
- Microsoft Edge: 125 or later
- Mozilla Firefox: 128 or later
- Apple Safari: 17 or later
- JavaScript must be activated

Network

Bandwidth and speed

When it comes to bandwidth requirements for high-quality audio, there are a number of factors that can affect the input and output of the audio. The network speed required for especially audio transmission via Dante® should be as high as possible to ensure a smooth listening experience. As a rule, the minimum bandwidth for transmitting and receiving audio at the Spectera Base Station is approximately the following:

> “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.
>
> ”

Source: Audinate Dante Information for Network Administrators (PDF)

Internet access

For both components Spectera Base Station and Sennheiser LinkDesk we recommend to provide permanent Internet access. Please refer to chapter Ports, protocols and services to get more details about used Internet services.

i At least for the initial product activation of the Spectera Base Station and for the use of the optional Sennheiser Account Login in Sennheiser LinkDesk it is mandatory to have a direct Internet access and DNS support.

i At the moment it is not possible to manually configure any network proxy and DNS server at Spectera Base Station. Please make sure to provide direct Internet access e.g. via white-listing the device and any used port, protocol and domain and using DHCP to provide DNS server settings.

Network infrastructure (switches/cables)

Generally any kind of unmanaged or managed network switch can be used for control and audio data transmission. For proper operation of Dante® some fundamental requirements need to be fulfilled:

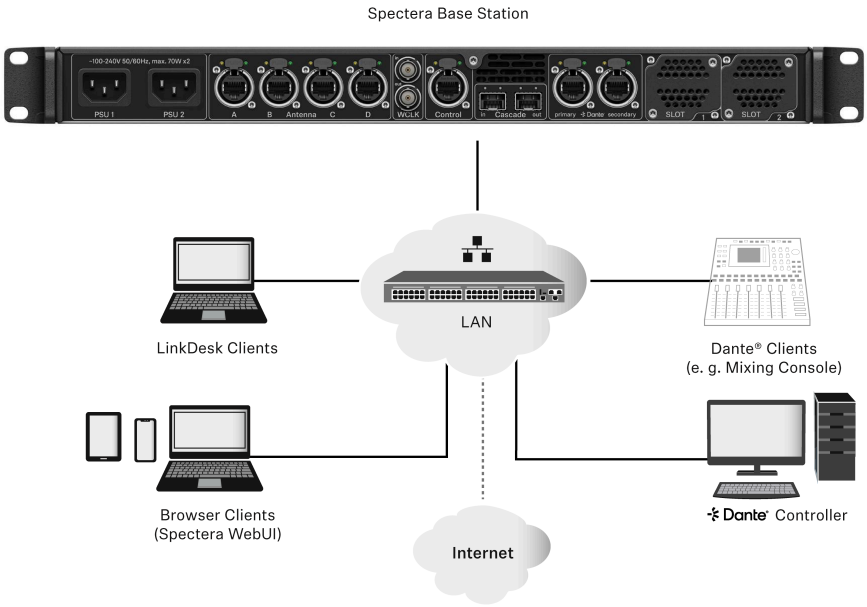
- When using managed switches, ensure that they allow EEE (Energy Efficient Ethernet or "Green Ethernet") to be disabled. Make sure that EEE is disabled on all ports used for real-time Dante traffic.
- When using unmanaged switches, do not use switches that support the EEE function, because it cannot be disabled.
- Make sure that the switch supports Quality of Service (QoS) and that it is enabled.
- For larger networks, consider using VLANs to segment audio traffic from other types of network traffic.

> **i** For further information about that topic, please refer to the: Audinate FAQ - Networks and Switches. Additionally, there is a list of incompatible switches available at Audinate: Audinate List of incompatible EEE switches (PDF)

To ensure a reliable transmission speed of audio and control data with the Spectera Base Station, please use an RJ45 network cable with the CAT5e S/FTP standard or higher.

