

TeamConnect Bar

Network guide for system integrators

PDF export of the original HTML instructions



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1. Introduction

This document is intended for system integrators and room planners and serves as a planning guide for the network integration of the TeamConnect Bar (TC Bar) in a room.

The network guide contains recommendations for the optimal operation of the TC Bar, which is operated in particular with extended or routed Sennheiser devices in a networked environment (e.g. TeamConnect Ceiling Medium (TCC M)).

Furthermore, recommendations for setting up a Dante® network are described in order to enable smooth use of the TC Bar via Dante.



2. Requirements

Operating system

The TC Bar was designed for indoor use and is operated with network-capable PC or Mac devices. The following system requirements apply for operation:

- Windows: 10 or later
- mac OS: 13 or later
- Android: 11 or later
- Installed DisplayLink® driver on used operating system

DisplayLink®

DisplayLink® technology is integrated into the TC Bar and does not require an additional HDMI® cable from your PC or Mac to the TV screen.

- Check that the minimum version of the DisplayLink® driver is present on all user PCs / Macs involved to be able to use the Plug & Play functionality for screen sharing.
- Mac devices may not have a DisplayLink® driver installed by default as Apple is a closed system. In this case, it is necessary to install the minimum DisplayLink® driver version as indicated below.

Download

Information on the latest driver for your operating system can be found at synaptics.com.

Network

When it comes to bandwidth requirements for high-quality audio and video conferencing, there are a number of factors that can affect the input and output of both audio and video. An inadequate or interrupted Internet connection is reflected, for example, in a disrupted image or sound or in an incorrectly synchronized rendering of both formats.

Bandwidth and Speed

The Internet speed required for video conferencing should be as high as possible to ensure a smooth conferencing experience. As a rule, the minimum bandwidth for transmitting and receiving video is approximately the following:

- HD (1280 × 720): 2 Mbit/s
- Full-HD (1920 × 1080): 4 Mbit/s
- QHD (2560 × 1440): 6 Mbit/s
- 4K UHD (3840 × 2160): 10 Mbit/s



Cabling

As long as a good Internet speed is guaranteed, the network cable used determines the actual transmission speed of data sent and received in the network.

- To ensure a reliable transmission speed of audio and video data with the TC Bar, please use an RJ45 network cable with the CAT5e S/FTP standard or higher.

Power over Ethernet (PoE)

Power over Ethernet (PoE) is a network function that can supply network-compatible devices with power via an existing data connection.

Power and data transmission takes place via a network cable (RJ45) and, depending on the device type, can be sufficient for operation even without an additional power supply via the socket.

Powered Device (PD)

- TC Bar S is a Powered Device (IEEE 802.3at Type 2, PoE+) and can be operated using the network cable alone.

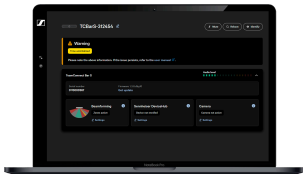
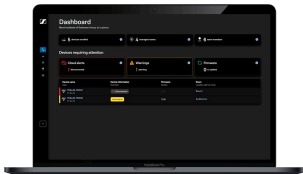
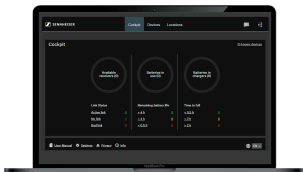
i For a continuous power supply, we always recommend connecting and using the included power supply unit.



3. Control software

The TC Bar can be operated and managed through multiple Sennheiser control applications.

The TC Bar can be configured via various software tools, namely:

Application	Description
Local Web UI (LUI) 	<p>LUI is a browser-based interface for easy and quick device configuration in the local network and is accessible over the device IP address or host name. LUI is available as of firmware version 2.0.0.</p> <ul style="list-style-type: none">• Online manual: Local Web UI
DeviceHub 	<p>Cloud-based platform for managing and monitoring Sennheiser AV devices across locations. DeviceHub compatibility is available as of firmware version 2.0.0.</p> <ul style="list-style-type: none">• Online manual: DeviceHub• Product info: sennheiser.com/devicehub• Software: https://devicehub.sennheiser.com
Control Cockpit 	<p>On-premise centralized management software that allows you to configure your TC Bar.</p> <ul style="list-style-type: none">• Online manual: Control Cockpit• Product info: sennheiser.com/control-cockpit

Details on the control solutions can be found in chapter **Monitoring & Controlling**



4. Network modes

To integrate the TC Bar into an existing network structure and control it, use one of the provided control software from Sennheiser such as Sennheiser Device Hub, the Local Web UI, or Sennheiser Control Cockpit.

The TC Bar can be integrated into any existing or new network. Different network modes are available, which can be configured for the TC Bar in the available Sennheiser control software options.

The following network settings are available for the TC Bar:

- Single Domain Mode (for TC Bar S and TC Bar M)
- Dual Domain Mode (for TC Bar S and TC Bar M)
- Split mode (only for TC Bar M)

Default modes:

The following modes are configured by default:

- TC Bar S: Single Domain Mode
- TC Bar M: Split Mode

Device-dependent network set-up

Depending on the model, the TC Bar offers various options for integrating the device into a network.

