8 Linking Main Stations

This chapter describes how to link Main Stations. You can connect Main Stations directly using Ethernet or Fiber, or connect them over a LAN via Ethernet.

Main Station linking is achieved using interface modules fitted to the extension bay of the Main Station. There are two modules:

- Ethernet interface module (HLI-ET2). This module provides an Ethernet connection between Main Stations.
- Fiber interface module (HLI-FBS). This module provides a Fiber connection between Main Stations.

Each Main Station has four channels, and can connect up to 20 beltpacks.

Note: If you change the network topology between any two stations, you must reboot the stations.

Warning: Both ports are configured to bridge traffic from one port to the other in order to work in daisy-chain. Spanning Tree Protocol is not enabled on those ports, therefore do not connect them both to the same network.

8.1 Linking scenarios

Main Stations are connected together using CAT, CAT5e or CAT6 shielded cable. They can also be connected using fiber. There are various topologies that you can create. Some of these are illustrated below.

8.1.1 Linking two Main Stations with Ethernet

1) Insert an HLI-ET2 Ethernet interface module in each station. Use any of the three slots available.

   Note: Ensure that the Main Station is powered down before inserting modules.

2) Connect a regular Ethernet cable (for example, CAT5, CAT5e, CAT6, CAT6e) from one HLI-ET2 port on one station to one HLI-ET2 port on the other station.

3) Power up both stations. Verify that the green LED on each HLI-ET2 port is flashing.

4) Go to **Networking**->**Stations** menu on each station. You should see two entries on each screen indicating that each station properly sees itself and the other station.

5) Go to **Networking**->**Linking**->**Link** Station menu on each station and select **Enabled**. You now have an 8 channel system and can start assigning channels to Main Stations and Beltpacks.

Note: You should see a Link icon on the Main Station display.

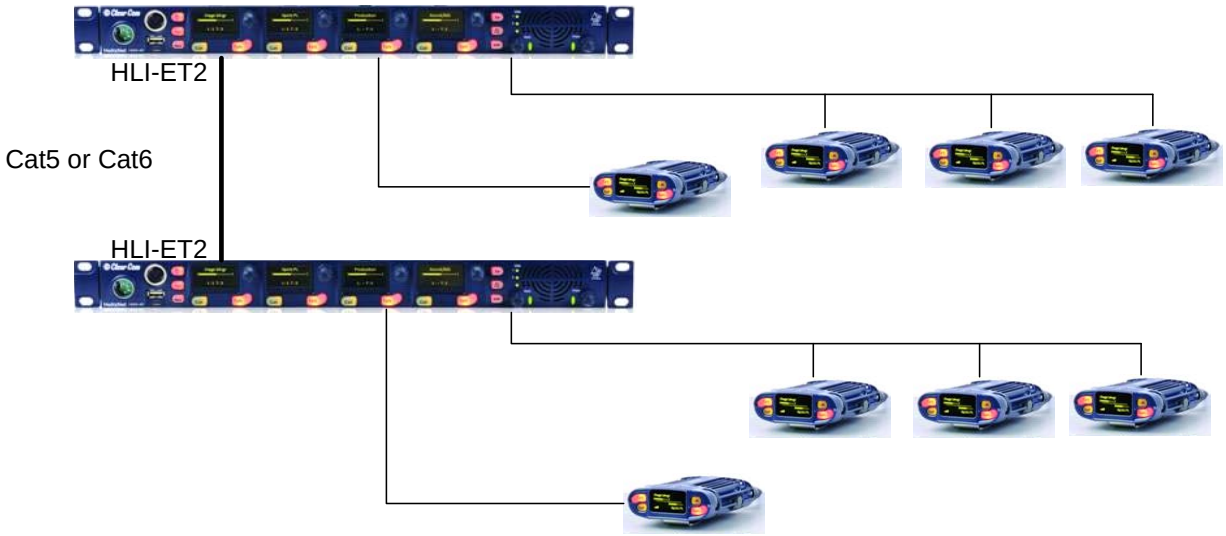

Figure 8-1: Linking two stations with Ethernet

8.1.2 Linking two Main Stations with Fiber

1) Insert an HLI-FBS Fiber interface module in each station. Use any of the three slots available.

   Note: Ensure that the Main Station is powered down before inserting modules.

2) Ensure that an SFP Transceiver is connected into one HLI-FBS module port on each station.