Network setups

To operate the several components of the Spectera offering they need to be integrated into a network setup, either existing or new. Following figure shows a general overview of the network setup and their participants.



Spectera Base Station

This Sennheiser device has 3 network interfaces. One interface dedicated for control data and two interfaces for audio data (specifically Dante®). There is a primary and a secondary interface for redundancy of the audio transmission.

Sennheiser LinkDesk client

This client can be any host computer (PC or Mac), with the LinkDesk software application installed.

Browser Client (Spectera WebUI)

This client can be any host computer (PC, Mac, Tablet, Smartphone), with a supported web browser installed, accessing the Spectera WebUI.

Dante® client

This can be any device with a Dante® network interface installed. This ranges from Virtual Dante® Soundcards installed on a host computer up to dedicated devices like a Mixing Console.

Dante® Controller

This is typically host computer (PC or Mac), with the Dante® Controller software application installed. This application configures and controls all the Dante® devices and audio streams inside the network.

LAN with network switches and router

This can be any network switch for routing the network communication inside the Local Area Network (LAN) and any network router providing the gateway to other networks and to the Internet.

Spectera Base Station - network configuration

Depending on the desired network address configuration all network interface (Control and both Dante®) can be operated in following IP Modes with IPv4 only:

- Fixed/Static IP
- Auto IP (DHCP or Zeroconf)

Additionally it can be configured if mDNS/DNS-SD information shall be published by the device or not.

Dante® restrictions

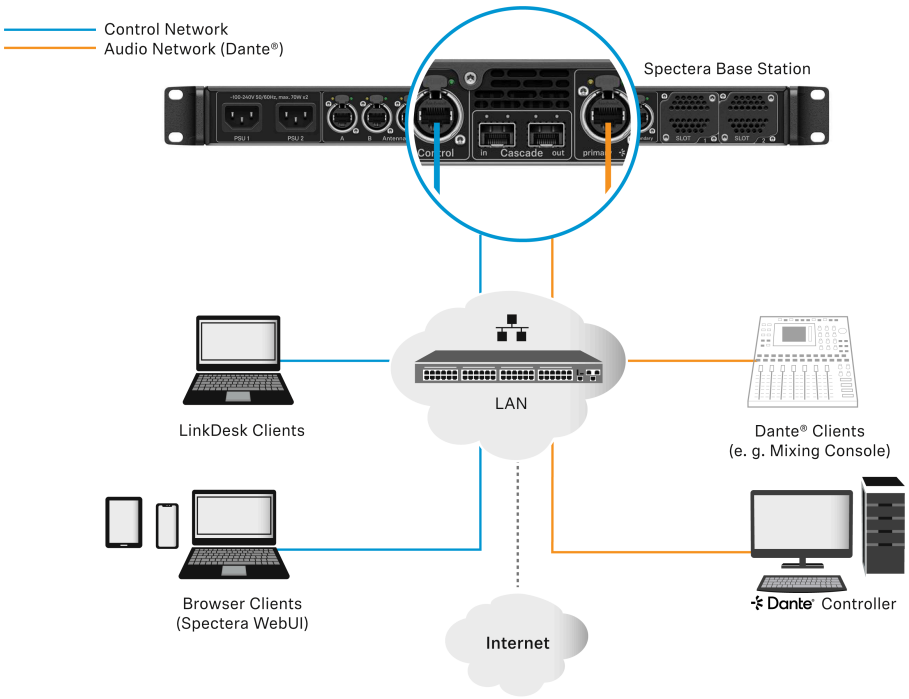
- It is not possible to deactivate the Dante® functionality for the both Dante® ports.
- Dante® ports are shutdown when the device is in standby mode.
- Network configuration of Dante® ports can only be done via Dante® Controller software application.
- By default the Dante® ports are configured to Auto IP. If Fixed/Static IPs have been configured and the device cannot be reached anymore, the IP Mode can only be reset to Auto IP by a Factory Reset of the device.
- The Dante primary and secondary networks must not be directly connected to each other (network loop). Make sure you always connect the Base Station Dante network ports to two different networks that do not run via a common switch.