The following is an overview for quick orientation of outgoing use cases and for setting up preferred network configurations.

The following network modes are available:

- [Single Domain Mode](#)
- [Dual Domain Mode](#)
- [Split Mode](#)

Table 1. Single Domain Mode

Network structure	Description
<ul style="list-style-type: none">• One network• One IP address• One network switch	<ul style="list-style-type: none">▶ Configure both Dante® and control networks over one switch▶ Use only one IP address for both networks▶ Control both networks over one single network port of the TC Bar



Table 2. Dual Domain Mode

Network structure	Description
<ul style="list-style-type: none">• Two separated networks (Control and Dante) over one cable• Two different IP addresses• One network switch	<ul style="list-style-type: none">▶ Configure both Dante and control networks over one switch▶ Use two different IPs to address the Control network and the Dante® network separately▶ Control both networks over one single network port of the TC Bar

Table 3. Split Mode

Network structure	Description
<ul style="list-style-type: none">• Two physically separated networks (Control and Dante) over two different network cables• Two different IP addresses• One managed network switch or two independent network switches	<ul style="list-style-type: none">▶ Configure both Dante® and Control networks over two different switches▶ Use two different IPs to address the Control network and the Dante® network separately▶ Control the Dante® network and the Control network over different ports of the TC Bar



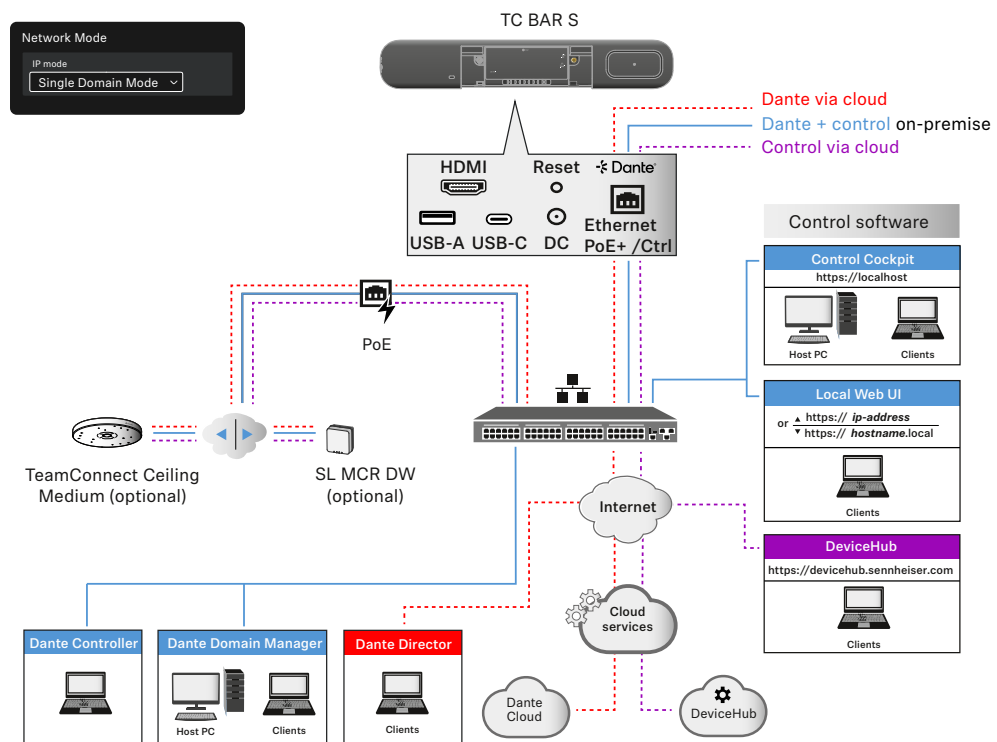
Single Domain Mode

This mode is usually used if you want to use both the controller (Sennheiser or third-party provider) and Dante® on the same physical port with only one available IP in the same network.

To set up both configurations, you need a Sennheiser control software for the control network and the Dante® software (Dante Domain Manager or Dante Director) for other routed Sennheiser devices.

TC Bar S

- The TC Bar S has only one network port and can only provide a merged flow for Dante® and control over a switch.



TC Bar M

- The TC Bar M provides two network ports but using only one IP address in this mode.
- One port can be used to control the bar over the network via Dante Controller and via [Control software](#) directly through a switch.