3) Connect Two Fibers from one HLI-FBS port on one station to one HLI-FBS port on the other station. If using Single connector fiber, make sure that Tx on one goes to Rx on the other.

4) Power up both stations. Verify that the green LED on each HLI- FBS port is flashing.

5) Go to **Networking**->**Stations** menu on each station. You should see two entries on each screen indicating that each station properly sees itself and the other station.

6) Go to **Networking**->**Linking**->**Link** Station menu on each station and select **Enabled**. You now have an 8 channels system and can start assigning channels to Main Stations and Beltpacks.

   Note: You should see a Link icon on the Main Station display.

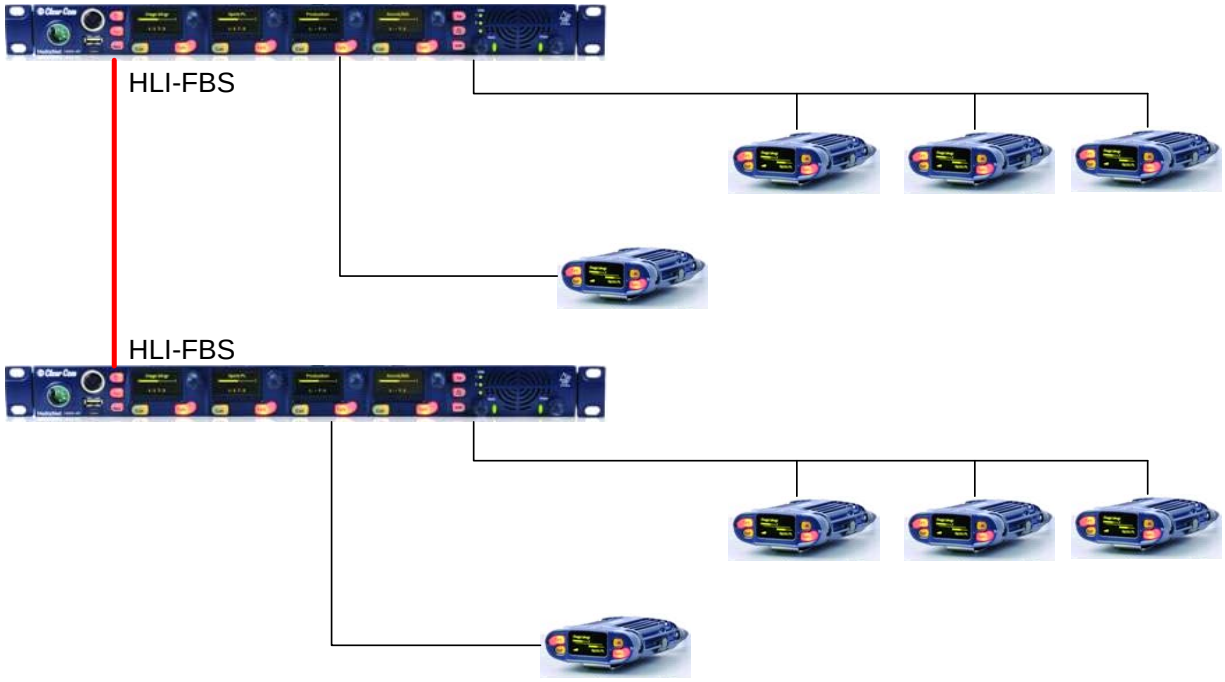

Figure 8-2: Linking two stations with Fiber

8.1.3 Linking three Main Stations in a daisy chain

You can daisy chain stations following all the instructions of the previous sections using the second port on one of the HLI-ET2 or HLI-FBS module to connect to a third station. Then enable linking on the third station. The advantage of daisy chain is that it does not require any additional equipment for interconnection. The disadvantage is that if you disconnect or power down a station in the middle it will break the chain and prevent audio from prevent audio from passing between the units either side of the break.

You can also mix Ethernet and Fiber in the chain using an additional slot in a station in the middle of the chain.

Alternatively, you can save a slot by using an HLI-FBS module in the middle station, populating one port with a fiber SFP transceiver and one port with a 10/100Base-T electrical SFP transceiver.