Shared Network Mode

In Shared Network Mode both networks for Control and Dante® are using the same physical network infrastructure.

- Configure both Control and Dante® networks over one switch / router.
- Use two different IPs to address the Control network and the Dante® network separately.

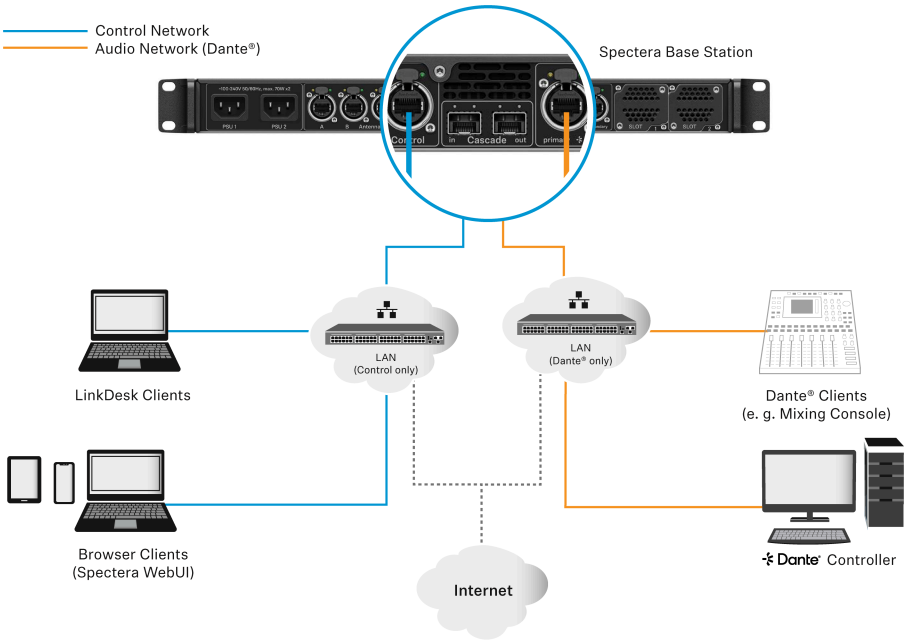
> The Spectera Base Station can not be configured to use VLAN tagging (IEEE 802.1Q) at its network ports. Still it is possible to use network switches that support VLANs to separate the Control and Dante® traffic within the same physical network. Please make sure that the switch is configured to forward untagged traffic from both networks to the respective ports of the Base Station. Additionally, make sure that the switch is configured to forward multicast traffic for the Dante® network.



Split Network Mode

In Split Network Mode both networks for Control and Dante® are using different physical network infrastructure.

- Configure both Control and Dante® networks over two different switches / routers.
- Use two different IPs to address the Control network and the Dante® network separately.


Control Network
Audio Network (Dante®)
Spectera Base Station
LinkDesk Clients
LAN
(Control only)
LAN
(Dante® only)
Dante® Clients
(e. g. Mixing Console)
Browser Clients
(Spectera WebUI)
Internet
Dante Controller

Ports, protocols and services

Spectera Base Station

In order to use the Spectera Base Station device in a network, certain ports must be enabled (especially for the organization/enterprise firewall) for communication between software and devices.

> **i** If necessary, please contact the local administrator to configure the required ports.

Ports - Base Station Control Network Interface

Address	Port	Protocol	Type	Service	Usage
Requests from device to ...					
Sennheiser License Server address[1]	80	HTTPS (TCP)	Unicast	Sennheiser License Server	Activation of devices
ANY address of time server (see list of **NTP time server pools**)	123	NTP	Unicast	NTP Time Server	Synchronize system time
224.0.0.251	5353	mDNS (UDP)	Multicast	mDNS, DNS-SD	(optional - if desired) Device/Service Discovery
Requests to device from ...					
ANY IP of SSCv2 client	443	HTTPS (TCP)	Unicast	SSCv2 - Spectera Base Station API	Monitor+Control communication from clients

[1] my.nalpeiron.com

NTP servers

To correctly operate with licenses and certificates, the Spectera Base Station needs a correct system time. The device will use the well-established NTP mechanism from the IP protocol stack to synchronize clock between a time server in a network and the client inside the device.