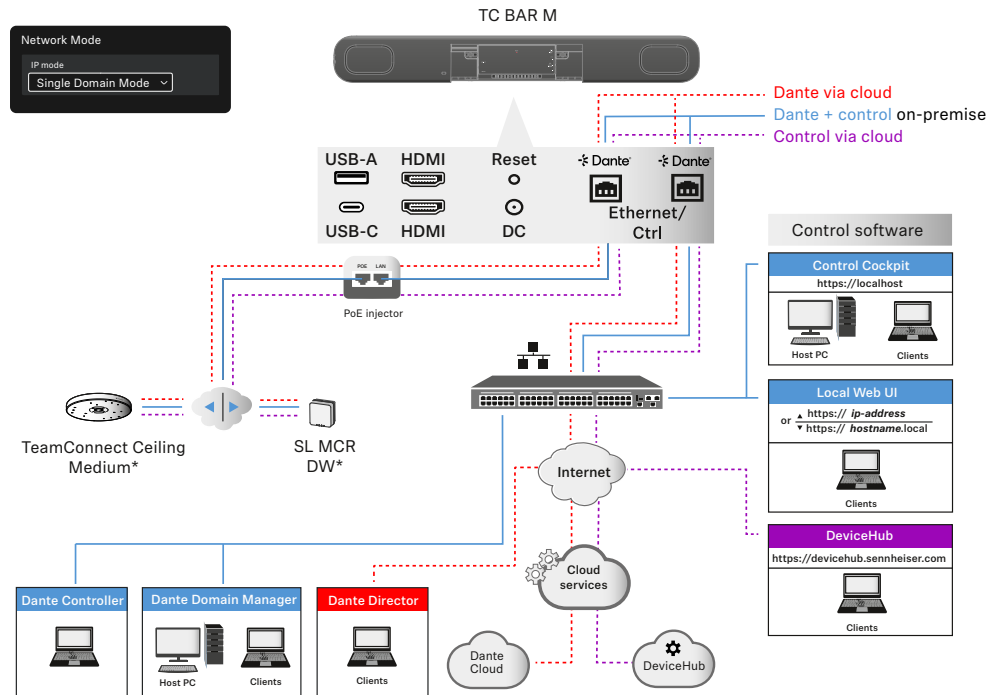
There is a potential risk of creating loops (see [Danger of Network Loop](#)).

- Make sure you always connect the TC Bar M to two different networks that do not run via a common switch.



| 4 - Network modes

- The other port is used to connect routed Sennheiser devices (e.g. TCC M)
- Any extensions connected can be managed both via the Dante Controller and via the **Control software**, as the Bar M forwards the flows using the integrated switch.





This mode is generally used if you receive a merged flow from two separate networks via a single network line and you want to resolve this merged flow back into two different IP and MAC addresses.

The incoming data packets must also be tagged by the externally connected network in order to be able to assign them correctly for internal use. Depending on the device, the data packets may need to be translated from the outgoing 802.1Q standard to 802.3 via a managed switch.

TC Bar S

- One IP is used to address the TC Bar via the **Control software**.
- The other IP is used to address the TC Bar via the Dante Controller





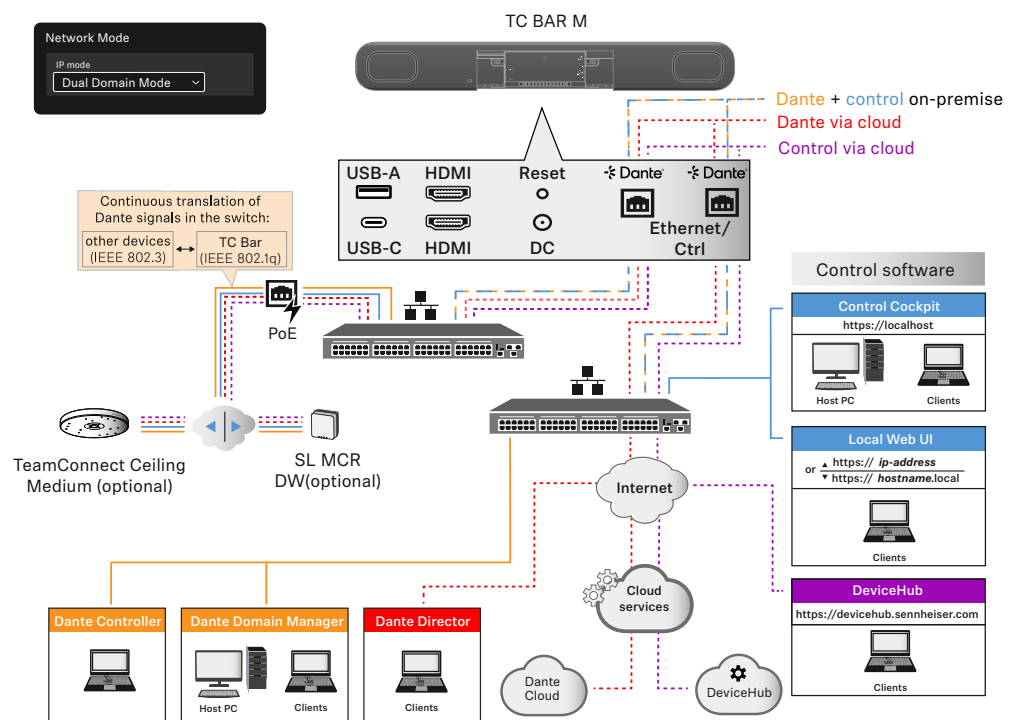
TC Bar M

- Both Ethernet ports can be used to address the TC Bar both via the [Control software](#) and via the Dante Controller. In this case, one IP is available for Dante® and one IP for control.
- Any extensions connected can be managed both via the Dante Controller and via the control software, as the Bar M forwards the flows using the integrated switch.