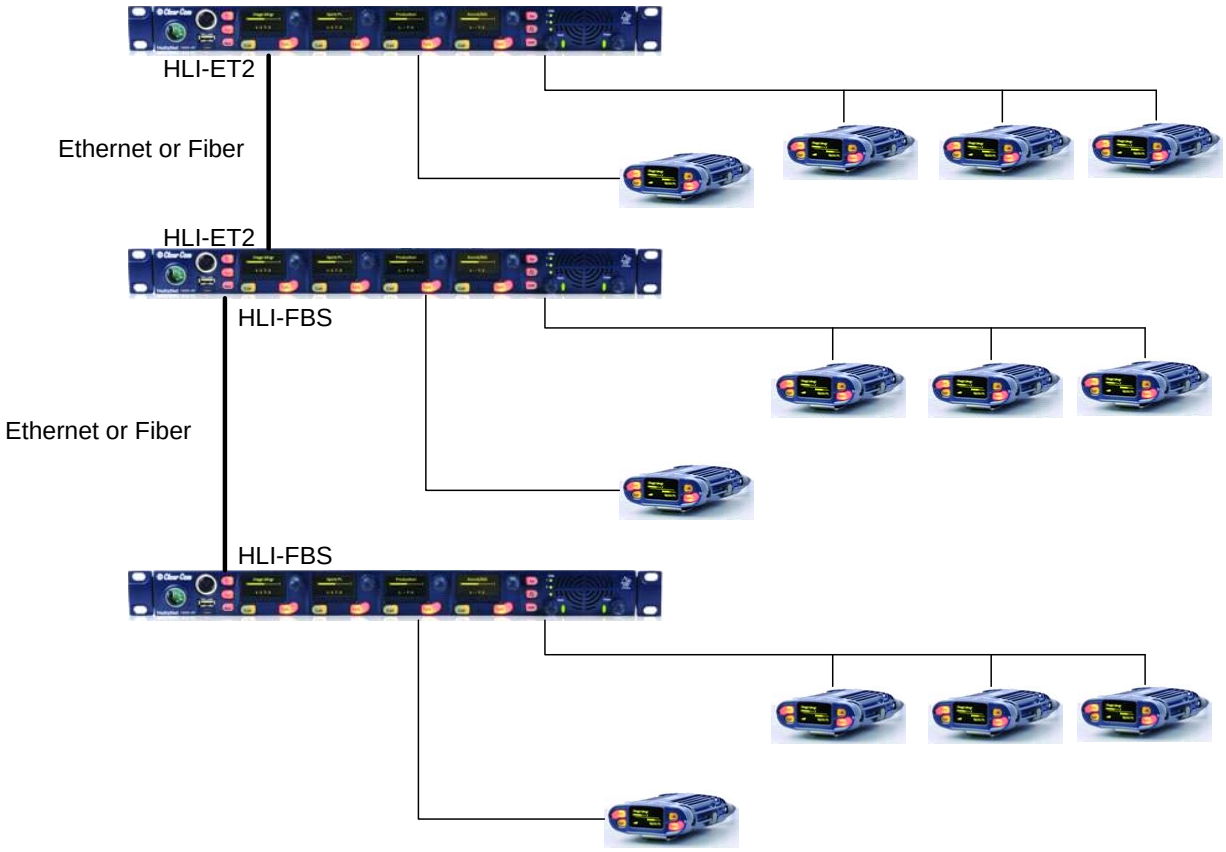

Figure 8-3: Linking three Main Stations in a daisy chain

8.1.4 Network connections

Connecting in an existing IP network requires planning with your IT department in order to plan the IP addressing scheme. By default HelixNet Main Station uses automatic IP addressing (DHCP) enabled. In order for that to work properly in an existing IP network there must be a DHCP server handing out IP addresses. If no DHCP server is found, a Main Station will revert to an unused link-local address in the 169.254.0.0/16 block.

Through the Networking menu you can disable DHCP and set static IP addresses. When you assign static IP addresses you need to make sure that the Main Stations you want to link together are part of the same subnet. The following figure shows an example of Static IP addresses and Subnet Mask that would work. For more information on IP addresses and subnets see http://en.wikipedia.org/wiki/Subnetwork.