Currently for an IT administrator or system integrator it is not possible to manually configure a dedicated NTP server to be used by the Spectera Base Station. Being able to configure a dedicated NTP server manually is a planned feature for an upcoming release.

The device behaves the following way:

- If a time server configuration has been provided via DHCP or manually, it tries to connect and sync to that time server first.
- Otherwise the device is trying to access any server of following list of time server pools worldwide publicly available.

> **i** An IT administrator has to assure to provide Internet access to at least one of the server pools and to provide DNS settings via DHCP to the device.

List of NTP time server pools:

- pool.ntp.org
- time.nist.gov
- time.aws.com
- time.cloudflare.com

Ports - Base Station Dante® Network Interfaces

Spectera Base Station requires several ports to be opened for both Dante® Network Interfaces to operate properly. For the list of ports and more detailed information, please refer directly to the Dante® website: Audinate FAQ - Networks and Switches.

Spectera WebUI

In order to use the Spectera WebUI, certain ports must be enabled (especially for the organization/enterprise firewall) for communication between software and devices.

> **i** If necessary, please contact the local administrator to configure the required ports.

Port requirements

Address	Port	Protocol	Type	Service	Usage
Requests from host to ...					
ANY IP of a Base Station	443	HTTPS (TCP)	Unicast	SSCv2 - Spectera Base Station API	Monitor+Control communication to devices
Sennheiser User Insights addresses [1]	443	HTTPS (TCP)	Unicast	Sennheiser User Insights	Analytics of usage and operational data

[1] sennheiseruserinsights.matomo.cloud

cdn.matomo.cloud

Sennheiser LinkDesk

In order to use the Sennheiser LinkDesk software, certain ports must be enabled (especially for the organization/enterprise firewall) for communication between software and devices.

> **i** If necessary, please contact the local administrator to configure the required ports.

Port requirements

Address	Port	Protocol	Type	Service	Usage
Host Internal					
LOCALHOST	54352	HTTPS (TCP)	Unicast	LinkDesk backend	Internal backend communication
Requests from host to ...					
ANY IP of a Base Station	443	HTTPS (TCP)	Unicast	SSCv2 - Spectera Base Station API	Monitor+Control communication to devices
Sennheiser CIAM addresses [1]	443	HTTPS (TCP)	Unicast	Sennheiser CIAM	Sennheiser account Sign-in/Log-in
Sennheiser User Insights addresses [2]	443	HTTPS (TCP)	Unicast	Sennheiser User Insights	Analytics of usage and operational data
Requests to host from ...					
224.0.0.251	5353	mDNS (UDP)	Multicast	mDNS, DNS-SD	(optional - if desired) Device/service discovery