There is a potential risk of creating loops (see [Danger of Network Loop](#)).

- ▶ Make sure you always connect the TC Bar M to two different networks that do not run via a common switch.





Split Mode

In this mode, the Sennheiser [control software](#) and the Dante Controller are located in different networks and both have different IP and MAC addresses. All data packages are untagged.

i The Split Mode is available for the TC Bar M only.

This mode is generally used if you receive two different IP and MAC addresses (one for Dante® and one for Control). In this way, you want to operate the Dante® network and the control network independently of each other and use a separate switch for each network.

The Ethernet connections can be used to address the TC Bar both via the [control software](#) and via the Dante Controller as follows:

- Ethernet port I: Control only
- Ethernet port II: Dante® only

TC Bar M

- The first Ethernet connection provides an IP address for the [control software](#) network only.
- The second Ethernet connection provides an IP address for the Dante® network only.

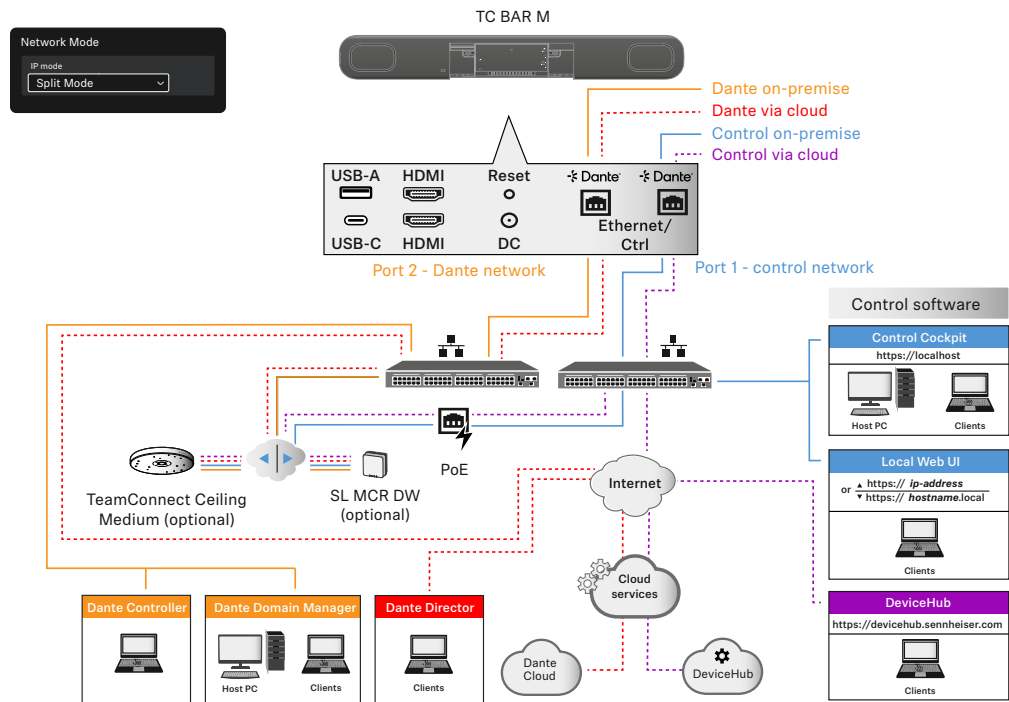


There is a potential risk of creating loops (see [Danger of Network Loop](#)).

- ▶ Make sure you always connect the TC Bar M to two different networks that do not run via a common switch.



| 4 - Network modes





5. Network availability and extensions

Dante® features for TC Bar S and M

With the built-in Dante Embedded Platform (DEP), the TC Bar integrates media and control of your entire AV system over a single IP network.

The Dante® functionality is deactivated by default and must be activated in the control software (see [Activating Dante® signal forwarding](#)).

The TC Bar offers various inputs and outputs for Dante® and makes it possible to connect several extensions:

Dante® Input

- 2x Dante® input with AEC on each input

Dante® Output

General:

- 4x Dante® Output:
 - Audio content is only played back when the TC Bars are used as a USB device.
 - Otherwise, the Dante® channels are muted (if the feature Continuous Dante® Stream is disabled)

ConferenceOut:

- Mix of NearEnd + Far End (in conference mode and music mode)

LocalMicrophoneMixOut:

- NearEnd (in conference mode and music mode)

FarEndRefOut:

- Audio data for AEC reference channel for TCC 2 + TCC M solutions

ExternalSpeakerOut:

- FarEnd (in conference mode and music mode, if ext. Dante® speaker feature is enabled)

Dante® features

Continuous Dante® Stream:

- Enables the continuous transmission of microphone streams over Dante®.