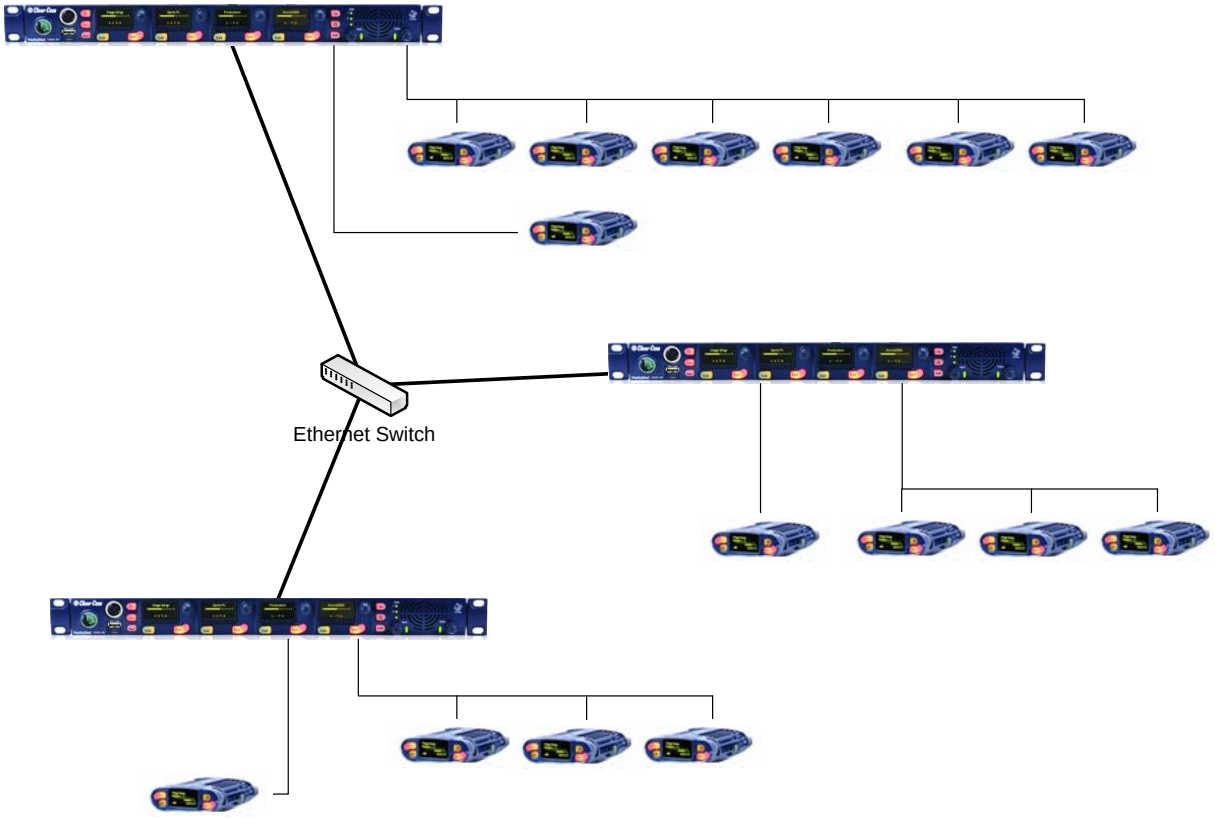

Figure 8-4: Network connections

8.1.5 Multiple Groups in the same IP Network

You can have multiple groups of Main Stations linked together. Each group must be part of a different subnet. Here is an example of IP addresses and subnets that would allow two independent groups of Main Stations in the same IP network.