[1] accounts-pro-emea.sennheiser-cloud.com

b2c-config.sennheisercloud.com

[2] sennheiseruserinsights.matomo.cloud

cdn.matomo.cloud

Best practice

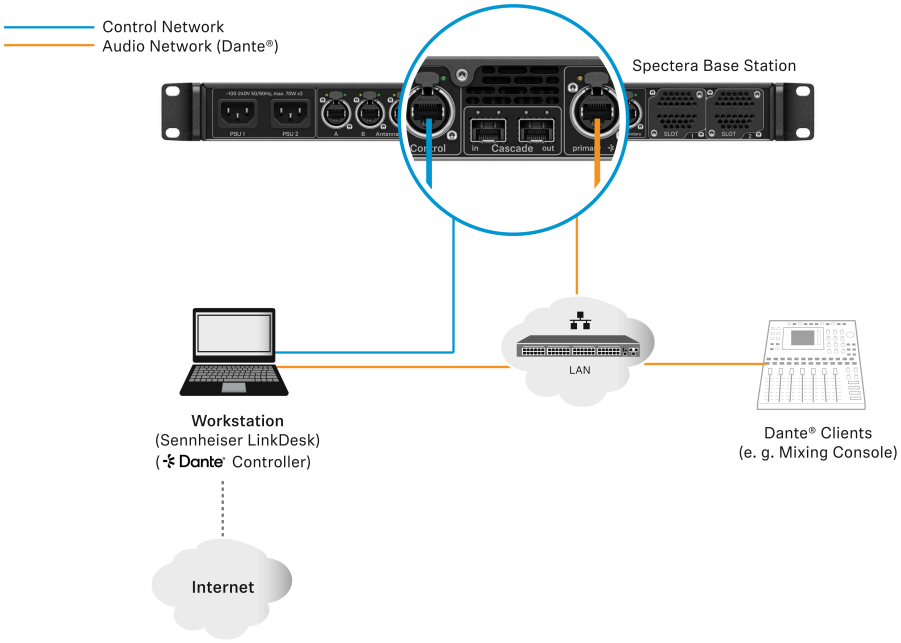
Sharing Internet connection in small network setups

It is possible to operate the Spectera offering without dedicated router networks e.g. in really small setups, but we do recommend to always use some kind of home network router for trouble-free usage.

Especially for providing Internet access to Spectera Base Station it is possible to use the builtin functionality of Windows and MacOS for Internet Connection Sharing.

> **i** For enterprise networks we DO NOT RECOMMEND the usage of Internet Connection Sharing. Most of the times it is even prohibited by enterprise IT policy to use such service.

The network setup might look like this:



Inside this setup one workstation is used for all client software applications (Sennheiser LinkDesk, Spectera WebUI, Dante® Controller). Either two separated wired network interface are used for control and audio (Dante®) or one interface gets shared. Please be aware that in such setups (typically) no DHCP service is activated. Use either manual IP settings or ZeroConf configuration.

For Internet Connection Sharing typically an existing network connection (Wi-Fi or Ethernet) with Internet access gets shared with another selected network interface of the host.

In order to share your Internet connection on Windows:

- Connect your client device to your host PC using an Ethernet cable. If either device doesn't have a free Ethernet port, use a USB-to-Ethernet adapter.
- Go to the **Network Connections** menu. The easiest way to get there is by searching for "Network Connections" in the Windows Search box.
- Right-click on the network adapter connected to the Internet (for example, Wi-Fi or modem), and then select **Properties**.
- Toggle **Allow other network users to connect** to **ON** from the Sharing tab and select the relevant Ethernet port from the pull-down menu.

  i Note that, if you have VPN software installed, you may see a lot of virtual Ethernet ports on your list and you'll need to pick the real one.

  ✓ After you click OK, Internet should flow to your client device over its Ethernet port. For more details on sharing an Internet connection please refer to the Microsoft Support page.

In order to share your Internet connection on MacOS:

- On your Mac, choose **Apple menu** > **System Settings**.
- Click on **General** in the sidebar and then on **Sharing** (you may need to scroll down).
- Turn on **Internet Sharing** and click on **Configure**.
- Click the **Share your connection** from pop-up menu.
- Choose the Internet connection you want to share ((For example, if you're connected to the Internet over Wi-Fi, choose Wi-Fi).
- Under **To devices using**, turn on the port other devices can use to access the shared internet connection. (For example, if you want to share your Internet connection over Ethernet, select Ethernet).

  i If you're sharing to devices using Wi-Fi, configure the Internet-sharing network, then click **OK**.

- Click on **Done**.

  i For more details on sharing an Internet connection please refer to the Apple Support page.

✓ Your Internet connection will be shared on MacOS/Windows.

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