Dedicated Dante® speaker output:

- Routes audio to external Dante® speakers and disables the device's internal speakers.

Dante® connections

Ceiling mics:

- 2x TCC M (medium-sized conference rooms, recommended solution) or 2x TCC 2 (not recommended, as TC Bars are not designed for large meeting rooms)
- 1x TCC 2 and 1 channel of an SL-DW MCR
- 1x TCC M and 1 channel of an SL-DW MCR

SL-DW or EW-DX:

- Up to 2 channels SL-DW MCR or EW-DX
- The use of the mixed sum signal of the MCR is not recommended

i The TC Bar S has only one network connection. Therefore an additional switch is required in most cases. TC Bar S can in turn be supplied with power via this one port using PoE+.



Virtual Local Area Network (VLAN 802.1Q)

The TC Bar S and M supports the tagged VLAN prioritization technology in accordance with IEEE 802.1Q.

A VLAN separates a physical network into logical sub-networks. This enables several virtual networks to be created from one physical switch port.

When using Dual Domain Mode, Dante® and [Control software](#) can be used separately. In case of Dante® network, this can be virtually separated and operated independently using a VLAN with just one network connection. The frames are given a tag containing a VLAN ID. This provides the switch port with information on which Dante® VLAN the frame belongs to.

For more information on activating VLAN in the control software, see [Activating tagged VLAN \(Dante® network\)](#).

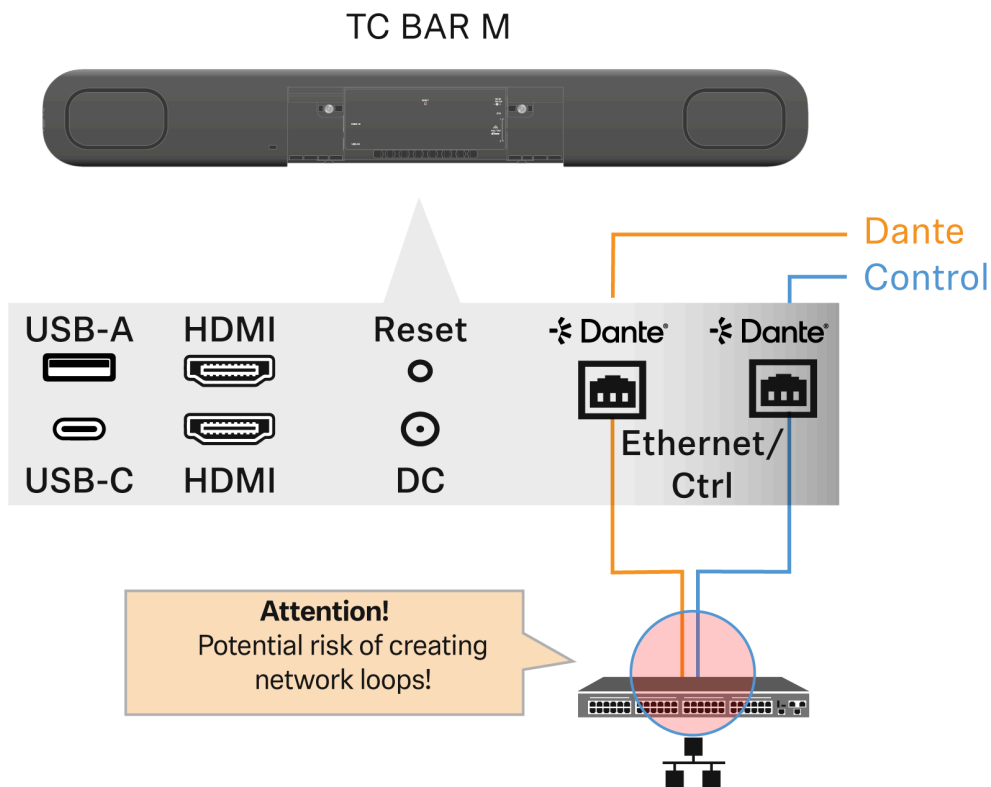
- i** When using the TC Bar M, the Dante® and the control software network can be operated independently of each other via the two available network ports. To do this, select the Split Mode in the field Network Mode.



Danger of Network Loop

A network loop occurs when a network has more than one active path carrying information from the same source to the same destination.

The information loops and amplifies itself using the additional path instead of stopping when it reaches its destination. Network loops might cause a slow, irregular Internet connection or network failure.



Examples:

1. Both cables coming from the two ports of the TC Bar M are plugged into the same network switch.
 - ▶ Make sure you always connect the TC Bar M to two different networks that do not run via a common switch.
 - Ethernet I: Sennheiser control software
 - Ethernet II: Dante® network
2. Both ends of an Ethernet cable are plugged into the same router.
 - ▶ Unplug the Ethernet cable.



6. Best practice

Configuring network settings

Selecting network mode

First, the network mode must be selected in the control software.

To select a network mode:

- ▶ Open your control software and navigate to:

Local Web UI	Network.
DeviceHub	Devices > TC Bar > Network.
Control Cockpit	Devices > TC Bar > Network.