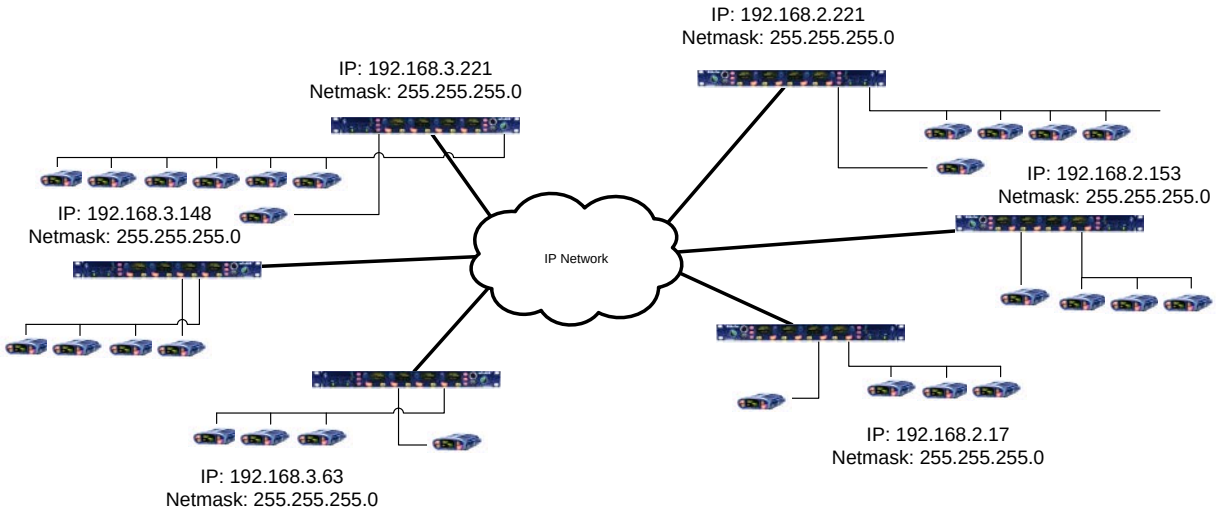

Figure 8-5: Multiple Groups in the same IP Network

Here the Subnet Mask is set to 255.255.255.0 indicating that a Subnet is identified by the first three numbers of the IP address. The three Main Stations on the left share the same 192.168.3.0 subnet prefix the three on the right share the same 192.168.2.0 subnet prefix. When powered up the three on the left would see each other (in the Networking->Stations menu), the three on the right see each other but one group cannot see the other. When linking is enabled on all, you would end up with two 12-channels systems, one in the 192.168.2.0 subnet and one in the 192.168.3.0 subnet all working on the same IP infrastructure.

8.1.6 Resource Sharing between Linked Stations

The number of partyline channels available in your system will increase by 4 for each Main Station linked together. At the moment of linking, channels with exactly the same name will merge their audio together then only one will remain. When that happens, an additional channel name will be automatically generated (Ch 98798E-b in the following example).

Once linked, each Main Station still “owns” 4 channels. When a station is disconnected or powered down, a broken link icon will appear on the remaining Main Station displays. The names of the channels owned by that station will go *Italic.*