- ▶ Select a network mode from among the following options:
 - Single domain mode
 - Dual domain mode
 - Split mode (only for TC Bar M)

✓ The network mode has been selected.



Activating Dante® protocols

You can enable a digital audio network protocol over Ethernet for routing and synchronization of Dante-compatible devices using the Dante Controller software.

i Please note that the audio signal via Dante® is not encrypted by default!

To route additional Sennheiser Audio devices to the TC Bar, the following steps must be performed:

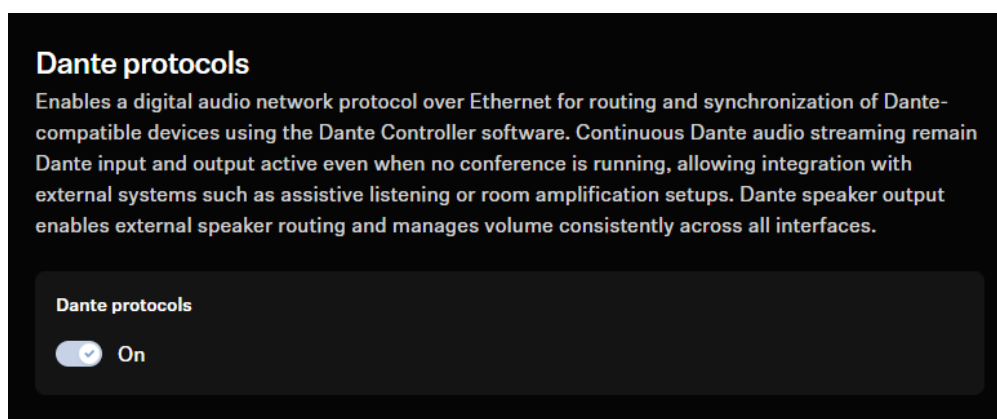
- Activating the Dante® protocol in the [Control software](#),
- Forwarding the audio signals in the Dante Controller.

To activate the Dante® protocol:

- ▶ Open your control software and navigate to:

Local Web UI	Network.
DeviceHub	Devices > TC Bar > Network.
Control Cockpit	Devices > TC Bar > Network.

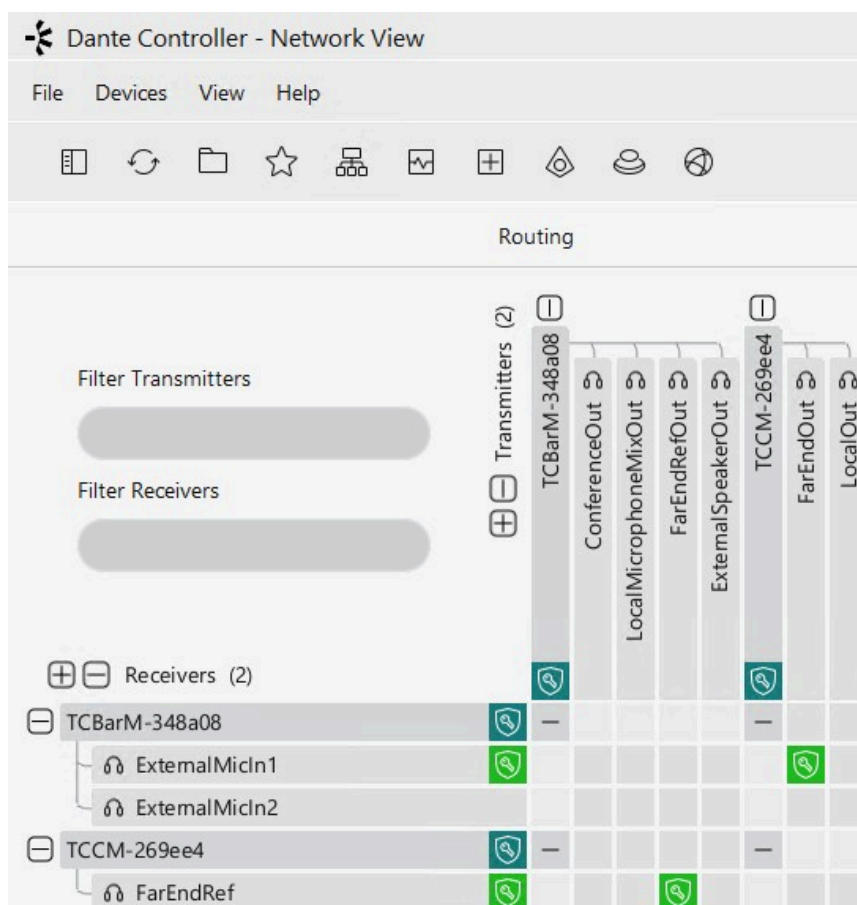
- ▶ Activate the slider in the field **Dante® protocols**.



- ✓ The Dante® protocol was activated.

To route TCC M signals to the TC Bar, for example

- ▶ Guide the **FarEndOut** from the TCC M to **ExternalMicIn1** of the TC Bar (or **ExternalMicIn2**).
- ▶ Guide the **FarEndRefOut** of the TC Bar to the **FarEndRef** of the TCC M.



i We strongly recommend using the beam freeze function of the TCC M microphone. Our tests have shown that the TC Bar's echo suppression is far better when the beam freeze function is used.

✓ Forwarding AV signals via the Dante Controller has been activated.



Activating tagged VLAN (Dante® network)

A VLAN (virtual local area network) separates a physical network into partial networks. As a result, you can set up several virtual networks from a physically existent switch port (such as the Dante® network and control software network).

The TC Bar supports the prioritizing technology **tagged VLAN** as per IEEE 802.1Q. Thus, for example, when the TC Bar S is used with only a network connection, the Dante® network and the control software network can be separated virtually and operated independently. In the process, the frames for the Dante® network receive a tag (marking) that contains the VLAN ID. That is how the switch port receives information about the Dante® VLAN to which the frame belongs.

- i** When the TC Bar M is used, the Dante® network and control software network are operated independently from each other via the two existing network ports. To do this, select the network mode [Split Mode](#). You can find more information in the chapter [Split mode](#).

To activate tagged VLAN for a Dante® network:

- ▶ Open your control software and navigate to:

Local Web UI	Network.
DeviceHub	Devices > TC Bar > Network.
Control Cockpit	Devices > TC Bar > Network.

- ▶ In the **Network Mode** window, select the mode **Dual Domain Mode**.
 - ✓ The device will be rebooted.
- ▶ In the **Dante® Settings** window, click **Edit**.
- ▶ In the field **VLAN ID**, enter the correct ID in order to be routed to the correct network.
- ▶ Click **OK** to save the changes.

✓ Tagged VLAN has been activated.



Activating third-party access

The TC Bar can be accessed by third-party applications via a media control protocol.

To do this, third-party access must be activated in the [control software](#) and protected using a password.

- i** Please refer to the media control protocol for the TC Bar to obtain the complete range of functions and list of methods that can be called up. The general description for using third-party applications and product-specific API documentation can be found on the API documentation for Sennheiser products website ().

To activate third-party access:

- Open your control software and navigate to:

Local Web UI	Access & Security.
DeviceHub	Devices > TC Bar > Network.
Control Cockpit	Devices > TC Bar > Access.

- In the field **3rd Party Access**, click on:
- In the field **Access**, set the switch to **Activated** (Control Cockpit only).
- Assign an access password, which is requested by a media control system during device authentication.

- i** Please note that the new password must meet the following requirements:
- At least ten characters
 - One lowercase letter (a...z)
 - One uppercase letter (A...Z)
 - One number (0...9)
 - One special character (!#\$%&()*+,- ./:;<=>?@[]^_{}~)
 - Maximum length: 64 characters

- Click **OK** to save the settings.

✓ Third-party access has been activated.



Activating the continuous Dante® stream

This function enables the continuous transmission of microphone streams over Dante®.

- i** Audio data will be streamed permanently over Dante®. This may increase power consumption. Ensure that continuous audio streaming over Dante® complies with your regional security and regulatory requirements before enabling.

CAUTION



Risk from unencrypted audio communication

Communication over Dante® is not encrypted by default and can be eavesdropped on and misused by 3rd parties.

- ▶ Enable continuous transmission over Dante® only when no sensitive content is being transmitted.
- ▶ Encrypt your communication for sensitive content using [Dante Media Encryption feature](#) in [Dante Director](#).

To enable the continuous Dante® stream:

- ▶ Open your control software and navigate to:

Local Web UI	Network.
DeviceHub	Devices > TC Bar > Network.
Control Cockpit	Devices > TC Bar > Network.

- ▶ Enable the toggle in the field **Continuous Dante® Stream**.

- ✓ The continuous Dante® stream has been activated.



Enabling Dante® speaker output

Route audio to external Dante® speakers and disable the device's internal speakers.

When enabled, audio output is routed to external Dante® speakers and the device's internal speakers are muted.

- i** Before enabling this function, ensure that the Dante® protocols are enabled (see **Activating Dante® signal forwarding**). Also verify that routing has been configured in Audinate Apps before activation; otherwise, echo effects may occur.

To enable the Dante® speaker output:

- Open your control software and navigate to:

Local Web UI	Audio > Audio Setup.
DeviceHub	Devices > TC Bar > Audio > Audio Setup.
Control Cockpit	Devices > TC Bar > Audio.

- Activate the slider in the field **External Dante® speaker output**.

- ✓ Audio output is routed to the external Dante® speakers.



Designing and configuring Dante® network

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.

For detailed information please refer to the "Dante Information for Network Administrators": ["Dante Information for Network Administrators"](#).

Selecting the Network Switch

If you are not using Dante® devices connected in series, you will need a network switch that meets some requirements to create a stable Dante® network.

Below you will find our recommendations for setting up a functioning network with Dante.