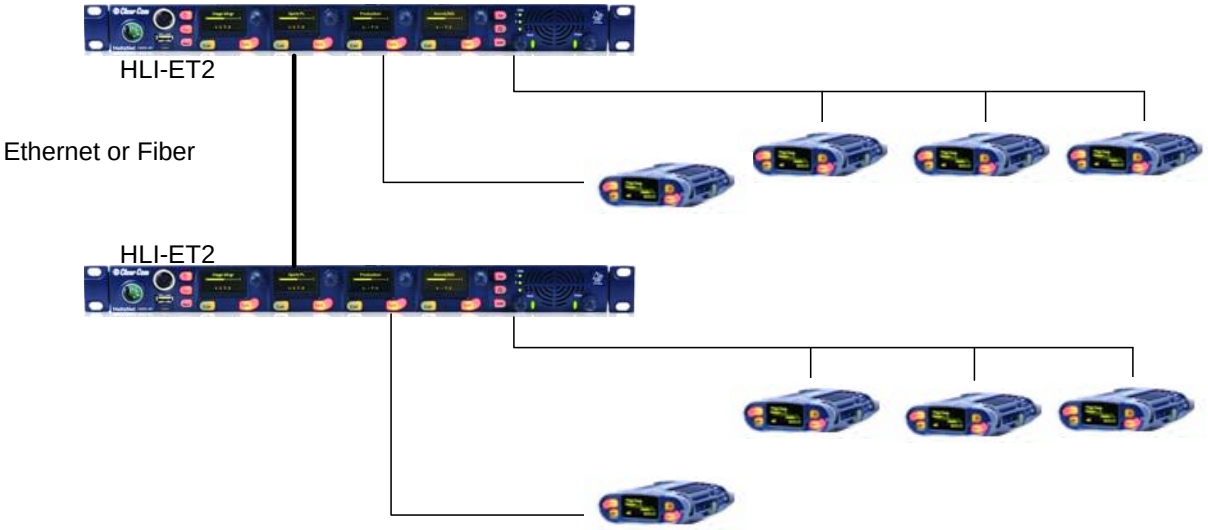

Figure 8-6: Resource sharing between linked stations

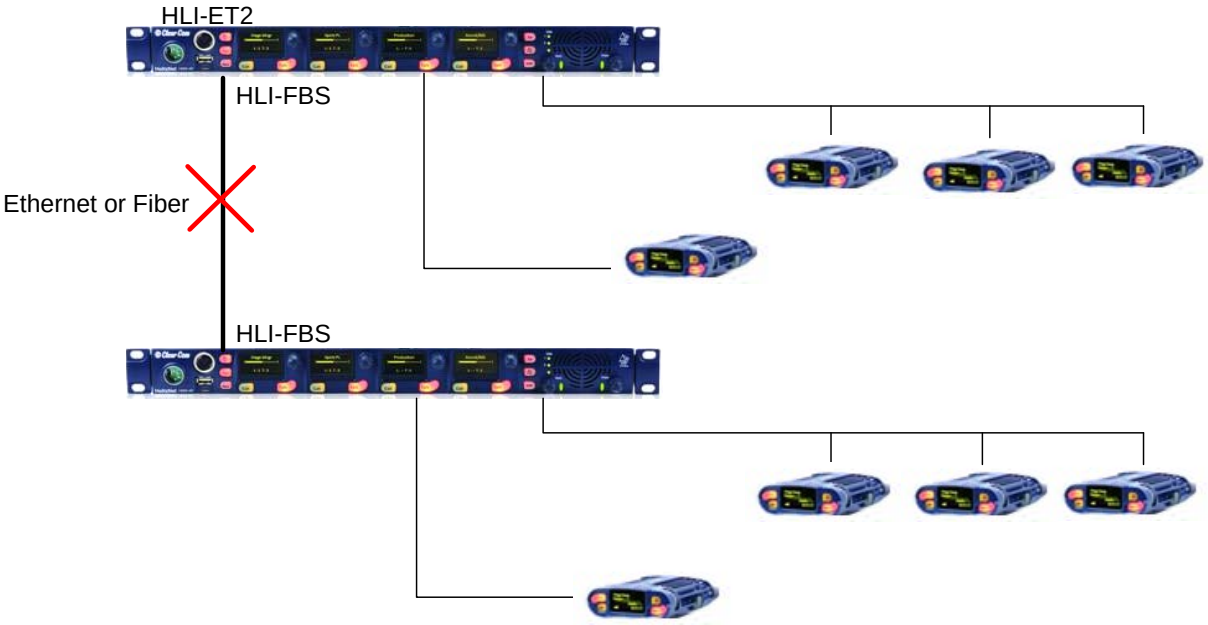

Figure 8-7: Resource sharing between unlinked stations

The following tables show how the labels appear before and after linking.

Channel number	Station 1 Labels	Station 2 Labels
1	Sound	Lighting
2	Stage	Stage
3	LD Private	Director
4	Spots	SPOTS

Table 8-1 Labels before enabling linking

Channel number	Station 1 Labels	Station 2 Labels	Linked Network Label	
1	Sound		Sound	“Owned” by Station 1
2	Stage	Stage	Stage	
3	LD Private		LD Private	
4	Spots		Spots	
5		Lighting	Lighting	“Owned” by Station 2
6			Ch 98798E-b	
7		Director	Director	
8		SPOTS	SPOTS	

Table 8-2 Labels after enabling linking

Labels after link is severed

Channel number	Station 1 Labels	Station 2 Labels	Linked Network Label
1	Sound	Sound	“Owned” by Station 1
2	Stage	Stage	
3	LD Private	LD Private	
4	Spots	Spots	
5	*Lighting*	*Lighting*	“Owned” by Station 2
6	*Channel 6*	*Channel 6*	
7	*Director*	*Director*	
8	*SPOTS*	*SPOTS*	

Table 8-3 Labels after link is severed

8.2 Networking Specifications

Specification	Value
Latency on Powerline	40-80ms (Depends on cable type and length, and how many devices are connected. The greater the number of devices, the greater the latency.)
Latency over IP Network	30ms + Network Latency (Main Station to Main Station)
Bandwidth used	300 kbps per active Talker, for a maximum of 1 talker per device in the system Each Beltpack and Speaker Station counts as 1 device Each Main Station and Remote Station counts as 2 devices
IP version	IPv4

Table 8-4 Networking specifications