Our recommendations:

- ▶ Use non-blocking layer 2 gigabit switches.
- ▶ Use managed (intelligent) switches that support DiffServ (DSCP) Quality of Service (QoS) with strict priority and 4 queues. Quality of Service (QoS) is a technology for prioritizing the transmission of audio data over background data traffic.
- ▶ Check whether all connections can perform gigabit transmissions simultaneously (whether the switch is non-blocking).
- ▶ Determine whether the switching capacity is at least $1 \text{ Gbit/s} \times \text{the number of ports} \times 2$ (for input and output).
- ▶ Make sure that the switch has sufficient packet forwarding functions and features such as VLAN and IGMP snooping.
 - ▶ The packet forwarding rate (throughput) is measured in packets per second (pps). A sufficient forwarding rate is 1.4 Mpps per connection (gigabit). This corresponds to a forwarding rate for the entire switch of $1.4 \text{ Mpps} \times \text{the number of ports}$.
 - ▶ VLAN is needed to separate a physical network into logical sub-networks (see [Virtual Local Area Network \(VLAN 802.1Q\)](#)).
 - ▶ IGMP is an important feature of network multicast and is used to set up and manage memberships of hosts and routing devices in a multicast group.

Configuring Dante® network

Dante® devices use DHCP for addressing when available or will auto-assign an IP address in the 169.254.0.0/16 range on the network.

Dante® devices continue to look for a DHCP server even after auto-assigning an IP address. Most Dante® devices support static IP addressing.

1. Switch off the WiFi function on the PC via which you are carrying out the Dante® configuration.
2. Assign the connected LAN as a private network.
3. Make sure that all Dante® devices, including the PC running Dante Controller, are assigned to the same IP subnet by assigning IP addresses in the same subnet.



Managing Energy Efficiency Ethernet (EEE)

The EEE function reduces the power consumption of devices and is automatically managed by the switches.

This issue can result in poor synchronization performance and occasional audio dropouts.

1. Disable Energy Efficient Ethernet (EEE) or 'Green Ethernet' (IEEE 802.3az) on all ports used for Dante® traffic.



7. Ports and protocols

Control software ports

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

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

Ports

Port	Protocol	Service	Product
53	UDP	DNS	Translates domain names to IP addresses.
68	UDP	DHCP	Automatically assigns IP addresses to devices.
80	TCP	HTTP	Purely used for securely redirecting communication to port 443.
443	TCP	SSC Sound Control Protocol v2 (SSCv2)	Sennheiser Sound Control Protocol v2 is an HTTPS-based protocol used for control communication between the Control Application (Sennheiser Control Cockpit or 3rd Party Access) and the device.
443	TCP	Update	Used for updating the device firmware.
443	TCP	MQTT	HTTPS based protocol, used for the control communication between the control software (Sennheiser DeviceHub) and the device.
5353	UDP	mDNS (Multicast 224.0.0.251)	mDNS (Multicast 224.0.0.251) is used by Sennheiser Control Cockpit to discover devices. You can disable this port in the Control Cockpit web interface and add devices manually instead.
28800, 28700-28708, 38800, 38700-38708, 14336-15359, 34336-34600, 4440, 4444, 4455, 24440, 24441, 24444, 24455, 4777, 8850, 28900,	UDP	Dante®	For more information about Dante® ports, please refer to the Audinate website .



Port	Protocol	Service	Product
24445, 8850, 38900, 8899, 8000, 8001, 8002, 8029, 8751, 8800, 61440-61951, 123, 8702, 69, 6969, 9005, 67, 6700			
4777, 8028, 8753, 4778, 443, 80, 8001, 8443, 8081, 27017	TCP	Dante®	For more information about Dante® ports, please refer to the Audinate website .
4321, 5004, 319, 320, 5353, 8700-8708, 9998, 9875	TCP/ UDP	Dante®	For more information about Dante® ports, please refer to the Audinate website .
n/a	ICMP	Ping	Error messages and operational information.



Dante® ports

To set up a Dante network, defined port information is required.

Please extract all required ports directly from the website: [Dante® network ports](#).



8. Trouble shooting

Device error codes

Unexpected errors may occur when updating device firmware via the control software.

You can identify the problem using error codes and solve it quickly with the recommended remedial steps.

Device Error Codes in Control Cockpit

0 **None**: The device is ready to be updated

1 **DeviceNotReady** : The device is not ready to be updated

- ▶ The device is not in the ‚Processing‘ update state and therefore cannot be updated.
- ▶ Please wait until the device is fully loaded (not grayed out in the Control Cockpit).

2 **CannotSetDeviceProperty** : The device is not ready to be updated

- ▶ The device could not enable the update property.
- ▶ Please check the connection to the device.

3 **DeviceReportsError** : Update error

- ▶ The device reports an update error.
- ▶ Please read the error message and react accordingly / contact the Sennheiser support.

4 **NoDeviceReaction**: Error after image upload

- The device does not react after firmware image upload.
- Please check the connections / contact the Sennheiser support.

5 **GeneralError**: General error

- ▶ A general error has occurred.
- ▶ Please check the connection and restart the device

